

# Microsoft Power Automate documentation

Discover how to make the most of Power Automate with online training courses, docs, and videos covering product capabilities and how-to articles. Learn how to quickly create automated workflows between your favorite apps and services to synchronize files, get notifications, collect data, and more.



GET STARTED  
[What is Power Automate?](#)



WHAT'S NEW  
[What's new in Power Automate?](#)



TRAINING  
[Power Automate training](#)



CONCEPT  
[Troubleshoot](#)

## Create and design

### Try/Buy

[Try Power Automate](#)

[Buy Power Automate](#)

### Create flows

[Create automated flows](#)

[Create scheduled flows](#)

[Create desktop flows](#)

### AI copilot capabilities

[Copilot in cloud flows](#)

[Copilot in Process Mining](#)

[Copilot in desktop flows](#)

### Plan with the process mining capability

[Understand your processes and identify opportunities with process mining](#)

[Dig into the details with Power Automate Process Mining](#)

### Use solutions

[Use solutions to distribute flows](#)

[Create a cloud flow in a solution](#)

### Integrate with other products

[Use flows in Teams](#)

[Build SharePoint workflows](#)



Streamline workflows and identify inefficiencies with task

### Best practices guidance

Plan a Power Automate project

Manage, govern, and scale adoption with the Automation Kit

Apply best practices for automation adoption

Implement healthy application lifecycle management (ALM) using solutions

Send email, schedule meetings, add contacts, and more

## Administer and extend

### Administer Power Automate

Use the Power Platform admin center

Administer environments and resources

Set up data loss prevention policies

### Extend Power Automate

Enterprise developer, ISV, and partner guide

Work with cloud flows using code

Work with desktop flows using code

Build and certify custom connectors

## Use

### Use flows with Dataverse

Add a row

Delete a row

Upload or download files and images

### Use flows with...

Teams

SharePoint

Email

Forms

Approvals

### Use business process flows

Understand business process flows

Create a business process flow

Add custom controls in business process flows

Apply best practices for using business process flow columns

## Related content

Power Platform

Power Apps

Power BI

One-stop learning resource for Power Platform applications and features, with admin, developer, and guidance...

Quickly build low-code apps that modernize processes and solve tough business challenges in your organizati...

Turn your unrelated sources of data into coherent, visually immersive, and interactive insights.

### **Power Pages**

Design, host, and administer secure, modern, and low-code business websites.

### **Dynamics 365**

Empower your organization with the next generation of CRM and ERP applications.

### **Microsoft Azure**

Learn how this ever-expanding set of cloud computing services can help your organization meet its busines...

# Overview of the different types of flows

Article • 06/13/2023

Power Automate is a service that you can use to automate repetitive tasks to bring efficiencies to any organizations.

You can create [cloud flows](#), [desktop flows](#), or [business process flows](#).

Check out this video about the different types of flows.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKUwZ?postJsllMsg=true> 

## Cloud flows

Create a cloud flow when you want your automation to be triggered either automatically, instantly, or via a schedule.

Flow type	Use case	Automation target
<a href="#">Automated flows</a>	Create an automation that is triggered by an event such as arrival of an email from a specific person, or a mention of your company in social media.	<a href="#">Connectors</a> for cloud or on-premises services connect your accounts and enable them to talk to each other.
<a href="#">Instant flows</a>	Start an automation with a click of a button. You can automate for repetitive tasks from your Desktop or Mobile devices. For example, instantly send a reminder to the team with a push of a button from your mobile device.	Wide range of tasks such as requesting an approval, an action in Teams or SharePoint.
<a href="#">Scheduled flows</a>	Schedule an automation such as daily data upload to SharePoint or a database.	Tasks that need to be automated on a schedule.

## Desktop flows

Use [desktop flows](#) to automate tasks on the Web or the desktop.

## Business process flows

[Business process flows](#) provide a guide for people to get work done. They provide a streamlined user experience that leads people through the processes their organization has defined for interactions that need to be advanced to a conclusion of some kind. This

user experience can be tailored so that people with different security roles can have an experience that best suits the work they do.

## See also

- Read guidance to [determining which automation method \(flow type\) to use](#)
- Get started with [cloud flows](#).
- Get started with [desktop flows](#).
- Get started with [business process flows](#) in conditions in advanced mode.

# Sign up and sign in for Power Automate

Article • 06/22/2023

Starting with Power Automate, as an individual, is easy! Before you can create a cloud flow, sign up by using any email address. If you've never used an online Microsoft product with that address, you'll need to take a few moments to register it.

## Sign up free

If you haven't used other online Microsoft products, you'll need to sign up.

1. In [Power Automate](#), select **Try free** in the upper-right corner.
2. Enter your email address.
3. Select the right arrow.

## Sign in

If you've used other Microsoft online products, either for work or yourself, all you need to do is sign in.

1. In [Power Automate](#), select **Sign in** in the upper-right corner.
2. On the sign-in page, enter your email address and password.
3. After you've signed in, you'll see a product consent dialog that asks you to consent to the [Microsoft Online Subscription Agreement](#), and asks you to sign up for marketing and promotional emails from Power Automate. If you agree to the terms and conditions, you'll be able to start using Power Automate.

## Use paid features

Anyone can sign up and get a free plan for Power Automate. If your organization has purchased Microsoft 365 or Dynamics 365, you may already have access to Power Automate. You can also start a 90 day free trial, or purchase a Power Automate license if you want to use the paid features. [Learn more about billing](#).

For administration information, go to [Flows in your organization Q&A](#).

## Troubleshooting

In many cases, you can register for Power Automate by following the simple process described previously in this topic. However, this table summarizes the most common reasons why you might not be able to sign up, and describes available workarounds.

Symptom / error message	Cause and workaround
<p><b>No Microsoft account created yet</b></p> <p>You receive a message after entering your email during signup:</p> <p><i>That Microsoft account doesn't exist. Enter a different account or get a new one.</i></p>	<p>You signed up with an email that doesn't yet have a Microsoft account created for it. Select the <b>Sign up now</b> link on that page and you'll be able to create a new Microsoft account for your email. You can use your existing email to create a Microsoft account.</p>
<p><b>.gov or .mil email addresses</b></p> <p>You receive a message like the following during signup:</p> <p><i>Power Automate unavailable: Power Automate is not available for users with .gov or .mil email addresses at this time. Use another work email address or check back later.</i></p>	<p>You cannot currently sign up for Power Automate with a .gov or .mil address. Instead, you can sign in with any Microsoft Account email address such as a @outlook.com address.</p>
<p><b>Self-service signup disabled</b></p> <p>You receive a message like the following during signup:</p> <p><i>We can't finish signing you up. Your IT department has turned off signup for Power Automate. Contact them to complete signup.</i></p> <p>or</p> <p><i>We can't finish signing you up. It looks like Microsoft Power Automate isn't currently available for your work or school.</i></p>	<p>You have selected <b>Sign up</b> instead of <b>Sign in</b>. If you select <b>Sign in</b> in the top of the home page you will be able to access Power Automate.</p>

Symptom / error message	Cause and workaround
<p><b>Email address is not an Office 365 ID</b></p> <p>You receive a message like the following during signup: <i>We can't find you at contoso.com. Do you use a different ID at work or school? Try signing in with that, and if it doesn't work, contact your IT department.</i></p>	<p>Your organization uses IDs to sign in to Office 365 and other Microsoft services, and those IDs differ from your email address. For example, your email address might be Nancy.Smith@contoso.com, but your ID might be nancys@contoso.com. To complete signup, use the ID that your organization has assigned to you for signing in to Office 365 or other Microsoft services.</p>

## Next steps

- [Start with a template](#), which is a prebuilt flow that's set up for you.
- [Start from blank](#), if you already have a process in mind and can't find a template for it.
- Get help planning your [cloud flow project](#).

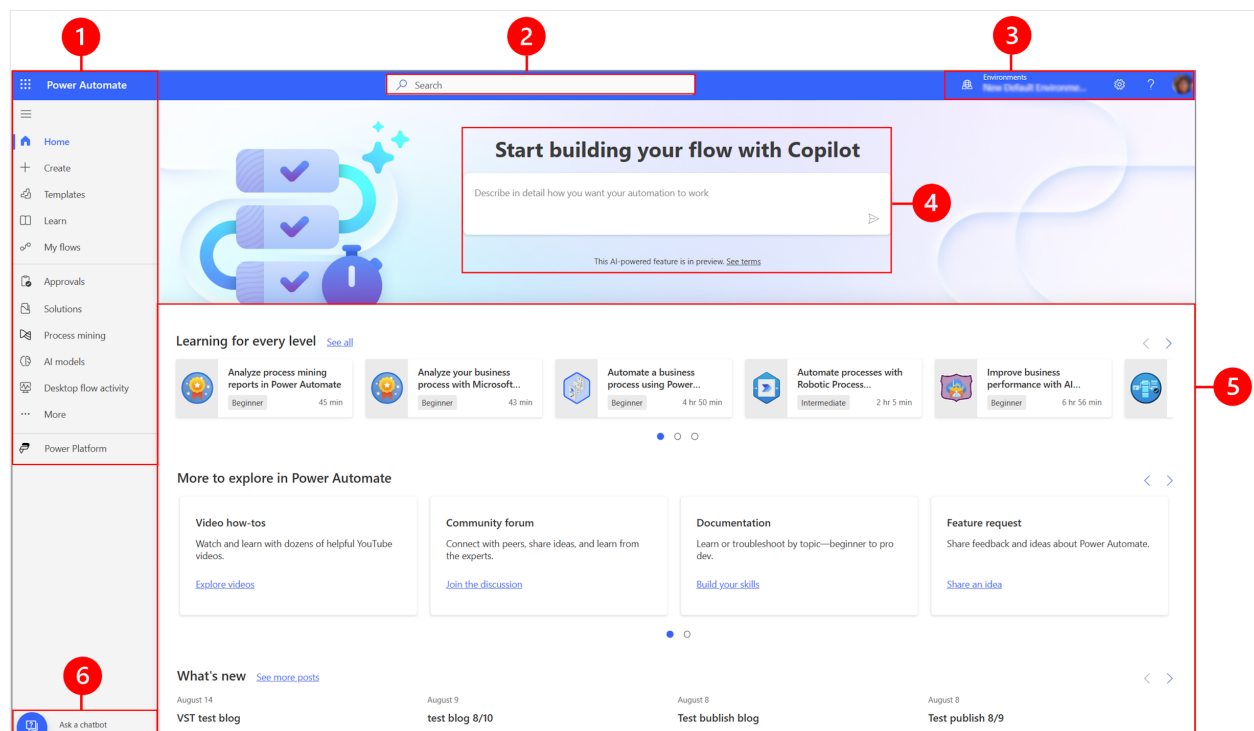
# Get started with Power Automate

Article • 11/15/2023

The Power Automate home page offers you various options for creating your own flows and learning about the key features for Power Automate. You can get a quick sense of what's possible and how Power Automate can help your business.

If your organization has AI enabled, then it also includes the new Copilot features.

To learn more, select the links below.



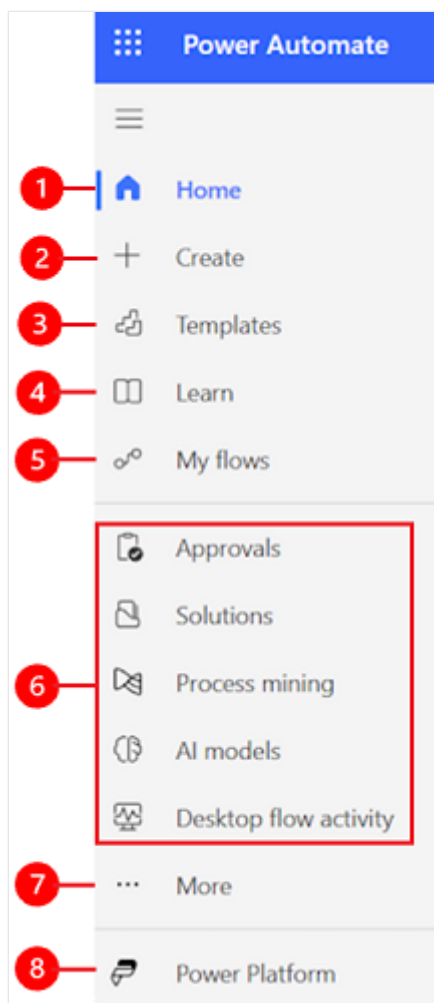
Legend:

1. Left navigation pane
2. Search
3. Environment information and settings
4. AI Copilot
5. Learning tools and more
6. Ask a chatbot

## 1 – Left navigation pane

Find what you need with the left navigation pane. When you sign in to [Power Automate home page](#), the left navigation pane shows the following menu items:







Legend:

1. **Home:** Takes you to the Power Automate home page.
2. **Create:** Create flows by using Copilot, templates or build your own.
3. **Templates:** View and search for templates you can use to create flows.
4. **Learn:** Learn experience takes you to the Power Automate product documentation.
5. **My Flows:** If you've created a flow, or someone else has created one and shared it with you, you can view or edit it.
6. **Your most used pages:** When you first sign in, items such as **Approvals**, **Solutions**, **Process mining**, **AI models**, and **Desktop Flow Activity** appear in the left navigation menu by default. Use the **More** menu item to [unpin](#) any of these items and [pin](#) something else.
7. **More:** [Pin](#) your most used items to the left navigation pane, such as **Tables**, **Cloud flow activity**, **Connections**, and more.
8. **Power Platform:** Explore other Power Platform products.

## Pin and unpin

Pin your most used pages in the navigation pane so you can quickly access features that you use frequently. Links to other pages are available through the **More** menu item. When you pin an item, it appears in the middle section above **More**.

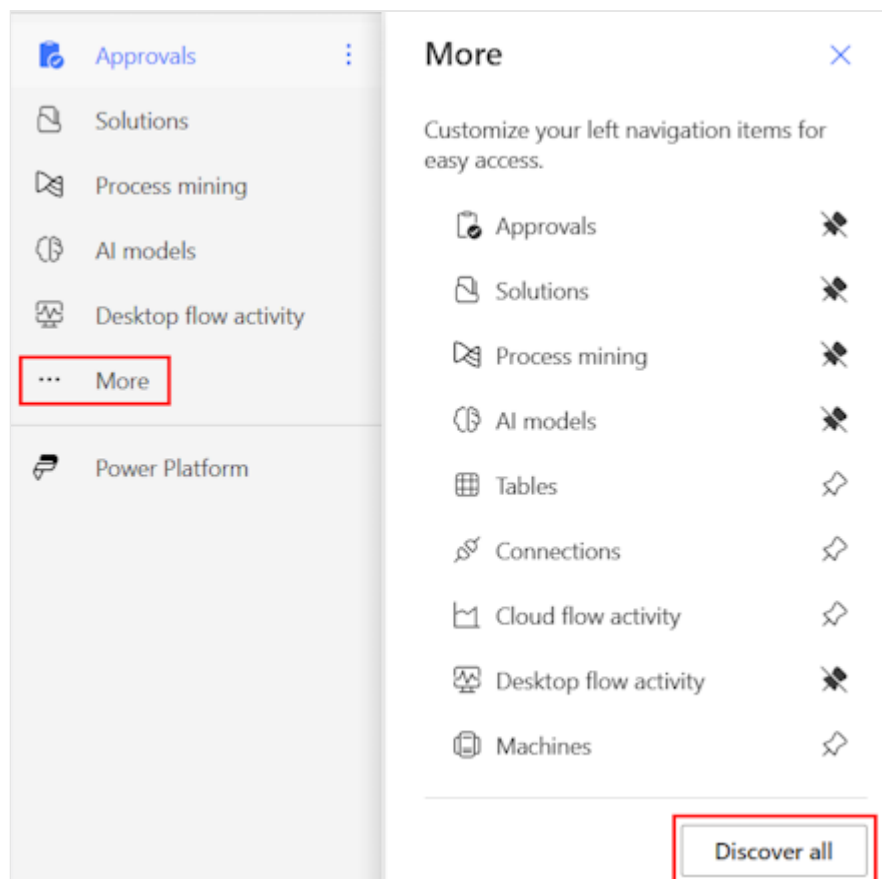
When you sign in, the left navigation pane contains **Templates, Approvals, Solutions, Process mining, AI models, and Desktop Flow Activity**. However, you can pin and unpin pages to customize it to your preference.

To pin or unpin an item from the left navigation pane, select **More**, and then select the  pin button or  unpin button.

You can also unpin an item by selecting the vertical ellipsis (:) next to the item > **Unpin**.

## Discover all

Select **Discover all** to see the **Discover** page on the left navigation pane.

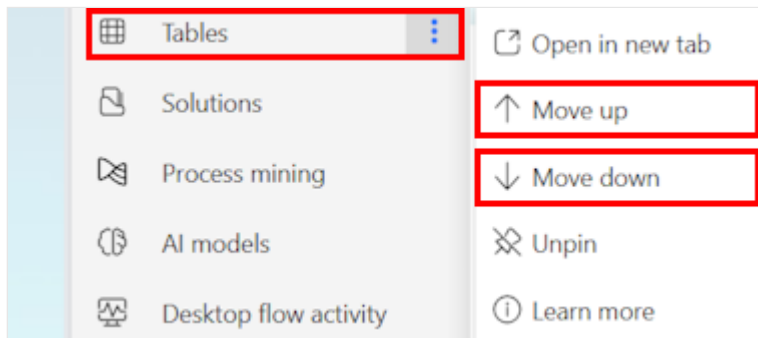


To keep it pinned, select the  pin button.

## Move up or move down

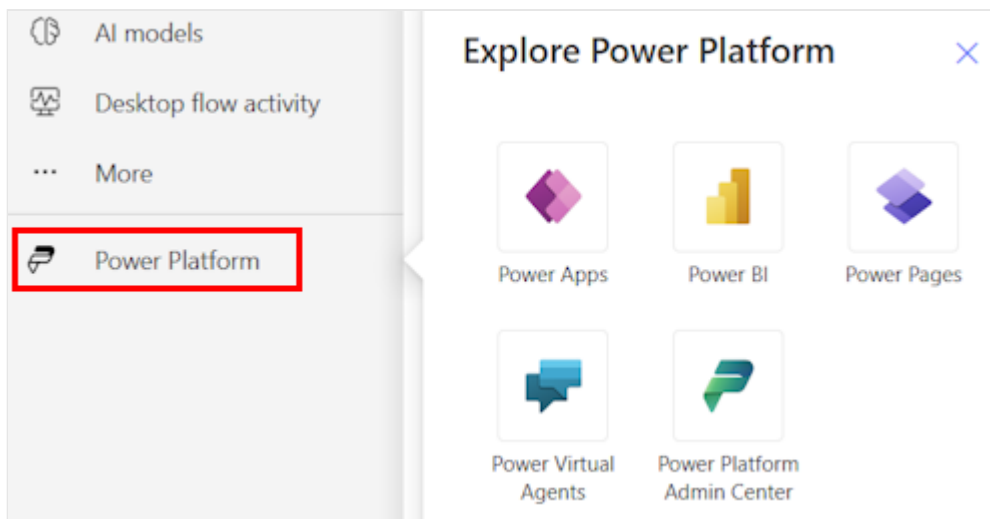
When you have some pages pinned in the navigation pane, you can move them up or down.

To move a page up or down, select the vertical ellipsis (:) next to the menu item that you want to move, and then select **Move up** or **Move down**.



## Power Platform

From the left navigation pane, select **Power Platform** to access Power Platform services such as Power Platform admin center, Power BI, and Power Apps.



## 2 – Search

Use the **Search** field at the top of the screen to create flows.

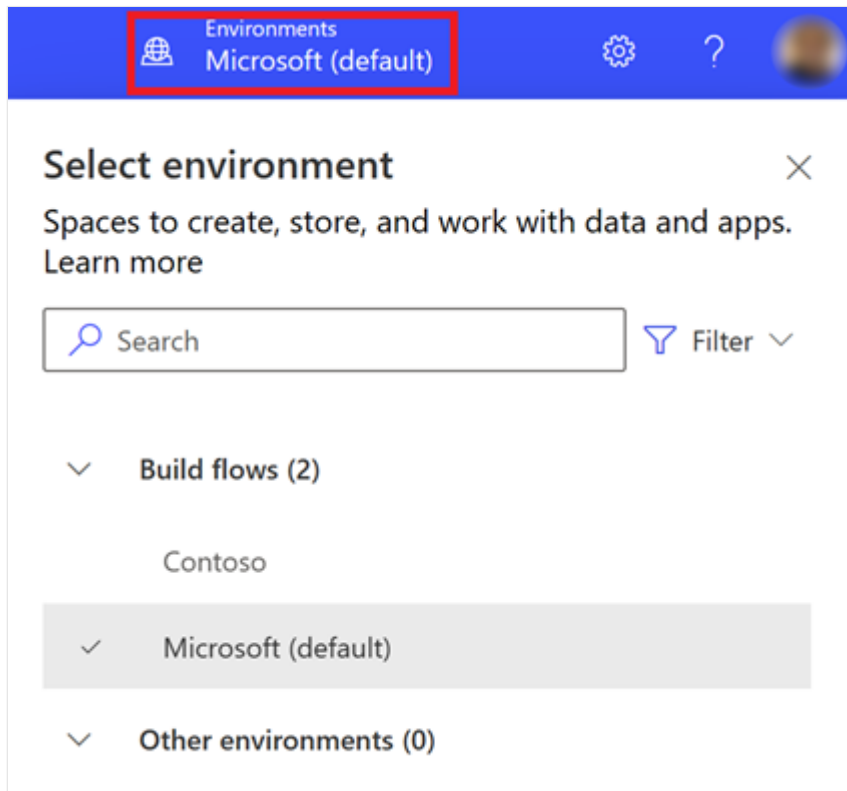
## 3 – Environment information and settings

View your environment information and settings.

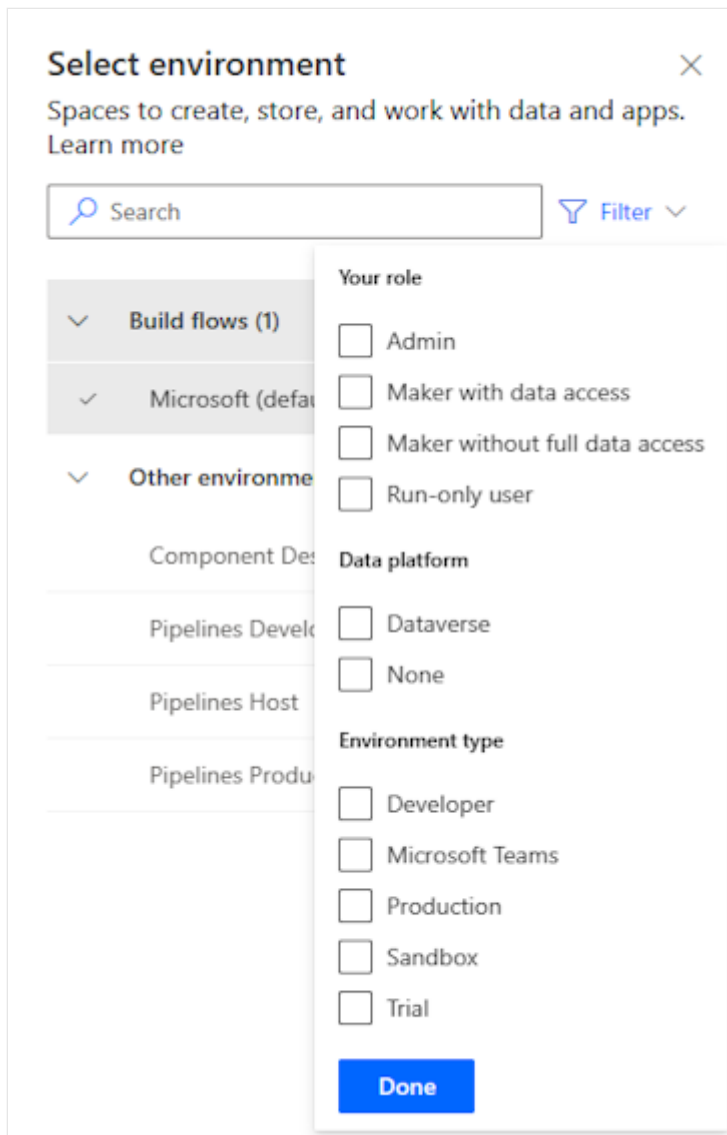
### Choose an environment

Environments create boundaries between different types of work. For example, an organization might have separate environments for different departments. Many organizations use environments to separate flows that are still being developed from those that are ready for widespread use. You might have access to multiple environments or only one. If you have the appropriate permissions, you might even be able to create your own environments.

To verify which environment you're in, find the environment switcher near the right side of the header.



With the environment selector, environments are grouped into two categories: **Build Flows** and **Other environments**. Select **Filter** to filter the list of environments by your role, data platform (Dataverse or none), and environment type, such as production or sandbox.



Environments where you have either system administrator and/or system customizer security role membership appear under **Build flows**. The **Other environments** list displays environments where you have read-only permissions, and can access approvals.

### 💡 Tip

Hover over an environment in the list to view the details of the environment.

### Filter environments by role

Filter role	Power Platform role or description
Admin	System administrator
	Environment administrator
Maker with data access	System administrator
	System customizer

Filter role	Power Platform role or description
Maker without full data access	Environment maker (with or without Dataverse)
Run only user	User without maker-level access

### ⓘ Note

- To view the environment list in the environment switcher in Power Automate, you must have the Environment Maker, System Customizer, or System Administrator security role in the environment. For information about predefined security roles, see **Predefined security roles** in the Microsoft Power Platform admin guide.
- Make sure that you're in the correct environment *before* you create a flow, an app, or a similar component. You can't easily move components from one environment to another.
- Every member in an organization can access the **default environment**. Like any environment, users can see flows where they have sufficient privileges to access a flow.
- When you create a flow in one environment, you won't be able to see it from another environment.

For more information, see [Environments overview](#)

## Frequently asked questions about environments

### Why does Power Automate show different environments compared to Power Apps?

Power Automate and Power Apps will both show environments with administrator access and environment maker access.

Power Apps will show environments with app contributor access, when users without a maker-level security role assigned but with edit permission to at least one canvas app in the environment. More information: [Choose an environment in Power Apps](#)

Power Automate will show environments user can approve approvals. User will be granted read access to environments have approvals.

Since approvals are frequently used in Power Automate, users could have read access to many environments.

## How do I get access to environments?

You can view access in the Power Platform admin center, by logging in using an account with environment administrator permissions. If you don't have administrator privileges, contact your administrator to obtain access.

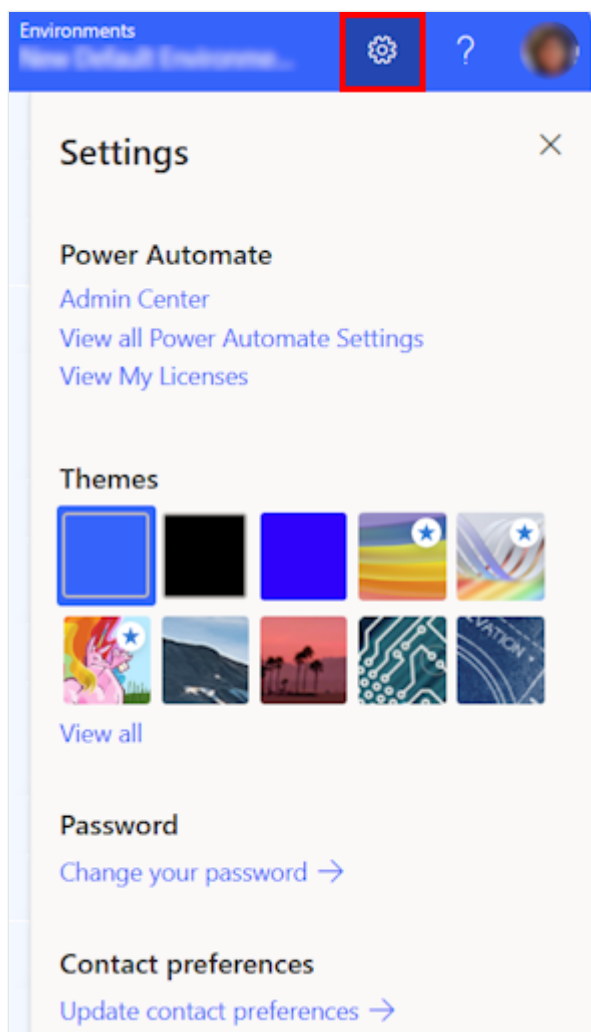
Once in admin center, select the **Users** and **Teams** options under the access panel, environment admin could find everyone/teams has access to the environment. Environment admin could also change the security roles for a particular user.

More information: [Manage environments in Power Platform admin center](#).

## Settings

Select the gear icon to perform tasks such as identify your Power Automate licenses, and open the page where you can perform administrative tasks.

- **Admin Center:** Opens the Power Platform admin center.
- **View all Power Automate Settings:** View or update your language and time settings, notifications, or access directories.
- **View My Licenses:** View your licenses. To learn more, go to [Licensing overview for Microsoft Power Platform](#).
- **Themes:** From the list of themes, select a theme for your organization.
- **Password:** Change your password.
- **Contact preferences:** Update your contact information.



## Help

In the header, select the question mark icon to find more information about Power Automate.



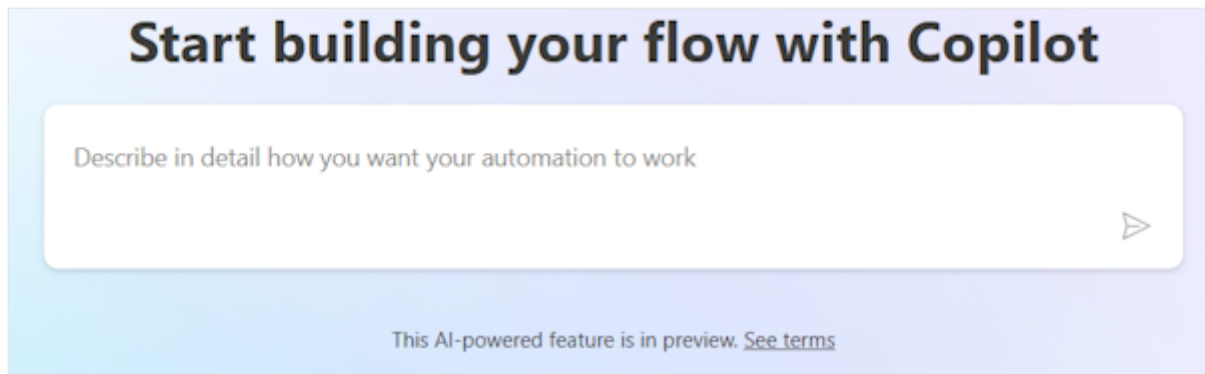
Here are some examples of what you can find with the help feature:

- Find links to documentation.
- Browse the Power Automate training on Microsoft Learn.
- Access the Power Automate Community, where you can share information with users in other organizations.
- Get announcements on the newest features in the Power Automate blog.

## 4 - AI Copilot

If your organization has AI enabled, then you see **Start building your flow with Copilot** on the Power Automate Home screen.





To learn more, go to [Get started with Copilot in Power Automate \(preview\)](#).

## 5 – Learning tools and more

The Home page gives you access to learning tools, videos, community forums, and more. Scroll down the screen to view all the product related tools.

Here's the list of the main categories:

- **Learning for every level:** Discover learning modules you can take to learn how to use Power Automate.
- **More to explore in Power Automate:** Discover all that Power Automate has to offer such as video how-tos and the Power Automate Community forum.
- **What's new:** Learn about upcoming events as well as new and updated product features.

## 6 - Ask a chatbot

Get contextual help while building your flow using the Power Platform virtual agent. To learn more, go to [Get contextual help with flows from the Power Virtual Agents bot](#).

# Copilot in Power Automate

Article • 06/21/2024

Copilot in Power Automate accelerates your journey to adopting automation and transforming your processes. It enhances these scenarios by using the instructions you give Copilot written in natural language to surface possible solutions that can achieve desired results. Copilot stays with you all the way during creation to guide you through your entire process.

Use the following sections to learn how to use Copilot features in Power Automate.

## Copilot in cloud flows

Copilot in cloud flows allows you to create automation that helps streamline your workflow through quick and easy natural language expressions. You can create a flow by describing what you need through multiple steps of conversation.

- [Create a flow using the cloud flows designer with Copilot](#)
- [Get contextual help with flows from the Microsoft Copilot Studio bot](#)
- [Use flows as plugins in Copilot for Microsoft 365 \(preview\)](#)

## Copilot in Process Mining

Copilot in Process Mining *ingestion* navigates you through the ingestion experience in Process Mining. Copilot in Process Mining process *analytics* helps you generate process insights through natural language. Copilot can then take the data you collected and easily summarize findings from it quantitatively and qualitatively.

- [Copilot in Process Mining ingestion \(preview\)](#)
- [Copilot in Process Mining process analytics \(preview\)](#)

## Copilot in desktop flows

Copilot in desktop flows allows you to analyze desktop flow activity. With this analysis, you can democratize access to insights by asking Copilot activity-specific questions using natural language.

- [Use Copilot to analyze desktop flow activity \(preview\)](#)
- [Use the Power Automate plug-in for Windows Copilot \(preview\)](#)
- [Use Copilot to get answers to product-related questions](#)

# Copilot in automation center

Copilot in automation center enables makers, business analysts, and members of the Center of Excellence team to easily retrieve information about past flow runs, work queue performance, and general product features. You can get this information by asking questions in natural language.

- [Copilot](#)
- [Use Copilot to analyze automation activity and ask product questions \(preview\)](#)

## Enable or disable Copilot in Power Automate

If a region has GPUs (UK, Australia, US, India), we turn on Copilot by default. In this scenario, an admin needs to contact support and they'll use a PowerShell script to turn it off only at tenant level. Environment level support isn't available. If a region doesn't have GPUs (everywhere else except sovereign clouds), we turn on Copilot by default by toggling on the cross-geo data sharing. In this scenario, if you want to disable Copilot, you can toggle off the cross-geo data sharing in Power Platform admin center at the tenant level.

To learn more, go to [Availability by region](#).

## Related information

- [Responsible AI FAQs for Power Automate](#)
- [Understand the cloud flows designer](#)
- [Troubleshoot in Copilot](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# What's new in Power Automate?

Article • 05/22/2023

This article provides resources that you can use to learn about the features that have been released recently, features that will be released soon, and known issues.

## Weekly releases

For information about the new features, fixes, and improvements that were released in the past few weeks, see [Released versions for Microsoft Power Automate](#).

### ⓘ Note

Releases are rolled out over several days. New or updated functionality might not appear immediately.

## Release plans

Get familiar with upcoming features and plan your deployments by reading the [2023 release wave 1 plan](#).

## Preview and Experimental features

Get early access to functionalities and updates before they are available worldwide through [Preview features](#) [↗](#) and [Experimental features](#).

## See also

[Power Platform release plans](#)

# Create and manage flows in Power Apps

Article • 12/16/2022

Your Power Automate license also gives you rights to create and manage flows in Power Apps. Here are the ways you can do this in Power Apps.

- Through [Power Apps](#). After you sign in to Power Apps, select **Flows** in the left navigation pane.
- Through [Power Automate pane](#) within Power Apps Studio.

Check out the Power Automate [Get started guide](#) to create your first flow.

## Related topic

[What is Power Apps?](#)

# Overview of cloud flows

Article • 02/01/2024

Create a cloud flow when you want your automation to be triggered either automatically, instantly, or via a schedule.

This video gives an overview of cloud flows.

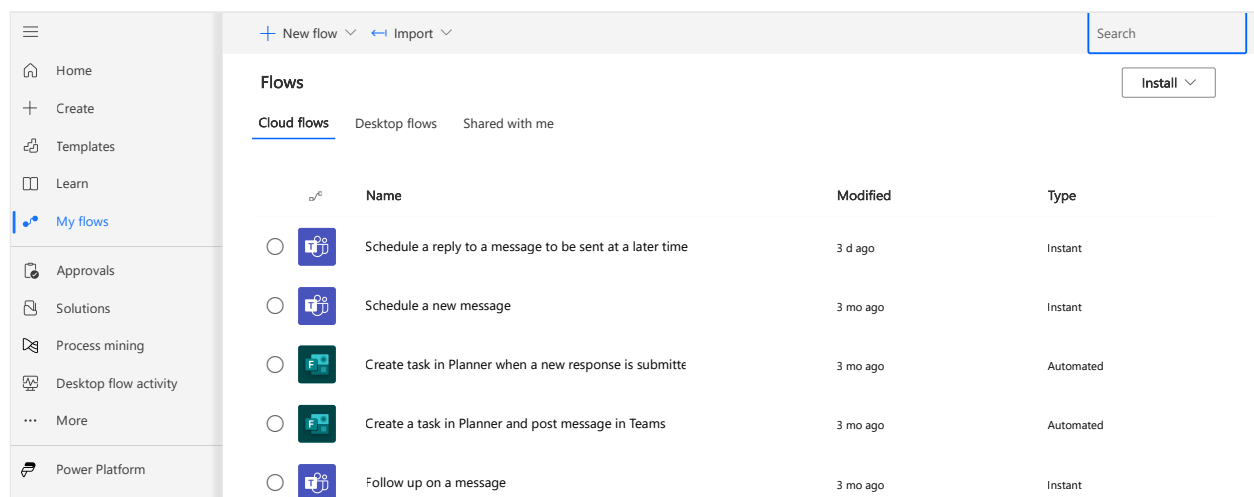
<https://www.microsoft.com/en-us/videoplayer/embed/RWL2mo?postJsIIlMsg=true>

 Expand table

Flow type	Use case	Automation target
<a href="#">Automated flows</a>	Create an automation that is triggered by an event such as arrival of an email from a specific person, or a mention of your company in social media.	<a href="#">Connectors</a> for cloud or on-premises services connect your accounts and enable them to talk to each other.
<a href="#">Instant flows</a>	Start an automation with a click of a button. You can automate for repetitive tasks from your desktop or mobile devices. For example, instantly send a reminder to the team with a push of a button from your mobile device.	Wide range of tasks such as requesting an approval, an action in Teams or SharePoint.
<a href="#">Scheduled flows</a>	Schedule an automation such as daily data upload to SharePoint or a database.	Tasks that need to be automated on a schedule.

## Find your flows easily

You might have a need to find a flow within a large number of flows. Finding your flows is easy—just use the search box on the **Cloud flows**, **Desktop flows**, or **Shared with me** tab to display only flows that match the search terms you enter.



The screenshot shows the Microsoft Power Automate interface. On the left is a navigation sidebar with options like Home, Create, Templates, Learn, My flows (selected), Approvals, Solutions, Process mining, Desktop flow activity, More, and Power Platform. The main area displays a list of flows under the 'Flows' heading, with tabs for 'Cloud flows', 'Desktop flows', and 'Shared with me'. A search box is visible in the top right. The list of flows includes:

Name	Modified	Type
Schedule a reply to a message to be sent at a later time	3 d ago	Instant
Schedule a new message	3 mo ago	Instant
Create task in Planner when a new response is submitted	3 mo ago	Automated
Create a task in Planner and post message in Teams	3 mo ago	Automated
Follow up on a message	3 mo ago	Instant

### ⓘ Note

The search filter finds only flows that have been loaded into the page. If you don't find your flow, try selecting **Load more** at the bottom of the page.

## More options to find your flow

If you can't find your flow, try one of the options in the following table.

 Expand table

Scenario	Solution
The flow might be in a different environment.	To change environments, go to <a href="#">Environment information and settings</a> .
The flow was shared.	Check the <b>Shared with me</b> tab in <b>My Flows</b> menu option. (For an example, refer to the screenshot in <a href="#">Find your flows easily</a> in this article.)
You might have been removed as an owner of the flow.	Contact the flow owner to be re-added. To find out if you're an owner of the flow, go to <a href="#">Remove an owner</a> .
The flow might have been deleted.	To restore the flow, go to <a href="#">Restore deleted flows</a> .

# Get started with Copilot in cloud flows

Article • 07/02/2024

Copilot in cloud flows allows you to create automation that helps streamline your workflow through quick and easy natural language expressions. You can create a flow by describing what you need through multiple steps of conversation.

The cloud flows copilot can perform the following actions:

- Understand your intent, and create a flow based on the scenario prompt you provide.
- Auto-set up connections on your behalf to get you to a working automation as soon as possible.
- Apply the necessary parameters in the flow based on your prompt.
- Respond to your requests to make changes to your flow, such as update actions and replace actions.
- Answer questions about your flow and product. For example, you can ask Copilot questions about your flow like, *What does my flow do?* to get a summary of what the flow does. You can also ask Copilot product questions like, *How do I access child flows?* and *How do I access licenses?*
- Suggest a description for the flow when editing the flow's details.

## Important

- Copilot is new technology that is still being developed. It is optimized for use with English language and has limited support with other languages. As such, parts of it may appear in English rather than your preferred language.
- This capability is powered by [Azure OpenAI Service](#).
- More information: [Responsible AI FAQs for Power Automate](#), [Responsible AI FAQ for Copilot in cloud flows](#), [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

## Availability by region

You need a Power Platform environment in the following regions to use Copilot in Power Automate cloud flows.

 Expand table



Region	Copilot availability
Preview region	Copilot is enabled by default at the beginning of October 2023, unless <a href="#">an admin turns it off</a> .
Regions with copilot GPUs (United States, Australia, United Kingdom, India)	Copilot is enabled by default, unless <a href="#">an admin turns it off</a> .
Europe and all other regions, including France and Canada, except for Sovereign clouds	Copilot is enabled in the Europe region (using Sweden and Switzerland GPUs) by default, unless admins manually opt out of cross-geo data sharing settings from the <a href="#">Power Platform admin center</a> <sup>↗</sup> . More information: <a href="#">Turn on copilots and generative AI features</a>
Sovereign clouds and personal Microsoft service account (MSA) users	There's no access for MSA users or Sovereign cloud users to copilot features. You need to use an organization ID and in a non-Sovereign cloud region.

### ⓘ Note

If your environment is in the region previously listed and you still don't see the Copilot in cloud flows experience, contact your admin. An admin can turn the Copilot feature off or on in the Power Platform admin center. In some geographic regions outside the United States, Australia, United Kingdom, an admin needs to turn the cross geo calls on to enable Copilot.

More information: [Availability by region](#)

## Create a flow using the cloud flows designer with Copilot

Follow these steps to create a flow using the cloud flows designer with Copilot.

1. Sign in to [Power Automate](#)<sup>↗</sup>.
2. On the navigation menu to the left, select **Home** and begin to describe your scenario.

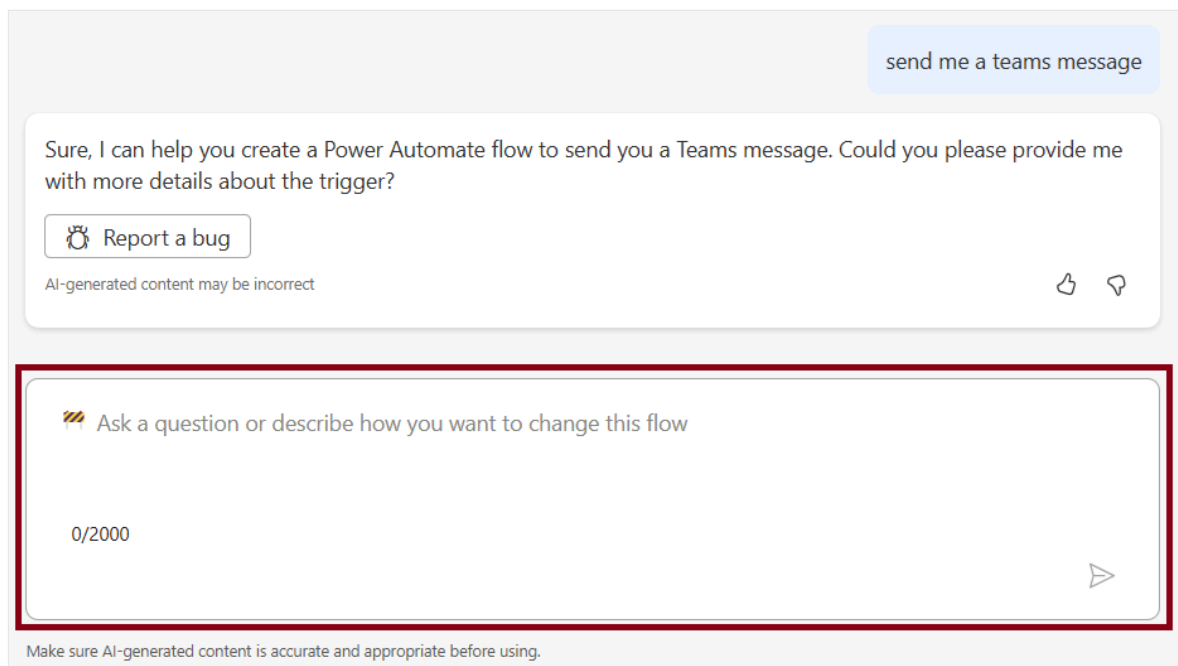
*Conversation first* (preview) provides a new way to interact with Copilot in Power Automate. You can go to this experience from the home page by selecting **Chat with Copilot about my idea**, or any of the predefined items above the input field.

- Alternatively, you can continue to interact with Copilot by typing what you want your flow to do. You can also select one of the AI generated suggested flow descriptions based on your manual prompt entry.

To learn how to write a good prompt, go to [How to write a good prompt](#) in this article.

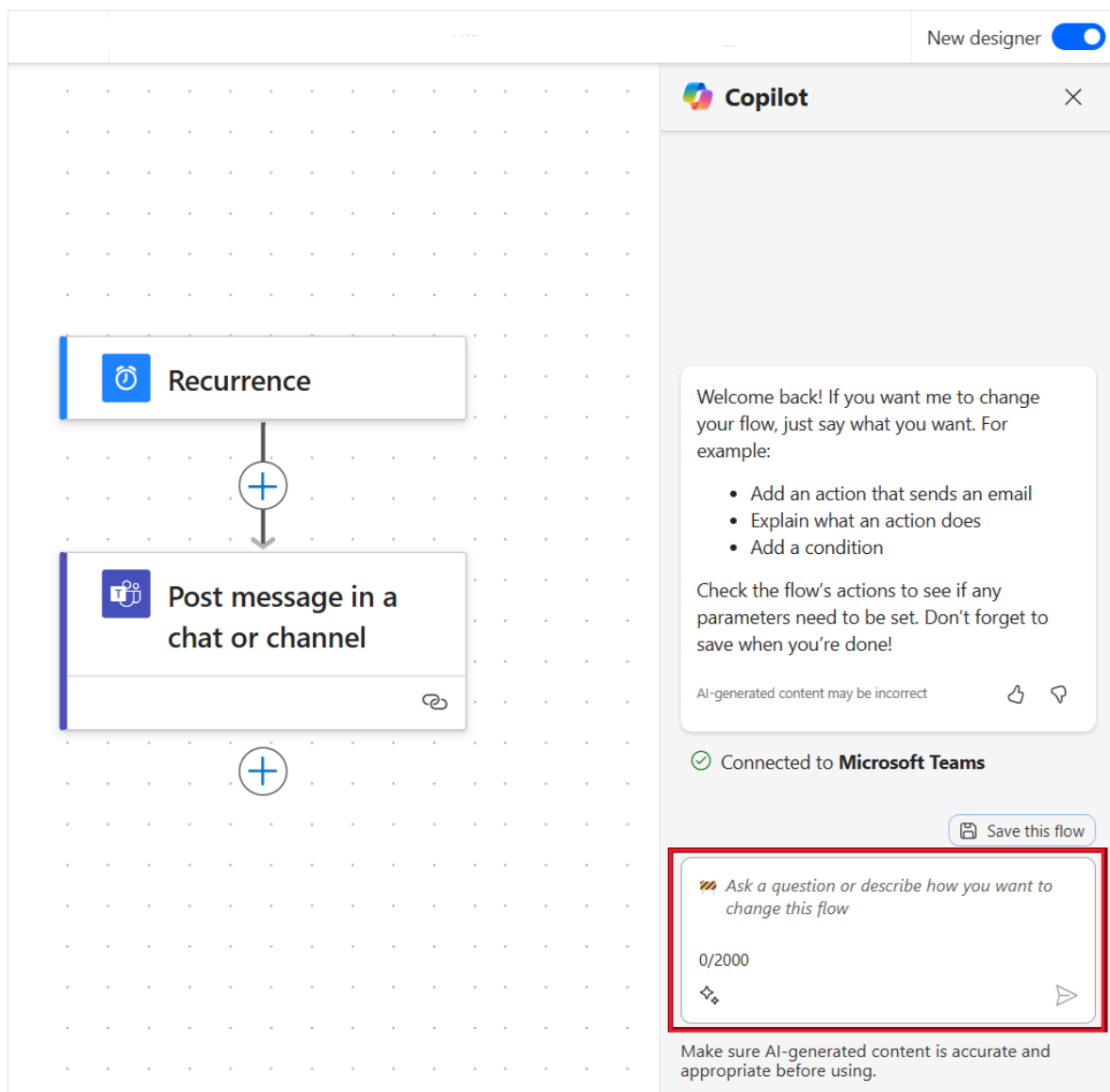
- When you're ready to proceed, select **Generate**.

If you manually enter a prompt and it's vague, Copilot assists you in building it to completion. You can use this stage of the flow building process to ask questions, or further describe what you would like to achieve with your automation.



- Copilot begins to depict the structure of the flow, which it generates based on your prompts. Select **Next** to proceed and verify any connections that are part of the flow are configured correctly.
- To finalize your flow, configure the required settings.
- Select **Create flow**.

The cloud flows designer with Copilot opens with your flow.



8. On the panel to the right, follow the Copilot suggestions to complete the flow setup, ask questions, or make edits to your flow using **Edit with Copilot**.
9. When your flow is complete, select **Save this flow**.
10. Once your flow is saved, we recommend that you test it. Do this by selecting **Test** in the upper-right corner.

## Troubleshoot in Copilot


The new troubleshoot in Copilot feature can assist you in identifying and resolving errors that might occur during testing of cloud flows or when reviewing flow run history. You can use this Copilot feature when the new designer experience is enabled.

To learn more, go to [Troubleshoot in Copilot](#).

## How to write a good prompt

Writing good prompts includes more than just being specific with your request, or saying how you want your results to be displayed. Copilot lets you try out different variations of prompts to help you evaluate what works best. If the initial results aren't what you're looking for, try tweaking your prompt and running it again.

- For better and more accurate results, provide prompts in *When X happens, do Y* format.
- Be as specific as possible. Instead of a generic prompt like, *I want to process an email*, try this prompt instead: *When an email arrives, I want to post the subject of the email to 'Contoso' Teams General channel.*
- If possible, mention the connector in your prompt. For example, include Outlook, Teams, Forms, or other.
- Try tweaking your prompt to further fine tune.

For more general information about writing prompts with generative AI, go to [The art of the prompt: How to get the best out of generative AI](#) .


## Examples of interactions with Copilot

This section describes some example scenarios of how you can interact with Copilot.

 Expand table

<b>From the Home page or Describe it to design it</b>	<b>Inside canvas</b>
When an email arrives from contoso@gmail.com, post in Teams.	<ul style="list-style-type: none"><li>• Ask Copilot to edit the flow: <b>I want to send the email subject to Teams channel.</b></li><li>• Ask Copilot what your flow does: <b>What does my flow do?</b></li></ul>
When an item is created in SharePoint, send me a mobile notification.	<ul style="list-style-type: none"><li>• Edit the flow with this prompt: <b>I want to send the item title to notification.</b></li><li>• Edit the flow with this prompt: <b>I don't want to receive mobile notification. Send me an email instead.</b></li></ul>

### Tip

For more examples you can try out, go to the prompt library in the [Sample Solutions Gallery](#) .

# Edit a flow using the designer with copilot capabilities

In addition to using Copilot to create a starting flow, you can also change or complete your existing flows.

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **My flows**.
3. Find your flow, select the vertical ellipses (:), and then select **Edit**.

Alternatively, access the cloud flows designer with copilot capabilities from the flow **Details** page of your existing flow by selecting the flow name from **My flows** > **Edit**.

Your flow opens with the **Copilot** pane on the side. You can now edit your flow by using the cloud flows designer with copilot capabilities. Try typing the following prompts:

- a. Delete action X
- b. I want to send an email at the end of the flow with subject equal to the SharePoint file name.
- c. Instead of email, I want to post message on Teams channel.
- d. Check if each of the SharePoint items being returned has a title that equals 'USB', and if so, send an email.

## Frequently asked questions

Use this section to find answers to frequently asked questions.

### Why don't I see the cloud flow designer with Copilot in my Power Automate experience?

- Check if the environment you're using is in the copilot available region in the table in the [Availability by region](#) section of this article. Your Microsoft Power Platform admin can help review and verify the region.
- Ask your admin if they requested Microsoft Support to disable the Copilot, if the region is supposed to enable Copilot by default.
- Ask your admin if they enabled Copilot by toggling on **Allow data movement for generative AI features** from the Power Platform admin center. To learn more, go to [Enable copilots and generative AI features](#).

## How do I enable Copilot?

If you're not in the region listed in the table in the [Availability by region](#) section where Copilot is enabled by default, your admin can enable Copilot for an environment from the Power Platform admin center by consenting to data movement. To learn more, go to [Enable copilots and generative AI features](#).

## How do I disable Copilot in the cloud flows designer?

Refer to the table in the [Availability by region](#) section in this article. If you aren't in the region with GPUs (infrastructure to support Copilot), you can toggle off the cross-geo data sharing settings from the [Power Platform admin center](#) [↗](#). However, if you're in the region with native GPUs with Copilot on by default, you can disable Copilot for your tenant by contacting Microsoft Support. You can disable and re-enable at tenant level easily using a PowerShell script.

## How is Copilot in cloud flows different from the text generation model in AI Builder?

Copilot in cloud flows is designed to help you create and edit Power Automate flows just by describing them in everyday language, providing helpful guidance along the way.

The text generation model in AI Builder lets you use the GPT model directly in your Power Automate flows and your apps built in Power Apps for various scenarios such as text summarization, draft responses, classify text, and more.

To learn more, go to [Text generation model overview \(preview\)](#).

## What are the limitations of the cloud flows designer with the copilot experience?

You can't edit flows in the cloud flows designer with the Copilot experience if your flow has any of the following flows capabilities:

- A non-Open API flow (older connection format).

### Tip

If there's Peek code on an action and if you see the *APIConnection* value instead of *OpenAPIConnection* in Kind field, it's a non-Open API flow.

- A flow with a comment.
- A flow contains an unsupported hybrid trigger. Hybrid triggers don't require connections, and are triggered manually from outside of Power Automate. The hybrid triggers, which aren't supported are:
  - When a flow is run from business process flow (Dataverse).
  - For a selected message (v2 Teams). We plan to enable worldwide by July end.
  - Teams On Compose Message (Teams). We plan to enable worldwide by July end.
  - Microsoft 365 Compliance Connector.
- A flow contains a Power Apps V1 trigger.
- A flow contains Perform a Changeset Request (Dataverse).
- A flow contains a Power Pages component.
- A solution flow using connections instead of connection reference isn't supported. We recommend that you use [connection reference](#) instead.
  - Email auto-complete suggestions in Send Email/Post message in Teams actions.
  - HTML editor in Send Email action.
  - Copy/Paste supporting Scope, Condition, Do until constructs.
  - Ability to make manual trigger fields optional.

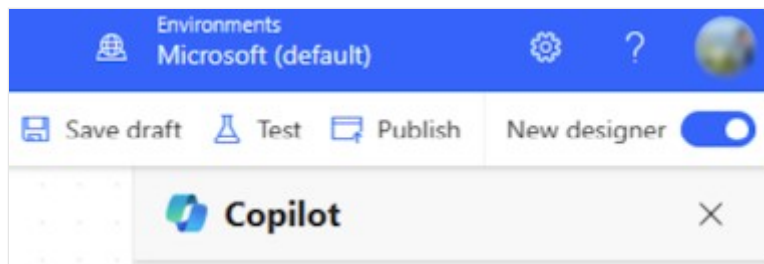
You can't use the cloud flows designer with Copilot if you're using a personal Microsoft account. For example, you can't use someone@live.com. Use a work or school account like someone@contoso.com instead.

The cloud flows Copilot supports English language only for models.

## There are some missing functionalities in the cloud flows designer with copilot capabilities. What do I do?

As we continue to innovate, we're introducing a new designer alongside our classic designer. While the classic designer remains valuable, the new designer is our future direction. While the classic designer isn't supported indefinitely, the new designer is gradually becoming the primary interface.

If you prefer to access features not yet available in the new designer, or encounter any limitations or known issues, you can temporarily revert to the classic designer. To do this, turn off the **New designer** toggle on the menu in the cloud flows designer.



## Why do I get this error "O.split(...).at is not a function" when signing in?

Power Automate designer doesn't support browsers that are more than two (2) years old. You could see the previously mentioned or similar errors in the designer if your browser version isn't current. It's generally a good idea to update your browser to latest version to avoid such issues.

## Why do I get this error "The provided flow name contains invalid characters" when importing a flow in a new tenant?

This is a temporary gap, which you can work around by adding a query parameter `v3=false` in your URL.

## Why do I not see dynamic content from triggers like 'When a response is submitted' or why is the flow automatically putting an unnecessary loop?

This might be because of a temporary issue where the **Split On** setting of the trigger is off. If you enable the setting, the issue should go away.



1. On the action configuration pane, select the **Settings** tab.
2. Under the **Split On** heading, move the toggle to **On**.

## What licenses do I need to access Copilot in Power Automate cloud flows?

You need a standalone Power Automate license, or a seeded Microsoft 365 license, or PowerApps/Dynamics license, to access and use Copilot. MSA users (@microsoft.com) without an org ID aren't able to use the experience.



## Related information

- [Responsible AI FAQs for Power Automate](#)
  - [FAQ for Copilot in cloud flows](#)
  - [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)
  - [Language availability for Power Platform](#) 
  - [Geographical availability for Power Platform](#) 
- 

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Understand the cloud flows designer

Article • 07/10/2024

You can create, configure, and customize your cloud flows with the classic designer or the cloud flows designer. For a description of the types of cloud flows, go to [Overview of cloud flows](#).

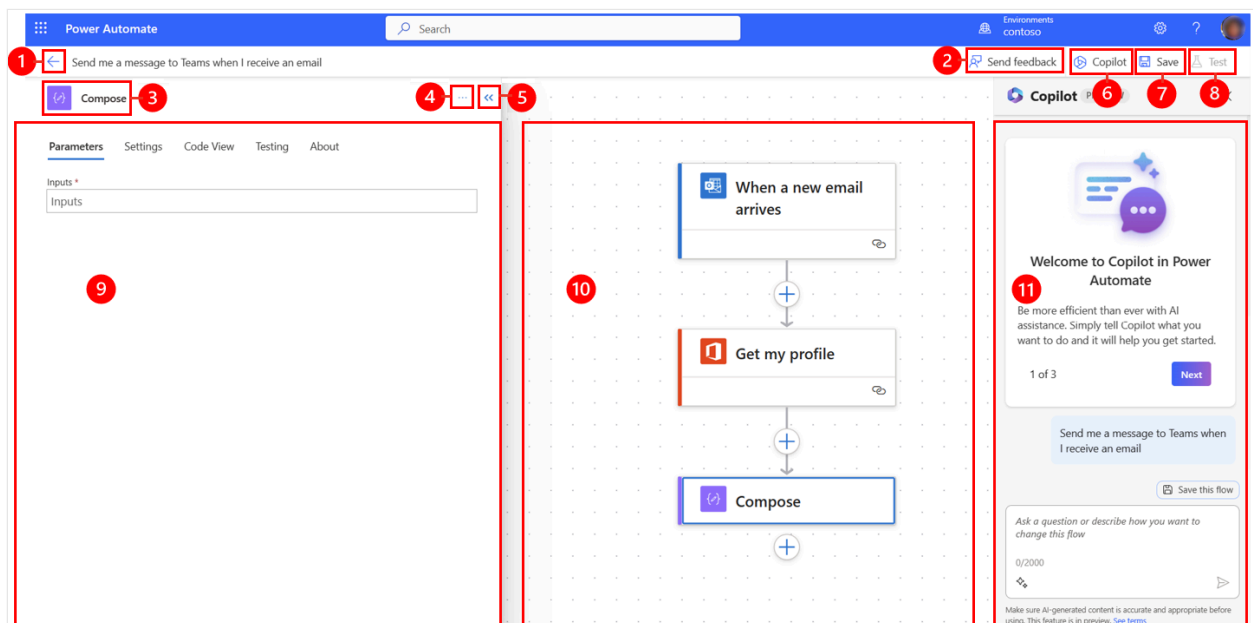
## 📌 Note

Here are some visual cues that tell you that you're using the cloud flows designer (not the classic designer):

- The cards in the flow are small.
- The standalone action configuration pane appears on the left when you select a card.

More information: [Identify differences between the classic designer and the cloud flows designer](#)

The following screenshot shows the features of the AI-powered cloud flows designer.



Legend:

1. **Left arrow button:** Return to the previous page.
2. **Send feedback button:** Send us feedback about your flow creation experience or general comments about the AI-powered designer.

3. **Action/trigger name:** The action or trigger card that is selected in your flow in the center of the page.
4. **More commands button:** Add a note to the selected card, or delete the card.
5. **Collapse button:** Hide the pane. When the pane is collapsed, the **Expand** button (>>) appears in the upper-left corner. Select it to show the pane again.
6. **Copilot button:** Show or hide the Copilot pane. The Copilot pane appears by default when the AI-powered designer opens.
7. **Save button:** Save your flow.
8. **Test button:** Test your flow to make sure that it works as you intended.
9. **Action configuration pane:** After you select an action card to configure on the canvas, the action configuration pane opens on the left side of the AI-powered designer.
10. **Canvas:** The canvas is where you build your flow. It's free-flowing and therefore allows for easier navigation.
11. **Copilot pane:** Copilot stays with you during your flow editing and fit-and-finish journey. It can help you update and make changes to your flow, based on your conversational-style prompt. It can also help answer flow-related and product-related questions.

## Send feedback

We want to hear from you to help us measure and improve our impact. To provide your feedback, select **Send Feedback**, answer the three questions in the feedback form that opens, and then select **Submit**.

1. The new AI powered editing experience is currently in preview. Tell us about your experience to help us improve the feature.

- 4 - Very satisfied
- 3 - Satisfied
- 2 - Dissatisfied
- 1 - Very dissatisfied

2. What improvements would you like to see?

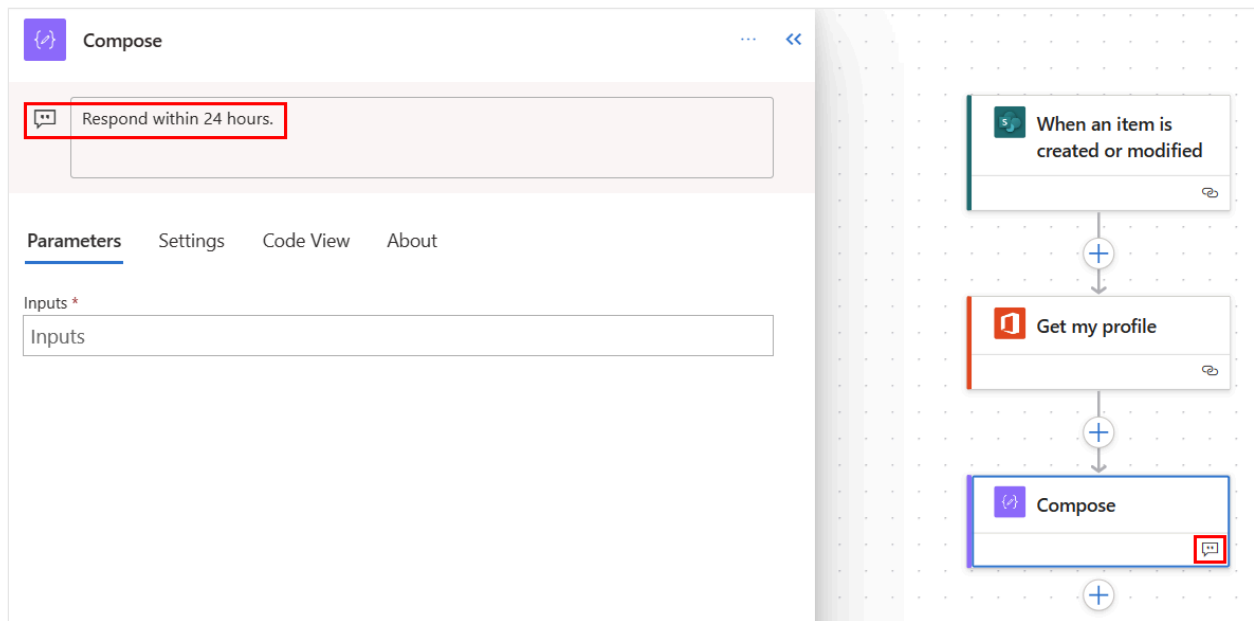
- Save button is disabled
- Copilot broke my existing flow
- Card is spinning
- Missing connector
- Flow errors
- Copilot understanding is limited
- 

3. Tell us more. What's working well? What can be improved?

Submit

## More commands

Select the **More commands** (...) button to add a note to the selected card in your flow, or to delete the card. Select **Add a note** to describe the purpose of the card in your flow. After you add a note, a note symbol appears in the lower right of the card. To view the note, hover over this symbol.



## Save button

Select **Save** to save your flow. If there are no errors, the message, "Your flow is ready to go. We recommend you test it" appears in the upper left with a green check.

✔ Your flow is ready to go. We recommend you test it

If an error is found, a description of the error and a red X appear in the upper left. The following screenshot shows an example of an error message.

✘ Invalid parameter for 'Compose'. Error: 'Inputs' is required.

The error also appears on the card that caused the error in your flow. Correct the error, and then select **Save** again.

When there are no errors, your next step should be to test your flow.


## Test button

After your flow is saved successfully, **Test** becomes active. To test your flow, select **Test** > After your flow is successfully saved, the **Test** button becomes available. To test your flow, select **Test**, select the **Manually** option, and then select **Test**.

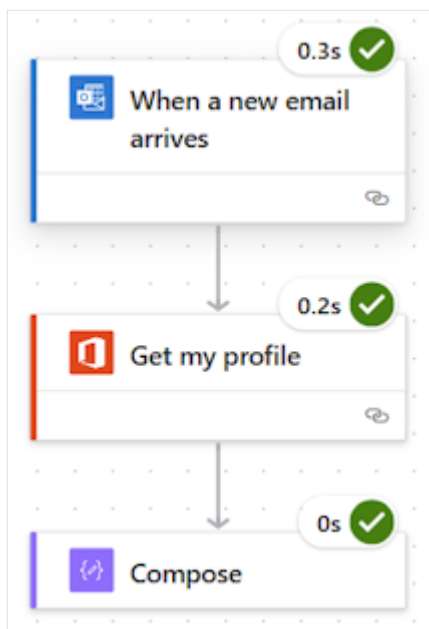
## Test Flow

- Manually  
Send a new email in your inbox to trigger it.
- Automatically  
There are no runs for this flow.

Instructions appear and tell you what you must do to test your flow. The following screenshot shows an example of an instructional message.

 To see it work now, send a new email in your inbox.

To test your flow, follow the instructions. In this example, you must send an email. The flow test then runs. When the test finishes running, a green check mark appears on each card, together with the number of seconds that it took to be processed.



Testing is part of the planning for a Power Automate project. To learn more, go to [Introduction: Planning a Power Automate project](#).

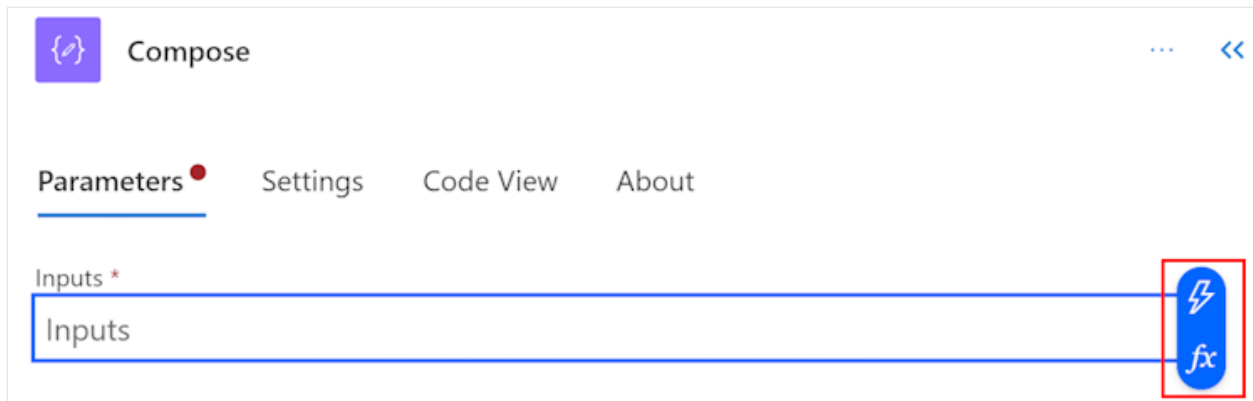
## Action configuration pane

Use the action configuration pane to customize parameters, settings, and code for the selected card in your flow.

## Parameters

On the **Parameters** tab, you can use the blue **Insert token** (lightning bolt) and **Insert expression** (*fx*) buttons next to the **Inputs** field to quickly enter values for the selected

action card.



To insert a dynamic token into the **Inputs** field, select the **Insert token** (lightning bolt) button. In the pop-up window that opens, search for or scroll to find the tokens that you can use. After you select a token, it appears in the **Inputs** field.

To insert an expression into the **Inputs** field, select the **Insert expression (fx)** button. In the pop-up window that opens, select a function to start your expression. To complete your expression, place the cursor in the function, and then select **Dynamic content**. Search for or select the content/tokens to add, and then select **Add**. Your completed expression appears in the **Inputs** field.

To learn more about expressions, go to [Reference guide to workflow expression functions](#).

Alternatively, use the keyboard to enter a slash (/) in the **Inputs** field. Then select the dynamic content/token and expression pop-ups.

## Settings

On the **Settings** tab, you can set the action time-out, network retry policy, how an action should run, security input and output, and tracking properties. The following table provides a description of the settings.

[Expand table](#)

Setting	Description
General	In the <b>Action Timeout</b> field, set the maximum duration between retries and asynchronous responses for the selected action. This setting doesn't change the request time-out of a single request.
Networking	In the <b>Retry Policy</b> field, select a retry policy for intermittent failures. The default setting is an exponential interval policy that is set to retry four times. You can also set your own exponential or fixed interval settings, or choose none at all.

Setting	Description
Run After	In the <b>Run After</b> field, configure how an action should run after the execution of any of the preceding flow actions. For example, you can choose to run an action after the preceding action runs successfully, times out, skips, or fails.
Security	Use the <b>Secure inputs</b> and <b>Secure outputs</b> toggles to turn the operations, and references of output properties, on or off.
Tracking	Set the key and value of tracked properties.

## Configurable trigger polling setting

In select triggers such as *When an item is created-Sharepoint*, and more, you can manually configure the trigger polling setting. This means you can configure how often the flow should check for new items in Sharepoint and others. This in turn ensures how quickly your flow responds to any changes or trigger events. The default polling period is three (3) minutes, which means the flow checks every three (3) minutes if a new item was created.

1. On the [action configuration pane](#), select the **Parameters** tab.
2. Under the **How often do you want to check for items?** heading, enter the interval number and the frequency from the dropdown menu.

▼ **How often do you want to check for items?**

Recurrence \*

Interval \*

Frequency \*

Minute
▼

## Code View

To view the code behind any card in your flow, select the card on the canvas, and then select **Code View** in the action configuration pane. As you customize the code on the [Parameters](#) tab, you can view the new code on the **Code View** tab.

The following screenshot shows an example of the code for the **Compose** action card.



```
Compose
Parameters Settings Code View About

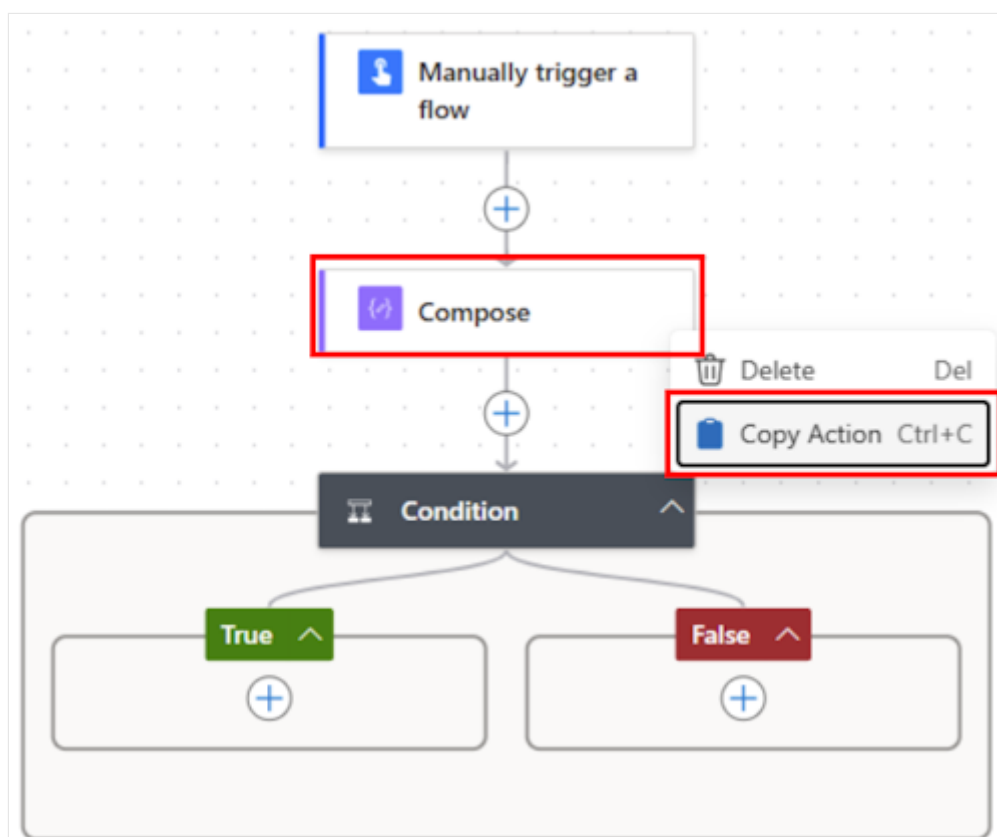
1 {
2   "type": "Compose",
3   "inputs": "",
4   "runAfter": {
5     "Get_my_profile": [
6       "Succeeded"
7     ]
8   }
9 }
```

## Copy and paste actions

You can copy actions to the clipboard whether they're atomic actions or container actions. Examples of atomic actions are `Compose`, `Get items`, `Create item`, and others. Examples of container actions are `Scope`, `Switch`, `Condition`, `Apply to each`, and others.

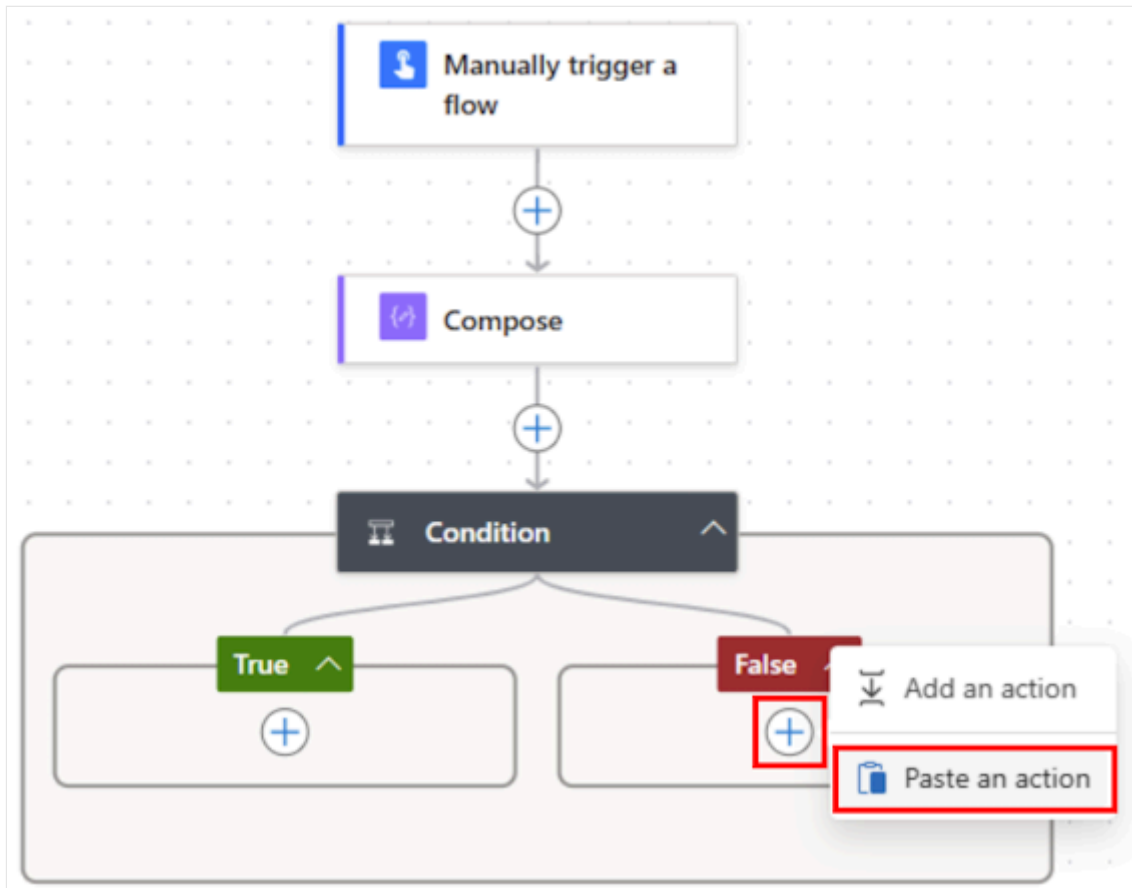
To copy and paste an action, follow these steps.

1. Right-click on any action (or trigger) you want to copy.

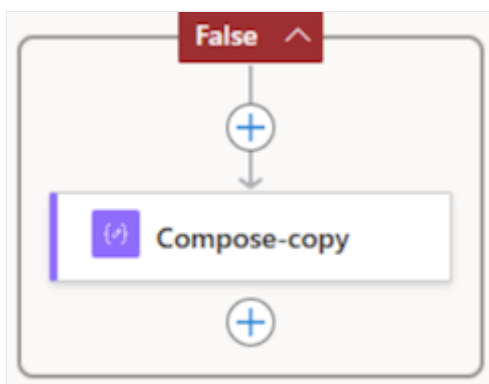


2. On the canvas, select + on the canvas to add an action, and then select **Paste an action**.

You can copy and paste actions across different parts of your flow, or in between flows.



After you paste your action, the copied action name is followed by **-copy**.



If you don't have access to a mouse, you can use your keyboard. To copy, press **Ctrl + C**. To paste, press **Ctrl + V**.

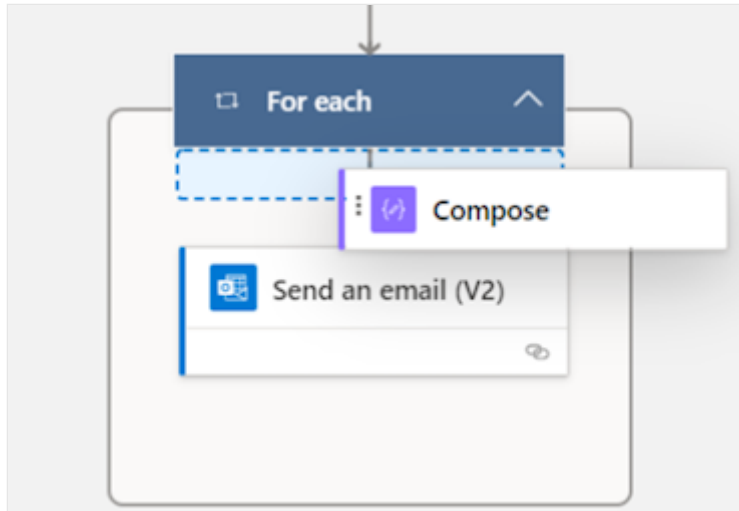
## Canvas

For easy navigation, you can drag your flow on the canvas. You configure the actions of each card in the action configuration pane on the left. The cards on the canvas are

compact to allow for easy visibility and navigation, especially in large flows.

## Drop zones

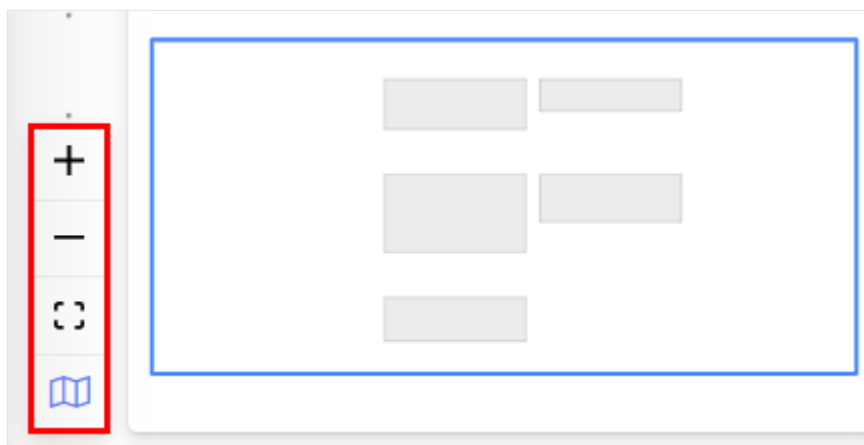
The canvas contains AI-powered designer drop zones to help you easily drag cloud flow actions. The drop zones are represented by blue dashed lines.



## Zoom buttons

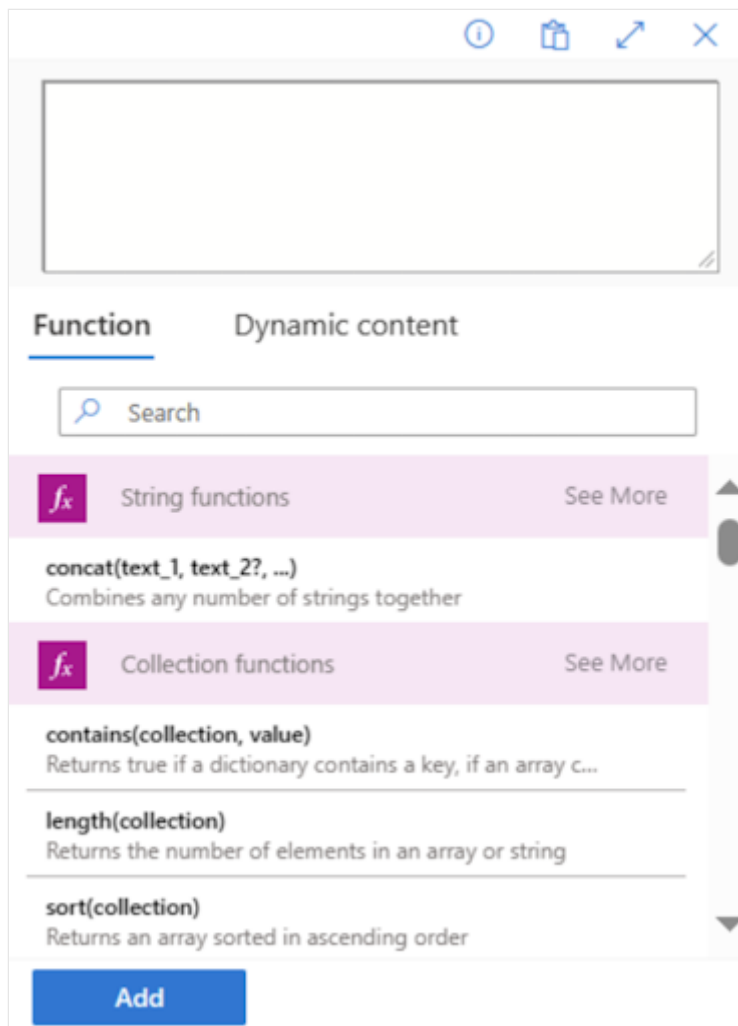
Depending on the size and complexity of your flow, you might want to adjust its size on the canvas as you're building it. Use the zoom buttons to zoom in, zoom out, fit to screen, and toggle a *minimap*. The buttons appear when the Action configuration pane is closed.

The bottom button is for the minimap. Use it to focus on a specific section of a large flow.



## Expression editor and token picker

The expression editor in the designer is multi-line, which allows you to easily create and edit long, complex expressions. A *gripper* allows you to temporarily expand the box by one or two (1-2) lines, as needed. If that's not enough, you can expand the popup to a full page view. A search box allows you to search for tokens and functions, both in the Dynamic content view and Function view.



### 💡 Tip

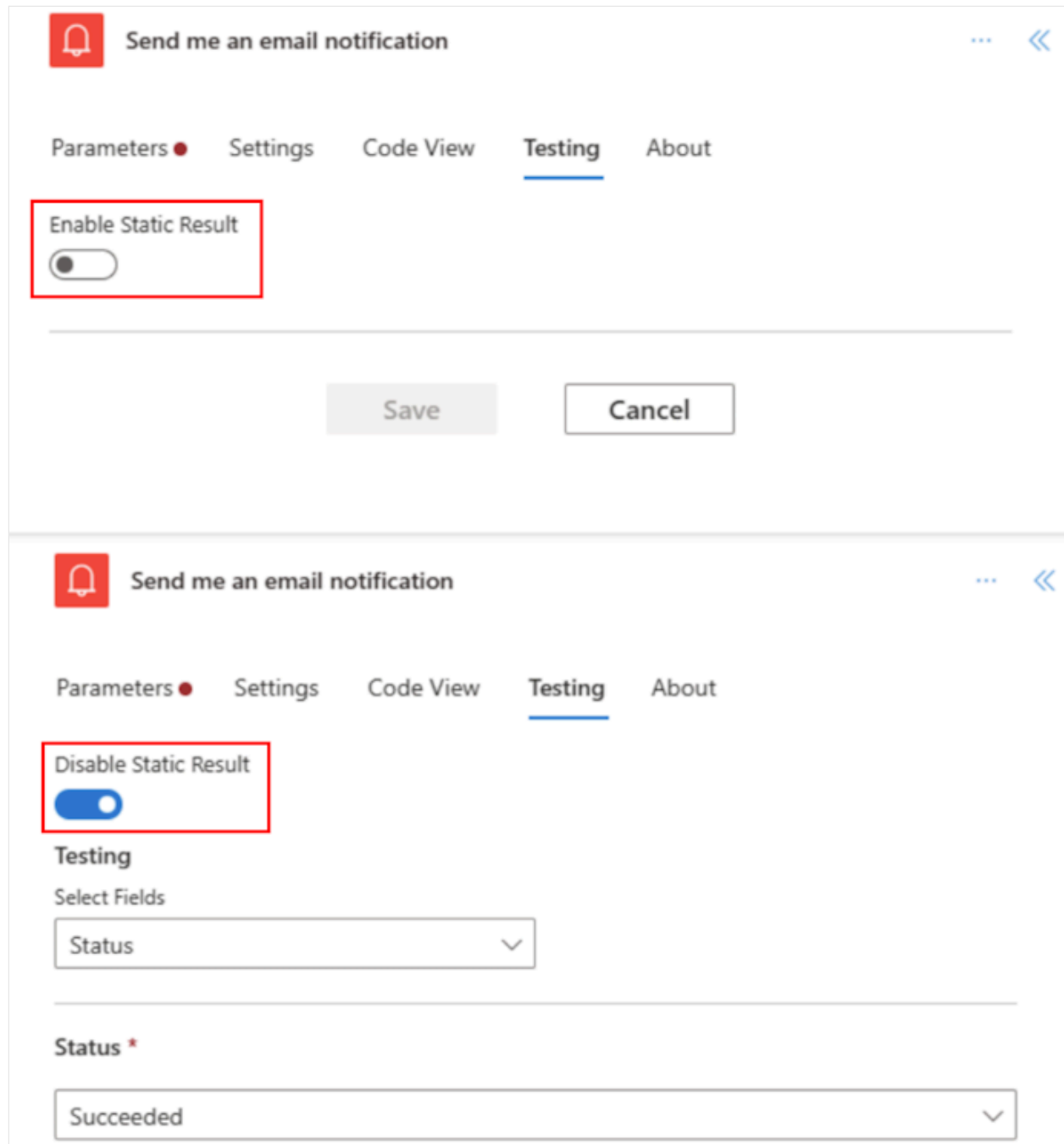
You can use a forward slash ( / ) keyboard shortcut to invoke the token picker/expression editor popup when you're on an action field.

## Disable an action or enable static results on an action

On the designer, if you want to disable an action rather than remove it entirely, go to the **Testing** tab of the action and enable static outputs by turning on the **Enable Static Result** toggle. When the flow runs, this essentially treats the action as successful, without actually running the action.

Similarly, if you want to see how your flow reacts if a certain action fails with a code or succeeds with a code, you can use the same capability of static outputs available on the action to mock the action execution to your needs.

When static outputs are disabled, the toggle label is **Enable Static Result**. When static outputs are enabled, the toggle label is **Disable Static Result**.



## Identify differences between the classic designer and the cloud flows designer

To quickly identify which designer version you're using, ask yourself the following questions:

- Are the action cards on the flow small or large?
- Is the action configuration pane inline or in a separate pane?

The cloud flows designer has smaller cards to facilitate easy navigation. It also has a standalone action configuration pane on the left.

## Limitations and known issues

You might notice that some functionalities that were in the classic designer aren't available in the cloud flows designer yet. Currently, the designer doesn't support the following items:

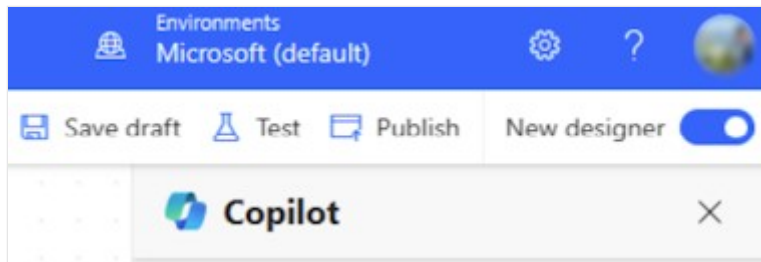
- Non-Open API flows (If there's Peek code on an action and if you see the APIConnection value instead of OpenAPIConnection in Kind field, it's a non-Open API flow.)
- Some hybrid triggers:
  - When a flow is run from business process flow (Dataverse)
  - For a selected message (v2 Teams) - Plan to enable worldwide by July end
  - Teams On Compose Message (Teams) - Plan to enable worldwide by July end
  - Microsoft 365 Compliance Connector
- A comment
- Power Pages connector
- Power Apps v1 trigger
- Perform a changeset request action (Dataverse)
- A solution flow using connections instead of connection reference isn't supported. We recommend that you use connection reference instead.
- Email auto-complete suggestions in *Send Email/Post message* in Teams actions
- Ability to make manual trigger fields optional

## Some known issues

- Dynamic content friendly names are getting updated to internal code names upon save.
- Autoamted trigger polling setting (How often do you want to check for new items) reverts to 1min after saving

As we continue to innovate, we're introducing a new designer alongside our classic designer. While the classic designer remains valuable, the new designer is our future direction. While the classic designer isn't supported indefinitely, the new designer is gradually becoming the primary interface.

If you prefer to access features not yet available in the new designer, or encounter any limitations or known issues, you can temporarily revert to the classic designer. Simply turn off the **New designer** toggle on the menu in the cloud flows designer.



#### ⓘ Note

The Power Automate cloud flows designer isn't yet available in integration surfaces such as Power Apps, Teams, and others.

## FAQ

### Why do I get this error "O.split(...).at is not a function" when signing in?

Power Automate designer doesn't support browsers that are more than two (2) years old. You could see the aforementioned or similar errors in the designer if your browser version is old. It's generally a good idea to update your browser to latest version to avoid such issues.

### Why do I get this error "The provided flow name contains invalid characters" when importing a flow in a new tenant?

This error is a temporary gap, which you can work around by adding a query parameter `v3=false` in your URL.

### Why do I not see dynamic content from triggers like 'When a response is submitted' or why is the flow automatically putting an unnecessary loop?

This scenario might be because of a temporary issue where the **Split On** setting of the trigger is off. If you enable the setting, the issue should go away.

1. On the [action configuration pane](#), select the **Settings** tab.
2. Under the **Split On** heading, move the toggle to **On**,

## Why don't I see new or updated SharePoint or Excel column values in my flow?

Power Automate designer requires a flow action to be re-added in order to pick up new entities of the underlying action. For example, if you have a SharePoint *Get item* action in your flow and Sharepoint item has four (4) columns, the flow allows you to access all four column values of the SharePoint item. Now, if you navigate to SharePoint, add a fifth column, and come back to the flow, you can't access the fifth column unless you delete the *Get item* action and re-add it again to force the designer to pick up the latest changes. The same behavior applies in Excel columns, Dataverse, OneDrive folder/files, and others.

## Will the new cloud flows designer eventually replace the classic designer fully?

Yes, once the issues noted here are resolved and the new cloud flows designer can cover most, if not all, of the classic designer scenarios. At this time, the classic designer will be fully replaced.

## Related information

[Get started with Copilot in cloud flows](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

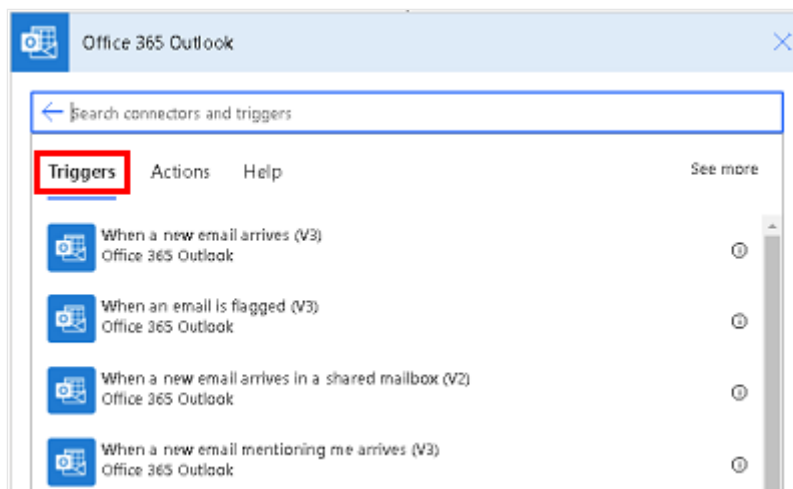


# Get started with triggers

Article • 06/19/2024

A *trigger* is an event that starts a cloud flow. For example, you want to get a notification in Microsoft Teams when someone sends you an email. In this case, receiving an email is the trigger that starts this flow.

Power Automate offers connectors to services such as SharePoint and Outlook. Most connectors offer prebuilt triggers that you can use to start your flows. Here's a partial look at the triggers that Office 365 Outlook connector provides by default.



## Choose the right trigger

Triggers can be started instantly or manually, on a schedule, or automatically when an external event occurs, such as when an email arrives.

## Triggers for instant/manual flows

If you'd like to run a cloud flow with a tap of a button on your mobile device, to remind your team to join the daily team meeting, create an instant flow. You can trigger these flows manually from any device.

## Triggers for scheduled flows

If you'd like to run a cloud flow on a schedule, for example, to send a weekly project report, create a *scheduled flow*. In scheduled flows, you can choose when (date and time) and frequency (monthly/daily/hourly, and more).

To learn more, go to [Run flows on a schedule](#).

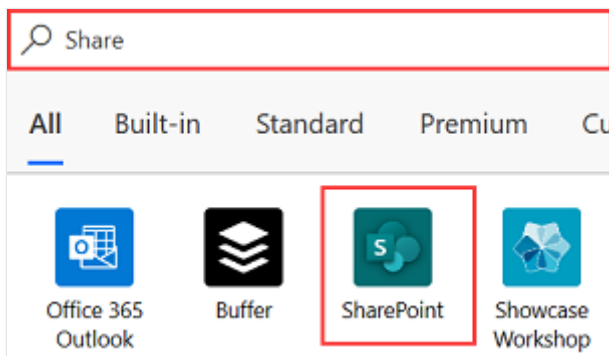
## Triggers for automated flows

If you want to create a cloud flow that performs tasks automatically after an event occurs, for example, a cloud flow that notifies you by email when someone tweets with a keyword you specify, create [an automated flow](#).

## Add a trigger to an existing flow

When you edit a trigger in an existing flow, the new trigger must be the first step of the flow.

1. Edit the flow and delete the existing trigger.
2. After deleting the trigger, Power Automate prompts you to select a new trigger.
3. Search for the connector and then select the app icon. The following screenshot shows the results if you search for **Share**.



4. When you select the app icon, the corresponding triggers and actions are listed. Select the trigger that best suits your needs.

## Licensing for premium connectors

You need a standalone [Power Automate license](#) to access all premium, on-premises, and custom connectors. For flows that are in-context of an app built in Power Apps, you can leverage [Power Apps license](#). Microsoft 365 plan licenses can use standard connectors but can't use premium connectors. To learn more about licensing, go to the [Power Platform Licensing Guide](#).

To find your license, do the following steps.

1. Sign in to [Power Automate](#).
2. Select **My flows**.
3. Select a cloud flow.

4. Go to the **Details** section and view the details under **Plan**.

## Customize a trigger by adding conditions

Sometimes, you might need to customize a trigger so that it fires only when certain conditions are met. For example, you might be using SharePoint's **When an item is created or modified** trigger in Power Automate. This trigger fires for every change to SharePoint items. However, you might want the flow to only trigger when an item is created or the status is marked as *Approved*. While you can filter other events by adding conditions to the flow, the flow still runs and the calls are counted as an API request. This causes you to reach your API request limits faster. To avoid it, you can write [expressions](#) in trigger conditions, avoiding a *run* if the condition in trigger isn't met.

## Use trigger conditions to reduce flow runs

Trigger conditions can help streamline your flows and reduce the number of unnecessary runs. This helps keep flow runs and Power platform requests consumption low. With trigger conditions, you can set up multiple conditions that must be met before a flow is triggered.

For example, you need to create a flow that processes every approved invoice. Without trigger conditions, your flow would trigger every time an invoice email is received, even if the invoice isn't approved. This can result in the flow running 1,000 times for 1,000 invoices, even though only 50 of them are approved.

By adding a trigger condition to trigger only when an invoice is approved, the flow runs only 50 times. This means it consumes fewer Power Platform requests. If the trigger condition isn't met, the flow isn't triggered, and no run history is logged.

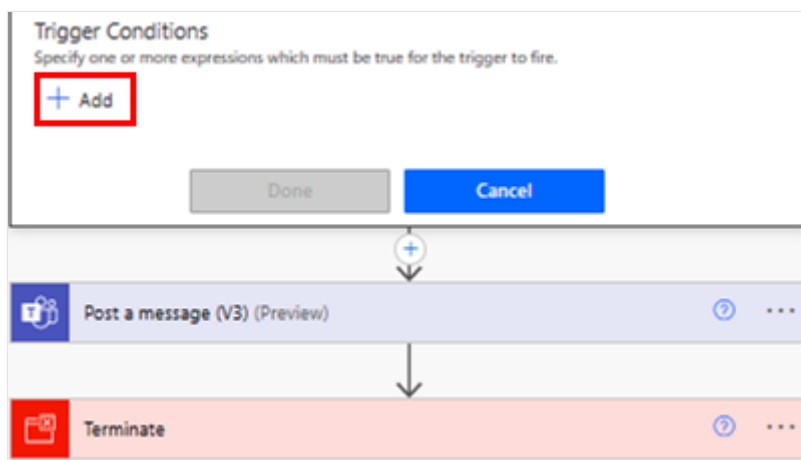
This is especially important in pay-as-you-go environments, where every flow run is charged. By reducing the number of runs, you can keep your costs low while still achieving your desired outcomes.

### ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in [Understand the cloud flows designer with copilot capabilities](#).

To set a trigger condition:

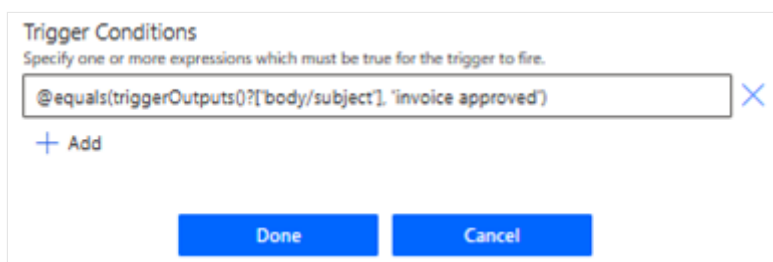
1. Select the trigger of the flow.
2. On the upper right, select the ellipses (...) > **Settings**.
3. Under **Trigger Conditions**, select **Add**.



4. Add an expression and then select **Done**.

#### ⓘ Note

Every trigger condition must start with a the @ symbol.



As an alternative, follow the instructions in [Easily create expressions](#).

5. If you have multiple filter conditions to add, Select + **Add** and add expressions.

By default, all conditions must be met for the condition to be true. If any condition is optional, you need **OR**, and then use the syntax `@or (test1, test2, test3)`.

## Easily create expressions

Your flow can generate expressions for you.

1. On your flow, select the + sign in the down arrow, and then select **Add an action**.
2. Search for and select the **Filter array** action.
3. On the **Filter array** card, create your condition.
4. Select **Edit in advanced mode** and copy the expression.
5. Paste the expression into the trigger condition.
6. Remove the **Filter array** action.

---

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Add OAuth authentication for HTTP request triggers

Article • 10/02/2023

You can use the **When an HTTP request is received** trigger to trigger workflows by sending a request to an HTTP request to the endpoint generated from the flow. You can restrict what users can trigger in this workflow by ensuring that only authenticated users can trigger this workflow.

## ⓘ Note

This feature is being rolled out and might not be available in your region yet.

## Choose an authentication parameter

The trigger has three modes for the authentication parameter:

1. **Any user in my tenant:** Ensures that any user in the same tenant as the maker is able to trigger this workflow. This is the default setting for any new flows.
2. **Specific users in my tenant:** Ensures that only specific user IDs from the same tenant can only trigger this workflow. You can provide email addresses of the specific users in the **Allowed users** field. You can also provide object IDs of service principal users if you intend to use this flow to be triggered only by SPN (service principal name) users.
3. **Anyone:** Legacy setting for this trigger that has open access without any additional authentication support. Anyone can trigger this workflow if they have access to the URL and the associated JSON schema.

## ⓘ Note

If you select the **Specific users in my tenant** option and leave the allowed users blank, the authentication scope is limited to the tenant. This means any user in the tenant can trigger this workflow.

## Choose the claims for your HTTP request

If you're restricting the workflow to be triggered only by authenticated users, you need to ensure that the HTTP request contains the correct claims. The required claims are in the following list:

- `"aud"`: <audience of the flow service>. This is where you find the audience values across different clouds. More information: [Audience values](#)
- `"iss"`: <Issuer of the requestor>
- `"tid"`: <tenant id of the requestor>
- `"oid"`: <object id of the requestor>. Optional. This field is required only if you have configured the trigger to restrict to specific users within the tenant.

You can check the claims of your request by pasting the bearer token within the authorization header at <https://jwt.io>. For more information on extracting the tokens programmatically, go to the [Microsoft Authentication Library \(MSAL\)](#).

## Audience values

The following table shows the audience values across different clouds:

[Expand table](#)

Cloud type	Audience value
Public cloud	<code>https://service.flow.microsoft.com/</code>
Government Community Cloud (GCC)	<code>https://gov.service.flow.microsoft.us/</code>
Government Community Cloud High (GCCH)	<code>https://high.service.flow.microsoft.us/</code>
China	<code>https://service.powerautomate.cn/</code>
Department of Defense (DOD)	<code>https://service.flow.appsplatform.us/</code>

## View the parameter in the designer

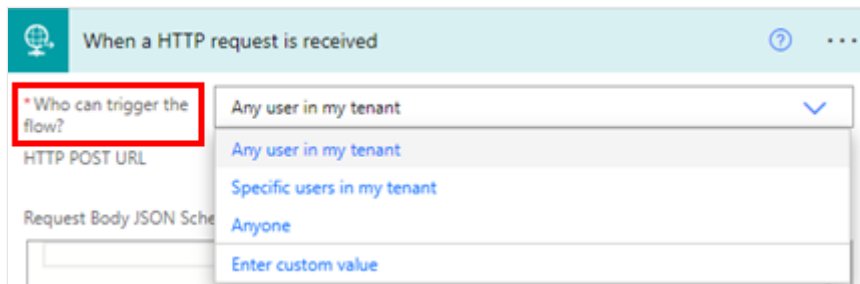
Depending on your designer version, parameters appear in different locations.

### ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in [Understand the cloud flows designer with copilot capabilities](#).

Classic designer

The parameter shows on the card.



## Related information

[Overview of the Microsoft Authentication Library \(MSAL\)](#)

## Feedback

Was this page helpful?

[Provide product feedback](#) [↗](#)



# Get contextual help with flows from the Power Virtual Agents bot

Article • 03/10/2023

Real-time, in-product help is available from the [documentation](#) and the Power Virtual Agent bot to solve the most common workflow scenarios. While building your flows, you can access content from the documentation, community, blogs, and templates.

## Use in-product help

### ⓘ Note

In-product help is available while you create or edit cloud and desktop flows.

1. Select the ? on a connector, action, or trigger to start the in-product help experience.

The screenshot displays a Power Automate flow editor with three steps: 'When an item is created', 'Create an approval', and 'Send an email (V2)'. The 'Send an email (V2)' step is expanded, showing fields for 'To', 'Subject', and 'Body'. A red box highlights the help icon (a question mark) in the top right corner of the 'Send an email (V2)' step. Below the flow steps are buttons for '+ New step' and 'Save'.

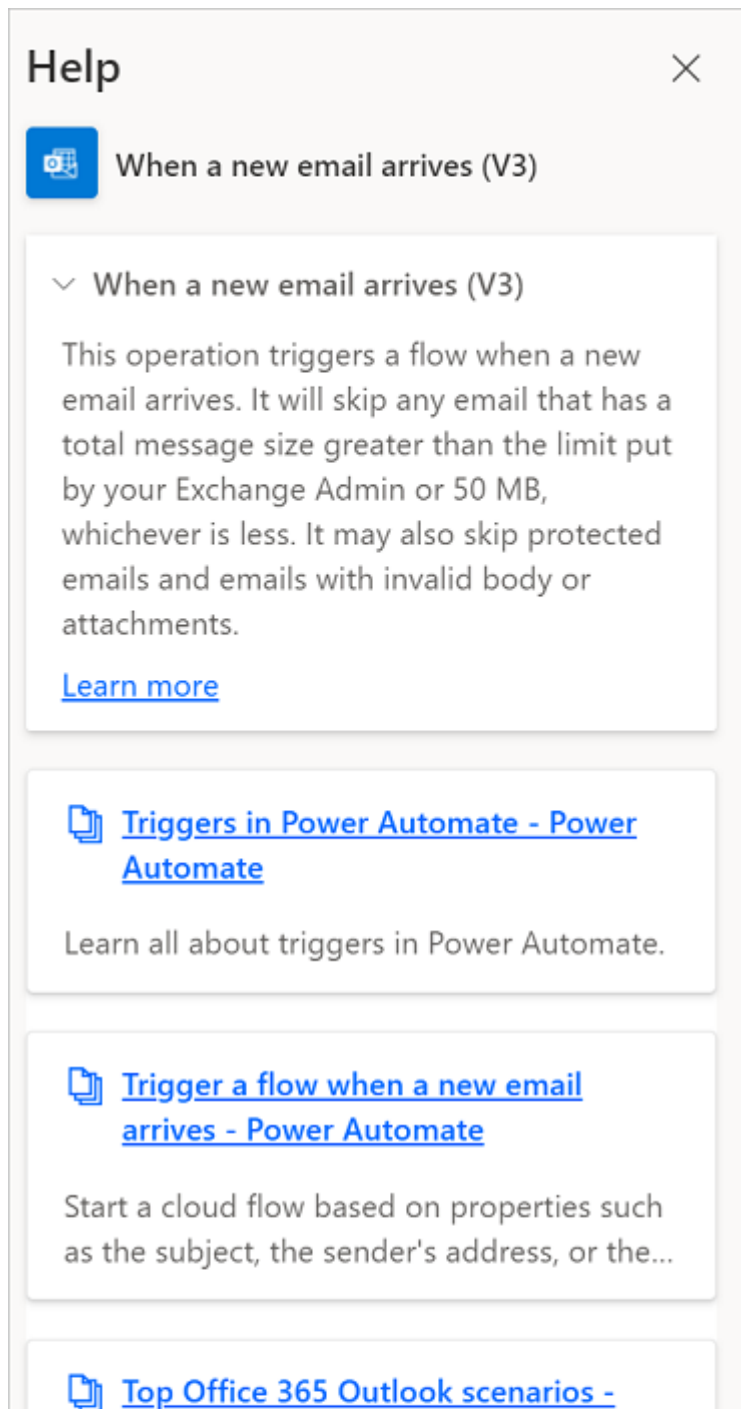
2. The right pane opens with details about the action and provides documentation links for that action.

In the following example, the **Send an email (V2)** action is selected, showing help topics regarding the top email scenarios, an overview of the action, and more.


If you select ? on a different action, the help pane updates to show guidance documents for the currently selected action.

### Tip

In product help is contextual, always displaying content that's relevant to the currently selected action, trigger, or connector.




**Help** ×

 **When a new email arrives (V3)**


∨ **When a new email arrives (V3)**

This operation triggers a flow when a new email arrives. It will skip any email that has a total message size greater than the limit put by your Exchange Admin or 50 MB, whichever is less. It may also skip protected emails and emails with invalid body or attachments.


[Learn more](#)

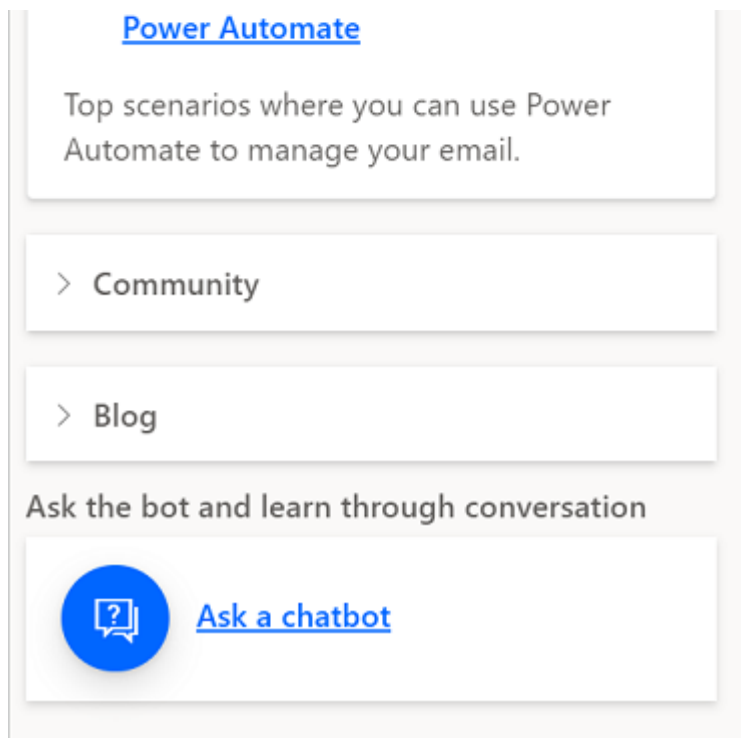
 [Triggers in Power Automate - Power Automate](#)

Learn all about triggers in Power Automate.

 [Trigger a flow when a new email arrives - Power Automate](#)

Start a cloud flow based on properties such as the subject, the sender's address, or the...

 [Top Office 365 Outlook scenarios -](#)

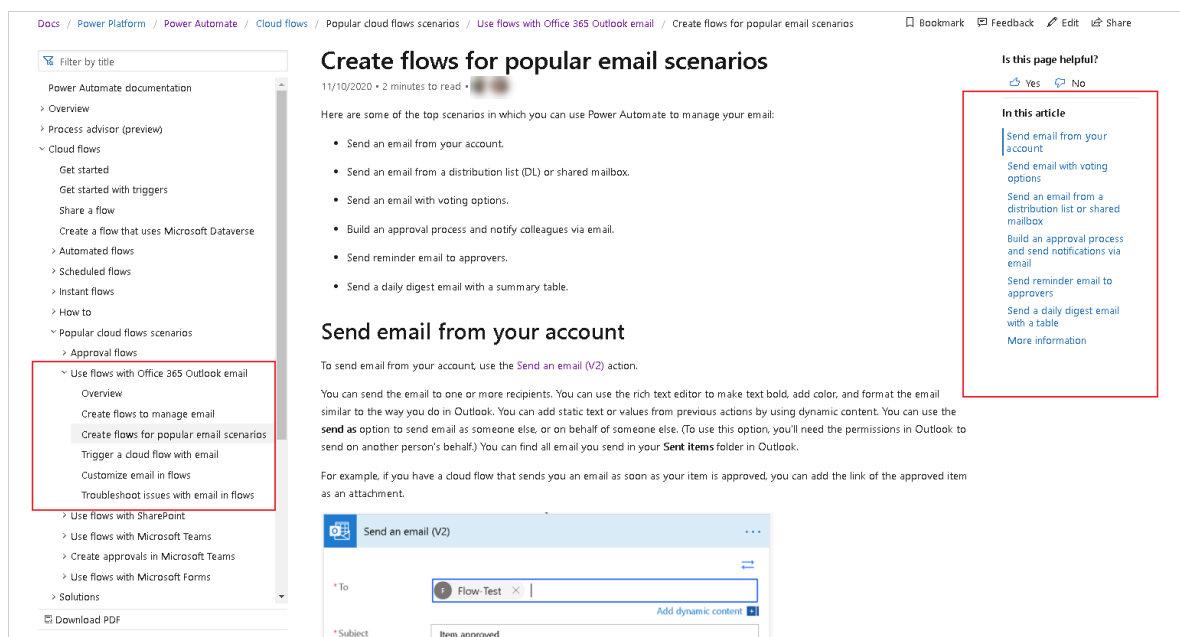


## Get help from the community

Now that you've displayed the in-product help, follow these steps to use the various topics.

1. Select any link from the list of help topics.


The corresponding documentation opens.



2. Expand the **Community** section.

The community results about the action are displayed.


## Help

 [Create an approval](#)


▼ [Create an approval](#)

Starts an automated approval process, but does not wait for the approval to complete. The approval is cancelable.


[Learn more](#)

 [Create an approval from the approvals app - Power Automate](#)

Learn how to create an approval from a chat or channel.

 [Customize Approvals - Power Automate](#)

Create custom processes for approvals by creating an approval flow.


 [Create a custom connector for an approval flow - Power Automate](#)

Learn how to create a custom connector to use in an approval flow.

> **Community**


> Blog

Ask the bot and learn through conversation

 [Ask a chatbot](#)

3. Select an item to go to specific community thread.


## Help

 [Create an approval](#)


▼ [Create an approval](#)

Starts an automated approval process, but does not wait for the approval to complete. The approval is cancelable.

[Learn more](#)

 [Create an approval from the approvals app - Power Automate](#)

Learn how to create an approval from a chat or channel.

 [Customize Approvals - Power Automate](#)

Create custom processes for approvals by creating an approval flow.

 [Create a custom connector for an approval flow - Power Automate](#)

Learn how to create a custom connector to use in an approval flow.

∨ Community



[Create an Approval is waiting](#)

Modified: 5/2/2022



[Approval Range \(Between\) Two Values with Multiple Approvals](#)

Modified: 4/22/2022



[From an excel file, create multiples approvals \(1 by row\)](#)

Modified: 4/8/2022

> Blog

Ask the bot and learn through conversation



[Ask a chatbot](#)

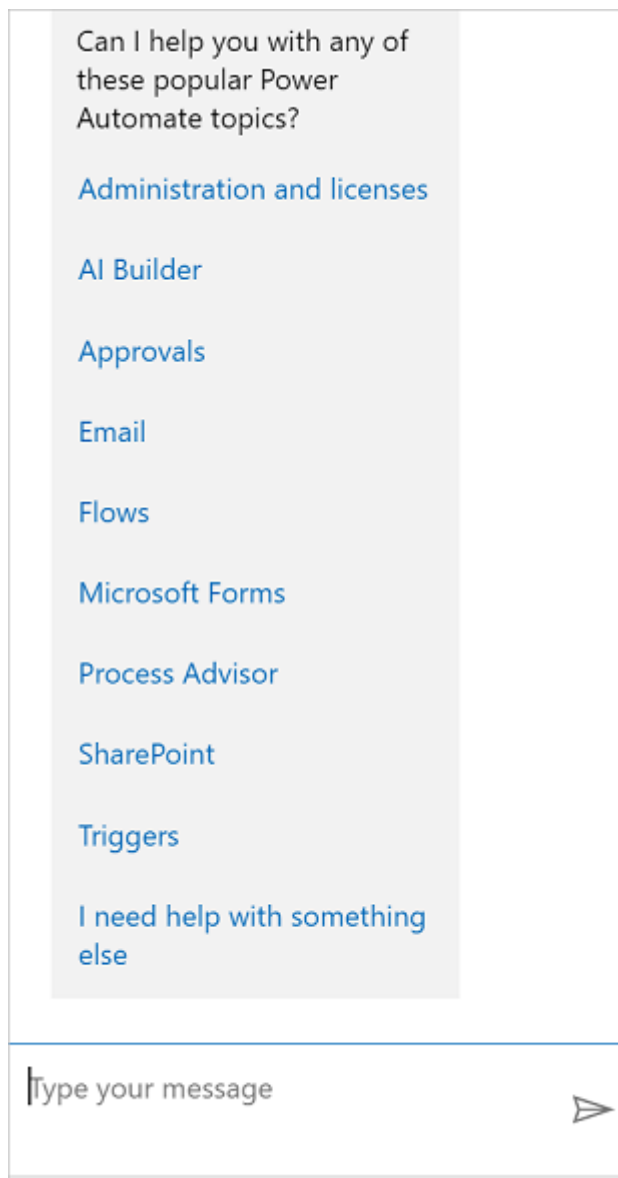


4. You can also get help from blog posts if you select the **Blog** link.

## Get conversational self-help from the bot

1. Select **Ask a chatbot**.

The chat bot lists the most requested topics and provides a field that you can use to ask the bot questions.

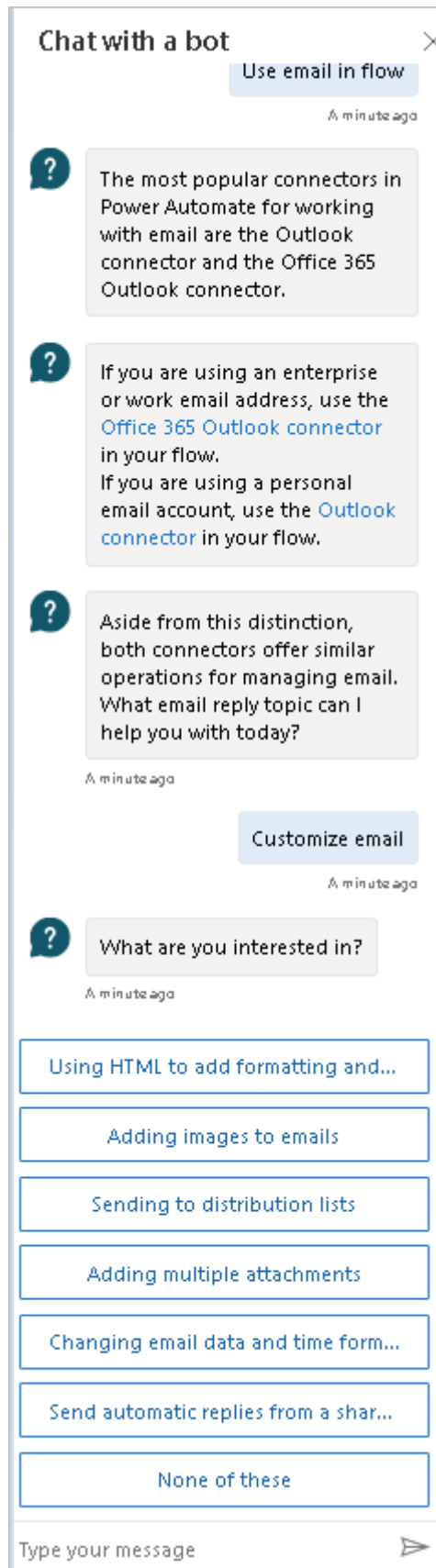


2. Choose one of the topics.

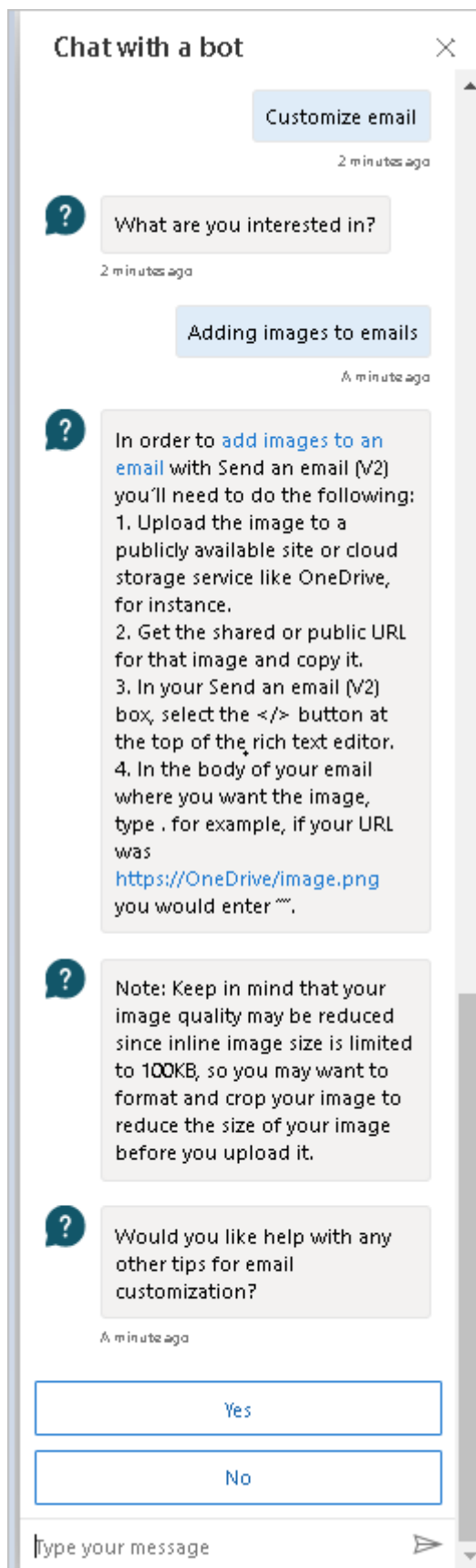
The bot gives an overview and then provides the next level of topics.

3. Find the right topic.

The bot provides the steps and links to the corresponding documentation with a detailed explanation, showing examples and images.



4. Select **Yes** to indicate that you've found an answer to your question.
5. Select **No** if the bot didn't provide the answer that your're looking for.



6. Select **Yes** to check the knowledge database and enter another question.



## Chat with a bot



storage services like OneDrive, for instance.

2. Get the shared or public URL for that image and copy it.
3. In your Send an email (V2) box, select the `</>` button at the top of the rich text editor.
4. In the body of your email where you want the image, type . for example, if your URL was <https://OneDrive/image.png> you would enter "".



Note: Keep in mind that your image quality may be reduced since inline image size is limited to 100KB, so you may want to format and crop your image to reduce the size of your image before you upload it.



Would you like help with any other tips for email customization?

18 minutes ago

No

3 minutes ago



Did that answer your question?

3 minutes ago

No

A minute ago



Sorry I wasn't able to help better. Would you like to check for other topics or search in the knowledge database?

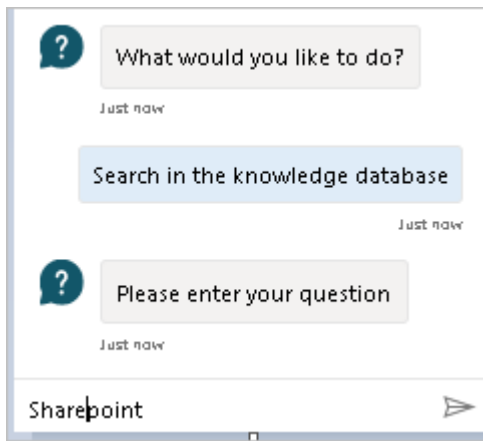
A minute ago

Yes

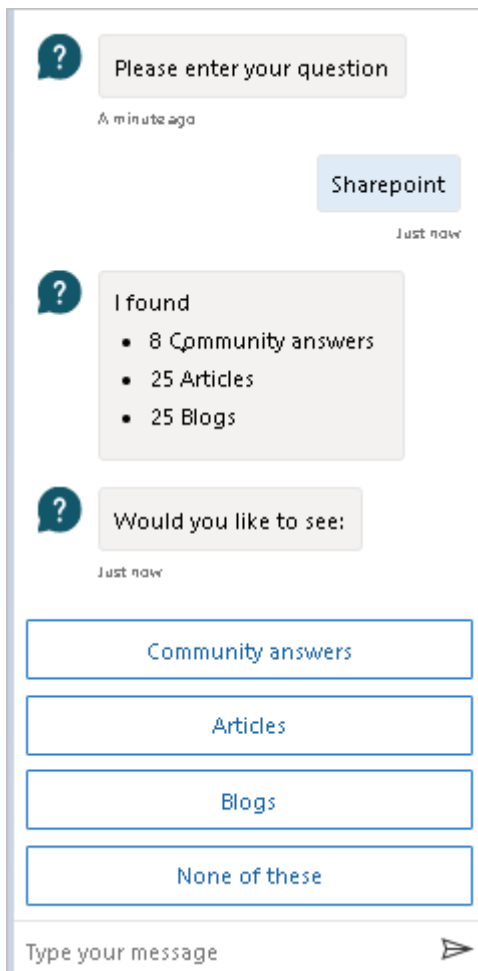
No

Type your message





7. Select a category to see the corresponding results





I found

- 8 Community answers
- 25 Articles
- 25 Blogs



Would you like to see:

Just now

Community answers

Just now



Community answers

- [Sharepoint](#): I have 3 lists in Sharepoint 2 of those lists get synced into the 3rd list. I am creating the items in those 2 lists, but for some reason, the 3rd lists is not syncing everything in or it is gettin...
- [Sharepoint excel to sharepoint list](#): Hello all, I have an excel table with 3 date columns submitted, action, completed, along with other data. I have build a flow to make a SharePoint list. However the dreaded date doesn't come...

# Share a cloud flow

Article • 10/30/2023

Share a cloud flow with others in your organization and guest users so they can also benefit from automation you've created. There are three primary ways to share a cloud flow in Power Automate:

- Add an owner to a cloud flow.
- Share a cloud flow with run-only privileges.
- Share a copy of a cloud flow.

## Prerequisites

- You must have either a [Power Automate license \(except the free license\)](#) or a seeded license (Office 365, Dynamics 365 Enterprise plans, Dynamics 365 Professional plans, Dynamics 365 Team Member, Power Apps (Canvas and Model driven Apps)- Per App plans, Power Apps per user plan, Power Apps Plan 1 (grandfathered), Power Apps Plan 2 (grandfathered), Windows licenses) to share a cloud flow.
- You must be the creator or owner to add or remove owners from a cloud flow.

## About embedded and other connections

Connections used in a cloud flow fall into two categories:

- **Embedded:** These connections are used in the flow.
- **Other:** These connections have been defined for a cloud flow, but aren't used in it.

If you stop using a connection in a cloud flow, that connection appears in the **Other connections** list, where it remains until an owner includes it in the flow again. To make changes to embedded connections, follow the steps in [Modify a connection](#), later in this article.

The list of connections appears under the list of owners in a cloud flow's properties.

## Add an owner to a cloud flow

Adding an owner to a cloud flow is the most common way to share a cloud flow. Any owner of a cloud flow can perform these actions:

- View the run history.

- Manage the properties of the flow (for example, start or stop the flow, add owners, or update credentials for a connection).
- Edit the definition of the flow (for example, add or remove an action or condition).
- Add or remove other owners (but not the flow's creator), including guest users.
- Delete the flow.

If you're the creator or an owner of a cloud flow, you'll find it listed on the **Team flows** tab in Power Automate.

#### 📌 Note

Shared connections can be used *only* in the flow in which they were created.

Owners can use services in a cloud flow but can't modify the credentials for a connection that another owner created.

To add more owners to a cloud flow:

1. Sign in to [Power Automate](#), and then select **My flows**.
2. Select the flow that you want to share, select the vertical ellipsis (:), and then select **Share**.
3. Enter the name, email address, or group name for the person or group that you want to add as an owner.

The user or group you've selected becomes an owner of the flow.

Congratulations—you've created your team flow!

## Add a list as a co-owner

You can add SharePoint lists as co-owners of a cloud flow so that everyone who has edit access to the list automatically gets edit access to the flow. After the flow is shared, you can simply distribute a link to it. More information: [Training: Create and set up a SharePoint list](#)

Use a list when the flow is connected to SharePoint, and use a group in all other cases.

#### 📌 Important

- SharePoint users must have **Edit** permission or be a member of the **Members** or **Owners** group to run flows in SharePoint.

- Adding a list as a co-owner is not available in GCC High and DoD tenants.

## Remove an owner

When you remove an owner whose credentials are used to access Power Automate services, you should update the credentials for those connections so that the flow will continue to run properly. To learn more, go to [Modify a connection](#).

1. On the flow details page, in the **Owners** section, select **Edit**.
2. Select **Delete** (the trash can) for the owner you want to remove.
3. In the confirmation dialog box, select **Remove**.

Congratulations—the user or group that you removed is no longer listed as an owner of the flow.

## Modify a connection

You might need to change the owner of a connection in a cloud flow if you remove the existing owner or if you just want to use a different account to sign in to an action or trigger.

1. Go to the flow that you want to modify.
2. Select **Edit**.
3. Select the ellipsis (...) in the step where you want to edit the connection.
4. If you have a connection already, select it; if not, select **Add new connection** to create a new connection, and then select **Sign in** to create your new connection.

## Share a cloud flow with run-only permissions

Instant flows (that is, flows that use a manual trigger such as a button or an item being selected) can be shared by using run-only permissions. Any user who's added as a run-only user won't have access to edit or modify the flow in any way; they'll only have permissions to trigger the flow.

To add a run-only user:

1. On the flow details page, in the **Run only users** section, select **Edit**.

2. In the **Manage run-only permissions** panel, specify the users and groups you want to provide run-only access to.
3. As an owner, you can specify whether run-only users will need to provide their own connections or you can choose use a connection that's already defined in the flow.

The screenshot shows the 'Request Audit' flow details and the 'Manage run-only permissions' panel. The 'Connections Used' section is highlighted with a red box, showing a dropdown menu with options like 'Provided by run-only user' and 'Use this connection (admin@onmicrosoft.com)'.

Congratulations—the user or group now has access to run the flow.

To remove a run-only user:

1. On the flow details page, in the **Run only users** section, select **Edit**.
2. In the **Manage run-only permissions** panel, select **Delete** (the trash can) next to the user whose access you want to remove, and then select **Save**.

Congratulations—the user or group no longer has access to run this flow.

## Send a copy of a cloud flow

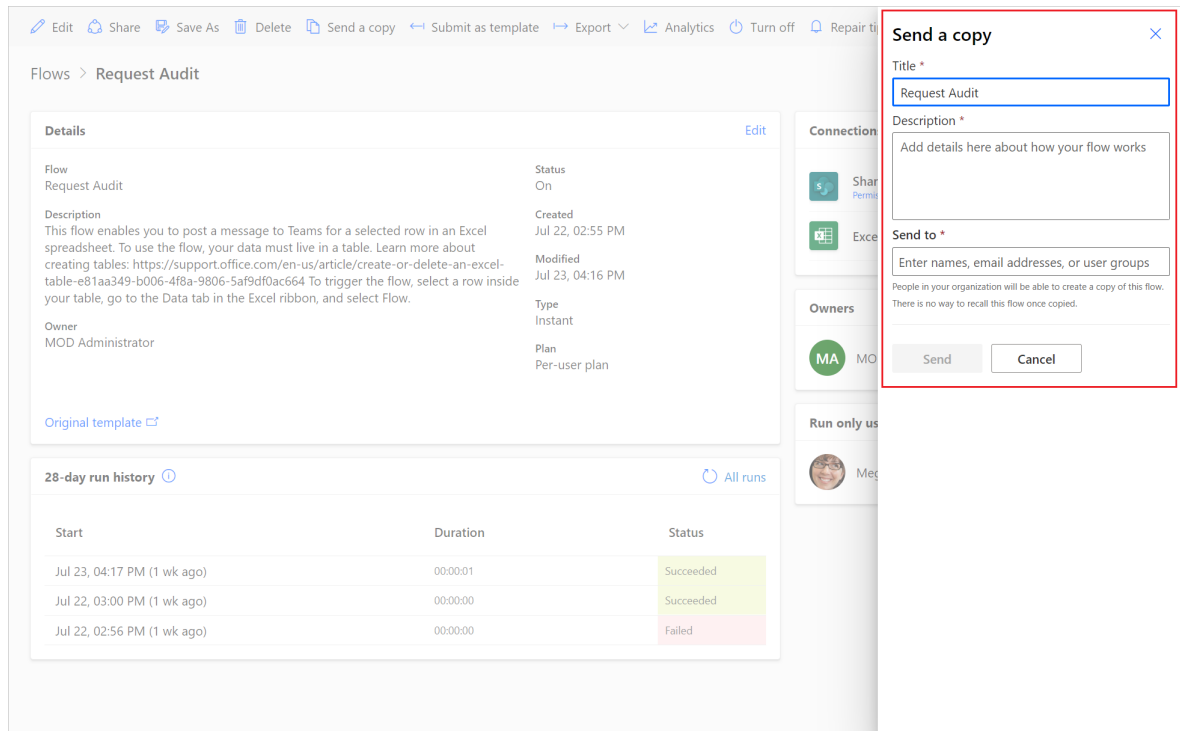
You can send a copy of a cloud flow to another user, who can then use the definition of the flow as a template. It provides a good way for you to share the general structure of a cloud flow without sharing any connections, while also allowing the recipient to modify their flow independently of yours, so they can make it fit their needs.

**Note**

Sending a copy creates an independent instance of the flow for the recipient. You can't revoke access to the flow after you share it.

## To send a copy of a cloud flow

1. On the flow details page command bar, select **Send a copy**.
2. On the **Send a copy** panel, you can edit the name and description of the flow you want to share, and specify the users with whom you want to share it.



The screenshot shows the Microsoft Power Automate interface. The main window displays the details for a flow named "Request Audit". The "Details" section includes the flow name, status (On), description, creation and modification dates, owner (MOD Administrator), type (Instant), and plan (Per-user plan). Below this is a "28-day run history" table with columns for Start, Duration, and Status. The "Send a copy" dialog box is open on the right, with a red border. It contains fields for "Title \*" (filled with "Request Audit"), "Description \*" (with a placeholder "Add details here about how your flow works"), and "Send to \*" (with a placeholder "Enter names, email addresses, or user groups"). There are "Send" and "Cancel" buttons at the bottom of the dialog.

Start	Duration	Status
Jul 23, 04:17 PM (1 wk ago)	00:00:01	Succeeded
Jul 22, 03:00 PM (1 wk ago)	00:00:00	Succeeded
Jul 22, 02:56 PM (1 wk ago)	00:00:00	Failed

3. The recipient will receive an email stating that you have shared a cloud flow template with them, and they can then create their own instance of that flow.

## FAQ

### Manage flows when the user who created a shared flow leaves the organization

If the shared flow still has an active owner, the flow continues to run.

#### ⓘ Note

If the flow uses any active or embedded connections that belong to the user who has left the organization, those specific actions might fail. To fix this, follow the steps in **Modify a connection**, earlier in this article to update the credentials.



If there's no active owner for a flow, you should change the owner. To change the owner of a flow, make a copy of the flow, and then let the intended owner create the flow from the copy.

## Change the owner of a solution-aware cloud flow

[Edit the details](#) to change the ownership of a solution-aware cloud flow.

## Change the owner of a non-solution-aware cloud flow

To change the ownership of a non-solution-aware cloud flow, you must create a new flow via export/import, **Save as**, or **Send a copy**. In-place ownership change for non-solution-aware cloud flows is not available because the owner is part of the flow identity.

## Share ownership of a solution-aware cloud flow with a user who isn't in Dataverse

When you share ownership of a solution-aware cloud flow with a user who isn't in Dataverse, that user gets added into Dataverse automatically to facilitate sharing. In a default environment, Microsoft Entra ID (Microsoft Entra ID) users have the EnvironmentMaker role. In a non-default environment, Microsoft Entra users and groups are added into Dataverse but they aren't assigned the EnvironmentMaker role automatically. Therefore, they may only be able to run the flow until an administrator assigns them a role. If the user doesn't have an appropriate role, they will see a detailed error message.

## Can connections be provided by the user that runs the flow?

Yes. When a connection is configured to be **Provided by run-only user**, then that connection is provided by the user who runs (or invokes) the flow.

## Can a connection provided by run-only user be used by another user?

No. When a connection is configured to be **Provided by run-only user** then that connection is provided by the user that runs (or "invokes") the flow. Embedded connections are used by all users of the flow, but connections provided by a run-only

user are used only by the user that provides them. When the flow connects to a service via a connector, then the **Provided by run-only user** connections will allow the flow to act as the run-only user and access the data that the user has access to. If the flow is exported, then the **Provided by run-only user** connections have a **RuntimeSource** value of **invoker**.

# Support for guest users

Article • 10/30/2023

The Power Automate experience for guest users is the same as it is for nonguest users, with some stipulations. A guest user can be a vendor or customer in a tenant of their own organization who needs access to a tenant in another organization. Guest users have the same experience in both the Power Automate portal and the Power Automate mobile app. They're sometimes referred to as external users.

This article should help you understand the scenarios that are supported for guest users.

## ⓘ Note

Guest users aren't currently supported in Process Mining.

## Prerequisites

A guest user must meet the following criteria:

- Have a Power Automate license assigned through either the tenant that hosts the flow, or the home tenant of the guest user. To learn more about licensing implications, go to [FAQs about licenses](#).
- Sign in and consent to Power Automate.

## Licensing requirements

A user can become a guest user if both these criteria are met:

- They're invited to a tenant through the Microsoft Entra admin portal.
- An Office 365 plan, or any plan with a Power Automate license is assigned to the guest user.

## Supported capabilities

A guest user can create flows, run flows, and make changes to flow runs. The following sections provide details.

## Sharing

If a guest user needs to only run a flow, they need to have the **Sharing-Run Only** role assigned. If they need to edit flows and perform actions to flow runs such as canceling or resubmitting a flow run, they need a co-owner role assigned.

## Approvals

A guest user can be assigned an approval, receive an approval email, and be routed to the **Approvals** page in the guest tenant to approve or reject. They can also view and interact with the approval email body in the same way as a nonguest user.

Guest users can't see the approvals from their guest tenant while they're in their original tenant, or from their original tenant while they're in their guest tenant.

## Widgets

A guest user can create, manage, or run flows using widgets in apps like SharePoint, Teams, Excel, Power BI, and more.

## Search for a guest user

A nonguest user can search for, find, and select a guest user in a trigger or action. As they start typing the name of the guest user, they see a list of names to choose from in the dropdown list. When they see the name of the guest user, they can select it. This saves the nonguest user time because they don't need to finish typing the entire name.

Some connectors don't support this capability.

## Set up Business to Business (B2B) collaboration

To set up B2B collaboration between tenants in different clouds, both guest user and nonguest user tenants need to configure their Microsoft cloud settings to enable collaboration with the other cloud. Then, each tenant must configure inbound and outbound cross-tenant access with the tenant in the other cloud. To learn more, go to [Configure Microsoft cloud settings for B2B collaboration](#).

## Related information

- [Microsoft Entra B2B in government and national clouds](#)
  - [Assign Azure roles to external guest users using the Azure portal](#)
-

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗

# Support for service principal owned flows

Article • 04/05/2024

Power Automate has the ability for service principal application users to own and run flows to provide flexibility and stability in how organizations administer Power Automate flows.

## Service principal application users

A [service principal](#) is a non-human security identity that represents an application or service that can own and manage resources within Azure and the Power Platform. To use a service principal in the Power Platform, a service principal application user needs to be created that represents the service principal [through the portal](#) or [through API](#). An application user can have connections shared with them and own resources such as flows.

## When to use service principal application user

We recommend that the flow runs under the service principal in the cases listed in this section.

- Mission critical flows that service departmental or enterprise-wide scenarios. This insulates the flow ownership from the lifecycle of the owner and prevents issues when:
  - The owner of the flow leaves the organization or their role changes.
  - Premium license of the flow owner were to be unassigned and their flow utilizes premium capabilities.
- If the organization uses DevOps pipelines to deploy the flow across Dev, Test, and Production environments.

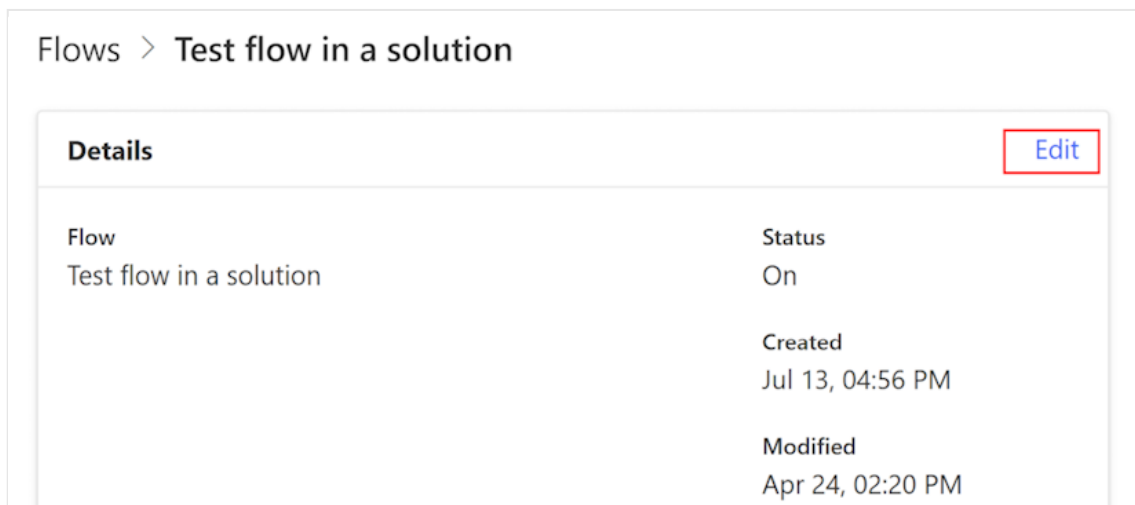
Since a service principal application user is a [non-interactive user](#) without a user license, it's subject to [non-licensed user limits](#) and has special [licensing and request limit implications](#).

The flow [connections need to be shared](#) with the service principal application user in order for them to successfully run the flow.

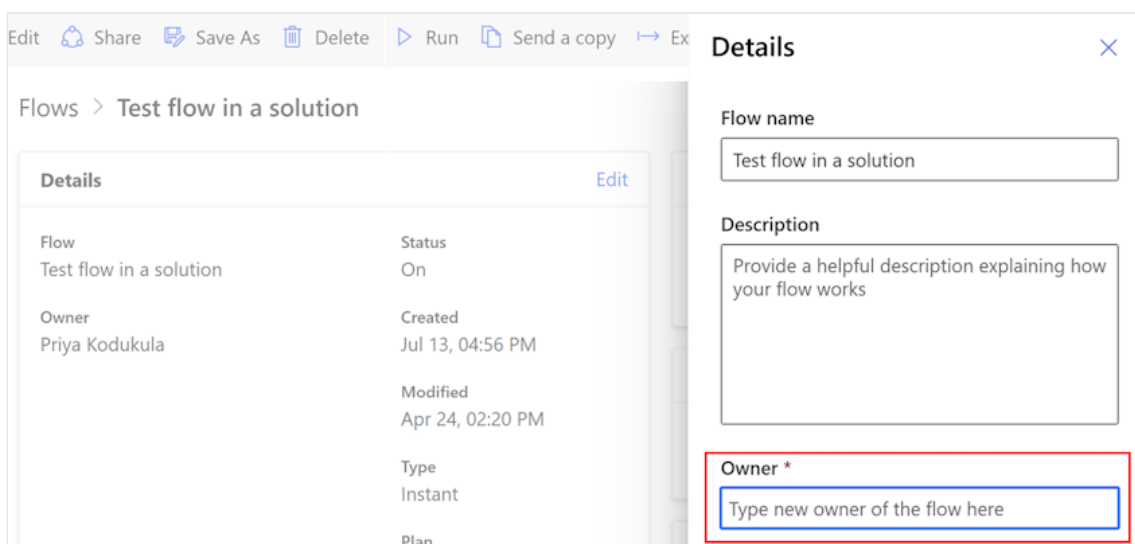
## Prerequisites

To have a service principal own and run a flow, follow these steps.

1. [Create a service principal application user](#) representing the Microsoft Entra ID service principal.
2. [Share connections](#) with the service principal application user.
3. Change the owner of the flow to the service principal application user using these steps:
  - a. On Power Automate portal, open a flow.
  - b. On the **Details** section, select **Edit**.



- c. Replace the **Owner** with the name of the service principal application user.



### ⚠ Note

A service principal application user can't be made a co-owner of a flow. You can't find a service principal application user in the **Owners** edit dialog.


4. [Turn on the flow](#) so it's ready to run.

## Licensing requirements

A service principal application user is a [non-interactive user](#), so it can't have a user license associated with it. Premium service principal application user-owned flows need a Power Automate Process/Power Automate per-flow license. However, if a flow doesn't utilize premium connectors, or is used exclusively [within the context](#) of a Dynamics 365 application, it's exempted from the need for a Power Automate process or Power Automate per-flow license.

## Power Platform request limits

To learn about service principal application user-owned flows, go to [non-licensed user limits](#).

 [Expand table](#)

Products	Pooled non-licensed tenant-level requests per 24 hours	Details
Service principal flows in context of Dynamics 365 Enterprise & Professional applications <sup>1</sup>	500,000 base requests + 5,000 requests accrued per USL <sup>1</sup> up to 10,000,000 max <sup>2</sup> The flows can use both standard and premium connectors.	The following service principal owned flows are considered in context of Dynamics 365 apps:  In an environment with Dynamics 365 app installed and using Dataverse connector to talk to Dynamics entities in the environment.  Or  Using first party Dynamics connectors like finance and operations.  Or  <a href="#">Flows associated with a Dynamics 365 app.</a>
Service principal flows in context of Power Apps	Flows using standard connectors only - 25,000 base requests with no per-license accrual for the	The following service principal owned flows are considered in context of Power Apps:

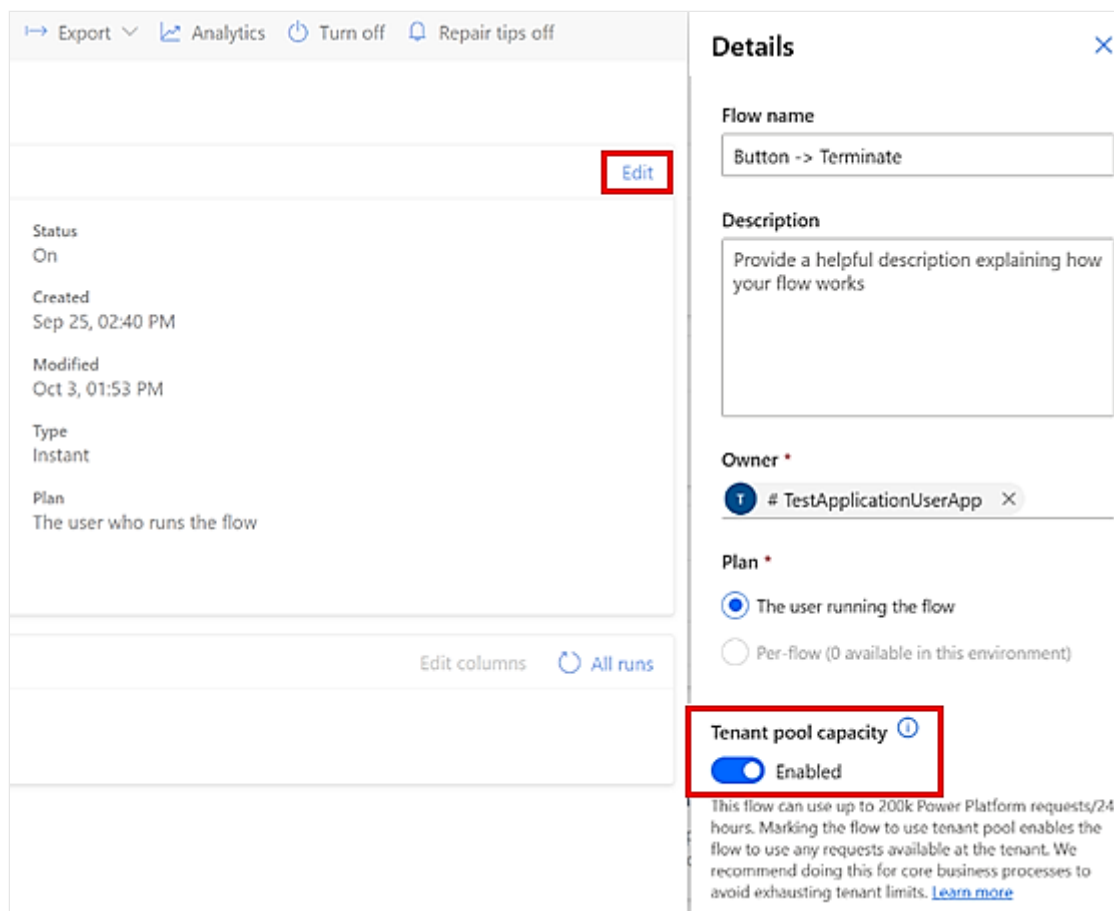


Products	Pooled non-licensed tenant-level requests per 24 hours	Details
	tenant. Flows using premium connectors need a Power Automate Process/Power Automate per-flow license and can get up to 250,000 requests per flow.	Triggered from the canvas apps.  Or  Use Dataverse <b>For a select record</b> trigger in model driven app.  Or <a href="#">Flows associated with</a> a Power App.
Service principal flows in a tenant with Power Automate licenses	Flows using standard connectors only - 25,000 base requests with no per-license accrual for the tenant  Flows using premium connectors need a Power Automate Process/Power Automate Per-flow license and can get up to 250,000 requests per flow.	

## Tenant pool

Service principal flows in context of Dynamics 365 applications get 500,000 base requests + 5,000 requests accrued per USL1 up to 10,000,000 max. However, to avoid a poorly designed flow using up the tenant pool and impacting all service principal owned flows in the tenant, a maker can now enable Tenant pool on core business flows.

1. Go to the Service principal flows in context of Dynamics application.
2. On the **Details** tile, select **Edit**, and then enable **Tenant pool capacity**.



Turning on tenant pool on the flow enables the flow to use higher Power Platform requests. During the [transition period](#), the flow that has tenant pool enabled can go up to 10M Power Platform requests in 24 hours and the [performance profile](#) on the flow is UnlimitedExtended. Service principal flows in context of Dynamics application with tenant pool disabled can go up to 200K in Power Platform requests in 24 hours and the [performance profile](#) on the flow is Medium.

All service principal flows created before October 20, 2023 have Tenant pool enabled and use performance profile of UnlimitedExtended. A maker can disable the setting anytime. All service principal flows created after October 20, 2023 have Tenant pool disabled and use Medium performance profile. However, a maker can enable Tenant pool on the flow anytime. Once it's enabled, the flow has a performance profile of UnlimitedExtended and can scale up to 10M requests in 24 hours. It can take up to seven (7) days for the change to reflect. To force refresh, edit and save the flow for the change to take effect immediately.

## Known issue

If a flow owned by a service principal tenant pool was turned on, importing the flow as non application user throws an error.

# Export and import a non-solution flow

Article • 01/31/2024

You can export and import non-solution flows by using packages. This feature allows you to export one flow from one environment and import it to another. Export and import packages have the file format *.zip*.

If you would like to export and import multiple flows, you can either use solutions, as described in the [Export a solution](#) and [Import a solution](#) articles, or you can [copy an environment](#).

## 📘 Important

- You must have [third party cookies](#) enabled to export and import non-solution flows .
- For application lifecycle management (ALM) capabilities in Microsoft Power Platform environments, use Microsoft Dataverse and solutions instead of the package export and import. More information: [Overview of ALM](#)
- Flow packages can't be used with [Dataverse solution packages](#) because of the package incompatibility.

## Resources included in the package

When you export a flow, the dependent resources for your flow are also exported into the package.

 Expand table

Resource	Supported	Import options
Flow	Yes	There are two options to import a flow into an environment: <ul style="list-style-type: none"><li>• <b>Create as new:</b> The flow is created as a new flow into the environment where the package is imported.</li><li>• <b>Update:</b> The flow already exists in the environment and is updated when this package is imported.</li></ul>

## Permissions required to import and export a non-solution flow

Only the [owner or co-owner](#) of a flow can export the flow. To import a flow, the [Environment Maker](#) is required on the destination environment.

## Export a flow package

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **My Flows** > **Cloud flows**, and then select the flow you want to export.
3. On the menu, select the down arrow next to **Export**, and then select **Package (.zip)**.
4. On the next screen, enter a name and description for your package.
5. *(Optional)* Configure the package.

- a. Under **Review Package Content** in the **ACTION** field, select **Configure** (the tool icon).

- b. Select **Update (default)** or **Create as new**.

For a description of these options, go to the table in the [Resources included in the package](#) section in this article.

- c. Select **Save**.

6. *(Optional)* Add a comment.
  - a. Under the **Review Package Content** heading in the **ACTION** field, select **Comment** (the speech balloon icon).
  - b. Enter your comment.
  - c. *(Optional)* You can view multiple lines in your comment by using the up and down arrows in the scroll bar. Alternatively, you can enlarge the field by selecting and dragging the diagonal lines on the lower right corner of the field.
  - d. Select **Save**. The icon in the **ACTION** column now contains quotation marks to indicate there's a comment.

7. On the bottom right corner, select **Export**.

Your package starts downloading shortly after. If your download doesn't start automatically, select **Download**.

8. When you're ready to import a flow, you'll need the downloaded .zip file.

## Import a flow

1. On the left navigation pane, select **My Flows**.
2. On the menu, select **Import > Import Package (Legacy)**.
3. Select **Upload > your zip file > Open**.
4. The **Upload** button now reads **Uploading**, and the name of your .zip file appears to the left of the button.

When the upload is complete, the package details appear.

5. In the **IMPORT SETUP** column in the first row, select the content in the field, and then select **Create as New** or **Update** from the **Setup** dropdown menu.

For a description of the fields in the **Setup** menu, go to [Resources included in the package](#).

6. Select **Save**.
7. Under **Related Resources**, do the following steps:
  - a. In the **IMPORT SETUP** column, select the contents of the field for each row.
  - b. In the **Import setup** dialog, select the item if it's required to set up the flow to place a checkmark at the end of the row.

Import setup ✕

**Setup**

Select during import ▾

The package creator chose this setup. You can make changes to the import here.

---

The connection or custom API already exists in the environment and must be selected when this package is imported.

+ **Create new** ↻ **Refresh list**

NAME	RESOURCE TYPE	
MSN Weather	5 mo ago	✓

c. Select **Save**.

8. The **Import** button becomes active once you've successfully configured all the required settings. Select **Import**.

## Related information

- [Export a solution](#)
  - [Import a solution](#)
  - [Share a cloud flow](#)
  - [Send a copy of a cloud flow](#)
- 

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Drafts and versioning for cloud flows

Article • 06/28/2024

When you're authoring a solution cloud flow, you can save drafts in Microsoft Dataverse before the flow is complete. Then, the flow can be published when you're ready to run the flow. As you're evolving the flow, a version history is built up in Dataverse and can be accessed on the version history panel.

## Availability

The flow drafts and versioning feature set is available only for [solution cloud flows](#). Solution cloud flows can be [created directly in a solution](#), [added into a solution](#), or created by default if the [Create in Dataverse solutions environment setting](#) is enabled.

The flow drafts and versioning feature set is being released slowly across specific environments region-by-region. When drafts and versioning capabilities show up in an environment in your region, allow two weeks for full release in that region.

## Save drafts

Save a draft of a flow whenever you want, even with errors. Make changes to your flow with confidence at your own pace.

1. Open the flow in the designer.
2. Make changes as needed.
3. Select **Save draft**.

A confirmation message appears in the information bar.

The flow state is visible next to the flow title.

## State indicator

The state of the flow (*Draft* or *Published*) shows beside the flow title to indicate if that version of the flow was published, or if the flow has draft changes.

## Publish a flow

When you're ready for changes to a flow to have an effect at runtime, the flow can be published.

1. Open the flow in the designer.
2. Make changes as needed.
3. Select **Publish**.

A confirmation message appears in the information bar.

## Version history

Review a flow's version history list to understand how it evolved. View flow versions grouped by day with indicators for *Latest version*, *Published*, and *Past published*.

1. Open the flow in the designer.
2. Select **Version history**.

The version history panel opens.

## Version restore

When you view a flow's version history list, you can select a previous version for review, and optionally restore it as a new draft.

1. Open the flow in the designer.
2. Select **Version history**.

The version history panel opens.

3. Select a previous version.
4. Select **Restore**.
5. Confirm the restore action.

The flow is now the latest draft in the version history.

## FAQ



## Why is the drafts and versioning feature set only available for solution cloud flows?

Dataverse is the storage used for drafts that aren't published. It's also the storage used for version history. Solution cloud flows are defined in Dataverse, so they can have drafts and a version history.

## How do I change a non-solution cloud flow into a solution cloud flow?

When you [add your non-solution cloud flow into a solution](#), it adds the definition into Dataverse so it can have versions.

## Can co-owners see a full version history or only their own changes?

Co-owners can see a full version history of changes from any user who made a change to the flow.

## Can notes or titles be added to versions?

Notes and titles can't be added to the version at this time.

## Can drafts be tested?

Not at this time. Currently, flow changes need to be published and runnable to be tested. We're exploring the concept of creating a second runtime representation of a single flow to facilitate testing.

## Is there a unique identifier for a version?

Timestamps are used to differentiate between versions. There's a GUID identifier used for each version, but that doesn't show in the version history cards. A simple integer identifier isn't available at this time.

## Can the version history list be filtered?

Not at this time.

## Can a summary of the version changes show in the version history cards?

Not at this time.

## Can copilot summarize the changes made to a flow over a certain time period?

Not at this time.

## Can versions be compared?

Versions can be compared by viewing them in succession, or by opening up another browser tab to view a specific version. A side-by-side comparison of versions isn't available at this time.

## Can connection permissions be associated with a certain version so a new connection authorization is needed when the flow is changed by a co-owner?

Not at this time.

## Which version is exported?

The last published version of a solution cloud flow is exported in a solution. Draft versions and version history aren't exported.

## What tables are used for drafts and version history?

Dataverse is the storage used for drafts and version history. Solution cloud flows are defined in Dataverse, so they can have drafts and a version history. The [Workflow table](#) has a row for the latest published and a row for the latest draft. The version history is stored in the [Component Version table](#).

## Known issues

**Changing flow URL:** When a solution cloud flow is first published, the URL contains the `workflowUniqueId` and this changes with each version. If the published flow is subsequently opened from the My Flows experience, then the `FlowId` is used in the URL

and it doesn't change. If the published flow is subsequently opened from the Solution Explorer experience, then the `workflowUniqueId` is used in the URL and it does change. We're planning to update the Solution Explorer experience to provide a static URL. In the interim, if you need a static URL reference, then open the flow from the My Flows experience.

## Related information

- [Manage and edit a cloud flow](#)
- [Create a solution](#)
- [Create a cloud flow in a solution](#)
- [Edit a solution-aware cloud flow](#)
- [Set a preferred solution](#)
- [Export a solution](#)
- [Import a solution](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Create a cloud flow from a template in Power Automate

Article • 09/05/2023

A good way to get started is to use a template that is suited to your organization's scenario. You can choose from a collection of templates to find the one that best matches your scenario. Search [all templates](#) or browse by category to find your scenario, and then follow the steps in the template to create a cloud flow from the template.

The following video gives insights into using templates to create your flows.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKZQv?postJsllMsg=true>

You can tweak templates by adding, editing, or removing triggers and actions to create your own flows. You can [copy paste actions](#) in the same flow or across flows to speed up the your tweaks.

Create a cloud flow from one of many built-in templates that can, for example, send you a Slack message when your manager sends you an email in Microsoft 365.

## Tip

**Create a cloud flow from scratch** if you already have a process in mind and can't find a template for it.

Here, we follow an example that uses a template to create a flow that sends you a Slack message when your manager sends you an email in Microsoft 365.

## Prerequisites

To complete this example, you need accounts with access to the following:

- [Power Automate](#)
- Slack
- Microsoft 365

## Choose a template

1. Sign in to [Power Automate](#).

2. On the left-side navigation pane, select **Templates**.
3. Use the search bar to search for **slack manager** to find the **Send a message on Slack when my manager emails me** template, and then select it.
4. If you aren't signed into Office or Slack, select **Sign in**, and then follow the prompts.
5. After you confirm your connections, select **Continue**.

Your flow appears, showing each action with an orange title bar.

## Customize your flow

1. Select the title bar for an event to expand it, and then customize it (for example, by specifying a filter on the email that interests you).
2. Actions that require input from you are automatically be expanded.

For example, the **Post message** action is expanded because you need to enter a channel, such as your *@username*. You can also customize the message content. By default, the message contains just the subject, but you can include other information.

3. Near the top of the screen, specify a name for your flow, and then select **Create flow**.
4. If you're satisfied with your flow, select **Save**.

Now, when your manager sends you an email, you receive a Slack message that contains the information that you specified.

## See also

- [Watch your flow in action](#)
- [Publish your own template](#)
- [Use a template with Microsoft Dataverse](#)
- [Get started with team flows and invite others to collaborate with you to design flows](#)

# Create a cloud flow from a description (preview)

Article • 08/15/2023

[This article is pre-release documentation and is subject to change.]

When you build automation with Power Automate, it might take valuable time to learn which actions and triggers you need, especially if you're new to the Power Automate. If you want to jump right in and get started, you can now just write a description of what you want to automate in everyday language. Supporting most of the connectors, Power Automate then uses OpenAI Codex to translate your description into code, and then provides a corresponding flow that you can create instantly.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

## Prerequisites

- A work or school account with access to a Power Automate [environment](#) that's based in Europe or the United States.

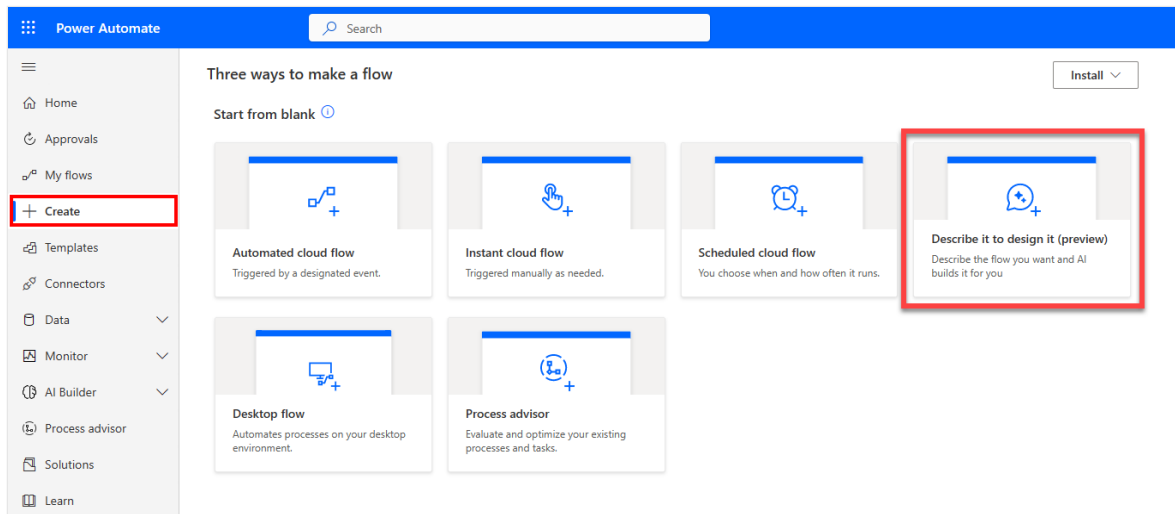
### Note

- You can't create cloud flows from a description if you're logged in with a Microsoft account.
  - If you don't have access to an environment that's based Europe or the United States, you can [create a new environment and select Europe or United States](#) as the region.
- Check current [limitations](#) for more information.

## Create a flow from a description

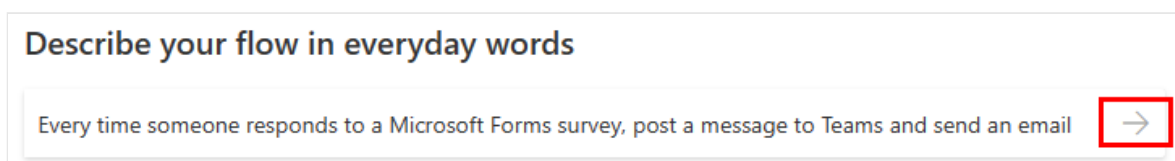
In the following example, we'll build an automated cloud flow that sends a notification through Teams and an email each time someone responds to a Microsoft Forms survey.

1. Sign in to [Power Automate](#).
2. On the left pane, select **Create** > **Describe it to design it (preview)**.



A screen opens where you can enter a description of what you want to automate. You'll also get an example you can use for inspiration and try it out right away. As an alternate, you can also go to **Home** and start describing your requirement. More information: [Create a flow using Copilot](#)

3. For this example, enter **Every time someone responds to a Microsoft Forms survey, post a message to Teams and send an email**.
4. Select **Confirm** (the right arrow).



Power Automate returns a suggested flow that corresponds to what you've entered.

#### ⓘ Note

If the suggestion doesn't correspond to what you're looking to automate, select **This isn't what I'm looking for**. You'll get guidance on what you can do next. This helps Microsoft to improve the AI behind this feature.

**Describe your flow in everyday words**

Every time someone responds to a Microsoft Forms survey, post a message to Teams and send an email →

**Suggested flow**

After you review this flow suggestion, select **Next** to start building it

**Trigger**  
The flow starts when this happens

When a new response is submitted  
Microsoft Forms

↓

**Actions**  
This is what the flow will do

Get response details  
Microsoft Forms

Get my profile  
Office 365 Users

Post message in a chat or channel  
Microsoft Teams

Send an email  
Office 365 Outlook









[This isn't what I'm looking for](#)

5. Select **Next**.

6. Set up all the connections needed to run the flow.

**Review your connected apps and services**

A green check means that connection's ready to go.

	<b>Microsoft Forms</b>		...
	<b>Office 365 Users</b> Permissions		...
	<b>Microsoft Teams</b>		...
	<b>Office 365 Outlook</b> Permissions		...

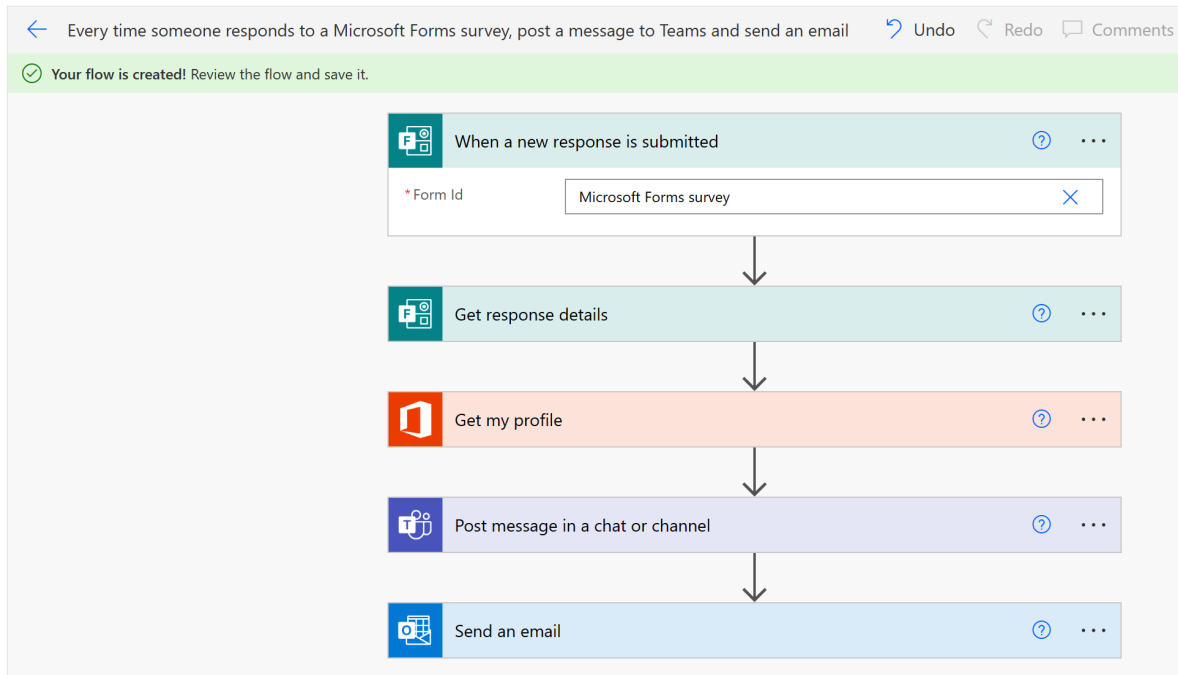
7. Select **Next**.

8. Enter the information needed to run the flow. For example, which form to use and to whom to send the Teams message and email. You can decide to fill in the information on this step or do it later in the designer.

9. Select **Create flow**.



And there you have it! Your flow has been built. Congratulations! You can decide to make any modification and edit the flow, or save and test it.



## Limitations

- Power Automate supports descriptions written in the English language only. Descriptions you write in other languages might work, but they are not supported.
- Cloud flows are the only type of flow that you can create from a description.
- In the current version, the AI might not fill in some parameters automatically, even if you provide them in the description.

## See also


[Learn more about cloud flows](#)

# Create a cloud flow in Power Automate

Article • 10/02/2023

Create a cloud flow that performs one or more tasks automatically after it's triggered by an event. For example, create a cloud flow that notifies you by email when someone sends a tweet that contains a keyword you specify. In this example, sending a tweet is the event, and sending mail is the action.

## Prerequisites

- An account on [Power Automate](#) 
- A Twitter account
- Office 365 credentials


### Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in [Understand the cloud flows designer with copilot capabilities](#).

Classic designer

## Specify an event to start the flow

First, select what event, or *trigger*, starts your flow.

1. Sign in to [Power Automate](#) .
2. From the navigation bar on the left, select **My flows**.
3. Select **New flow**, and then select **Automated cloud flow**.
4. In the **Flow name** field, give your flow a name.

If you skip this step, Power Automate will generate a name for you.

5. In the **Search all triggers** field, enter **twitter**.
6. Select **When a new tweet is posted - Twitter**.

Flow name

Twitter test flow

Choose your flow's trigger \* ⓘ

Search or select a trigger from the list below to create a flow. (Required)

twitter

When a new tweet is posted  
Twitter ⓘ

7. At the bottom of the screen, select **Create**.

#### 💡 Tip

Connectors support multiple types of authentication. For example, SQL Server supports Azure AD, SQL Server authentication, Windows authentication, and SQL connection string. Users choose which type of authentication they want to use when configuring a connector.

8. If you haven't already connected your Twitter account to Power Automate, select **Sign in to Twitter**, and then provide your credentials.

9. In the **Search text** box, type the keyword that you want to find.

## Specify an action

1. Select **New step**.

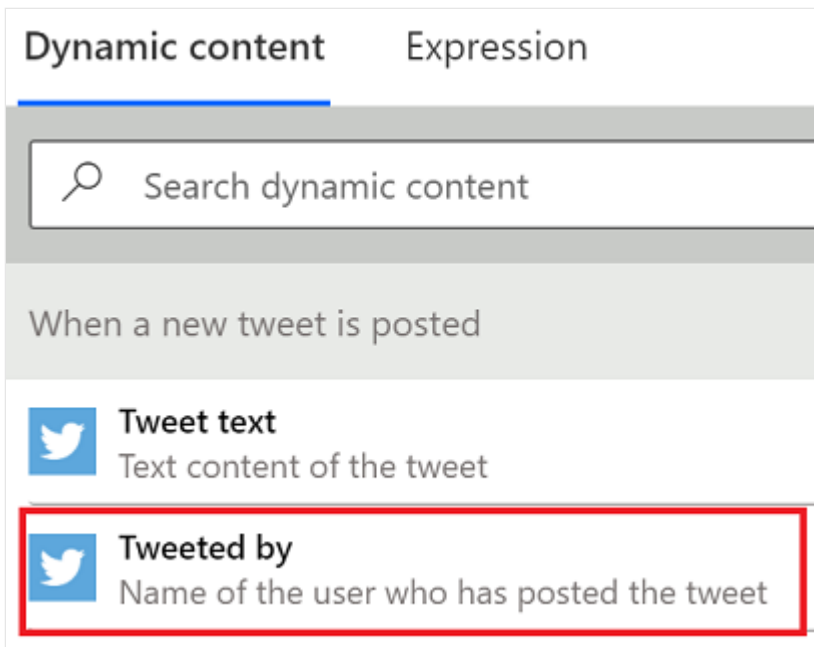
2. In the box that shows **Search connectors and actions**, enter **send email**, and then select **Send an email (V2)**.

3. If prompted, select the sign-in button, and then provide your credentials.

4. In the form that appears, enter your email address in the **To** box, and then select your name from the list of contacts that appears.

5. In the **Subject** box, enter **New tweet from:**, and then type a space.

6. In the list of tokens, select the **Tweeted by** token to add a placeholder for it.



7. Select the **Body** box, and then select the **Tweet text** token to add a placeholder for it.

Optionally, you can add more tokens, other text, or both to the body of the email.

8. Near the top of the screen, select **Save**.

## Test your flow

Send a tweet with the keyword that you indicated, or wait for someone else to post such a tweet.

Within a minute after the tweet is posted, an email message notifies you of the new tweet.

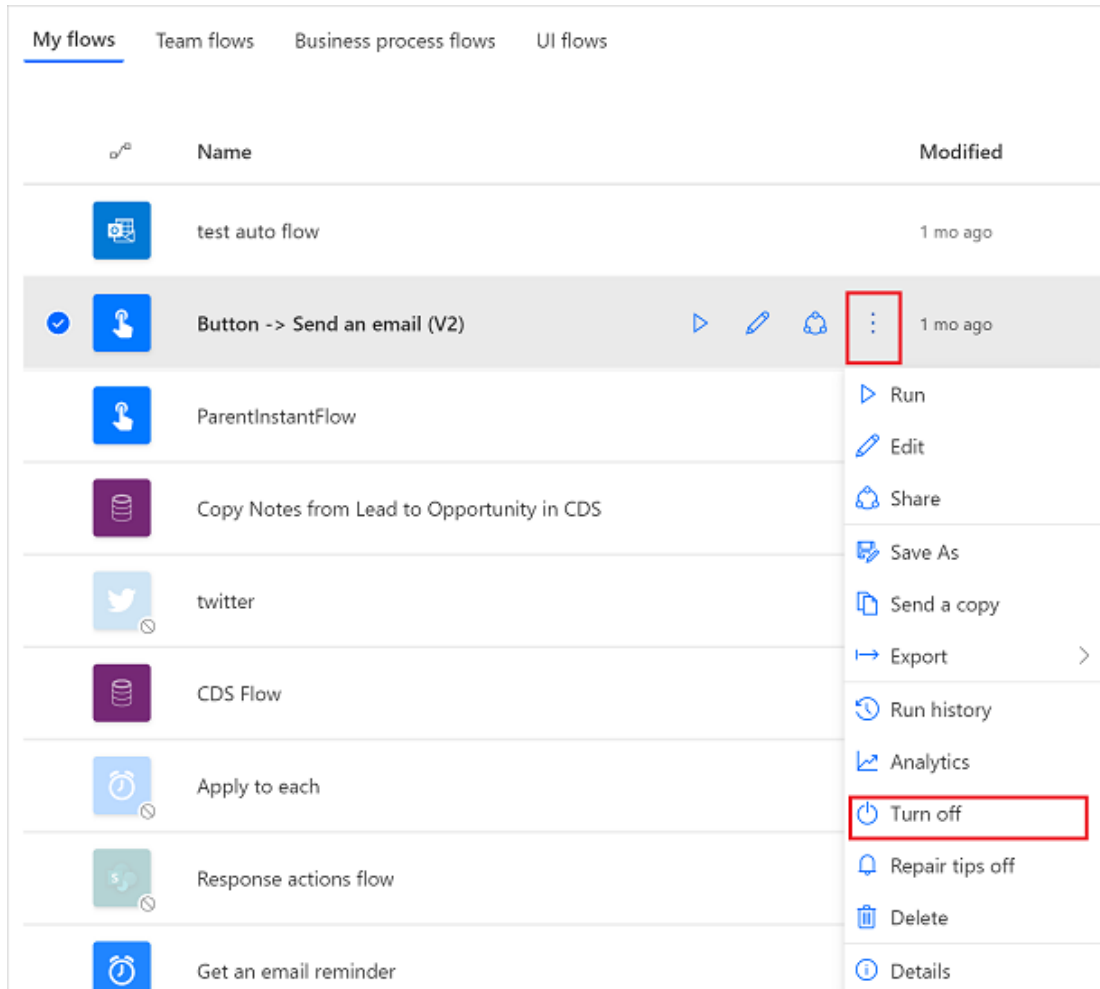
### Tip

Use the **Send email (V2)** action to format email in which you customize the font, use bold, italic or underline, customize the color and highlight, and create lists or links, and more.

## Manage a cloud flow

You can have up to 600 flows in your account. If you already have 600 flows, delete one before you create another flow.

1. Sign in to [Power Automate](#) .
2. In the navigation bar on the left, select **My flows**.
3. In the list of flows, do any of the following:
  - To pause a cloud flow, set its toggle to **Off**.



- To resume a cloud flow, set its toggle to **On**.
- To edit a cloud flow, select the pencil icon that corresponds to the flow you want to edit.
- To delete a cloud flow, select the ... icon, select **Delete**, and then select **Delete** on the message box that appears.
- To view the run history of a cloud flow, select the flow from the **My flows** page, and then view the history under the **28 day run history** section of the page that opens.

Select a cloud flow run from the list of runs to see the inputs and outputs of each step.

## See also

- [Add steps](#), such as different ways to be notified, to your flow.
- [Run tasks on a schedule](#), when you want an action to occur daily, on a certain date, or after a certain number of minutes.
- [Add a cloud flow to an app](#)
- [Get started with team flows](#) and invite others to collaborate with you to design flows.

# Create flows from the OneDrive for Business launch panel

Article • 04/14/2023

Similar to the Power Automate [Launch Panel in SharePoint](#), you can run flows on specific files in OneDrive for Business.

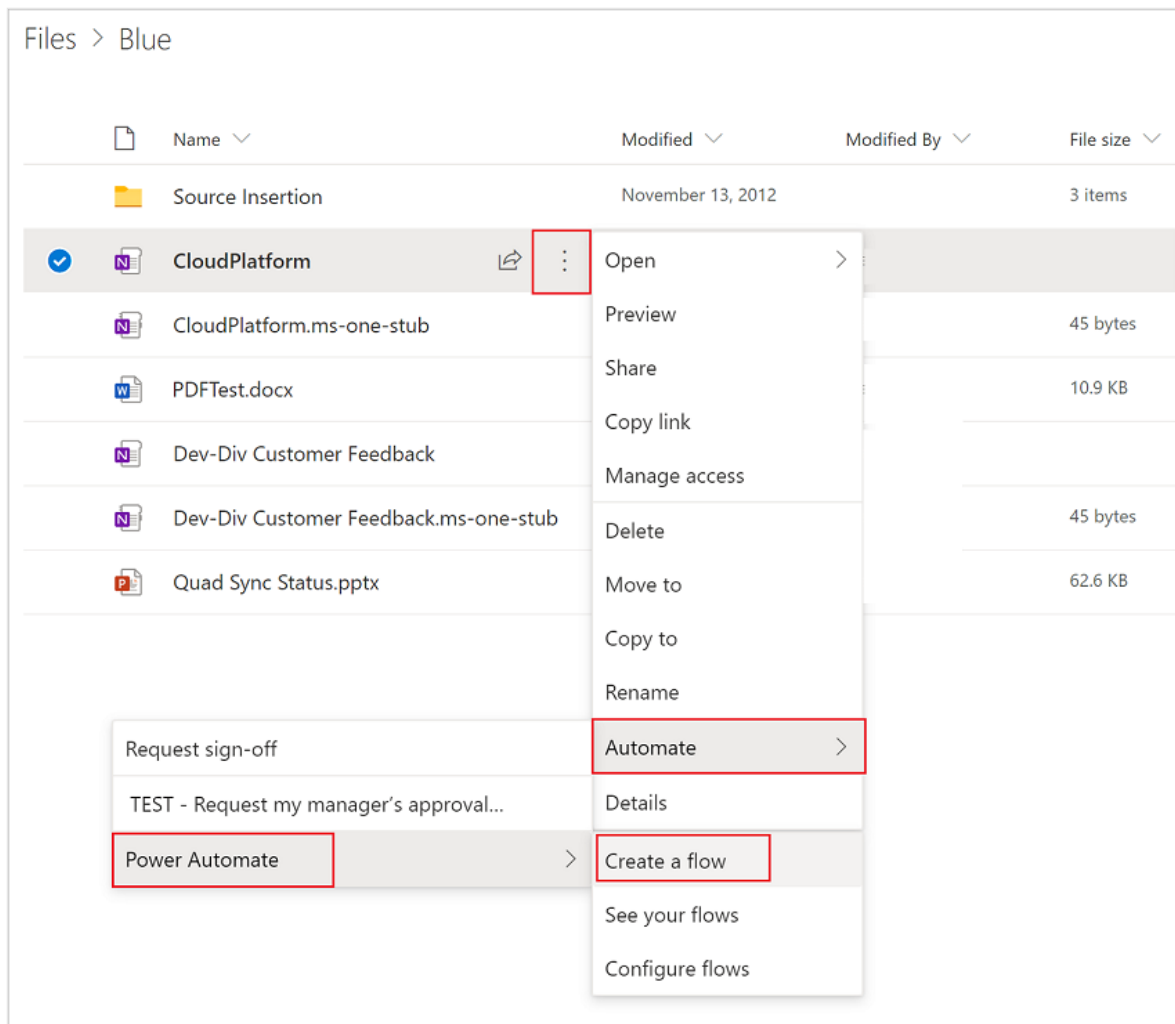
This feature enables the person running the flow to use their own credentials, which is especially applicable for flows that have been created by an IT department.

Users can also get prompts for runtime inputs like **Approver** or **Message**, which can be of type text, file, email, Boolean, or number.

In this tutorial, we'll create a simple flow that uses one of the many [OneDrive for Business templates](#) to request approval of a file by the requestor's manager.

## Create a cloud flow that requests manager approval for a file in OneDrive for Business

1. Sign in to OneDrive for Business.
2. Find, and then select the file for which you want to create the flow.
3. Select the **Show actions** link (three dots).
4. Select **Automate** > **Power Automate** > **Create a flow**.



5. Select one of the available templates.






In this example, select the **Request my manager's approval for the selected file** template.



×

## Create a flow

Start with a template and create automated tasks between your OneDrive data and other apps. Choosing a template will open the Power Automate site where you'll finish creating your flow.

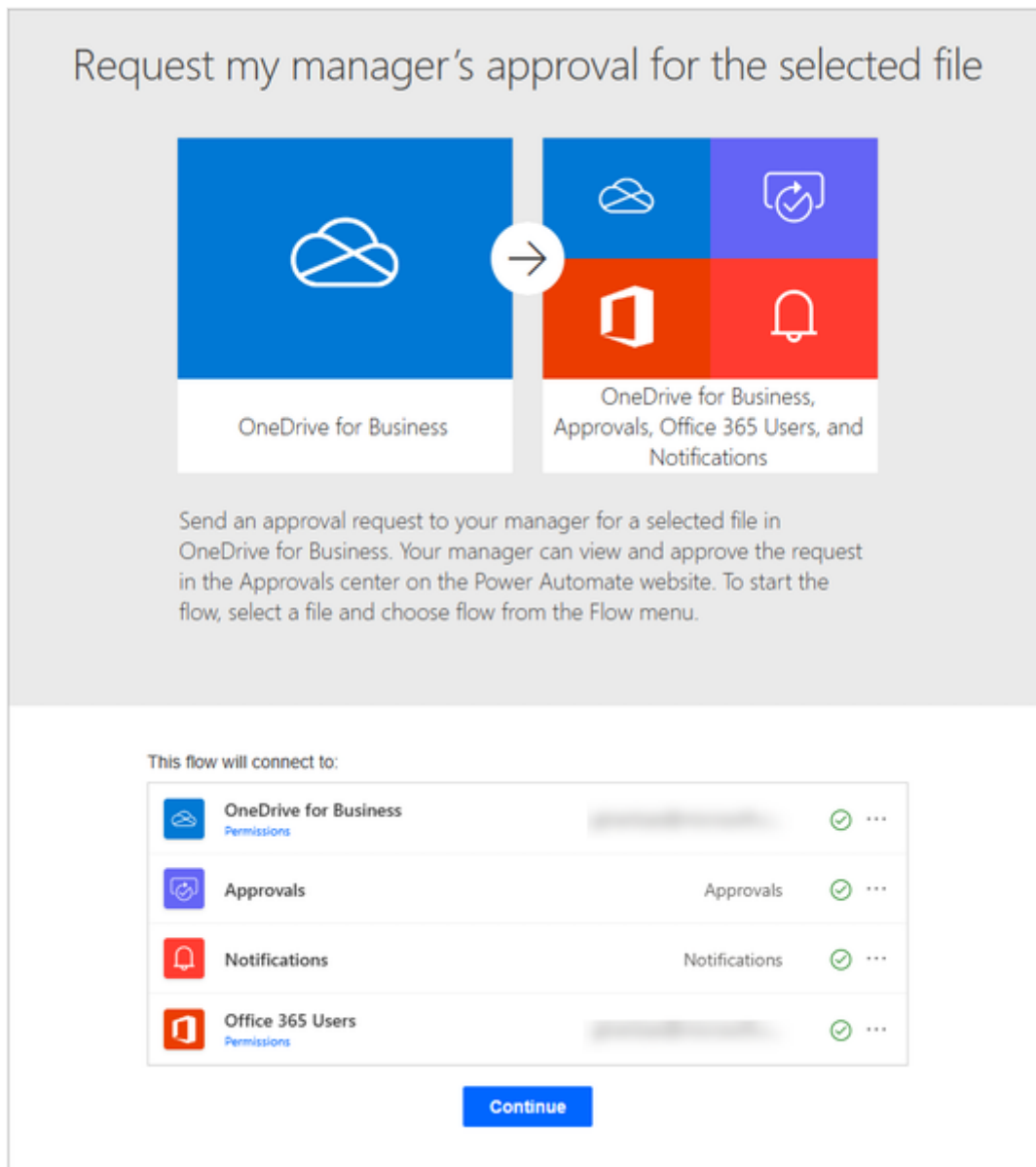
-  Request my manager's approval for the selected file
-  Start manager approval for the selected file
-  Get signatures on a selected file in OneDrive for Business
-  Post a message to Teams for the selected file
-  Post a message to Yammer for the selected file

Show more ▾

[See your flows](#)

[Learn more about Power Automate](#)

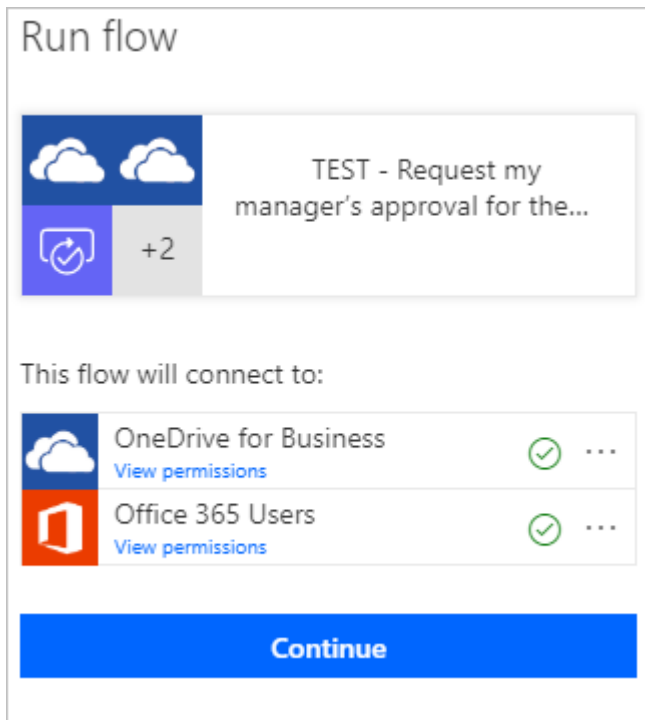
6. Sign in to the required connectors, and then select **Continue**.



7. Make any changes you want to the template and then save your flow with a name that you'll remember easily.

## Run the flow

1. Sign in to OneDrive for Business.
2. Find, and then select the file for which you want to request manager approval.
3. Select the **Show actions** link (three dots).
4. Select **Flow**. You'll see the flow that you created earlier.
5. Select the flow you created earlier.



### 💡 Tip

While this tutorial shows how to create a cloud flow from a template, you can also create a cloud flow from blank to use any of the hundreds of connectors available in Power Automate.

## See also

- [Get started with Power Automate](#)
- [Build multi-step flows](#)

# Filter and copy data with Power Automate

Article • 04/14/2023

This tutorial shows you how to create a cloud flow that monitors a source for new or changed items and then copies those changes to a destination. You may create a cloud flow like this one if your users enter data in one location, but your team needs it in a different location or format.

While this tutorial copies data from a Microsoft SharePoint [list](#) (the source) to an [Azure SQL Database](#) table (the destination), you can copy data among any of the more than [900 connectors](#) that Power Automate supports.

## Tip

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

## Prerequisites

- Access to a data source and a destination. This tutorial doesn't include steps to create the source and destination.
- Access to [Power Automate](#).
- A basic understanding of how your data is stored.
- Familiarity with the basics of creating flows. You can review how to add [actions](#), [triggers](#), and [conditions](#). The following steps assume that you know how to perform these actions.

## Tip

Every column name in the source and destination doesn't need to match. However, you must provide data for all *required* columns when you insert or update an item. Power Automate identifies the required fields for you.

## Quick overview of the steps

If you're comfortable with Power Automate, use these quick steps to copy data from one data source to another.

### **Important**

Changes you make in the destination aren't copied to the source because two-way syncs aren't supported. If you attempt to set up a two-way sync, you'll create an infinite loop where changes are sent endlessly between the source and destination.

1. Identify the source you'll monitor and the destination to which you'll copy changed data. Confirm you've access to both.
2. Identify at least one column that uniquely identifies items in the source and destination. In the example that follows, we use the **Title** column, but you could use any column(s) you want.
3. Set up a trigger that monitors the source for changes.
4. Search the destination to determine if the changed item exists.
5. Use a **Condition** like this:
  - If the new or changed item doesn't exist in the destination, create it.
  - If the new or changed item exists in the destination, update it.
6. Trigger your flow, and then confirm that new or changed items are being copied from the source to the destination.

If you haven't created a connection to SharePoint or Azure SQL Database previously, follow the instructions when you're prompted to sign in.

Here are the detailed steps to create the flow.

## Monitor the source for changes

1. Sign in to [Power Automate](#).
2. Select **My flows** > **Create from blank**.
3. Search for **SharePoint** > select the **SharePoint - When an item is created or modified** trigger from the list of triggers.
4. Enter the **Site Address** and then select the **List Name** on the **When an item is created or modified** card.

5. Provide the **Site Address** and **List Name** for the SharePoint list your flow monitors for new or updated items.

## Search the destination for the new or changed item

Use the **SQL Server - Get rows** action to search the destination for the new or changed item.

1. Select **New step > Add an action**.
2. Search for **Get rows**, select **SQL Server - Get rows**, and then select the table you want to monitor from the **Table name** list.
3. Select **Show advanced options**.
4. In the **Filter Query** box, enter **Title eq '** , select the **Title** token from the dynamic content list, and then enter **'**.

The previous step assumes you're matching the titles of the rows in the source and the destination.

The **Get rows** card should now look like the following screenshot:

The screenshot shows the 'Get rows' action card in Power Automate. The card is titled 'Get rows' and has a red 'SQL' icon. The 'Table name' field is set to 'VacationDB'. The 'Filter Query' field contains 'Title eq ' followed by a dynamic content token for 'Title' and a closing quote. The 'Filter Query' field is highlighted with a red box. Other fields include 'Aggregation transformation', 'Order By', 'Skip Count', 'Top Count', and 'Select Query'. A 'Hide advanced options' link is at the bottom left.

## Check if the new or changed item was found

We use the **Condition** action to check if the new or changed item was found.

1. Select **New step > Add a condition** to open the **Condition** card.

2. On the condition card:
  - a. Select the box on the left.

The **Add dynamic content from the apps and connectors used in this flow list** opens.

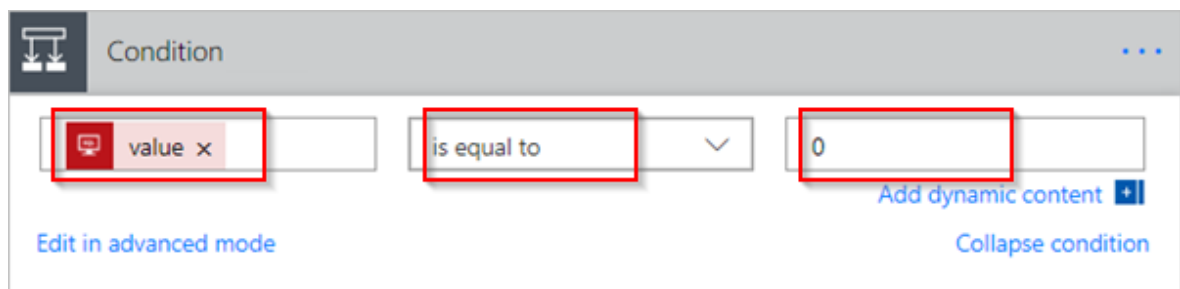
- b. Select **value** from the **Get rows** category.

#### 💡 Tip

Confirm you've selected **value** from the **Get rows** category. Don't select **value** from the **When an item is created or modified** category.

3. Select **is equal to** from the list in the center box.
4. Enter **0** (zero) in the box on the right side.

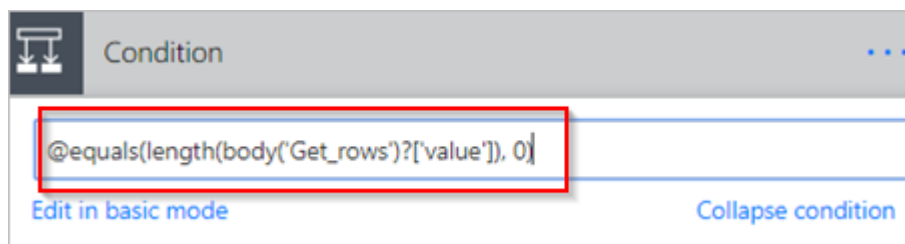
The **Condition** card now resembles this image:



5. Select **Edit in advanced mode**.

When advanced mode opens, you see `@equals(body('Get_rows')['value'], 0)` expression in the box. Edit this expression by adding `length()` around the `body('Get_items')['value']` function. The entire expression now appears like this: `@equals(length(body('Get_rows')['value']), 0)`

The **Condition** card now resembles this image:



#### 💡 Tip

Adding the `length()` function allows the flow to check the **value** list and determine if it contains any items.

When your flow gets items from the destination, there are two possible outcomes.

Outcome	Next step
The item exists	<a href="#">Update the item</a>
The item doesn't exist	<a href="#">Create a new item</a>

#### ⓘ Note

The images of the **Insert row** and **Update row** cards shown next may differ from yours because these cards show the names of the columns in the Azure SQL Database table that's being used in the flow.

## Create the item in the destination

If the item doesn't exist in the destination, create it using the **SQL Server - Insert row** action.

On the **If yes** branch of the **Condition**:

1. Select **Add an action**, search for **insert row**, and then select **SQL Server - Insert row**.

The **Insert row** card opens.

2. From the **Table name** list, select the table into which the new item will be inserted.

The **Insert row** card expands and displays all columns in the selected table. Fields with an asterisk (\*) are required and must be populated for the row to be valid.

3. Select each column that you want to populate and enter the data.

You can enter the data manually, select one or more tokens from the **Dynamic content**, or enter any combination of text and tokens into the columns.

The **Insert row** card now resembles this screenshot:



✓ If yes

+

**SQL** Insert row i ...

\* Table name: VacationDB

\* FullName: Author.DisplayName x

\* Title: Title x

\* StartTime: Leave\_x0020\_SG\_x00... x

\* Department: The Department

[Add dynamic content](#) +

## Update the item in the destination

If the item exists in the destination, update it with the changes.

1. Add the **SQL Server - Update row** action to the **If no** branch of the **Condition**.
2. Follow the steps in the [create the item](#) section of this document to populate the columns of the table.

✗ If no

↻ Apply to each ...

\* Select an output from previous steps: value x

+

**SQL** Update row i ...

\* Table name: VacationDB

\* Row id: Id x

\* FullName: Author.DisplayName x

\* Title: Title x

\* StartTime: Leave\_x0020\_SG\_x00... x

\* Department: UpdatedDepartment

3. At the top of the page, enter a name for your flow in the **Flow name** box, and then select **Create flow** to save it.

Now, whenever an item in your SharePoint list (source) changes, your flow triggers and either inserts a new item or updates an existing item in your Azure SQL Database (destination).

#### ⓘ Note

Your flow isn't triggered when an item is deleted from the source. If this is an important scenario, consider adding a separate column that indicates when an item is no longer needed.

## See also

[Use data operations](#)

# Run your flows with bttns from The Button Corporation (preview)

Article • 06/13/2023

Trigger your flows by pressing a btttn (a physical button made by [The Button Corporation](#)). For example, you can press a btttn that triggers a cloud flow to perform these tasks:

- contacts your helpdesk with location information
- sends an email to your team
- blocks your calendar
- reorders supplies

## Important

You must [register](#) your btttn before you can use it in a cloud flow.

## Tip

Configure all btttn properties such as name, location, and email address on the [btttn website](#) before you create your flow.

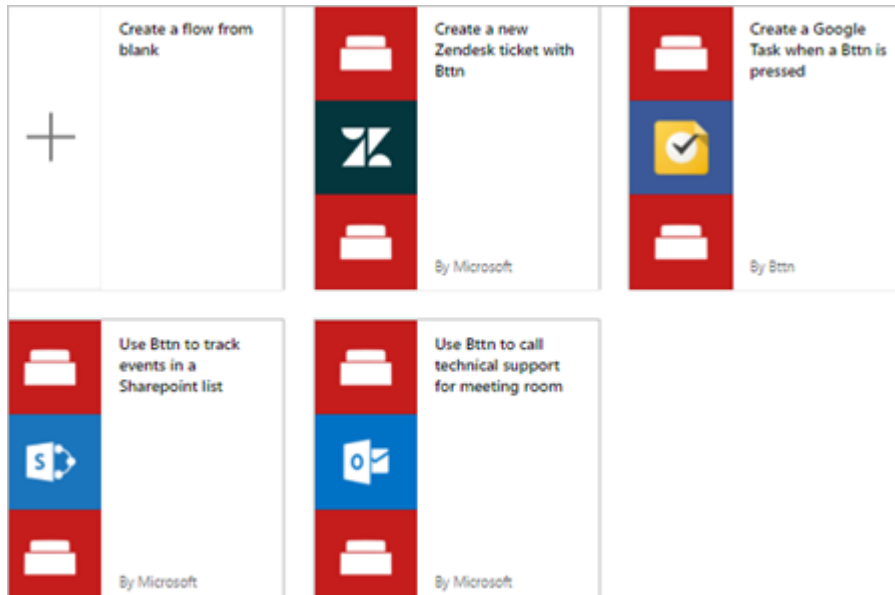
## Prerequisites

- Access to [Power Automate](#)
- At least one [registered btttn](#)

## Create a cloud flow that's triggered from a btttn

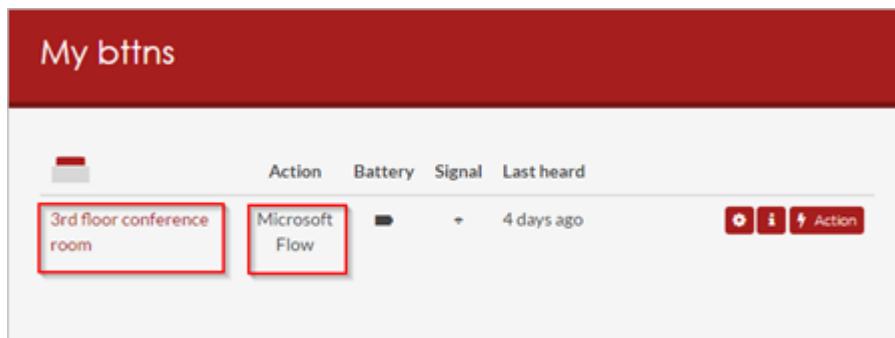
In this walkthrough, we use a helpdesk template to create a cloud flow that you can trigger with a single press of a [btttn](#). When the flow runs, it generates a support request and then sends it to the helpdesk. The support request provides the helpdesk with the location of the room where help is needed. This walkthrough demonstrates how to create this flow from a template, but you can use the blank template, which gives you full control over all aspects of your flow.

You can use any of these templates to quickly create flows for your bttm and connect to Zendesk, Google, and SharePoint, among others:



Tip: For the purposes of this walkthrough, give your bttm a name that represents a conference room in a typical office building.

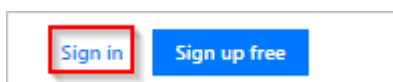
The settings for your bttm should resemble this example (from the bttm website):



Now that you've registered and configured your bttm, let's get started creating our flow.

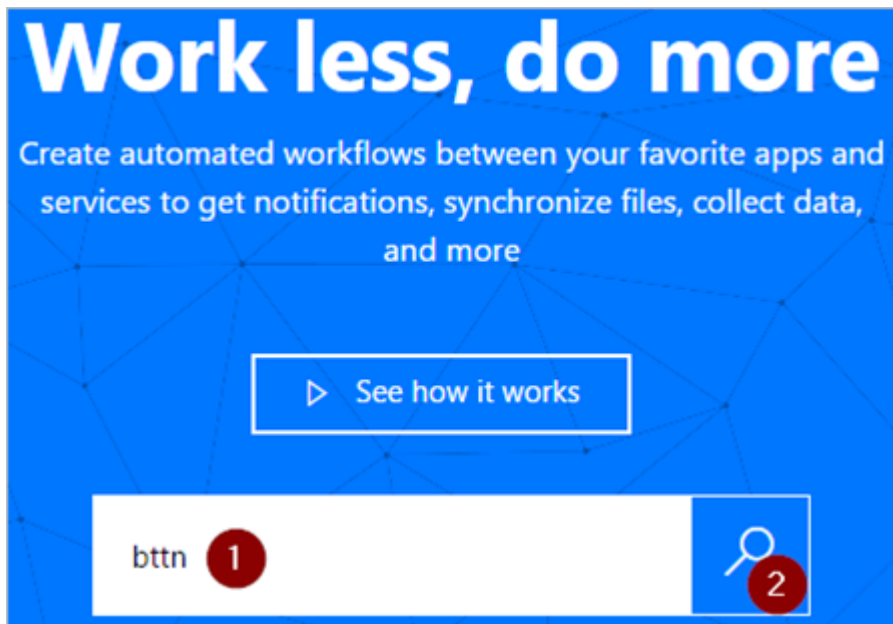
## Sign in and select a template

1. Sign into [Power Automate](#).



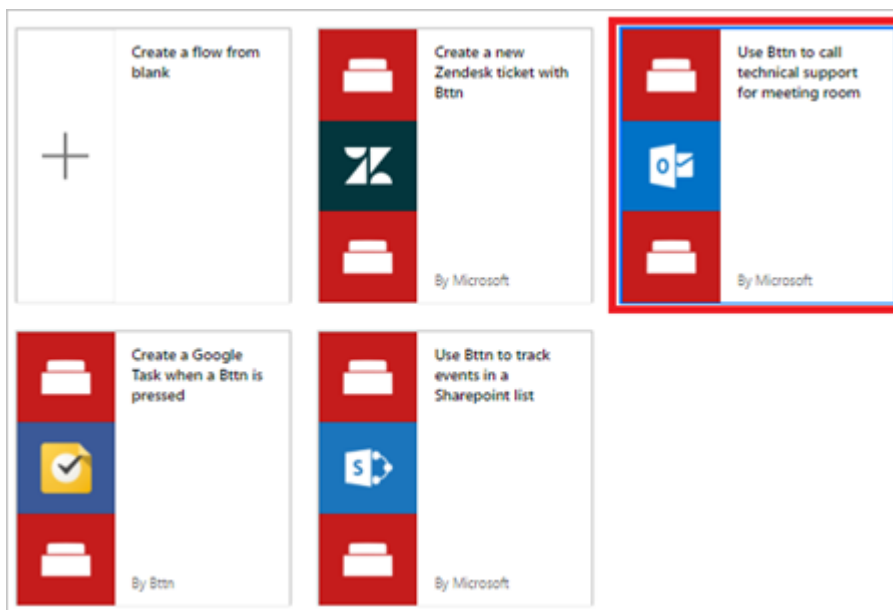
Note: As an alternative, you can create flows in the Power Automate mobile app for [Android](#), [iOS](#), or [Windows Phone](#).

2. Enter **bttm** into the search box, and then select the search icon.



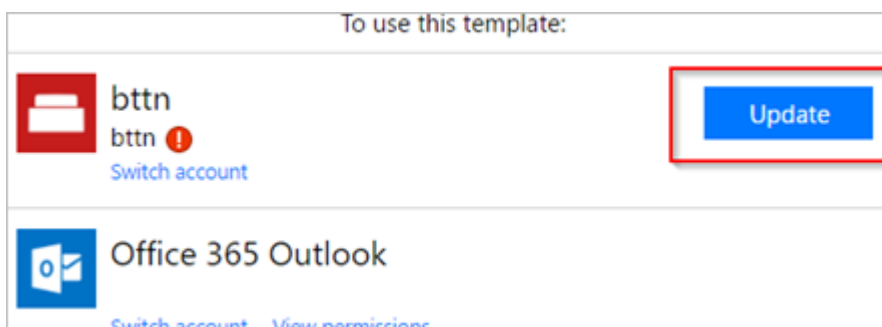
After you select the search icon, all templates that you can use with bttns appear.

3. Select the **Use Bttn to call technical support for meeting room** template.



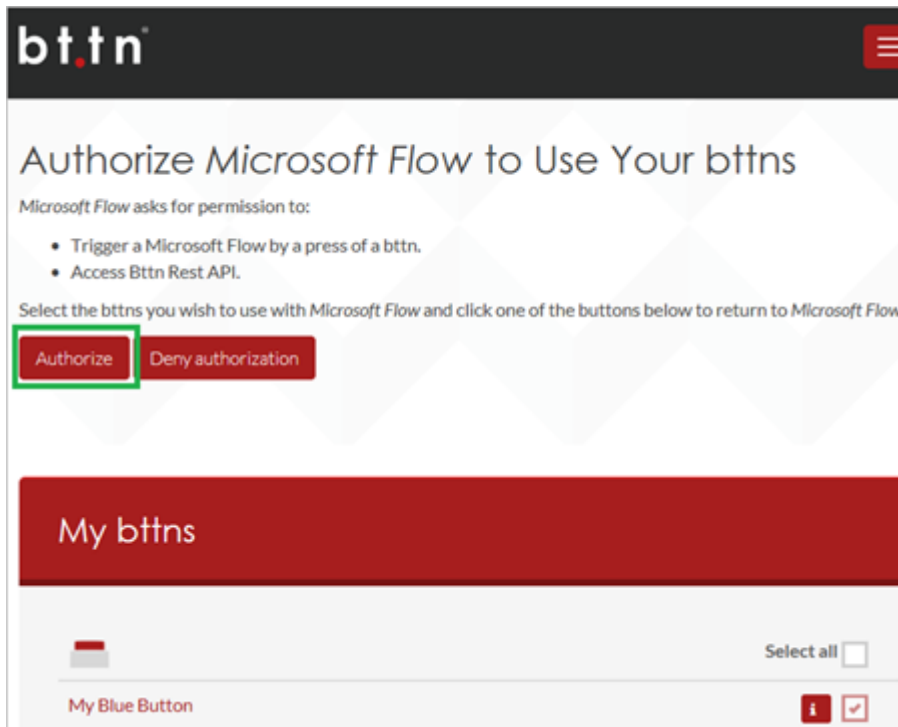
## Authorize Power Automate to connect to your bttn

1. If prompted, sign into the bttn and the Office 365 Outlook services, which will enable the **Continue** button.

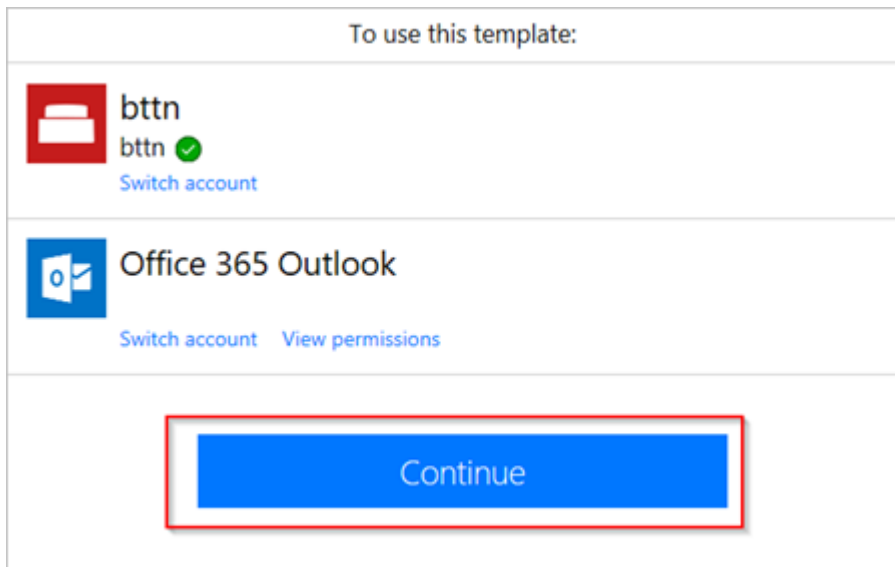


2. When you sign into the bbtn service, authorize Power Automate to use your bbtns.

**Important:** If you don't authorize Power Automate to use your bbtns, you can't see or connect to them from Power Automate.

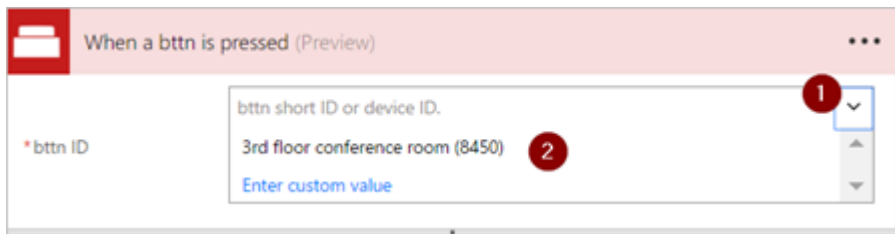


3. After you sign into both services, select **Continue**.

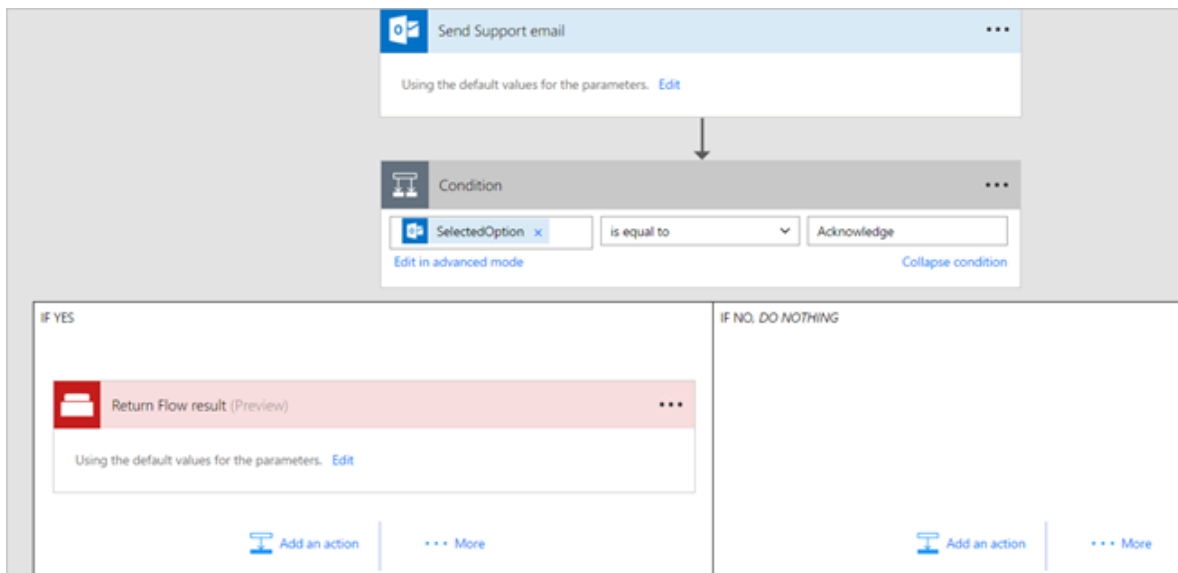


## Select the bbtn that triggers the flow

1. In the **When a bbtn is pressed** card, open the list of bbtn IDs, and then select the bbtn that you want to use.



Your flow should now resemble this example.



2. Give your flow a name, and then select **Create flow** to save it.



## Test your flow and confirm results

1. Press the button on your btnn.
2. View your flow's run history to confirm that it ran successfully.

You can check run history on the Power Automate website or on your mobile device.

Note: The run status is set to **running** until someone selects **Acknowledge** in the support-request email.

3. You can also confirm that the email was sent to the support team.

If you've followed along, the support email looks similar to this example:

## Request for your input

---

There is a malfunction in 3rd floor conference room equipment. Please acknowledge if you are able to come and handle this issue.

**Select one of the options below to respond**

Acknowledge

Message sent via **Microsoft Flow**, enabling you to create automated workflows between your favorite apps and services.

© Microsoft Corp. 2016

## Troubleshooting

- If your flow wasn't triggered, sign into The Button Corporation's site and confirm whether the button activity (presses) are being recorded.
- You can also drill into the run activity on the Power Automate site and check for error messages.



# Run flows on a schedule

Article • 10/03/2023

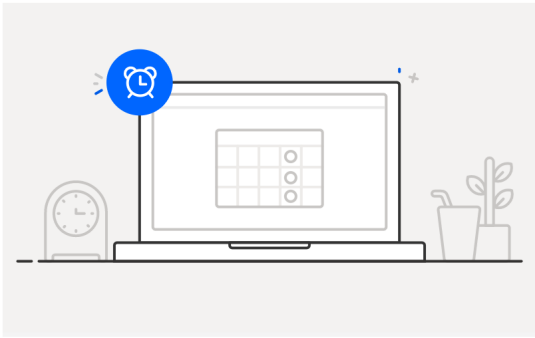
Create a cloud flow that performs one or more tasks (such as sending a report in email).

- Once a day, an hour, or a minute.
- On a date that you specify.
- After a number days, hours, or minutes that you specify.

## Create a recurring flow

1. Sign in to [Power Automate](#).
2. Select **My flows** > **New flow** > **Scheduled cloud flow**.
3. In the fields next to **Starting**, specify the date and time when your flow should start.
4. In the fields next to **Repeat every**, specify the flow's recurrence.
5. Select **Create**.

### Build a scheduled cloud flow



Stay on top of what's important without the effort—you choose when and how often the flow runs.

Examples:

- Automate team reminders to submit expense reports
- Auto-backup data to designated storage on a regular basis

Flow name

**Run this flow \***

Starting  \* at  \*

Repeat every  \*  \*

**This flow will run:**  
Every minute

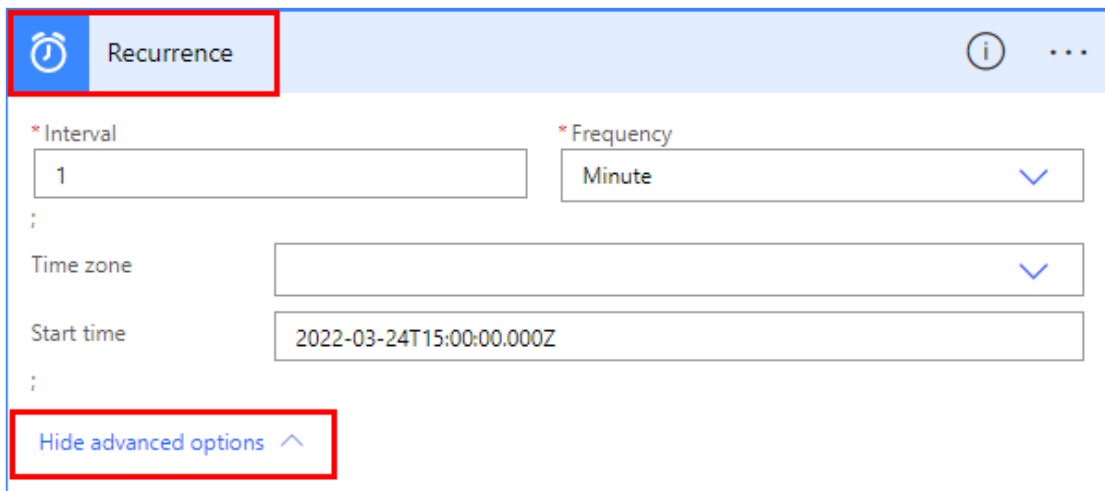
ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in **Understand the cloud flows designer with copilot capabilities**.

## Configure advanced options

Classic designer

1. Follow the steps in the previous section.
2. Select **Recurrence** > **Show advanced options**. When you select **Show advanced options**, the dropdown name changes to **Hide advanced options**.



The screenshot shows the 'Recurrence' configuration panel in the Classic designer. The 'Recurrence' tab is selected and highlighted with a red box. Below it, the 'Interval' field is set to '1', and the 'Frequency' dropdown is set to 'Minute'. The 'Time zone' dropdown is empty, and the 'Start time' field contains '2022-03-24T15:00:00.000Z'. At the bottom, the 'Hide advanced options' button is highlighted with a red box.

3. In the **Time zone** field, select a time zone from the dropdown list to specify whether the **Start time** reflects a local time zone, Coordinated Universal Time (UTC), or other time zone.
4. In the **Start time** field, enter a start time in this format: YYYY-MM-DDTHH:MM:SSZ
5. If you specified **Day** under **Frequency**, select the time of day when the flow should run in the **At these hours** and **At these minutes** dropdown lists.
6. If you specified **Week** under **Frequency**, do the following.
  - In the **On these days** and **At these hours** dropdown lists, select the day or days of the week on which the flow should run and the time or times of day when the flow should run.
  - In the **At these minutes** field, enter the minute values (from 0 to 59) separated by a comma.

For example, configure the options as shown to start a cloud flow no sooner than 3:00 PM (Pacific time) on Thursday, March 24, 2022, and run it every two weeks on Tuesdays at 5:30 PM (Pacific time).

The screenshot shows the 'Recurrence' configuration window. It includes the following fields and values:

- \* Interval:** 2
- \* Frequency:** Week
- Time zone:** (UTC-08:00) Pacific Time (US & Canada)
- Start time:** 2022-03-24T15:00:00.000Z
- On these days:** Tuesday
- At these hours:** 17
- At these minutes:** 30

A preview box shows: **Preview**  
Runs at 17:30 on Tuesday every 2 weeks

At the bottom, there is a link: [Hide advanced options](#) with an upward arrow.

#### ⓘ Note

If you run a flow on the month frequency, the flow runs on the same date each month.

7. Add the action or actions that you want the flow to take, as described in [Create a cloud flow from scratch](#).

## See also

[Advanced options in Azure Logic Apps](#)

# Use the Apply to each action to process a list of items periodically

Article • 09/08/2023

Many triggers can immediately start a cloud flow based on an event such as when a new email arrives in your inbox. These triggers are great, but sometimes you want to run a cloud flow that queries a data source on a predefined schedule, taking certain actions based on the properties of the items in the data source. To do this, your flow can be started on a schedule (such as once per day) and use a loop action such as **Apply to each** to process a list of items. For example, you could use **Apply to each** to update records from a database or list of items from Microsoft SharePoint.

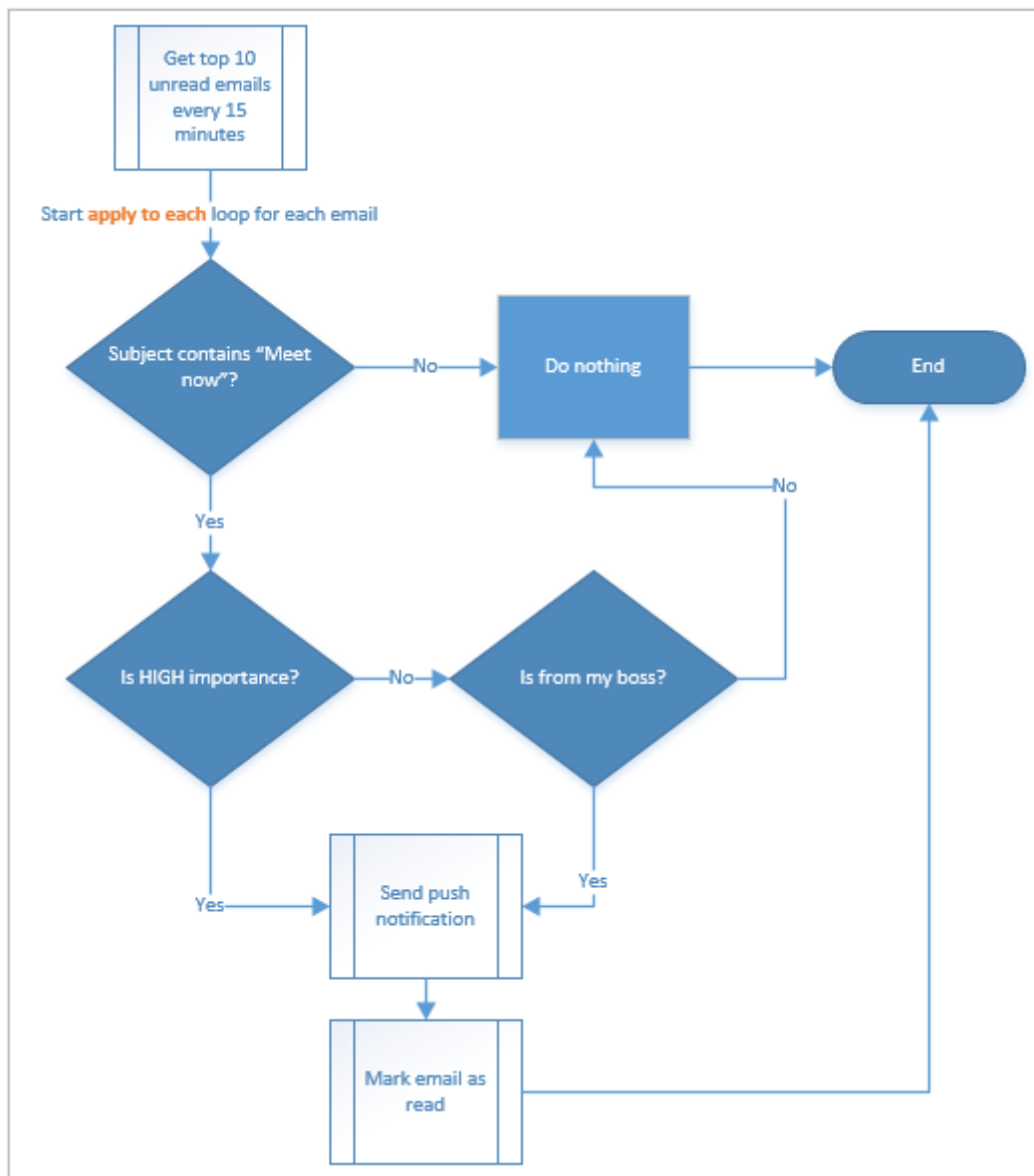
Watch this video for a demo of the **Apply to each** action.

<https://www.microsoft.com/en-us/videoplayer/embed/RWL7EL?postJsllMsg=true> 

In this tutorial, we'll create a cloud flow that runs every 15 minutes and does the following:

1. Gets the last 10 unread messages in your Microsoft 365 Outlook Inbox.
2. Checks each of the 10 messages to confirm if any has **meet now** in the subject.
3. Checks if the email is from your boss or was sent with high importance.
4. Sends a push notification and marks as read, any email that has **meet now** in the subject and is either from your boss or was sent with high importance.

This diagram shows the details of the flow we'll create.



## Prerequisites

Here are the requirements for successfully performing the steps in this tutorial.

- An account that's registered to use [Power Automate](#).
- A Microsoft 365 Outlook account.
- The Power Automate mobile app for [Android](#), [iOS](#), or [Windows Phone](#).
- Connections to Microsoft 365 Outlook and the push notification service.

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

### ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in **Understand the new cloud flows designer with Copilot (preview)**.

## Create a cloud flow

### Classic designer

1. Sign in to [Power Automate](#).
2. Select **My flows** > **New flow** > **Scheduled cloud flow**.
3. In the **Flow name** field, enter a name for your flow.
4. In the **Starting** fields, select the date and time to indicate when the flow should start running.
5. In the **Repeat every** fields, set the schedule to run the flow. In this example, type 15 and select **Minute** from the dropdown menu to run the flow every 15 minutes.
6. Select **Create**.

**Build a scheduled cloud flow**

Stay on top of what's important without the effort—you choose when and how often the flow runs.

Examples:

- Automate team reminders to submit expense reports
- Auto-backup data to designated storage on a regular basis

**Flow name**  
Apply to each flow

**Run this flow \***  
Starting 3/25/22 \* at 10:00 AM  
Repeat every 15 \* Minute \*

This flow will run:  
Every 15 minutes

Skip **Create** Cancel

7. Select **+ New step**.
8. In the **Search** field, type **outlook** to find all connectors and actions related to Microsoft Outlook.

9. Select the **Get emails (V3)** action to open the **Get emails (V3)** card.
10. Configure the **Get emails (V3)** card to select the top 10 unread emails from the **Inbox** folder.

Don't include attachments because they won't be used in the flow.

The screenshot shows the configuration interface for the 'Get emails (V3)' action. The 'Folder' is set to 'Inbox'. The 'Fetch Only Unread Messages' dropdown is set to 'Yes'. The 'Include Attachments' dropdown is set to 'No'. The 'Search Query' field is empty. The 'Top' radio button and the '10' input field are highlighted with a red box.

So far, you've created a simple flow that gets some emails from your inbox. These emails will be returned in an array. The **Apply to each** action requires an array, so this is exactly what's needed.

## Add actions and conditions

1. Select **+ New step > Built-in > Apply to each** action.
2. Select the field and then select **value** from the **Dynamic content** list to place it in the **Select an output from previous steps** field on the **Apply to each** card. This pulls in the body of the emails to be used in the **Apply to each** action.
3. Select **+ New step > Control > Condition**.
4. Configure the **Condition** card to search the subject of each email for the words "meet now".

- Select the first field and then select **Subject** in the **Dynamic content** list.
  - In the dropdown list of operators in the second field, select **contains**.
  - In the third field, enter **meet now**.
5. In the **If yes** branch, select **Add an action** > **Condition**. This opens the **Condition 2** card.
  6. Configure the **Condition 2** card to search each email with "meet now" in the subject with high importance.
    - Select the first field and then select **Importance** in the **Dynamic content** list.
    - (If not already selected) In the dropdown list of operators in the second field, select **is equal to**.
    - In the third field, enter **high**.
  7. In the **If yes** branch, select **Add an action**. This opens the **Choose an action** card, where you'll define what happens if the search condition (the **meet now** email was sent with high importance) is true.
  8. Search for **notification**, and then select the **Send me a mobile notification** action.
  9. On the **Send me a mobile notification** card in the **Text** field, enter the details for the push notification that will be sent if the subject of an email contains "meet now" and the **Importance** is **high**.

The screenshot shows a configuration interface for a mobile notification. At the top, there is a green header with a checkmark and the text "If yes". Below this is a red header for the "Send me a mobile notification" action, which includes a bell icon, a question mark, and a menu icon. The main configuration area contains a text field with a red border. The text field is labeled "\*Text" and contains a preview of a notification message: "Hello, [From] might want to meet with you now. Importance of the message: [Importance]". Below the text field are two input fields: "Link" with the placeholder text "Include a link in the notification" and "Link label" with the placeholder text "The display name for the link". At the bottom of the card, there is a blue button with a downward arrow icon and the text "Add an action".

10. Select the **If no** branch to select the recipients.



- Select **Add an action**, and then type **get manager** in the search field.
- In the **Actions** list, select **Get manager (V2)**.
- In the **Get Manager (V2)** card, select the **User (UPN)** field.
- In the **Dynamic content** list, select **To**.

11. In the **If no** branch, select **Add an action**.

12. From the **Actions** list, select **Condition**. This opens the **Condition 3** card.

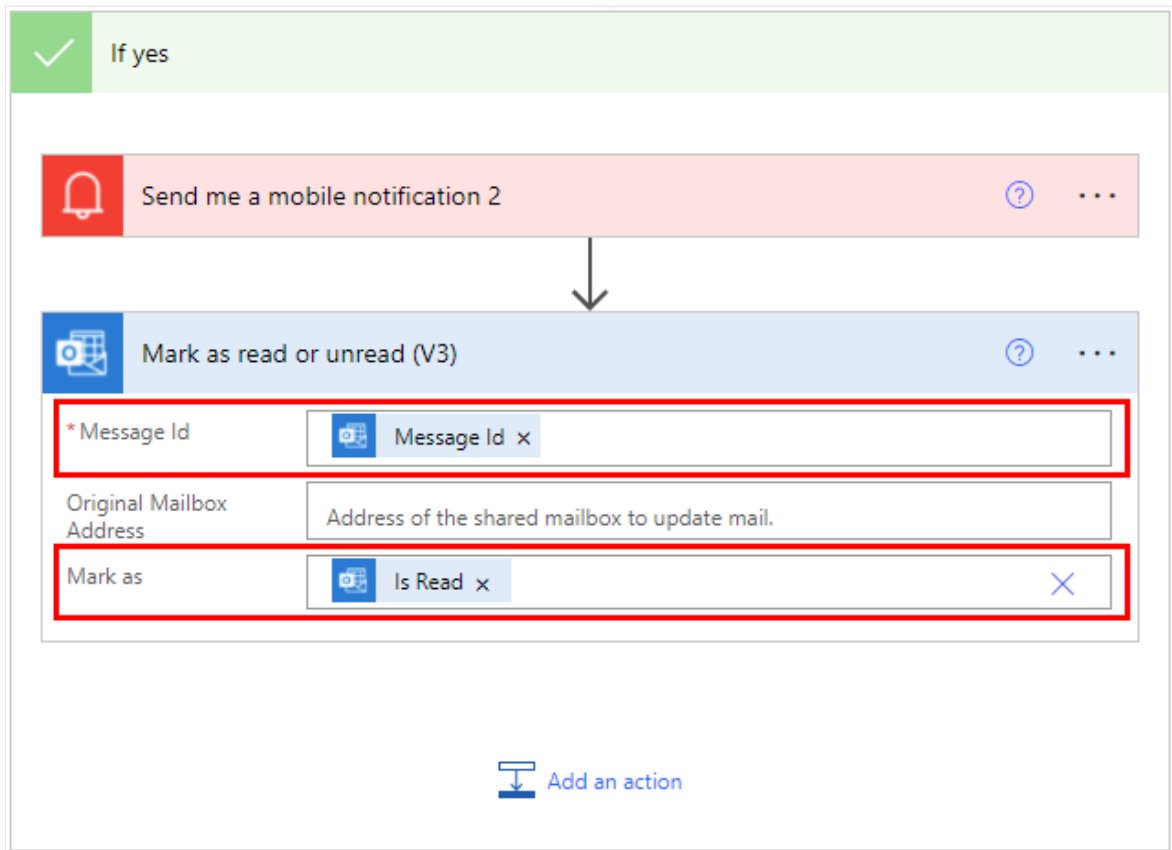
13. Configure the card to check if the email sender's email address (the **From** token) is the same as your boss' email address (the **Email** token).

- Select the first field and then select **From** in the **Dynamic content** list.
- In the dropdown list of operators in the second field, select **contains**.
- In the third field, enter **mail**.

14. Under the **If yes** section of the **Condition 3** card, select **Add an action**.

Next, you'll define what should happen if the search condition (the email was sent from your boss) is true.

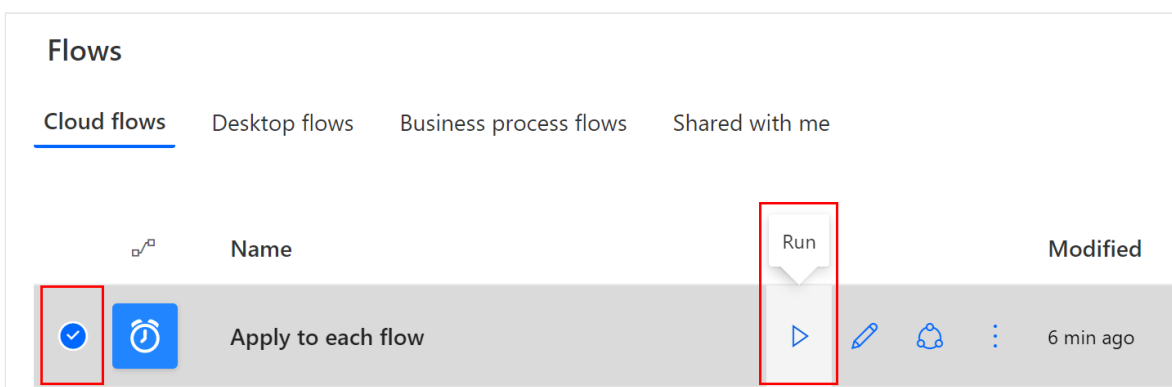
1. Search for **notification**, and then select the **Send me a mobile notification** action.
2. On the **Send me a mobile notification 2** card, provide the details for the push notification that will be sent if the email is from your boss.
3. Select **Add an action**.
4. Add the **Mark as read or unread (V3)** action.
5. Add the **Message Id** token to the **Mark as read or unread (V3)** card. The **Message Id** is the Id of the message that will be marked as read.
6. Select **Enter custom value** from the **Mark as** list on the **Mark as read or unread (V3)** card.
7. In the **Dynamic content** list, select **Is Read**.



8. On the toolbar at the top, select **Save** to save your flow.

## Run the flow

1. Send yourself a high-importance email that includes **meet now** in the subject. Alternatively, you can have someone in your organization send you such an email.
2. Confirm the email is in your inbox and it's unread.
3. Sign into [Power Automate](#).
4. Select **My flows**. A list of your flows displays.
5. Place a check in the circle for the flow you just created to select it.
6. Select the **Run** icon to the right of the flow name.



7. On the panel to the right, select **Run flow**.
8. When the run flow has successfully started, select **Done**.
9. Select the flow run in which you're interested to view the results.

## View results of the run

Now that you've run the flow successfully, you should receive the push notification on your mobile device.

### Note

If you don't receive the push notification, confirm that your mobile device has a working data connection.

# Power Automate mobile app overview

Article • 10/30/2023

This article provides an overview of the Microsoft Power Automate mobile app, including installation, changing environments, and limitations of the app.


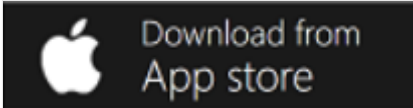


Experience the familiar look and feel of Power Automate on the go with the Power Automate mobile app, where you can:

- [Create flows](#)
- [Manage cloud flows](#)
- [Create widgets](#)
- [Manage approvals](#)
- [Receive notifications](#)

—all from your mobile device.

## Install the Power Automate mobile app

If you haven't tried Power Automate yet, [sign up for free](#). Then scan one of the QR codes below with your mobile device. As an alternative, you can use the [Google Play](#) link or the [App store](#) link to install the Power Automate mobile app.

Android	iOS
	
	

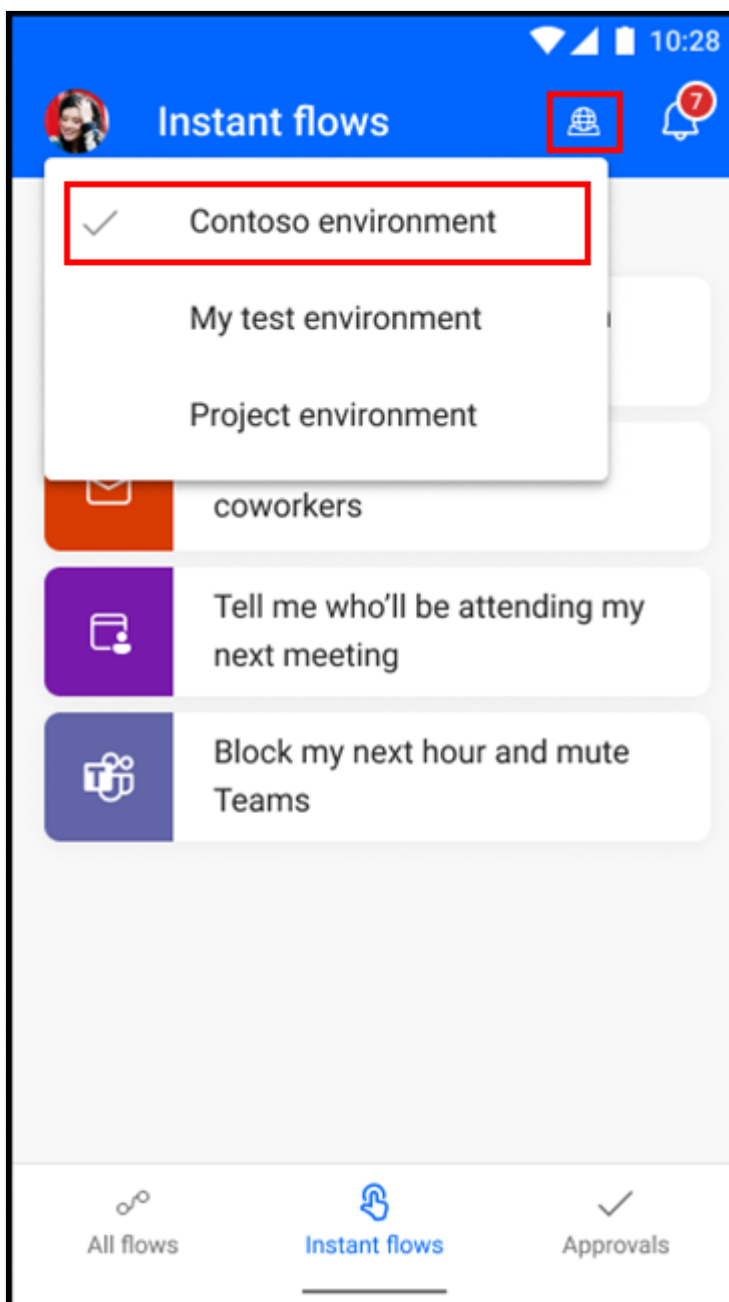
### ⓘ Note

If you're installing the Power Automate mobile app, you'll need version 3.x.x or later to get the functionality that's described in the articles in this section.

# Change environments

You might have different environments to work in depending on the purpose of your work (for example, testing, projects, and customers). You can easily change your environment to access your flows, approvals, notifications, and more when you're working on your mobile device.

1. Open the Power Automate mobile app and sign in with either Microsoft Entra ID or your Microsoft account.
2. Select the environment icon, and then select the environment you want to access. A check mark appears next to the selected environment.



## Limitations

Power Automate mobile app doesn't support geofencing (using location-based triggers).

# Create flows from your phone

Article • 06/13/2023

There are many repetitive tasks that we all wish we could run with just a tap of a button. For example, you may need to quickly email your team to remind them to join the daily team sync. Or, you might want to start a new Visual Studio Codespaces build of your code base after you've been notified that there are no more checkins planned for the day. Flows allow you to accomplish these and many other tasks simply by tapping a button on your mobile device.

The main difference between flows and instant flows is that you need to trigger instant flows manually. To learn about the different types of flows, go to [Cloud flows](#).

## Prerequisites

To complete the example in this article, you'll need the following:

- Access to [Power Automate](#).
- The generally available version of Power Automate mobile app for [iOS](#) or [Android](#).
- An account with permissions to use the connectors to create your flow. For example, you'll need a Dropbox account in order to create a flow that accesses Dropbox.

## Create a flow

Create flows so that you can easily run repetitive tasks from any place, at any time from your mobile device. Running flows saves you time and, since the tasks they perform are automated, there will be fewer errors than if you manually did them.

1. Select the + (plus sign icon).
2. Select the **Post MSN Weather updates to Yammer group everyday** template.
3. Customize your flow by filling in these fields:
  - **Recurrence**
    - **Interval:** Enter a number. **Frequency:** Select the time occurrence.
  - **Get forecast for today**
    - **Location:** Select a valid input. **Units:** Select a measurement system.

- Post message
  - Group ID: Aelect the group to post a message to.

The screenshot shows the 'Create flow' interface in a mobile application. The top bar is blue with a white back arrow and the text 'Create flow'. Below the bar is a toolbar with icons for 'Post', undo, redo, comment, save, and a profile icon. The main content area is divided into three sections, each with a blue header and a white body. The first section is 'Recurrence' with an alarm icon, containing fields for '\* Interval' (24) and '\* Frequency' (Hour), and a 'Show advanced options' link. The second section is 'Get forecast for today' with a sun icon, containing fields for '\* Location' and '\* Units'. The third section is 'Post message' with a speech bubble icon, containing a field for '\* Group ID'. Arrows indicate the flow from one section to the next.

4. (Optional) Enter a name for your flow.

If you don't enter a name, the flow will be saved using the same name as the template you chose.



5. Select **Save**.

Congratulations, you've created a flow! You can now run this flow anytime, any place, from the Power Automate mobile app. Simply press the flow and it will run!

## Related information

[Power Automate mobile app overview](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Manage cloud flows

Article • 06/13/2023

Use the Power Automate mobile app to do the following tasks:

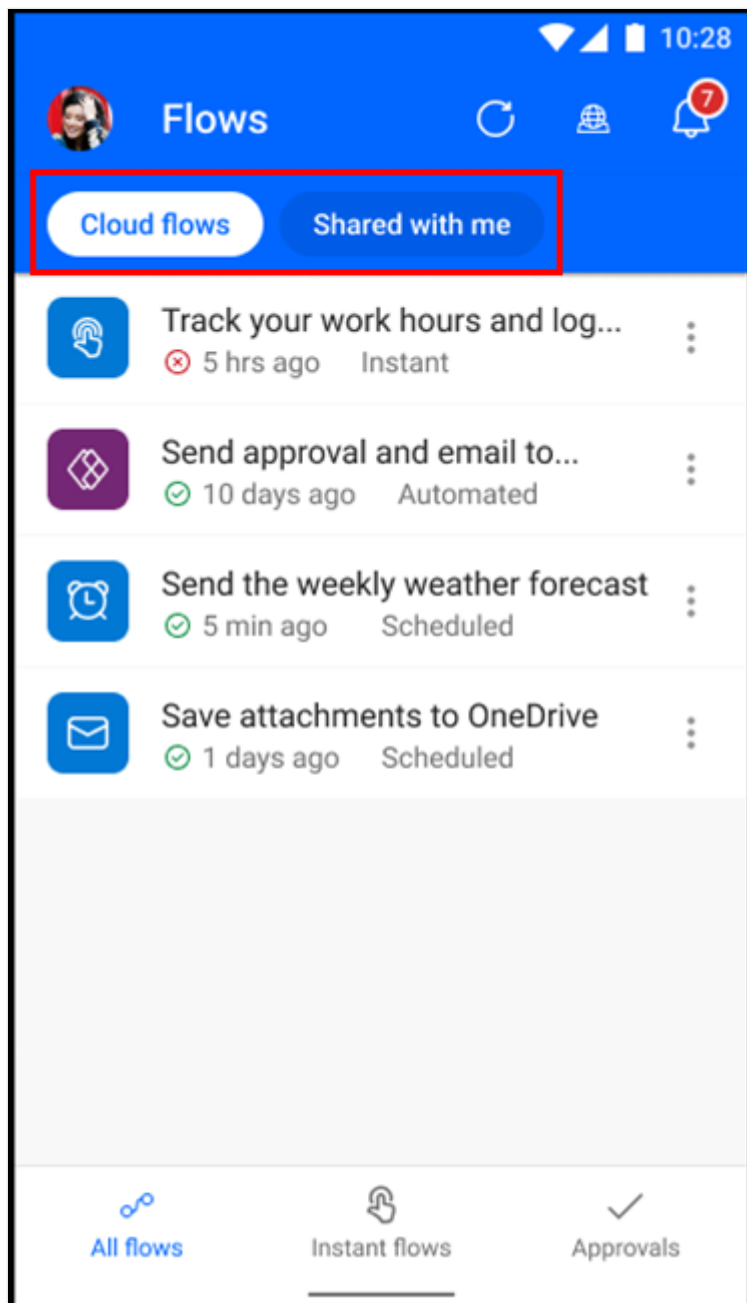
- View, edit, and run your flows.
- Check the run history of flows.
- Turn your flows on and off, or delete them.

You can manage your flows when you're away from your computer whether they're solution-aware or non-solution-aware. [Learn about solution-aware flows.](#)

To learn about the different types of cloud flows, go to [Cloud flows](#).

## View a list of your cloud flows

By default, the **Flows** screen shows all the flows that you've created.



To show flows that others have shared with you, select **Shared with me** at the top of the **Flows** screen.

## Edit a cloud flow

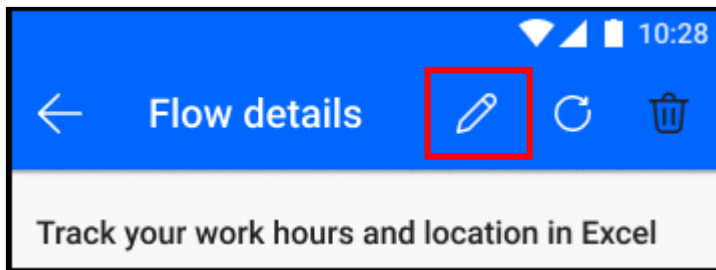
You can edit your cloud flows on-the-go. Your available cloud flows are in one of the lists in the **Flows** screen, as shown in the previous screenshot.

To edit a cloud flow:

1. On the **Flows** screen, select the flow that you want to edit.

The **Flow details** screen displays.

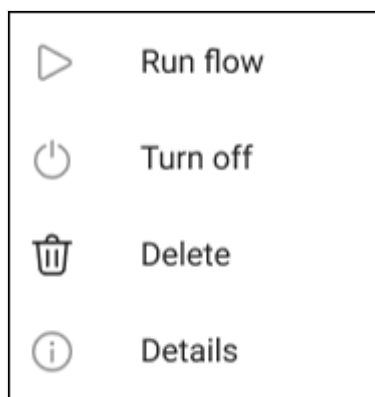
2. Select the pencil icon at the top of the screen.



## Run, delete, and turn a flow on or off

Select the vertical ellipsis (⋮) next to a flow, and then select one of the options: **Run flow**, **Turn off** (or if the flow is off, **Turn on**), or **Delete**.

You can also turn a flow on and off in the [Details screen](#).



## Run an instant flow

The main difference between flows and instant flows is that you need to trigger instant flows manually to run them.

1. Launch Power Automate mobile app, tap **Instant flows** at the bottom of the page, and tap the flow that you wish to run.
2. View the progress while the flow runs.

The page updates, indicating that the flow has completed.




## View run history and details

Select the vertical ellipsis (⋮) next to a flow, and then select **Details**.

In addition to the flow's run history, you can view a description of the flow if one was provided, how long ago it was modified, and its type.

You can also toggle **Enable** here to turn the flow on or off.

10:28

← Flow details   

### Track your work hours and location in Excel

**Details**

Description  
Track your working hours. Each button tap logs the current time to an Excel Online (Business) spreadsheet. The spreadsheet must have the following columns: Date, Timestamp.

Created  
11/12/21

Modified  
5 days ago

Type  
Automate

Plan  
Per user

Enable flow

**Run history**

Start	Duration	Status
7/14/22	00:00:01	✔ Succeeded
7/14/22	00:00:01	✔ Succeeded

## See also

[Power Automate mobile app overview](#)

# Create widgets for flows

Article • 06/13/2023

For quick and easy access to your flows, create a widget. Widgets make running flows effortless. You can run a flow from the home screen of your mobile device, without having to open the Power Automate app.

If your flow requires you to enter information, the widget will open the flow in the app. The flow will continue after you fill in the information.

Widgets can only run flows that you created. They can't run flows that have been shared with you. However, you can run [solution-aware flows](#) using a widget.

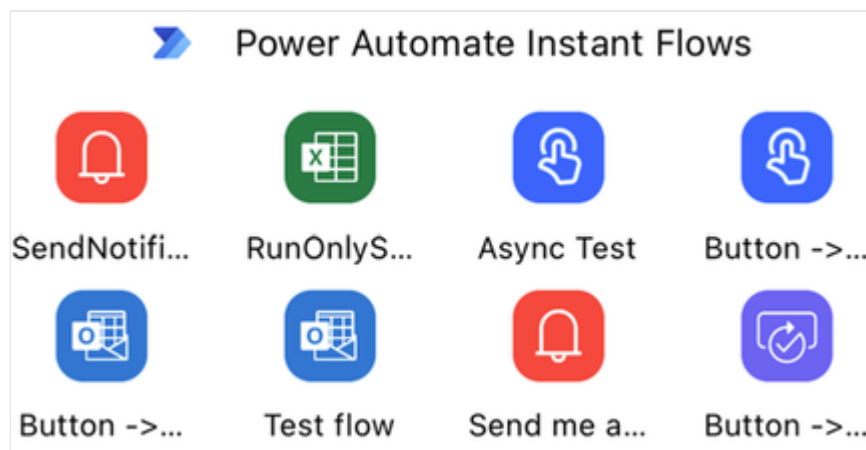
## Create a widget on an iOS device

The widget will show only the top eight (8) flows on an iOS device.

1. Long-press the home screen where you want to place the widget and select the plus icon (+).
2. Select the Power Automate app.

If you aren't signed in to the app, it will open to allow you to sign in.

3. Select **Add a widget**.

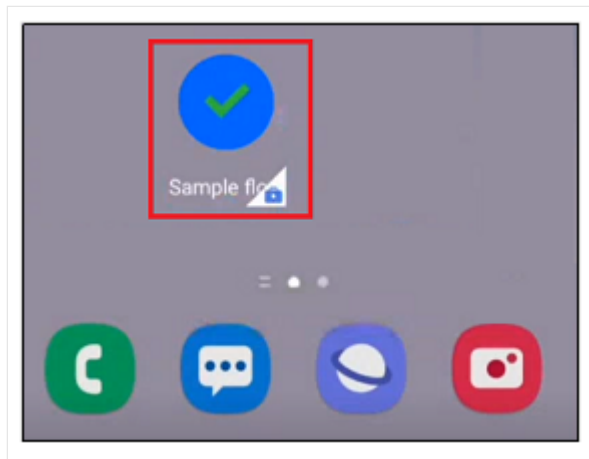


## Create a widget on an Android device

1. Long-press the home screen where you want to place the widget and select **Widgets**.
2. Select the Power Automate app.

If you aren't signed in to the app, it will open to allow you to sign in.

3. Tap the widget on your home screen.



## See also

[Power Automate mobile app overview](#)

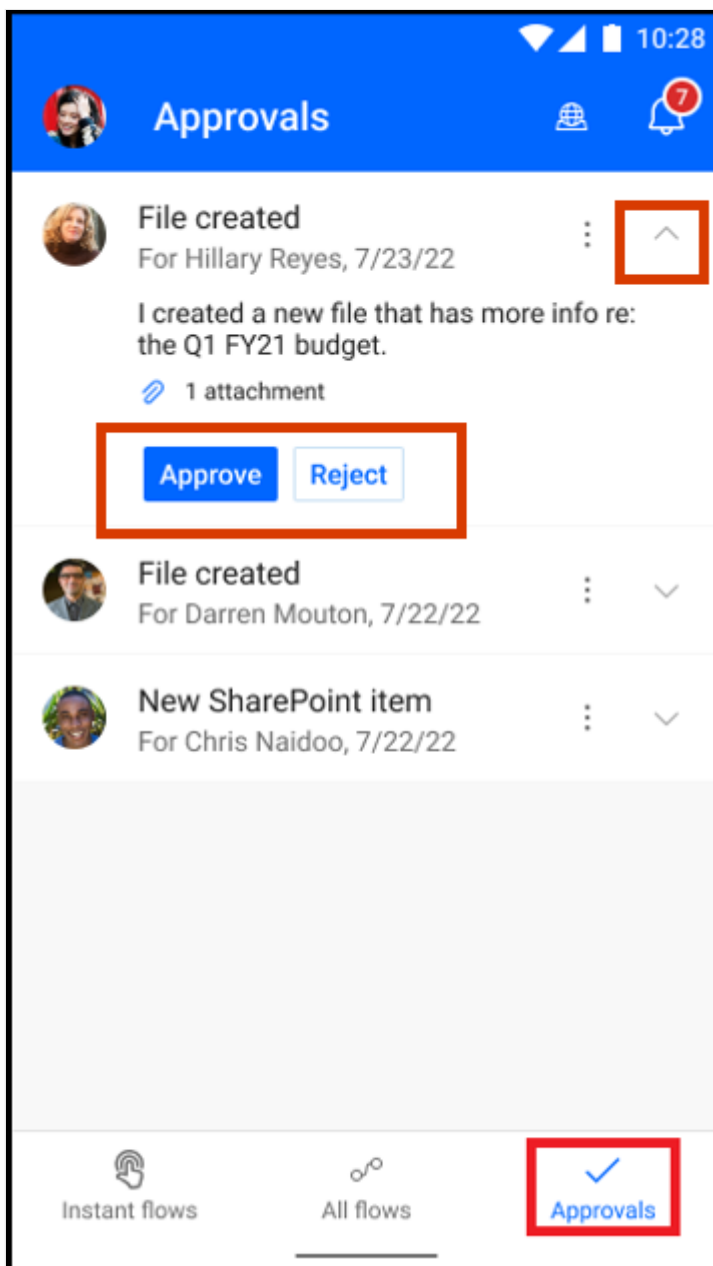
# Manage approvals

Article • 06/13/2023

Manage your approval requests on your mobile device when you're away from your desk.

You can quickly approve or reject approval requests in the Power Automate mobile app, right from the **Approvals** screen.

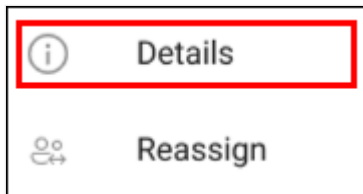
1. In the Power Automate mobile app, select **Approvals**, and then select the arrow to expand a request.
2. Select **Approve** or **Reject**.



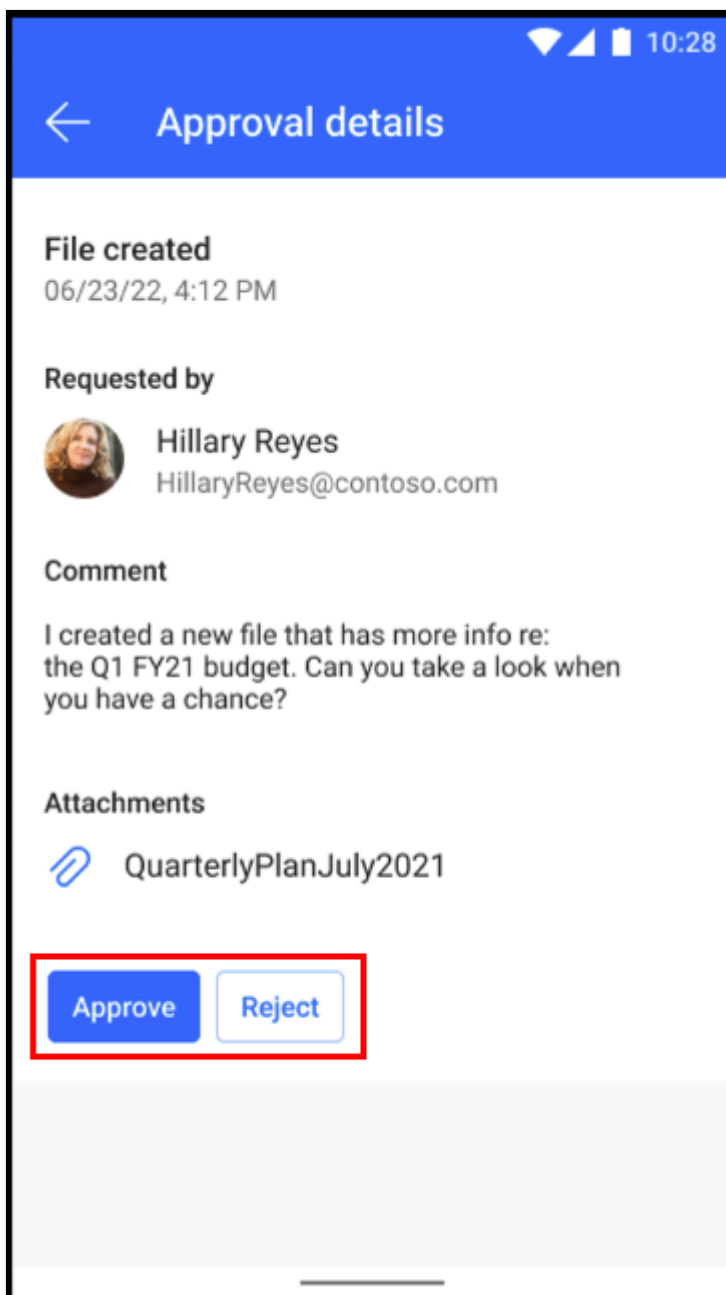


If you want more information about a request before you approve or reject it, you can view any comments and attachments on a separate screen.

1. On the **Approvals** screen, select the vertical ellipsis (⋮) next to a request, and then select **Details**.



2. Read the comments and view the attachments, if any.
3. Select **Approve** or **Reject**.



When the **Approval submitted successfully** or **Rejection submitted successfully** message appears at the top of the screen, your approval or rejection is complete:

✓ Approval submitted successfully

✓ Rejection submitted successfully

## Create custom responses

You can also create your own responses to approval requests. For example, you might want to respond with **Need more info** before you either **Accept** or **Reject** a request.

[Learn how to create custom responses.](#)

## See also

[Power Automate mobile app overview](#)

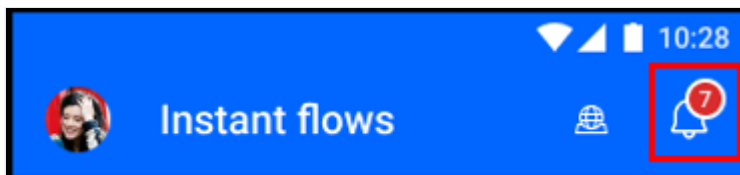
# Receive notifications

Article • 06/05/2023

The Power Automate mobile app allows you to receive notifications on your mobile device. You'll get a notification whenever you run a flow that uses either the [Microsoft Notifications](#) connector or the [Approvals](#) connector. You'll also get a notification when a flow encounters a run error.

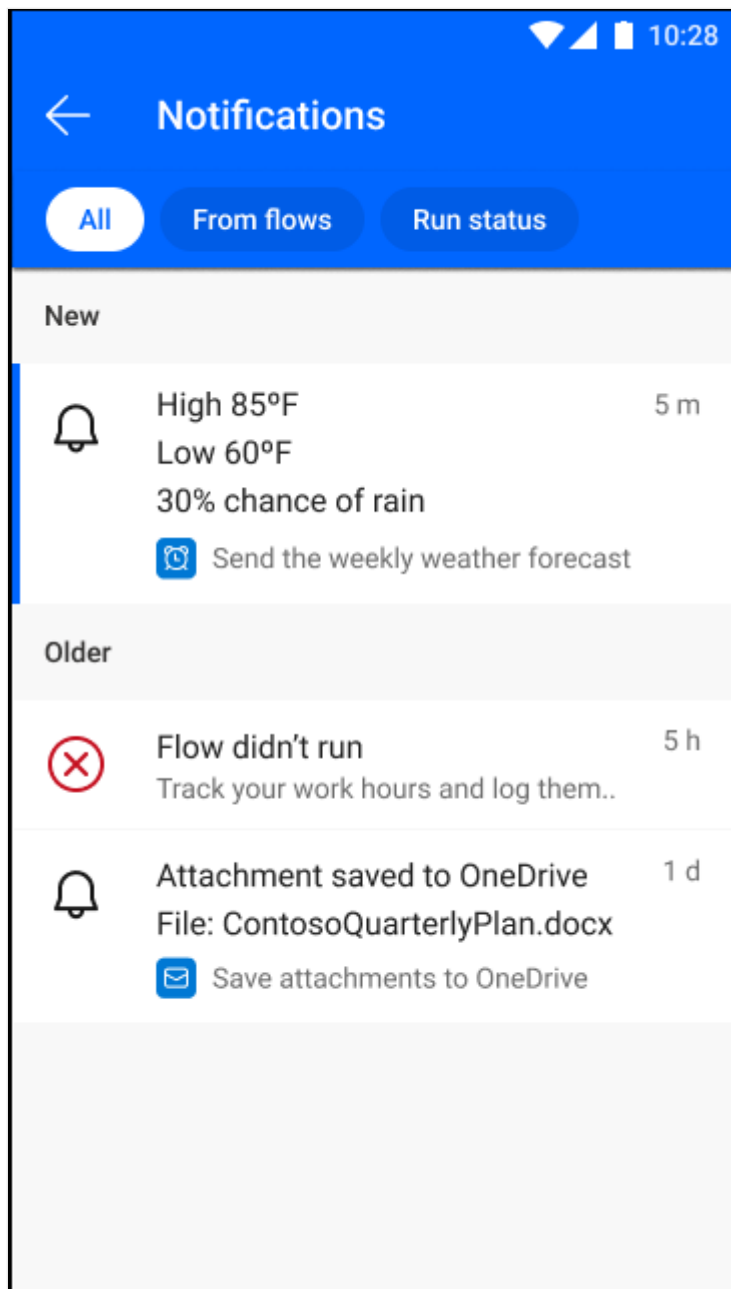
The list of notifications you've received was previously called Activity Feed.

To view all notifications that correspond to your flows, select the bell icon at the top of the screen.



Notifications that arrived since the last time you opened the app appear in the **New** list. Other notifications appear in the **Older** list.

A timestamp indicates how long ago the notification arrived. For instance, **5 m** means the notification arrived five minutes ago. Notifications are removed from the **Older** list after 14 days.



The **Notifications** screen shows notifications from the current environment only. To view notifications from a different environment, [select the environment](#).

## Filter your notifications

By default, the **Notifications** screen shows all the notifications you've received.

To show only notifications that are related to push notifications sent from a flow, select **From flows** at the top of the **Notifications** screen.

To show only notifications of errors that occurred when a flow ran, select **Run status** at the top of the **Notifications** screen.

## See also

## Power Automate mobile app overview

# Add multiple actions and advanced options to a cloud flow

Article • 02/09/2023

Customize a cloud flow by adding one or more advanced options and multiple actions for the same trigger. For example, add an advanced option that sends an email message as high priority. In addition to sending mail when an item is added to a list created in Microsoft Lists, create a file in Dropbox that contains the same information.

## Tip

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

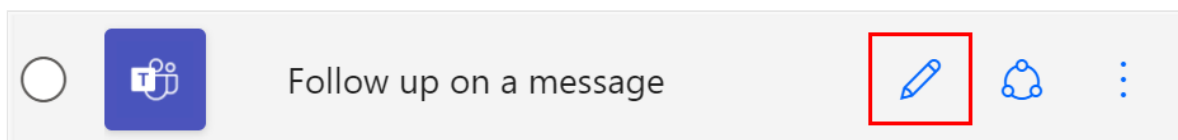
## Prerequisites

[Create a cloud flow](#)

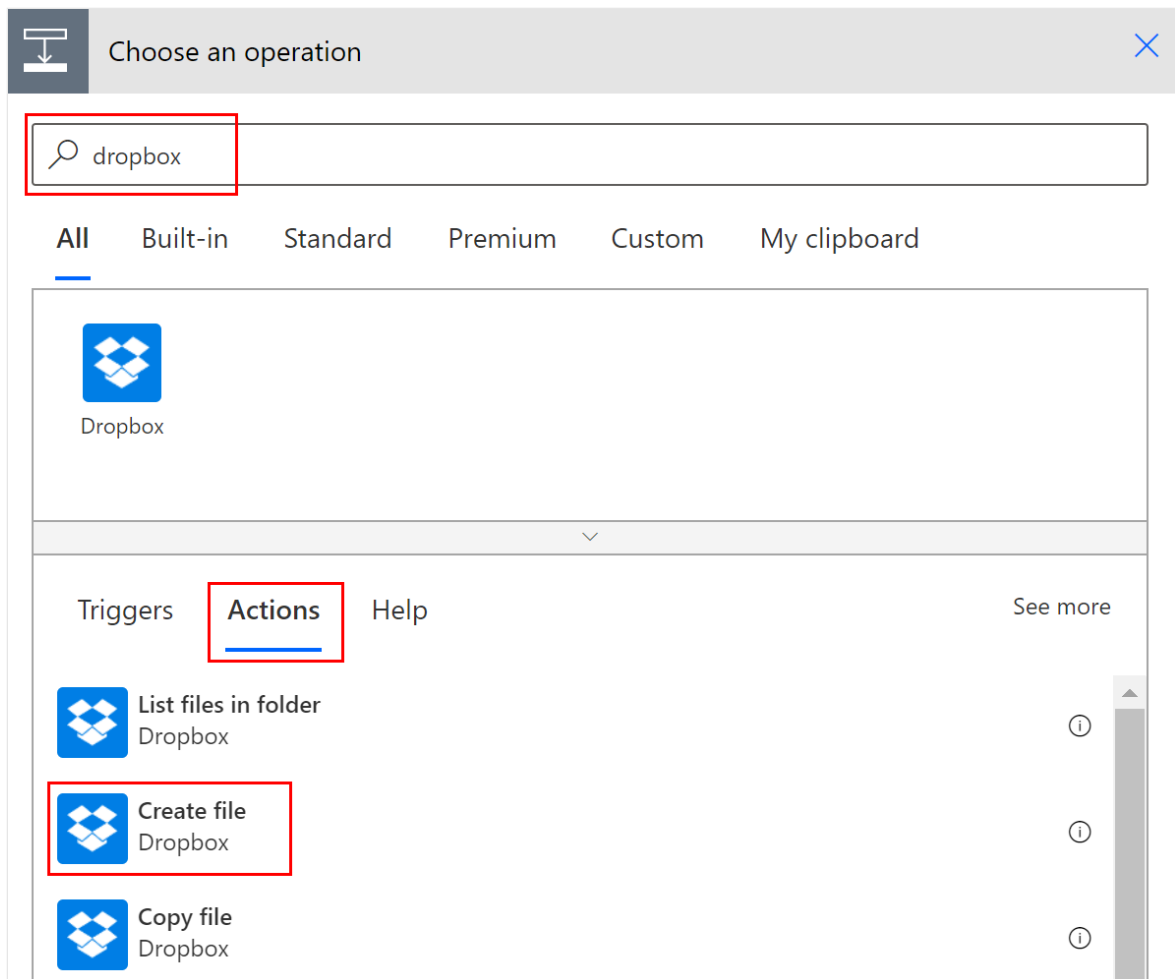
## Add another action

In this procedure, you'll add an action in the middle of the flow. This action will save a file in your Dropbox, archiving the item in the list.

1. Sign into [Power Automate](#).
2. On the left pane, select **My flows**.
3. In the list of flows, select the **Edit** icon next to the flow you want to edit.



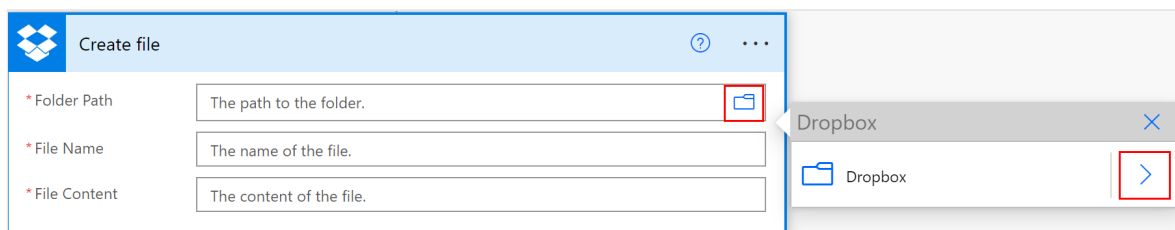
4. Select **New step**, enter **dropbox** in the search field, and select **Create file - Dropdown** in the **Actions** list.



5. If prompted, provide your Dropbox credentials.


6. Select the folder icon on the right side of the **Folder path** box.

7. Select > and then choose the folder in which you want to place the new file.



8. Enter the name of the new file into the **File name** box. Be sure to append an extension, such as ".txt", to the file name. Here, let's use the **TweetId** in the file's name to ensure uniqueness of the files. You may have to select **See more** to find the **TweetId** token.


9. Add the text that you want the file to contain by typing into the **File content** box. You can also add tokens into the **File content** box.


 Create file i ...


\* Folder path


\* File name

\* File content

Tweeted by:  Tweeted by x

Number of retweets:  Retweet count x

Tweet text:  Tweet text x

[Add dynamic content](#) 

 **Important**

If the file name you enter matches an existing file's name in the selected folder, the existing file will be overwritten.


10. Save your flow.

11. Send a tweet that contains the keyword you specified.

Within a minute, a file is created in your Dropbox account.

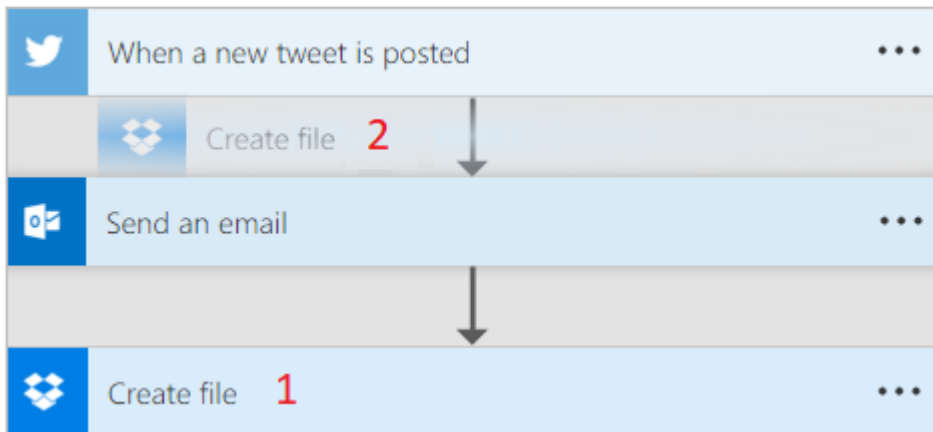
## Reorder or delete an action

- To receive email after the file is created in Dropbox, move the Dropbox action by dragging its title bar above the email action. Release the Dropbox action over the arrow between the trigger (**When a new tweet is posted**) and the email action. (The cursor indicates whether the action is positioned correctly.)

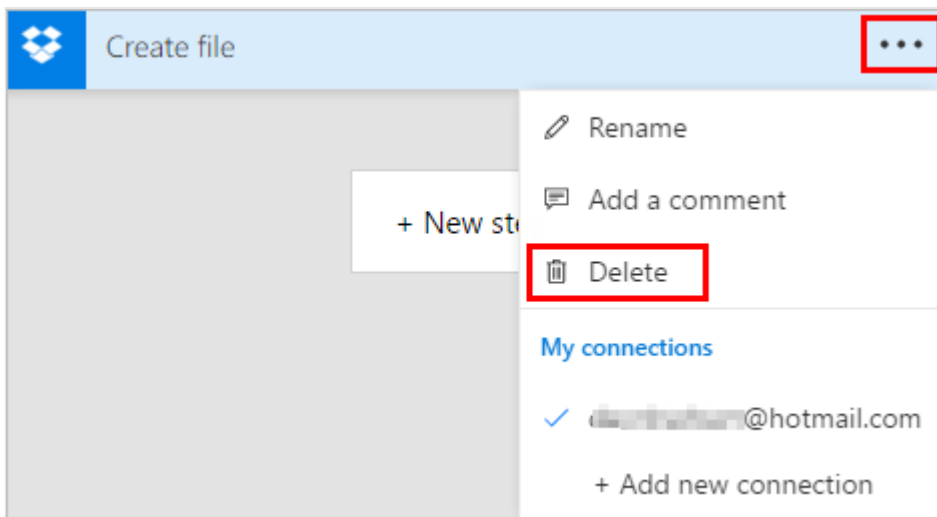
 **Note**



You can't move a step before another if you're using any outputs from that step.



- To delete an action, select ... (the ellipsis) near the right edge of the title bar for the action you want to delete, select **Delete**, and then select **OK**.



**Note:** You can't delete an action if you're using any outputs from it anywhere in the flow. First, remove those outputs from the fields, and then you can delete the action.

## Copy and paste actions

If you want to duplicate actions while designing a cloud flow, you can copy and paste them. For example, if you're building a condition and want similar actions in the **If yes** side and the **If no** side, you can build the first action in one side and then copy it to the other side. This is an alternative to creating both actions from scratch.

### To copy an action

1. On the action menu heading, select ... (the ellipses).

2. Select **Copy to my clipboard**.

3. Select **New step** where you want your action to go.

Notice the **My clipboard** tab that lets you choose from all of the actions that you've copied.

4. Select the item you want to paste.

## Add advanced options

Start with a cloud flow that has a **Send an email (V2)** action.

1. On the bottom of the **Send an email (V2)** card, select **Show advanced options**.

You'll see the advanced options for sending an email. The word **Show** changes to **Hide** so that you can toggle the advanced options.

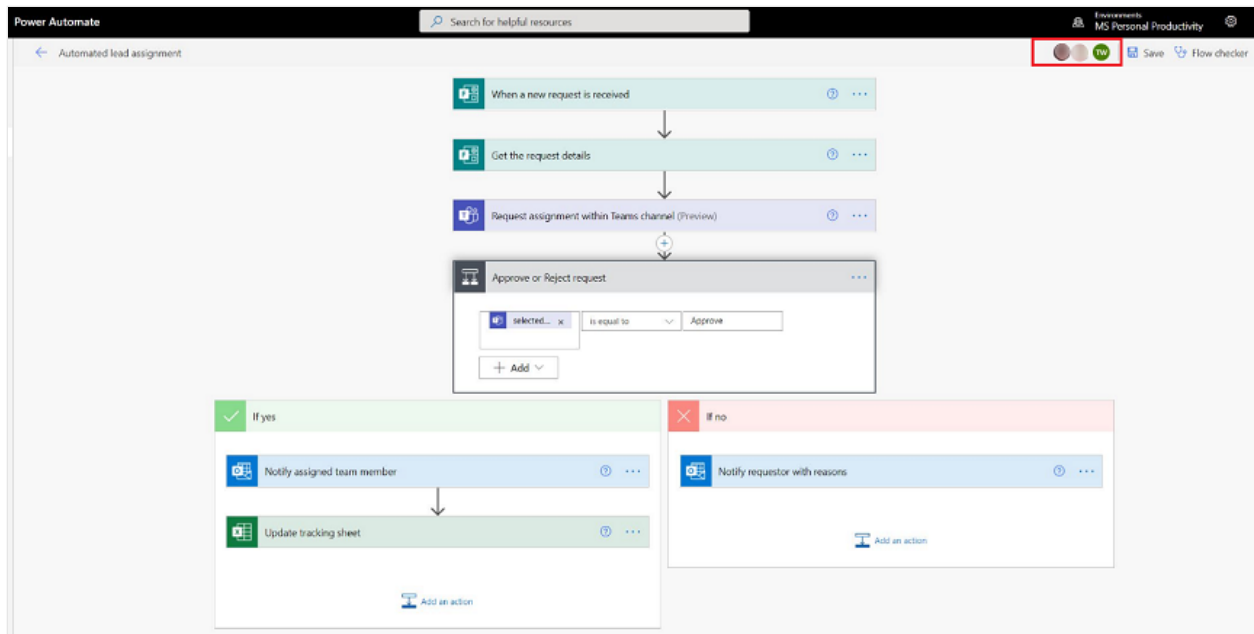
The screenshot shows the configuration interface for the 'Send an email (V2)' connector. The fields are as follows:

- To:** Specify email addresses separated by semicolons like someone@con
- Subject:** Specify the subject of the mail
- Body:** Rich text editor with options for Font, size (12), Bold (B), Italic (I), Underline (U), and various list and link icons.
- From (Send as):** Email address to send mail from (requires "Send as" or "Send on beh
- CC:** Specify email addresses separated by semicolons like someone@con
- BCC:** Specify email addresses separated by semicolons like someone@con
- Attachments:** A section with two rows:
  - Attachments Name - 1: Attachment name
  - Attachments Content - 1: Attachment content
 Below this is a '+ Add new item' button.
- Sensitivity:** Sensitivity (dropdown arrow)
- Reply To:** The email addresses to use when replying
- Importance:** Importance (dropdown arrow)
- Hide advanced options:** A button with an upward arrow, highlighted with a red box.

2. From the **Importance** dropdown list, select **High**.
3. Select **Hide advanced options**.
4. Save your flow.

## Use co-presence to get notified of all editors

Power Automate displays the list of other makers who are editing a flow simultaneously. The list of editors is updated periodically.



## Add comments to actions and triggers

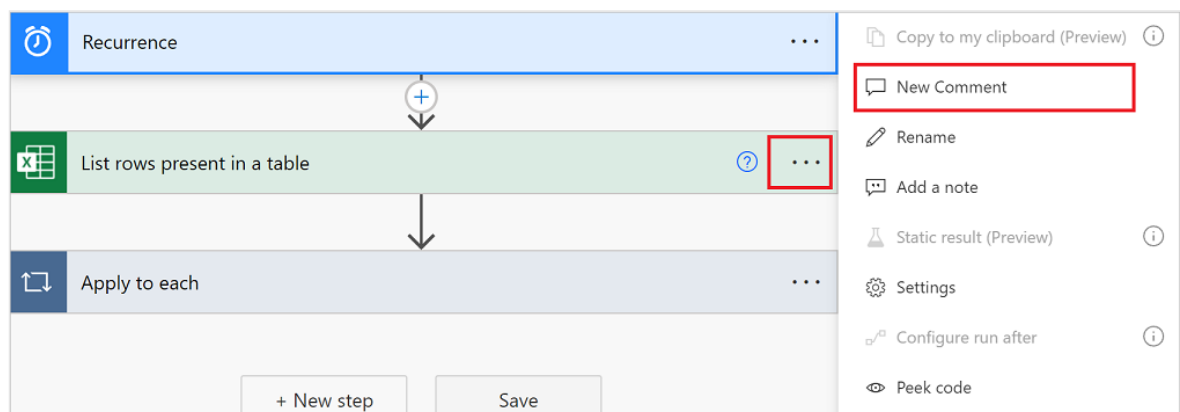
Makers can have threaded comments with colleagues as they build their flows. They can add or edit comments, reply to comment threads, and resolve and delete comment threads. It's possible to have multiple comment threads for both actions and triggers.

### **i** Important

Comments are supported for environments that have a Dataverse database.

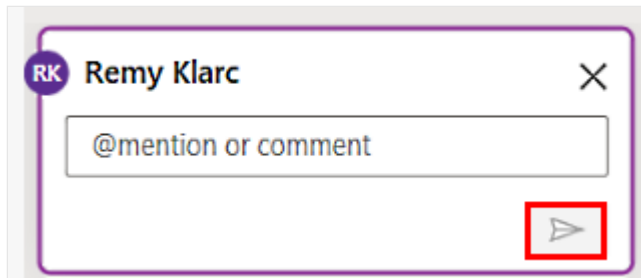
Follow these steps to add a comment to any action or trigger in your flow.

1. On the trigger or action heading, select ... (the ellipsis).
2. Select **New Comment**.

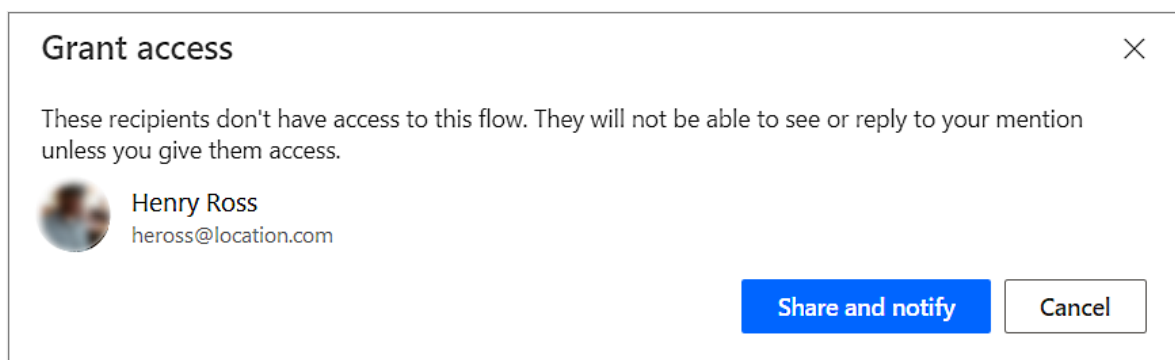


The comments pane opens.

3. Enter a comment to your action with an @mention to others. If you do this, an email notification will be sent to them when you select the **Send** icon.

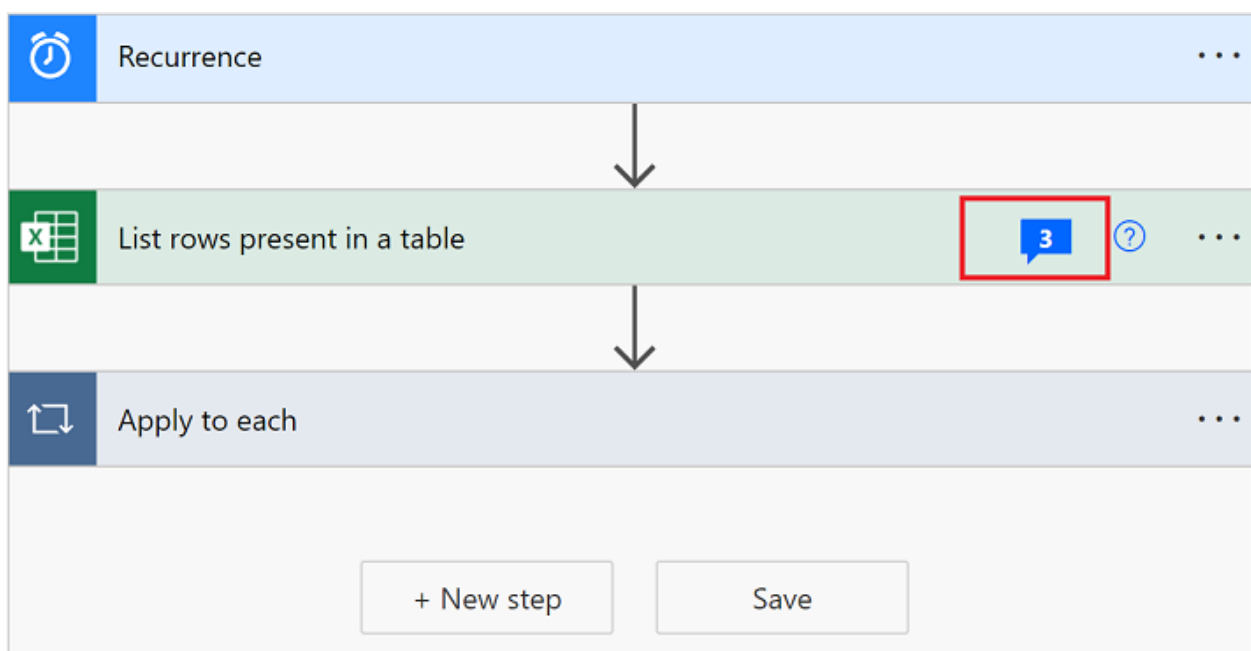


If the person you want to @mention isn't a co-owner of the flow, they'll get the **Share and notify** option. Select this option to share the flow with the other user, and send an email notification automatically.



4. Enter your comments in the **Start a conversation** box on the **Comments** pane, and then post it.

The Power Automate designer provides visual cues on the action cards to display the number of comment threads contained within each.

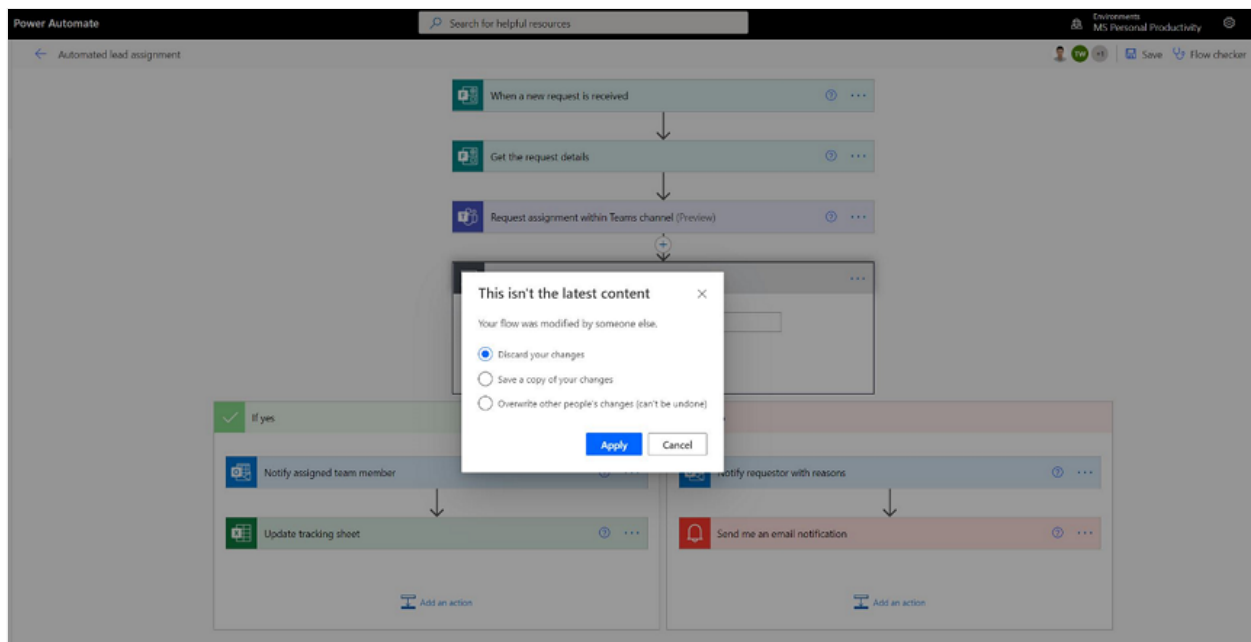


## Limitations

- Makers must save the flow at least once before they can add a comment.
- The comment thread count icons don't appear for control actions such as condition, switch, and scope.
- Comments aren't allowed for managed solution flows.
- The **Share and notify** option is available only for non-solution aware flows. For solution aware flows, @mentioning is limited to users who are already co-owners of the flow.

## Address conflicts from multiple edits

If multiple users make changes to the flow simultaneously, Power Automate presents appropriate options to the maker to minimize conflicts during a save operation. A maker can choose to refresh the flow definition or save a copy of the flow to keep their changes.



## New expression editor for actions (experimental feature)

Do you struggle with writing expressions in your flow actions? You can make use of the improved expression editor in experimental mode. To use the improved expression editor, [enable the Experimental Features setting](#) and select **fx** on an action.

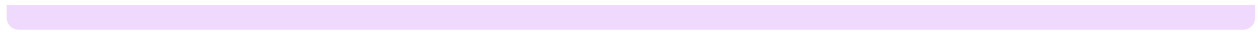
- The large expression editor view helps you manage rich and complex expressions.

- The expression editor allows you to choose dynamic content in the expressions without having to switch tabs.

- The expression editor preserves expressions with errors and unblocks the view to work in parallel on other parts of flow.

### ⓘ Note

Some actions might not support the new expression editor.





# Add a condition to a cloud flow

Article • 12/16/2022

Use a *condition* to specify that a cloud flow performs one or more tasks only if a condition is true or false. For example, you can use a condition that indicates that you'll get an email only if a tweet that contains a keyword is retweeted at least 10 times.

Here's a video tutorial about conditions.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKUx0?postJsllMsg=true>

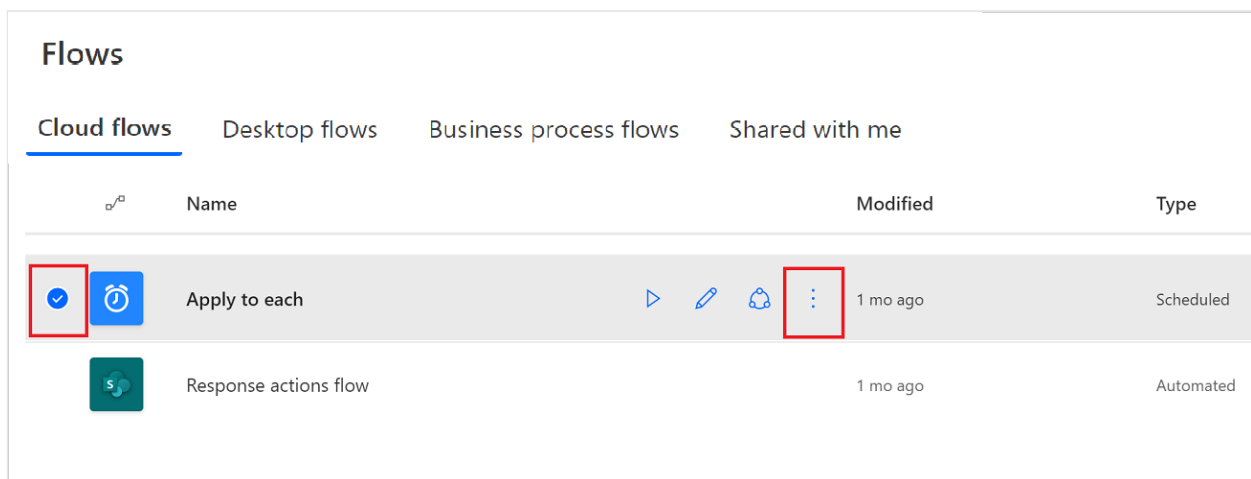
## Prerequisites

Create a [cloud flow](#) from a template. This tutorial [uses this template](#) as the example.

## Add a condition

This tutorial uses an example with a Twitter trigger and a SharePoint action.

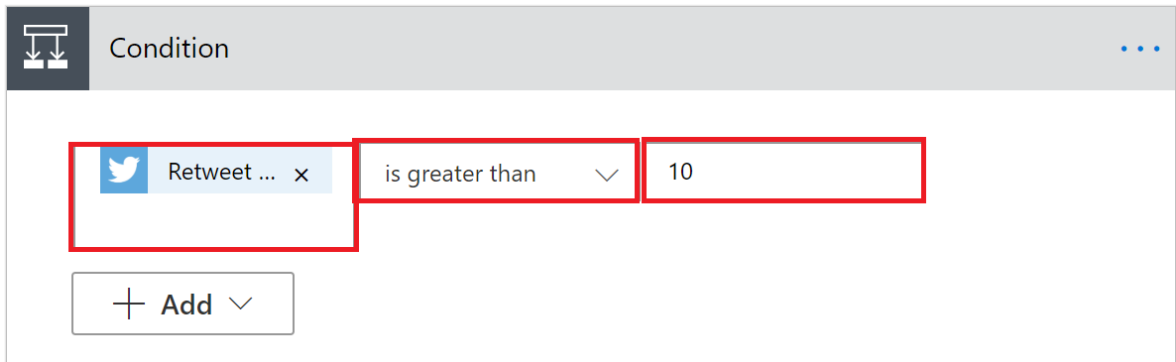
1. Sign into [Power Automate](#).
2. On the left pane, select **My flows**.
3. On the list of flows, select the flow you want to edit by placing a check mark in the circle and then selecting **More commands** (the three dots).



4. Select **Edit**.
5. Under the last action, select **New step > Condition**.
6. On the **Condition** card, select an empty area in box on the left.

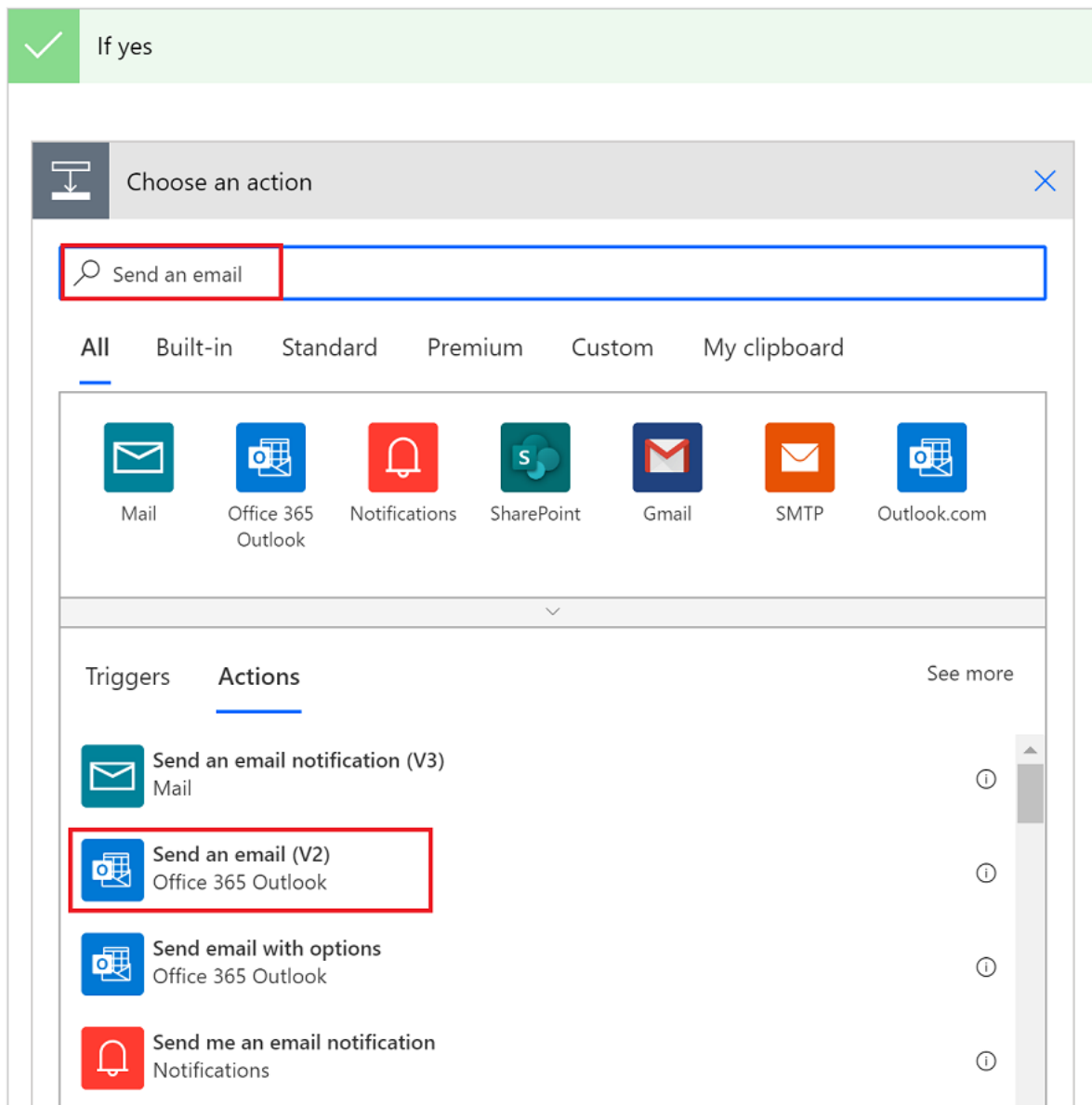
The **Dynamic content** list opens.

7. Select the **Retweet count** parameter to add it to the box.
8. In the box in the middle of the **Condition** card, select **is greater than or equal to**.
9. In the box on the right, enter **10**.



Now that you've configured the condition, continue with the following steps to send an email if the **Retweet count** is more than 10.

10. Select **Add an action** on the **If yes** send of the condition.
11. Enter **Send an email** into the search box, and then select **Send an email (V2)**.



12. Configure the **Send an email (V2)** card to your liking, indicating the contents of the email that the flow sends if the **Retweet count** is greater than 10.

You can also configure the **If no** side of the condition if you'd like to take an when the **Retweet count** is less than 10.

13. Save the flow.

#### 💡 Tip

You can create complex conditions by using the **Add** button on the condition card.



Learn about all the available [expressions](#).

## Next step

Learn how to [use expressions](#) in conditions in advanced mode.

# Associate flows with apps

Article • 01/13/2024

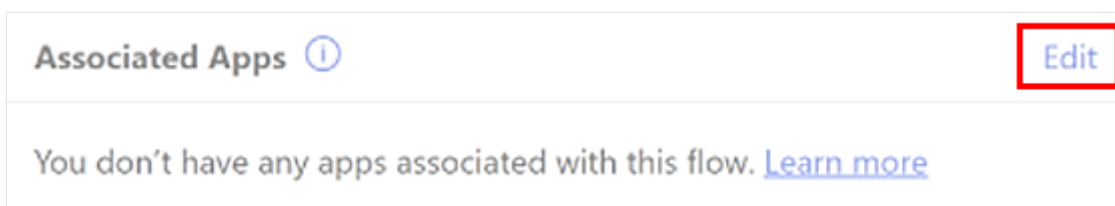
From the Power Automate portal, you can associate automated and scheduled flows with apps in Power Apps and with Dynamics 365 apps. You can then manage flows and apps together and more easily keep track of dependencies. If the associated app is missing in any environment, the flow alerts you about the missing dependency. This feature also ensures that apps are always up to date.

This feature can provide relief to makers who often struggle to keep track of which flows are used by which apps. Without the association, flows can break if the corresponding app isn't present in the environment. The result can be frustration and delays.

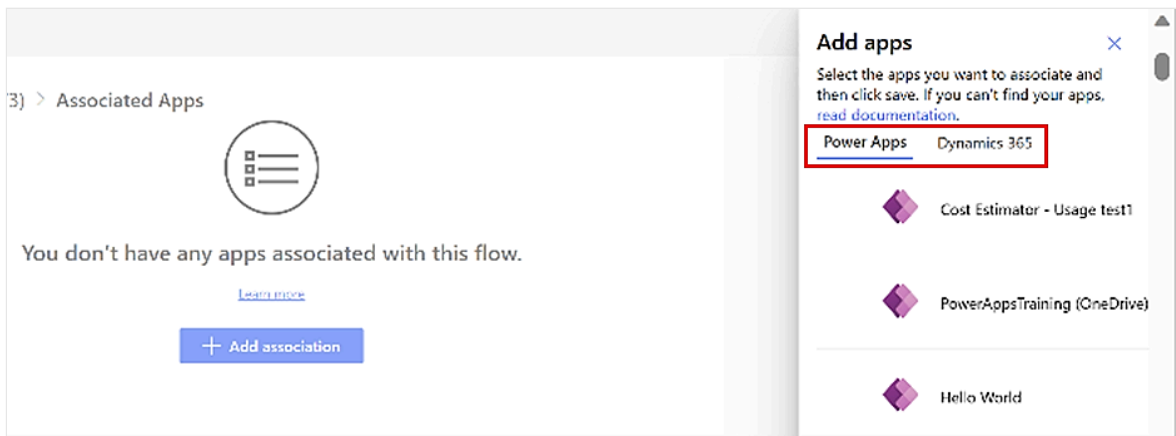
## Add an association

To make an association between a flow and an app, follow these steps. For consistency and continuity, the association is then preserved as the flow is deployed in other environments. In this way, it helps reduce errors and speed up the development process.

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **My flows**.
3. Find and select the flow that you want to associate with an app.
4. On the **Associated Apps** tile in the lower right, select **Edit**.



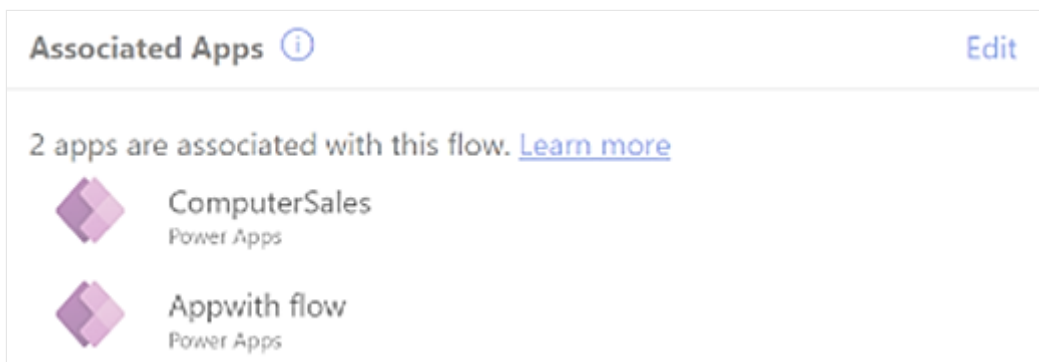
5. On the **Associated Apps** page, select **Add association**.
6. By default, the **Power Apps** tab is selected and shows the apps in Power Apps that use the same data sources as the flow. To find Dynamics 365 apps, select the **Dynamics 365** tab.



### ⓘ Note

If you can't find your app, go to [Why can't I find my app in the list of apps?](#) in the "FAQ" section of this article.

7. Select one or more apps, and then select **Save**.
8. To view the associated apps, go back to the flow details.



## Remove an association

To remove an association between a flow and an app, follow these steps.

1. Sign in to [Power Automate](#).
2. On the **Associated Apps** tile in the lower right, select **Edit**.
3. Select the app that you want to delete.
4. When a trash can symbol appears next to the app name, select it.
5. On the **Remove app association** page, select **Remove**.

## FAQ

### Why can't I find my app in the list of apps?

Your app might not be listed for one of the following reasons:

- You don't have access to the app.
- The app isn't installed in the environment.
- The app doesn't use the same data sources as the flow.

## I associated 10 apps. So why are only four apps shown on the flow details page?

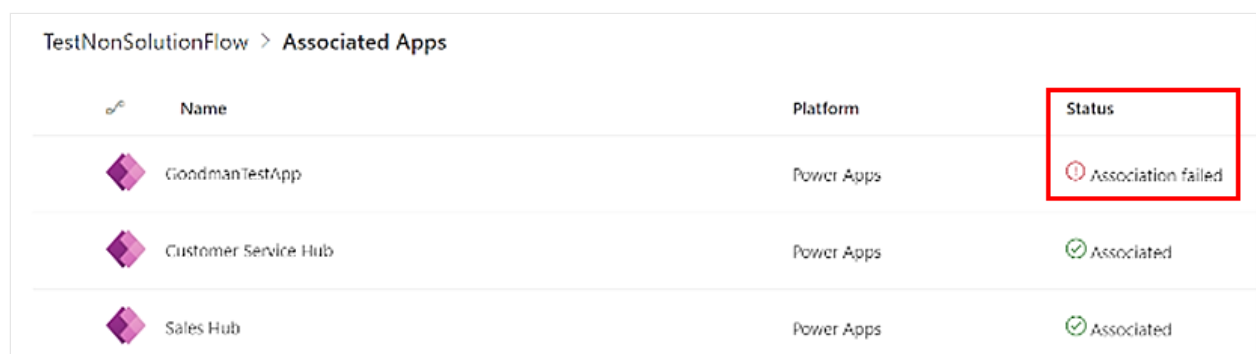
The **Associated Apps** tile on the flow details page shows only the top four apps. To view the whole list, select **Edit**. All apps then appear on the **Associated Apps** page.

## I'm deploying the flow into production. Will I have to associate again after the flow is in production?

You need to make the association only once in the lower environments. The association is then preserved as the flow is deployed in other environments.

## Why is the status of my app association shown as failed?

The **Associated Apps** page shows the status of your apps.



Name	Platform	Status
GoodmanTestApp	Power Apps	Association failed
Customer Service Hub	Power Apps	Associated
Sales Hub	Power Apps	Associated

The *Association failed* status might be caused by one of the following reasons:

- The app is removed from the environment.
- The app is edited and no longer uses the same data sources as the flow.
- You no longer have access to the app.

## My flow has a Power Apps trigger. So why is the Associated Apps tile blank?

This is a known issue. If a flow has a Power Apps trigger, the apps that use that flow aren't automatically shown. We plan to implement the functionality soon.

## I have a Power Apps per app license. How can I ensure that the in-context flows run?

A Power Apps per app license allows for a limited set of Power Automate capabilities. If the flow is supporting an app in Power Apps, associate the flow with the app. After the association is made, users who have a Power Apps per app license can use the flow.

## Why are my end-user's Power Automate flow connections not working in Power Apps?

It might be that the connection for the current user has become unauthenticated. For instance, the user might have changed their password. The flow will continuously fail. Power Apps doesn't try to automatically repair these connections or re-prompt the end user for updated credentials. This is a known issue for Microsoft SharePoint Online and non-Entra based connections. Refreshing the session might work. Alternatively, you might need to wrap the flow in an `IfError()` and in the failure case, invoke all the dependent connections directly to trigger reauthentication and then rerun the flow.

## I'm an admin and want to associate flows and apps in bulk. Is there an admin command?

Use the PowerShell command in [How can I associate in context flows to Power Apps/Dynamics365 apps](#) in the *Frequently asked questions about Power Automate licensing* article.

## Related information

- [How can I associate in context flows to Power Apps/Dynamics365 apps](#)
- [Can I use service principal in flows, and does it count against my request limits?](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 



# Use data operations

Article • 03/21/2024

In this article, you learn about some common data operations in Power Automate, such as compose, join, select, filter arrays, create tables, and parse JSON. Use these operations to manipulate data when you create flows.

## ⓘ Note

The different sections in this article aren't related and aren't dependent upon each other. The different sections use different examples.

Here's a quick video about data operations.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKXdo?postJsllMsg=true>

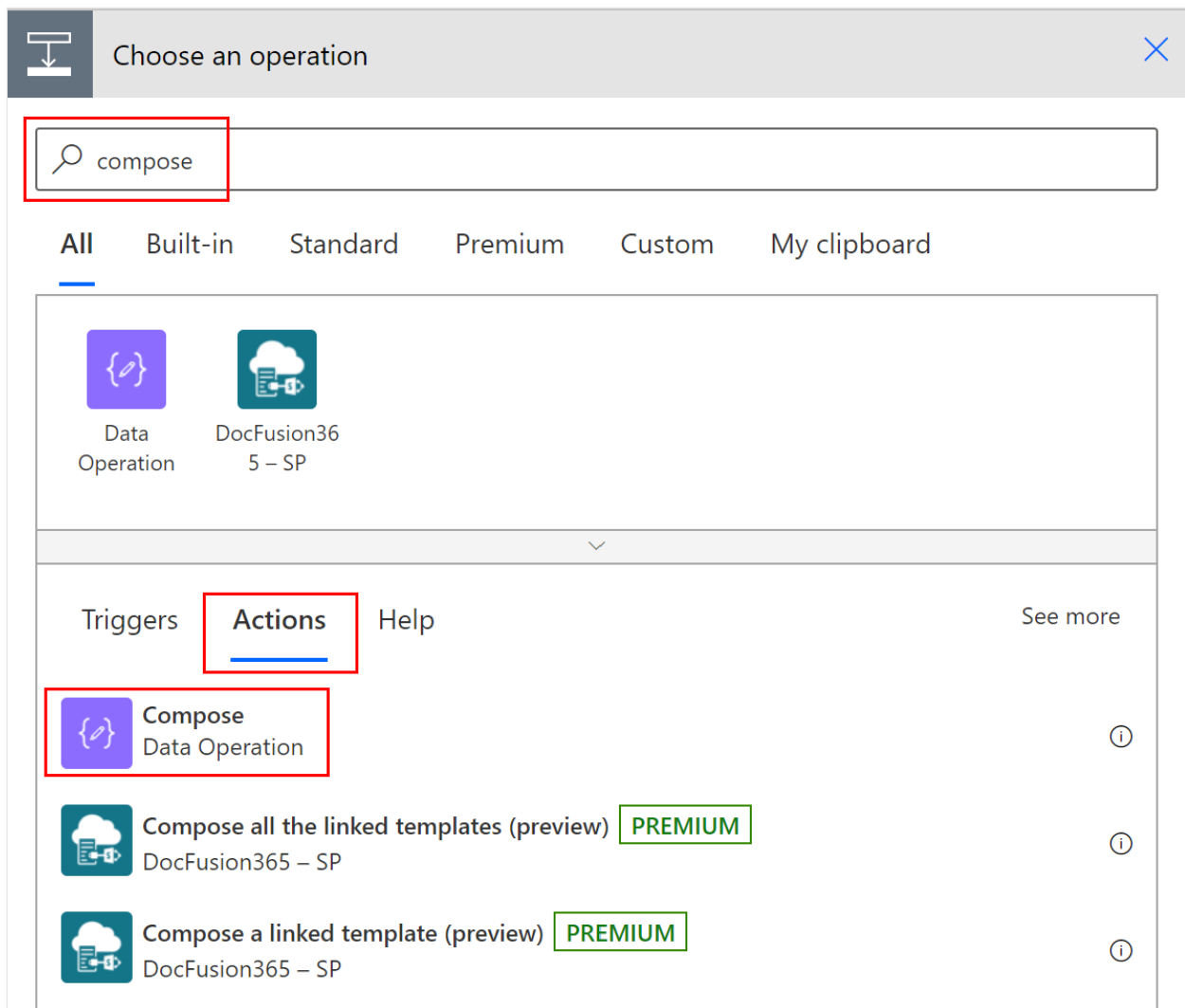
## Prerequisites

- Access to [Power Automate](#).
- A tool to send HTTP POST requests with a JSON array to your flow.

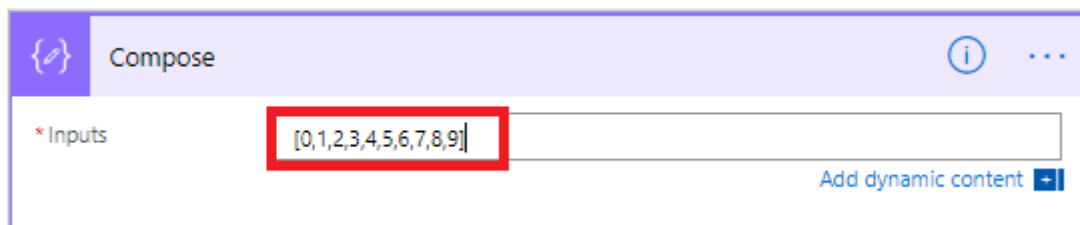
## Use the compose action

Use the **Data Operation - Compose** action to save yourself from having to enter the same data multiple times as you're designing a cloud flow. In this example, you need to enter an array of digits—`[0,1,2,3,4,5,6,7,8,9]`—several times while you design your flow. You can use the compose action to save the array, as described in the following procedure.

1. Search for **compose**, and then select the **Compose - Data Operation** action.



1. In the **Inputs** box, enter the array that you want to reference later.



### 💡 Tip

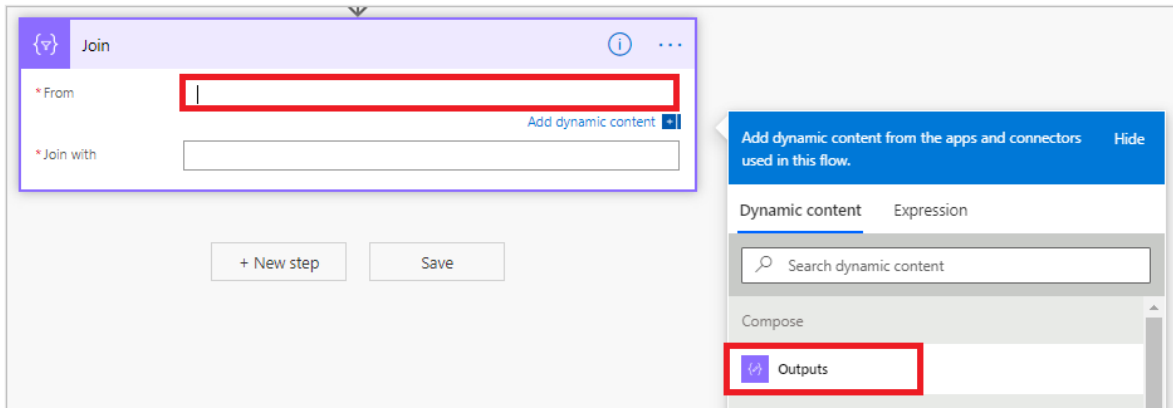
To make the **Compose** card easier to find later, rename it by selecting the text **Compose** on the title bar of the card and entering a name that's easy to remember.

When you need to access the contents of the compose action, do so by following these steps.

1. Add an action, such as **Join - Data Operation**.
2. Select the control to which you'd like to add the contents you saved in the compose action.

The **Add dynamic content from the apps and connectors used in this flow** screen opens.

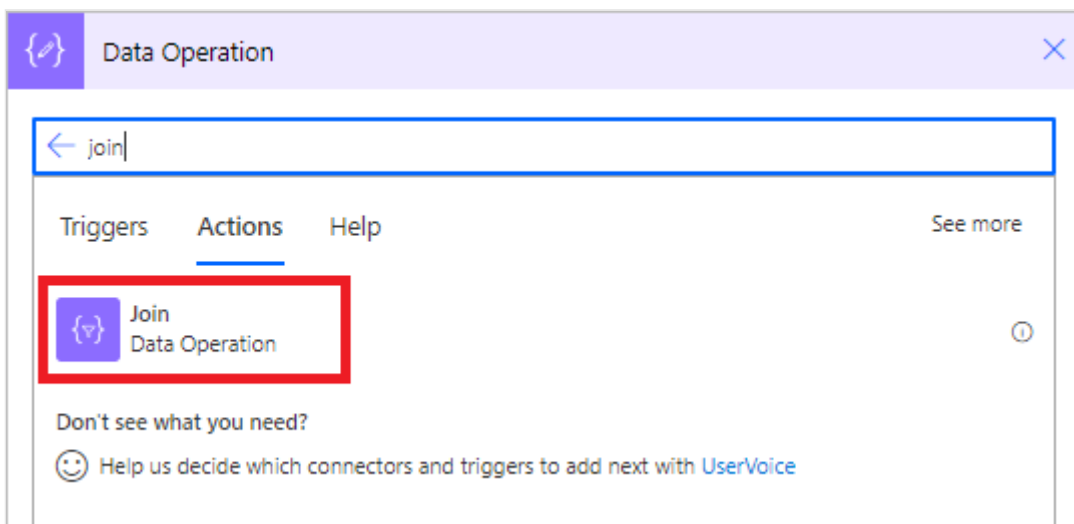
3. On the **Dynamic content** tab, in the **Compose** section, select **Outputs**.



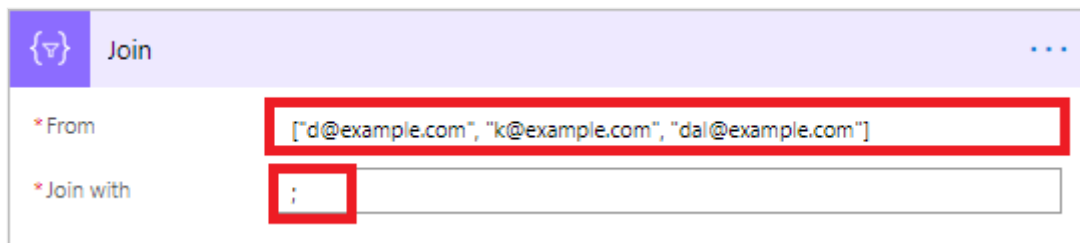
## Use the join action

Use the **Data Operation - Join** action to delimit an array with the separator of your choice. For example, your flow receives a web request that includes the following array of email addresses: ["d@example.com", "k@example.com", "dal@example.com"]. However, your email program requires addresses to be formatted in a single string, separated with semicolons. You use the **Data Operation - Join** action to change the comma delimiter (,) to a semicolon (;) by following these steps:

1. Add a new action, search for **Join**, and then select **Data Operation - Join**.

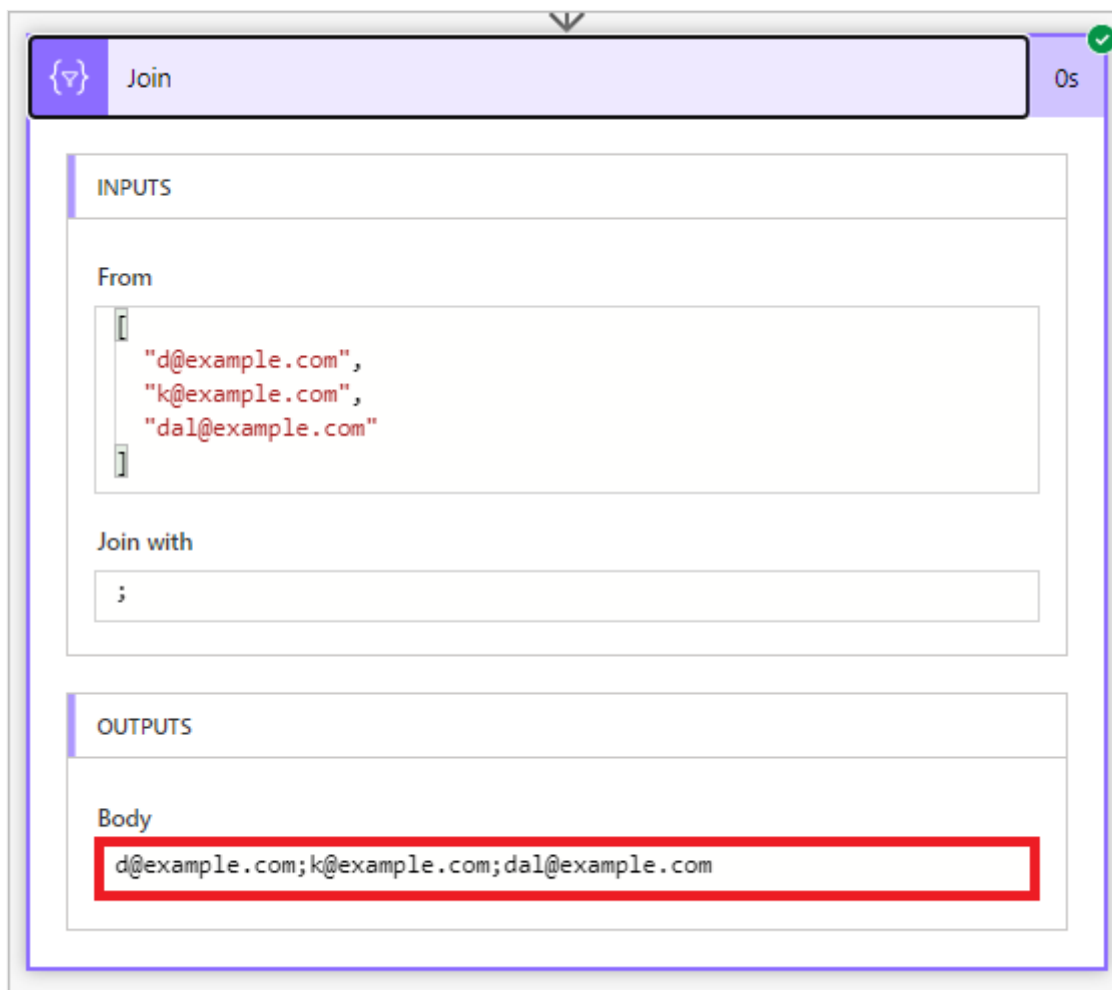


2. In the **From** box, enter the array, and in the **Join with** box, enter a semicolon (;).



3. Save your flow, and then run it.

4. After your flow runs, the output of the **Data Operation – Join** action will be a string with the addresses joined by semicolons, as shown in the following screenshot.



## Use the select action

Use the **Data Operation – Select** action to transform the shape of objects in an array. For example, you can add, remove, or rename elements in each object in an array.

### ⓘ Note

Although you can add or remove elements by using the select action, you can't change the number of objects in the array.

In this example, data enters your flow via a web request in this format:

JSON

```
[ { "first": "Eugenia", "last": "Lopez" }, { "first": "Elizabeth", "last": "Moore" } ]
```

You want to reshape the incoming data by renaming `first` to `FirstName` and `last` to `FamilyName`, and adding a new member named `FullName` that combines `first` and `last` (separated with a space).

JSON

```
[ { "FirstName": "Eugenia", "FamilyName": "Lopez", "FullName": "Eugenia Lopez" }, { "FirstName": "Elizabeth", "FamilyName": "Moore", "FullName": "Elizabeth Moore" } ]
```

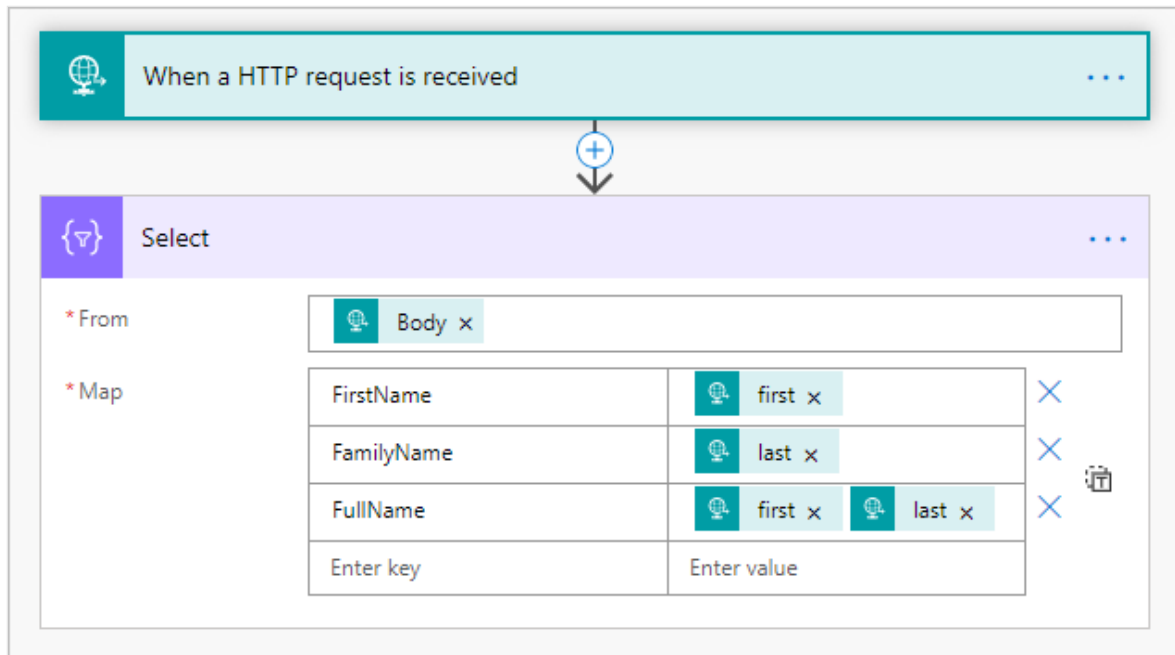
To do this:

1. Add the **When an HTTP request is received** trigger to your flow.
2. Select **Use sample payload to generate schema**.



3. In the box that appears, paste a sample of your source data array, and then select **Done**.

4. Add the **Data Operation – Select** action, and then configure it as shown in the following screenshot.



## Use the filter array action

Use the **Filter array - Data Operation** action to reduce the number of objects in an array to a subset that matches the criteria you provide.

### ⓘ Note

- You can't use the filter array action to change the shape of objects in the array.
- The text on which you filter is case-sensitive.

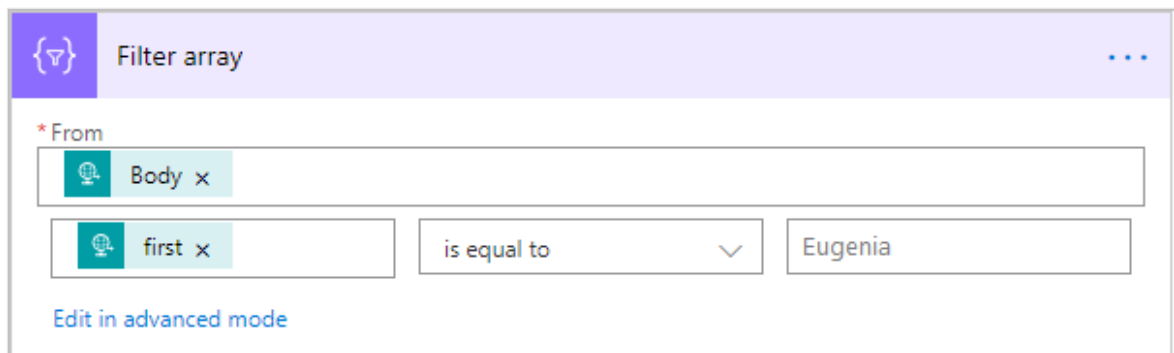
In this example, you use the filter array action on this array:

JSON

```
[ { "first": "Eugenia", "last": "Lopez" }, { "first": "Elizabeth", "last": "Moore" } ]
```

This example creates a new array that contains only objects in which `first` is set to `Eugenia`.

1. Find, and then add, the **Filter array** action to your flow.
2. Configure the filter array action as shown in the following screenshot.



3. Save, and then run your flow.

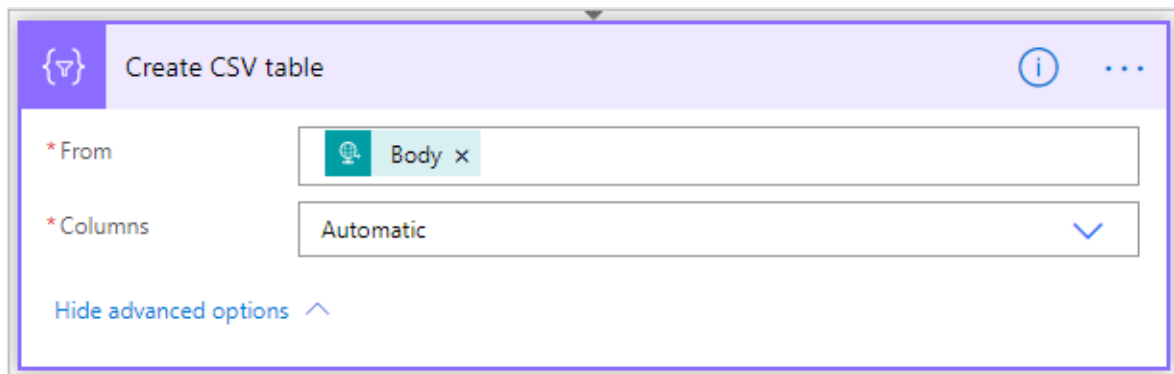
## Use the create CSV table action

Use the **Create CSV table - Data Operation** action to change a JSON array input into a comma-separated value (CSV) table. You can keep the headers visible in the CSV output. In this example, you convert the following array into a CSV table:

JSON

```
[ { "first": "Eugenia", "last": "Lopez" }, { "first": "Elizabeth", "last": "Moore" } ]
```

1. Find, add, and then configure the **Create CSV table - Data Operation** action to resemble the following image.



The **Body** token in this image comes from a **When a HTTP request is received** action; however, you can get the input for the **Create CSV table** action from the output of any previous action in your flow, or you can enter it directly in the **From** box.

2. Save, and then run your flow.

When your flow runs, the **Create CSV table** action displays the output shown in the following screenshot.

OUTPUTS
<b>Body</b>
<pre>first, last Eugenia, Lopez Elizabeth, Moore</pre>

## Use the create HTML table action

Use the **Create HTML table - Data Operation** action to change a JSON array input into an HTML table. You can keep the headers visible in the HTML output.

To do this, follow the steps in the previous **Use the create CSV table action** section for creating a CSV table. Use the **Create HTML table - Data Operation** action instead of **Create CSV table**.

### Tip

If you plan to send the HTML table via email, remember to select **IsHtml** in the email action.



# Customize or format date and time values in a flow

Article • 01/24/2024

This article provides steps to customize or format date and time values in a Power Automate flow.

When working with date and time values in a Power Automate flow, you might find that the date and time format isn't what you expected, or you might want to customize the format of the output. You can do this by passing format strings to the [formatDateTime](#) function.

## Format date and time

The `formatDateTime()` function in Power Automate enables you to manipulate and format date and time values in various display formats. It also offers an easy way to handle data and time across different time zones.

The `formatDateTime()` function takes two parameters:

- **Timestamp:** The timestamp is the date and time value that needs to be formatted.

It can be a manual string or dynamic content. When entered manually, the timestamp is expected to follow the ISO 8601 format ("yyyy-MM-ddTHH:mm:ssZ").

- **Format string:** The format string specifies the output format for the date and time.

The format string parameter of the `formatDateTime()` function can either be a standard format string or a custom format string.

## Standard format strings

A standard format string uses a single character (for example, d, g, or G) as the format specifier.

### Examples

- The format string `g` corresponds to the General date/time pattern (short time):

```
formatDateTime('2009-06-15T13:45:30', 'g') // Returns the format 6/15/2009 1:45 PM
```

- The format string `D` corresponds to the Long date pattern:

```
formatDateTime('2009-06-15T13:45:30', 'D') // Returns the format Monday, June 15, 2009
```

For more information and examples of using standard date and time format strings, go to [Standard date and time format strings](#).

## Custom format strings

A custom format string is any string with more than one character (for example, `M/dd/yyyy h:mm tt`) that can control the visibility, positioning, and precision of the month, day, year, hour, second, and so on, of the date and time value.

### Examples

- The format string `M/dd/yyyy h:mm tt` represents the same pattern as the standard format string `g` as described in [Standard format strings](#):

```
formatDateTime('2009-06-15T13:45:30', 'M/dd/yyyy h:mm tt') // Returns the format 6/15/2009 1:45 PM
```

- The format string `HH:mm:ss tt` returns the 24 hour format:

```
formatDateTime('2009-06-15T13:45:30', 'M/dd/yyyy HH:mm:ss tt') // Returns the format 6/15/2009 13:45:30 PM
```

- The format string `hh:mm:ss tt` returns the 12 hour format:

```
formatDateTime('2009-06-15T13:45:30', 'yyyy/MM/dd hh:mm:ss tt') // Returns the format 2009/06/15 1:45:30 PM
```

- `utcNow()` function used as the timestamp to automatically fetch the current date and time in UTC, and the format string `dd-MM-yyyy` to display the date and time:

```
formatDateTime(utcNow(), 'MMMM dd, yyyy, HH:mm') //Returns the current date time in the format June 15, 2009, 16:50
```

- `utcNow()` function used as the timestamp to automatically fetch the current date and time in UTC, and the format string `dd-MM-yyyy` to display the date but not time:

```
formatDateTime(utcNow(), 'dd-MM-yyyy') //Returns the current date in the format 15-06-2009
```

For more information and examples of using custom date and time format strings, go to [Custom date and time format strings](#).

## Use in a flow

To use a date and time value in a flow, follow these steps.

1. In the flow, select the input field where you want to enter the formatted date and time value.
2. Go to **Add dynamic content** and select the **Expression** tab to open the expression editor.
3. Type `formatDateTime()`.

Alternatively, look for it under **Date and time** functions.

4. Provide the value to be formatted, surrounded by single quotes.

Dynamic content can be used but shouldn't be surrounded by single quotes.

5. Provide the format string, surrounded by single quotes.

6. The full expression should look like the following examples:

- `formatDateTime('<your-value>', 'dd/MM/yyyy hh:mm tt')`
- `formatDateTime('<dynamic-value>', 'dd/MM/yyyy hh:mm tt')`

The image shows a screenshot of the 'Convert time zone' step configuration in a flow editor. The 'Base time' field is set to 'Timestamp' and has an 'Add dynamic content' button highlighted with a red box. The 'Source time zone' is '(UTC-06:00) Central Time (US & Canada)' and the 'Destination time zone' is '(UTC+00:00) Dublin, Edinburgh, Lisbon, London'. The 'Format string' is 'A string specifying the desired format of the converted time.' To the right, the 'Expression' tab is selected, showing the expression `formatDateTime('2009-06-15T13:45:30', 'M/c` highlighted with a red box. Below the expression editor is a list of functions including `convertFromUtc`, `formatDateTime`, `parseDateTime`, `startOfHour`, `startOfDay`, `startOfMonth`, `dayOfWeek`, `dayOfMonth`, and `dayOfYear`.

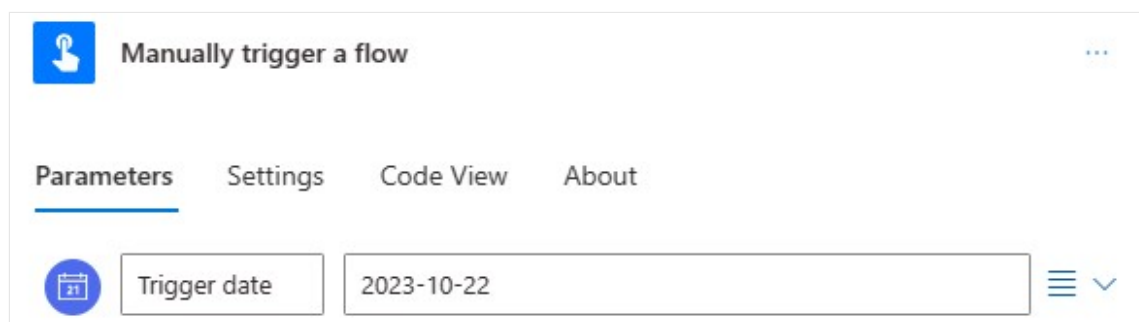
7. Select OK.

## Example with dynamic content

Dynamic contents are variables produced by triggers and actions within a flow diagram. They enable users to select field references from previous steps and write expressions.

This example walks through a simple flow that demonstrates the use of the `formatDateTime()` function with dynamic content. The trigger used in this example is a manually triggered flow that requires user input.

1. Sign in to [Power Automate](#).
2. Set up the trigger for the flow. This example uses **Date** as the input.
  - a. On the left navigation pane, select **Create** > **Instant cloud flow**.
  - b. In the **Flow name** field, enter a name for your flow.
  - c. In the **Choose how to trigger this flow** list, select **Manually trigger a flow**.
  - d. Select **Create**.
  - e. Select the **Manually trigger a flow** card.
  - f. On the **Parameters** tab, select + **Add an input** > **Date**.
  - g. In the field to the right, enter **2023-10-22**.



3. Add the **Send an email (v2)** action.
  - a. Below the **Manually trigger a flow** card, select the plus sign (+) > **Add an action**.
  - b. In the **Search** field, start typing **Send an email (v2)** and select it from the list when you see it.

c. Select the **Body** field in the email, and then select *fx* (Insert Expression).

d. Select **Dynamic content**.

The dynamic content shown here is related to the trigger. It links together the trigger and actions that need to be taken.

e. In the field above **Dynamic content**, start typing **formatDateTime** and select it from the dropdown menu when it appears.

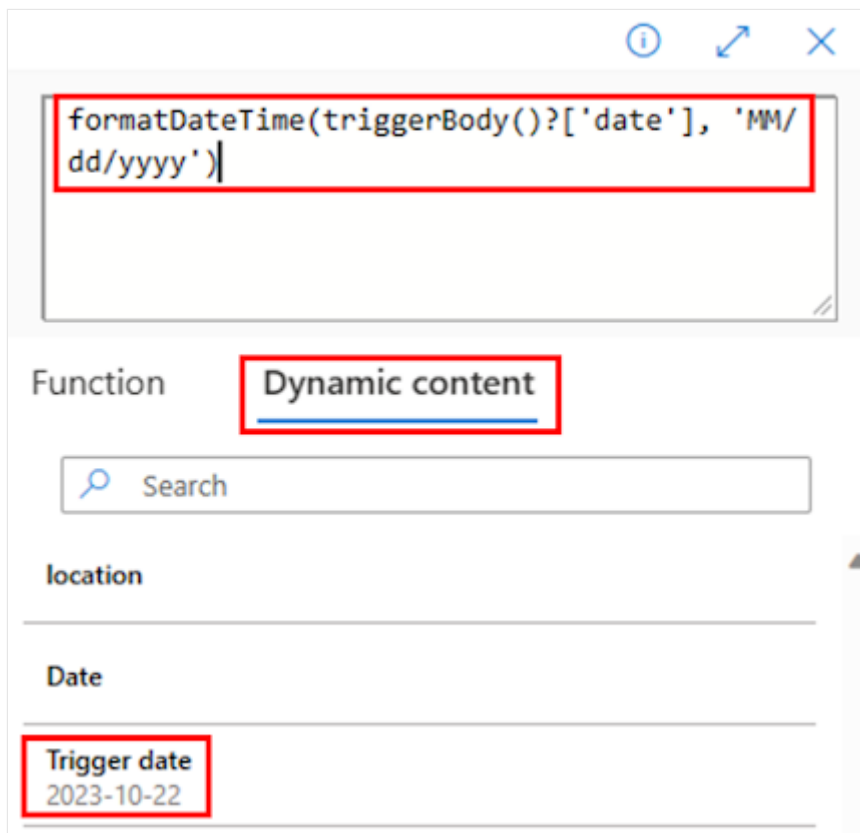
f. Scroll down the **Dynamic content** list and select **Trigger date**. If it doesn't appear, select **See More**.

This variable's dynamic content comes from the date field in the trigger.

g. Provide the format string (surrounded by single quotes) based on the desired output format for the date. In this example, MM/dd/yyyy format is used.

The full expression looks like this:

```
formatDateTime(triggerBody()?['date'], 'MM/dd/yyyy')
```



h. Select **Add**.

4. In the **Parameters** tab, insert an email in the **To** field, and a subject in the **Subject** field.

5. Select **Save**.

6. After running the flow, the email received shows the date in the specified MM/dd/yyyy format.

## Example with Convert time zone

Power Automate uses Coordinated Universal Time (UTC) by default. To handle date and time values in other time zones, you can use `formatDateTime` in conjunction with the `convertTimeZone` function.

For example, to display the current time in Eastern Standard time, you can use the following syntax:

```
formatDateTime(convertTimeZone(utcNow(), 'UTC', 'Eastern Standard Time'), 'yyyy-MM-dd HH:mm:ss') // Returns the date time adjusted for Eastern Standard time
```

## Related information

For more information on the date and time function, select the following articles.

- [Convert a time zone](#)
- [formatDateTime function reference](#)
- [Format dates by examples](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Convert a time zone

Article • 01/31/2024

This article provides steps to convert the time zone to the intended time zone in a Power Automate trigger or action.

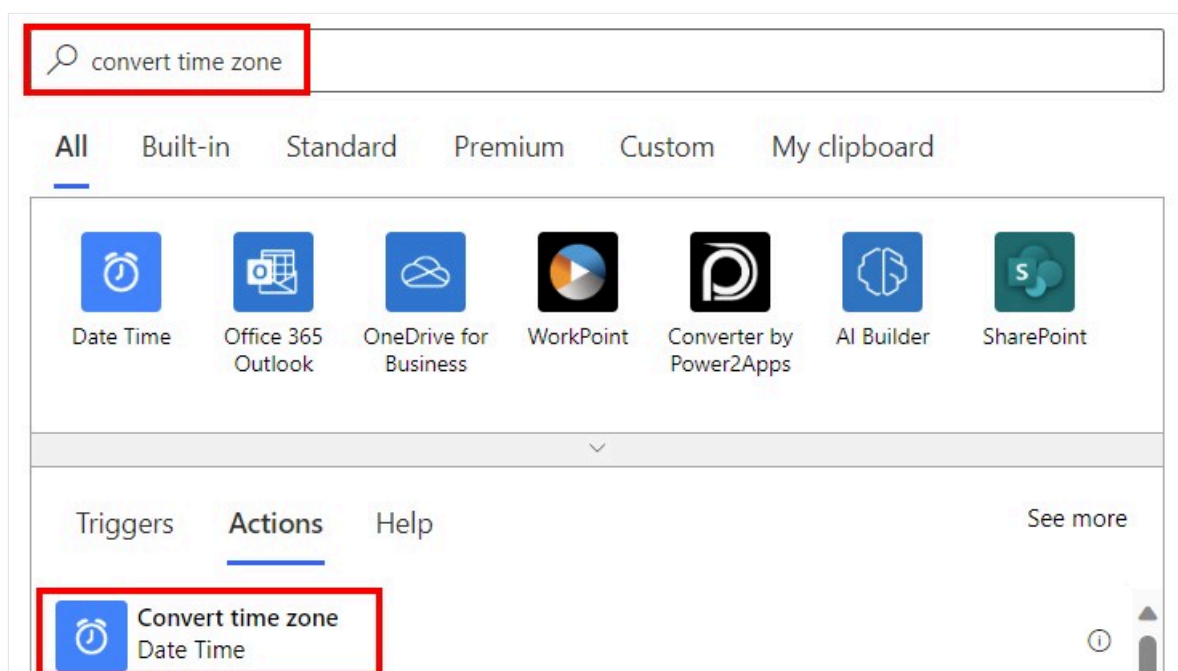
When passing datetimes through triggers and actions in Power Automate flows, you might find that the time zone isn't what you expected, or you might wish to convert the time zone (frequently in Coordinated Universal Time (UTC)) to your local time. You can do this using the **Convert time zone** action or the `convertTimeZone` expression.

Dates are passed through services in varying formats or time zones, so each connector might use a different datetime format or time zone. Some services strictly use UTC time to avoid confusion.

## Convert a time zone using an action

Power Automate has a built-in operation called **Convert time zone**.

1. Sign in to [Power Automate](#).
2. Find your flow and select **Edit** to add an action.
3. In the **Search** box, type **convert time zone** and choose the built-in **Convert time zone** operation.



4. Add the required and optional inputs for the **Convert time zone** operation.

- **Base time:** The datetime you wish to convert.
- **Source time zone:** The time zone that the datetime is currently in.
- **Destination time zone:** The time zone you want to convert your date to.
- **Format string (Optional):** The string that specifies the desired format of the converted time.

For ways to find the current time zone, go to the [Common format scenarios](#) section in this article.

## Convert a time zone using an expression

Power Automate has an expression function `convertTimeZone` that converts a timestamp from the source time zone to the target time zone.



Here's an example of the function in the console:

```
Console

convertTimeZone(timestamp: string, sourceTimeZone: string,
destinationTimeZone: string, format?: string)
```

The function takes the following parameters:

- `timestamp`: The datetime you wish to convert.
- `sourceTimeZone`: The time zone the datetime is currently in.
- `destinationTimeZone`: The time zone you want to convert your date to.
- `format` (optional): The format of the time zone you wish to convert your date to.

### Example: Convert a time zone

This example converts a time zone to the specified time zone and format.

```
Console

convertTimeZone('2018-01-01T80:00:00.0000000Z', 'UTC', 'Pacific Standard
```



```
Time', 'D')
```

It returns the result: `Monday, January 1, 2018`.

## Example: Use dynamic content

This is an example of using dynamic content in the expression. Here, the `triggerBody()?['Date']` timestamp is the dynamic content you want to format. The source time zone is `UTC`. The destination time zone is `Eastern Standard Time`. The format is the custom format string `HH:mm`.

Console

```
convertTimeZone(triggerBody()?['Date'],'UTC','Eastern Standard  
Time','HH:mm')
```

To learn more about this expression function, go to [convertTimeZone](#).

To learn more about the format string parameter, go to [standard date and time format strings](#) and [custom date and time format strings](#).

## Common format scenarios

This section covers various scenarios and how to apply the appropriate format.

### Decipher a datetime

- Datetimes might have different formats. If your datetime has a `Z` at the end, it means it's in UTC time.

**Example:** `2020-04-10T01:28:14.0406387Z`

- You might receive an error that states your date time string isn't in the correct format.

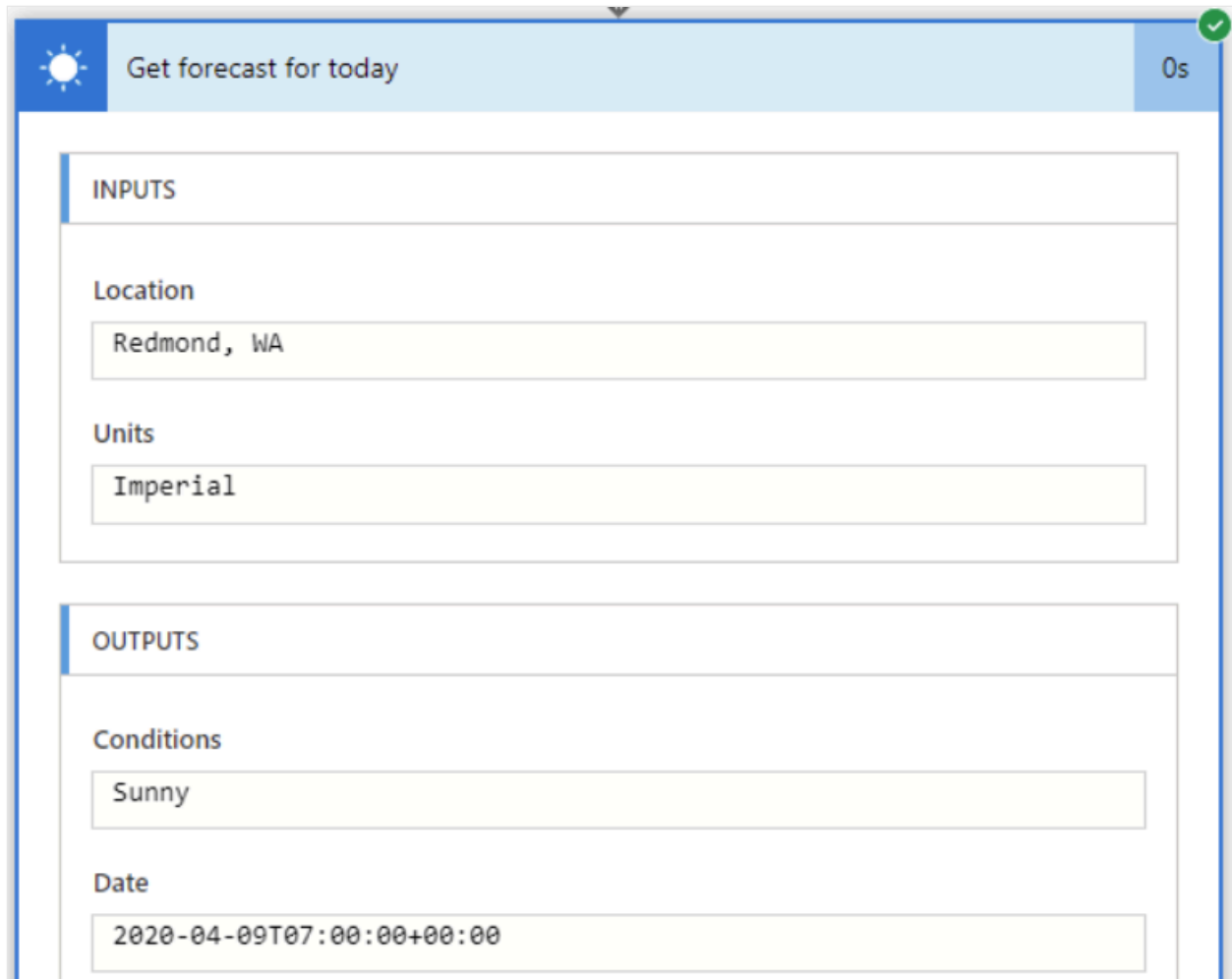
**Example:** 'The date time string must match ISO8601 format.'

To learn more about how to correctly format your datetime string, go to [convertTimeZone](#).

### Check the time zone of an output

If you're unsure what format the datetime time zone is currently in, you can run your flow and see the datetime output format.

In this example, the **Get forecast for today** operation outputs the timestamp for when you got the forecast.



The screenshot shows the configuration and results of the 'Get forecast for today' operation. The interface has a blue header with a sun icon, the operation name, and a '0s' timer. Below the header are two main sections: 'INPUTS' and 'OUTPUTS'. The 'INPUTS' section contains 'Location' (Redmond, WA) and 'Units' (Imperial). The 'OUTPUTS' section contains 'Conditions' (Sunny) and 'Date' (2020-04-09T07:00:00+00:00).

Section	Field	Value
INPUTS	Location	Redmond, WA
	Units	Imperial
OUTPUTS	Conditions	Sunny
	Date	2020-04-09T07:00:00+00:00

This datetime uses the ISO-8601 datetime format. This operation outputs the datetime in the UTC time zone.

## Convert a timestamp to or from UTC

To convert a timestamp from the source time zone to UTC, or from UTC to the target time zone, use the [convertFromUtc](#) and [convertToUtc](#) expression functions.

## Limitations

There might be limitations in some connectors for how the time zone displays. To learn more about each connector, go to [Connector reference overview](#).

## Related information

- [Customize or format date and time values in a flow](#)
  - [Reference guide to workflow expression functions in Azure Logic Apps and Power Automate](#)
- 

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# Use expressions in conditions to check multiple values

Article • 10/02/2023

In this tutorial, you'll learn to use expressions and *conditions* to compare multiple values in **Advanced mode**.

When you create a cloud flow, you can use the **Condition** card in basic mode to quickly compare a single value with another value. However, there're times when you need to compare multiple values. For example, you might want to check the value of a few columns in a spreadsheet or database table.

You can use any combination of the following logical expressions in your conditions.

Expression	Description	Example
<a href="#">and</a>	Takes two arguments and returns true if both values are true. <b>Note:</b> Both arguments must be Booleans.	This expression returns false: <code>and(greater(1,10),equals(0,0))</code>
<a href="#">or</a>	Takes two arguments and returns true if either argument is true. <b>Note:</b> Both arguments must be Booleans.	This expression returns true: <code>or(greater(1,10),equals(0,0))</code>
<a href="#">equals</a>	Returns true if two values are equal.	For example, if parameter1 is someValue, this expression returns true: <code>equals(parameters('parameter1'),'someValue')</code>
<a href="#">less</a>	Takes two arguments and returns true if the first argument is less than the second argument. <b>Note:</b> The supported types are integer, float, and string.	This expression returns true: <code>less(10,100)</code>
<a href="#">lessOrEquals</a>	Takes two arguments and returns true if the first argument is less than or equal to the second argument. <b>Note:</b> The supported types are integer, float, and string.	This expression returns true: <code>lessOrEquals(10,10)</code>
<a href="#">greater</a>	Takes two arguments and returns true if the first argument is	This expression returns false: <code>greater(10,10)</code>

Expression	Description	Example
	greater than the second argument. <b>Note:</b> The supported types are integer, float, and string.	
greaterOrEquals	Takes two arguments and returns true if the first argument is greater than or equal to the second argument. <b>Note:</b> The supported types are integer, float, and string.	This expression returns false: <code>greaterOrEquals(10,100)</code>
empty	Returns true if the object, array, or string is empty.	This expression returns true: <code>empty('')</code>
not	Returns the opposite of a boolean value.	This expression returns true: <code>not(contains('200 Success', 'Fail'))</code>
if	Returns a specific value if the expression results in true or false.	This expression returns "yes": <code>if(equals(1, 1), 'yes', 'no')</code>

## Prerequisites

Here's what you'll need to complete this walkthrough.

- Access to Power Automate.
- Your own spreadsheet with the tables described later in this walkthrough. Be sure to save your spreadsheet in a location such as Dropbox or Microsoft OneDrive so that Power Automate can access it.
- Microsoft 365 Outlook (While we use Outlook here, you can use any supported email service in your flows.)

## Use the 'or' expression

Sometimes your workflow needs to take an action if the value of an item is valueA *or* valueB. For example, you may be tracking the status of tasks in a spreadsheet table. Assume that the table has a column named **Status** and the possible values in this column are:

- completed
- blocked
- unnecessary
- not started

Here's an example of what the spreadsheet might look like:

Issue to do	Assigned to	Status
Check dropbox account for new files	David James	completed
Update payroll app	John Wonder	blocked
Alert security about new employee	James John	not started
Prepare invoices for printers	Annie Caines	unnecessary
Change password	D. Herb	completed

Given the preceding spreadsheet, you want to use Power Automate to remove all rows with a **Status** column that's set to **completed** or **unnecessary**.

Let's create the flow.

## Start with a blank flow

1. Sign into [Power Automate](#).
2. On the left pane, select **My flows**.
3. Select **New flow** > **Scheduled cloud flow**.

## Add a trigger to your flow

1. Give your flow a name.
2. Set the schedule to run the flow once daily.
3. Select the **Create** button to go to the next step.

### ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in [Understand the cloud flows designer with copilot capabilities](#).

## Select the spreadsheet and get all rows

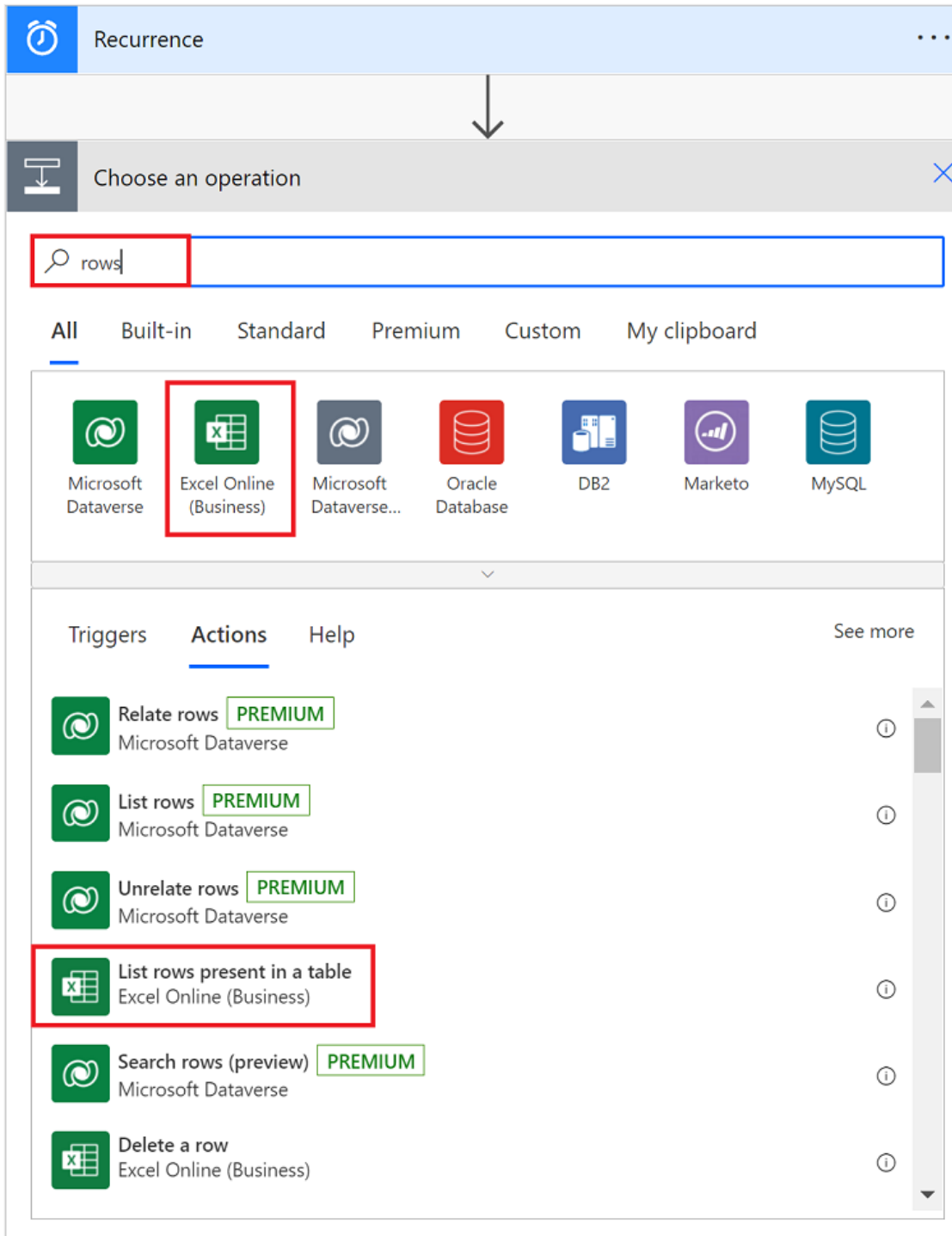
Classic designer

1. Select **New step**.

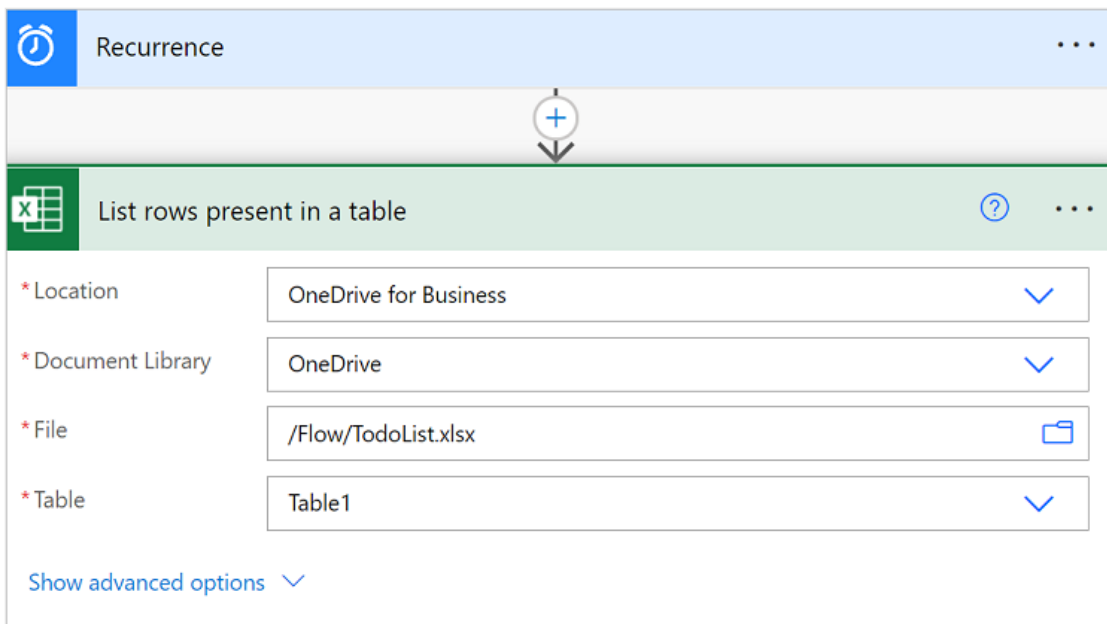
2. Search for **rows**, and then select **Excel Online (Business)**.

Select the *get a row* action that corresponds to the spreadsheet that you're using. For example, if you're using Google Sheets, select **Google Sheets - Get rows**.

3. Select the **List rows present in a table** action.



4. Select the **Location, Document Library, File, and Table** that contain your data.



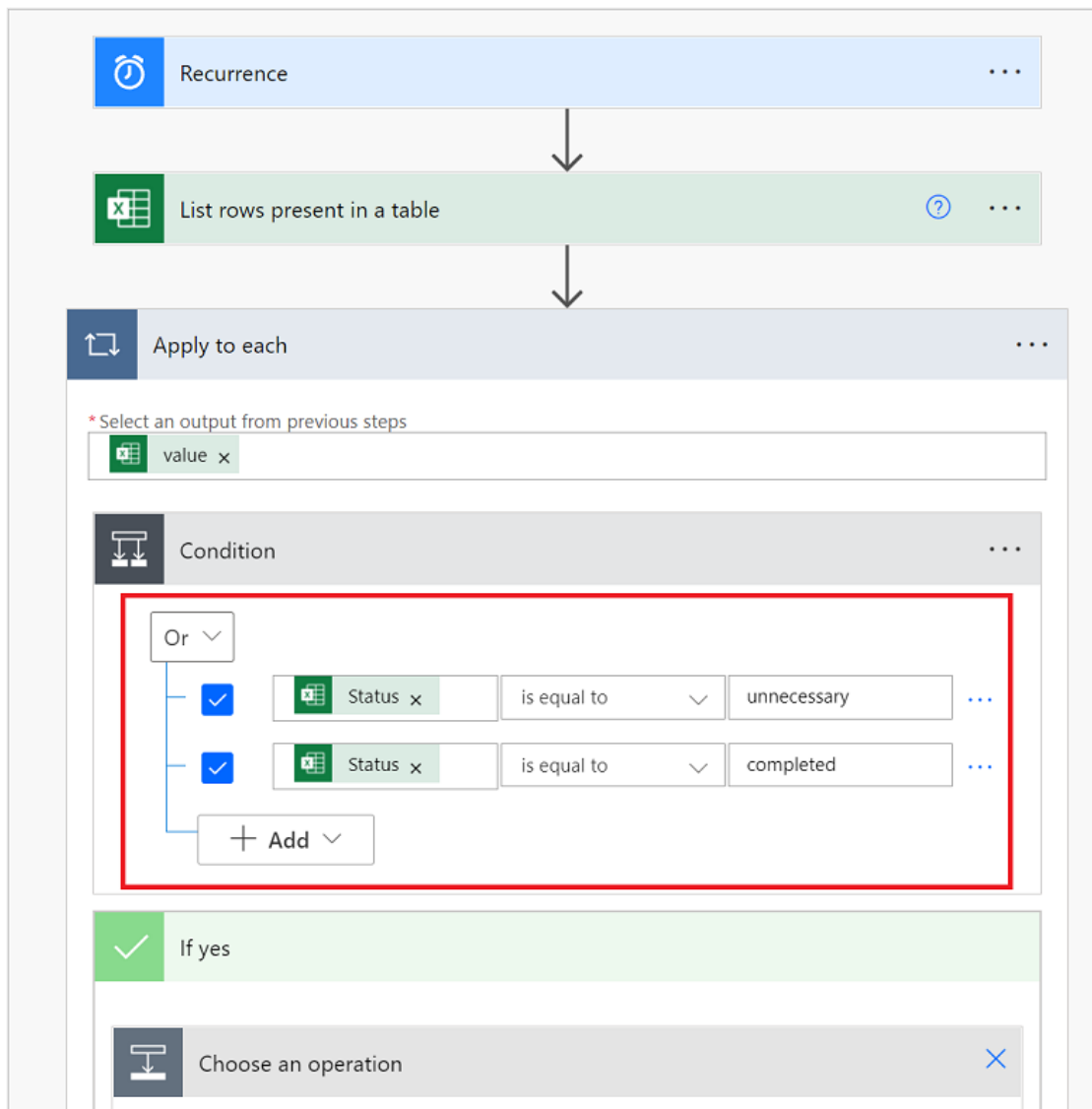
## Check the status column of each row

Classic designer

1. Select **New step**.
2. Search for **apply to each**, and then select the **Apply to each - Control**.
3. Add the **value** token to the **Select an output from previous steps** box.  
This **value** token represents the spreadsheet table and all of its data.
4. Select **Add an action** on the **Apply to each** card.
5. Search for **condition**, and then select the **Condition** control.
6. Add the following **Or** expression. This **Or** expression checks the value of each row in the table. If the value of the **Status** column is *completed* **Or** *unnecessary*, the **Or** expression evaluates to "true".

Here's an example of a **Condition** card.





## Delete matching rows from the spreadsheet

Classic designer

1. Select **Add an action** on the **If yes** branch of the condition.  
The **If yes** branch runs if the **OR** condition evaluates to **true**.
2. Search for **Delete a row**, select **Excel Online (Business)**, and then select **Delete a row**.
3. On the **Delete a row** card, set the **Location**, **Document Library**, **File**, and **Table** boxes exactly as you set these boxes on the **List rows present in a table** card earlier in this tutorial.
4. In the **Key Column** dropdown list, select **\_PowerAppsId\_**.

5. In the **Key Value** field, insert the `_PowerAppId_` dynamic value.

6. Save your flow.

## Run the flow with the 'or' expression

The flow runs after you save it. If you created the spreadsheet shown earlier in this tutorial, here's what it looks like after the run completes.

Issue to do	Assigned to	Status	_PowerAppId_
Update payroll app	John Wonder	blocked	XQu2dQeTgCY
Alert security about new employee	James John	not started	HI5hPkF_e5g
			hcOmRBkYA9M
			zWFK53IEUX4
			7aoJcRUxK28
			lxhG_7e_jHU

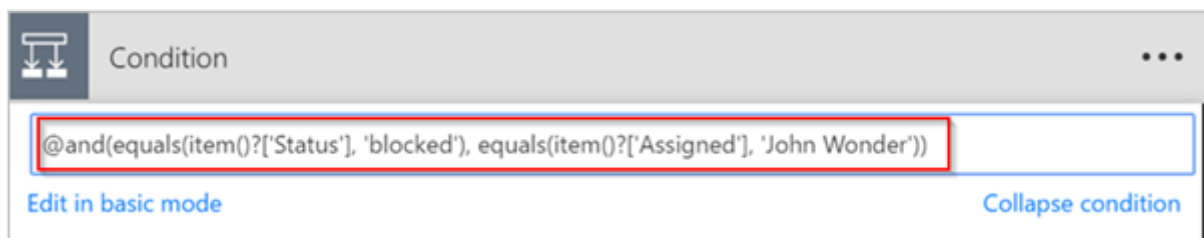
Notice all data from rows that had **completed** or **unnecessary** in the **Status** column were deleted.

## Use the 'and' expression

Assume you have a spreadsheet table with two columns. The column names are **Status** and **Assigned**. Assume also that you want to delete all rows if the **Status** column's value is **blocked** and the **Assigned** column's value is **John Wonder**. To accomplish this task, follow all steps earlier in this tutorial, but when you edit the **Condition** card in advanced mode, use the **and** expression shown here.

```
@and(equals(item()?['Status'], 'blocked'), equals(item()?['Assigned'], 'John Wonder'))
```

Here's an example of a **Condition** card.



## Run the flow with the 'and' expression

If you've followed the steps in this tutorial, your spreadsheet should look similar to the following screenshot.

Issue to do	Assigned	Status	__PowerAppsId__
Update payroll app	John Wonder	blocked	XQu2dQeTgCY
Alert security about new employee	James John	not started	HI5hPkF_e5g
			hcOmRBkYA9M
			zWFK53IEUX4
			7aoJcRUxK28
			lXhG_7e_jHU

After your flow runs, your spreadsheet should look similar to the following screenshot.

Issue to do	Assigned	Status	__PowerAppsId__
Alert security about new employee	James John	not started	HI5hPkF_e5g
			hcOmRBkYA9M
			zWFK53IEUX4
			7aoJcRUxK28
			lXhG_7e_jHU

## Use the 'empty' expression

Notice that there are several empty rows in the spreadsheet now. To remove them, use the **empty** expression to identify all rows that don't have text in the **Assigned** and **Status** columns.

To accomplish this task, follow all steps listed in the [Use the 'and' expression](#) section earlier in this tutorial. When you edit the **Condition** card in advanced mode, use the following **empty** expression.

```
@and(empty(item()?['Status']), empty(item()?['Assigned']))
```

Your **Condition** card should look similar to the following screenshot.

Condition

```
@and(empty(item()?['Status']), empty(item()?['Assigned']))
```

Edit in basic mode Collapse condition

After your flow runs, the spreadsheet should look similar to the following screenshot.

Issue to do	Assigned	Status	__PowerAppsId__
Alert security about new employee	James John	not started	HI5hPkF_e5g

Notice extra lines are removed from the table.

## Use the 'greater' expression

Imagine you've bought baseball tickets for your coworkers and you're using a spreadsheet to ensure you're reimbursed by each person. You can quickly create a cloud flow that sends a daily email to each person who hasn't paid the full amount.

Use the **greater** expression to identify the employees who haven't paid the full amount. You can then automatically send a reminder email to those who haven't paid in full.

Here's a view of the spreadsheet.

Employee	Email	Due	Paid
Jenny	<a href="mailto:jenny@example.com">jenny@example.com</a>	10.00	5.00
Evo	<a href="mailto:evo@example.com">evo@example.com</a>	10.00	10.00
Shea	<a href="mailto:shea@example.com">shea@example.com</a>	10.00	0.00
Kohl	<a href="mailto:kohl@example.com">kohl@example.com</a>	10.00	20.00

Here's the implementation of the **greater** expression that identifies all persons who have paid less than the amount due from them.

```
@greater(item()?['Due'], item()?['Paid'])
```

## Use the 'less' expression

Imagine you've bought baseball tickets for your coworkers, and you're using a spreadsheet to ensure you're reimbursed by each person by the date to which everyone agreed. You can create a cloud flow that sends a reminder email to each person who hasn't paid the full amount if the current date is less than one day before the due date.

Use the **and** expression with the **less** expression since there are two conditions being validated.

Condition to validate	Expression to use	Example
Has the full amount due been paid?	greater	<pre>@greater(item()?['Due'], item()?['Paid'])</pre>
Is the due date less than one day away?	less	<pre>@less(item()?['DueDate'], addDays(utcNow(),1))</pre>

# Combine the 'greater' and 'less' expressions in an 'and' expression

Use the **greater** expression to identify the employees who have paid less than the full amount due and use the **less** expression to determine if the payment due date is less than one day away from the current date. You can then use the **Send an email** action to send reminder emails to those employees who haven't paid in full and the due date is less than one day away.

Here's a view of the spreadsheet table.

Employee	Paid	Due	DueDate
Jenny	5.00	10.00	12/25/2017
Evo	10.00	10.00	12/1/2017
Shea	0.00	10.00	11/25/2017
Kohl	10.00	10.00	6/27/2017

Here's the implementation of the **and** expression that identifies all employees who have paid less than the amount due from them and the due date is less than one day away from the current date.

```
@and(greater(item()?['Due'], item()?['Paid']), less(item()?['dueDate'],  
addDays(utcNow(),1)))
```

## Use functions in expressions

Some expressions get their values from runtime actions that might not yet exist when a cloud flow starts to run. To reference or work with these values in expressions, you can use functions that the Workflow Definition Language provides. More information. To learn more, go to [Reference guide to workflow expression functions in Azure Logic Apps and Power Automate](#).

# Store and manage values in variables

Article • 10/02/2023

This article shows how to create and work with variables to store values in your cloud flows. For example, variables can help you track the number of times a loop runs. To iterate over an array or check an array for a specific item, you can use a variable to reference the index number 'apply to each' array item.

You can create variables for data types such as integer, float, boolean, string, array, and object. After you create a variable, you can perform other tasks, for example:

- Get or reference the variable's value.
- Increase or decrease the variable by a constant value, also known as *increment* and *decrement*.
- Assign a different value to the variable.
- Insert or *append* the variable's value as the last item in a string or array.

Variables exist and are global only within the cloud flow that creates them. Also, they persist across any loop iterations inside the flow.


When you reference a variable, use the variable's name as the token, not the action's name, which is the usual way to reference an action's outputs.

## Warning

By default, each iteration in the 'apply to each' loops run sequentially. You can run the loop iterations in parallel to improve performance. If you use variables in the 'apply to each' loops, you *must* run the loop iterations sequentially if it's important for your loop variables to return predictable results.

## Prerequisites

Before you can add actions for creating and working with variables, your flow must start with a trigger. You can't use a mobile device to add variables.

- Access to [Power Automate](#) .
- A cloud flow in which you want to create the variable.
- If you're new to Power Automate, review [Getting started with Power Automate](#) and [Overview of cloud flows](#).

## ⓘ Note

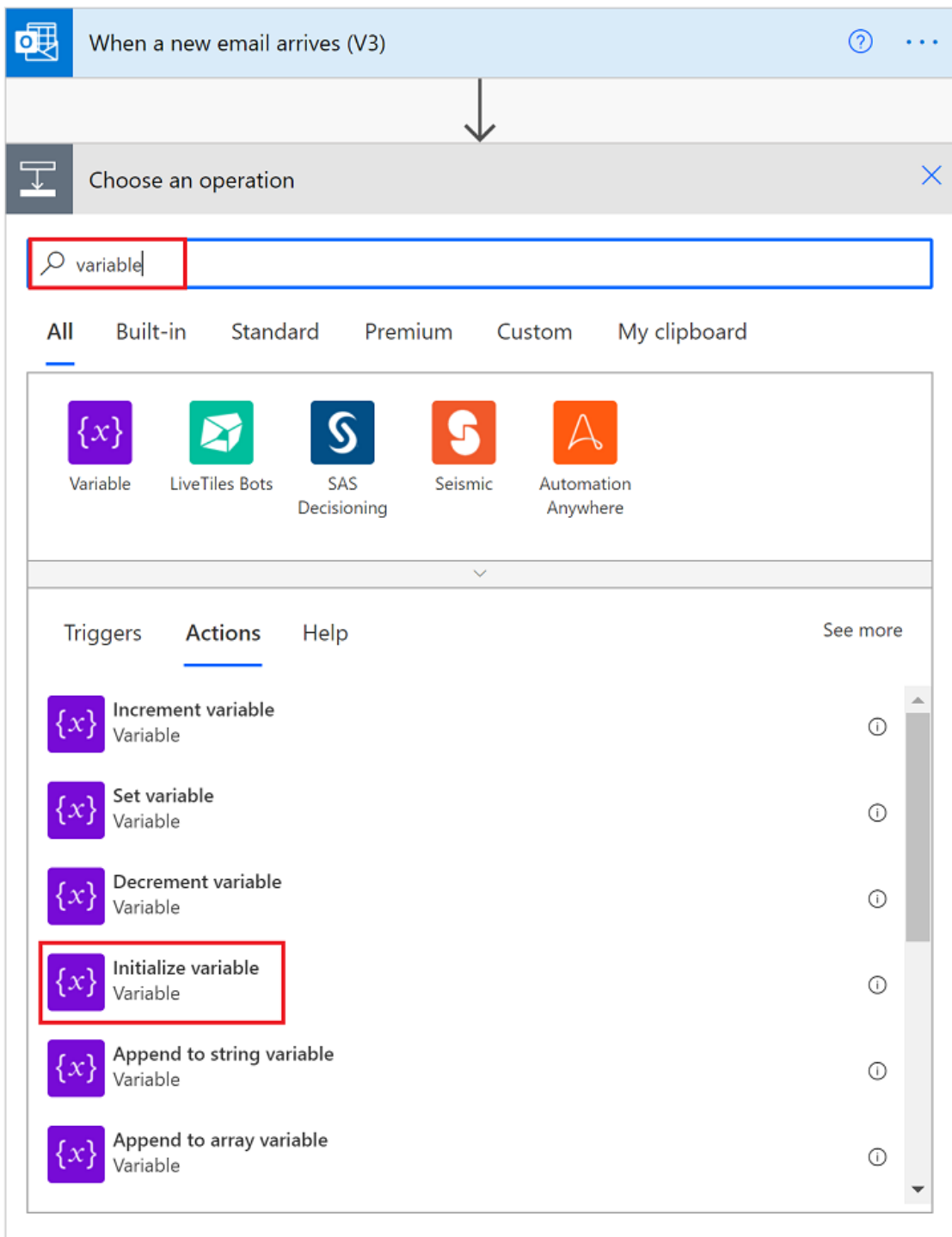
Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in **Understand the cloud flows designer with copilot capabilities**.

# Initialize a variable

## Classic designer

You can create a variable and declare its data type and initial value all within one action in your flow. You can only declare variables at the global level, not within scopes, conditions, and loops.

1. Sign in to [Power Automate](#).
2. Create or open a cloud flow.
3. Under the step where you want to add a variable, follow one of these steps.
  - To add an action under the last step, select **New step**.
  - To add an action between steps, move your input device pointer over the connecting arrow until the plus sign (+) appears. Select the plus sign (+) > **Add an action**.
4. In the search box under **Choose an operation**, enter **variable** as your filter.
5. From the **Actions** list, select **Initialize variable - Variable**.



6. Provide the following information about your variable.

Property	Required	Value	Description
Name	Yes	<variable-name>	The name for the variable to initialize
Type	Yes	<variable-type>	The data type for the variable
Value	No	<start-value>	The initial value for your variable



Property	Required	Value	Description
			<b>Tip:</b> Although optional, set this value as a best practice so you always know the start value for your variable.

Example:

The screenshot shows a workflow editor interface. At the top, there is a trigger step titled "When a new email arrives (V3)". Below it, a new action step titled "Initialize variable" is being added. The "Initialize variable" step has three input fields: "Name" with the value "Count", "Type" with a dropdown menu set to "Integer", and "Value" with the value "0". There is also a button labeled "Add dynamic content" with a plus sign. At the bottom of the editor, there are two buttons: "+ New step" and "Save".

7. Add the other actions that you want. When you're done, select **Save**.

### ⓘ Note

Although the **Initialize variable** action has a `variable` section structured as an array, the action can create only one variable at a time. Each new variable requires an individual **Initialize variable** action.

## Examples of other variable types

### *String variable*

JSON

```
"name": "myStringVariable",
"type": "String",
"value": "lorem ipsum"
```

## Boolean variable

JSON

```
"name": "myBooleanVariable",  
"type": "Boolean",  
"value": false
```

## Array with integers

JSON

```
"name": "myArrayVariable",  
"type": "Array",  
"value": [1, 2, 3]
```

## Array with strings

JSON

```
"name": "myArrayVariable",  
"type": "Array",  
"value": ["red", "orange", "yellow"]
```

# Get the variable's value

To retrieve or reference a variable's contents, you can use the `variables()` function in the Power Automate designer.

For example, this expression gets the items from the array variable by using the `variables()` function. The `string()` function returns the variable's contents in string format: "1, 2, 3, red"

JSON

```
@{string(variables('myArrayVariable'))}
```

# Increment variable

To increase or *increment* a variable by a constant value, add the **Increment variable** action to your flow.

This action works only with integer and float variables.

1. In the Power Automate designer, under the step where you want to increase an existing variable, select **New step**.

To add an action between steps, move your input device pointer over the connecting arrow until the plus sign (+) appears. Select the plus sign (+) > **Add an action**.

2. In the search box, enter **increment variable** as your filter.
3. In the **Actions** list, select **Increment variable - Variable**.
4. Provide this information for incrementing your variable:

Property	Required	Value	Description
<b>Name</b>	Yes	<variable-name>	The name for the variable to increment
<b>Value</b>	No	<increment-value>	The value used for incrementing the variable. The default value is one.  <b>Tip:</b> Although optional, set this value as a best practice so you always know the specific value for incrementing your variable.

Example:

The screenshot shows the configuration for the 'Increment variable' action. The action name is 'Increment variable' with a variable icon. The 'Name' field is set to 'Count' and the 'Value' field is set to '1'. There is an 'Add dynamic content' button with a plus sign.

5. When you're done, on the designer toolbar, select **Save**.

## Example: Create loop counter

Variables are commonly used for counting the number of times that a loop runs. This example shows how to create and use variables for this task by creating a loop that

counts the attachments in an email.

Classic designer

1. In Power Automate, create a cloud flow and add a trigger that checks for new email and any attachments.

This example uses the Office 365 Outlook trigger for **When a new email arrives**. You can set up this trigger to fire only when the email has attachments. However, you can use any connector that checks for new emails with attachments, such as the Outlook.com connector.

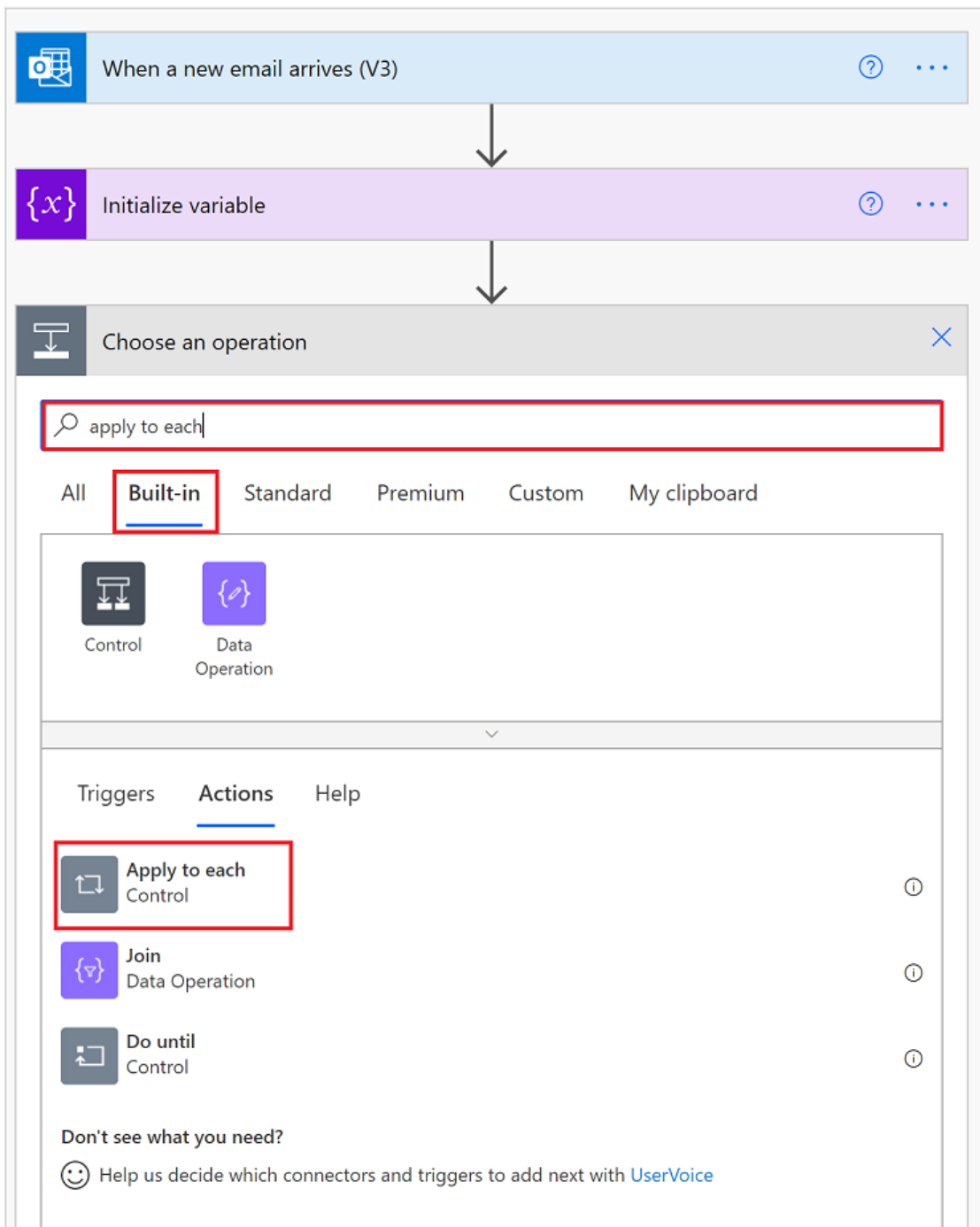
2. In the trigger, to check for attachments and pass those attachments into your flow, select **Yes** for these properties:

- **Include Attachments**
- **Only with Attachments**

3. Add the **Initialize variable** action with the following values:

- **Name:** Count
- **Type:** Integer
- **Value:** 0 (start value)

4. Add an *apply to each* loop to cycle through the attachments.
  - a. Under the **Initialize variable** action, select **New step**.
  - b. Under **Choose an action**, select **Built-in**.
  - c. In the search box, enter **apply to each** as your search filter, and select **Apply to each**.



5. In the loop, select inside the **Select an output from previous steps** box. When the dynamic content list appears, select **Attachments**.

The **Attachments** property passes an array, which has all email attachments from the email, into your loop.

6. In the **Apply to each** loop, select **Add an action**.

7. In the search box, enter **increment variable** as your filter.

8. From the actions list, select **Increment variable**.

ⓘ **Note**

The **Increment variable** action must appear inside the loop.

9. In the **Increment variable** action, from the **Name** list, select the **Count** variable.
10. Under the loop, add any action that sends you the number of attachments. In your action, include the value from the **Count** variable, for example:

The screenshot displays a workflow designer interface. At the top, there is a trigger action 'When a new email arrives (V3)'. This is followed by an 'Initialize variable' action. Below these is an 'Apply to each' loop. Inside the loop, the 'Attachments' output from the trigger is selected. The 'Increment variable' action is configured with the name 'Count' and a value of '1'. Below the loop, a 'Send an email (V2)' action is shown, which is highlighted with a red border. The email body is configured to include the text 'The number of attachments is: {x} Count x', where '{x}' is a dynamic content placeholder for the 'Count' variable.

11. On the designer toolbar, select **Save**.

## Decrement variable

To decrease or *decrement* a variable by a constant value, follow the steps for increasing a variable except that you find and select the **Decrement variable** action instead. This action works only with integer and float variables.

Here are the properties for the **Decrement variable** action:

Property	Required	Value	Description
Name	Yes	<variable-name>	The name for the variable to decrement
Value	No	<increment-value>	The value for decrementing the variable. The default value is one.  <b>Tip:</b> Although optional, set this value as a best practice so you always know the specific value for decrementing your variable.

## Set variable

To assign a different value to an existing variable, follow the steps for increasing a variable except that you:

1. Find and select the **Set variable** action instead.
2. Provide the variable name and value you want to assign. Both the new value and the variable must have the same data type. The value is required because this action doesn't have a default value.

Here are the properties for the **Set variable** action:

Property	Required	Value	Description
Name	Yes	<variable-name>	The name for the variable to change
Value	Yes	<new-value>	The value you want to assign the variable. Both must have the same data type.

### ⓘ Note

Unless you're incrementing or decrementing variables, changing variables inside loops *might* create unexpected results if you run loops in parallel. For these cases, try setting your loop to run sequentially, which is the default setting.

# Append to variable

For variables that store strings or arrays, you can insert or *append* a variable's value as the last item in those strings or arrays. You can follow the steps for increasing a variable except that you follow these steps instead:

1. Find and select one of these actions based on whether your variable is a string or an array.
  - **Append to string variable**
  - **Append to array variable**
2. Provide the value to append as the last item in the string or array. This value is required.

Here are the properties for the **Append to...** actions:

Property	Required	Value	Description
Name	Yes	<variable-name>	The name for the variable to change
Value	Yes	<append-value>	The value you want to append, which can have any type

## See also

[Power Automate connectors](#)



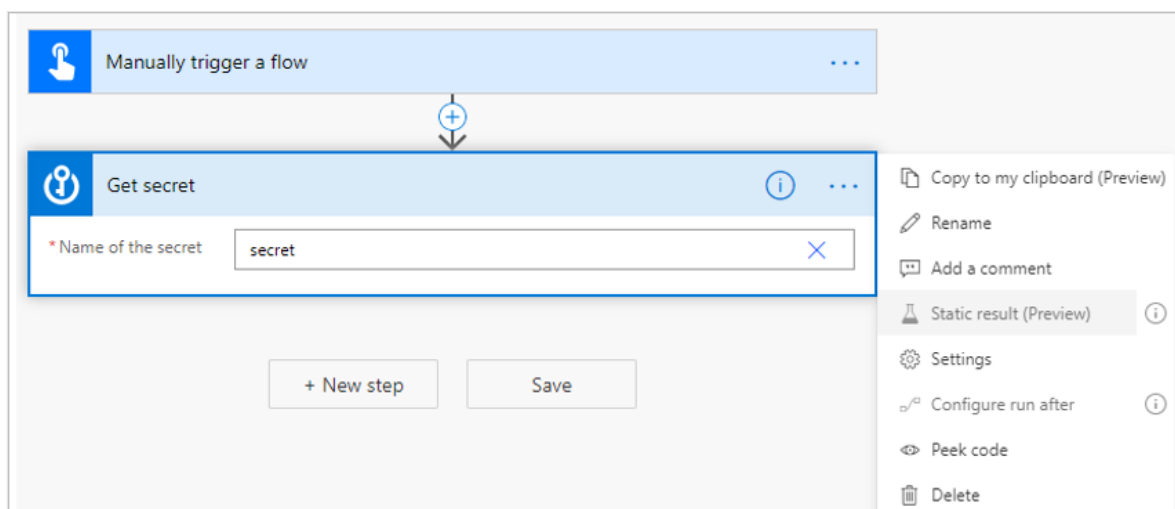
# Manage sensitive input like passwords

Article • 12/16/2022

Some inputs like passwords need to be omitted from the logs. Power Automate uses **Sensitive text inputs** to store these "confidential" values.

Follow these steps to turn on **Secure Inputs** and **Secure Outputs** to work with sensitive content from connectors.

1. On the top right corner of an action, select (...).
2. Select **Settings**.



3. Turn on the **Secure Inputs** and **Secure Outputs** properties to prevent these values from being shown in the logs.

### Settings for 'Get secret'

**Secure Inputs (Preview)**  
Secure inputs of the operation.  
Secure Inputs  On

**Secure Outputs (Preview)**  
Secure outputs of the operation and references of output properties.  
Secure Outputs  On

**Asynchronous Pattern**  
With the asynchronous pattern, if the remote server indicates that the request is accepted for processing with a 202 (Accepted) response, the Logic Apps engine will keep polling the URL specified in the response's location header until reaching a terminal state.  
Asynchronous Pattern  On

**Automatic decompression**  
Automatically decompress gzip response.  
Automatic decompression  On

**Timeout**  
Limit the maximum duration an asynchronous pattern may take. Note: this does not alter the request timeout of a single request.  
Duration ⓘ

**Retry Policy**  
A retry policy applies to intermittent failures, characterized as HTTP status codes 408, 429, and 5xx, in addition to any connectivity exceptions. The default is an exponential interval policy set to retry 4 times.  
Type

**Tracked Properties**

<input type="text"/>	<input type="text"/>	Properties
----------------------	----------------------	------------

#### 4. Select **Done**.

You'll notice that the action now has a lock icon on the top right, indicating special handling for input and output values.

The screenshot shows a Power Automate flow configuration. The first step is 'Manually trigger a flow'. Below it, the 'Get secret' connector is selected. The configuration field for 'Name of the secret' is set to 'secret'. The connector has an information icon, a lock icon, and a more options icon.

### 💡 Tip

Follow the same steps to configure inputs as given earlier in this article to pass the output from this connector to a desktop flow, and then turn on **Secure Text** in the **Settings**.

The screenshot shows a Power Automate flow configuration. The first step is 'Manually trigger a flow'. Below it, the 'Get secret' connector is selected. Below that, the 'Run a UI flow for desktop' connector is selected. The configuration fields are as follows:

* UI flow	Automate desktop application	Edit
Run Mode	Choose between running while signed in (attended) or in the background	▼
Username	Unique identifier for the application logon	
Password	value x	
Invoice Account	Account name for this invoice	

# Cancel or resubmit flow runs in bulk

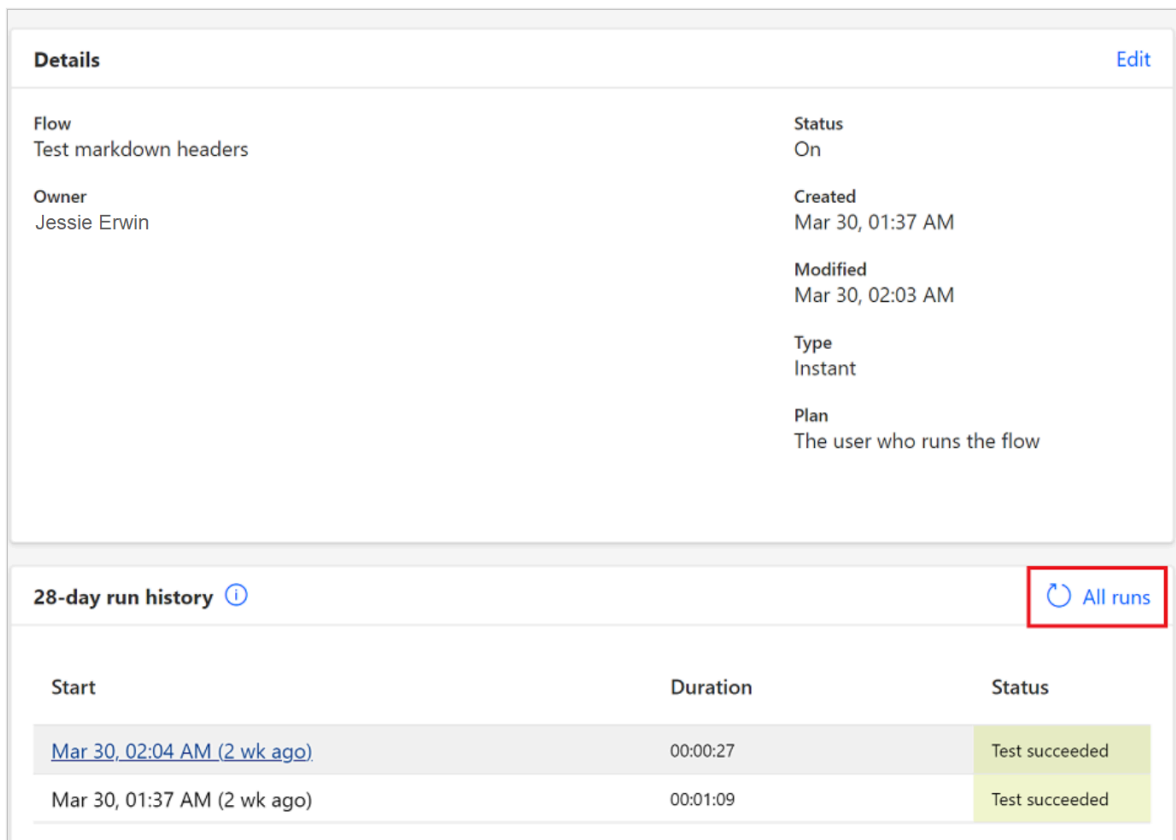
Article • 05/09/2024

You can cancel or resubmit your flow runs in bulk instead of one at a time, which can be a huge time saver.

## Resubmit flow runs

You can resubmit previous runs of a flow in bulk. To do this, follow these steps:

1. Sign in to [Power Automate](#).
2. On the left panel, select **My flows**.
3. On the right panel, select the cloud flow that you would like to resubmit or cancel.
4. Select **All runs**.



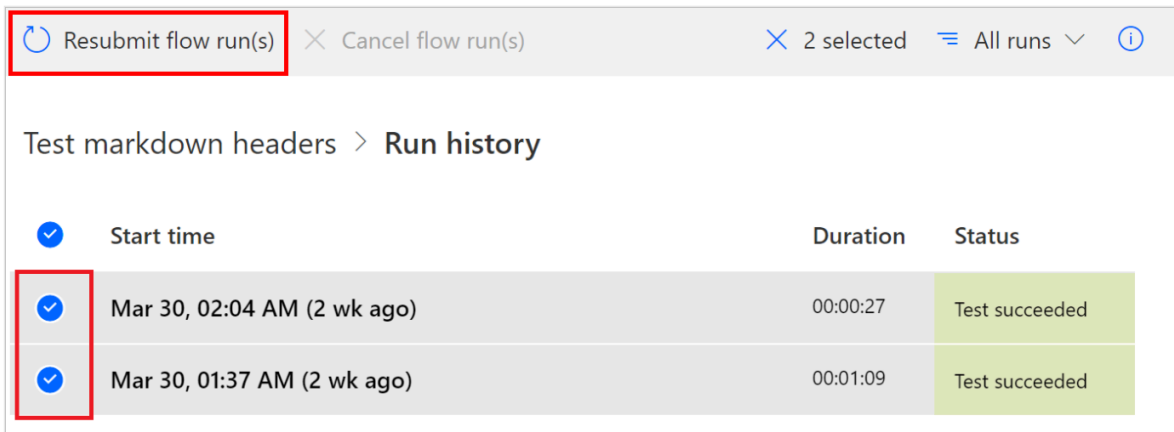
The screenshot displays the 'Details' view of a flow named 'Test markdown headers'. The flow is currently 'On' and was created on Mar 30, 01:37 AM. The owner is Jessie Erwin. The flow type is 'Instant' and the plan is 'The user who runs the flow'. Below the details is a '28-day run history' section with a table of recent runs. A red box highlights the 'All runs' button in the top right corner of the run history section.

Start	Duration	Status
<a href="#">Mar 30, 02:04 AM (2 wk ago)</a>	00:00:27	Test succeeded
Mar 30, 01:37 AM (2 wk ago)	00:01:09	Test succeeded

### 💡 Tip

- The flow must have runs to cancel or resubmit the flow runs.
- You can resubmit or cancel up to 20 flows at a time.

5. Select the flow runs that you would like to resubmit or cancel on the **Run history** page.
6. Select **Resubmit flow run(s)**.



Resubmit flow run(s) × Cancel flow run(s) 2 selected All runs ▾ ⓘ

Test markdown headers > Run history

<input checked="" type="checkbox"/>	Start time	Duration	Status
<input checked="" type="checkbox"/>	Mar 30, 02:04 AM (2 wk ago)	00:00:27	Test succeeded
<input checked="" type="checkbox"/>	Mar 30, 01:37 AM (2 wk ago)	00:01:09	Test succeeded

### ⓘ Important

The number of flows that you can resubmit is limited based on the maximum number of API calls for the connectors in the flow.

## Cancel flow runs

You can cancel flow runs either through the Run history page or by using a template. If you need to cancel up to 20 runs, use the Run history page. If you need to cancel more than 20 (even hundreds), use the template. Procedures for both methods are detailed in the following sections.

### Cancel up to 20 flow runs

To cancel flow runs that are in progress, follow the steps outlined previously in [Resubmit flow runs](#) with one exception: In step 6, select **Cancel flow run(s)**, as shown in the following screenshot.

Resubmit flow run(s)	<b>Cancel flow run(s)</b>	
Test markdown headers > Run history		
Start time	Duration	Status
<input checked="" type="checkbox"/> Apr 14, 04:28 AM (0 sec ago)	10 ms	Running
<input checked="" type="checkbox"/> Apr 14, 04:28 AM (0 sec ago)	55 ms	Running
Mar 30, 02:04 AM (2 wk ago)	00:00:27	Test succeeded
Mar 30, 01:37 AM (2 wk ago)	00:01:09	Test succeeded

## Cancel flow runs in bulk

This feature cancels a large number of flow runs.

Canceling a large number of flow runs changes the run status to **Canceling**, typically within three (3) minutes. Then, the final status changes to **Canceled** after some time. Runs are effectively canceled after the three-minute window.

### ⓘ Note

If you have a smaller number of flow runs, we recommend you cancel runs in batches of 20. To learn how to do this, go to [Cancel up to 20 flow runs](#) in this article.

Depending on your license, you might be subject to temporary throttling if the flow has an excessive number of runs. To learn more, go to [Throughput limits](#).

1. Sign in to [Power Automate](#).
2. On the left panel, select **My flows**.
3. On the right panel, select the cloud flow in which you would like to cancel flow runs.
4. Select **All runs**.
5. At the top of the page, select **Cancel all flow runs**.

A message opens asking you to confirm the cancellation of all runs.

6. (Optional) In the message, select **Turn my flow off to prevent additional runs**.

If you don't do this optional step, go to step 7.

7. Confirm you want to cancel all flow runs by selecting **Yes**.

The run **Status** column might take up to three (3) minutes to show **Canceling**. Within the three-minute window, the runs might show up as running or canceling, but might still continue to execute. Beyond the three-minute window, nothing runs.

You can refresh the page to see the current status. In rare instances, if you don't see the **Canceling** status after the first three minutes, you can cancel all runs again. You can now make changes to the flow and start the flow again.

8. To verify the cancelation, you can view runs with a **Canceling** status in **All Runs**. To view the canceled runs, you can select **Bulk-Canceled Runs** from the filters menu at the top of the page. Only runs that were canceled using this feature will show with this filter selected. To view other canceled runs, select **Canceled runs**.

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Restore deleted flows

Article • 04/24/2023

If you or someone else accidentally deletes a non-solution or solution flow, you can restore it within 21 days of deletion.

There are the two ways you can restore deleted flows.

- Use the [Power Automate Management connector](#) to restore the deleted flows.
- Use [PowerShell](#) to restore the deleted flows.

## ⓘ Note

- The steps in this article apply to both non-solution and solution flows.
- Flows that were deleted more than 21 days ago can't be recovered. Both restore methods (PowerShell script and Power Automate Management connector), as well as Microsoft Support can't help to restore them.
- After you restore a flow, it defaults to the disabled state. You must manually enable the flow, per your requirements.

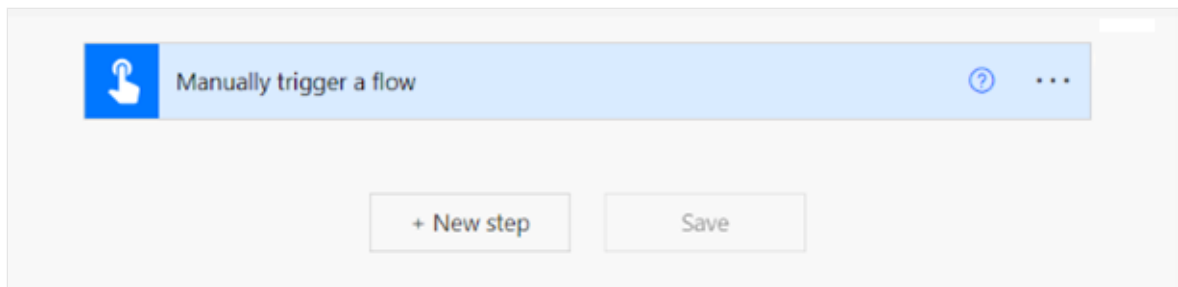
## Restore deleted flows with the Power Automate Management connector

You can restore a deleted non-solution or solution flow within 21 days of deletion using Power Automate. A non-solution flow is a flow that wasn't created inside a solution. As an admin, all you need is a button flow with two Power Automate management connector actions—**List Flows as Admin** and **Restore Deleted Flows as Admin**.

As part of this process, in four easy and quick steps, you'll first list deleted flows in an environment using the **List flows as Admin** action. Then, you'll use the **Restore Deleted Flows as Admin** action to restore the flow using `flowName` property of the flow that you retrieved from the **List flows as Admin** action.

1. Build a manual flow with a button trigger.





2. Add the **List Flows as Admin** action.

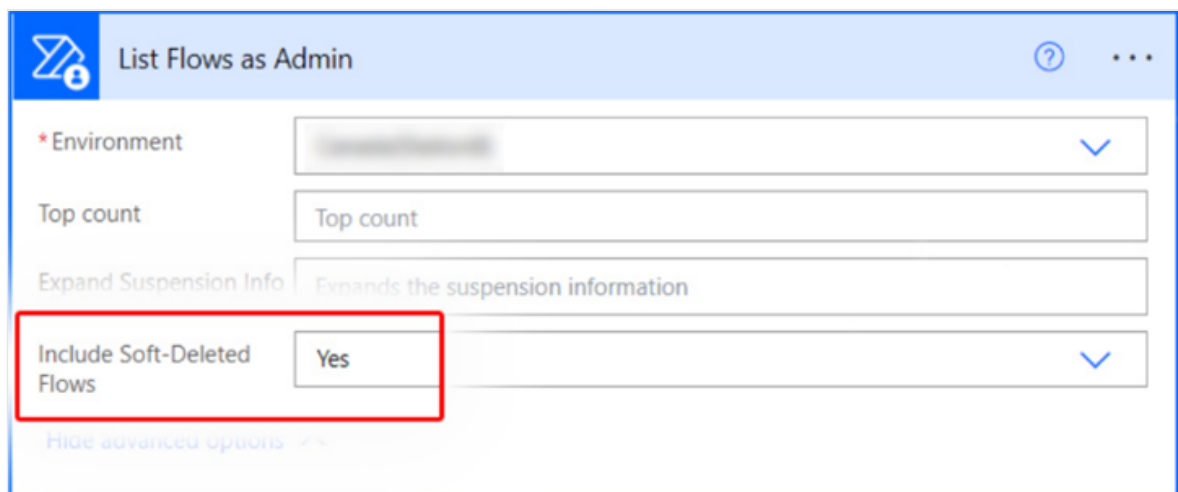
a. Select **New Step**.

b. Search for **Power Automate Management Connector** or **List Flows as Admin** action.

c. Select the **List Flows as Admin** action.

d. In the **Environment** dropdown menu, select the environment the flow was originally deleted from.

e. In the **Include Soft-Deleted Flows** dropdown menu, select **Yes**.



3. Run the flow to note the `flowName` of the flow you want to retrieve.

a. Run the flow.

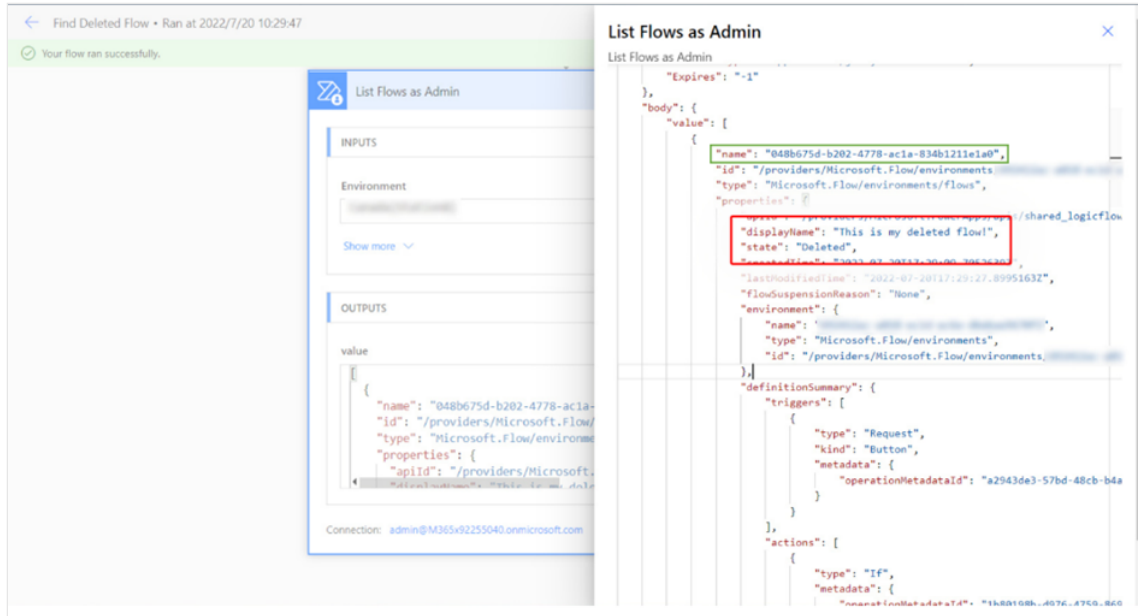
b. Expand the flow run.

c. Expand the raw **OUTPUTS/value** of the **List Flows as Admin** action.

You'll see all the flows in that environment you have access to as an admin, including the ones that are soft deleted.

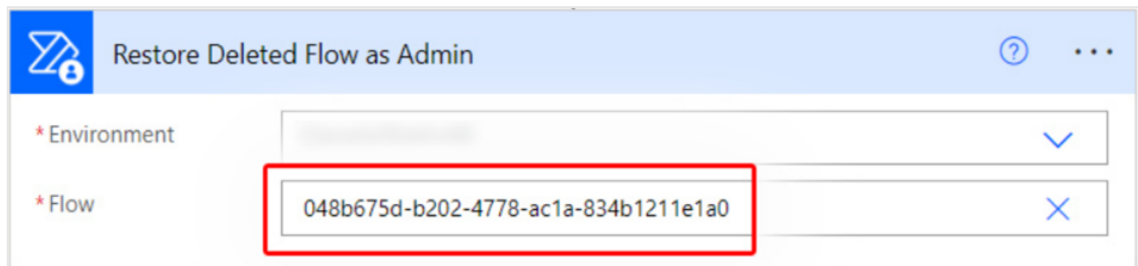
d. Using the "**displayName**" among other flow metadata, identify the flow you're trying to recover and note the name in "**name**" field.

In the following screenshot, the name of the flow is highlighted in green. You'll use this value for the next step.

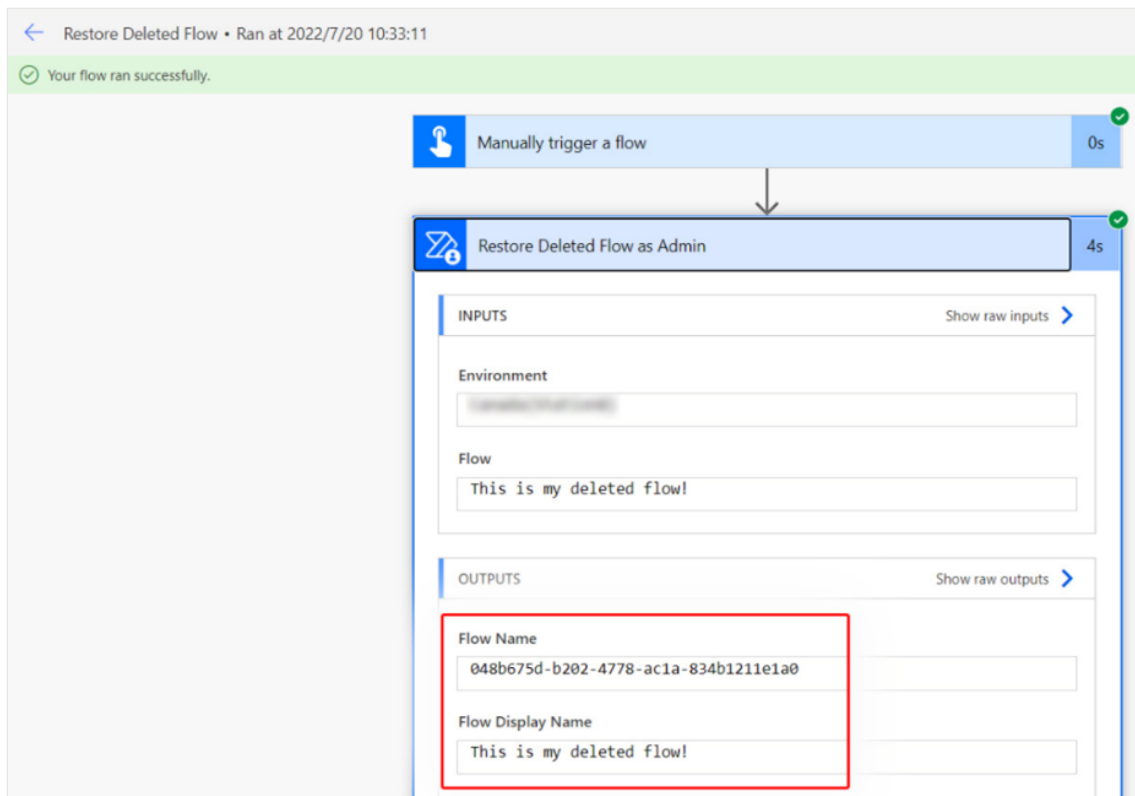


4. Add the **Restore Deleted Flows as Admin** action and run the flow.

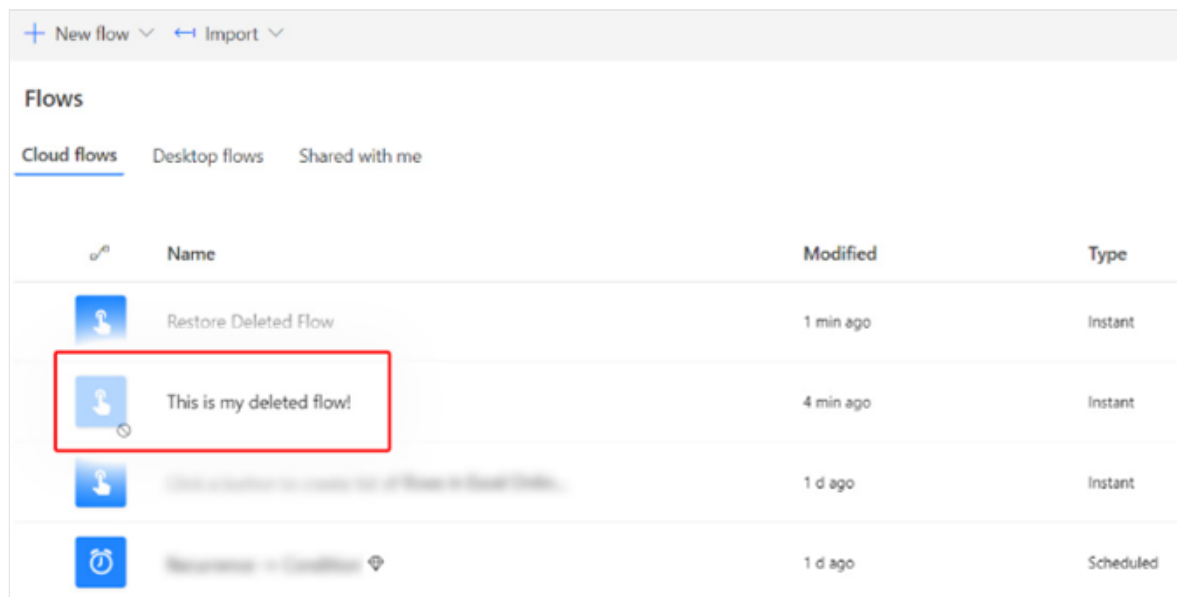
- a. Add the **Restore Deleted Flows as Admin** action from the Power Automate Management Connector.
- b. In the **Flow** field, enter the name value from step 3.



- c. Run the flow.



After the run has succeeded, you'll notice that the flow has been restored in a disabled state in the environment it was originally deleted from.



## Restore deleted flows with PowerShell

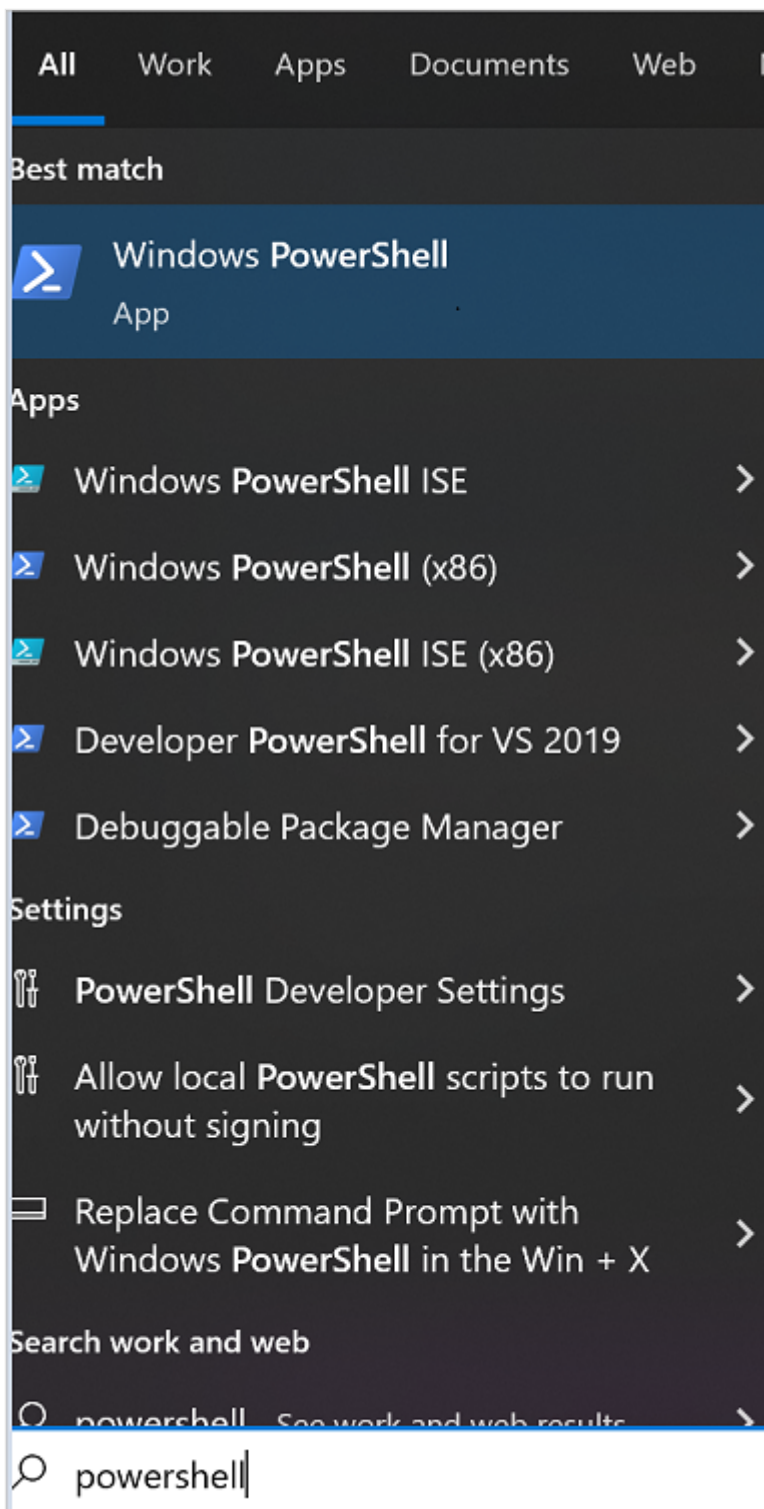
In this section, you'll learn about how to restore deleted flows using PowerShell.

### Prerequisites for PowerShell

- You must install the latest version of [PowerShell cmdlets for Power Apps](#).
- You must be an environment admin.

- There must be an [execution policy](#) set on your device to run PowerShell scripts.

1. Open PowerShell with elevated privileges to begin.



2. Install the latest version of [PowerShell cmdlets for Power Apps](#).

3. Sign in to your Power Apps environment.

Use this command to authenticate to an environment. This command opens a separate window that prompts for your Azure Active Directory (Azure AD) authentication details.

```
PowerShell
```

```
Add-PowerAppsAccount
```

4. Provide the credentials you want to use to connect to your environment.
5. Run the following script to get a list of flows in the environment, including flows that were soft-deleted within the past 21 days.

If the `IncludeDeleted` parameter isn't recognized, you might be working with an older version of the PowerShell scripts. Ensure that you're using the [latest version](#) of the script modules and retry the steps.

```
PowerShell
```

```
Get-AdminFlow -EnvironmentName 41a90621-d489-4c6f-9172-81183bd7db6c -  
IncludeDeleted $true  
//To view examples: Get-Help Get-AdminFlow -Examples
```

#### Tip

Navigate to the URL of any of the flows in your environment to get your environment name

(<https://make.powerautomate.com/Environments/|<EnvironmentName>/flows>) which is required for subsequent steps. Don't omit the prefixed words in the URL if your environment name contains it, for example, Default-8ae09283902-....

```

PS C:\WINDOWS\system32> Get-AdminFlow

FlowName       : 012c1754-6ed3-468b-b366-9b1cdaac19b5
Enabled        : True
DisplayName     : test non default environment approval flow behavior
UserType       :
CreatedTime    : 2022-03-30T09:53:29.8625413Z
CreatedBy      : @{tenantId=72f988bf-86f1-41af-91ab-2d7cd011db47; objectId=eaaa9dc8-8303-4f34-bd13-6a224f63b5dd;
                 userId=eaaa9dc8-8303-4f34-bd13-6a224f63b5dd; userType=ActiveDirectory}
LastModifiedTime : 2022-03-30T09:53:30.6103099Z
EnvironmentName : Legacy-57e676f0-a6e0-45c3-ae6b-115b88949652
Internal       : @{name=012c1754-6ed3-468b-b366-9b1cdaac19b5; id=/providers/Microsoft.ProcessSimple/environments/Lega
                 cy-57e676f0-a6e0-45c3-ae6b-115b88949652/flows/012c1754-6ed3-468b-b366-9b1cdaac19b5;
                 type=Microsoft.ProcessSimple/environments/flows; properties=}

FlowName       : 0210a83b-0618-4989-b148-9e826f6d1c9f
Enabled        : True
DisplayName     : Send myself a reminder in 10 minutes
UserType       :
CreatedTime    : 2018-09-05T17:00:52.3992729Z
CreatedBy      : @{tenantId=72f988bf-86f1-41af-91ab-2d7cd011db47; objectId=eaaa9dc8-8303-4f34-bd13-6a224f63b5dd;
                 userId=eaaa9dc8-8303-4f34-bd13-6a224f63b5dd; userType=ActiveDirectory}
LastModifiedTime : 2018-09-05T17:00:52.2277938Z
EnvironmentName : Legacy-57e676f0-a6e0-45c3-ae6b-115b88949652
Internal       : @{name=0210a83b-0618-4989-b148-9e826f6d1c9f; id=/providers/Microsoft.ProcessSimple/environments/Lega
                 cy-57e676f0-a6e0-45c3-ae6b-115b88949652/flows/0210a83b-0618-4989-b148-9e826f6d1c9f;
                 type=Microsoft.ProcessSimple/environments/flows; properties=}

FlowName       : 3323bd7e-f0be-4dd6-809c-12fb655e00ba
Enabled        : False
DisplayName     : Get daily reminders in Email
UserType       :
CreatedTime    : 2017-10-03T10:25:14.0740062Z
CreatedBy      : @{tenantId=72f988bf-86f1-41af-91ab-2d7cd011db47; objectId=eaaa9dc8-8303-4f34-bd13-6a224f63b5dd;
                 userId=eaaa9dc8-8303-4f34-bd13-6a224f63b5dd; userType=ActiveDirectory}
LastModifiedTime : 2018-05-01T06:13:05.0122575Z
EnvironmentName : Legacy-57e676f0-a6e0-45c3-ae6b-115b88949652
Internal       : @{name=3323bd7e-f0be-4dd6-809c-12fb655e00ba; id=/providers/Microsoft.ProcessSimple/environments/Lega

```

- Optionally, you can filter the list of flows if you know part of the name of the deleted flow whose flowID you want to find. To do this, use a script similar to this one that finds all flows (including flows that were soft-deleted) in environment 3c2f7648-ad60-4871-91cb-b77d7ef3c239 that contain the string "Testing" in their display name. 256fe2cd306052f68b89f96bc6be643

PowerShell

```
Get-AdminFlow Testing -EnvironmentName 3c2f7648-ad60-4871-91cb-b77d7ef3c239 -IncludeDeleted $true
```

- Make a note of the `FlowName` value of the flow you want to restore from the previous step.
- Run the following script to restore the soft-deleted flow with `FlowName` value as 4d1f7648-ad60-4871-91cb-b77d7ef3c239 in an environment named Default-55abc7e5-2812-4d73-9d2f-8d9017f8c877.

PowerShell

```
Restore-AdminFlow -EnvironmentName Default-55abc7e5-2812-4d73-9d2f-8d9017f8c877 -FlowName 4d1f7648-ad60-4871-91cb-b77d7ef3c239
//To view examples: Get-Help Restore-AdminFlow -Examples
```

9. Optionally, you can run the `Restore-AdminFlow` script with the following arguments to restore multiple deleted flows.

PowerShell

```
foreach ($id in @( "4d1f7648-ad60-4871-91cb-b77d7ef3c239", "eb2266a8-67b6-4919-8afd-f59c3c0e4131" )) { Restore-AdminFlow -EnvironmentName Default-55abc7e5-2812-4d73-9d2f-8d9017f8c877 -FlowName $id; Start-Sleep -Seconds 1 }
```

# Design flows with Microsoft Visio

Article • 02/10/2023

The Power Automate designer is a rich tool in which you can configure every detail of your logic. However, sometimes you may want to just sketch your flow logic before you start building your flow. To do this, use Microsoft Visio directly from within Power Automate.

## Tip

Many processes share a common model but have minor variations throughout an organization. You can save time within your organization by using Visio to create a master workflow model that others will then adjust with specialized parameters.

## Note

This feature isn't available for GCC (Government Community Cloud), GCC High, or DoD (Department of Defense) customers.

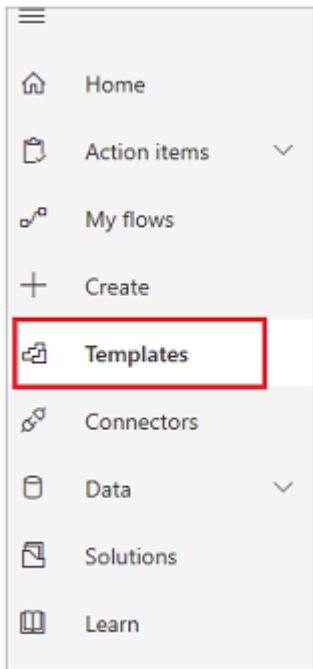
## Prerequisites

- A [Power Automate](#) account.
- The Microsoft Visio desktop app (English version).
- Expertise in using Microsoft Visio.

## Design a workflow in Visio

1. Sign in to [Power Automate](#).
2. From the left pane, select **Templates**.

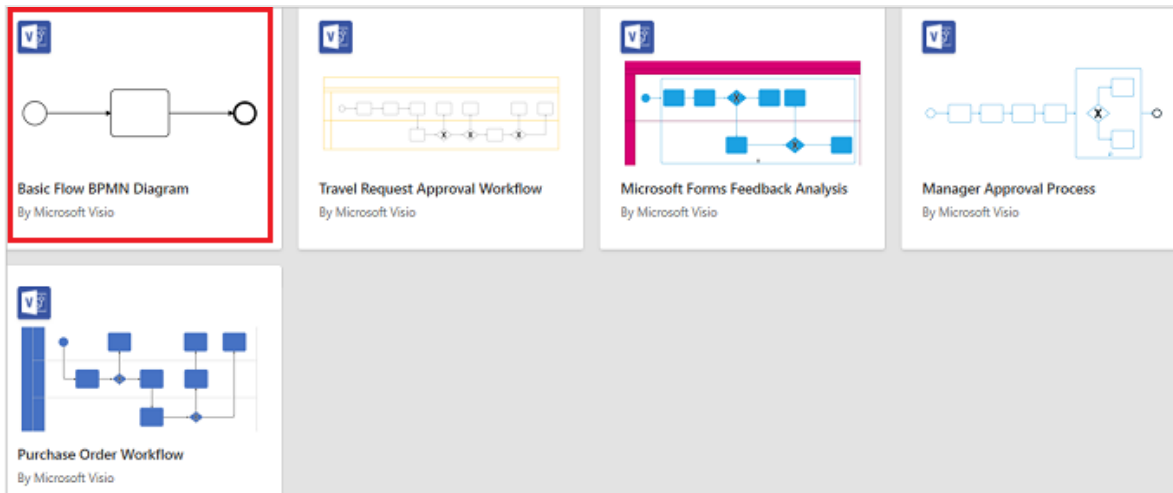




3. From the menu at the top, select **Visio**.

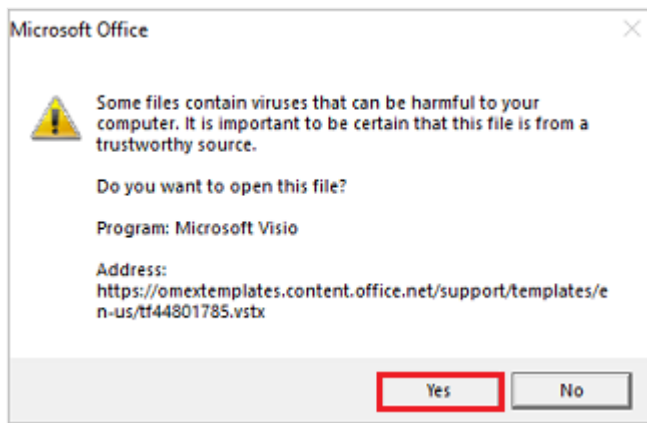


4. From the list of Visio templates, select **Basic Flow BPMN Diagram**.

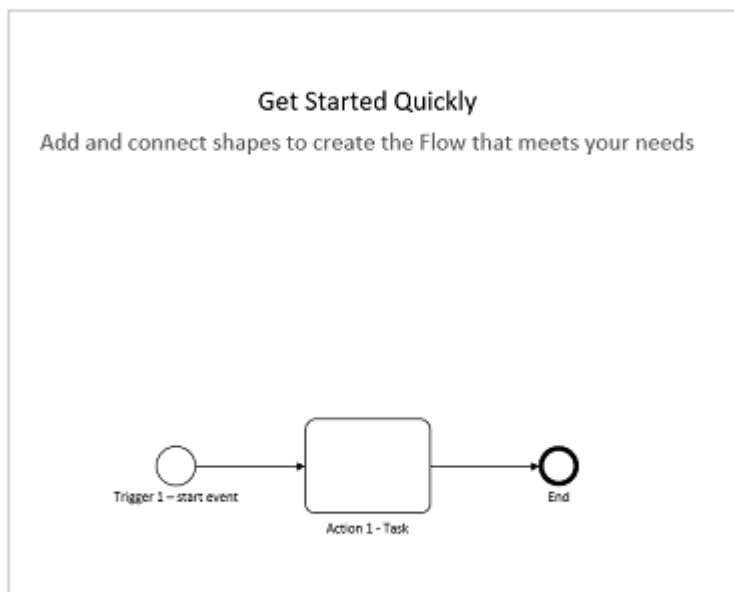


**ⓘ Important**

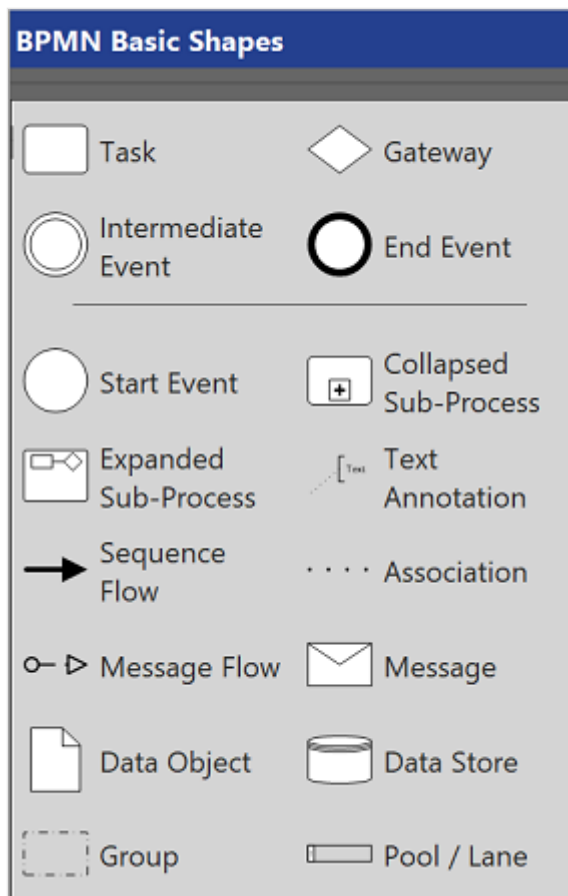
Visio warns you that files from the Internet could harm your device. If you are comfortable, select **YES** on the warning message.



The Visio designer opens.



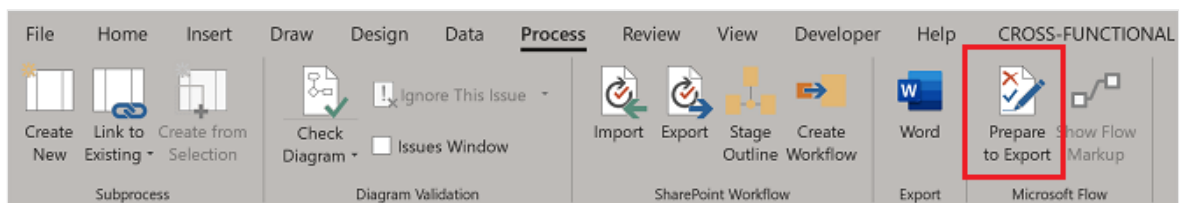
5. Use the BPMN basic shapes to [design your workflow](#).



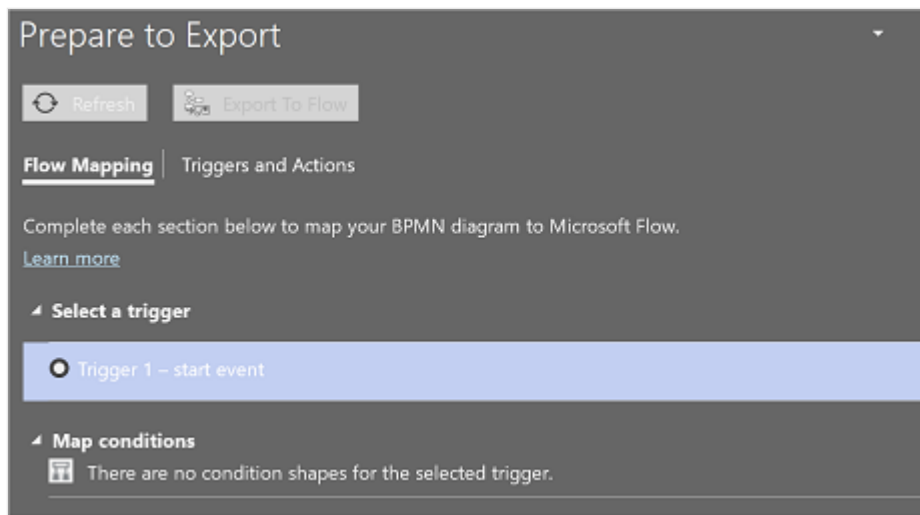
## Prepare to export your workflow to Power Automate

Follow these steps to prepare your workflow so that you can export it to Power Automate.

1. Select the **Process** tab.
2. Select **Prepare to Export** from the **Power Automate** group of icons.

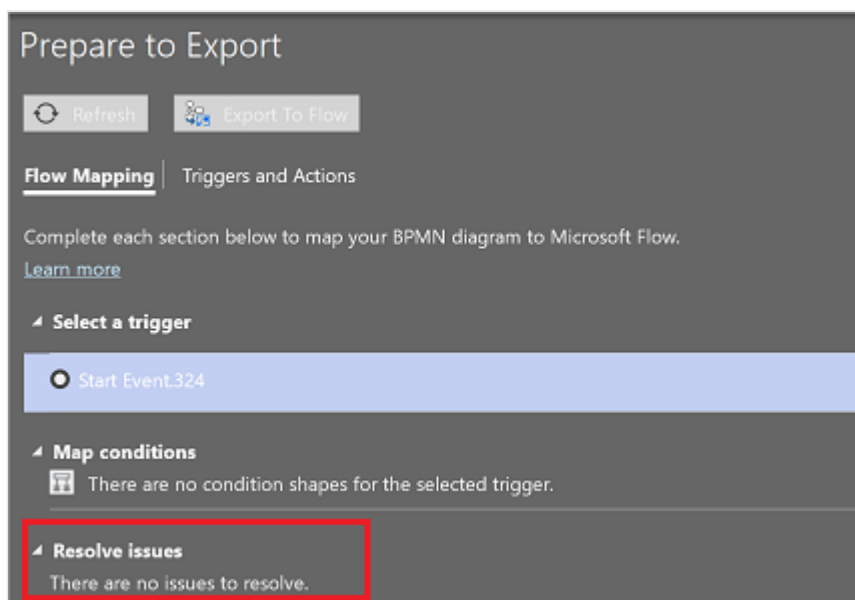


The **Prepare to Export** group opens.



3. On the **Flow Mapping** tab of the **Prepare to Export** group, map your BPMN diagram to Power Automate controls.
4. On the **Triggers and Actions** tab of the **Prepare to Export** group, select each shape, and then select either a trigger or an action to map your BPMN diagram to Power Automate triggers and actions. This mapping is to represent that shape in Power Automate.


You can export your workflow when no issues remain on the **Prepare to Export** control.



## Export your workflow


1. Select the **Export to Flow** button to export your workflow diagram to Power Automate.
2. Name your flow and then select the **Create flow** button.

Create a flow



 Drawing4

Flow name

[Create flow](#)

See details 


This flow will connect to:

 Twitter  deherb3185 ...

Permissions

Powered by [Microsoft Flow](#)

3. You should see a success report similar to this one.



Your flow was created

Your flow was successfully created!  
To make changes to it, go to [Microsoft Flow](#).

[Done](#)

Powered by [Microsoft Flow](#)

You can now run or make edits to your flow from the Power Automate designer, just like any other flow.

 **Tip**

Use Visio's sharing and commenting capabilities to collaborate with multiple stakeholders and quickly create a complete workflow .

## See also

- [Get started with Power Automate](#)
- [Build multi-step flows](#)
- [Design a cloud flow with Microsoft Visio](#) ↗

# Reference guide to workflow expression functions in Azure Logic Apps and Power Automate

Article • 12/13/2023

Applies to: **Azure Logic Apps (Consumption + Standard)**

For workflow definitions in [Azure Logic Apps](#) and [Power Automate](#), some [expressions](#) get their values from runtime actions that might not yet exist when your workflow starts running. To reference or process the values in these expressions, you can use *expression functions* provided by the [Workflow Definition Language](#).

## ⓘ Note

This reference page applies to both Azure Logic Apps and Power Automate, but appears in the Azure Logic Apps documentation. Although this page refers specifically to logic app workflows, these functions work for both flows and logic app workflows. For more information about functions and expressions in Power Automate, review [Use expressions in conditions](#).

For example, you can calculate values by using math functions, such as the [add\(\)](#) function, when you want the sum from integers or floats. Here are other example tasks that you can perform with functions:

 Expand table

Task	Function syntax	Result
Return a string in lowercase format.	<code>toLowerCase('&lt;text&gt;')</code>  For example: <code>toLowerCase('Hello')</code>	"hello"
Return a globally unique identifier (GUID).	<code>guid()</code>	"c2ecc88d-88c8-4096-912c-d6f2e2b138ce"

To find functions [based on their general purpose](#), review the following tables. Or, for detailed information about each function, see the [alphabetical list](#).

# Functions in expressions

To show how to use a function in an expression, this example shows how you can get the value from the `customerName` parameter and assign that value to the `accountName` property by using the `parameters()` function in an expression:

JSON

```
"accountName": "@parameters('customerName')"
```

Here are some other general ways that you can use functions in expressions:

[Expand table](#)

Task	Function syntax in an expression
Perform work with an item by passing that item to a function.	"@<functionName>(<item>)"
<ol style="list-style-type: none"><li>1. Get the <i>parameterName</i>'s value by using the nested <code>parameters()</code> function.</li><li>2. Perform work with the result by passing that value to <i>functionName</i>.</li></ol>	"@<functionName> (parameters(' <parameterName> '))"
<ol style="list-style-type: none"><li>1. Get the result from the nested inner function <i>functionName</i>.</li><li>2. Pass the result to the outer function <i>functionName2</i>.</li></ol>	"@<functionName2>(<functionName> <item>)"
<ol style="list-style-type: none"><li>1. Get the result from <i>functionName</i>.</li><li>2. Given that the result is an object with property <i>propertyName</i>, get that property's value.</li></ol>	"@<functionName>(<item>). <propertyName>"

For example, the `concat()` function can take two or more string values as parameters. This function combines those strings into one string. You can either pass in string literals, for example, "Sophia" and "Owen" so that you get a combined string, "SophiaOwen":

JSON

```
"customerName": "@concat('Sophia', 'Owen')"
```

Or, you can get string values from parameters. This example uses the `parameters()` function in each `concat()` parameter and the `firstName` and `lastName` parameters. You



then pass the resulting strings to the `concat()` function so that you get a combined string, for example, "SophiaOwen":

JSON

```
"customerName": "@concat(parameters('firstName'), parameters('lastName'))"
```

Either way, both examples assign the result to the `customerName` property.

## Considerations for using functions

- The designer doesn't evaluate runtime expressions that are used as function parameters at design time. The designer requires that all expressions can be fully evaluated at design time.
- Function parameters are evaluated from left to right.
- In the syntax for parameter definitions, a question mark (?) that appears after a parameter means the parameter is optional. For example, see [getFutureTime\(\)](#).
- Function expressions that appear inline with plain text require enclosing curly braces ({}), to use the expression's interpolated format instead. This format helps avoid parsing problems. If your function expression doesn't appear inline with plain text, no curly braces are necessary.

The following example shows the correct and incorrect syntax:

**Correct:** `"<text>/@{<function-name>('<parameter-name>')}/<text>"`

**Incorrect:** `"<text>/@<function-name>('<parameter-name>')/<text>"`

**OK:** `"@<function-name>('<parameter-name>')"`

The following sections organize functions based on their general purpose, or you can browse these functions in [alphabetical order](#).

## String functions

To work with strings, you can use these string functions and also some [collection functions](#). String functions work only on strings.

String function	Task
<a href="#">chunk</a>	Split a string or collection into chunks of equal length.
<a href="#">concat</a>	Combine two or more strings, and return the combined string.
<a href="#">endsWith</a>	Check whether a string ends with the specified substring.
<a href="#">formatNumber</a>	Return a number as a string based on the specified format
<a href="#">guid</a>	Generate a globally unique identifier (GUID) as a string.
<a href="#">indexOf</a>	Return the starting position for a substring.
<a href="#">isFloat</a>	Return a boolean that indicates whether a string is a floating-point number.
<a href="#">isInt</a>	Return a boolean that indicates whether a string is an integer.
<a href="#">lastIndexOf</a>	Return the starting position for the last occurrence of a substring.
<a href="#">length</a>	Return the number of items in a string or array.
<a href="#">nthIndexOf</a>	Return the starting position or index value where the <i>n</i> th occurrence of a substring appears in a string.
<a href="#">replace</a>	Replace a substring with the specified string, and return the updated string.
<a href="#">slice</a>	Return a substring by specifying the starting and ending position or value. See also <a href="#">substring</a> .
<a href="#">split</a>	Return an array that contains substrings, separated by commas, from a larger string based on a specified delimiter character in the original string.
<a href="#">startsWith</a>	Check whether a string starts with a specific substring.
<a href="#">substring</a>	Return characters from a string, starting from the specified position. See also <a href="#">slice</a> .
<a href="#">toLowerCase</a>	Return a string in lowercase format.
<a href="#">toUpperCase</a>	Return a string in uppercase format.
<a href="#">trim</a>	Remove leading and trailing whitespace from a string, and return the updated string.

## Collection functions

To work with collections, generally arrays, strings, and sometimes, dictionaries, you can use these collection functions.

Collection function	Task
<a href="#">chunk</a>	Split a string or collection into chunks of equal length.
<a href="#">contains</a>	Check whether a collection has a specific item.
<a href="#">empty</a>	Check whether a collection is empty.
<a href="#">first</a>	Return the first item from a collection.
<a href="#">intersection</a>	Return a collection that has <i>only</i> the common items across the specified collections.
<a href="#">item</a>	If this function appears inside a repeating action over an array, return the current item in the array during the action's current iteration.
<a href="#">join</a>	Return a string that has <i>all</i> the items from an array, separated by the specified character.
<a href="#">last</a>	Return the last item from a collection.
<a href="#">length</a>	Return the number of items in a string or array.
<a href="#">reverse</a>	Reverse the order of items in an array.
<a href="#">skip</a>	Remove items from the front of a collection, and return <i>all the other</i> items.
<a href="#">sort</a>	Sort items in a collection.
<a href="#">take</a>	Return items from the front of a collection.
<a href="#">union</a>	Return a collection that has <i>all</i> the items from the specified collections.


## Logical comparison functions

To work with conditions, compare values and expression results, or evaluate various kinds of logic, you can use these logical comparison functions. For the full reference about each function, see the [alphabetical list](#).

### Note

If you use logical functions or conditions to compare values, null values are converted to empty string ("" ) values. The behavior of conditions differs when you

compare with an empty string instead of a null value. For more information, see the [string\(\) function](#).

 Expand table

Logical comparison function	Task
<a href="#">and</a>	Check whether all expressions are true.
<a href="#">equals</a>	Check whether both values are equivalent.
<a href="#">greater</a>	Check whether the first value is greater than the second value.
<a href="#">greaterOrEquals</a>	Check whether the first value is greater than or equal to the second value.
<a href="#">if</a>	Check whether an expression is true or false. Based on the result, return a specified value.
<a href="#">isFloat</a>	Return a boolean that indicates whether a string is a floating-point number.
<a href="#">isInt</a>	Return a boolean that indicates whether a string is an integer.
<a href="#">less</a>	Check whether the first value is less than the second value.
<a href="#">lessOrEquals</a>	Check whether the first value is less than or equal to the second value.
<a href="#">not</a>	Check whether an expression is false.
<a href="#">or</a>	Check whether at least one expression is true.

## Conversion functions

To change a value's type or format, you can use these conversion functions. For example, you can change a value from a Boolean to an integer. For more information about how Azure Logic Apps handles content types during conversion, see [Handle content types](#). For the full reference about each function, see the [alphabetical list](#).

### Note

Azure Logic Apps automatically or implicitly performs base64 encoding and decoding, so you don't have to manually perform these conversions by using the encoding and decoding functions. However, if you use these functions anyway in

the designer, you might experience unexpected rendering behaviors in the designer. These behaviors affect only the functions' visibility and not their effect unless you edit the functions' parameter values, which removes the functions and their effects from your code. For more information, see [Implicit data type conversions](#).

 Expand table

Conversion function	Task
<a href="#">array</a>	Return an array from a single specified input. For multiple inputs, see <a href="#">createArray</a> .
<a href="#">base64</a>	Return the base64-encoded version for a string.
<a href="#">base64ToBinary</a>	Return the binary version for a base64-encoded string.
<a href="#">base64ToString</a>	Return the string version for a base64-encoded string.
<a href="#">binary</a>	Return the binary version for an input value.
<a href="#">bool</a>	Return the Boolean version for an input value.
<a href="#">createArray</a>	Return an array from multiple inputs.
<a href="#">dataUri</a>	Return the data URI for an input value.
<a href="#">dataUriToBinary</a>	Return the binary version for a data URI.
<a href="#">dataUriToString</a>	Return the string version for a data URI.
<a href="#">decimal</a>	Return the decimal number for a decimal string.
<a href="#">decodeBase64</a>	Return the string version for a base64-encoded string.
<a href="#">decodeDataUri</a>	Return the binary version for a data URI.
<a href="#">decodeUriComponent</a>	Return a string that replaces escape characters with decoded versions.
<a href="#">encodeUriComponent</a>	Return a string that replaces URL-unsafe characters with escape characters.
<a href="#">float</a>	Return a floating point number for an input value.
<a href="#">int</a>	Return the integer version for a string.
<a href="#">json</a>	Return the JavaScript Object Notation (JSON) type value or object for a string or XML.
<a href="#">string</a>	Return the string version for an input value.

Conversion function	Task
<a href="#">uriComponent</a>	Return the URI-encoded version for an input value by replacing URL-unsafe characters with escape characters.
<a href="#">uriComponentToBinary</a>	Return the binary version for a URI-encoded string.
<a href="#">uriComponentToString</a>	Return the string version for a URI-encoded string.
<a href="#">xml</a>	Return the XML version for a string.

## Implicit data type conversions

Azure Logic Apps automatically or implicitly converts between some data types, so you don't have to manually perform these conversions. For example, if you use non-string values where strings are expected as inputs, Azure Logic Apps automatically converts the non-string values into strings.

For example, suppose a trigger returns a numerical value as output:

```
triggerBody()?['123']
```

If you use this numerical output where string input is expected, such as a URL, Azure Logic Apps automatically converts the value into a string by using the curly braces (`{}`) notation:

```
@{triggerBody()?['123']}
```

## Base64 encoding and decoding

Azure Logic Apps automatically or implicitly performs base64 encoding or decoding, so you don't have to manually perform these conversions by using the corresponding functions:

- `base64(<value>)`
- `base64ToBinary(<value>)`
- `base64ToString(<value>)`
- `base64(decodeDataUri(<value>))`
- `concat('data;base64,', <value>)`
- `concat('data:', encodeUriComponent(<value>))`
- `decodeDataUri(<value>)`

### ⓘ Note

If you manually add any of these functions while using the designer, either directly to a trigger or action or by using the expression editor, navigate away from the designer, and then return to the designer, the function disappears from the designer, leaving behind only the parameter values. This behavior also happens if you select a trigger or action that uses this function without editing the function's parameter values. This result affects only the function's visibility and not the effect. In code view, the function is unaffected. However, if you edit the function's parameter values, the function and its effect are both removed from code view, leaving behind only the function's parameter values.

## Math functions

To work with integers and floats, you can use these math functions. For the full reference about each function, see the [alphabetical list](#).

 Expand table

Math function	Task
<a href="#">add</a>	Return the result from adding two numbers.
<a href="#">div</a>	Return the result from dividing two numbers.
<a href="#">max</a>	Return the highest value from a set of numbers or an array.
<a href="#">min</a>	Return the lowest value from a set of numbers or an array.
<a href="#">mod</a>	Return the remainder from dividing two numbers.
<a href="#">mul</a>	Return the product from multiplying two numbers.
<a href="#">rand</a>	Return a random integer from a specified range.
<a href="#">range</a>	Return an integer array that starts from a specified integer.
<a href="#">sub</a>	Return the result from subtracting the second number from the first number.

## Date and time functions

To work with dates and times, you can use these date and time functions. For the full reference about each function, see the [alphabetical list](#).

<b>Date or time function</b>	<b>Task</b>
<a href="#">addDays</a>	Add days to a timestamp.
<a href="#">addHours</a>	Add hours to a timestamp.
<a href="#">addMinutes</a>	Add minutes to a timestamp.
<a href="#">addSeconds</a>	Add seconds to a timestamp.
<a href="#">addToTime</a>	Add specified time units to a timestamp. See also <a href="#">getFutureTime</a> .
<a href="#">convertFromUtc</a>	Convert a timestamp from Universal Time Coordinated (UTC) to the target time zone.
<a href="#">convertTimeZone</a>	Convert a timestamp from the source time zone to the target time zone.
<a href="#">convertToUtc</a>	Convert a timestamp from the source time zone to Universal Time Coordinated (UTC).
<a href="#">dateDifference</a>	Return the difference between two dates as a timespan.
<a href="#">dayOfMonth</a>	Return the day of the month component from a timestamp.
<a href="#">dayOfWeek</a>	Return the day of the week component from a timestamp.
<a href="#">dayOfYear</a>	Return the day of the year component from a timestamp.
<a href="#">formatDateTime</a>	Return the date from a timestamp.
<a href="#">getFutureTime</a>	Return the current timestamp plus the specified time units. See also <a href="#">addToTime</a> .
<a href="#">getPastTime</a>	Return the current timestamp minus the specified time units. See also <a href="#">subtractFromTime</a> .
<a href="#">parseDateTime</a>	Return the timestamp from a string that contains a timestamp.
<a href="#">startOfDay</a>	Return the start of the day for a timestamp.
<a href="#">startOfHour</a>	Return the start of the hour for a timestamp.
<a href="#">startOfMonth</a>	Return the start of the month for a timestamp.
<a href="#">subtractFromTime</a>	Subtract a number of time units from a timestamp. See also <a href="#">getPastTime</a> .
<a href="#">ticks</a>	Return the <code>ticks</code> property value for a specified timestamp.
<a href="#">utcNow</a>	Return the current timestamp as a string.



# Workflow functions

These workflow functions can help you:

- Get details about a workflow instance at run time.
- Work with the inputs used for instantiating logic apps or flows.
- Reference the outputs from triggers and actions.

For example, you can reference the outputs from one action and use that data in a later action. For the full reference about each function, see the [alphabetical list](#).

 Expand table

Workflow function	Task
<a href="#">action</a>	Return the current action's output at runtime, or values from other JSON name-and-value pairs. See also <a href="#">actions</a> .
<a href="#">actionBody</a>	Return an action's <code>body</code> output at runtime. See also <a href="#">body</a> .
<a href="#">actionOutputs</a>	Return an action's output at runtime. See <a href="#">outputs</a> and <a href="#">actions</a> .
<a href="#">actions</a>	Return an action's output at runtime, or values from other JSON name-and-value pairs. See also <a href="#">action</a> .
<a href="#">body</a>	Return an action's <code>body</code> output at runtime. See also <a href="#">actionBody</a> .
<a href="#">formDataMultiValues</a>	Create an array with the values that match a key name in <i>form-data</i> or <i>form-encoded</i> action outputs.
<a href="#">formDataValue</a>	Return a single value that matches a key name in an action's <i>form-data</i> or <i>form-encoded output</i> .
<a href="#">item</a>	If this function appears inside a repeating action over an array, return the current item in the array during the action's current iteration.
<a href="#">items</a>	If this function appears inside a Foreach or Until loop, return the current item from the specified loop.
<a href="#">iterationIndexes</a>	If this function appears inside an Until loop, return the index value for the current iteration. You can use this function inside nested Until loops.
<a href="#">listCallbackUrl</a>	Return the "callback URL" that calls a trigger or action.
<a href="#">multipartBody</a>	Return the body for a specific part in an action's output that has multiple parts.
<a href="#">outputs</a>	Return an action's output at runtime.

Workflow function	Task
<a href="#">parameters</a>	Return the value for a parameter that is described in your workflow definition.
<a href="#">result</a>	Return the inputs and outputs from the top-level actions inside the specified scoped action, such as <code>For_each</code> , <code>Until</code> , and <code>Scope</code> .
<a href="#">trigger</a>	Return a trigger's output at runtime, or from other JSON name-and-value pairs. See also <a href="#">triggerOutputs</a> and <a href="#">triggerBody</a> .
<a href="#">triggerBody</a>	Return a trigger's <code>body</code> output at runtime. See <a href="#">trigger</a> .
<a href="#">triggerFormDataValue</a>	Return a single value matching a key name in <i>form-data</i> or <i>form-encoded</i> trigger outputs.
<a href="#">triggerMultipartBody</a>	Return the body for a specific part in a trigger's multipart output.
<a href="#">triggerFormDataMultiValues</a>	Create an array whose values match a key name in <i>form-data</i> or <i>form-encoded</i> trigger outputs.
<a href="#">triggerOutputs</a>	Return a trigger's output at runtime, or values from other JSON name-and-value pairs. See <a href="#">trigger</a> .
<a href="#">variables</a>	Return the value for a specified variable.
<a href="#">workflow</a>	Return all the details about the workflow itself during run time.

## URI parsing functions

To work with uniform resource identifiers (URIs) and get various property values for these URIs, you can use these URI parsing functions. For the full reference about each function, see the [alphabetical list](#).

 Expand table

URI parsing function	Task
<a href="#">uriHost</a>	Return the <code>host</code> value for a uniform resource identifier (URI).
<a href="#">uriPath</a>	Return the <code>path</code> value for a uniform resource identifier (URI).
<a href="#">uriPathAndQuery</a>	Return the <code>path</code> and <code>query</code> values for a uniform resource identifier (URI).
<a href="#">uriPort</a>	Return the <code>port</code> value for a uniform resource identifier (URI).
<a href="#">uriQuery</a>	Return the <code>query</code> value for a uniform resource identifier (URI).

URI parsing function	Task
<a href="#">uriScheme</a>	Return the <code>scheme</code> value for a uniform resource identifier (URI).

## Manipulation functions: JSON & XML

To work with JSON objects and XML nodes, you can use these manipulation functions. For the full reference about each function, see the [alphabetical list](#).

 Expand table

Manipulation function	Task
<a href="#">addProperty</a>	Add a property and its value, or name-value pair, to a JSON object, and return the updated object.
<a href="#">coalesce</a>	Return the first non-null value from one or more parameters.
<a href="#">removeProperty</a>	Remove a property from a JSON object and return the updated object.
<a href="#">setProperty</a>	Set the value for a JSON object's property and return the updated object.
<a href="#">xpath</a>	Check XML for nodes or values that match an XPath (XML Path Language) expression, and return the matching nodes or values.

---

## All functions - alphabetical list

This section lists all the available functions in alphabetical order.

### A

#### action

Return the *current* action's output at runtime, or values from other JSON name-and-value pairs, which you can assign to an expression. By default, this function references the entire action object, but you can optionally specify a property whose value you want. See also [actions\(\)](#).

You can use the `action()` function only in these places:

- The `unsubscribe` property for a webhook action so you can access the result from the original `subscribe` request
- The `trackedProperties` property for an action
- The `do-until` loop condition for an action

```
action()
action().outputs.body.<property>
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;property&gt;</code>	No	String	The name for the action object's property whose value you want: <code>name</code> , <code>startTime</code> , <code>endTime</code> , <code>inputs</code> , <code>outputs</code> , <code>status</code> , <code>code</code> , <code>trackingId</code> , and <code>clientTrackingId</code> . In the Azure portal, you can find these properties by reviewing a specific run history's details. For more information, see <a href="#">REST API - Workflow Run Actions</a> .

 Expand table

Return value	Type	Description
<code>&lt;action-output&gt;</code>	String	The output from the current action or property

## actionBody

Return an action's `body` output at runtime. Shorthand for `actions('<actionName>').outputs.body`. See [body\(\)](#) and [actions\(\)](#).

```
actionBody('<actionName>')
```

 Expand table

Parameter	Required	Type	Description
<actionName>	Yes	String	The name for the action's <code>body</code> output that you want

[Expand table](#)

Return value	Type	Description
<action-body-output>	String	The <code>body</code> output from the specified action

### Example

This example gets the `body` output from the Twitter action `Get user`:

```
actionBody('Get_user')
```

And returns this result:

JSON

```
"body": {
  "FullName": "Contoso Corporation",
  "Location": "Generic Town, USA",
  "Id": 283541717,
  "UserName": "ContosoInc",
  "FollowersCount": 172,
  "Description": "Leading the way in transforming the digital workplace.",
  "StatusesCount": 93,
  "FriendsCount": 126,
  "FavouritesCount": 46,
  "ProfileImageUrl":
  "https://pbs.twimg.com/profile_images/908820389907722240/gG9zaHcd_400x400.jpg"
}
```

## actionOutputs

Return an action's output at runtime. and is shorthand for

`actions('<actionName>').outputs`. See [actions\(\)](#). The `actionOutputs()` function resolves to `outputs()` in the designer, so consider using [outputs\(\)](#), rather than `actionOutputs()`. Although both functions work the same way, `outputs()` is preferred.

```
actionOutputs('<actionName>')
```

[Expand table](#)

Parameter	Required	Type	Description
<actionName>	Yes	String	The name for the action's output that you want

[Expand table](#)

Return value	Type	Description
<output>	String	The output from the specified action

### Example

This example gets the output from the Twitter action `Get_user`:

```
actionOutputs('Get_user')
```

And returns this result:

JSON

```
{
  "statusCode": 200,
  "headers": {
    "Pragma": "no-cache",
    "Vary": "Accept-Encoding",
    "x-ms-request-id": "a916ec8f52211265d98159adde2efe0b",
    "X-Content-Type-Options": "nosniff",
    "Timing-Allow-Origin": "*",
    "Cache-Control": "no-cache",
    "Date": "Mon, 09 Apr 2018 18:47:12 GMT",
    "Set-Cookie":
"ARRAffinity=b9400932367ab5e3b6802e3d6158afffb12fcde8666715f5a5fbd4142d0f0b7
d;Path=/;HttpOnly;Domain=twitter-wus.azurewebsites.net",
    "X-AspNet-Version": "4.0.30319",
    "X-Powered-By": "ASP.NET",
    "Content-Type": "application/json; charset=utf-8",
    "Expires": "-1",
    "Content-Length": "339"
  },
}
```

```
"body": {
  "FullName": "Contoso Corporation",
  "Location": "Generic Town, USA",
  "Id": 283541717,
  "UserName": "ContosoInc",
  "FollowersCount": 172,
  "Description": "Leading the way in transforming the digital workplace.",
  "StatusesCount": 93,
  "FriendsCount": 126,
  "FavouritesCount": 46,
  "ProfileImageUrl":
  "https://pbs.twimg.com/profile_images/908820389907722240/gG9zaHcd_400x400.jpg"
}
```

## actions

Return an action's output at runtime, or values from other JSON name-and-value pairs, which you can assign to an expression. By default, the function references the entire action object, but you can optionally specify a property whose value that you want. For shorthand versions, see [actionBody\(\)](#), [actionOutputs\(\)](#), and [body\(\)](#). For the current action, see [action\(\)](#).

### Tip

The `actions()` function returns output as a string. If you need to work with a returned value as a JSON object, you first need to convert the string value. You can transform the string value into a JSON object using the [Parse JSON action](#).

### Note

Previously, you could use the `actions()` function or the `conditions` element when specifying that an action ran based on the output from another action. However, to declare explicitly dependencies between actions, you must now use the dependent action's `runAfter` property. To learn more about the `runAfter` property, see [Catch and handle failures with the runAfter property](#).

```
actions('<actionName>')
actions('<actionName>').outputs.body.<property>
```

 Expand table

Parameter	Required	Type	Description
<actionName>	Yes	String	The name for the action object whose output you want
<property>	No	String	The name for the action object's property whose value you want: <b>name</b> , <b>startTime</b> , <b>endTime</b> , <b>inputs</b> , <b>outputs</b> , <b>status</b> , <b>code</b> , <b>trackingId</b> , and <b>clientTrackingId</b> . In the Azure portal, you can find these properties by reviewing a specific run history's details. For more information, see <a href="#">REST API - Workflow Run Actions</a> .

 Expand table

Return value	Type	Description
<action-output>	String	The output from the specified action or property

### Example

This example gets the `status` property value from the Twitter action `Get user` at runtime:

```
actions('Get_user').outputs.body.status
```

And returns this result: `"Succeeded"`

## add

Return the result from adding two numbers.

```
add(<summand_1>, <summand_2>)
```

 Expand table

Parameter	Required	Type	Description
<summand_1>, <summand_2>	Yes	Integer, Float, or mixed	The numbers to add



Parameter	Required	Type	Description
-----------	----------	------	-------------

[Expand table](#)

Return value	Type	Description
<code>&lt;result-sum&gt;</code>	Integer or Float	The result from adding the specified numbers

### Example

This example adds the specified numbers:

```
add(1, 1.5)
```

And returns this result: `2.5`


## addDays

Add days to a timestamp.

```
addDays('<timestamp>', <days>, '<format>'?)
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;timestamp&gt;</code>	Yes	String	The string that contains the timestamp
<code>&lt;days&gt;</code>	Yes	Integer	The positive or negative number of days to add
<code>&lt;format&gt;</code>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.fffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<updated-timestamp>	String	The timestamp plus the specified number of days

### Example 1

This example adds 10 days to the specified timestamp:

```
addDays('2018-03-15T00:00:00Z', 10)
```

And returns this result: "2018-03-25T00:00:00.0000000Z"

### Example 2

This example subtracts five days from the specified timestamp:

```
addDays('2018-03-15T00:00:00Z', -5)
```

And returns this result: "2018-03-10T00:00:00.0000000Z"

## addHours

Add hours to a timestamp.

```
addHours('<timestamp>', <hours>, '<format>?')
```

 Expand table

Parameter	Required	Type	Description
<timestamp>	Yes	String	The string that contains the timestamp
<hours>	Yes	Integer	The positive or negative number of hours to add
<format>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.fffffffK),

Parameter	Required	Type	Description
			which complies with <a href="#">ISO 8601</a> and preserves time zone information.
			If the format isn't a valid value, an error is generated.

[Expand table](#)

Return value	Type	Description
<updated-timestamp>	String	The timestamp plus the specified number of hours

### Example 1

This example adds 10 hours to the specified timestamp:

```
addHours('2018-03-15T00:00:00Z', 10)
```

And returns this result: "2018-03-15T10:00:00.000000Z"

### Example 2

This example subtracts five hours from the specified timestamp:

```
addHours('2018-03-15T15:00:00Z', -5)
```

And returns this result: "2018-03-15T10:00:00.000000Z"

## addMinutes

Add minutes to a timestamp.

```
addMinutes('<timestamp>', <minutes>, '<format>?')
```

[Expand table](#)

Parameter	Required	Type	Description
< <i>timestamp</i> >	Yes	String	The string that contains the timestamp
< <i>minutes</i> >	Yes	Integer	The positive or negative number of minutes to add
< <i>format</i> >	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated.

[Expand table](#)

Return value	Type	Description
< <i>updated-timestamp</i> >	String	The timestamp plus the specified number of minutes

### Example 1

This example adds 10 minutes to the specified timestamp:

```
addMinutes('2018-03-15T00:10:00Z', 10)
```

And returns this result: "2018-03-15T00:20:00.000000Z"

### Example 2

This example subtracts five minutes from the specified timestamp:

```
addMinutes('2018-03-15T00:20:00Z', -5)
```

And returns this result: "2018-03-15T00:15:00.000000Z"

## addProperty

Add a property and its value, or name-value pair, to a JSON object, and return the updated object. If the property already exists at runtime, the function fails and throws an

error.

```
addProperty(<object>, '<property>', <value>)
```

[Expand table](#)

Parameter	Required	Type	Description
<object>	Yes	Object	The JSON object where you want to add a property
<property>	Yes	String	The name for the property to add
<value>	Yes	Any	The value for the property

[Expand table](#)

Return value	Type	Description
<updated-object>	Object	The updated JSON object with the specified property

To add a parent property to an existing property, use the `setProperty()` function, not the `addProperty()` function. Otherwise, the function returns only the child object as output.

```
setProperty(<object>, '<parent-property>', addProperty(<object>['<parent-property>'], '<child-property>', <value>))
```

[Expand table](#)

Parameter	Required	Type	Description
<object>	Yes	Object	The JSON object where you want to add a property
<parent-property>	Yes	String	The name for parent property where you want to add the child property
<child-property>	Yes	String	The name for the child property to add
<value>	Yes	Any	The value to set for the specified property

Return value	Type	Description
<updated-object>	Object	The updated JSON object whose property you set

### Example 1

This example adds the `middleName` property to a JSON object, which is converted from a string to JSON by using the `JSON()` function. The object already includes the `firstName` and `surName` properties. The function assigns the specified value to the new property and returns the updated object:

```
addProperty(json('{ "firstName": "Sophia", "lastName": "Owen" }'),  
'middleName', 'Anne')
```

Here's the current JSON object:

JSON

```
{  
  "firstName": "Sophia",  
  "surName": "Owen"  
}
```

Here's the updated JSON object:

JSON

```
{  
  "firstName": "Sophia",  
  "middleName": "Anne",  
  "surName": "Owen"  
}
```

### Example 2

This example adds the `middleName` child property to the existing `customerName` property in a JSON object, which is converted from a string to JSON by using the `JSON()` function. The function assigns the specified value to the new property and returns the updated object:

```
setProperty(json('{ "customerName": { "firstName": "Sophia", "surName": "Owen" } }'), 'customerName', addProperty(json('{ "customerName": { "firstName": "Sophia", "surName": "Owen" } }')['customerName'], 'middleName', 'Anne'))
```

Here's the current JSON object:

JSON

```
{
  "customerName": {
    "firstName": "Sophia",
    "surName": "Owen"
  }
}
```

Here's the updated JSON object:

JSON

```
{
  "customerName": {
    "firstName": "Sophia",
    "middleName": "Anne",
    "surName": "Owen"
  }
}
```

## addSeconds

Add seconds to a timestamp.

```
addSeconds('<timestamp>', <seconds>, '<format>?')
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;timestamp&gt;</code>	Yes	String	The string that contains the timestamp
<code>&lt;seconds&gt;</code>	Yes	Integer	The positive or negative number of seconds to add
<code>&lt;format&gt;</code>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for

Parameter	Required	Type	Description
			<p>the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.</p> <p>If the format isn't a valid value, an error is generated.</p>

[Expand table](#)

Return value	Type	Description
<updated-timestamp>	String	The timestamp plus the specified number of seconds

### Example 1

This example adds 10 seconds to the specified timestamp:

```
addSeconds('2018-03-15T00:00:00Z', 10)
```

And returns this result: "2018-03-15T00:00:10.000000Z"

### Example 2

This example subtracts five seconds to the specified timestamp:

```
addSeconds('2018-03-15T00:00:30Z', -5)
```

And returns this result: "2018-03-15T00:00:25.000000Z"

## addToTime

Add the specified time units to a timestamp. See also [getFutureTime\(\)](#).

```
addToTime('<timestamp>', <interval>, '<timeUnit>', '<format>?')
```



 Expand table

Parameter	Required	Type	Description
<timestamp>	Yes	String	The string that contains the timestamp
<interval>	Yes	Integer	The number of specified time units to add
<timeUnit>	Yes	String	The unit of time to use with <i>interval</i> : "Second", "Minute", "Hour", "Day", "Week", "Month", "Year"
<format>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<updated-timestamp>	String	The timestamp plus the specified number of time units

### Example 1

This example adds one day to the specified timestamp:

```
addTime('2018-01-01T00:00:00Z', 1, 'Day')
```

And returns this result: "2018-01-02T00:00:00.000000Z"

### Example 2

This example adds one day to the specified timestamp:

```
addTime('2018-01-01T00:00:00Z', 1, 'Day', 'D')
```

And returns the result using the optional "D" format: "Tuesday, January 2, 2018"

# and

Check whether all expressions are true. Return true when all expressions are true, or return false when at least one expression is false.

```
and(<expression1>, <expression2>, ...)
```

[Expand table](#)

Parameter	Required	Type	Description
<expression1>, <expression2>, ...	Yes	Boolean	The expressions to check

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when all expressions are true. Return false when at least one expression is false.

## Example 1

These examples check whether the specified Boolean values are all true:

```
and(true, true)
and(false, true)
and(false, false)
```

And returns these results:

- First example: Both expressions are true, so returns `true`.
- Second example: One expression is false, so returns `false`.
- Third example: Both expressions are false, so returns `false`.

## Example 2

These examples check whether the specified expressions are all true:

```
and(equals(1, 1), equals(2, 2))
and(equals(1, 1), equals(1, 2))
and(equals(1, 2), equals(1, 3))
```

And returns these results:

- First example: Both expressions are true, so returns `true`.
- Second example: One expression is false, so returns `false`.
- Third example: Both expressions are false, so returns `false`.

## array

Return an array from a single specified input. For multiple inputs, see [createArray\(\)](#).

```
array('<value>')
```

 Expand table

Parameter	Required	Type	Description
<value>	Yes	String	The string for creating an array

 Expand table

Return value	Type	Description
[<value>]	Array	An array that contains the single specified input

### Example

This example creates an array from the "hello" string:

```
array('hello')
```

And returns this result: `["hello"]`

# B

## base64

Return the base64-encoded version for a string.

### ⓘ Note

Azure Logic Apps automatically or implicitly performs base64 encoding and decoding, so you don't have to manually perform these conversions by using the encoding and decoding functions. However, if you use these functions anyway, you might experience unexpected rendering behaviors in the designer. These behaviors affect only the functions' visibility and not their effect unless you edit the functions' parameter values, which removes the functions and their effects from your code. For more information, see [Base64 encoding and decoding](#).

```
base64('<value>')
```

 Expand table

Parameter	Required	Type	Description
<value>	Yes	String	The input string

 Expand table

Return value	Type	Description
<base64-string>	String	The base64-encoded version for the input string

### Example

This example converts the "hello" string to a base64-encoded string:

```
base64('hello')
```

And returns this result: "aGVsbG8="

## base64ToBinary

Return the binary version for a base64-encoded string.

### ⓘ Note

Azure Logic Apps automatically or implicitly performs base64 encoding and decoding, so you don't have to manually perform these conversions by using the encoding and decoding functions. However, if you use these functions anyway in the designer, you might experience unexpected rendering behaviors in the designer. These behaviors affect only the functions' visibility and not their effect unless you edit the functions' parameter values, which removes the functions and their effects from your code. For more information, see [Base64 encoding and decoding](#).

```
base64ToBinary('<value>')
```

 Expand table

Parameter	Required	Type	Description
<value>	Yes	String	The base64-encoded string to convert

 Expand table

Return value	Type	Description
<binary-for-base64-string>	String	The binary version for the base64-encoded string

### Example

This example converts the "aGVsbG8=" base64-encoded string to a binary string:

```
base64ToBinary('aGVsbG8=')
```

For example, suppose you're using an HTTP action to send a request. You can use `base64ToBinary()` to convert a base64-encoded string to binary data and send that data using the `application/octet-stream` content type in the request.

## base64ToString

Return the string version for a base64-encoded string, effectively decoding the base64 string. Use this function rather than `decodeBase64()`, which is deprecated.

### ⓘ Note

Azure Logic Apps automatically or implicitly performs base64 encoding and decoding, so you don't have to manually perform these conversions by using the encoding and decoding functions. However, if you use these functions anyway in the designer, you might experience unexpected rendering behaviors in the designer. These behaviors affect only the functions' visibility and not their effect unless you edit the functions' parameter values, which removes the functions and their effects from your code. For more information, see [Base64 encoding and decoding](#).

```
base64ToString('<value>')
```

 Expand table

Parameter	Required	Type	Description
<value>	Yes	String	The base64-encoded string to decode

 Expand table

Return value	Type	Description
<decoded-base64-string>	String	The string version for a base64-encoded string

### Example

This example converts the "aGVsbG8=" base64-encoded string to just a string:

```
base64ToString('aGVsbG8=')
```

And returns this result: "hello"

## binary

Return the base64-encoded binary version of a string.

```
binary('<value>')
```

 Expand table

Parameter	Required	Type	Description
<value>	Yes	String	The string to convert

 Expand table

Return value	Type	Description
<binary-for-input-value>	String	The base64-encoded binary version for the specified string

### Example

For example, you're using an HTTP action that returns an image or video file. You can use `binary()` to convert the value to a base-64 encoded content envelope model. Then, you can reuse the content envelope in other actions, such as `Compose`. You can use this function expression to send the string bytes with the `application/octet-stream` content type in the request.

## body

Return an action's `body` output at runtime. Shorthand for

`actions('<actionName>').outputs.body`. See [actionBody\(\)](#) and [actions\(\)](#).

```
body('<actionName>')
```

[Expand table](#)

Parameter	Required	Type	Description
<actionName>	Yes	String	The name for the action's <code>body</code> output that you want

[Expand table](#)

Return value	Type	Description
<action-body-output>	String	The <code>body</code> output from the specified action

### Example

This example gets the `body` output from the `Get user` Twitter action:

```
body('Get_user')
```

And returns this result:

JSON

```
"body": {
  "FullName": "Contoso Corporation",
  "Location": "Generic Town, USA",
  "Id": 283541717,
  "UserName": "ContosoInc",
  "FollowersCount": 172,
  "Description": "Leading the way in transforming the digital workplace.",
  "StatusesCount": 93,
  "FriendsCount": 126,
  "FavouritesCount": 46,
  "ProfileImageUrl":
  "https://pbs.twimg.com/profile_images/908820389907722240/gG9zaHcd_400x400.jpg"
}
```

## bool



Return the Boolean version of a value.

```
bool(<value>)
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	Any	The value to convert to Boolean.

If you're using `bool()` with an object, the value of the object must be a string or integer that can be converted to Boolean.

[Expand table](#)

Return value	Type	Description
<code>true</code> or <code>false</code>	Boolean	The Boolean version of the specified value.

### Outputs

These examples show the different supported types of input for `bool()`:

[Expand table](#)

Input value	Type	Return value
<code>bool(1)</code>	Integer	<code>true</code>
<code>bool(0)</code>	Integer	<code>false</code>
<code>bool(-1)</code>	Integer	<code>true</code>
<code>bool('true')</code>	String	<code>true</code>
<code>bool('false')</code>	String	<code>false</code>

## C

### chunk

Split a string or array into chunks of equal length.

```
chunk('<collection>', '<length>')  
chunk([<collection>], '<length>')
```

[Expand table](#)

Parameter	Required	Type	Description
<collection>	Yes	String or Array	The collection to split
<length>	Yes	The length of each chunk	

[Expand table](#)

Return value	Type	Description
<collection>	Array	An array of chunks with the specified length

### Example 1

This example splits a string into chunks of length 10:

```
chunk('abcdefghijklmnopqrstuvwxy', 10)
```

And returns this result: `['abcdefghij', 'klmnopqrst', 'uvwxyz']`

### Example 2

This example splits an array into chunks of length 5.

```
chunk(createArray(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), 5)
```

And returns this result: `[[1,2,3,4,5], [6,7,8,9,10], [11,12]]`

## coalesce

Return the first non-null value from one or more parameters. Empty strings, empty arrays, and empty objects aren't null.

```
coalesce(<object_1>, <object_2>, ...)
```

[Expand table](#)

Parameter	Required	Type	Description
<object_1>, <object_2>, ...	Yes	Any, can mix types	One or more items to check for null

[Expand table](#)

Return value	Type	Description
<first-non-null-item>	Any	The first item or value that isn't null. If all parameters are null, this function returns null.

### Example

These examples return the first non-null value from the specified values, or null when all the values are null:

```
coalesce(null, true, false)
coalesce(null, 'hello', 'world')
coalesce(null, null, null)
```


And returns these results:

- First example: `true`
- Second example: `"hello"`
- Third example: `null`


## concat

Combine two or more strings, and return the combined string.

```
concat('<text1>', '<text2>', ...)
```

 Expand table

Parameter	Required	Type	Description
<text1>, <text2>, ...	Yes	String	At least two strings to combine

 Expand table

Return value	Type	Description
<text1text2...>	String	The string created from the combined input strings.

**Note:** The length of the result must not exceed 104,857,600 characters.

### Note

Azure Logic Apps automatically or implicitly performs base64 encoding and decoding, so you don't have to manually perform these conversions when you use the `concat()` function with data that needs encoding or decoding:

- `concat('data:;base64,', <value>)`
- `concat('data:', encodeUriComponent(<value>))`

However, if you use this function anyway in the designer, you might experience unexpected rendering behaviors in the designer. These behaviors affect only the function's visibility and not the effect unless you edit the function's parameter values, which removes the function and the effect from your code. For more information, review [Base64 encoding and decoding](#).

### Example

This example combines the strings "Hello" and "World":

```
concat('Hello', 'World')
```

And returns this result: "HelloWorld"

## contains

Check whether a collection has a specific item. Return true when the item is found, or return false when not found. This function is case-sensitive.

```
contains('<collection>', '<value>')  
contains([<collection>], '<value>')
```

Specifically, this function works on these collection types:

- A *string* to find a *substring*
- An *array* to find a *value*
- A *dictionary* to find a *key*

[Expand table](#)

Parameter	Required	Type	Description
<collection>	Yes	String, Array, or Dictionary	The collection to check
<value>	Yes	String, Array, or Dictionary, respectively	The item to find

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when the item is found. Return false when not found.

### Example 1

This example checks the string "hello world" for the substring "world" and returns true:

```
contains('hello world', 'world')
```

### Example 2

This example checks the string "hello world" for the substring "universe" and returns false:


```
contains('hello world', 'universe')
```

## convertFromUtc

Convert a timestamp from Universal Time Coordinated (UTC) to the target time zone.

```
convertFromUtc('<timestamp>', '<destinationTimeZone>', '<format>?')
```

 Expand table

Parameter	Required	Type	Description
<i>&lt;timestamp&gt;</i>	Yes	String	The string that contains the timestamp
<i>&lt;destinationTimeZone&gt;</i>	Yes	String	The name for the target time zone. For time zone names, review <a href="#">Microsoft Windows Default Time Zones</a> .
<i>&lt;format&gt;</i>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.fffffffK), which complies with <a href="#">ISO 8601</a>  and preserves time zone information.  If the format isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<i>&lt;converted-timestamp&gt;</i>	String	The timestamp converted to the target time zone without the timezone UTC offset.

### Example 1

This example converts a timestamp to the specified time zone:

```
convertFromUtc('2018-01-01T08:00:00.000000Z', 'Pacific Standard Time')
```

And returns this result: "2018-01-01T00:00:00.000000"

### Example 2

This example converts a timestamp to the specified time zone and format:

```
convertFromUtc('2018-01-01T08:00:00.000000Z', 'Pacific Standard Time', 'D')
```


And returns this result: "Monday, January 1, 2018"

## convertTimeZone

Convert a timestamp from the source time zone to the target time zone.

```
convertTimeZone('<timestamp>', '<sourceTimeZone>', '<destinationTimeZone>',  
'<format>?')
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;timestamp&gt;</code>	Yes	String	The string that contains the timestamp
<code>&lt;sourceTimeZone&gt;</code>	Yes	String	The name for the source time zone. For time zone names, see <a href="#">Microsoft Windows Default Time Zones</a> , but you might have to remove any punctuation from the time zone name.
<code>&lt;destinationTimeZone&gt;</code>	Yes	String	The name for the target time zone. For time zone names, see <a href="#">Microsoft Windows Default Time Zones</a> , but you might have to remove any punctuation from the time zone name.
<code>&lt;format&gt;</code>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.fffffffK), which complies with <a href="#">ISO 8601</a>  and preserves time zone information.

Parameter	Required	Type	Description
			If the format isn't a valid value, an error is generated.

[Expand table](#)

Return value	Type	Description
<converted-timestamp>	String	The timestamp converted to the target time zone

### Example 1

This example converts the source time zone to the target time zone:

```
convertTimeZone('2018-01-01T08:00:00.000000Z', 'UTC', 'Pacific Standard Time')
```

And returns this result: "2018-01-01T00:00:00.000000"

### Example 2

This example converts a time zone to the specified time zone and format:

```
convertTimeZone('2018-01-01T08:00:00.000000Z', 'UTC', 'Pacific Standard Time', 'D')
```

And returns this result: "Monday, January 1, 2018"

## convertToUtc


Convert a timestamp from the source time zone to Universal Time Coordinated (UTC).

```
convertToUtc('<timestamp>', '<sourceTimeZone>', '<format>?')
```



 Expand table

Parameter	Required	Type	Description
<timestamp>	Yes	String	The string that contains the timestamp
<sourceTimeZone>	Yes	String	The name for the source time zone. For time zone names, see <a href="#">Microsoft Windows Default Time Zones</a> , but you might have to remove any punctuation from the time zone name.
<format>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.fffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<converted-timestamp>	String	The timestamp converted to UTC

### Example 1

This example converts a timestamp to UTC:

```
convertToUtc('01/01/2018 00:00:00', 'Pacific Standard Time')
```

And returns this result: "2018-01-01T08:00:00.0000000Z"

### Example 2

This example converts a timestamp to UTC:

```
convertToUtc('01/01/2018 00:00:00', 'Pacific Standard Time', 'D')
```

And returns this result: "Monday, January 1, 2018"

# createArray

Return an array from multiple inputs. For single input arrays, see [array\(\)](#).

```
createArray('<object1>', '<object2>', ...)
```

 Expand table

Parameter	Required	Type	Description
<object1>, <object2>, ...	Yes	Any, but not mixed	At least two items to create the array

 Expand table

Return value	Type	Description
[<object1>, <object2>, ...]	Array	The array created from all the input items

## Example

This example creates an array from these inputs:

```
createArray('h', 'e', 'l', 'l', 'o')
```


And returns this result: `["h", "e", "l", "l", "o"]`

# D


## dataUri

Return a data uniform resource identifier (URI) for a string.

```
dataUri('<value>')
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;value&gt;</code>	Yes	String	The string to convert

 Expand table

Return value	Type	Description
<code>&lt;data-uri&gt;</code>	String	The data URI for the input string

### Example

This example creates a data URI for the "hello" string:


```
dataUri('hello')
```

And returns this result: `"data:text/plain;charset=utf-8;base64,aGVsbG8="`

## dataUriToBinary

Return the binary version for a data uniform resource identifier (URI). Use this function rather than [decodeDataUri\(\)](#). Although both functions work the same way, `dataUriBinary()` is preferred.

```
dataUriToBinary('<value>')
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;value&gt;</code>	Yes	String	The data URI to convert

 Expand table

Return value	Type	Description
<binary-for-data-uri>	String	The binary version for the data URI

### Example

This example creates a binary version for this data URI:

```
dataUriToBinary('data:text/plain;charset=utf-8;base64,aGVsbG8=')
```

And returns this result:

```
"01100100011000010111010001100001001110100111010001100101011110000111010000101111011100000
1100000
110110001100001011010010110111000111011011000110110100001100001011110010011100110110
01010111
010000111101011101010111010001100110001011010011100000111011011000100110000101111001
10110010
100110110001101000010110001100001010001110101011001110011011000100100011100111100000
111101"
```

## dataUriToString

Return the string version for a data uniform resource identifier (URI).

```
dataUriToString('<value>')
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	String	The data URI to convert

[Expand table](#)

Return value	Type	Description
<string-for-data-uri>	String	The string version for the data URI

### Example

This example creates a string for this data URI:

```
dataUriToString('data:text/plain;charset=utf-8;base64,aGVsbG8=')
```

And returns this result: `"hello"`

## dateDifference

Return the difference between two timestamps as a timespan. This function subtracts `startDate` from `endDate`, and returns the result as timestamp in string format.

```
dateDifference('<startDate>', '<endDate>')
```

[Expand table](#)

Parameter	Required	Type	Description
<startDate>	Yes	String	A string that contains a timestamp
<endDate>	Yes	String	A string that contains a timestamp

[Expand table](#)

Return value	Type	Description
<timespan>	String	The difference between the two timestamps, which is a timestamp in string format. If <code>startDate</code> is more recent than <code>endDate</code> , the result is a negative value.

### Example

This example subtracts the first value from the second value:

```
dateDifference('2015-02-08', '2018-07-30')
```

And returns this result: "1268.00:00:00"

## dayOfMonth

Return the day of the month from a timestamp.

```
dayOfMonth('<timestamp>')
```

[Expand table](#)

Parameter	Required	Type	Description
<timestamp>	Yes	String	The string that contains the timestamp

[Expand table](#)

Return value	Type	Description
<day-of-month>	Integer	The day of the month from the specified timestamp

### Example

This example returns the number for the day of the month from this timestamp:

```
dayOfMonth('2018-03-15T13:27:36Z')
```

And returns this result: 15

## dayOfWeek

Return the day of the week from a timestamp.

```
dayOfWeek('<timestamp>')
```

[Expand table](#)

Parameter	Required	Type	Description
<i>&lt;timestamp&gt;</i>	Yes	String	The string that contains the timestamp

[Expand table](#)

Return value	Type	Description
<i>&lt;day-of-week&gt;</i>	Integer	The day of the week from the specified timestamp where Sunday is 0, Monday is 1, and so on

### Example

This example returns the number for the day of the week from this timestamp:

```
dayOfWeek('2018-03-15T13:27:36Z')
```

And returns this result: `4`

## dayOfYear

Return the day of the year from a timestamp.

```
dayOfYear('<timestamp>')
```

[Expand table](#)

Parameter	Required	Type	Description
<i>&lt;timestamp&gt;</i>	Yes	String	The string that contains the timestamp

 Expand table

Return value	Type	Description
<day-of-year>	Integer	The day of the year from the specified timestamp

### Example

This example returns the number of the day of the year from this timestamp:

```
dayOfYear( '2018-03-15T13:27:36Z' )
```

And returns this result: 74

## decimal

Returns a decimal number in a string as a decimal number. You can use this function when you're working with data that requires decimal precision and also as input for [logical comparison functions](#) and [math functions](#). To capture and preserve precision when you use the result from the **decimal()** function, wrap any decimal output with the [string function](#). This usage is shown in the following examples below where you can lose precision if you use the decimal result as a number.

### Note

The decimal precision that's discussed in the context for this function and the Azure Logic Apps runtime is the same as the [.NET decimal precision](#).

```
decimal('<value>')
```

 Expand table

Parameter	Required	Type	Description
<value>	Yes	String	The decimal number in a string



Return value	Type	Description
<decimal>	Decimal Number	The decimal number for the input string

### Example 1

This example creates a decimal that's used as a number:

```
decimal('1.2345678912312131') // Returns 1.234567891231213.
```

### Example 2

This example creates a decimal and then converts the result to a string for precision preservation:

```
string(decimal('1.2345678912312131')) // Returns "1.2345678912312131".
```

### Example 3

This example uses a math function on two decimal numbers and uses the result as a number:

```
add(decimal('1.2345678912312131'), decimal('1.2345678912312131')) // Returns 2.469135782462426.
```

### Example 4

This example uses a math function on two decimal numbers and converts the result to a string for precision preservation:

```
string(add(decimal('1.2345678912312131'), decimal('1.2345678912312131'))) // Returns "2.4691357824624262".
```

## decodeBase64 (deprecated)

This function is deprecated, so use [base64ToString\(\)](#) instead.

## decodeDataUri

Return the binary version for a data uniform resource identifier (URI). Consider using [dataUriToBinary\(\)](#), rather than `decodeDataUri()`. Although both functions work the same way, `dataUriToBinary()` is preferred.

### ⓘ Note

Azure Logic Apps automatically or implicitly performs base64 encoding and decoding, so you don't have to manually perform these conversions by using the encoding and decoding functions. However, if you use these functions anyway in the designer, you might experience unexpected rendering behaviors in the designer. These behaviors affect only the functions' visibility and not their effect unless you edit the functions' parameter values, which removes the functions and their effects from your code. For more information, see [Base64 encoding and decoding](#).

```
decodeDataUri('<value>')
```

[Expand table](#)

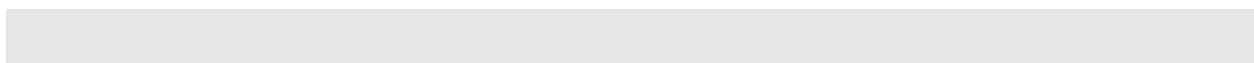
Parameter	Required	Type	Description
<code>&lt;value&gt;</code>	Yes	String	The data URI string to decode

[Expand table](#)

Return value	Type	Description
<code>&lt;binary-for-data-uri&gt;</code>	String	The binary version for a data URI string

### Example

This example returns the binary version for this data URI:



```
decodeDataUri('data:text/plain;charset=utf-8;base64,aGVsbG8=')
```

And returns this result:

```
"01100100011000010111010001100001001110100111010001100101011110000111010000101111011100000  
1100000  
11011000110000101101001011011100011101101100011011010000110000101110010011100110110  
01010111  
01000011110101110101011101000110011000101101001110000011101101100010011000010111001  
10110010  
10011011000110100001011000110000101000111010101100111001101100010010001110011100000  
111101"
```

## decodeUriComponent

Return a string that replaces escape characters with decoded versions.

```
decodeUriComponent('<value>')
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	String	The string with the escape characters to decode

[Expand table](#)

Return value	Type	Description
<decoded-uri>	String	The updated string with the decoded escape characters

### Example

This example replaces the escape characters in this string with decoded versions:

```
decodeUriComponent('https%3A%2F%2Fcontoso.com')
```

And returns this result: "https://contoso.com"


## div

Return the result from dividing two numbers. To get the remainder result, see [mod\(\)](#).

```
div(<dividend>, <divisor>)
```

 Expand table

Parameter	Required	Type	Description
<dividend>	Yes	Integer or Float	The number to divide by the <i>divisor</i>
<divisor>	Yes	Integer or Float	The number that divides the <i>dividend</i> , but can't be zero

 Expand table

Return value	Type	Description
<quotient-result>	Integer or Float	The result from dividing the first number by the second number. If either the dividend or divisor has Float type, the result has Float type.  <b>Note:</b> To convert the float result to an integer, try <a href="#">creating and calling a function in Azure</a> from your logic app.

### Example 1

Both examples return this value with Integer type: 2

```
div(10,5)  
div(11,5)
```

### Example 2

Both examples return this value with Float type: 2.2

```
div(11,5.0)
div(11.0,5)
```

## E

### encodeURIComponent

Return a uniform resource identifier (URI) encoded version for a string by replacing URL-unsafe characters with escape characters. Consider using `uriComponent()`, rather than `encodeURIComponent()`. Although both functions work the same way, `uriComponent()` is preferred.

#### ⓘ Note

Azure Logic Apps automatically or implicitly performs base64 encoding and decoding, so you don't have to manually perform these conversions by using the encoding and decoding functions. However, if you use these functions anyway in the designer, you might experience unexpected rendering behaviors in the designer. These behaviors affect only the functions' visibility and not their effect unless you edit the functions' parameter values, which removes the functions and their effects from your code. For more information, see [Base64 encoding and decoding](#).

```
encodeURIComponent('<value>')
```

 Expand table

Parameter	Required	Type	Description
<value>	Yes	String	The string to convert to URI-encoded format

 Expand table

Return value	Type	Description
<encoded-uri>	String	The URI-encoded string with escape characters

### Example

This example creates a URI-encoded version for this string:

```
encodeURIComponent('https://contoso.com')
```

And returns this result: "https%3A%2F%2Fcontoso.com"

## empty

Check whether a collection is empty. Return true when the collection is empty, or return false when not empty.

```
empty('<collection>')
empty([<collection>])
```

 Expand table

Parameter	Required	Type	Description
<collection>	Yes	String, Array, or Object	The collection to check

 Expand table

Return value	Type	Description
true or false	Boolean	Return true when the collection is empty. Return false when not empty.

### Example

These examples check whether the specified collections are empty:

```
empty('')
empty('abc')
```

And returns these results:

- First example: Passes an empty string, so the function returns `true`.
- Second example: Passes the string "abc", so the function returns `false`.

## endsWith

Check whether a string ends with a specific substring. Return true when the substring is found, or return false when not found. This function isn't case-sensitive.

```
endsWith('<text>', '<searchText>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;text&gt;</code>	Yes	String	The string to check
<code>&lt;searchText&gt;</code>	Yes	String	The ending substring to find

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when the ending substring is found. Return false when not found.

### Example 1

This example checks whether the "hello world" string ends with the "world" string:

```
endsWith('hello world', 'world')
```

And returns this result: `true`

## Example 2

This example checks whether the "hello world" string ends with the "universe" string:

```
endsWith('hello world', 'universe')
```

And returns this result: `false`

## equals

Check whether both values, expressions, or objects are equivalent. Return true when both are equivalent, or return false when they're not equivalent.

```
equals('<object1>', '<object2>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;object1&gt;</code> , <code>&lt;object2&gt;</code>	Yes	Various	The values, expressions, or objects to compare

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when both are equivalent. Return false when not equivalent.

## Example

These examples check whether the specified inputs are equivalent.

```
equals(true, 1)  
equals('abc', 'abcd')
```

And returns these results:



- First example: Both values are equivalent, so the function returns `true`.
- Second example: Both values aren't equivalent, so the function returns `false`.

## F

### first

Return the first item from a string or array.

```
first('<collection>')  
first([<collection>])
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;collection&gt;</code>	Yes	String or Array	The collection where to find the first item

[Expand table](#)

Return value	Type	Description
<code>&lt;first-collection-item&gt;</code>	Any	The first item in the collection

#### Example

These examples find the first item in these collections:

```
first('hello')  
first(createArray(0, 1, 2))
```

And return these results:

- First example: `"h"`
- Second example: `0`

## float

Convert a string version for a floating-point number to an actual floating point number. You can use this function only when passing custom parameters to an app, for example, a logic app workflow or Power Automate flow. To convert floating-point strings represented in locale-specific formats, you can optionally specify an RFC 4646 locale code.

```
float('<value>', '<locale>?')
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	String	The string that has a valid floating-point number to convert. The minimum and maximum values are the same as the limits for the float data type.
<locale>	No	String	The RFC 4646 locale code to use.  If not specified, default locale is used.  If <i>locale</i> isn't a valid value, an error is generated that the provided locale isn't valid or doesn't have an associated locale.

[Expand table](#)

Return value	Type	Description
<float-value>	Float	The floating-point number for the specified string. The minimum and maximum values are the same as the limits for the float data type.

### Example 1

This example creates a string version for this floating-point number:

```
float('10,000.333')
```

And returns this result: `10000.333`

### Example 2

This example creates a string version for this German-style floating-point number:

```
float('10.000,333', 'de-DE')
```

And returns this result: `10000.333`

## formatDateTime

Return a timestamp in the specified format.

```
formatDateTime('<timestamp>', '<format>?', '<locale>?')
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;timestamp&gt;</code>	Yes	String	The string that contains the timestamp
<code>&lt;format&gt;</code>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.
<code>&lt;locale&gt;</code>	No	String	The locale to use. If unspecified, the value is <code>en-us</code> . If <code>locale</code> isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<code>&lt;reformatted-timestamp&gt;</code>	String	The updated timestamp in the specified format and locale, if specified.

### Examples

```
formatDateTime('03/15/2018') // Returns '2018-03-15T00:00:00.0000000'.  
formatDateTime('03/15/2018 12:00:00', 'yyyy-MM-ddTHH:mm:ss') // Returns
```

```
'2018-03-15T12:00:00'.
formatDateTime('01/31/2016', 'dddd MMMM d') // Returns 'Sunday January 31'.
formatDateTime('01/31/2016', 'dddd MMMM d', 'fr-fr') // Returns 'dimanche
janvier 31'.
formatDateTime('01/31/2016', 'dddd MMMM d', 'fr-FR') // Returns 'dimanche
janvier 31'.
formatDateTime('01/31/2016', 'dddd MMMM d', 'es-es') // Returns 'domingo
enero 31'.
```

## formDataMultiValues

Return an array with values that match a key name in an action's *form-data* or *form-encoded* output.

```
formDataMultiValues('<actionName>', '<key>')
```

[Expand table](#)

Parameter	Required	Type	Description
<actionName>	Yes	String	The action whose output has the key value you want
<key>	Yes	String	The name for the key whose value you want

[Expand table](#)

Return value	Type	Description
[<array-with-key-values>]	Array	An array with all the values that match the specified key

### Example

This example creates an array from the "Subject" key's value in the specified action's form-data or form-encoded output:

```
formDataMultiValues('Send_an_email', 'Subject')
```

And returns the subject text in an array, for example: `["Hello world"]`

# formDataValue

Return a single value that matches a key name in an action's *form-data* or *form-encoded* output. If the function finds more than one match, the function throws an error.

```
formDataValue('<actionName>', '<key>')
```

[Expand table](#)

Parameter	Required	Type	Description
<actionName>	Yes	String	The action whose output has the key value you want
<key>	Yes	String	The name for the key whose value you want

[Expand table](#)

Return value	Type	Description
<key-value>	String	The value in the specified key

## Example

This example creates a string from the "Subject" key's value in the specified action's form-data or form-encoded output:

```
formDataValue('Send_an_email', 'Subject')
```

And returns the subject text as a string, for example: "Hello world"

# formatNumber

Return a number as a string that's based on the specified format.

```
text
```

```
formatNumber(<number>, <format>, <locale>?)
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;number&gt;</code>	Yes	Integer or Double	The value that you want to format.
<code>&lt;format&gt;</code>	Yes	String	A composite format string that specifies the format that you want to use. For the supported numeric format strings, see <a href="#">Standard numeric format strings</a> , which are supported by <code>number.ToString(&lt;format&gt;, &lt;locale&gt;)</code> .
<code>&lt;locale&gt;</code>	No	String	The locale to use as supported by <code>number.ToString(&lt;format&gt;, &lt;locale&gt;)</code> . If unspecified, the value is <code>en-us</code> . If <code>locale</code> isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<code>&lt;formatted-number&gt;</code>	String	The specified number as a string in the format that you specified. You can cast this return value to an <code>int</code> or <code>float</code> .

### Example 1

Suppose that you want to format the number `1234567890`. This example formats that number as the string "1,234,567,890.00".

```
formatNumber(1234567890, '0,0.00', 'en-us')
```

### \*Example 2"

Suppose that you want to format the number `1234567890`. This example formats the number to the string "1.234.567.890,00".

```
formatNumber(1234567890, '0,0.00', 'is-is')
```

### Example 3

Suppose that you want to format the number `17.35`. This example formats the number to the string "\$17.35".

```
formatNumber(17.35, 'C2')
```

#### Example 4

Suppose that you want to format the number `17.35`. This example formats the number to the string "17,35 kr".

```
formatNumber(17.35, 'C2', 'is-is')
```

## G

### getFutureTime

Return the current timestamp plus the specified time units.

```
getFutureTime(<interval>, <timeUnit>, <format>?)
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;interval&gt;</code>	Yes	Integer	The number of time units to add
<code>&lt;timeUnit&gt;</code>	Yes	String	The unit of time to use with <i>interval</i> : "Second", "Minute", "Hour", "Day", "Week", "Month", "Year"
<code>&lt;format&gt;</code>	No	String	Either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated that the provided format isn't valid and must be a numeric format string.

[Expand table](#)

Return value	Type	Description
<code>&lt;updated-timestamp&gt;</code>	String	The current timestamp plus the specified number of time units

### Example 1

Suppose the current timestamp is "2018-03-01T00:00:00.0000000Z". This example adds five days to that timestamp:

```
getFutureTime(5, 'Day')
```

And returns this result: `"2018-03-06T00:00:00.0000000Z"`

### Example 2

Suppose the current timestamp is "2018-03-01T00:00:00.0000000Z". This example adds five days and converts the result to "D" format:

```
getFutureTime(5, 'Day', 'D')
```

And returns this result: `"Tuesday, March 6, 2018"`

## getPastTime

Return the current timestamp minus the specified time units.

```
getPastTime(<interval>, <timeUnit>, <format>?)
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;interval&gt;</code>	Yes	Integer	The number of specified time units to subtract
<code>&lt;timeUnit&gt;</code>	Yes	String	The unit of time to use with <i>interval</i> : "Second", "Minute", "Hour", "Day", "Week", "Month", "Year"



Parameter	Required	Type	Description
<format>	No	String	<p>Either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a>. The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.</p> <p>If the format isn't a valid value, an error is generated that the provided format isn't valid and must be a numeric format string.</p>

 Expand table

Return value	Type	Description
<updated-timestamp>	String	The current timestamp minus the specified number of time units

### Example 1

Suppose the current timestamp is "2018-02-01T00:00:00.000000Z". This example subtracts five days from that timestamp:

```
getPastTime(5, 'Day')
```

And returns this result: "2018-01-27T00:00:00.000000Z"

### Example 2

Suppose the current timestamp is "2018-02-01T00:00:00.000000Z". This example subtracts five days and converts the result to "D" format:

```
getPastTime(5, 'Day', 'D')
```

And returns this result: "Saturday, January 27, 2018"

## greater

Check whether the first value is greater than the second value. Return true when the first value is more, or return false when less.

```
greater(<value>, <compareTo>)  
greater('<value>', '<compareTo>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;value&gt;</code>	Yes	Integer, Float, or String	The first value to check whether greater than the second value
<code>&lt;compareTo&gt;</code>	Yes	Integer, Float, or String, respectively	The comparison value

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when the first value is greater than the second value. Return false when the first value is equal to or less than the second value.

### Example

These examples check whether the first value is greater than the second value:

```
greater(10, 5)  
greater('apple', 'banana')
```

And return these results:

- First example: `true`
- Second example: `false`

## greaterOrEquals

Check whether the first value is greater than or equal to the second value. Return true when the first value is greater or equal, or return false when the first value is less.

```
greaterOrEquals(<value>, <compareTo>)  
greaterOrEquals('<value>', '<compareTo>')
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	Integer, Float, or String	The first value to check whether greater than or equal to the second value
<compareTo>	Yes	Integer, Float, or String, respectively	The comparison value

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when the first value is greater than or equal to the second value. Return false when the first value is less than the second value.

### Example

These examples check whether the first value is greater or equal than the second value:

```
greaterOrEquals(5, 5)  
greaterOrEquals('apple', 'banana')
```

And return these results:

- First example: `true`
- Second example: `false`

## guid

Generate a globally unique identifier (GUID) as a string, for example, "c2ecc88d-88c8-4096-912c-d6f2e2b138ce":

```
guid()
```

Also, you can specify a different format for the GUID other than the default format, "D", which is 32 digits separated by hyphens.

```
guid('<format>')
```

[Expand table](#)

Parameter	Required	Type	Description
<i>&lt;format&gt;</i>	No	String	A single <a href="#">format specifier</a> for the returned GUID. By default, the format is "D", but you can use "N", "D", "B", "P", or "X".

[Expand table](#)

Return value	Type	Description
<i>&lt;GUID-value&gt;</i>	String	A randomly generated GUID

### Example

This example generates the same GUID, but as 32 digits, separated by hyphens, and enclosed in parentheses:

```
guid('P')
```

And returns this result: `"(c2ecc88d-88c8-4096-912c-d6f2e2b138ce)"`

# |

## if

Check whether an expression is true or false. Based on the result, return a specified value. Parameters are evaluated from left to right.

```
if(<expression>, <valueIfTrue>, <valueIfFalse>)
```

[Expand table](#)

Parameter	Required	Type	Description
<expression>	Yes	Boolean	The expression to check
<valueIfTrue>	Yes	Any	The value to return when the expression is true
<valueIfFalse>	Yes	Any	The value to return when the expression is false

[Expand table](#)

Return value	Type	Description
<specified-return-value>	Any	The specified value that returns based on whether the expression is true or false

### Example

This example returns "yes" because the specified expression returns true. Otherwise, the example returns "no":

```
if(equals(1, 1), 'yes', 'no')
```

## indexOf

Return the starting position or index value for a substring. This function isn't case-sensitive, and indexes start with the number 0.

```
indexOf('<text>', '<searchText>')
```

[Expand table](#)

Parameter	Required	Type	Description
<text>	Yes	String	The string that has the substring to find
<searchText>	Yes	String	The substring to find

[Expand table](#)

Return value	Type	Description
<index-value>	Integer	The starting position or index value for the specified substring.  If the string isn't found, return the number -1.

### Example

This example finds the starting index value for the "world" substring in the "hello world" string:

```
indexOf('hello world', 'world')
```

And returns this result: `6`

## int

Convert the string version for an integer to an actual integer number.

```
int('<value>')
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	String	The string version for the integer to convert. The minimum and maximum values are the same as the limits for the integer data type.

[Expand table](#)

Return value	Type	Description
<code>&lt;integer-result&gt;</code>	Integer	The integer version for the specified string. The minimum and maximum values are the same as the limits for the integer data type.

### Example

This example creates an integer version for the string "10":

```
int('10')
```

And returns this result: `10`

## isFloat

Return a boolean indicating whether a string is a floating-point number. By default, this function uses the invariant culture for the floating-point format. To identify floating-point numbers represented in other locale-specific formats, you can optionally specify an RFC 4646 locale code.

```
isFloat('<string>', '<locale>?')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;value&gt;</code>	Yes	String	The string to examine
<code>&lt;locale&gt;</code>	No	String	The RFC 4646 locale code to use

[Expand table](#)

Return value	Type	Description
<code>&lt;boolean-result&gt;</code>	Boolean	A boolean that indicates whether the string is a floating-point number

### Example 1

This example checks whether a string is a floating-point number in the invariant culture:

```
isFloat('10,000.00')
```

And returns this result: `true`

### Example 2

This example checks whether a string is a floating-point number in the German locale:

```
isFloat('10.000,00', 'de-DE')
```

And returns this result: `true`

## isInt

Return a boolean that indicates whether a string is an integer.

```
isInt('<string>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;string&gt;</code>	Yes	String	The string to examine

[Expand table](#)

Return value	Type	Description
<code>&lt;boolean-result&gt;</code>	Boolean	A boolean that indicates whether the string is an integer

### Example

This example checks whether a string is an integer:

---



```
isInt('10')
```

And returns this result: `true`

## item

When used inside a repeating action over an array, return the current item in the array during the action's current iteration. You can also get the values from that item's properties.

```
item()
```

[Expand table](#)

Return value	Type	Description
<code>&lt;current-array-item&gt;</code>	Any	The current item in the array for the action's current iteration

### Example

This example gets the `body` element from the current message for the "Send\_an\_email" action inside a for-each loop's current iteration:

```
item().body
```

## items

Return the current item from each cycle in a for-each loop. Use this function inside the for-each loop.

```
items('<loopName>')
```

[Expand table](#)

Parameter	Required	Type	Description
<loopName>	Yes	String	The name for the for-each loop

[Expand table](#)

Return value	Type	Description
<item>	Any	The item from the current cycle in the specified for-each loop

### Example

This example gets the current item from the specified for-each loop:

```
items('myForEachLoopName')
```

## iterationIndexes

Return the index value for the current iteration inside an Until loop. You can use this function inside nested Until loops.

```
iterationIndexes('<loopName>')
```

[Expand table](#)

Parameter	Required	Type	Description
<loopName>	Yes	String	The name for the Until loop

[Expand table](#)

Return value	Type	Description
<index>	Integer	The index value for the current iteration inside the specified Until loop

### Example

This example creates a counter variable and increments that variable by one during each iteration in an Until loop until the counter value reaches five. The example also creates a variable that tracks the current index for each iteration. During each iteration in the Until loop, the example increments the counter value and then assigns the counter value to the current index value and then increments the counter value. While in the loop, this example references the current iteration index by using the `iterationIndexes` function:

```
iterationIndexes('Until_Max_Increment')
```

JSON

```
{
  "actions": {
    "Create_counter_variable": {
      "type": "InitializeVariable",
      "inputs": {
        "variables": [
          {
            "name": "myCounter",
            "type": "Integer",
            "value": 0
          }
        ]
      },
      "runAfter": {}
    },
    "Create_current_index_variable": {
      "type": "InitializeVariable",
      "inputs": {
        "variables": [
          {
            "name": "myCurrentLoopIndex",
            "type": "Integer",
            "value": 0
          }
        ]
      },
      "runAfter": {
        "Create_counter_variable": [ "Succeeded" ]
      }
    },
    "Until_Max_Increment": {
      "type": "Until",
      "actions": {
        "Assign_current_index_to_counter": {
          "type": "SetVariable",
          "inputs": {
            "name": "myCurrentLoopIndex",
            "value": "@variables('myCounter')"
          },
          "runAfter": {
            "Increment_variable": [ "Succeeded" ]
          }
        }
      }
    }
  }
}
```

```

    }
  },
  "Compose": {
    "inputs": "'Current index: '
@{iterationIndexes('Until_Max_Increment')}}",
    "runAfter": {
      "Assign_current_index_to_counter": [
        "Succeeded"
      ]
    },
    "type": "Compose"
  },
  "Increment_variable": {
    "type": "IncrementVariable",
    "inputs": {
      "name": "myCounter",
      "value": 1
    },
    "runAfter": {}
  }
},
"expression": "@equals(variables('myCounter'), 5)",
"limit": {
  "count": 60,
  "timeout": "PT1H"
},
"runAfter": {
  "Create_current_index_variable": [ "Succeeded" ]
}
}
}
}

```

## J

### json

Return the JavaScript Object Notation (JSON) type value, object, or array of objects for a string or XML.

```

json('<value>')
json(xml('value'))

```

 Important

Without an XML schema that defines the output's structure, the function might return results where the structure greatly differs from the expected format, depending on the input.

This behavior makes this function unsuitable for scenarios where the output must conform to a well-defined contract, for example, in critical business systems or solutions.

 Expand table

Parameter	Required	Type	Description
<code>&lt;value&gt;</code>	Yes	String or XML	The string or XML to convert

 Expand table

Return value	Type	Description
<code>&lt;JSON-result&gt;</code>	JSON native type, object, or array	<p>The JSON native type value, object, or array of objects from the input string or XML.</p> <ul style="list-style-type: none"><li>- If you pass in XML that has a single child element in the root element, the function returns a single JSON object for that child element.</li><li>- If you pass in XML that has multiple child elements in the root element, the function returns an array that contains JSON objects for those child elements.</li><li>- If the string is null, the function returns an empty object.</li></ul>

### Example 1

This example converts this string into a JSON value:

```
json('[1, 2, 3]')
```

And returns this result: `[1, 2, 3]`

### Example 2

This example converts this string into JSON:

```
json('{ "fullName": "Sophia Owen" }')
```

And returns this result:

JSON

```
{
  "fullName": "Sophia Owen"
}
```

### Example 3

This example uses the `json()` and `xml()` functions to convert XML that has a single child element in the root element into a JSON object named `person` for that child element:

```
json(xml('<?xml version="1.0"?> <root> <person id="1"> <name>Sophia Owen</name>
<occupation>Engineer</occupation> </person> </root>'))
```

And returns this result:

JSON

```
{
  "?xml": {
    "@version": "1.0"
  },
  "root": {
    "person": {
      "@id": "1",
      "name": "Sophia Owen",
      "occupation": "Engineer"
    }
  }
}
```

### Example 4

This example uses the `json()` and `xml()` functions to convert XML that has multiple child elements in the root element into an array named `person` that contains JSON

objects for those child elements:

```
json(xml('<?xml version="1.0"?> <root> <person id="1"> <name>Sophia Owen</name>  
<occupation>Engineer</occupation> </person> <person id="2"> <name>John Doe</name>  
<occupation>Engineer</occupation> </person> </root>'))
```

And returns this result:

```
JSON  
  
{  
  "?xml": {  
    "@version": "1.0"  
  },  
  "root": {  
    "person": [  
      {  
        "@id": "1",  
        "name": "Sophia Owen",  
        "occupation": "Engineer"  
      },  
      {  
        "@id": "2",  
        "name": "John Doe",  
        "occupation": "Engineer"  
      }  
    ]  
  }  
}
```

## intersection

Return a collection that has *only* the common items across the specified collections. To appear in the result, an item must appear in all the collections passed to this function. If one or more items have the same name, the last item with that name appears in the result.

```
intersection([<collection1>], [<collection2>], ...)  
intersection('<collection1>', '<collection2>', ...)
```

[Expand table](#)

Parameter	Required	Type	Description
<collection1>, <collection2>, ...	Yes	Array or Object, but not both	The collections from where you want <i>only</i> the common items

[Expand table](#)

Return value	Type	Description
<common-items>	Array or Object, respectively	A collection that has only the common items across the specified collections

### Example

This example finds the common items across these arrays:

```
intersection(createArray(1, 2, 3), createArray(101, 2, 1, 10),
createArray(6, 8, 1, 2))
```

And returns an array with *only* these items: `[1, 2]`

## join

Return a string that has all the items from an array and has each character separated by a *delimiter*.

```
join([<collection>], '<delimiter>')
```

[Expand table](#)

Parameter	Required	Type	Description
<collection>	Yes	Array	The array that has the items to join
<delimiter>	Yes	String	The separator that appears between each character in the resulting string



[Expand table](#)

Return value	Type	Description
<code>&lt;char1&gt;&lt;delimiter&gt;&lt;char2&gt;&lt;delimiter&gt;...</code>	String	The resulting string created from all the items in the specified array.
		<b>Note:</b> The length of the result must not exceed 104,857,600 characters.

### Example

This example creates a string from all the items in this array with the specified character as the delimiter:

```
join(createArray('a', 'b', 'c'), '.')
```

And returns this result: `"a.b.c"`

## L

### last

Return the last item from a collection.

```
last('<collection>')  
last([<collection>])
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;collection&gt;</code>	Yes	String or Array	The collection where to find the last item

[Expand table](#)

Return value	Type	Description
<code>&lt;last-collection-item&gt;</code>	String or Array, respectively	The last item in the collection

### Example

These examples find the last item in these collections:

```
last('abcd')
last(createArray(0, 1, 2, 3))
```

And returns these results:

- First example: `"d"`
- Second example: `3`

## lastIndexOf

Return the starting position or index value for the last occurrence of a substring. This function isn't case-sensitive, and indexes start with the number 0.

```
lastIndexOf('<text>', '<searchText>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;text&gt;</code>	Yes	String	The string that has the substring to find
<code>&lt;searchText&gt;</code>	Yes	String	The substring to find

[Expand table](#)

Return value	Type	Description
<code>&lt;ending-index-value&gt;</code>	Integer	The starting position or index value for the last occurrence of the specified substring.

If the string or substring value is empty, the following behavior occurs:

- If only the string value is empty, the function returns `-1`.
- If the string and substring values are both empty, the function returns `0`.
- If only the substring value is empty, the function returns the string length minus 1.

### Examples

This example finds the starting index value for the last occurrence of the substring `world` in the string `hello world hello world`. The returned result is `18`:

```
lastIndexOf('hello world hello world', 'world')
```

This example is missing the substring parameter, and returns a value of `22` because the value of the input string (`23`) minus 1 is greater than 0.

```
lastIndexOf('hello world hello world', '')
```

## length

Return the number of items in a collection.

```
length('<collection>')  
length([<collection>])
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;collection&gt;</code>	Yes	String or Array	The collection with the items to count

[Expand table](#)

Return value	Type	Description
<length-or-count>	Integer	The number of items in the collection

### Example

These examples count the number of items in these collections:

```
length('abcd')
length(createArray(0, 1, 2, 3))
```

And return this result: 4

## less

Check whether the first value is less than the second value. Return true when the first value is less, or return false when the first value is more.

```
less(<value>, <compareTo>)
less('<value>', '<compareTo>')
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	Integer, Float, or String	The first value to check whether less than the second value
<compareTo>	Yes	Integer, Float, or String, respectively	The comparison item

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when the first value is less than the second value. Return false when the first value is equal to or greater than the second value.

## Example

These examples check whether the first value is less than the second value.

```
less(5, 10)
less('banana', 'apple')
```

And return these results:

- First example: `true`
- Second example: `false`

## lessOrEquals

Check whether the first value is less than or equal to the second value. Return true when the first value is less than or equal, or return false when the first value is more.

```
lessOrEquals(<value>, <compareTo>)
lessOrEquals('<value>', '<compareTo>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;value&gt;</code>	Yes	Integer, Float, or String	The first value to check whether less than or equal to the second value
<code>&lt;compareTo&gt;</code>	Yes	Integer, Float, or String, respectively	The comparison item

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when the first value is less than or equal to the second value. Return false when the first value is greater than the second value.

## Example

These examples check whether the first value is less or equal than the second value.

```
lessOrEquals(10, 10)
lessOrEquals('apply', 'apple')
```

And return these results:

- First example: `true`
- Second example: `false`

## listCallbackUrl

Return the "callback URL" that calls a trigger or action. This function works only with triggers and actions for the **HttpWebhook** and **ApiConnectionWebhook** connector types, but not the **Manual**, **Recurrence**, **HTTP**, and **APIConnection** types.

```
listCallbackUrl()
```

[Expand table](#)

Return value	Type	Description
<code>&lt;callback-URL&gt;</code>	String	The callback URL for a trigger or action

### Example

This example shows a sample callback URL that this function might return:

```
"https://prod-01.westus.logic.azure.com:443/workflows/<*workflow-ID*>/triggers/manual/run?api-version=2016-10-01&sp=%2Ftriggers%2Fmanual%2Frun&sv=1.0&sig=<*signature-ID*>"
```

## M

### max

Return the highest value from a list or array with numbers that is inclusive at both ends.

---

```
max(<number1>, <number2>, ...)  
max([<number1>, <number2>, ...])
```

[Expand table](#)

Parameter	Required	Type	Description
<number1>, <number2>, ...	Yes	Integer, Float, or both	The set of numbers from which you want the highest value
[<number1>, <number2>, ...]	Yes	Array - Integer, Float, or both	The array of numbers from which you want the highest value

[Expand table](#)

Return value	Type	Description
<max-value>	Integer or Float	The highest value in the specified array or set of numbers

### Example

These examples get the highest value from the set of numbers and the array:

```
max(1, 2, 3)  
max(createArray(1, 2, 3))
```

And return this result: `3`

## min

Return the lowest value from a set of numbers or an array.

```
min(<number1>, <number2>, ...)  
min([<number1>, <number2>, ...])
```

[Expand table](#)

Parameter	Required	Type	Description
<number1>, <number2>, ...	Yes	Integer, Float, or both	The set of numbers from which you want the lowest value
[<number1>, <number2>, ...]	Yes	Array - Integer, Float, or both	The array of numbers from which you want the lowest value

[Expand table](#)

Return value	Type	Description
<min-value>	Integer or Float	The lowest value in the specified set of numbers or specified array

### Example

These examples get the lowest value in the set of numbers and the array:

```
min(1, 2, 3)
min(createArray(1, 2, 3))
```

And return this result: `1`

## mod

Return the remainder from dividing two numbers. To get the integer result, see [div\(\)](#).

```
mod(<dividend>, <divisor>)
```

[Expand table](#)

Parameter	Required	Type	Description
<dividend>	Yes	Integer or Float	The number to divide by the <i>divisor</i>
<divisor>	Yes	Integer or Float	The number that divides the <i>dividend</i> , but can't be zero



Parameter	Required	Type	Description

 Expand table

Return value	Type	Description
<code>&lt;modulo-result&gt;</code>	Integer or Float	The remainder from dividing the first number by the second number

### Example 1

This example divides the first number by the second number:

```
mod(3, 2)
```

And returns this result: `1`

### Example 2

This example shows that if one or both values are negative, the result matches the sign of the dividend:

```
mod(-5, 2)  
mod(4, -3)
```

The example returns these results:

- First example: `-1`
- Second example: `1`

## mul

Return the product from multiplying two numbers.

```
mul(<multiplicand1>, <multiplicand2>)
```

[Expand table](#)

Parameter	Required	Type	Description
< <i>multiplicand1</i> >	Yes	Integer or Float	The number to multiply by <i>multiplicand2</i>
< <i>multiplicand2</i> >	Yes	Integer or Float	The number that multiples <i>multiplicand1</i>

[Expand table](#)

Return value	Type	Description
< <i>product-result</i> >	Integer or Float	The product from multiplying the first number by the second number

### Example

These examples multiply the first number by the second number:

```
mul(1, 2)
mul(1.5, 2)
```

And return these results:

- First example: `2`
- Second example `3`

## multipartBody

Return the body for a specific part in an action's output that has multiple parts.

```
multipartBody('<actionName>', <index>)
```

[Expand table](#)

Parameter	Required	Type	Description
< <i>actionName</i> >	Yes	String	The name for the action that has output with multiple parts

Parameter	Required	Type	Description
<code>&lt;index&gt;</code>	Yes	Integer	The index value for the part that you want

[Expand table](#)

Return value	Type	Description
<code>&lt;body&gt;</code>	String	The body for the specified part

## N

### not

Check whether an expression is false. Return true when the expression is false, or return false when true.

<code>not(&lt;expression&gt;)</code>
--------------------------------------

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;expression&gt;</code>	Yes	Boolean	The expression to check

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when the expression is false. Return false when the expression is true.

#### Example 1

These examples check whether the specified expressions are false:

--

```
not(false)
not(true)
```

And return these results:

- First example: The expression is false, so the function returns `true`.
- Second example: The expression is true, so the function returns `false`.

### Example 2

These examples check whether the specified expressions are false:

```
not(equals(1, 2))
not(equals(1, 1))
```

And return these results:

- First example: The expression is false, so the function returns `true`.
- Second example: The expression is true, so the function returns `false`.

## nthIndexOf

Return the starting position or index value where the *n*th occurrence of a substring appears in a string.

```
nthIndexOf('<text>', '<searchText>', <occurrence>)
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;text&gt;</code>	Yes	String	The string that contains the substring to find
<code>&lt;searchText&gt;</code>	Yes	String	The substring to find
<code>&lt;occurrence&gt;</code>	Yes	Integer	A number that specifies the <i>n</i> th occurrence of the substring to find. If <i>occurrence</i> is negative, start searching from the end.

[Expand table](#)

Return value	Type	Description
<code>&lt;index-value&gt;</code>	Integer	The starting position or index value for the <i>n</i> th occurrence of the specified substring. If the substring isn't found or fewer than <i>n</i> occurrences of the substring exist, return <code>-1</code> .

### Examples

```
nthIndexOf('123456789123465789', '1', 1) // Returns `0`.  
nthIndexOf('123456789123465789', '1', 2) // Returns `9`.  
nthIndexOf('123456789123465789', '12', 2) // Returns `9`.  
nthIndexOf('123456789123465789', '6', 4) // Returns `-1`.
```

## O

### or

Check whether at least one expression is true. Return true when at least one expression is true, or return false when all are false.

```
or(<expression1>, <expression2>, ...)
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;expression1&gt;</code> , <code>&lt;expression2&gt;</code> , ...	Yes	Boolean	The expressions to check

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when at least one expression is true. Return false when all expressions are false.

Return value	Type	Description

### Example 1

These examples check whether at least one expression is true:

```
or(true, false)
or(false, false)
```

And return these results:

- First example: At least one expression is true, so the function returns `true`.
- Second example: Both expressions are false, so the function returns `false`.

### Example 2

These examples check whether at least one expression is true:

```
JSON
or(equals(1, 1), equals(1, 2))
or(equals(1, 2), equals(1, 3))
```

And return these results:

- First example: At least one expression is true, so the function returns `true`.
- Second example: Both expressions are false, so the function returns `false`.

## outputs

Return an action's outputs at runtime. Use this function, rather than `actionOutputs()`, which resolves to `outputs()` in the designer. Although both functions work the same way, `outputs()` is preferred.

```
outputs('<actionName>')
```

Parameter	Required	Type	Description
<actionName>	Yes	String	The name for the action's output that you want

[Expand table](#)

Return value	Type	Description
<output>	String	The output from the specified action

### Example

This example gets the output from the Twitter action `Get user`:

```
outputs('Get_user')
```

And returns this result:

JSON

```
{
  "statusCode": 200,
  "headers": {
    "Pragma": "no-cache",
    "Vary": "Accept-Encoding",
    "x-ms-request-id": "a916ec8f52211265d98159adde2efe0b",
    "X-Content-Type-Options": "nosniff",
    "Timing-Allow-Origin": "*",
    "Cache-Control": "no-cache",
    "Date": "Mon, 09 Apr 2018 18:47:12 GMT",
    "Set-Cookie":
"ARRAffinity=b9400932367ab5e3b6802e3d6158afffb12fcde8666715f5a5fbd4142d0f0b7
d;Path=/;HttpOnly;Domain=twitter-wus.azurewebsites.net",
    "X-AspNet-Version": "4.0.30319",
    "X-Powered-By": "ASP.NET",
    "Content-Type": "application/json; charset=utf-8",
    "Expires": "-1",
    "Content-Length": "339"
  },
  "body": {
    "FullName": "Contoso Corporation",
    "Location": "Generic Town, USA",
    "Id": 283541717,
    "UserName": "ContosoInc",
    "FollowersCount": 172,
    "Description": "Leading the way in transforming the digital workplace."
  }
}
```

```
"StatusesCount": 93,
"FriendsCount": 126,
"FavouritesCount": 46,
"ProfileImageUrl":
"https://pbs.twimg.com/profile_images/908820389907722240/gG9zaHcd_400x400.jpg"
}
}
```

## P

### parameters

Return the value for a parameter that is described in your workflow definition.

```
parameters('<parameterName>')
```

[Expand table](#)

Parameter	Required	Type	Description
<i>&lt;parameterName&gt;</i>	Yes	String	The name for the parameter whose value you want

[Expand table](#)

Return value	Type	Description
<i>&lt;parameter-value&gt;</i>	Any	The value for the specified parameter

#### Example

Suppose that you have this JSON value:

JSON

```
{
  "fullName": "Sophia Owen"
}
```

This example gets the value for the specified parameter:



```
parameters('fullName')
```

And returns this result: "Sophia Owen"

## parseDateTime

Return the timestamp from a string that contains a timestamp.

```
parseDateTime('<timestamp>', '<locale>?', '<format>?')
```

[Expand table](#)

Parameter	Required	Type	Description
<i>&lt;timestamp&gt;</i>	Yes	String	The string that contains the timestamp
<i>&lt;locale&gt;</i>	No	String	The locale to use.  If not specified, the default locale is <code>en-us</code> .  If <i>locale</i> isn't a valid value, an error is generated.
<i>&lt;format&gt;</i>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.fffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information. If the format isn't specified, attempt parsing with multiple formats that are compatible with the provided locale. If the format isn't a valid value, an error is generated.

[Expand table](#)

Return value	Type	Description
<i>&lt;parsed-timestamp&gt;</i>	String	The parsed timestamp in "o" (yyyy-MM-ddTHH:mm:ss.fffffffK) format, which complies with <a href="#">ISO 8601</a> and preserves time zone information.

### Examples

```
parseDateTime('20/10/2014', 'fr-fr') // Returns '2014-10-20T00:00:00.0000000'.
parseDateTime('20 octobre 2010', 'fr-FR') // Returns '2010-10-20T00:00:00.0000000'.
parseDateTime('martes 20 octubre 2020', 'es-es') // Returns '2020-10-20T00:00:00.0000000'.
parseDateTime('21052019', 'fr-fr', 'ddMMyyyy') // Returns '2019-05-21T00:00:00.0000000'.
parseDateTime('10/20/2014 15h', 'en-US', 'MM/dd/yyyy HH\h') // Returns '2014-10-20T15:00:00.0000000'.
```

## R

### rand

Return a random integer from a specified range, which is inclusive only at the starting end.

```
rand(<minValue>, <maxValue>)
```

[Expand table](#)

Parameter	Required	Type	Description
<minValue>	Yes	Integer	The lowest integer in the range
<maxValue>	Yes	Integer	The integer that follows the highest integer in the range that the function can return

[Expand table](#)

Return value	Type	Description
<random-result>	Integer	The random integer returned from the specified range

#### Example

This example gets a random integer from the specified range, excluding the maximum value:

```
rand(1, 5)
```

And returns one of these numbers as the result: 1, 2, 3, or 4

## range

Return an integer array that starts from a specified integer.

```
range(<startIndex>, <count>)
```

[Expand table](#)

Parameter	Required	Type	Description
<startIndex>	Yes	Integer	An integer value that starts the array as the first item
<count>	Yes	Integer	The number of integers in the array. The <code>count</code> parameter value must be a positive integer that doesn't exceed 100,000.

**Note:** The sum of the `startIndex` and `count` values must not exceed 2,147,483,647.

[Expand table](#)

Return value	Type	Description
[<range-result>]	Array	The array with integers starting from the specified index

### Example

This example creates an integer array that starts from the specified index and has the specified number of integers:

```
range(1, 4)
```

And returns this result: [1, 2, 3, 4]

## removeProperty

Remove a property from an object and return the updated object. If the property that you try to remove doesn't exist, the function returns the original object.

```
removeProperty(<object>, '<property>')
```

[Expand table](#)

Parameter	Required	Type	Description
<i>&lt;object&gt;</i>	Yes	Object	The JSON object from where you want to remove a property
<i>&lt;property&gt;</i>	Yes	String	The name for the property to remove

[Expand table](#)

Return value	Type	Description
<i>&lt;updated-object&gt;</i>	Object	The updated JSON object without the specified property

To remove a child property from an existing property, use this syntax:

```
removeProperty(<object>['<parent-property>'], '<child-property>')
```

[Expand table](#)

Parameter	Required	Type	Description
<i>&lt;object&gt;</i>	Yes	Object	The JSON object whose property you want to remove
<i>&lt;parent-property&gt;</i>	Yes	String	The name for parent property with the child property that you want to remove
<i>&lt;child-property&gt;</i>	Yes	String	The name for the child property to remove

Return value	Type	Description
<updated-object>	Object	The updated JSON object whose child property that you removed

### Example 1

This example removes the `middleName` property from a JSON object, which is converted from a string to JSON by using the `JSON()` function, and returns the updated object:

```
removeProperty(json('{ "firstName": "Sophia", "middleName": "Anne",  
"surName": "Owen" }'), 'middleName')
```

Here's the current JSON object:

JSON

```
{  
  "firstName": "Sophia",  
  "middleName": "Anne",  
  "surName": "Owen"  
}
```

Here's the updated JSON object:

JSON

```
{  
  "firstName": "Sophia",  
  "surName": "Owen"  
}
```

### Example 2

This example removes the `middleName` child property from a `customerName` parent property in a JSON object, which is converted from a string to JSON by using the `JSON()` function, and returns the updated object:

```
removeProperty(json('{ "customerName": { "firstName": "Sophia",  
"middleName": "Anne", "surName": "Owen" } }')['customerName'], 'middleName')
```

Here's the current JSON object:

```
JSON

{
  "customerName": {
    "firstName": "Sophia",
    "middleName": "Anne",
    "surName": "Owen"
  }
}
```

Here's the updated JSON object:

```
JSON

{
  "customerName": {
    "firstName": "Sophia",
    "surName": "Owen"
  }
}
```

## replace

Replace a substring with the specified string, and return the result string. This function is case-sensitive.

```
replace('<text>', '<oldText>', '<newText>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;text&gt;</code>	Yes	String	The string that has the substring to replace
<code>&lt;oldText&gt;</code>	Yes	String	The substring to replace
<code>&lt;newText&gt;</code>	Yes	String	The replacement string

[Expand table](#)

Return value	Type	Description
<updated-text>	String	The updated string after replacing the substring  If the substring isn't found, return the original string.

### Example

This example finds the "old" substring in "the old string" and replaces "old" with "new":

```
replace('the old string', 'old', 'new')
```

And returns this result: "the new string"

## result

Return the results from the top-level actions in the specified scoped action, such as a `For_each`, `Until`, or `Scope` action. The `result()` function accepts a single parameter, which is the scope's name, and returns an array that contains information from the first-level actions in that scope. These action objects include the same attributes as the attributes returned by the `actions()` function, such as the action's start time, end time, status, inputs, correlation IDs, and outputs.

### ⓘ Note

This function returns information *only* from the first-level actions in the scoped action and not from deeper nested actions such as switch or condition actions.

For example, you can use this function to get the results from failed actions so that you can diagnose and handle exceptions. For more information, see [Get context and results for failures](#).

```
result('<scopedActionName>')
```

 Expand table

Parameter	Required	Type	Description
<scopedActionName>	Yes	String	The name of the scoped action where you want the inputs and outputs from the top-level actions inside that scope

[Expand table](#)

Return value	Type	Description
<array-object>	Array object	An array that contains arrays of inputs and outputs from each top-level action inside the specified scope

### Example

This example returns the inputs and outputs from each iteration of an HTTP action inside that's in a `For_each` loop by using the `result()` function in the `Compose` action:

JSON

```
{
  "actions": {
    "Compose": {
      "inputs": "@result('For_each')",
      "runAfter": {
        "For_each": [
          "Succeeded"
        ]
      },
      "type": "compose"
    },
    "For_each": {
      "actions": {
        "HTTP": {
          "inputs": {
            "method": "GET",
            "uri": "https://httpstat.us/200"
          },
          "runAfter": {},
          "type": "Http"
        }
      },
      "foreach": "@triggerBody()",
      "runAfter": {},
      "type": "Foreach"
    }
  }
}
```



```
}  
}
```

Here's how the example returned array might look where the outer `outputs` object contains the inputs and outputs from each iteration of the actions inside the `For_each` action.

JSON

```
[  
  {  
    "name": "HTTP",  
    "outputs": [  
      {  
        "name": "HTTP",  
        "inputs": {  
          "uri": "https://httpstat.us/200",  
          "method": "GET"  
        },  
        "outputs": {  
          "statusCode": 200,  
          "headers": {  
            "X-AspNetMvc-Version": "5.1",  
            "Access-Control-Allow-Origin": "*",  
            "Cache-Control": "private",  
            "Date": "Tue, 20 Aug 2019 22:15:37 GMT",  
            "Set-Cookie": "ARRAffinity=0285cfbea9f2ee7",  
            "Server": "Microsoft-IIS/10.0",  
            "X-AspNet-Version": "4.0.30319",  
            "X-Powered-By": "ASP.NET",  
            "Content-Length": "0"  
          },  
          "startTime": "2019-08-20T22:15:37.6919631Z",  
          "endTime": "2019-08-20T22:15:37.95762Z",  
          "trackingId": "6bad3015-0444-4ccd-a971-cbb0c99a7.....",  
          "clientTrackingId": "085863526764.....",  
          "code": "OK",  
          "status": "Succeeded"  
        }  
      },  
      {  
        "name": "HTTP",  
        "inputs": {  
          "uri": "https://httpstat.us/200",  
          "method": "GET"  
        },  
        "outputs": {  
          "statusCode": 200,  
          "headers": {  
            "X-AspNetMvc-Version": "5.1",  
            "Access-Control-Allow-Origin": "*",  
            "Cache-Control": "private",
```

```

        "Date": "Tue, 20 Aug 2019 22:15:37 GMT",
        "Set-Cookie": "ARRAffinity=0285cfbea9f2ee7",
        "Server": "Microsoft-IIS/10.0",
        "X-AspNet-Version": "4.0.30319",
        "X-Powered-By": "ASP.NET",
        "Content-Length": "0"
    },
    "startTime": "2019-08-20T22:15:37.6919631Z",
    "endTime": "2019-08-20T22:15:37.95762Z",
    "trackingId": "9987e889-981b-41c5-aa27-f3e0e59bf69.....",
    "clientTrackingId": "085863526764.....",
    "code": "OK",
    "status": "Succeeded"
}
}
]
}
]

```

## reverse

Reverse the order of items in a collection. When you use this function with `sort()`, you can sort a collection in descending order.

```
reverse([<collection>])
```

[Expand table](#)

Parameter	Required	Type	Description
<collection>	Yes	Array	The collection to reverse

[Expand table](#)

Return value	Type	Description
[<updated-collection>]	Array	The reversed collection

### Example

This example reverses an array of integers:

```
reverse(createArray(0, 1, 2, 3))
```

And returns this array: `[3,2,1,0]`

## S

### setProperty

Set the value for JSON object's property and return the updated object. If the property that you try to set doesn't exist, the property gets added to the object. To add a new property, use the [addProperty\(\)](#) function.

```
setProperty(<object>, '<property>', <value>)
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;object&gt;</code>	Yes	Object	The JSON object whose property you want to set
<code>&lt;property&gt;</code>	Yes	String	The name for the existing or new property to set
<code>&lt;value&gt;</code>	Yes	Any	The value to set for the specified property

To set the child property in a child object, use a nested `setProperty()` call instead. Otherwise, the function returns only the child object as output.

```
setProperty(<object>, '<parent-property>', setProperty(<object>  
['parentProperty'], '<child-property>', <value>))
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;object&gt;</code>	Yes	Object	The JSON object whose property you want to set
<code>&lt;parent-property&gt;</code>	Yes	String	The name for parent property with the child property that you want to set

Parameter	Required	Type	Description
<child-property>	Yes	String	The name for the child property to set
<value>	Yes	Any	The value to set for the specified property

[Expand table](#)

Return value	Type	Description
<updated-object>	Object	The updated JSON object whose property you set

### Example 1

This example sets the `surName` property in a JSON object, which is converted from a string to JSON by using the `JSON()` function. The function assigns the specified value to the property and returns the updated object:

```
setProperty(json('{ "firstName": "Sophia", "surName": "Owen" }'), 'surName', 'Hartnett')
```

Here's the current JSON object:

JSON

```
{
  "firstName": "Sophia",
  "surName": "Owen"
}
```

Here's the updated JSON object:

JSON

```
{
  "firstName": "Sophia",
  "surName": "Hartnett"
}
```

### Example 2

This example sets the `surName` child property for the `customerName` parent property in a JSON object, which is converted from a string to JSON by using the `JSON()` function. The function assigns the specified value to the property and returns the updated object:

```
setProperty(json('{ "customerName": { "firstName": "Sophia", "surName":  
"Owen" } }'), 'customerName', setProperty(json('{ "customerName": {  
"firstName": "Sophia", "surName": "Owen" } }')['customerName'], 'surName',  
'Hartnett'))
```

Here's the current JSON object:

JSON

```
{  
  "customerName": {  
    "firstName": "Sophie",  
    "surName": "Owen"  
  }  
}
```

Here's the updated JSON object:

JSON

```
{  
  "customerName": {  
    "firstName": "Sophie",  
    "surName": "Hartnett"  
  }  
}
```

## skip

Remove items from the front of a collection, and return *all the other* items.

```
skip([<collection>], <count>)
```

 Expand table

Parameter	Required	Type	Description
<collection>	Yes	Array	The collection whose items you want to remove
<count>	Yes	Integer	A positive integer for the number of items to remove at the front

[Expand table](#)

Return value	Type	Description
[<updated-collection>]	Array	The updated collection after removing the specified items

### Example

This example removes one item, the number 0, from the front of the specified array:

```
skip(createArray(0, 1, 2, 3), 1)
```

And returns this array with the remaining items: `[1,2,3]`

## slice

Return a substring by specifying the starting and ending position or value. See also [substring\(\)](#).

```
slice('<text>', <startIndex>, <endIndex>?)
```

[Expand table](#)

Parameter	Required	Type	Description
<text>	Yes	String	The string that contains the substring to find
<startIndex>	Yes	Integer	The zero-based starting position or value for where to begin searching for the substring  - If <i>startIndex</i> is greater than the string length, return an empty string.

Parameter	Required	Type	Description
			- If <i>startIndex</i> is negative, start searching at the index value that's the sum of the string length and <i>startIndex</i> .
<endIndex>	No	Integer	<p>The zero-based ending position or value for where to end searching for the substring. The character located at the ending index value isn't included in the search.</p> <p>- If <i>endIndex</i> isn't specified or greater than the string length, search up to the end of the string.</p> <p>- If <i>endIndex</i> is negative, end searching at the index value that the sum of the string length and <i>endIndex</i>.</p>

[Expand table](#)

Return value	Type	Description
<slice-result>	String	A new string that contains the found substring

### Examples

```
slice('Hello World', 2) // Returns 'llo World'.
slice('Hello World', 30) // Returns ''.
slice('Hello World', 10, 2) // Returns ''.
slice('Hello World', 0) // Returns 'Hello World'.
slice('Hello World', 2, 5) // Returns 'llo'.
slice('Hello World', 6, 20) // Returns 'World'.
slice('Hello World', -2) // Returns 'ld'.
slice('Hello World', 3, -1) // Returns 'lo Worl'.
slice('Hello World', 3, 3) // Returns ''.
```

## sort

Sort items in a collection. You can sort the collection objects using any key that contains a simple type.

```
sort([<collection>], <sortBy?>)
```

[Expand table](#)

Parameter	Required	Type	Description
<collection>	Yes	Array	The collection with the items to sort
<sortBy>	No	String	The key to use for sorting the collection objects

[Expand table](#)

Return value	Type	Description
[<updated-collection>]	Array	The sorted collection

### Example 1

This example sorts an array of integers:

```
sort(createArray(2, 1, 0, 3))
```

And returns this array: `[0,1,2,3]`

### Example 2

This example sorts an array of objects by key:

```
sort(createArray(json('{ "first": "Amalie", "last": "Rose" }'), json('{  
"first": "Elise", "last": "Renee" }')), 'last')
```

And returns this array: `[{ "first": "Elise", "last": "Renee" }, {"first": "Amalie",  
"last": "Rose" }]`

## split

Return an array that contains substrings, separated by commas, based on the specified delimiter character in the original string.



```
split('<text>', '<delimiter>')
```

[Expand table](#)

Parameter	Required	Type	Description
<text>	Yes	String	The string to separate into substrings based on the specified delimiter in the original string
<delimiter>	Yes	String	The character in the original string to use as the delimiter

[Expand table](#)

Return value	Type	Description
[<substring1>, <substring2>,...]	Array	An array that contains substrings from the original string, separated by commas

### Example 1

This example creates an array with substrings from the specified string based on the specified character as the delimiter:

```
split('a_b_c', '_')
```

And returns this array as the result: ["a", "b", "c"]

### Example 2

This example creates an array with a single element when no delimiter exists in the string:

```
split('a_b_c', '')
```

And returns this array as the result: ["a\_b\_c"]

## startOfDay

Return the start of the day for a timestamp.

```
startOfDay(<timestamp>, '<format>'?)
```

 Expand table

Parameter	Required	Type	Description
<timestamp>	Yes	String	The string that contains the timestamp
<format>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<updated-timestamp>	String	The specified timestamp but starting at the zero-hour mark for the day

### Example

This example finds the start of the day for this timestamp:


```
startOfDay('2018-03-15T13:30:30Z')
```

And returns this result: "2018-03-15T00:00:00.000000Z"

## startOfHour

Return the start of the hour for a timestamp.

```
startOfHour('<timestamp>', '<format>?')
```

 Expand table

Parameter	Required	Type	Description
<code>&lt;timestamp&gt;</code>	Yes	String	The string that contains the timestamp
<code>&lt;format&gt;</code>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<code>&lt;updated-timestamp&gt;</code>	String	The specified timestamp but starting at the zero-minute mark for the hour

### Example

This example finds the start of the hour for this timestamp:


```
startOfHour('2018-03-15T13:30:30Z')
```

And returns this result: `"2018-03-15T13:00:00.000000Z"`

## startOfMonth

Return the start of the month for a timestamp.

```
startOfMonth('<timestamp>', '<format>?')
```

 Expand table

Parameter	Required	Type	Description
<timestamp>	Yes	String	The string that contains the timestamp
<format>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<updated-timestamp>	String	The specified timestamp but starting on the first day of the month at the zero-hour mark

### Example 1

This example returns the start of the month for this timestamp:

```
startOfMonth('2018-03-15T13:30:30Z')
```

And returns this result: "2018-03-01T00:00:00.000000Z"

### Example 2

This example returns the start of the month in the specified format for this timestamp:

```
startOfMonth('2018-03-15T13:30:30Z', 'yyyy-MM-dd')
```

And returns this result: "2018-03-01"

## startsWith

Check whether a string starts with a specific substring. Return true when the substring is found, or return false when not found. This function isn't case-sensitive.

```
startsWith('<text>', '<searchText>')
```

[Expand table](#)

Parameter	Required	Type	Description
<text>	Yes	String	The string to check
<searchText>	Yes	String	The starting string to find

[Expand table](#)

Return value	Type	Description
true or false	Boolean	Return true when the starting substring is found. Return false when not found.

### Example 1

This example checks whether the "hello world" string starts with the "hello" substring:

```
startsWith('hello world', 'hello')
```

And returns this result: `true`

### Example 2

This example checks whether the "hello world" string starts with the "greetings" substring:

```
startsWith('hello world', 'greetings')
```

And returns this result: `false`

# string

Return the string version for a value.

```
string(<value>)
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	Any	The value to convert. If this value is null or evaluates to null, the value is converted to an empty string ("" ) value.  For example, if you assign a string variable to a non-existent property, which you can access with the ? operator, the null value is converted to an empty string. However, comparing a null value isn't the same as comparing an empty string.

[Expand table](#)

Return value	Type	Description
<string-value>	String	The string version for the specified value. If the <i>value</i> parameter is null or evaluates to null, this value is returned as an empty string ("" ) value.

## Example 1

This example creates the string version for this number:

```
string(10)
```

And returns this result: "10"

## Example 2

This example creates a string for the specified JSON object and uses the backslash character (\) as an escape character for the double-quotation mark (").

```
string( { "name": "Sophie Owen" } )
```

And returns this result: `"{ \"name\": \"Sophie Owen\" }"`

## sub

Return the result from subtracting the second number from the first number.

```
sub(<minuend>, <subtrahend>)
```

[Expand table](#)

Parameter	Required	Type	Description
<minuend>	Yes	Integer or Float	The number from which to subtract the <i>subtrahend</i>
<subtrahend>	Yes	Integer or Float	The number to subtract from the <i>minuend</i>

[Expand table](#)

Return value	Type	Description
<result>	Integer or Float	The result from subtracting the second number from the first number

### Example

This example subtracts the second number from the first number:

```
sub(10.3, .3)
```

And returns this result: `10`

## substring

Return characters from a string, starting from the specified position, or index. Index values start with the number 0. See also [slice\(\)](#).

```
substring('<text>', <startIndex>, <length>)
```

 Expand table

Parameter	Required	Type	Description
<text>	Yes	String	The string whose characters you want
<startIndex>	Yes	Integer	A positive number equal to or greater than 0 that you want to use as the starting position or index value
<length>	No	Integer	A positive number of characters that you want in the substring

#### Note

Make sure that the sum from adding the *startIndex* and *length* parameter values is less than the length of the string that you provide for the *text* parameter. Otherwise, you get an error, unlike similar functions in other languages where the result is the substring from the *startIndex* to the end of the string. The *length* parameter is optional and if not provided, the **substring()** function takes all the characters beginning from *startIndex* to the end of the string.

 Expand table

Return value	Type	Description
<substring-result>	String	A substring with the specified number of characters, starting at the specified index position in the source string

#### Example

This example creates a five-character substring from the specified string, starting from the index value 6:



```
substring('hello world', 6, 5)
```

And returns this result: `"world"`

## subtractFromTime

Subtract a number of time units from a timestamp. See also [getPastTime](#).

```
subtractFromTime('<timestamp>', <interval>, '<timeUnit>', '<format>?')
```

 Expand table

Parameter	Required	Type	Description
<i>&lt;timestamp&gt;</i>	Yes	String	The string that contains the timestamp
<i>&lt;interval&gt;</i>	Yes	Integer	The number of specified time units to subtract
<i>&lt;timeUnit&gt;</i>	Yes	String	The unit of time to use with <i>interval</i> : "Second", "Minute", "Hour", "Day", "Week", "Month", "Year"
<i>&lt;format&gt;</i>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.ffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.  If the format isn't a valid value, an error is generated.

 Expand table

Return value	Type	Description
<i>&lt;updated-timestamp&gt;</i>	String	The timestamp minus the specified number of time units

### Example 1

This example subtracts one day from this timestamp:

```
subtractFromTime('2018-01-02T00:00:00Z', 1, 'Day')
```

And returns this result: "2018-01-01T00:00:00.0000000Z"

### Example 2

This example subtracts one day from this timestamp:

```
subtractFromTime('2018-01-02T00:00:00Z', 1, 'Day', 'D')
```

And returns this result using the optional "D" format: "Monday, January, 1, 2018"

## T

### take

Return items from the front of a collection.

```
take('<collection>', <count>)  
take([<collection>], <count>)
```

[Expand table](#)

Parameter	Required	Type	Description
<i>&lt;collection&gt;</i>	Yes	String or Array	The collection whose items you want
<i>&lt;count&gt;</i>	Yes	Integer	A positive integer for the number of items that you want from the front

[Expand table](#)

Return value	Type	Description
<i>&lt;subset&gt;</i> or [ <i>&lt;subset&gt;</i> ]	String or Array, respectively	A string or array that has the specified number of items taken from the front of the original collection

## Example

These examples get the specified number of items from the front of these collections:

```
take('abcde', 3)
take(createArray(0, 1, 2, 3, 4), 3)
```

And return these results:

- First example: "abc"
- Second example: [0, 1, 2]

## ticks

Returns the number of ticks, which are 100-nanosecond intervals, since January 1, 0001 12:00:00 midnight (or `DateTime.Ticks` in C#) up to the specified timestamp. For more information, see this topic: [DateTime.Ticks Property \(System\)](#).

```
ticks('<timestamp>')
```

 Expand table

Parameter	Required	Type	Description
<i>&lt;timestamp&gt;</i>	Yes	String	The string for a timestamp

 Expand table

Return value	Type	Description
<i>&lt;ticks-number&gt;</i>	Integer	The number of ticks since the specified timestamp

## toLowerCase

Return a string in lowercase format. If a character in the string doesn't have a lowercase version, that character stays unchanged in the returned string.

```
toLowerCase('<text>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;text&gt;</code>	Yes	String	The string to return in lowercase format

[Expand table](#)

Return value	Type	Description
<code>&lt;lowercase-text&gt;</code>	String	The original string in lowercase format

### Example

This example converts this string to lowercase:

```
toLowerCase('Hello World')
```

And returns this result: `"hello world"`

## toUpperCase

Return a string in uppercase format. If a character in the string doesn't have an uppercase version, that character stays unchanged in the returned string.

```
toUpperCase('<text>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;text&gt;</code>	Yes	String	The string to return in uppercase format

 Expand table

Return value	Type	Description
<code>&lt;uppercase-text&gt;</code>	String	The original string in uppercase format

### Example

This example converts this string to uppercase:

```
toUpper('Hello World')
```

And returns this result: `"HELLO WORLD"`

## trigger

Return a trigger's output at runtime, or values from other JSON name-and-value pairs, which you can assign to an expression.

- Inside a trigger's inputs, this function returns the output from the previous execution.
- Inside a trigger's condition, this function returns the output from the current execution.

By default, the function references the entire trigger object, but you can optionally specify a property whose value that you want. Also, this function has shorthand versions available, see [triggerOutputs\(\)](#) and [triggerBody\(\)](#).

```
trigger()
```

 Expand table

Return value	Type	Description
<code>&lt;trigger-output&gt;</code>	String	The output from a trigger at runtime

## triggerBody

Return a trigger's `body` output at runtime. Shorthand for `trigger().outputs.body`. See [trigger\(\)](#).

```
triggerBody()
```

[Expand table](#)

Return value	Type	Description
<code>&lt;trigger-body-output&gt;</code>	String	The <code>body</code> output from the trigger

## triggerFormDataMultiValues

Return an array with values that match a key name in a trigger's *form-data* or *form-encoded* output.

```
triggerFormDataMultiValues('<key>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;key&gt;</code>	Yes	String	The name for the key whose value you want

[Expand table](#)

Return value	Type	Description
<code>[&lt;array-with-key-values&gt;]</code>	Array	An array with all the values that match the specified key

### Example

This example creates an array from the "feedUrl" key value in an RSS trigger's form-data or form-encoded output:



```
triggerFormDataMultiValues('feedUrl')
```

And returns this array as an example result:

```
["https://feeds.a.dj.com/rss/RSSMarketsMain.xml"]
```

## triggerFormDataValue

Return a string with a single value that matches a key name in a trigger's *form-data* or *form-encoded* output. If the function finds more than one match, the function throws an error.

```
triggerFormDataValue('<key>')
```

[Expand table](#)

Parameter	Required	Type	Description
<key>	Yes	String	The name for the key whose value you want

[Expand table](#)

Return value	Type	Description
<key-value>	String	The value in the specified key

### Example

This example creates a string from the "feedUrl" key value in an RSS trigger's form-data or form-encoded output:

```
triggerFormDataValue('feedUrl')
```

And returns this string as an example result:

```
"https://feeds.a.dj.com/rss/RSSMarketsMain.xml"
```

## triggerMultipartBody

Return the body for a specific part in a trigger's output that has multiple parts.

```
triggerMultipartBody(<index>)
```

 Expand table

Parameter	Required	Type	Description
<i>&lt;index&gt;</i>	Yes	Integer	The index value for the part that you want

 Expand table

Return value	Type	Description
<i>&lt;body&gt;</i>	String	The body for the specified part in a trigger's multipart output

## triggerOutputs

Return a trigger's output at runtime, or values from other JSON name-and-value pairs. Shorthand for `trigger().outputs`. See [trigger\(\)](#).

```
triggerOutputs()
```

 Expand table

Return value	Type	Description
<i>&lt;trigger-output&gt;</i>	String	The output from a trigger at runtime

## trim

Remove leading and trailing whitespace from a string, and return the updated string.

```
trim('<text>')
```



[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;text&gt;</code>	Yes	String	The string that has the leading and trailing whitespace to remove

[Expand table](#)

Return value	Type	Description
<code>&lt;updatedText&gt;</code>	String	An updated version for the original string without leading or trailing whitespace

### Example

This example removes the leading and trailing whitespace from the string " Hello World ":

```
trim(' Hello World ')
```

And returns this result: `"Hello World"`

## U

### union

Return a collection that has *all* the items from the specified collections. To appear in the result, an item can appear in any collection passed to this function. If one or more items have the same name, the last item with that name appears in the result.

```
union('<collection1>', '<collection2>', ...)  
union([<collection1>], [<collection2>], ...)
```

[Expand table](#)

Parameter	Required	Type	Description
<collection1>, <collection2>, ...	Yes	Array or Object, but not both	The collections from where you want <i>all</i> the items

[Expand table](#)

Return value	Type	Description
<updatedCollection>	Array or Object, respectively	A collection with all the items from the specified collections - no duplicates

### Example

This example gets *all* the items from these collections:

```
union(createArray(1, 2, 3), createArray(1, 2, 10, 101))
```

And returns this result: `[1, 2, 3, 10, 101]`

## uriComponent

Return a uniform resource identifier (URI) encoded version for a string by replacing URL-unsafe characters with escape characters. Use this function rather than [encodeURIComponent\(\)](#). Although both functions work the same way, `uriComponent()` is preferred.

```
uriComponent('<value>')
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	String	The string to convert to URI-encoded format

[Expand table](#)

Return value	Type	Description
<encoded-uri>	String	The URI-encoded string with escape characters

### Example

This example creates a URI-encoded version for this string:

```
uriComponent('https://contoso.com')
```

And returns this result: "https%3A%2F%2Fcontoso.com"

## uriComponentToBinary

Return the binary version for a uniform resource identifier (URI) component.

```
uriComponentToBinary('<value>')
```

[Expand table](#)

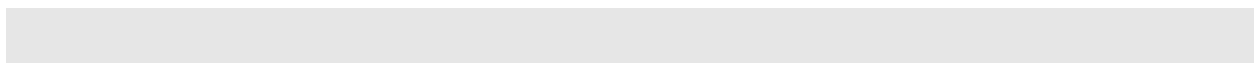
Parameter	Required	Type	Description
<value>	Yes	String	The URI-encoded string to convert

[Expand table](#)

Return value	Type	Description
<binary-for-encoded-uri>	String	The binary version for the URI-encoded string. The binary content is base64-encoded and represented by <code>\$content</code> .

### Example

This example creates the binary version for this URI-encoded string:



```
uriComponentToBinary('https%3A%2F%2Fcontoso.com')
```

And returns this result:

```
"00100010011010000111101000111010001111000000100101001100  
11010000010010010100110010010001100010010100110010010001  
10011000110110111101101110011101000110111101110011011011  
110010111001100011011011110110110110100100010"
```

## uriComponentToString

Return the string version for a uniform resource identifier (URI) encoded string, effectively decoding the URI-encoded string.

```
uriComponentToString('<value>')
```

[Expand table](#)

Parameter	Required	Type	Description
<value>	Yes	String	The URI-encoded string to decode

[Expand table](#)

Return value	Type	Description
<decoded-uri>	String	The decoded version for the URI-encoded string

### Example

This example creates the decoded string version for this URI-encoded string:

```
uriComponentToString('https%3A%2F%2Fcontoso.com')
```

And returns this result: "https://contoso.com"

# uriHost

Return the `host` value for a uniform resource identifier (URI).

```
uriHost('<uri>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;uri&gt;</code>	Yes	String	The URI whose <code>host</code> value you want

[Expand table](#)

Return value	Type	Description
<code>&lt;host-value&gt;</code>	String	The <code>host</code> value for the specified URI

## Example

This example finds the `host` value for this URI:

```
uriHost('https://www.localhost.com:8080')
```

And returns this result: `"www.localhost.com"`

# uriPath

Return the `path` value for a uniform resource identifier (URI).

```
uriPath('<uri>')
```

[Expand table](#)

Parameter	Required	Type	Description
<uri>	Yes	String	The URI whose <code>path</code> value you want

[Expand table](#)

Return value	Type	Description
<path-value>	String	The <code>path</code> value for the specified URI. If <code>path</code> doesn't have a value, return the "/" character.

### Example

This example finds the `path` value for this URI:

```
uriPath('https://www.contoso.com/catalog/shownew.htm?date=today')
```

And returns this result: `"/catalog/shownew.htm"`

## uriPathAndQuery

Return the `path` and `query` values for a uniform resource identifier (URI).

```
uriPathAndQuery('<uri>')
```

[Expand table](#)

Parameter	Required	Type	Description
<uri>	Yes	String	The URI whose <code>path</code> and <code>query</code> values you want

[Expand table](#)

Return value	Type	Description
<path-query-value>	String	The <code>path</code> and <code>query</code> values for the specified URI. If <code>path</code> doesn't specify a value, return the "/" character.

### Example

This example finds the `path` and `query` values for this URI:

```
uriPathAndQuery('https://www.contoso.com/catalog/shownew.htm?date=today')
```

And returns this result: `"/catalog/shownew.htm?date=today"`

## uriPort

Return the `port` value for a uniform resource identifier (URI).

```
uriPort('<uri>')
```

[Expand table](#)

Parameter	Required	Type	Description
<uri>	Yes	String	The URI whose <code>port</code> value you want

[Expand table](#)

Return value	Type	Description
<port-value>	Integer	The <code>port</code> value for the specified URI. If <code>port</code> doesn't specify a value, return the default port for the protocol.

### Example

This example returns the `port` value for this URI:

```
uriPort('https://www.localhost:8080')
```

And returns this result: 8080

## uriQuery

Return the `query` value for a uniform resource identifier (URI).

```
uriQuery('<uri>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;uri&gt;</code>	Yes	String	The URI whose <code>query</code> value you want

[Expand table](#)

Return value	Type	Description
<code>&lt;query-value&gt;</code>	String	The <code>query</code> value for the specified URI

### Example

This example returns the `query` value for this URI:

```
uriQuery('https://www.contoso.com/catalog/shownew.htm?date=today')
```

And returns this result: `"?date=today"`

## uriScheme

Return the `scheme` value for a uniform resource identifier (URI).



```
uriScheme('<uri>')
```

[Expand table](#)

Parameter	Required	Type	Description
<uri>	Yes	String	The URI whose <code>scheme</code> value you want

[Expand table](#)

Return value	Type	Description
<scheme-value>	String	The <code>scheme</code> value for the specified URI

### Example

This example returns the `scheme` value for this URI:

```
uriScheme('https://www.contoso.com/catalog/shownew.htm?date=today')
```

And returns this result: `"http"`

## utcNow

Return the current timestamp.

```
utcNow('<format>')
```

Optionally, you can specify a different format with the `<format>` parameter.

[Expand table](#)

Parameter	Required	Type	Description
<format>	No	String	A numeric format string that is either a <a href="#">single format specifier</a> or a <a href="#">custom format pattern</a> . The default format for the timestamp is "o" (yyyy-MM-ddTHH:mm:ss.fffffffK), which complies with <a href="#">ISO 8601</a> and preserves time zone information.

Parameter	Required	Type	Description
			If the format isn't a valid value, an error is generated.

[Expand table](#)

Return value	Type	Description
<current-timestamp>	String	The current date and time

### Example 1

Suppose today is April 15, 2018 at 1:00:00 PM. This example gets the current timestamp:

```
utcNow()
```

And returns this result: "2018-04-15T13:00:00.0000000Z"

### Example 2

Suppose today is April 15, 2018 at 1:00:00 PM. This example gets the current timestamp using the optional "D" format:

```
utcNow('D')
```

And returns this result: "Sunday, April 15, 2018"

## V

### variables

Return the value for a specified variable.

```
variables('<variableName>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;variableName&gt;</code>	Yes	String	The name for the variable whose value you want

[Expand table](#)

Return value	Type	Description
<code>&lt;variable-value&gt;</code>	Any	The value for the specified variable

### Example

Suppose the current value for a "numItems" variable is 20. This example gets the integer value for this variable:

```
variables('numItems')
```

And returns this result: `20`

## W

### workflow

Return all the details about the workflow itself during run time.

```
workflow().<property>
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;property&gt;</code>	No	String	The name for the workflow property whose value you want

By default, a workflow object has these properties: `name`, `type`,

Parameter	Required	Type	Description
			<p><code>id</code>, <code>location</code>, <code>run</code>, and <code>tags</code>.</p> <ul style="list-style-type: none"> <li>- The <code>run</code> property value is a JSON object that includes these properties: <code>name</code>, <code>type</code>, and <code>id</code>.</li> <li>- The <code>tags</code> property is a JSON object that includes <a href="#">tags that are associated with your logic app in Azure Logic Apps or flow in Power Automate</a> and the values for those tags. For more information about tags in Azure resources, review <a href="#">Tag resources, resource groups, and subscriptions for logical organization in Azure</a>.</li> </ul> <p><b>Note:</b> By default, a logic app has no tags, but a Power Automate flow has the <code>flowDisplayName</code> and <code>environmentName</code> tags.</p>

### Example 1

This example returns the name for a workflow's current run:

```
workflow().run.name
```

### Example 2

If you use Power Automate, you can create a `@workflow()` expression that uses the `tags` output property to get the values from your flow's `flowDisplayName` or `environmentName` property.

For example, you can send custom email notifications from the flow itself that link back to your flow. These notifications can include an HTML link that contains the flow's display name in the email title and follows this syntax:

```
<a href=https://flow.microsoft.com/manage/environments/@{workflow()}['tags']
['environmentName']/flows/@{workflow()}['name']/details>Open flow @{workflow()}
['tags']['flowDisplayName']</a>
```

# xml

Return the XML version for a string that contains a JSON object.

```
xml('<value>')
```

[Expand table](#)

Parameter	Required	Type	Description
<code>&lt;value&gt;</code>	Yes	String	The string with the JSON object to convert  The JSON object must have only one root property, which can't be an array. Use the backslash character (\) as an escape character for the double quotation mark (").

[Expand table](#)

Return value	Type	Description
<code>&lt;xml-version&gt;</code>	Object	The encoded XML for the specified string or JSON object

## Example 1

This example converts the string to XML:

```
xml('<name>Sophia Owen</name>')
```

And returns this result XML:

XML

```
<name>Sophia Owen</name>
```

## Example 2

This example creates the XML version for this string, which contains a JSON object:

```
xml(json('{ "name": "Sophia Owen" }'))
```

And returns this result XML:

XML

```
<name>Sophia Owen</name>
```

### Example 3

Suppose you have this JSON object:

JSON

```
{
  "person": {
    "name": "Sophia Owen",
    "city": "Seattle"
  }
}
```

This example creates XML for a string that contains this JSON object:

```
xml(json('{"person": {"name": "Sophia Owen", "city": "Seattle"}}'))
```

And returns this result XML:

XML

```
<person>
  <name>Sophia Owen</name>
  <city>Seattle</city>
</person>
```

## xpath

Check XML for nodes or values that match an XPath (XML Path Language) expression, and return the matching nodes or values. An XPath expression, or just "XPath", helps you navigate an XML document structure so that you can select nodes or compute values in the XML content.

### ⓘ Note

In Consumption and Standard logic apps, all function expressions use the [.NET XPath library](#). XPath expressions are compatible with the underlying .NET library and support only the expression that the underlying .NET library supports.

```
xpath('<xml>', '<xpath>')
```

[Expand table](#)

Parameter	Required	Type	Description
<xml>	Yes	Any	The XML string to search for nodes or values that match an XPath expression value
<xpath>	Yes	Any	The XPath expression used to find matching XML nodes or values

[Expand table](#)

Return value	Type	Description
<xml-node>	XML	An XML node when only a single node matches the specified XPath expression
<value>	Any	The value from an XML node when only a single value matches the specified XPath expression
[<xml-node1>, <xml-node2>, ...] - or- [<value1>, <value2>, ...]	Array	An array with XML nodes or values that match the specified XPath expression

### Example 1

Suppose that you have this `'items'` XML string:

XML

```
<?xml version="1.0"?>
<produce>
  <item>
    <name>Gala</name>
    <type>apple</type>
    <count>20</count>
  </item>
  <item>
    <name>Honeycrisp</name>
    <type>apple</type>
    <count>10</count>
  </item>
</produce>
```

This example passes in the XPath expression,  `'/produce/item/name/text()'` , to find the nodes that match the `<name></name>` node in the `'items'` XML string, and returns an array with those node values:

```
xpath(xml(parameters('items')), '/produce/item/name/text()')
```

The example also uses the `parameters()` function to get the XML string from `'items'` and convert the string to XML format by using the `xml()` function.

Here's the result array populated with values of the nodes that match `<name></name>`:

```
[ Gala, Honeycrisp ]
```

### Example 2

Following on Example 1, this example passes in the XPath expression,  `'/produce/item/name[1]'` , to find the first `name` element that is the child of the `item` element.

```
xpath(xml(parameters('items')), '/produce/item/name[1]')
```

Here's the result: `Gala`

### Example 3

Following on Example 1, this example pass in the XPath expression,  `'/produce/item/name[last()]'` , to find the last `name` element that is the child of the `item` element.

```
xpath(xml(parameters('items')), '/produce/item/name[last()]')
```

Here's the result: `Honeycrisp`

### Example 4

In this example, suppose your `items` XML string also contains the attributes, `expired='true'` and `expired='false'`:

XML

```
<?xml version="1.0"?>
<produce>
  <item>
    <name expired='true'>Gala</name>
    <type>apple</type>
    <count>20</count>
  </item>
```



```
<item>
  <name expired='false'>Honeycrisp</name>
  <type>apple</type>
  <count>10</count>
</item>
</produce>
```

This example passes in the XPath expression, `//*[name[@expired]]`, to find all the `name` elements that have the `expired` attribute:

```
xpath(xml(parameters('items')), '//*[name[@expired]]')
```

Here's the result: `[ Gala, Honeycrisp ]`

### Example 5

In this example, suppose your `items` XML string contains only this attribute, `expired = 'true'`:

XML

```
<?xml version="1.0"?>
<produce>
  <item>
    <name expired='true'>Gala</name>
    <type>apple</type>
    <count>20</count>
  </item>
  <item>
    <name>Honeycrisp</name>
    <type>apple</type>
    <count>10</count>
  </item>
</produce>
```

This example passes in the XPath expression, `//*[name[@expired = 'true']]`, to find all the `name` elements that have the attribute, `expired = 'true'`:

```
xpath(xml(parameters('items')), '//*[name[@expired = 'true']]')
```

Here's the result: `[ Gala ]`

### Example 6

In this example, suppose your `items` XML string also contains these attributes:

- `expired='true' price='12'`
- `expired='false' price='40'`

XML

```
<?xml version="1.0"?>
<produce>
  <item>
    <name expired='true' price='12'>Gala</name>
    <type>apple</type>
    <count>20</count>
  </item>
  <item>
    <name expired='false' price='40'>Honeycrisp</name>
    <type>apple</type>
    <count>10</count>
  </item>
</produce>
```

This example passes in the XPath expression, `//*[name[@price>35]]`, to find all the `name` elements that have `price > 35`:

```
xpath(xml(parameters('items')), '//*[name[@price>35]]')
```

Here's the result: `Honeycrisp`

### Example 7

In this example, suppose your `items` XML string is the same as in Example 1:

XML

```
<?xml version="1.0"?>
<produce>
  <item>
    <name>Gala</name>
    <type>apple</type>
    <count>20</count>
  </item>
  <item>
    <name>Honeycrisp</name>
    <type>apple</type>
    <count>10</count>
  </item>
</produce>
```

This example finds nodes that match the `<count></count>` node and adds those node values with the `sum()` function:

```
xpath(xml(parameters('items')), 'sum(/produce/item/count)')
```

Here's the result: `30`

## Example 8

In this example, suppose you have this XML string, which includes the XML document namespace, `xmlns="https://contoso.com"`:

XML

```
<?xml version="1.0"?><file xmlns="https://contoso.com">
<location>Paris</location></file>
```

These expressions use either XPath expression, `//*[name()="file"]//*[name()="location"]` or `//*[local-name()="file" and namespace-uri()="https://contoso.com"]//*[local-name()="location"]`, to find nodes that match the `<location></location>` node. These examples show the syntax that you use in either the designer or in the expression editor:

- `xpath(xml(body('Http')), '//*[name()="file"]//*[name()="location"]')`
- `xpath(xml(body('Http')), '//*[local-name()="file" and namespace-uri()="https://contoso.com"]//*[local-name()="location"]')`

Here's the result node that matches the `<location></location>` node:

```
<location xmlns="https://contoso.com">Paris</location>
```

### Important

If you work in code view, escape the double quotation mark (") by using the backslash character (\). For example, you need to use escape characters when you serialize an expression as a JSON string. However, if you're work in the designer or expression editor, you don't need to escape the double quotation mark because the backslash character is added automatically to the underlying definition, for example:

- Code view: `xpath(xml(body('Http')), '//*[name()=\"file\"]/*[name()=\"location\"]')`
- Expression editor: `xpath(xml(body('Http')), '//*[name()="file"]/*[name()="location"]')`

## Example 9

Following on Example 8, this example uses the XPath expression, `'string(/*[name()="file"]//*[name()="location"]')`, to find the value in the `<location></location>`

node:

```
xpath(xml(body('Http')), 'string(/*[name()="file"]/*[name()="location"]')
```

Here's the result: Paris

## Next steps

Learn about the [Workflow Definition Language](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Submit a template to the Power Automate gallery

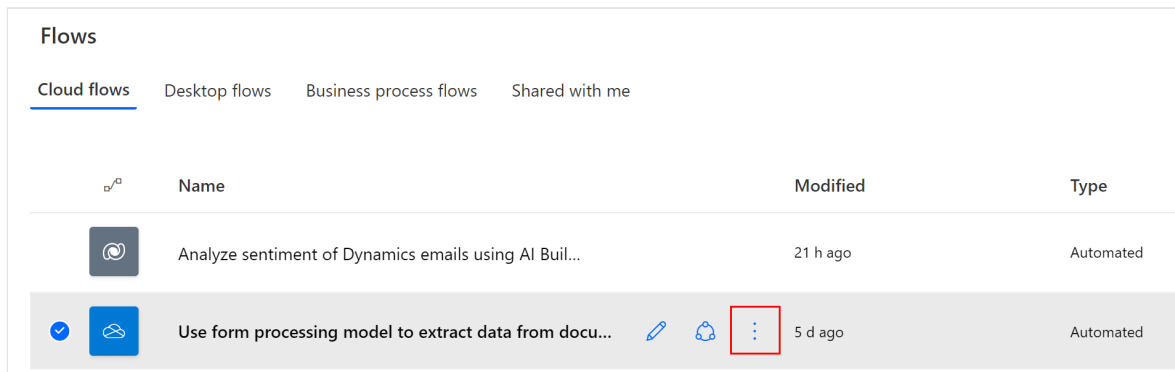
Article • 12/13/2022

Templates help people not only to create flows more easily, but also to imagine additional scenarios that would benefit from a cloud flow.

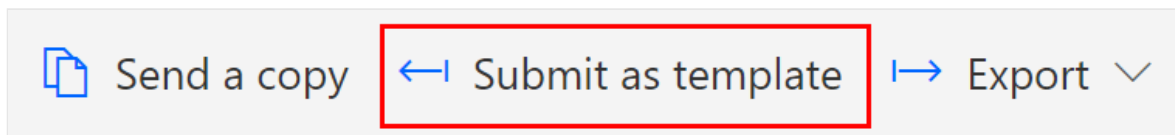
## Important

- Starting December 2022, the procedure to submit a template explained in this article has been deprecated. Any new template submissions using this deprecated procedure won't be accepted.
- This article will be updated with the new template submission process soon.

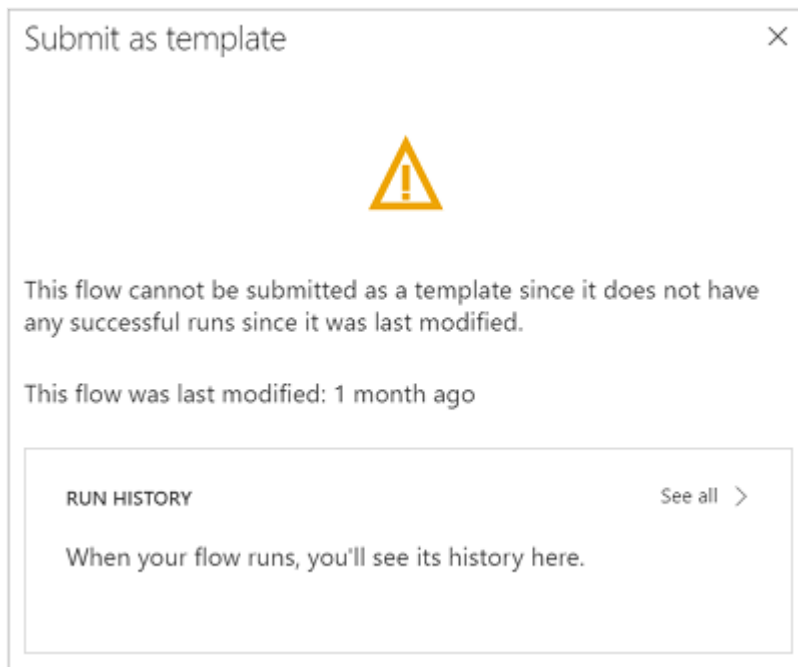
1. On the left pane, select **My flows**.
2. Select a cloud flow, and then select the **More commands** (vertical ellipses) icon.



3. On the menu that appears, select **Details**.
4. On the menu at the top, select **Submit as template**.



You can only submit flows that have run successfully at least once since the last time you saved the flow. If your flow doesn't meet this requirement, you'll get a warning message.



5. On the **Submit as template** screen, provide the following:
- A meaningful title. Make sure the title is fewer than 75 characters.
  - A clear description of the scenario that your template automates. Make sure the description/summary is fewer than 1,024 characters. Having accurate English text ensures that misunderstandings to our customers aren't translated into multiple languages.
  - The biggest benefit.
  - The number of users.
  - The number of runs
  - The categories that apply to the template.

Submit as template

Template title \*

Get an email reminder

Template description \*

Remind me a number of days in advance of the date in the column

Biggest benefit

For example, it helps organize your inbox

Number of users

Is this flow for one person or a group?

Number of runs

How often will this flow run on average?

Categories

<input type="checkbox"/> Remote work	<input type="checkbox"/> Approval
<input type="checkbox"/> Button	<input type="checkbox"/> Data collection
<input type="checkbox"/> Email	<input type="checkbox"/> Events and calendar
<input type="checkbox"/> Mobile	<input type="checkbox"/> Notifications
<input type="checkbox"/> Productivity	<input type="checkbox"/> Social media
<input type="checkbox"/> Sync	<input type="checkbox"/> Visio

Custom categories

Don't see a category that fits? Add your own

By submitting, you give Microsoft the right to publish your template in a public gallery for use by others and to improve the service. Please don't submit personal information or confidential/proprietary content.

---

6. Select **Submit**.

The Power Automate team verifies and *possibly modifies* your template. If the team approves your template, it appears in the gallery of templates for Power Automate.

ⓘ **Note**

Templates are for use in the public gallery only. They aren't supported for private use.

# Turn a flow on or off, and delete a flow

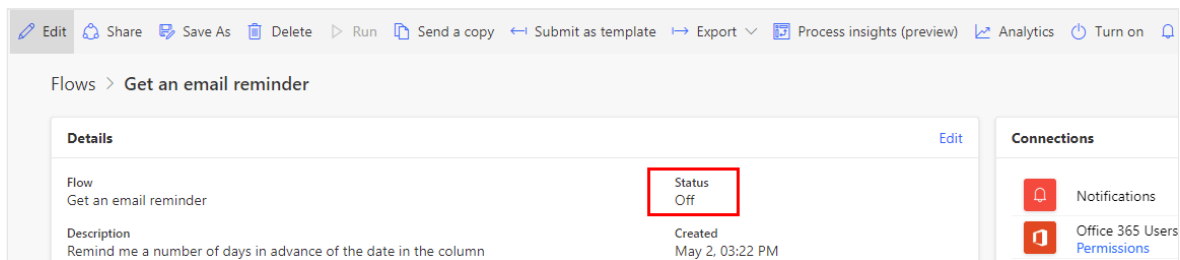
Article • 06/15/2023

At times, you might want to turn off a cloud flow to prevent it from running, or permanently delete a flow. Follow these steps to turn flows on or off, and delete a flow.

## Turn off a flow

After you create a cloud flow, it's turned on by default. Follow these steps to turn off a cloud flow.

1. On the left pane, select **My Flows**.
2. Select a cloud flow, and then select the vertical ellipsis (:).
3. On the menu that appears, select **Turn off**.
4. On the **Details** page, select the vertical ellipsis (:), and then select **Details** to verify the new status.



### ⓘ Note

If you turn off a flow while it's running, the flow runs will continue to run until all pending flow runs are completed.

## Turn on a flow

If you've turned off a cloud flow, but want to turn it back on so that it'll run again, follow one of these steps.

- If you're on the **Details** page, select **Turn on** on the menu at the top.
- If you are on the **Flows** page:
  1. Select a cloud flow, and then select the vertical ellipsis (:).



2. On the menu that appears, select **Turn on**. The status changes to **On**.

## Delete a flow

If you need to delete a flow, follow these steps:

1. Before you delete the flow, go to the **Details** page and select **All runs**.

To cancel pending runs, follow the instructions in [Cancel or resubmit flow runs in bulk](#). Otherwise, some pending flow runs might continue to run to avoid data loss.

2. Once you've cancelled pending runs, return to the **Details** page and select **Delete** on the menu at the top.

### ⓘ Note

If you deleted a flow accidentally and need to restore it, go to **Restore deleted flows**.

# Change the owner of a cloud flow

Article • 03/01/2024

The flow owner plays a vital role in the management, control, and maintenance of Power Automate flows. They have the authority to make changes, assign permissions, monitor performance, and ensure the flow meets the organization's requirements. When a flow is created, the creator is automatically set as the flow owner.

The flow owner responsibilities include the following:

- **Flow management:** Full control over the flow, including the ability to edit, manage, and delete it. They can make necessary modifications to the flow, update its triggers and actions, or troubleshoot any issues that may arise.
- **Permissions and sharing:** Determines who can access and use the flow. They can share the flow with other users or teams within the organization.
- **Monitoring and troubleshooting:** Monitoring their flow's performance, reviewing run history, and addressing errors or exceptions.
- **Licensing:** The licenses associated with the owner can have an effect on the flow.

In cases where ownership needs to be transferred, such as when a flow owner leaves the organization or changes roles, providing a new flow owner ensures a smooth transition. The previous flow owner can transfer ownership to another user to maintain continuity and avoid disruptions in flow management.

If an administrator wants to make changes to a flow, they must first make themselves an owner or co-owner. Flows are usually owned by [regular users](#), but if you need to change the owner to a Service Principal application user instead, go to [Change the owner of a cloud flow to a Service Principal application user](#).

## Change the owner of a solution-aware cloud flow

An owner, co-owner, or an admin can change the owner of a solution-aware flow to another user to ensure business continuity. After the change of ownership completes, the original owner and the new owner become co-owners of the flow.

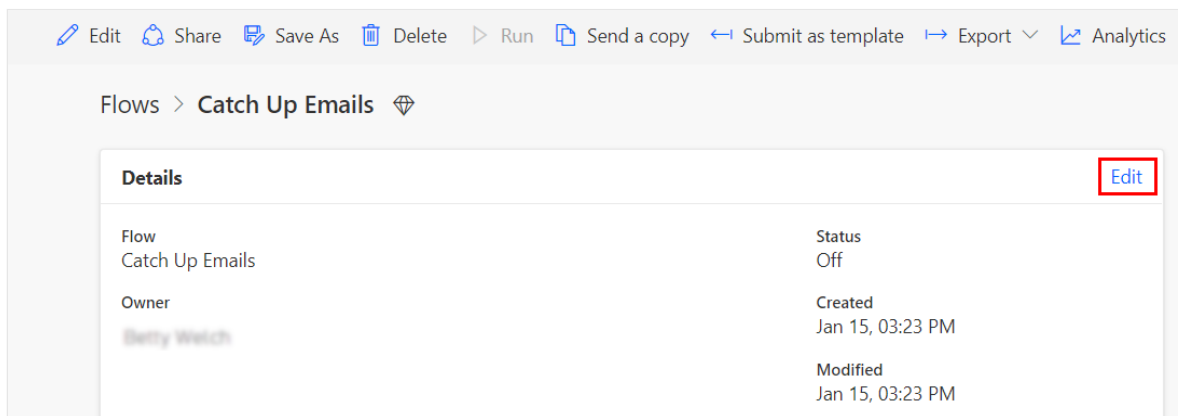
You can change the owner to an individual (not a distribution list) or a user account used as a service account. If the flow uses a service account, ensure it's licensed correctly to avoid [multiplexing](#).

Follow these steps to change the owner of a flow.

## 📘 Important

To perform this action, the flow must be a solution-aware flow.

1. Sign in to [Power Automate](#).
2. On the menu to the left, either select **My flows**, or select **Solutions** and locate a solution the flow is referenced by.
3. Select the flow for which you're changing the owner.
4. In the **Details** section, select **Edit**.



5. In the **Owner** section, remove the current owner.
6. Enter the email address of the new owner.

Once assigned, the new owner gets access to the run history and connection references. The new owner can update the flow or reassign it to other users.

If the flow is a **scheduled** or **automated** flow, after the owner changes, the flow runs under the license of the new owner and uses their Power Platform request limits. This change can take up to seven (7) days to become effective. If you need the new owner to take effect immediately, edit the flow, and then save it to force the flow to use the new owner's license.

If the flow is a **manual** flow, the flow runs under the license of the user who runs the flow. The plan section shows whose license plan the flow uses.

The screenshot shows the Microsoft Power Automate interface. At the top, there is a navigation bar with icons for Edit, Share, Save As, Delete, Run, Send a copy, Submit as template, Export, and Analytics. Below this, the breadcrumb path is 'Flows > Catch Up Emails'. The main content area is titled 'Details' and contains the following information:

Flow	Catch Up Emails	Status	Off
Owner	Prige Kodakula	Created	Jan 15, 03:23 PM
		Modified	Jan 15, 03:23 PM
		Type	Instant
		Plan	The user who runs the flow

The 'Plan' field is highlighted with a red rectangular box.

## Change the owner of a non-solution cloud flow

In-place ownership change for non-solution-aware cloud flows isn't available because the owner is part of the flow identity.

- If your environment has Dataverse, then the ideal way to change the ownership is to [add the flow into a solution](#) so ownership can be changed.
- If your environment doesn't have Dataverse, then you must create a new non-solution cloud flow with export/import, **Save as**, or **Send a copy**.

## Ownership and licensing

If flow ownership is changed to a new owner without a premium license and the flow uses premium features, then a warning shows with information about next steps.


### Details ✕

**Flow name**

**Description**

**Owner \***

All owners will need Power Automate [premium licenses](#).

 Service Principal ✕

The owner of this flow needs a premium license. [Contact your admin](#) to assign a license or ask the new owner to start a [free trial](#).

The flow can still be assigned to the new owner. The flow continues to run for 30 days, allowing time for the new owner to purchase a license. If the new owner doesn't have a premium license after the grace period, Power Automate turns off the flow. They can turn it on anytime after purchasing the license.

## Change the owner of a cloud flow to a service principal application user

The following sections include various scenarios for changing ownership.

### Service Principal application users

A [Service Principal](#) is a non-human security identity that represents an application or service that can own and manage resources within Azure and the Power Platform. To use a Service Principal within the Power Platform, a Service Principal application user needs to be created that represents the service principal [through the portal](#) or [through API](#). An application user can have connections shared with them and own resources such as flows.

A Service Principal application user is a [non-interactive user](#), so it can't have a user license associated with it. It's also subject to [non-licensed user limits](#).

### Service Principal application user ownership of flows

Power Automate has the ability for Service Principal application users to own and run flows to provide flexibility and stability in how organizations administer Power Automate flows. When the owners of flows change roles or leave the organization entirely, the ownership of a flow needs to be changed to a different user or set of users. If the owner of the flow is a Service Principal application user, then that ownership isn't tied to a user that could leave the organization.

The flow [connections need to be shared](#) with the Service Principal application user in order for them to successfully run the flow.

Since a Service Principal application user is a [non-interactive user](#) without a user license, it's subject to [non-licensed user limits](#) and has special [licensing and request limit implications](#).

## Change the owner of a flow to a Service Principal application user

To change the owner of a flow to a Service Principal application user:

1. Open the **Details** edit dialog.
2. Replace the **Owner** with the name of the Service Principal application user.

A Service Principal application user can't be made a co-owner of a flow. Attempts to find a Service Principal application user in the **Owners** edit dialog won't be successful.


## Enable a Service Principal to own and run a flow

To have a Service Principal own and run a flow, follow these steps.

1. [Create a Service Principal application user](#) representing the Microsoft Entra Service Principal.
2. [Share connections](#) with the Service Principal application user.
3. Change the owner of the flow to the Service Principal application user using the steps detailed here: **Details** > **Edit** > **Owner**.
4. [Turn on the flow](#) so it's ready to run.
5. Adjust licensing to deal with [request limit implications](#) as needed.

Examples are turning on [Pay As You Go](#), associating the flow to an app, or considering a [Power Automate Process license](#) (previously [Power Automate per flow](#)).

## See also

- [\(Video\) Microsoft Power Automate Tutorial - Export Import](#) 
- [The owner of a flow left the organization. How can we ensure it works without interruptions?](#)

# Format data by examples

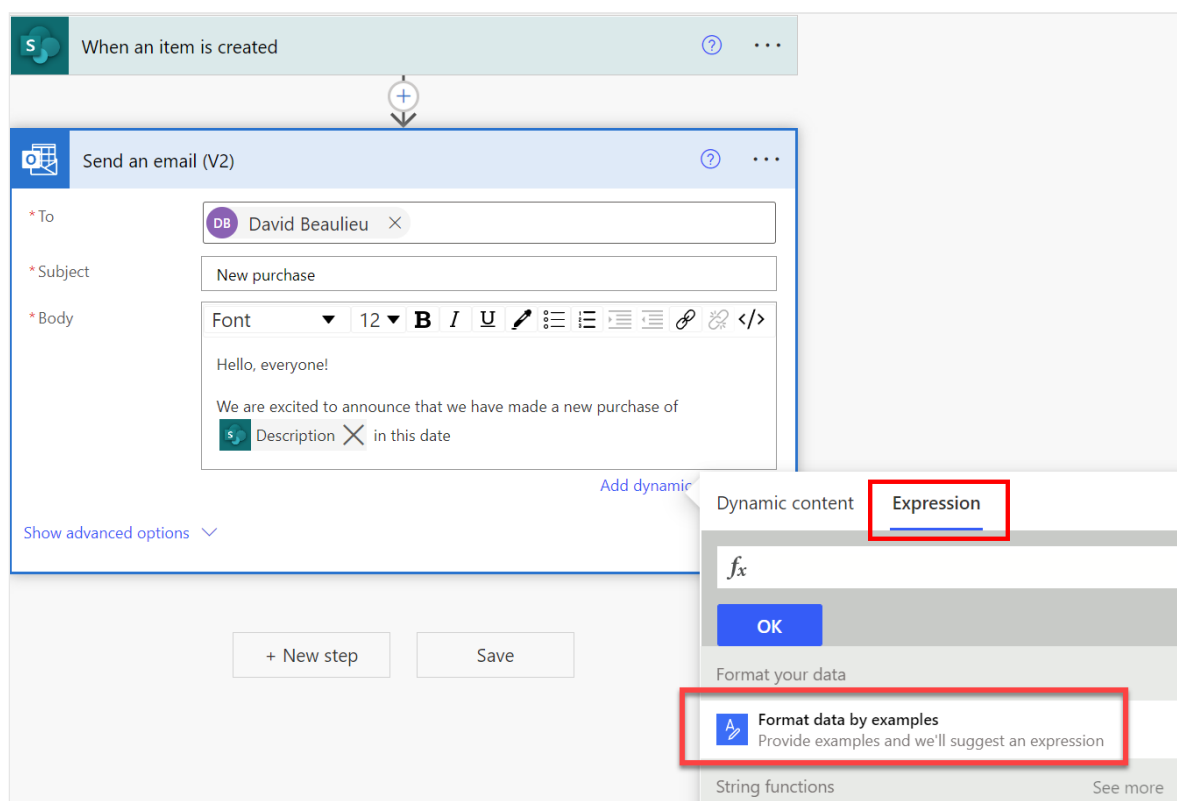
Article • 05/23/2023

**Expressions** in Power Automate is a powerful way to perform operations over data. You can use the *Format data by examples* feature to access these expressions without knowing the different functions and corresponding syntax that's needed to create the expressions that you want. To format text, dates, and numbers, you can just provide examples of the output format that you want the flow to produce, and Power Automate will automatically generate the expression formula to use.

## Format dates by examples

In this sample scenario, imagine that there's a Microsoft list with products that you've purchased. You want to send an email whenever the list gets updated with new products. By default, the SharePoint formats dates like this: *2022-09-18*, but you'd like it to display as *September 18* in the email notification message. Let's see how to change the format of the date with format data by examples.

1. Edit your flow in the Power Automate designer.
2. Select the action into which you want to insert the formatted date, and then select any text field on the card.
3. On the window that opens, select **Expression** > **Format data by examples**.





A list displays all items in your flow that can be formatted.

4. Select the item that you want to transform.
5. Provide an example of the original data for the item that you've selected in the previous step.

### 💡 Tip

You can go to the original data source or review a previous flow run to copy an example value for the previous step.

6. Provide a sample of how you'd like the flow to transform the example.
7. Select **Get expression**.

Power Automate displays the expression that it recommends that you use to get the output you want. You can test it with another value to confirm that the expression does what you expect.

### 💡 Tip

If the expression that Power Automate recommends isn't what you expect, you can add more examples to refine the expression that it recommends.

The screenshot shows the 'Format data by examples' dialog in Power Automate. It features two input fields for examples: '2022-09-18' and 'September 18'. Below these is a '+ Add example' button and a 'Get expression' button. A 'Suggested expression' box contains the following code: `formatDateTime(parseDateTime(triggerOutputs()['body/Purchasedate']), 'en-US', 'yyyy-MM-dd'), 'MMMM d', 'en-US')`. Below the code is a 'Test value' box with '2023-05-04' and an 'Output' box with 'May 4'. A 'Test' button is located at the bottom of the dialog.

8. Select **Apply** when the results of the expression match your expectations.

Power Automate adds the expression to the flow.

Congratulations! You've built an expression by providing an example.

## Format numbers by examples

In this example, imagine you have a number that comes from a Microsoft Forms survey as 5958. You want to format the number as a currency value before you store it in an Excel file, like this \$5,958. To direct your flow to format the number as a currency value, provide an example of how Microsoft Forms returns the number and an example of how you want your flow to format the number. Power Automate uses the information you provide and then it suggests the expression that does the transformation, as shown in the following screenshot.

The screenshot displays the Power Automate interface for formatting data by examples. On the left, a flow is shown with three steps: 'When a new response is submitted', 'Get response details', and 'Add a row into a table'. The 'Add a row into a table' step is selected, and its configuration is visible, including fields for Location, Document Library, File, Table, SKU, and Price. The 'Price' field is set to 'Add an expression'. On the right, the 'Format data by examples' pane is open, showing a 'Price' field with the value '5958' and a 'Desired output' field with the value '\$5,958'. Below this, a 'Suggested expression' box is highlighted in red, containing the expression: `formatNumber(float(outputs('Get_response_details')?['body/r5534dc627280400b92ab94be88649cd7']), '$#,###')`.

## Format text by examples

In the following scenario, imagine you have a registration form in which participants provide their full name and you want to send a registration confirmation email with just the first name. Instead of greeting the person by their full name, for example Casey Jensen, we just want to say Casey. Just provide an example and Power Automate suggests the right expression to achieve this transformation, as the following screenshot displays.

When a new response is submitted

Get response details

Add a new row

Send an email (V2)

To: Responders' Email

Subject: Thank you for your registration!

Body: Thank you for registering for our upcoming join us and look forward to seeing you there

Font: 12 B / U

Hi Add an expression

+ New step Save

### Format data by examples

Name  
Answer to the question above

Provide example

Enter examples of how you want to format the selected item and we'll suggest an expression that will perform the desired formatting. [Learn more](#)

Example value for Name	Desired output
Casey Jensen	Casey

+ Add example

Get expression

Suggested expression

We found an expression for you; if it looks good, apply it to your flow. If this is not the result you want, try adding another example.

```
split(outputs('Get_response_details')?['body/r7a3db8661ab14dd3a6ba0afbb8adf435'], ' ')[0]
```

Test value	Output
Enter text here	Result

Test

Apply Cancel

## Limitations

- Format data by examples can format one text, number, or date at a time. More complex structures like arrays aren't supported.
- Format data by examples isn't available in environments based in South Africa, GCC, GCC High, and DoD.

## See also

[PROSE](#), a technology that enables programming by example, powers format data by examples.

# Use the Power Automate plugin for ChatGPT

Article • 09/21/2023

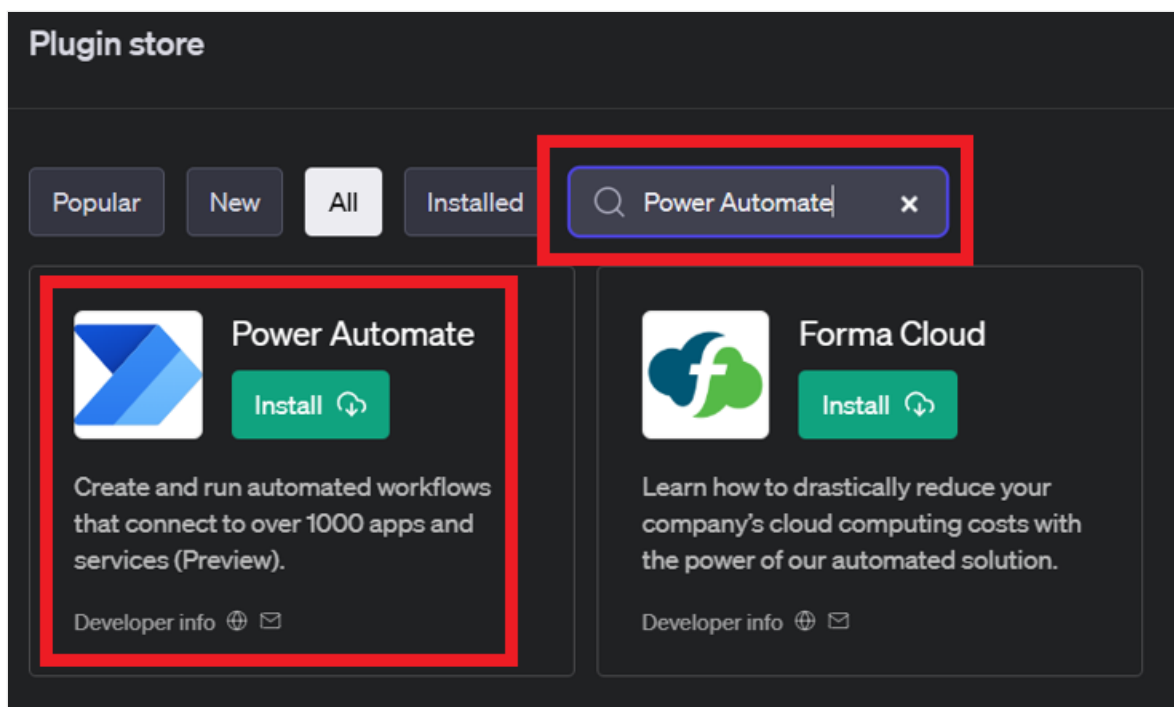
The **Power Automate plugin for ChatGPT** allows you to create, list, and run cloud flows directly from ChatGPT conversations. You can use the plugin to create instant, automated, or scheduled flows that run outside of ChatGPT, or use it to run flows that have the **Run from Copilot** trigger from the **Skills Plugins** connector.

## Prerequisites

- OpenAI account with [ChatGPT Plus](#) subscription.
- Power Automate account with permission to create flows with standard connectors ([types of licenses](#)). Personal Microsoft accounts and accounts in national and US Government clouds aren't currently supported by the Power Automate plugin for ChatGPT.

## Get the plugin

1. Log in to [ChatGPT](#).
2. If you haven't used Plugins before, go to **Settings** -> **Beta features** and enable the **Plugins** toggle.
3. Start a new chat with ChatGPT and select **GPT-4** using the model selector at the top.
4. Hover over GPT-4 and select **Plugins**.
5. At the top of the chat, select **No plugins enabled** then **Plugin store**.
6. In the Plugin store window that opens, search **Power Automate**.
7. Select **Install** on the Power Automate plugin:



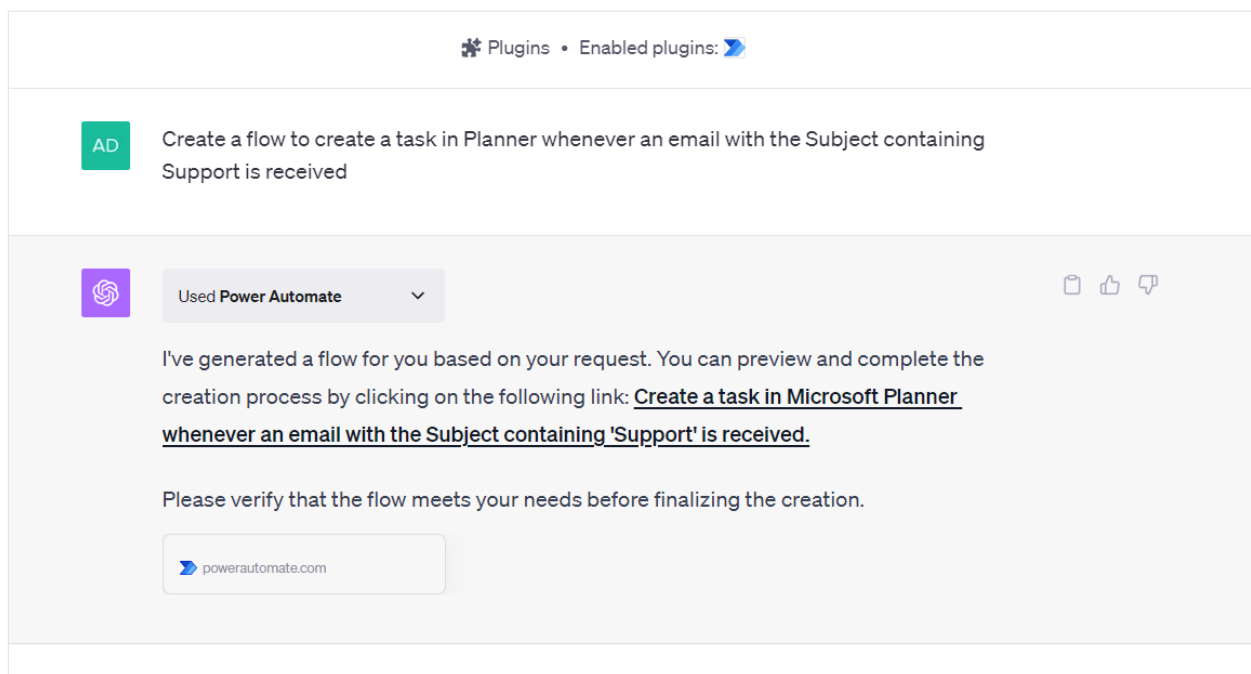
8. Log in with your Power Automate account.

9. Select **Allow** to authorize OpenAI to connect to your Microsoft account.

## Use the plugin to create flows from a prompt

When you use a prompt that mentions creating a flow or automation, ChatGPT uses the Power Automate plugin to respond with a link to preview and create a cloud flow. The flow won't run until you have reviewed and saved it. Try some of the following example prompts for creating automated and scheduled flows:

- Set up an automation that emails me every morning with my open tasks in Planner
- Help me create an automation where I get notified when my manager sends me a high profile email
- Create a flow that sends me an email when an item is added to a folder in SharePoint

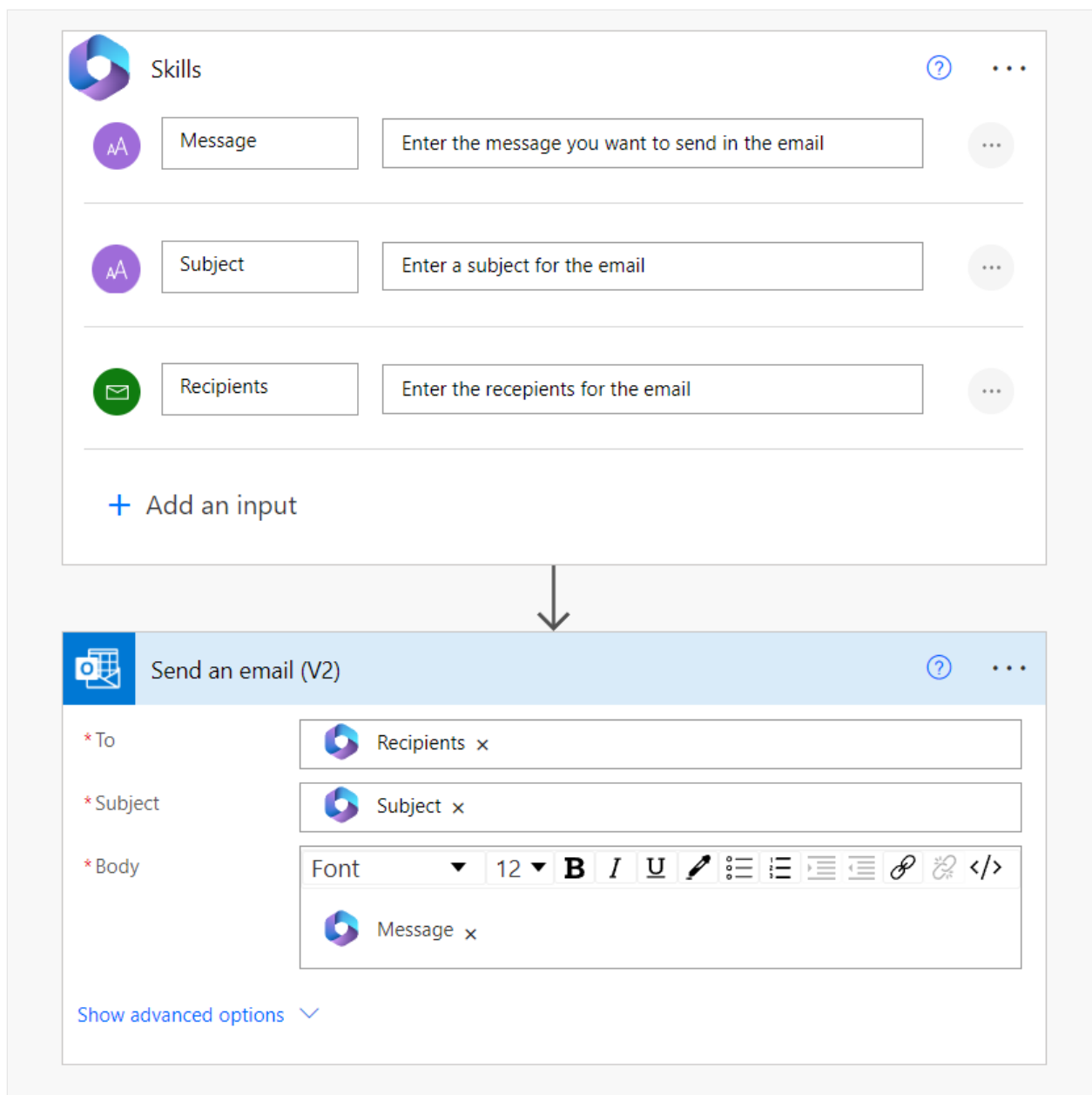


## Create flows to run from ChatGPT conversations

The **Run from copilot** trigger provides a way for you to create the equivalent of plugins for ChatGPT that can use any of the 1000+ connectors in the Power Automate ecosystem. To create a flow that can be used from a ChatGPT conversation use the following steps:

1. Go to [Power Automate](#).
2. Select **Create** from the left-pane, and then, select **Instant cloud flow**.
3. Select the **Run from Copilot** trigger and select **Create**. If you've added another trigger to your flow, you can delete it and search for **Run from Copilot** to replace it.
4. Add actions to your flow such as the Outlook connector's [Send an email \(V2\)](#).
5. Save the flow and test or run it at least once. The flow is now available from ChatGPT. ChatGPT uses the title and description of the flow to determine which flow you're referring to from a prompt. Ensure flows run as only tested flows show up on ChatGPT.

The following screenshot shows an example flow that sends an email using the Outlook connector:



## Use the plugin to list and run flows

You can run flows that use the **Run from Copilot** trigger from ChatGPT with prompts relevant to the title and description of your flows, such as **send an email**, **post to Teams**, or **add to Planner** depending on your flows. ChatGPT replies with a link to run the flow where you can enter and review any inputs to the flow before submitting the flow run.

To retrieve a list of all flows available to ChatGPT, use prompts such as **List my flows**, **Show my flows**, or **What are all my flows**. ChatGPT returns a table of flows that use the **Run from copilot** trigger and their details.

## Control and privacy

The following considerations apply when invoking cloud flows from ChatGPT and other Copilot experiences based on Large Language Models (LLMs):

1. ChatGPT doesn't immediately create the flow that the user wants. Instead, it returns a link to a possible flow based on the provided prompt. The flow creation happens on the Power Automate portal after human review. Users need to review the flow and go through the creation steps to complete the process, including confirming the actions and connections in the flow.
2. Only flows created by the user with the **Run from Copilot** trigger are discoverable from ChatGPT. Shared flows aren't yet discoverable from ChatGPT.
3. ChatGPT can't directly invoke the flow run, as control is in the hands of the user to review the run details and input parameters before submitting.
4. No user connections or data on which connectors are used are shared with ChatGPT as part of the functioning of this plugin outside of the authorization between the user's Microsoft and OpenAI accounts at plugin setup.

## Environment support

Currently the flows that are created and run need to be in the tenants default environment. We're working on a setup experience for the plugin that will allow users to choose nondefault environments to associate the plugin with.

## Frequently asked questions

### What is the Skills Plugins connector?

The Skills Plugins connector is a new built-in connector that includes the **Run from Copilot** trigger and **Respond to Copilot** action. It enables ChatGPT and Microsoft Copilots to discover and run cloud flows separately from your other flows.

### How can I manage what connectors and actions are available to flows run from ChatGPT?

[Power Platform data loss prevention \(DLP\) policies](#) provide control over which connectors and actions can be used by cloud flows, including flows with the **Run from Copilot** trigger. Admins can manage these policies from the [Power Platform Admin Center](#) [↗](#).



## Are all the flows in my tenant and Power Platform environments shared with ChatGPT?

No, only flows that use the **Run from Copilot** trigger are visible to ChatGPT. Even with those flows only the name and description of the flow are accessible in order for ChatGPT to determine when to invoke the flow.

# Use Power Automate flows as plugins in Copilot for Microsoft 365 (preview)

Article • 07/26/2024

[This article is prerelease documentation and is subject to change.]

You can run Power Automate flows as plugins from Copilot for Microsoft 365.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

## Prerequisites

To use flows as plugins in Copilot for Microsoft 365, you need a license and the ability to enable plugins. To learn more, go to [Licenses for Copilot for Microsoft 365](#).

## Deploy the app

1. Sign in to the [Microsoft 365 admin center](#) with your admin account.
2. On the navigation pane, expand **Settings**, and then select **Integrated apps**.
3. On the **Available apps** tab, search for **Power Automate**, and then select **Deploy App**.
4. To open the **Users** tab, select **Next**.
5. Choose to deploy for all users, a specific set of users, or yourself.
6. To complete the remaining steps to deploy the app, select **Next**.

It might take up to 12 hours for the deployed app's plugin to show in Copilot for Microsoft 365.

## Enable flow plugins

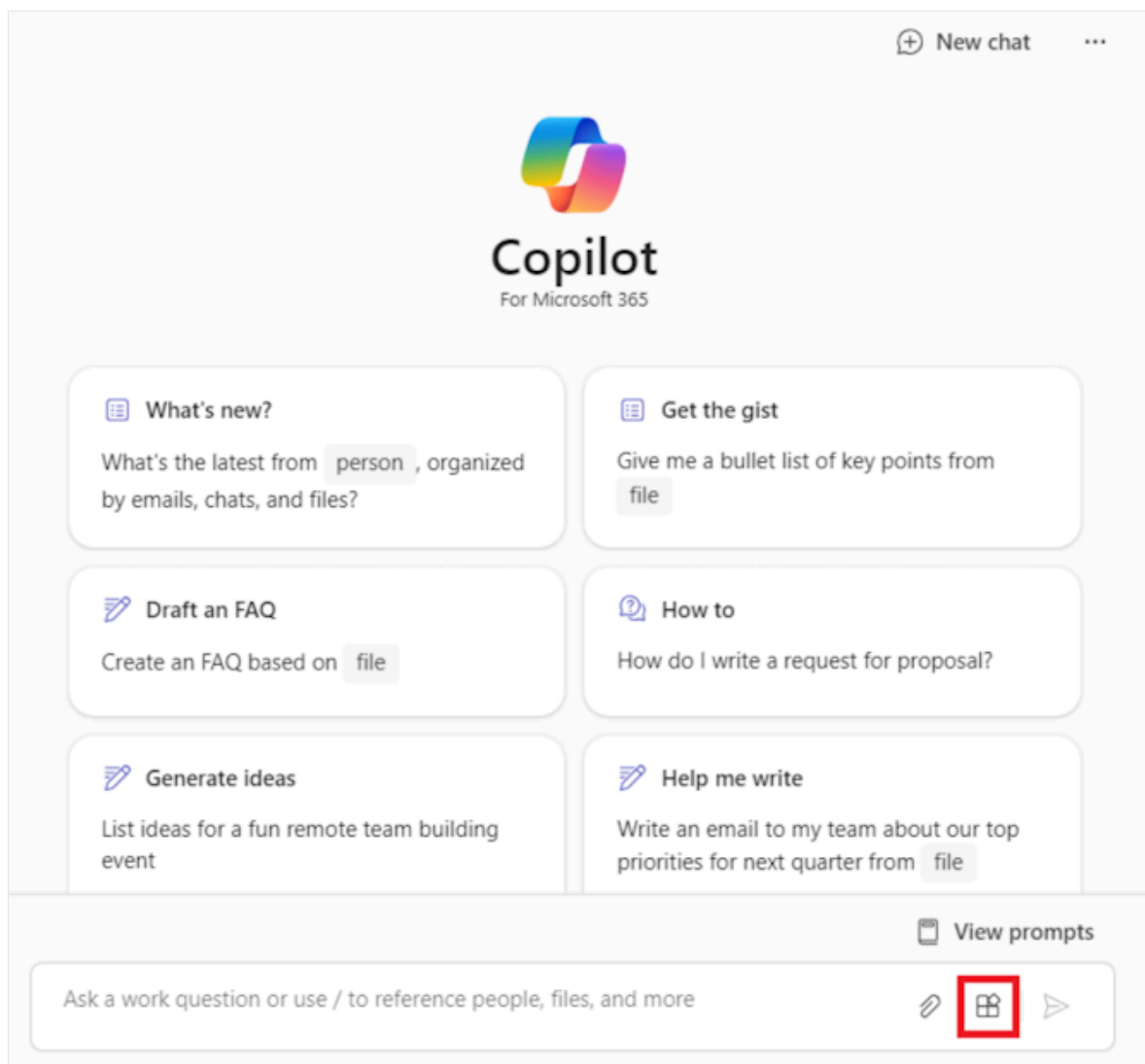
Create flows using the **Run a flow from Copilot** trigger from the Copilot Skills connector in the default environment. Once created, these flows appear in the plugins menu in Copilot for Microsoft 365. Currently, users can only see flow plugins that they created.

## Run flows from Copilot for Microsoft 365

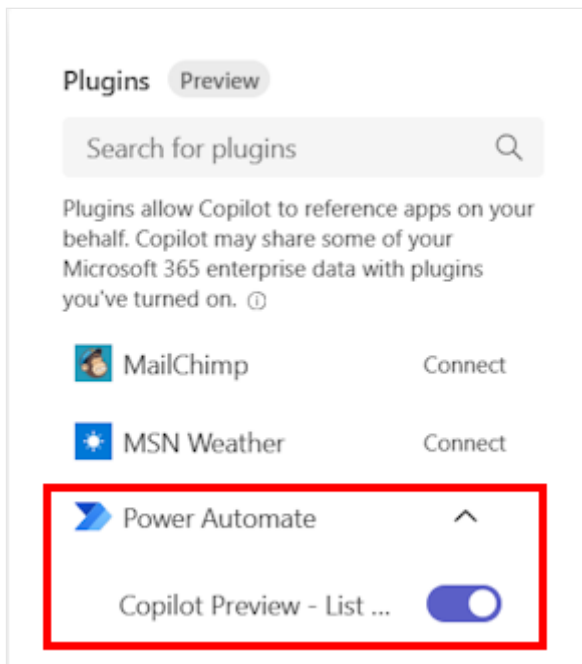
You can use the flow based plugins shipped by Microsoft in your Copilot for Microsoft 365 app in Microsoft Teams.

1. Sign in to [Microsoft Teams](#).
2. Open the **M365 Chat** app.

If the Copilot app isn't on your menu, search for it in the Teams app store. A plugins icon (four squares) shows on the text prompt.



3. Select the **Plugins** icon > **Power Automate**.
4. Enable the flow you want to use.



5. Enter a natural language prompt like **Get my pending approvals**, or **Show me my pending tasks from Microsoft Planner and To Do**, to get the results.

## Environment support

Currently, the flows that are created and run need to be in the tenant's default environment. A setup experience for the plugin that allows users to choose nondefault environments to associate the plugin with isn't available yet.

## Related information

[Build plugins using Microsoft business applications](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#)

# Get started with approvals

Article • 02/09/2023

Whether you need written acknowledgment from your manager or a formal authorization from a diverse group of stakeholders, getting things approved is part of almost every organization.

With the approvals capability in Power Automate, you can automate sign-off requests and combine human decision-making for workflows. Some popular cases where approvals can be used include:

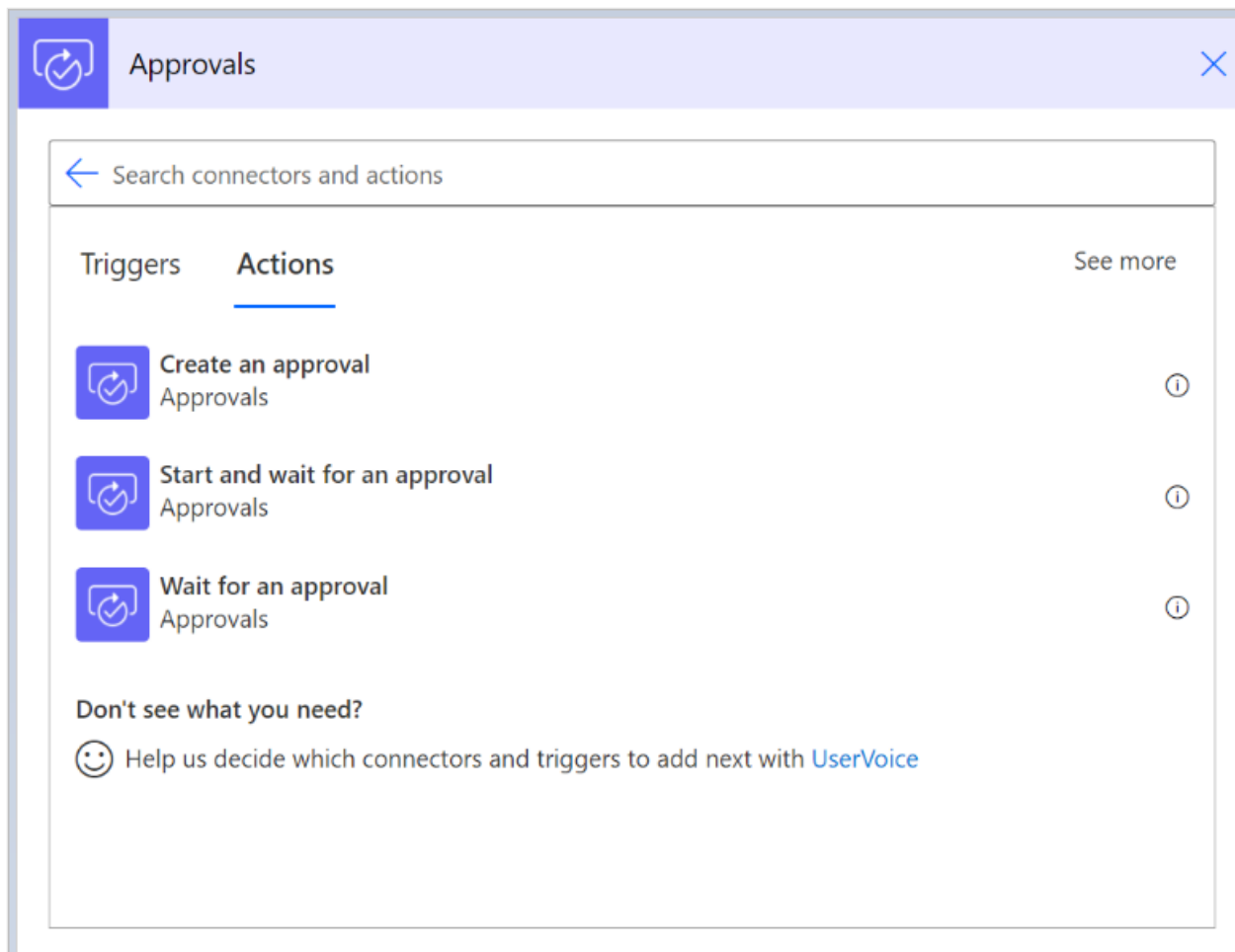
- Approving vacation time requests.
- Approving documents that need sign-off.
- Approving expense reports.

When you submit an approval in a flow, approvers are notified and can review and act on the request.

## Approvals actions

*Actions* are the events you want your flow to perform after the trigger starts the flow. For example, when a new item is added to a list created with Microsoft Lists, trigger an approval to have somebody review the new item.

The following image shows the full list of [approval actions](#) that you can use in your flows.



If you want to quickly get started with approvals, use the **Start and wait for an approval** action. This action lets you provide the information that should be in the approval request and the approvers who will receive the request.

When you use the **Start and wait for an approval** action, the flow starts and then waits for the approvers' response before it completes the run.

There are four approval types you can use.

Approval type	Behavior
Approve/Reject - Everyone must approve	All approvers are given two options: <b>Approve</b> or <b>Reject</b> . A response is needed from <i>each</i> approver before the flow run is completed. The actions that follow the <b>Start and wait for an approval</b> action run after <i>all</i> the approvers respond, or when a single rejection occurs.
Approve/Reject - First to respond	Assigned approvers are given two options: <b>Approve</b> or <b>Reject</b> . Approval or rejection by any approver completes the request. The actions that follow the <b>Start and wait for an approval</b> action run after any one of the approvers gives approval.
Custom Responses - Wait for all responses	You define the options the assigned approvers can choose from. All approvers must respond to complete the process.

Approval type	Behavior
Custom Responses - Wait for one response	You define the options the assigned approvers can choose from. A response from any approver completes the process.

## Prerequisites

If it's the first time you're using approvals in your organization, ensure that you've met the following prerequisites:

- [A Microsoft Dataverse database.](#)
- [A valid license to create flows.](#)

## Permissions to create a Dataverse database

When you create approval flows, they're saved in Dataverse. Initially, when you use the approvals connector in a cloud flow that's located in a non-default environment, the system automatically provisions a database. To be successful, the user who runs the first approval flow must have an administrator role in the environment.

It can take a few minutes for the database provisioning to be completed, and you'll notice this delay the first time that you run the flow. Other users who create approval flows don't need any elevated permissions in the environment.

### ⓘ Note

If you're using the default environment, you don't need to provision the Dataverse database. If you create approval flows, the Dataverse database is created for you automatically in the default environment.

## License to create flows

Because the approvals connector is a standard connector, any license that grants access to Power Automate and the ability to use standard connectors is sufficient to create approval flows.

Here are the licenses that grant rights to use standard connectors:

- [Power Automate](#) [↗](#).

- Office 365.
- Dynamics 365 license with built-in Power Automate capabilities.

You can find a list of the Office 365 and Dynamics 365 licenses in the [Microsoft Power Apps and Power Automate licensing guide](#).

## Get started

Use one of the following options to get started creating approval flows.

- Use an existing template—You can search the list of [approvals templates](#) for your scenario, and then follow steps to create a flow that suits your needs.
- Tweak an existing template—If one of the existing templates is similar, but doesn't fit your needs precisely, create a flow from that template and then tweak the flow to your liking.

After you create a flow from a template, it's yours to modify or extend. Do this by adding, editing, or removing triggers and actions.

### Tip

You can **copy and paste** actions in the same flow or across flows to speed up the editing process.

- Create an approval flow from scratch—If you can't find a suitable template, you can create a flow from scratch and then connect it to the services and the approvals you need by using the approvals actions. Learn [how to create a flow from scratch](#).
- Consult the community for inspiration and help—Power Automate has a thriving community that can help if you're stuck or looking for some inspiration. Just head over to the [Power Automate forums](#) to ask specific questions and get answers.

## Assign approvals to any user in your tenant

You can assign approvals to users—including guest users and Microsoft 365 groups—in your current Dataverse environment or your Azure Active Directory (Azure AD) tenant.

When you assign an approval to users who aren't in your environment, they're automatically given the *Approvals User* Dataverse security role. Users need this role for their responses to be processed and persisted in their approvals history.



The following tenant configurations don't allow this:

- When the AllowAdHocSubscriptions setting in Azure AD is disabled. In this case, you can request your tenant administrator to enable it. You can find more information about this in the self-service signup.
- If a security group has been used to control which users have access to the Dataverse environment.
- Power Automate [US Government plans](#).

After you assign an approval request to a user, they can respond directly from an Outlook email, a Microsoft Teams adaptive card, or the Power Automate action center if they have a Power Automate license or an Office 365 or a Dynamics 365 license with built-in Power Automate capabilities. You can find a list of these Office 365 and Dynamics 365 licenses in the Microsoft Power Apps and Power Automate licensing guide.

## Next step

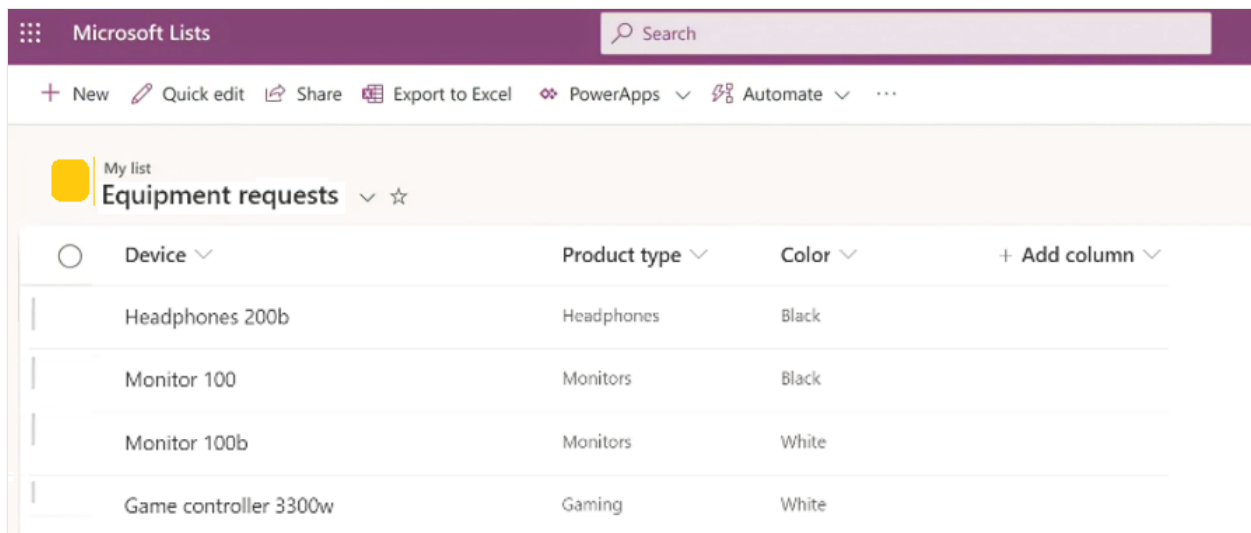
Create [approval flows](#)

# Trigger approvals from lists created with Microsoft Lists

Article • 02/10/2023

Imagine that you have a list created with Microsoft Lists in which employees store requests for devices like monitors or headsets. You want to create an approval process so that every time an employee adds a request to a list, somebody receives a request to approve it.

To follow this guided tutorial, create a list with Microsoft Lists. You can use the following example of a list.



The screenshot shows the Microsoft Lists interface for a list named "Equipment requests". The table has the following data:

Device	Product type	Color	+ Add column
Headphones 200b	Headphones	Black	
Monitor 100	Monitors	Black	
Monitor 100b	Monitors	White	
Game controller 3300w	Gaming	White	

Once you have a list for which you want to create an approval process:

1. Go to the [Start approval when a new item is added](#) template, which provides a flow that's configured to create an approval process on a list.
2. Make sure all connections listed have a green check, and then select **Continue**.

Start approval when a new item is added

Use this template for processing approvals on SharePoint list items. The approver can view their approval requests in the Approvals Center and over email. Once an item is approved or rejected, the item creator is sent a confirmation email.

This flow will connect to:

	Office 365 Outlook Permissions	✓ ...
	SharePoint Permissions	✓ ...
	Approvals	✓ ...
	Office 365 Users Permissions	✓ ...

[Continue](#)

3. Once the flow is created, configure these three items:

- **Site address:** Select the site where you have your list from the dropdown list.

If the site doesn't appear on the dropdown list, just enter your site URL.

When a new item is created

\* Site Address

\* List Name

[Show advanced options](#) ▾

- **List name:** Once you have defined the **Site Address**, select the list you want every new item added to trigger an approval.

When a new item is created

\* Site Address

\* List Name

[Show advanced options](#) ▾

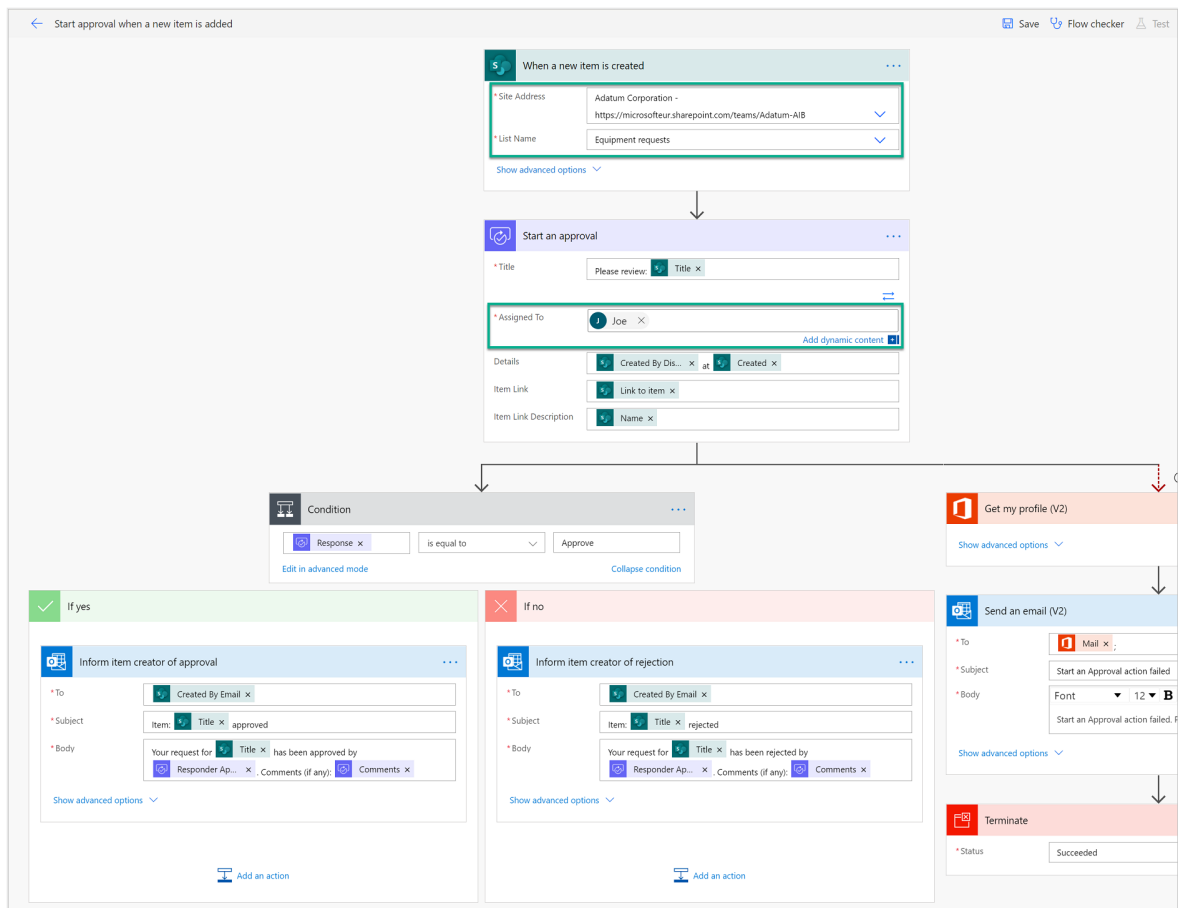
- **Assigned to:** This is the person in your company who should receive the approval request. You can start by assigning yourself as the approver.

The screenshot shows the 'Start an approval' configuration page. It features a header with a refresh icon and the title 'Start an approval'. Below the header are several input fields:

- \* Title:** A text input field containing 'Please review: [User Icon] Title x'.
- \* Assigned To:** A text input field containing 'Specify to whom the approval should be assigned. This should be a s'. This field is highlighted with a red border.
- Details:** A text input field containing '[User Icon] Author.Display... x at [User Icon] Created x'.
- Item Link:** A text input field containing '[User Icon] {Link} x'.
- Item Link Description:** A text input field containing '[User Icon] {Name} x'.

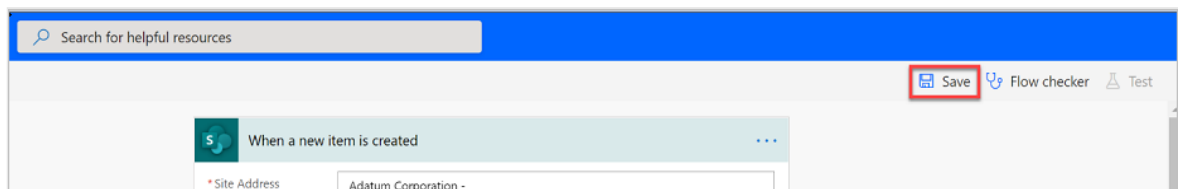
That's it! The approval flow is now configured. If you look at the entire flow, the steps are:

- The flow is triggered every time a new item is added to the list you have defined in step 3.
- An approval request is sent to the person you've chosen.
- If the approval is answered as **Approve**, the person who created the item on the list gets an email with the approval confirmation. If the request was answered as **Reject**, that person gets an email saying that the request was rejected.

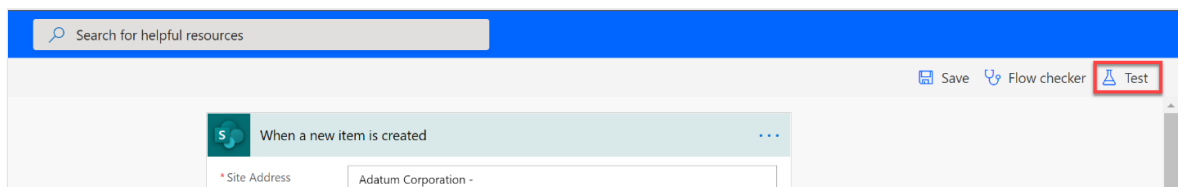


- If for some reason the approval fails, you as the maker of this flow will get an email informing you that the approval failed. In this case, you will need to look at the run history of the flow to see why the approval failed.

4. Now let's test this flow. first, select **Save** on the top right.

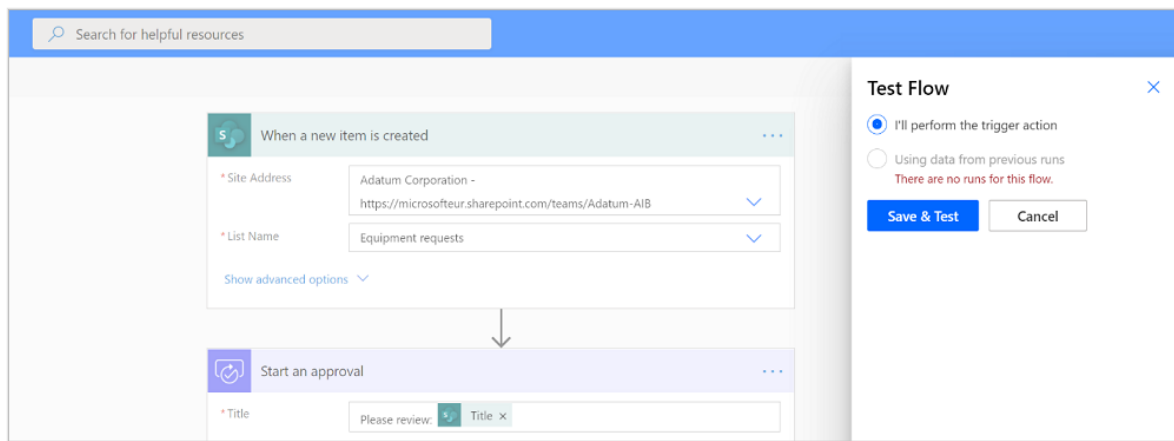


5. Once the flow has been successfully saved, select **Test**.



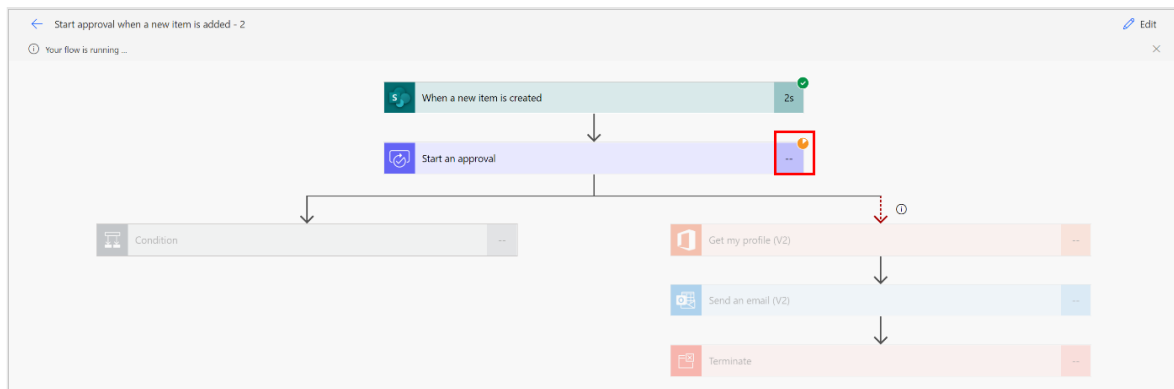
6. Select I'll perform the trigger action.

7. Select **Save** and test.



8. Power Automate alerts you after the flow enters test mode. When it is in test mode, create a new item on your list and then look at your flow to see it.

You'll see that once your flow starts, it runs to the approval action where it shows an orange circle on the top right of the approval action step. This means that the assigned approvers need to respond to the approval request for the flow to continue.



## Next step

- Create [approval flows](#)

# Trigger approvals from a SharePoint document library

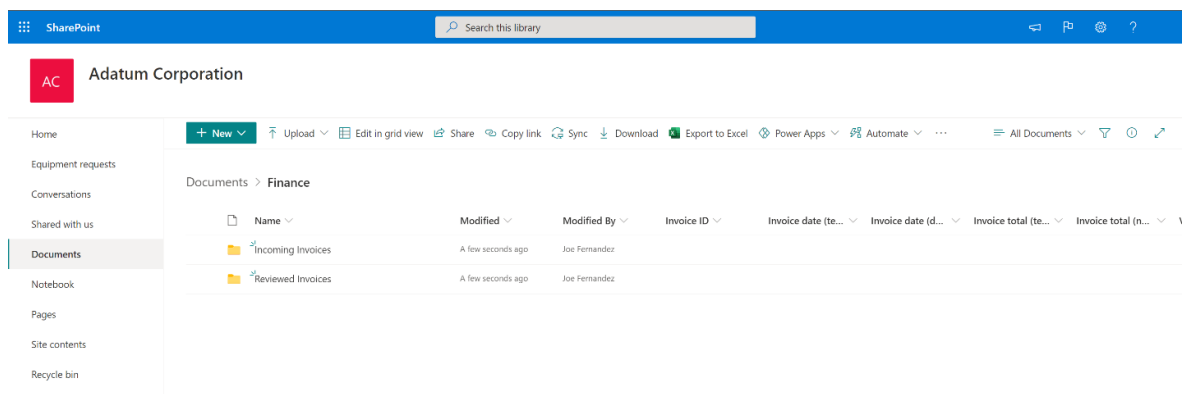
Article • 02/10/2023

This article shows you how to create an approval flow for new documents (invoices) when they are added to a SharePoint document library and how to attach the document to the approval request.

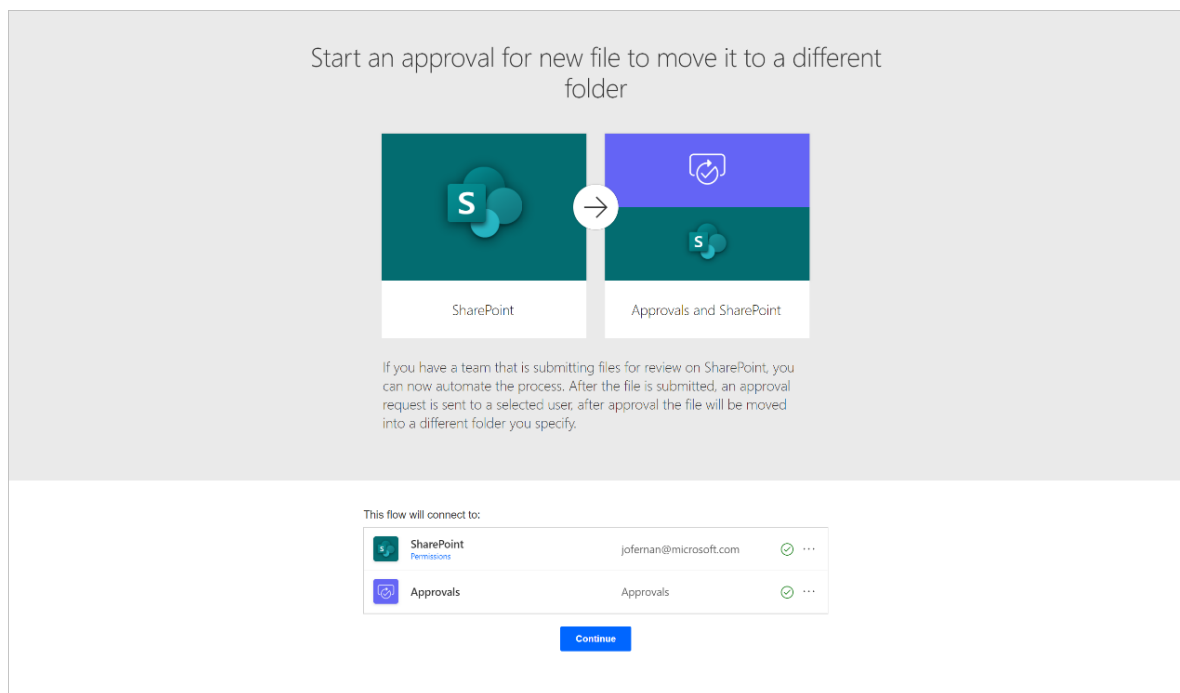
In the approval process, every time a new invoice is added to a SharePoint library, a request is sent for somebody to reviews its contents. If the request is approved, the invoice files are then moved to a folder.

Follow these steps to complete this tutorial.

1. Create two folders, for example: **Incoming Invoices** and **Reviewed Invoices**.



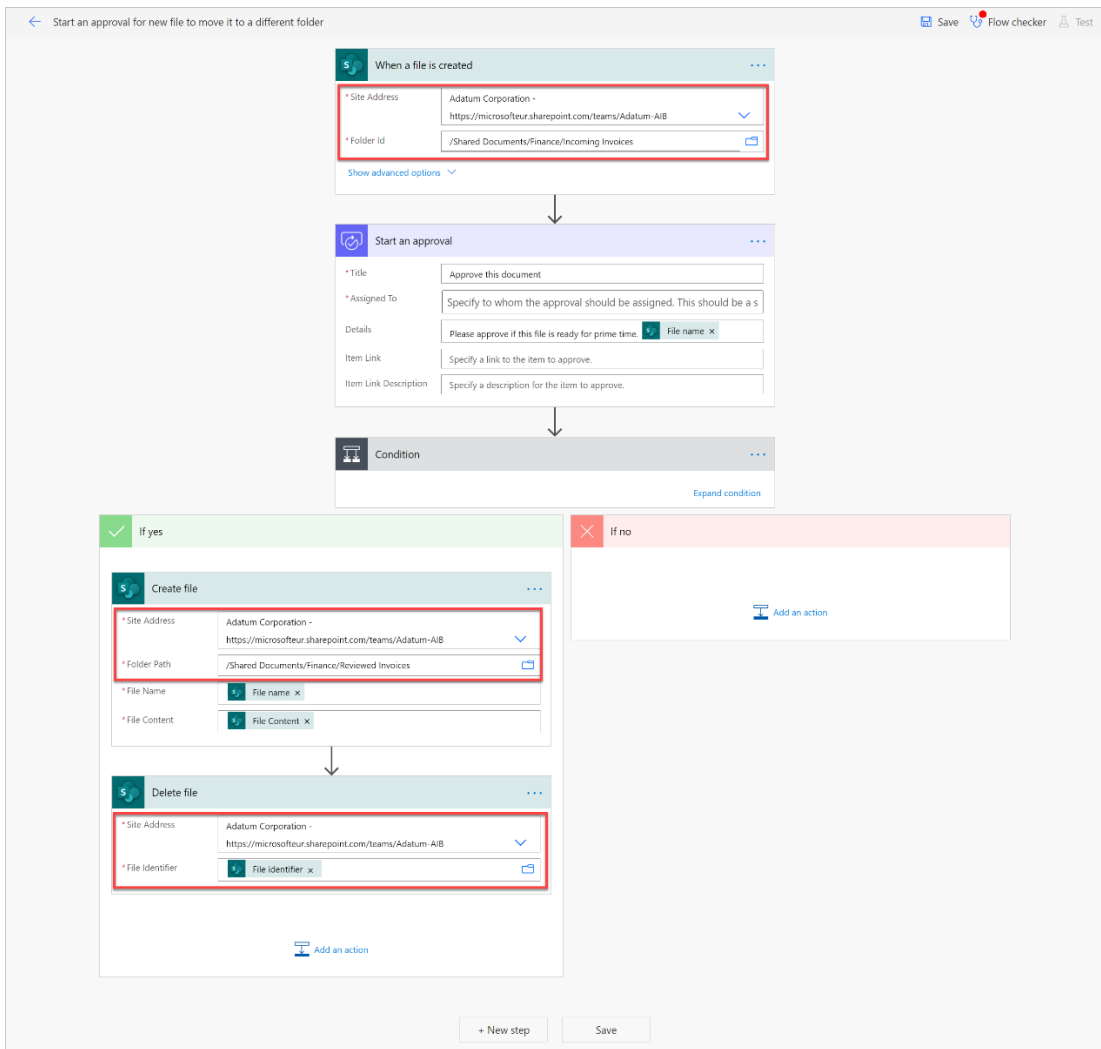
2. Go to the [Start an approval for new file to move it to a different folder](#) template. This template provides us a flow that's configured to setup an approval process for a SharePoint document library. Confirm that all the connections listed have a green check, and then select continue.



### 3. Once the flow is created, configure these items.

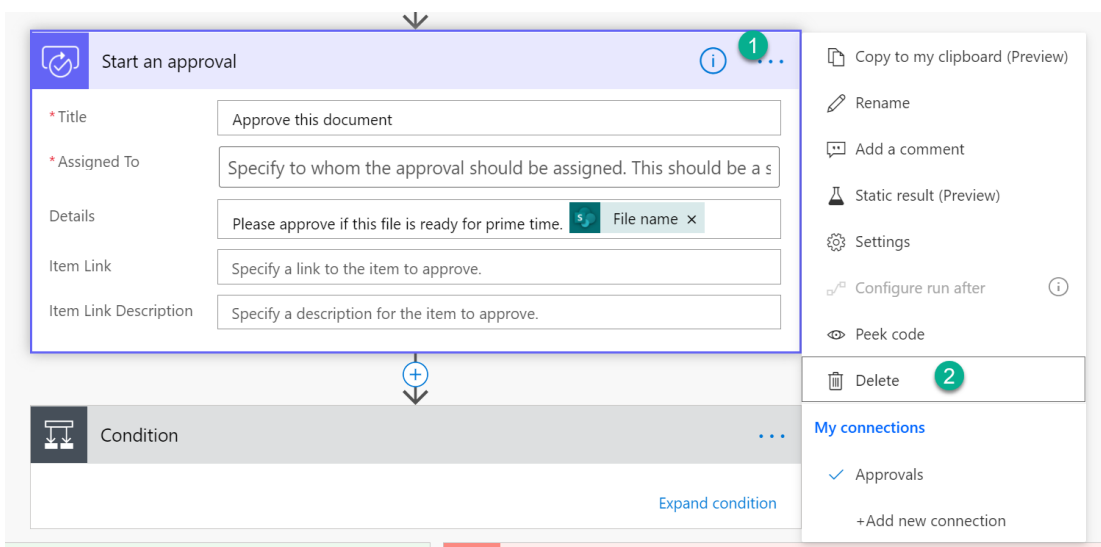
- **Site address** - On the trigger card, select the SharePoint site that contains your list. If the SharePoint site doesn't appear on the list, just write in your SharePoint site URL.
- **Folder id:** - Select the folder where you will put the incoming files to be reviewed with an approval.
- On the **Create file** card enter the same **Site address** as before, and then select the folder where you would like the files to be moved once they have been approved.
- On the **Delete file** card, enter the same **Site address** as before. This action will delete the file from the first folder once it has been approved and copied to the new folder.





4. Replace the **Start an approval** action with another approval action that will let you attach files to it.

- Delete the **Start an approval** action from the flow.




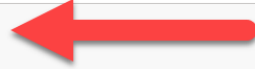
- Where the approval action used to be, select the vertical line to add a new action.


**S** When a file is created ⋮

\* Site Address  ⌵

\* Folder Id  📁

[Show advanced options](#) ⌵

 **Condition** ⋮

[Expand condition](#)

- Search for, and then select **Start and wait for an approval**.

When a file is created

Choose an action

start and wait for an approval

All Built-in Standard Premium Custom My clipboard

Approvals SharePoint Microsoft Teams OneDrive for Business Office 365 Outlook Notifications Mail

Triggers Actions See more

- Start and wait for an approval Approvals
- Wait for an approval Approvals
- Create an approval Approvals
- Set content approval status SharePoint
- Post an Adaptive Card to a Teams channel and wait for a response (preview) Microsoft Teams
- Post an Adaptive Card to a Teams user and wait for a response (preview) Microsoft Teams

Condition

- Select **Approve/Reject – First to respond** as the approval type.

Start and wait for an approval

\* Approval type: Select an approval type.

- Approve/Reject - Everyone must approve
- Approve/Reject - First to respond
- Custom Responses – Wait for all responses
- Custom Responses – Wait for one response
- Enter custom value

Condition

- Give the approval request a title, and then assign it to the approver. The approver can even be you!

Start and wait for an approval

\* Approval type: Approve/Reject - First to respond

\* Title: A new file needs your review and approval

\* Assigned to: Joe x ;

Details: Markdown supported (see <https://aka.ms/approvaldetails>)

Item link: Add a link to the item to approve

Item link description: Describe the link to the item

Show advanced options

- Select **Show advanced options**, and then select **Attachment Name – 1**.

A floating panel opens on the right where you will see all the data you can get from the SharePoint trigger.


- Select **File name**.

The screenshot shows the configuration for the 'Start and wait for an approval' step in a Power Automate flow. The configuration includes fields for Approval type, Title, Assigned to, Details, Item link, Item link description, Requestor, Enable notifications, and Enable reassignment. The 'Attachments Name - 1' and 'Attachments Content - 1' fields are highlighted with a red box. The 'Attachments Content - 1' field is currently empty, and the 'Add dynamic content' button is visible. A dynamic content panel is open on the right, showing a search bar and a list of dynamic content options under the trigger 'When a file is created'. The options include 'File Content', 'File identifier', 'File name', and 'File path'.

Dynamic content options:

Dynamic content	Expression
File Content	The content of the file.
File identifier	File identifier
File name	File name
File path	File path

- Select **Attachments Content – 1**, and then select **File Content**.

 Start and wait for an approval ⋮

\* Approval type

\* Title

\* Assigned to

Details


Item link

Item link description

Requestor

Enable notifications

Enable reassignment

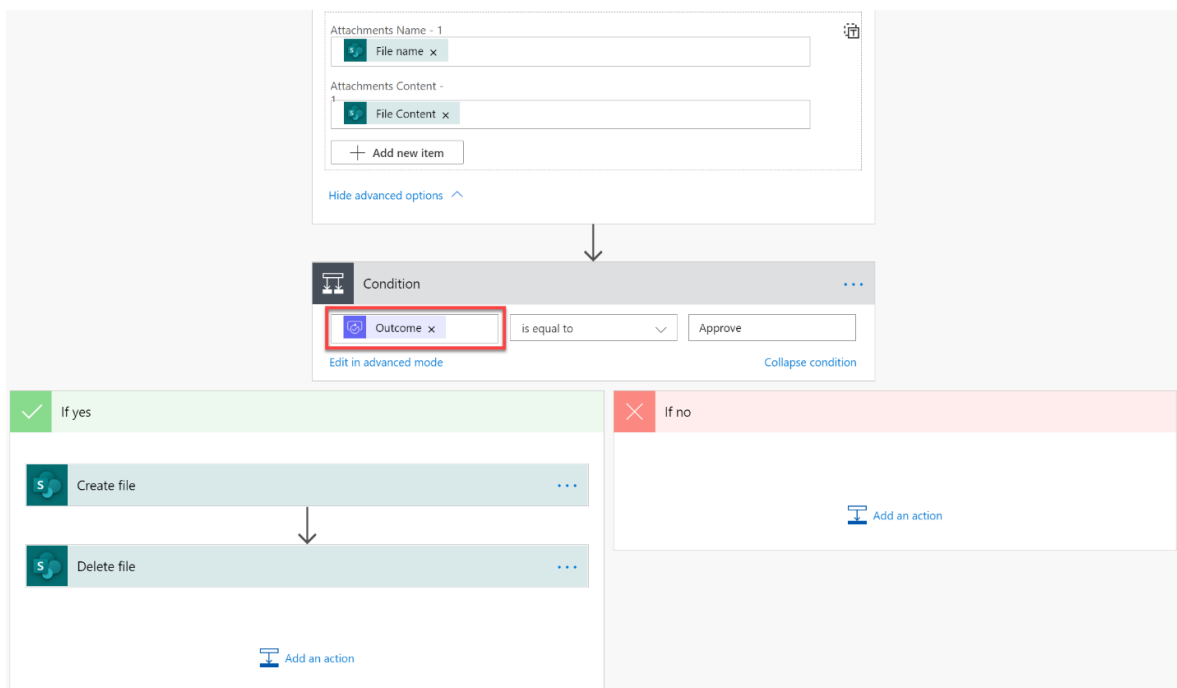
Attachments Name - 1 

Attachments Content -

[Hide advanced options](#) ^

5. Expand the **Condition** card, and on the left text box, select **Outcome**.

This way if the approver approves the request, the action to copy the file to the second folder runs.



The screenshot shows the workflow editor with the following configuration:

- Attachments Name - 1**:
- Attachments Content -**:
- Condition** card:
  - Left text box: **Outcome x** (highlighted with a red box)
  - Operator: **is equal to**
  - Value: **Approve**
- If yes** path (green background):
  - Create file** action
  - Delete file** action
- If no** path (red background):
  - Add an action** button

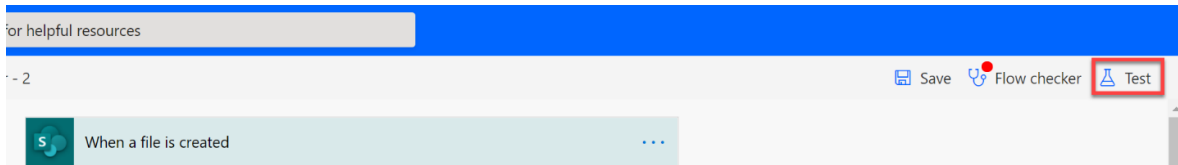
We're done configuring the flow. Now let's test it.

1. Select the **Save** button on the top right.

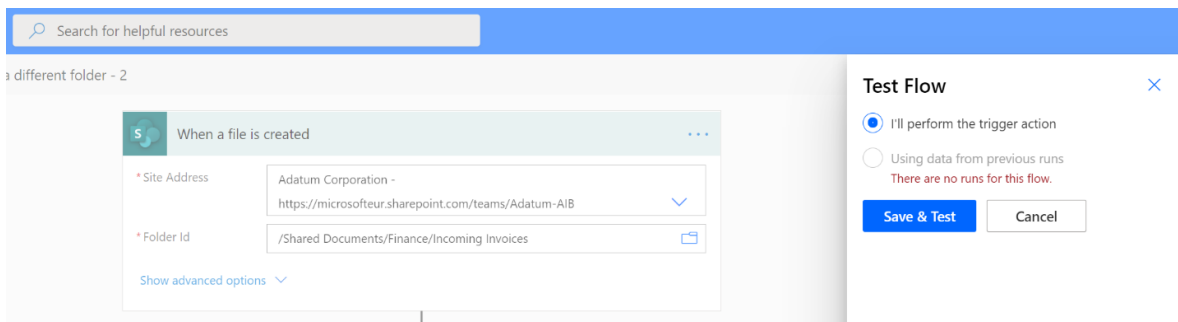
You might get a warning message from the Flow checker. It is safe to dismiss it.



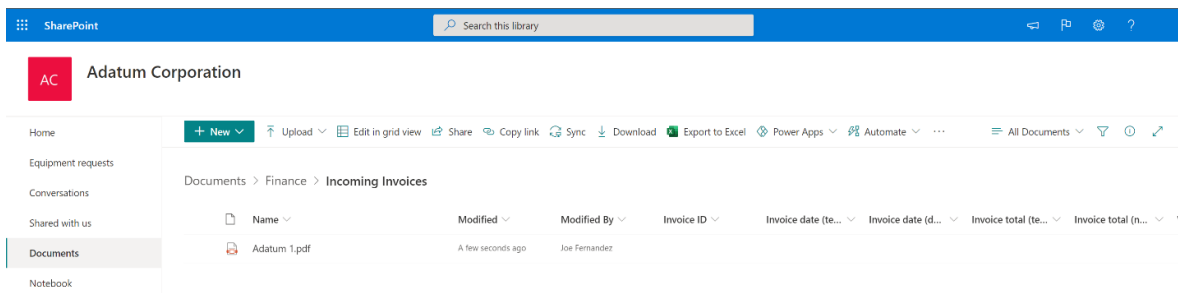
2. Once the flow is saved, select the **Test** button.



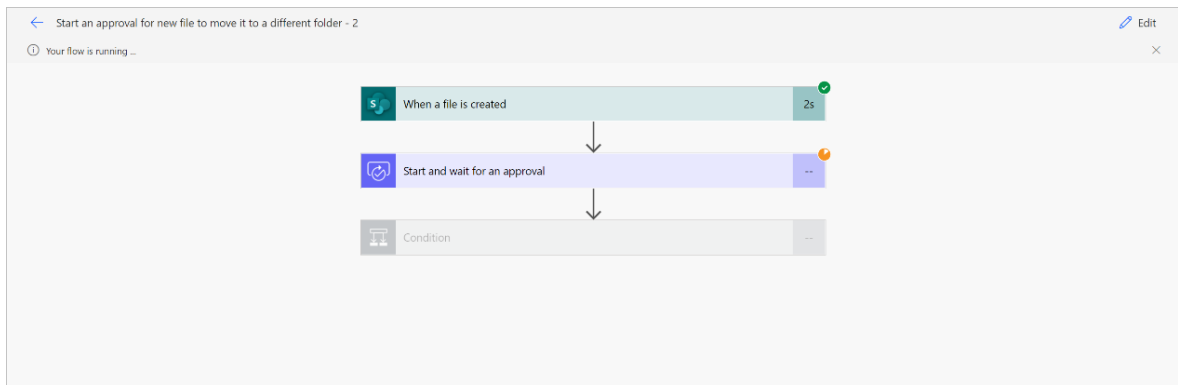
3. Select, **I'll select the trigger action**, and then select **Save and test**.



4. Power Automate indicates to you when the flow is in test mode. When it is, add a new file to the incoming files folder in the SharePoint document library that you specified earlier.

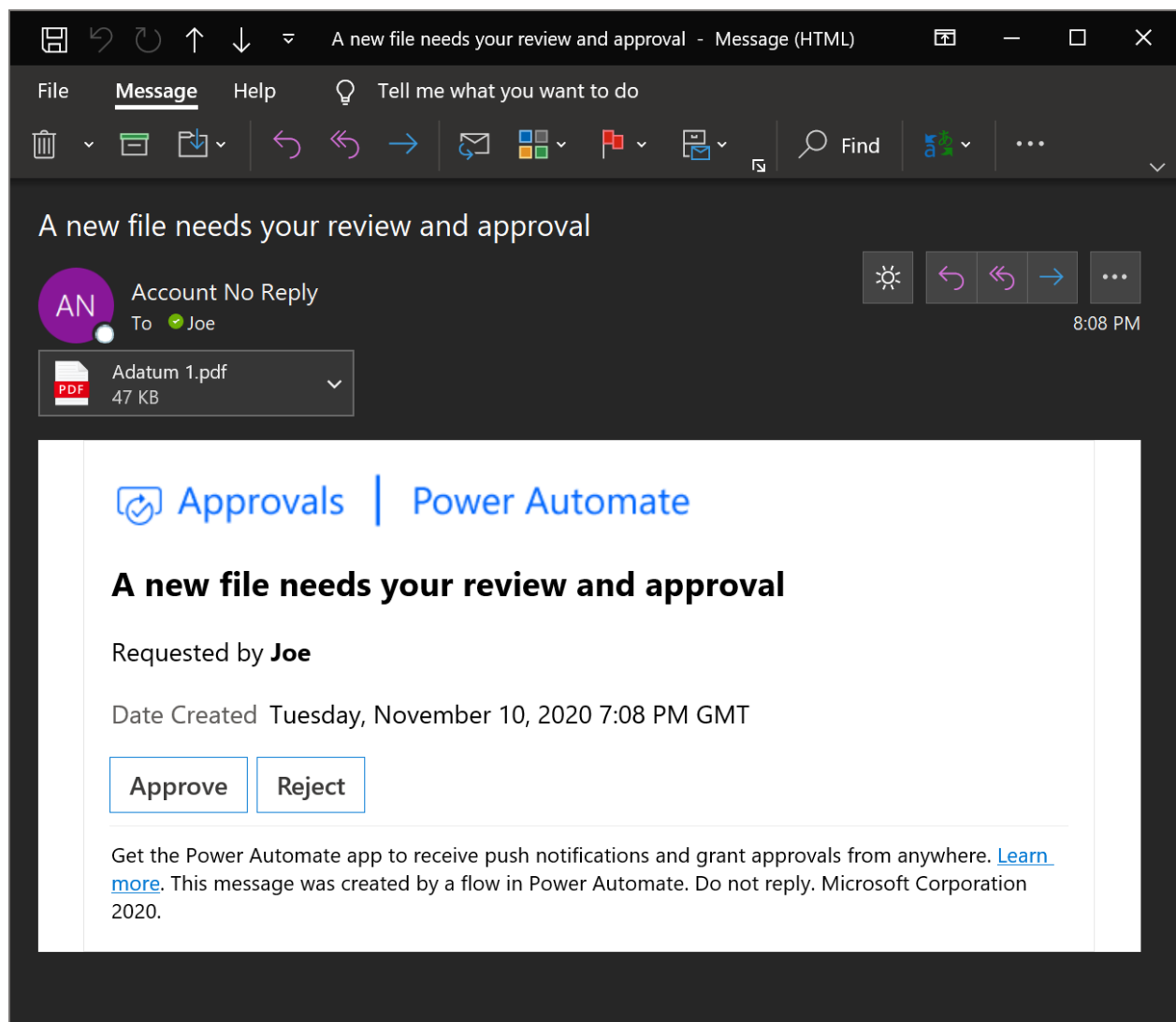


5. Now, you can see the flow is running.



The person to whom you have assigned the approval now receives the approval request in various places where they can approve or reject it. The file to review is attached to the approval request for easy reference.

### By email



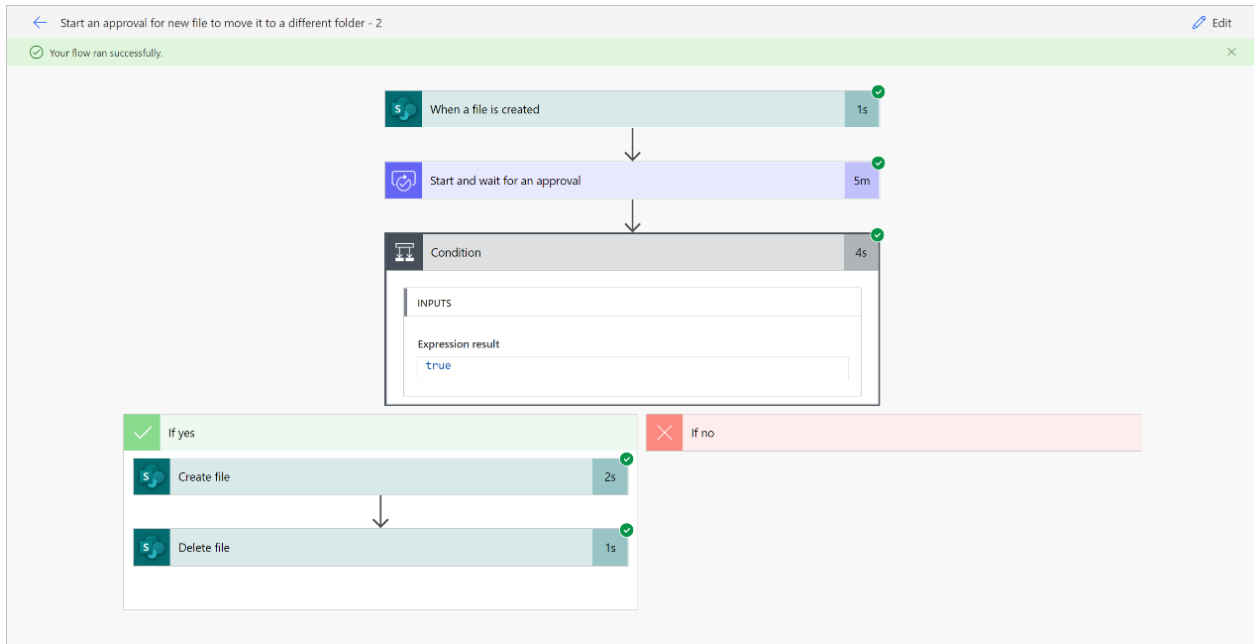
If you are not seeing the email displayed correctly, make sure you have the latest updates in your Outlook app or use the web version of Outlook.

**In Power Automate, on the Action items Approvals section**



Request	Received	Status	Requested by	Sent To
A new file needs your review and approval	Jan 12, 12:39 PM (1 sec ago)	Pending		

Once the request is approved or rejected, the flow execution continues. If the request was approved, the file you put in the incoming folder will be moved to the other folder.



Congratulations! You have successfully run your flow with approval capabilities. Now that you know the basics, you can build on top of this flow to tailor it to your specific business needs.

## Next steps

- Create [approval flows](#)

# How to - Top scenarios with approval flows

Article • 03/10/2023

Here are the top *how to* questions and answers about approvals in Power Automate.

## Customize approval requests

There are two ways to customize approval requests.

### Using custom options

Power Automate approvals provides two default options to *approve* or *reject* requests.

Your business might need other options beyond approve/reject. For example, you might be reviewing a discount request and you may want the approver to be able to respond from a list of possible discount limits, including:

- Up to 5%
- Up to 10%
- Up to 15%
- Denied.

You can customize the list of responses to approval requests by using **Custom Responses**.

Here's an example.

Salespeople in an organization can request an approver to give customers a discount for their purchases. These Salespeople enter the discount request into a SharePoint list, which is the trigger of the flow. The flow then uses custom responses with the **Start and wait for an approval** action.

**S** When an item is created ...

\* Site Address  ▼


\* List Name  ▼


[Show advanced options](#) ▼





**Choose an action** ✕


**All** Built-in Standard Premium Custom My clipboard


  
Approvals


  
SharePoint

  
Microsoft Teams

  
OneDrive for Business


  
AI Builder


  
Office 365 Outlook


  
Common Data Servic...


▼


**Triggers** **Actions** See more


 **Start and wait for an approval**  
Approvals i

 **Wait for an approval**  
Approvals i

 **Create an approval**  
Approvals i

 **Set content approval status**  
SharePoint i

 **Post an Adaptive Card to a Teams channel and wait for a response (preview)**  
Microsoft Teams i

 **Post an Adaptive Card to a Teams user and wait for a response (preview)**  
Microsoft Teams i

Select as approval type **Custom Responses – Wait for all responses** or **Custom Responses – Wait for one response**, depending on if you need multiple approvers or

just one.

Add as many **response options** as needed. In this case we are giving four mentioned earlier.

Give a **Title** to the approval request, and then list the approvers in **Assigned to**.

The screenshot shows a configuration window for an approval request. The title bar reads "Start and wait for an approval". The main content area is divided into several sections:

- \* Approval type:** Custom Responses – Wait for one response
- \* Response options Item:** A list of four items, each with a dropdown menu and a trash icon:
  - 1 Up to 5%
  - 2 Up to 10%
  - 2 Up to 15%
  - 4 Denied
- + Add new item** button
- \* Title:** Please review discount request
- \* Assigned to:** Joe
- Details:** Markdown supported (see <https://aka.ms/approvaldetails>)
- Item link:** Add a link to the item to approve
- Item link description:** Describe the link to the item

At the bottom, there is a link: [Show advanced options](#)

After the approval request is answered, the flow sends an email to the salesperson who requested the discount, informing them about the outcome of the request.

To get the response to the approval request, just use the **Outcome** output.

The image shows a Power Automate flow editor with three steps: "When an item is created", "Start and wait for an approval", and "Send an email (V2)". The "Send an email (V2)" step is expanded, showing the following configuration:

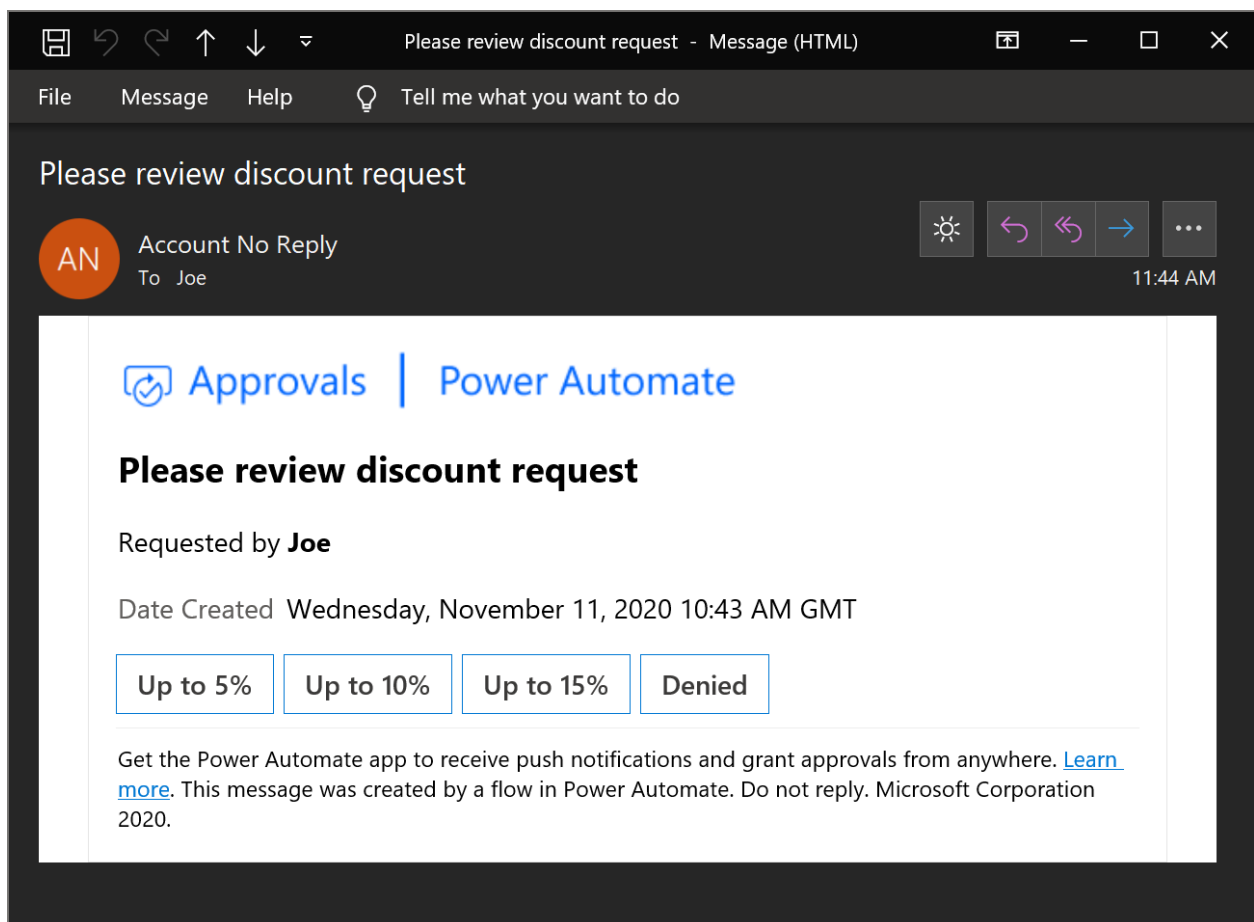
- To:** Created By Email
- Subject:** Discount request decision
- Body:** Hello, Your discount request has been reviewed and the discount policy for this purchase is: Outcome

Below the email configuration, there are buttons for "+ New step" and "Save".

On the right side, a "Dynamic content" pane is open, showing a list of dynamic content options for the "Start and wait for an approval" connector. The "Outcome" option is highlighted with a red box. The list includes:

- Response summary: A summary of the responses
- Outcome: The outcome of the approval**
- Approval ID: The name of the approval
- Title: The title of the approval
- Details: Additional details about the request
- Item link: A link to the item to approve

The approver sees the approval request like this.



## Using markdown

Markdown is a language that's used to format text into Webpages like headers, tables, or bold text. In an approval request, you can use markdown in the **Details** field to format the information presented to approvers.

You can learn more about how to use markdown and the supported apps in the [Use Markdown in Power Automate approval requests](#) article.

Here is an example of its usage.

Start and wait for an approval
...

* Approval type	Approve/Reject - First to respond <span style="float: right;">▼</span>
* Title	Please review discount request
* Assigned to	Joe x ;
Details	<p># Contoso discount policy</p> <p>Make sure you have reviewed our discount policy <b>**before**</b> approving this request.</p> <p>  Purchase amount   Recurrent customer   Policy recommendation  </p> <p> ----- :----- :----- </p> <p>  Less than \$1,000   No   Reject  </p> <p>  Less than \$1,000   Yes   Approve  </p> <p>  More than \$1,000   No   Approve  </p> <p>  LMore than \$1,000   Yes   Approve  </p> <p> [Read full policy](http://www.contoso.com/discountpolicy)</p>
Item link	Add a link to the item to approve
Item link description	Describe the link to the item

[Show advanced options](#) ▼

And here's how the approvers see it in a nicely formatted email in Outlook.

Please review discount request - Message (HTML)

File Message Help Tell me what you want to do

Please review discount request

Account No Reply  
To Joe

12:08 PM

If there are problems with how this message is displayed, click here to view it in a web browser.

Approvals | Power Automate

### Please review discount request

Requested by **Joe**

Date Created Wednesday, November 11, 2020 11:08 AM GMT

### Contoso discount policy

Make sure you have reviewed our discount policy **before** approving this request.

Purchase amount	Recurrent customer	Policy recommendation
Less than \$1,000	No	Reject
Less than \$1,000	Yes	Approve
More than \$1,000	No	Approve
More than \$1,000	Yes	Approve

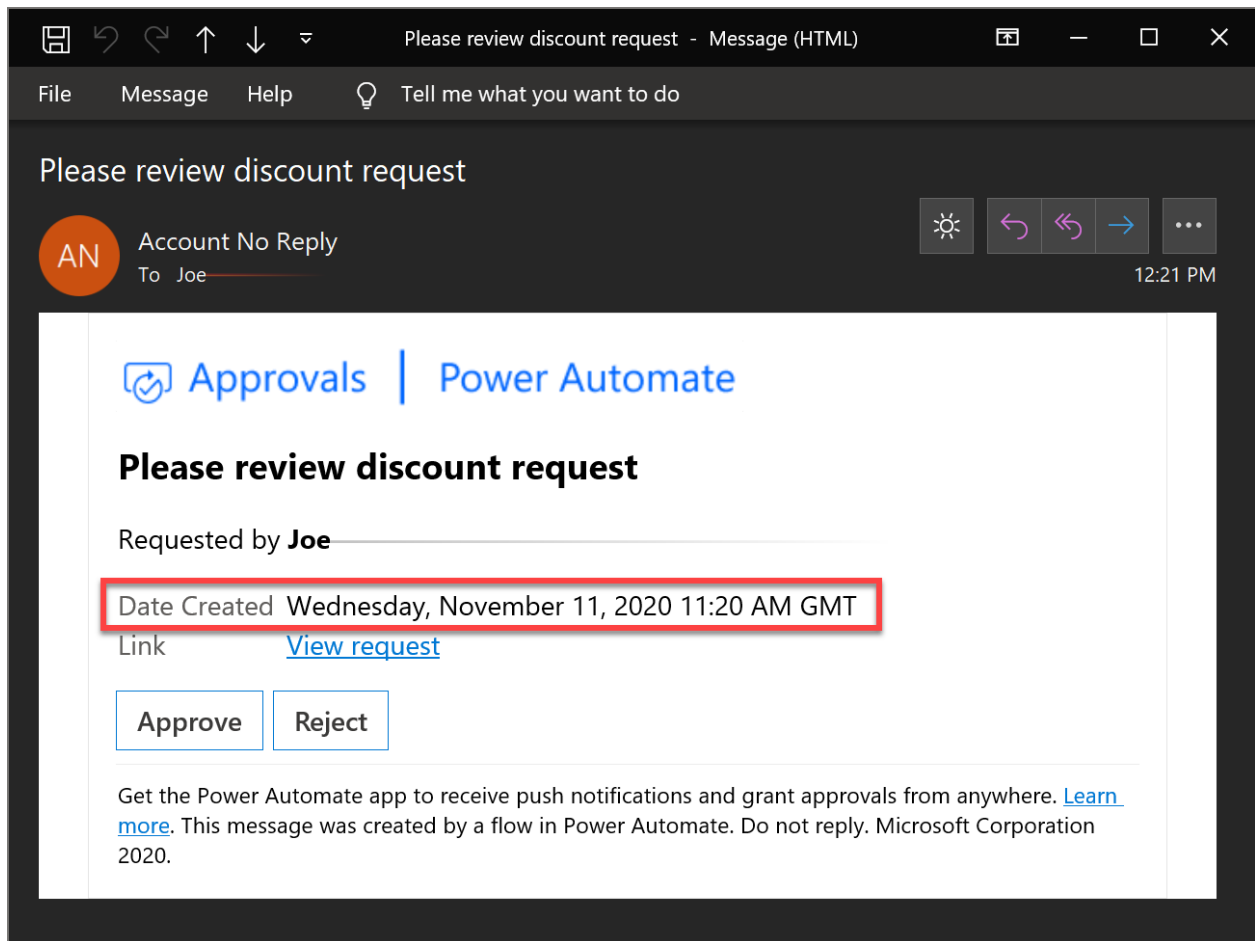
[Read full policy](#)

Get the Power Automate app to receive push notifications and grant approvals from anywhere. [Learn more](#). This message was created by a flow in Power Automate. Do not reply. Microsoft Corporation 2020.

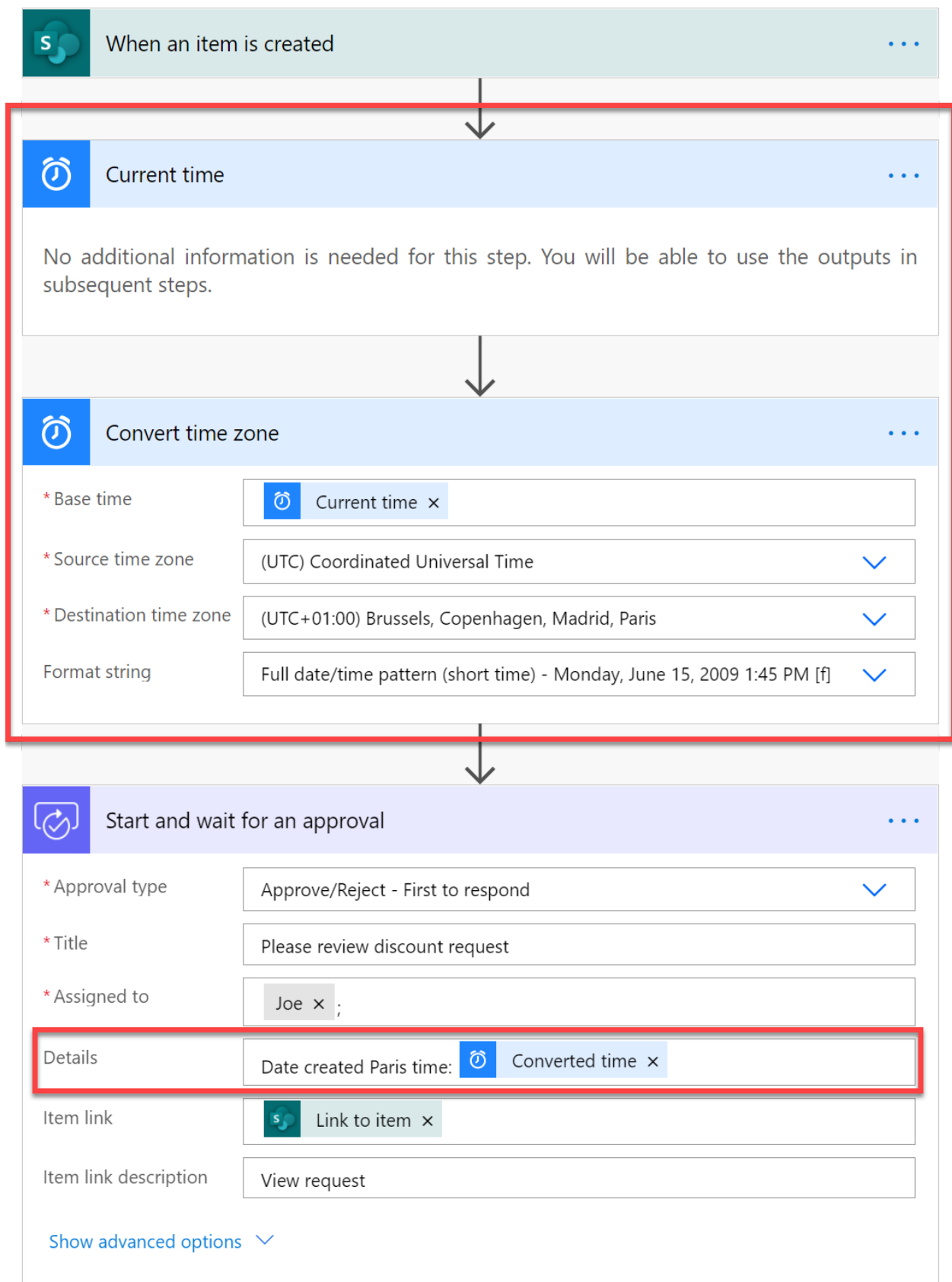
## Display approval date in my timezone

By default, approval emails display the **Date Created** field in GMT. There no way to change this field.

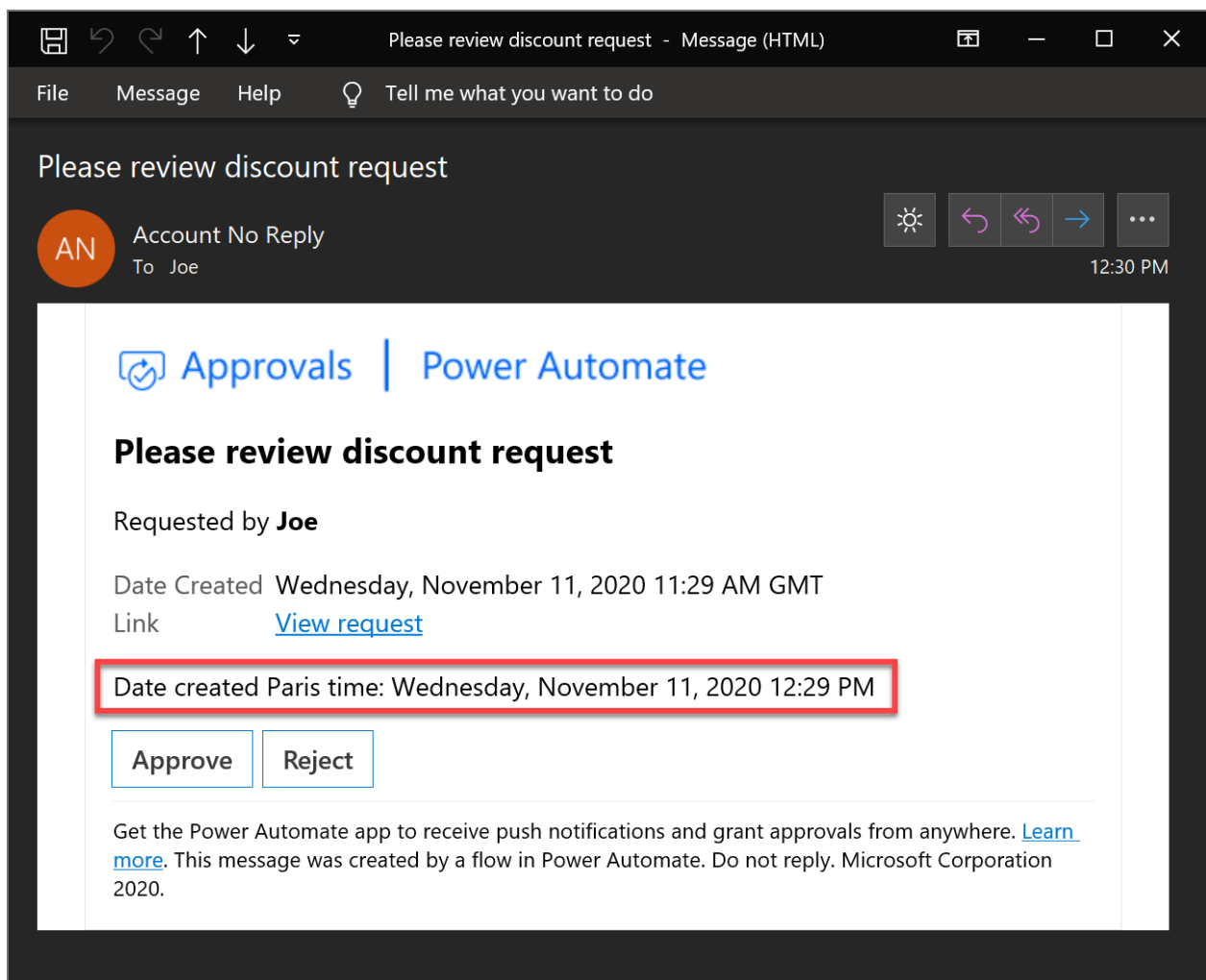




You can work around this by displaying the date the flow was run, in your desired timezone, in the **Details** field of the approval request. For example, to display the approval request date in Paris time, add two time actions like this.



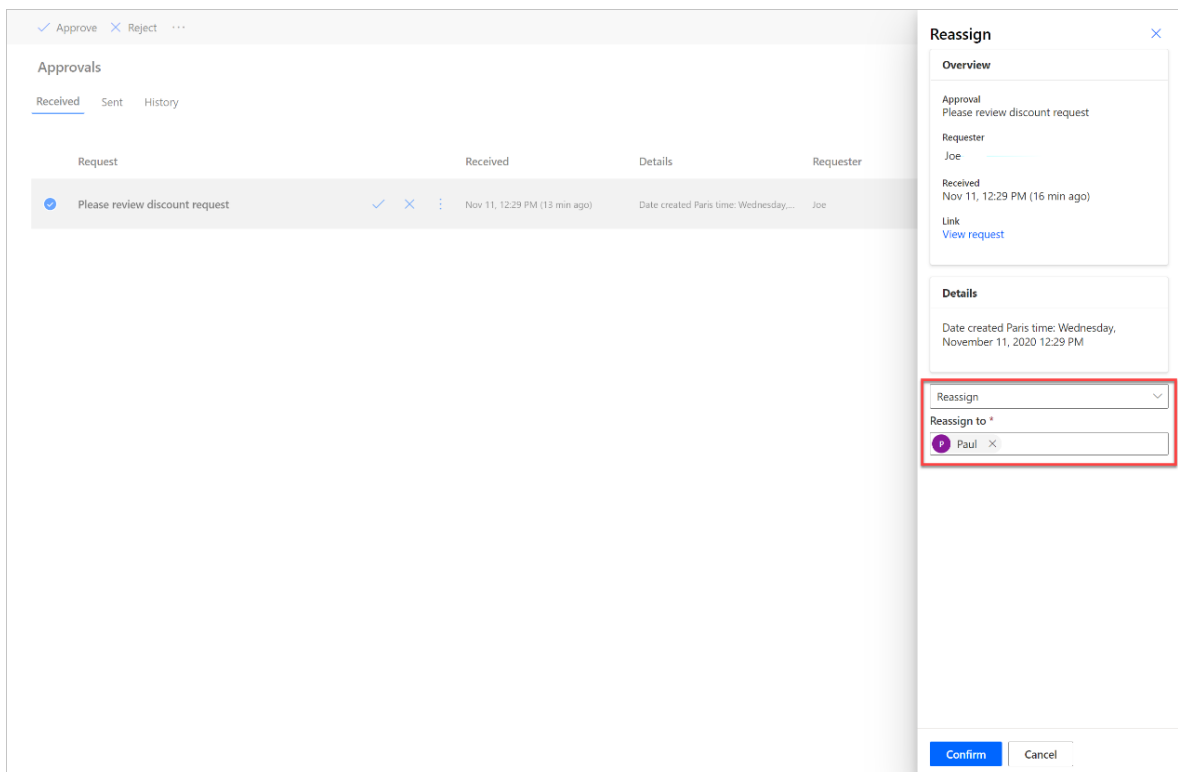
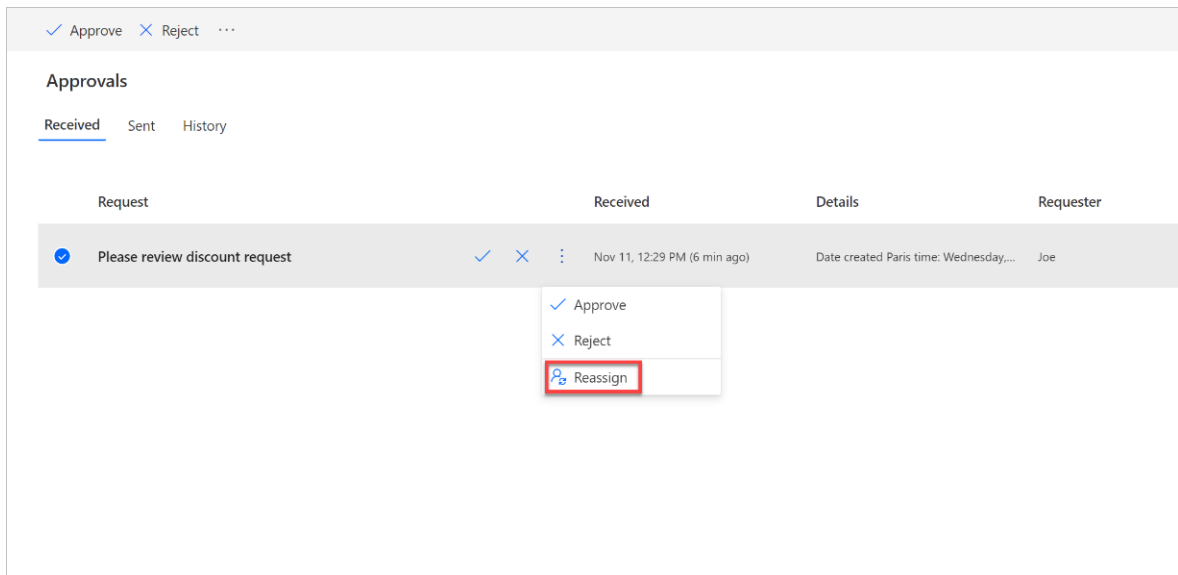
And the resulting approval email will look like this:



## Reassign an approval to another person

If received an approval request, but you want somebody else to make the approval decision, you can reassign the approval to somebody else:

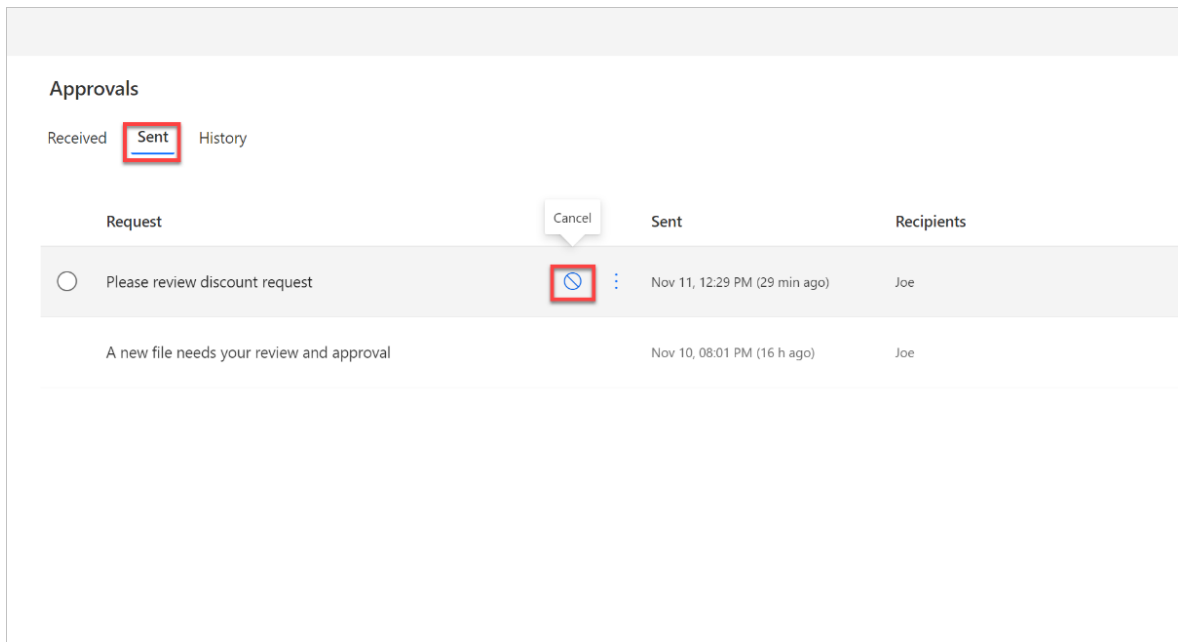
1. Login to the [Power Automate](#).
2. On the left navigation bar, select **Approvals**.
3. Hover your mouse over the approval you want to reassign, select the three dots > **Reassign**.



On the other hand, if you are the requester, you cannot reassign the approval request. However, you can **Cancel** the approval request, and then edit the flow to change the **Assigned to** approver.

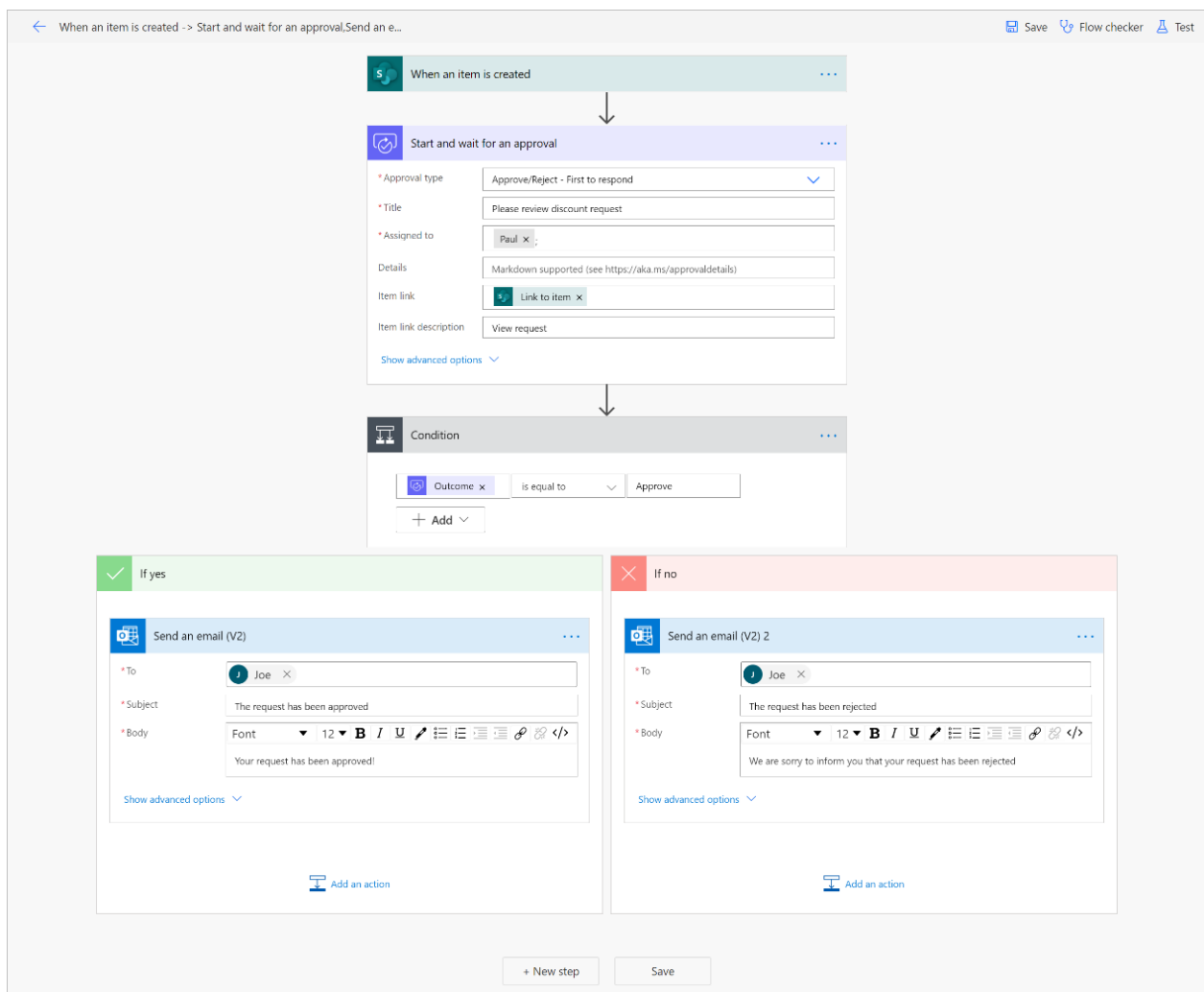
To cancel an approval:

1. Login to the [Power Automate](#) ↗.
2. On the left navigation bar, select **Approvals**.
3. Select the **Sent** tab.
4. Select **Cancel**.



## Get a confirmation email once an approval has been answered

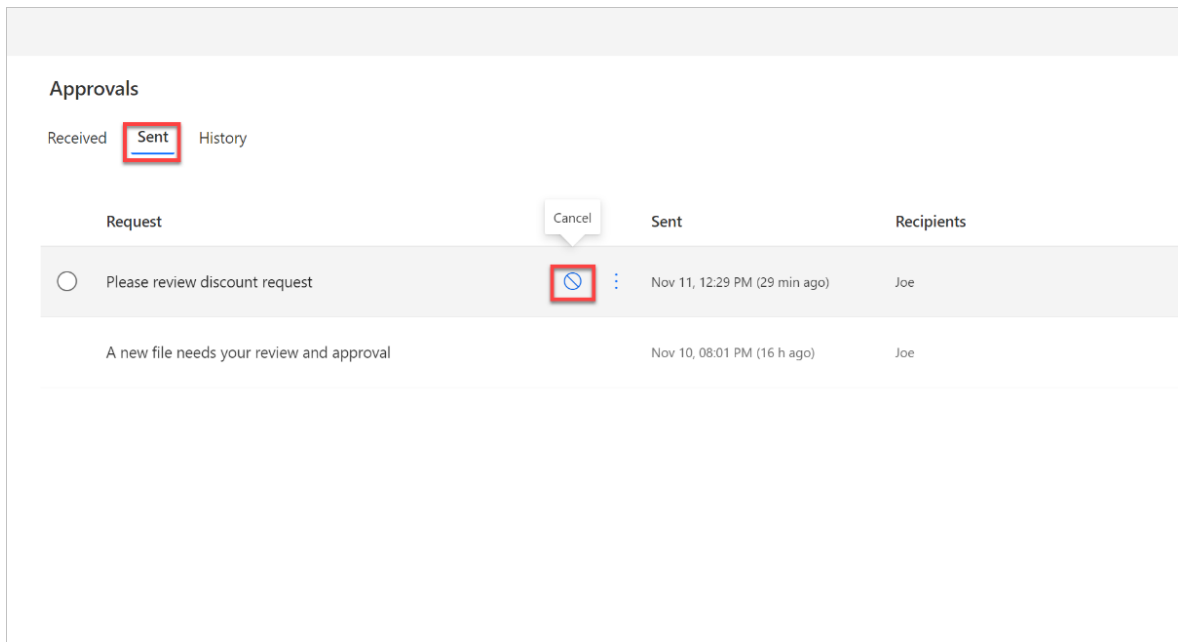
If you would like to be notified when an approver responds to an approval request, just send yourself an email after the approval step in the flow. Send the email on the **If yes** and on the **If no** branches of the approval outcome condition like this.



## Cancel an approval

If you are the maker of a flow that requests approvals, and the approval requests haven't been answered, you can cancel it by:

1. Login to the [Power Automate](#).
2. On the left navigation bar, select **Approvals**.
3. Select the **Sent** tab.
4. Select **Cancel**.



## Do sequential approvals

Some processes require pre-approval before the final approver is required to sign off. For example, an organization may have a sequential approval policy that requires pre-approval for invoices over \$1,000.00 before they're approved by the Finance department. This [walkthrough guides you on how to manage sequential approvals with Power Automate](#).

## Post an approval request in Microsoft Teams

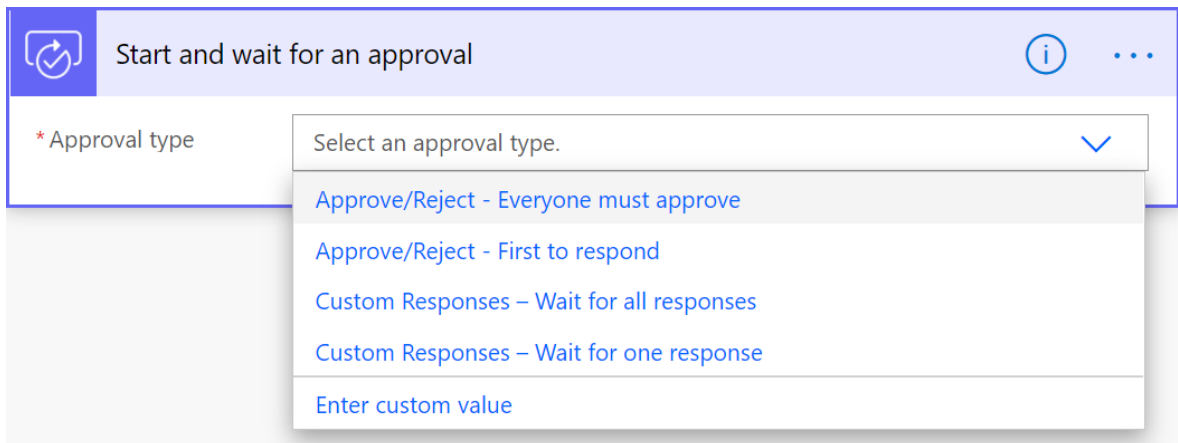
If you would like to notify the assigned approvers through a message in Microsoft Teams instead of by email, start with the [Request approval in Teams for a selected item in SharePoint template](#) to do it.

## Send an approval to multiple people

You can assign an approval request to multiple persons. Here are the two options.

1. When adding an approval action, there are two actions options for sending the approval request to multiple persons. Select the appropriate option based on your needs.
  - If only a response of one person from the group of people is enough to sign off the approval and continue with the flow run, use the **Approve/Reject – First to respond** or **Custom Responses – Wait for one response** action.

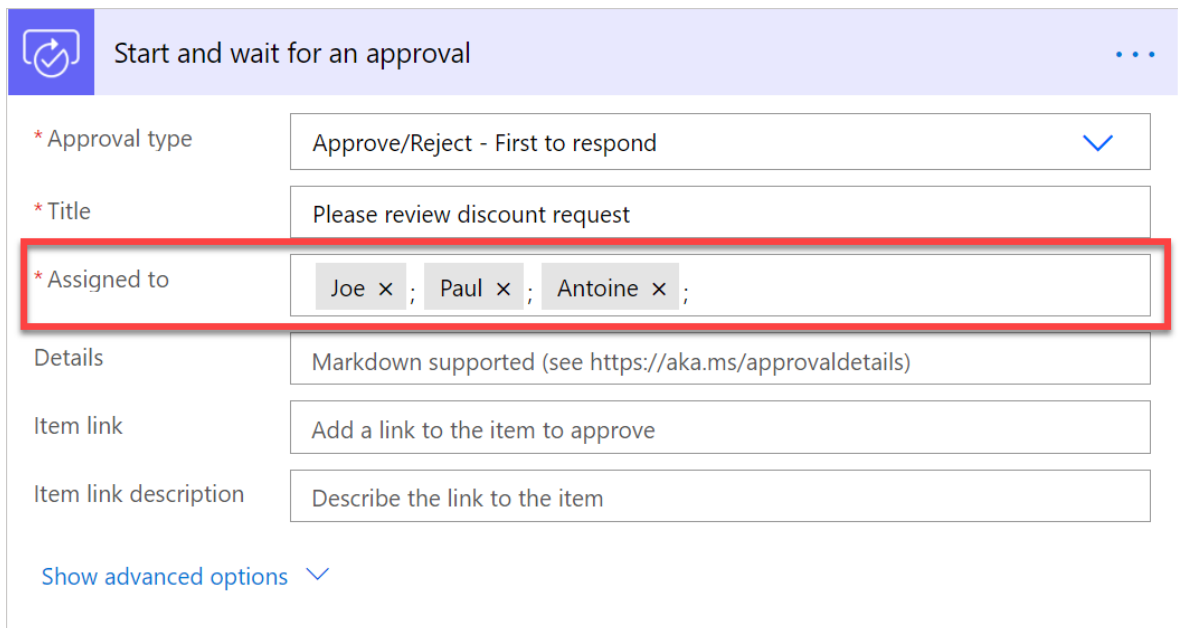
- If *Everybody* must respond to the approval request to continue with the flow run, select **Approve/Reject – Everybody must approve** or **Custom Responses – Wait for all responses – Wait for all responses**.



The screenshot shows the 'Start and wait for an approval' configuration interface. The 'Approval type' dropdown menu is open, displaying the following options:

- Select an approval type.
- Approve/Reject - Everyone must approve
- Approve/Reject - First to respond
- Custom Responses – Wait for all responses
- Custom Responses – Wait for one response
- Enter custom value

2. In the **Assigned to** field, define the list of persons to whom the approval request should be sent. Separate each person with a semicolon (;).



The screenshot shows the 'Start and wait for an approval' configuration interface with the 'Assigned to' field highlighted in red. The configuration is as follows:

- \* Approval type: Approve/Reject - First to respond
- \* Title: Please review discount request
- \* Assigned to: Joe x ; Paul x ; Antoine x ;
- Details: Markdown supported (see <https://aka.ms/approvaldetails>)
- Item link: Add a link to the item to approve
- Item link description: Describe the link to the item
- Show advanced options:

## Next steps

- Create [approval flows](#)



# Manage approval requests in Power Automate

Article • 04/14/2023

Power Automate makes it easy to automate [approval workflow processes](#). In this walkthrough, you learn how to view, approve, and reject approval requests sent from Power Automate.

## View pending approval requests

View all pending approval requests by following these steps:

1. Sign in to [Power Automate](#) <sup>↗</sup>.
2. On the left-side navigation pane, select **Action items > Approvals**.

Your pending approval requests appear on the **Received** tab.

## Approve a request

If you're an approver in an approval flow, you receive an email whenever someone creates a request. The approval request is also sent to the approvals center. You can then approve or reject requests from the email, the approvals center, or the Power Automate app.

To approve a request:

### From email

1. Select **Approve** from the email you receive when an item is added to the SharePoint Online list.

Note: If you're using a mobile device with the Power Automate app installed, the Power Automate app launches, otherwise, the approvals center opens in your browser.

2. Enter a comment, and then select the **Confirm** button.

### From the approvals center

1. Sign in to [Power Automate](#).
2. Select **Approvals** in the left-side navigation pane.
3. Select **Approve** on the request you want to approve.
4. Add any comments, and then select **Confirm** at the bottom of the screen.

## From the Power Automate app

1. On your mobile phone with the Power Automate app installed, select **Approve** from the request approval email.
2. Select **Confirm** in the upper right corner of the screen.
3. The success page shows, indicating that your approval has been recorded.

### ⓘ Note

The screens on Android, iOS and Windows Phone may differ slightly, however, the functionality is the same on all devices.

## Reject a request

You can reject a request via email, the approvals center, or the Power Automate app. To reject a request, follow the steps for approving a request, but select **Reject**, instead of **Approve**.

After you confirm your decision (rejection of the request), the flow runs the following steps:

1. Sends an email to the person who requested vacation.
2. Updates the SharePoint Online list with the decision, and the comments from the approver.

## See also

- [Create approval flows](#)
- [Create sequential approval flows](#)
- [Create parallel approval flows](#)
- Install the Power Automate mobile app for [Android](#), [iOS](#) or [Windows Phone](#)

# Create and test an approval workflow with Power Automate

Article • 10/30/2023

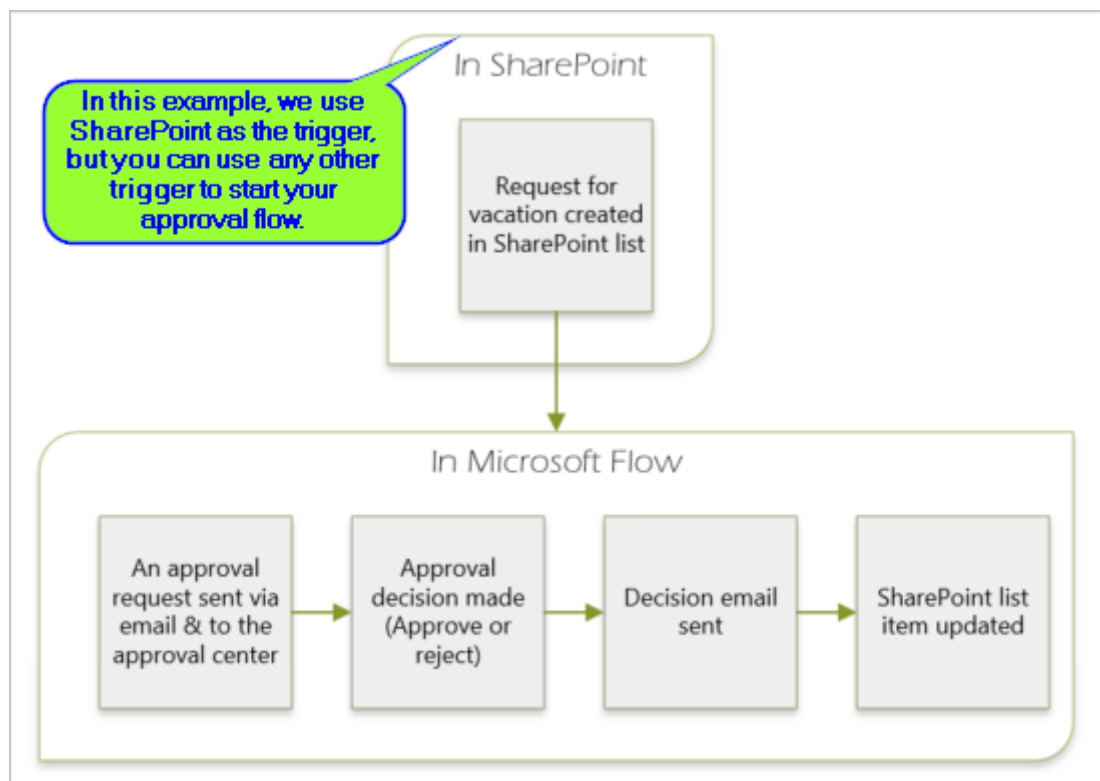
With Power Automate, you can manage the approval of documents or processes across several services, including SharePoint, Dynamics 365, Salesforce, OneDrive for Business, Zendesk, or WordPress.

To create an approval workflow, add the **Approvals - Start and wait for an approval** action to any flow. After you add this action, your flow can manage the approval of documents or processes. For example, you can create document approval flows that approve invoices, work orders, or sales quotations. You can also create process approval flows that approve vacation requests, overtime work, or travel plans.

Approvers can respond to requests from their email inbox, the approvals center in [Power Automate](#), or the Power Automate app.

## Create an approval flow

Here's an overview of the flow we'll create and test:



The flow performs the following steps:

1. Starts when someone creates a vacation request in a SharePoint Online list.

2. Adds the vacation request to the approval center, and then emails it to the approver.
3. Sends an email with the approver's decision to the person who requested vacation.
4. Updates the SharePoint Online list with the approver's decision comments.

#### Tip


For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

#### Important


Always follow the [best practices for SharePoint security](#) and your organization's best practices to ensure your environment is secure. Security is outside the scope of this article.


## Prerequisites

To complete this tutorial, you must have access to:

- [Power Automate](#) .
- A SharePoint Online list.
- Office 365 Outlook and Office 365 Users account.

#### Note

While we use SharePoint Online and Office 365 Outlook in this walk-through, you can use other services such as Zendesk, Salesforce, or Gmail. If you are using SharePoint 2010, see [SharePoint 2010 workflow retirement](#) .

Before you create the flow, create a [SharePoint Online list](#) . Later, we'll use this list to request approval for vacations.

Create these columns in your SharePoint Online list:

Column	Type
Title	Single line of text

Column	Type
Start Date	Date and Time
End Date	Date and Time
Comments	Single line of text
Approved	Yes/No
Manager Comments	Single line of text

Make note of the name and URL of the SharePoint Online list. You'll need these items later when you configure the **SharePoint - When an item is created** trigger.

## Create an automated cloud flow

1. Sign in to [Power Automate](#).
2. Select **My flows** in the left-side navigation pane.
3. On the top-left menu, select **New flow** > **Automated cloud flow**.

## Add a trigger

1. Give your flow a name.
2. Under **Choose your flow's trigger**, select **When an item is created - SharePoint**, and then select **Create**.
3. On the **When an item is created** card, select the **Site Address** and the **List Name** for the SharePoint list that you created earlier.

The **Site Address** and the **List Name** are the items you noted earlier in this walkthrough.

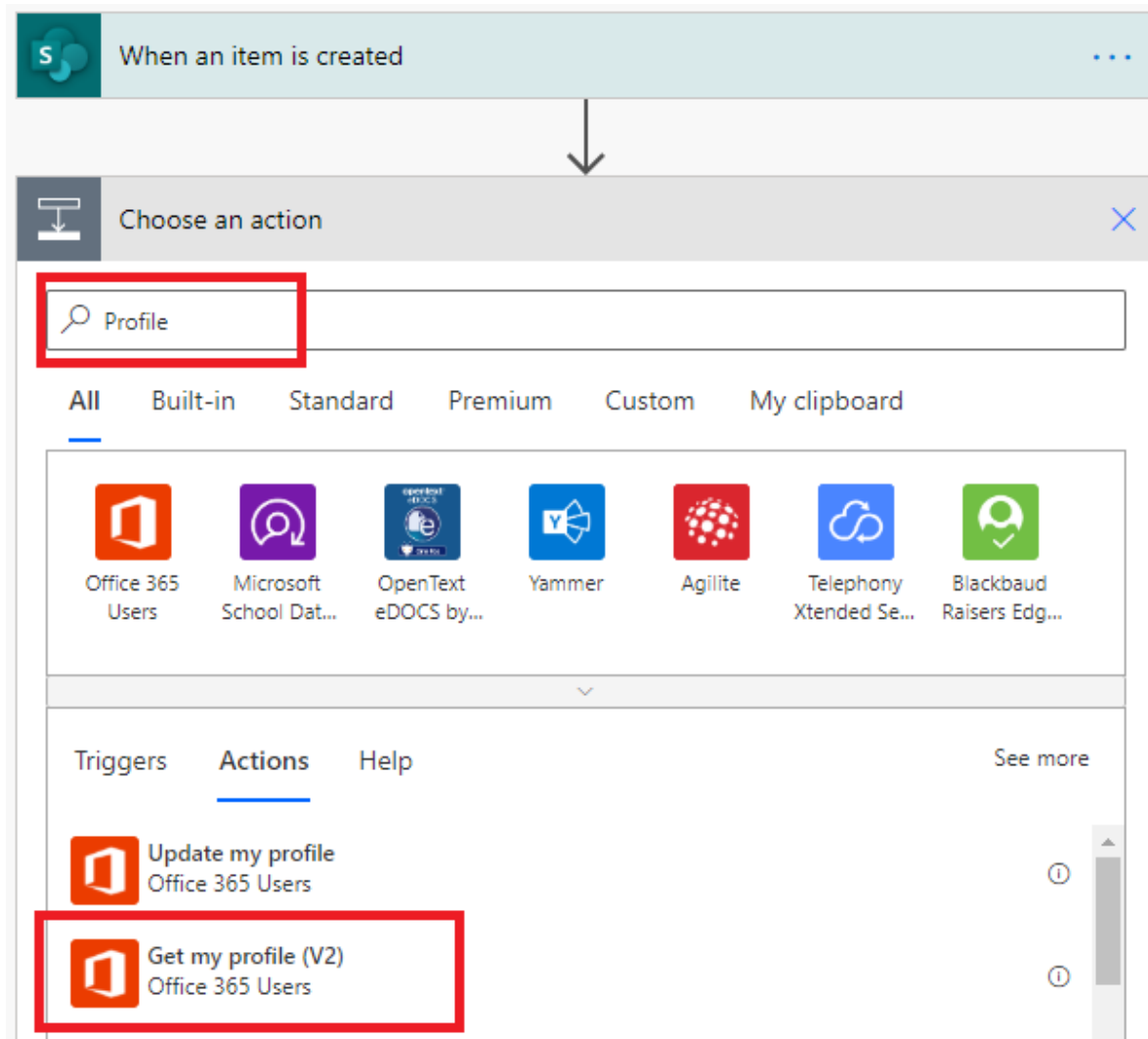
The screenshot shows the configuration interface for the 'When an item is created' trigger in Power Automate. The title bar at the top reads 'When an item is created' and includes an information icon (i) and a menu icon (three dots). Below the title bar, there are two dropdown menus for configuration:

- \* Site Address:** A dropdown menu with 'Process Simple Partners' selected and a downward arrow icon.
- \* List Name:** A dropdown menu with 'Vacation Requests' selected and a downward arrow icon.

At the bottom of the configuration area, there is a link labeled 'Show advanced options' with a downward arrow icon.

# Add a profile action

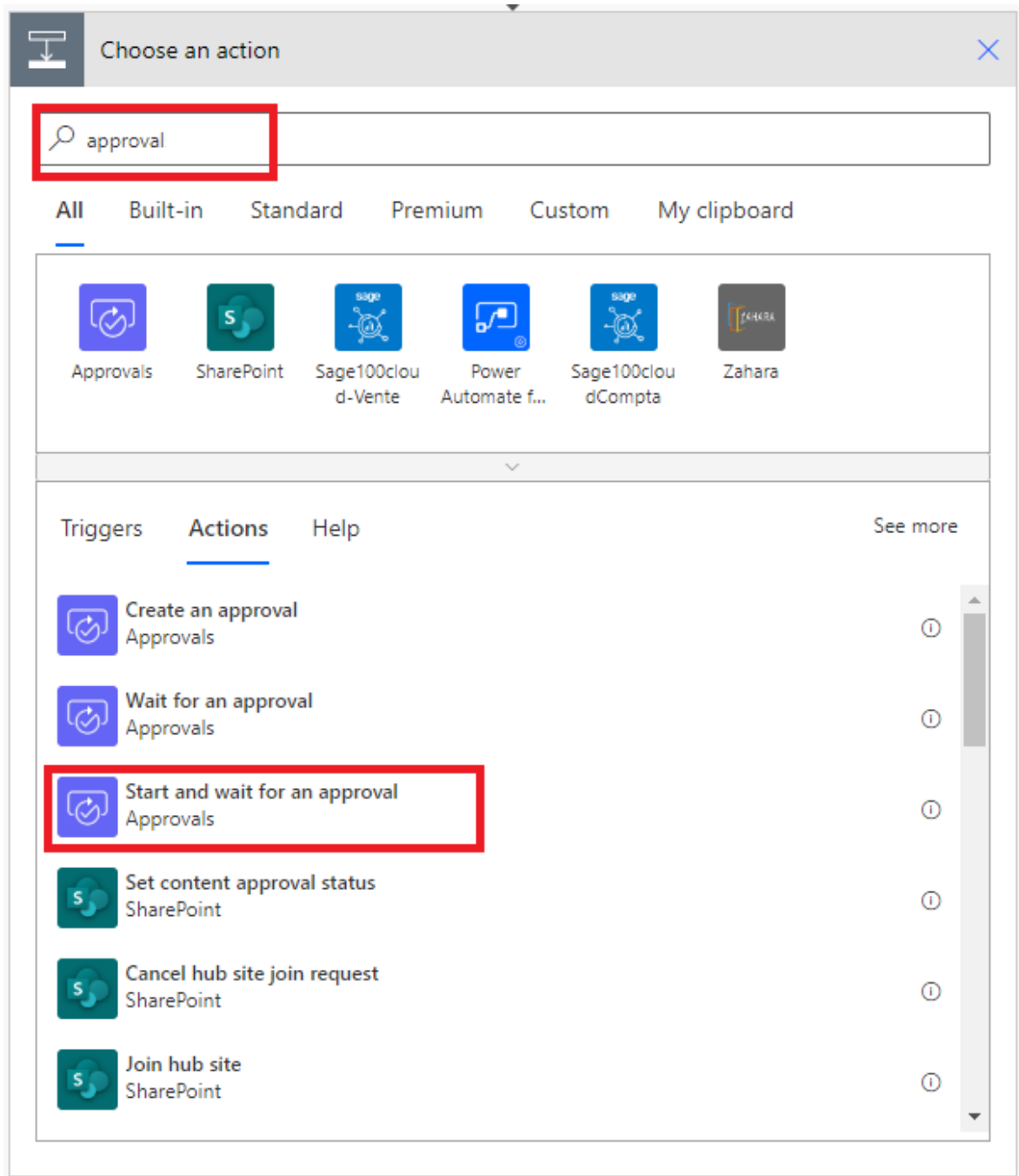
1. Select **New step**, and then type **profile** into the **Choose an action** search box.
2. Select **Office 365 Users**.
3. Find, and then select the **Get my profile (V2)** action.



4. Select the fields from your profile that you want to include in your flow, and then select **Create** to save the work you've done so far.

# Add an approval action

1. Select **New step**.
2. Type **approval** into the **Choose an action** search box.
3. Select the **Start and wait for an approval** action.



4. Configure the **Start and wait for an approval** card to suit your needs.

ⓘ **Note**

The **Approval type**, **Title** and **Assigned To** fields are required. You can use **Markdown** to format the **Details** field.

### ⓘ Note

This action sends the approval request to the email address in the **Assigned To** box.

If your scenario requires it, you can attach files to your approval requests that use Microsoft Dataverse.

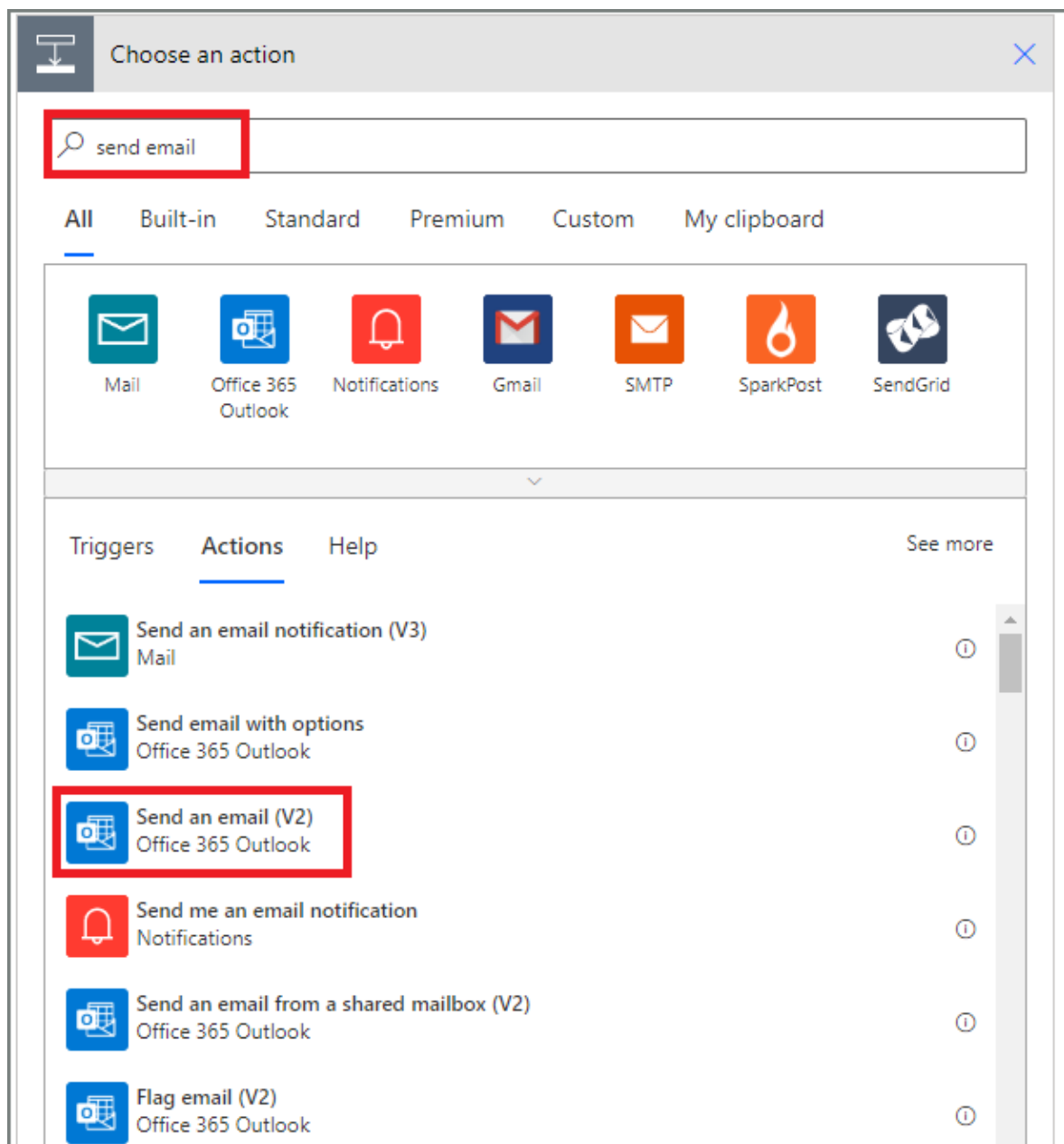
## Add an email action for approvals

Follow these steps to send an email if the vacation request is approved.

1. Select **Add an action** on the **If yes** branch of the condition.

2. Enter **send email** into the search box on the **Choose an action** card.
3. Select the **Send an email (V2)** action.





4. Configure the email card to suit your needs.

ⓘ Note

**To**, **Subject**, and **Body** are required.

This card is a template for the email that is sent when the status of the vacation request changes.

In the **Body** box on the **Send an email (V2)** card, use the **Comments** token from the **Approvals - Start an approval** action.

Send an email (V2) 3

\* To: Created By Email x

\* Subject: Your vacation request has been approved.

\* Body: Font 12 **B** *I* U [Rich Text Editor Icons]

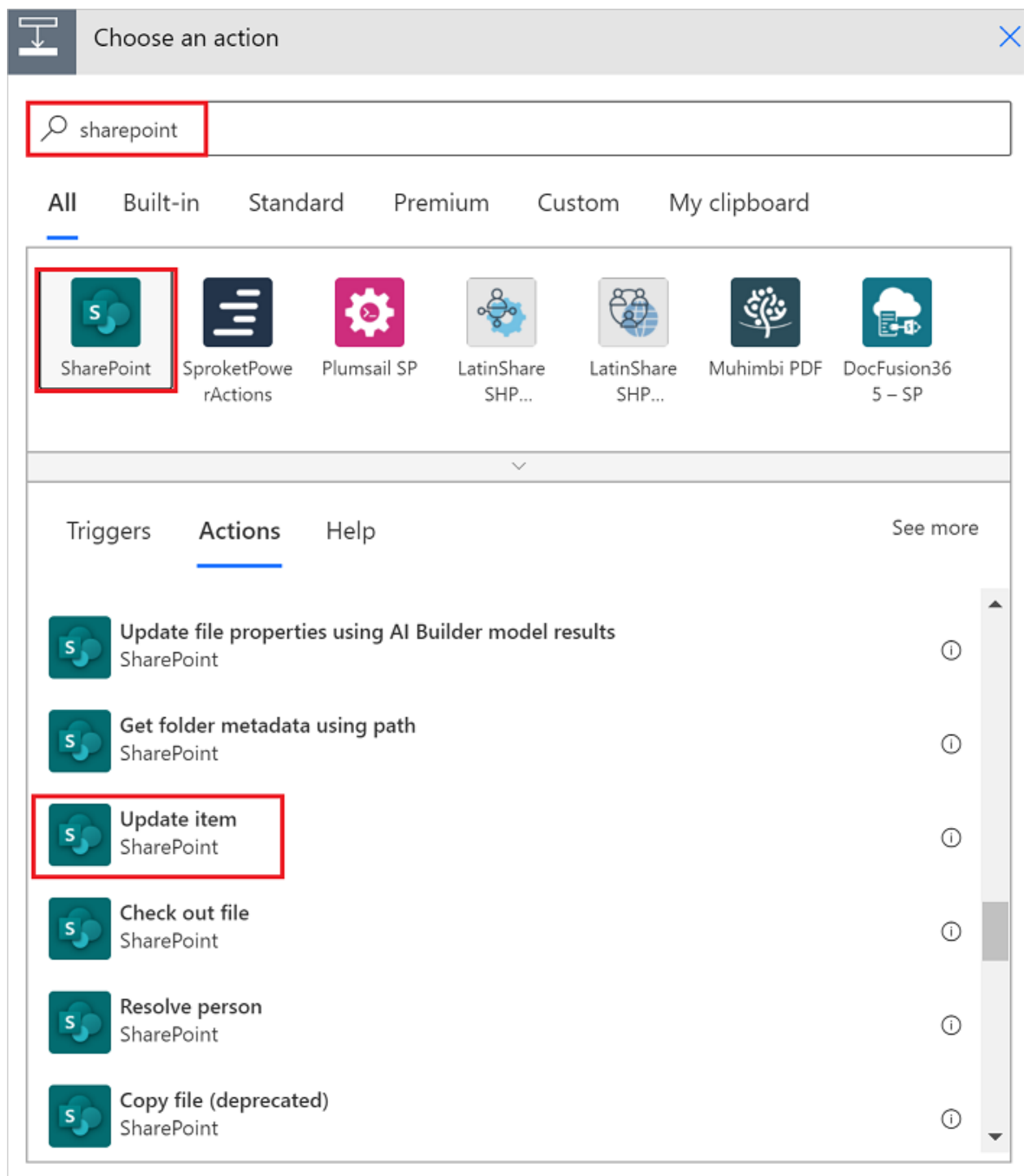
Your vacation request has been approved by Responses Approver name x

Approver comments: Responses Comments x

Show advanced options v

## Add an update action for approved requests

1. Select **Add an action** in the **If yes** branch.
2. Enter **SharePoint** in the search box on the **Choose an action** card, select the **SharePoint** filter, and then select the **Update item** action.



3. Configure the **Update item** card to suit your needs.

① Note

Site Address, List Name, Id, and Title are required.

S Update item (i) ...

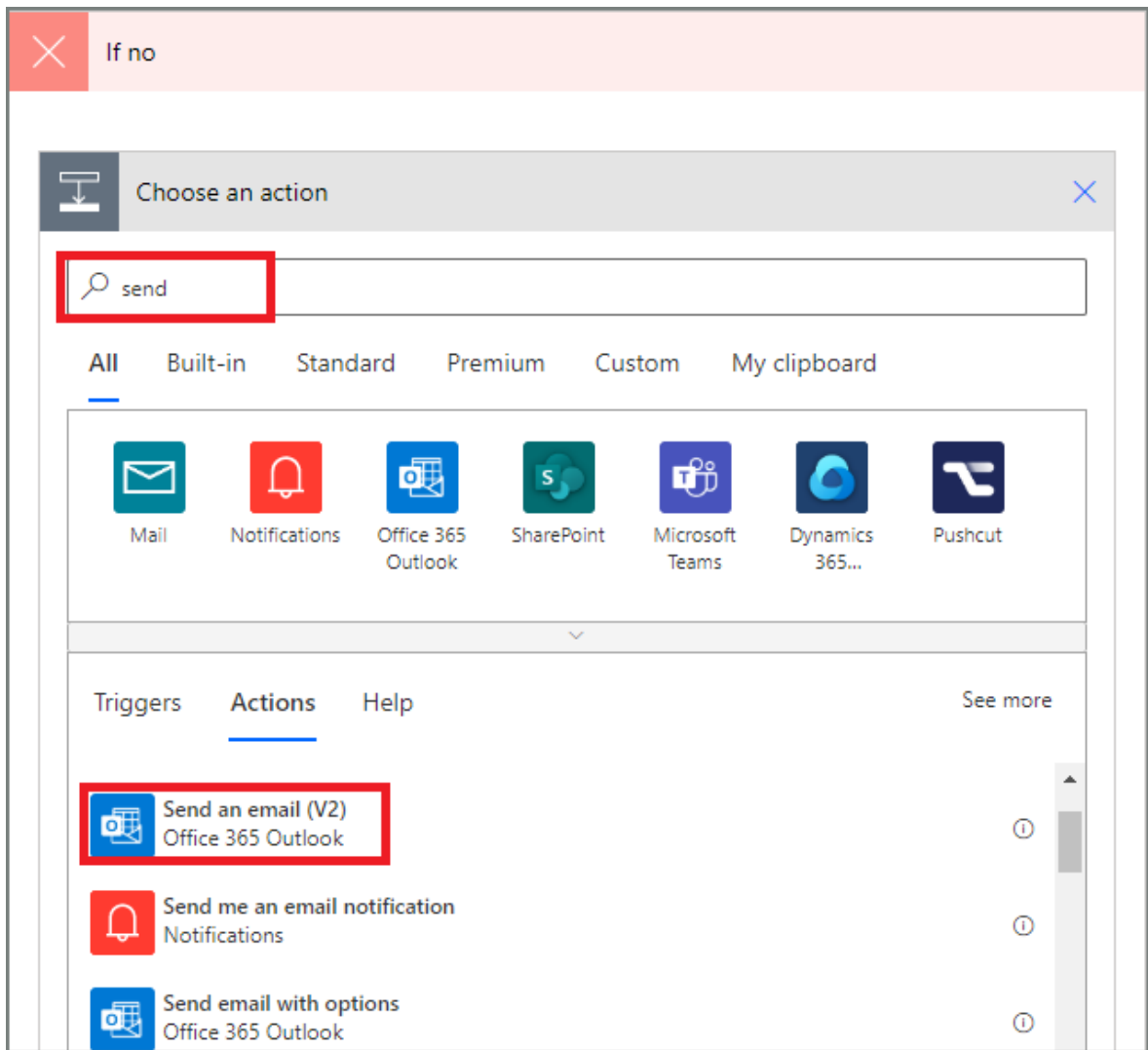
* Site Address	<div style="border: 1px solid #ccc; padding: 2px;">           Process Simple Partners -  <a href="https://microsoft.sharepoint.com/teams/processsimplepartners">https://microsoft.sharepoint.com/teams/processsimplepartners</a> </div>
* List Name	<div style="border: 1px solid #ccc; padding: 2px;">           Vacation Requests         </div>
* Id	<div style="border: 1px solid #ccc; padding: 2px;"> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">ID</span> ×         </div>
Limit Columns by View	<div style="border: 1px solid #ccc; padding: 2px;">           Avoid column threshold issues by only using columns defined in a view         </div>
* Title	<div style="border: 1px solid #ccc; padding: 2px;"> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">Title</span> ×         </div>
Vacation start date	<div style="border: 1px solid #ccc; padding: 2px;"> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">Vacation start ...</span> ×         </div>
Vacation end date	<div style="border: 1px solid #ccc; padding: 2px;"> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">Vacation end d...</span> ×         </div>
Comments	<div style="border: 1px solid #ccc; height: 20px;"></div>
Approved	<div style="border: 1px solid #ccc; padding: 2px;">           Yes         </div>
Manager comments	<div style="border: 1px solid #ccc; padding: 2px;"> <span style="background-color: #0070c0; color: white; padding: 2px 5px;">Responses Co...</span> ×         </div>

[Add dynamic content](#) +

[Hide advanced options](#) ^

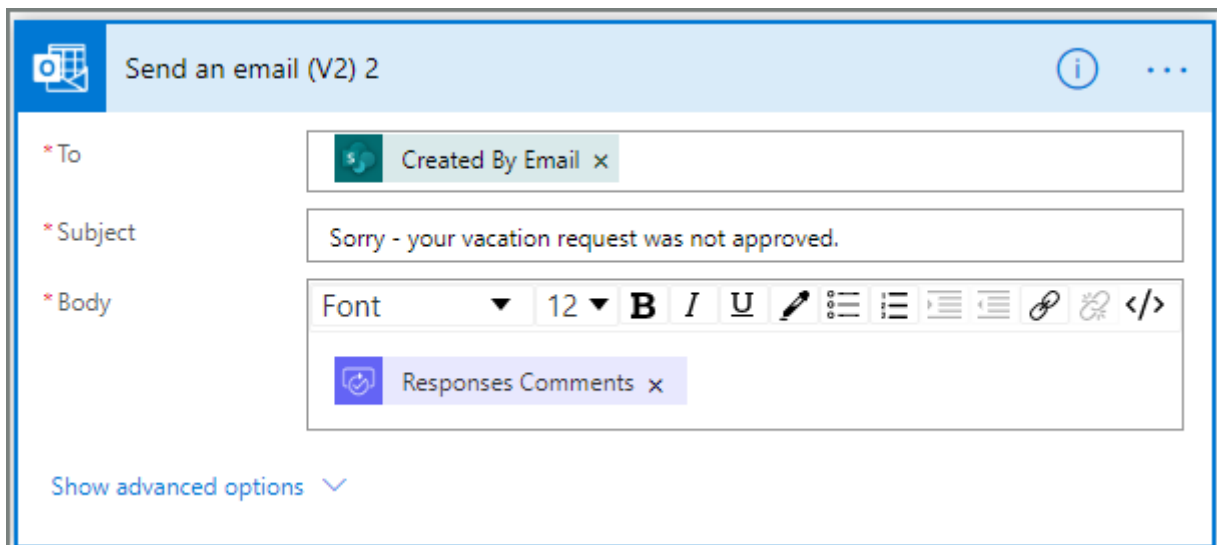
## Add an email action for rejections

1. Select **Add an action** on the **If no** branch.
2. Enter **Send** into the search box of the **Choose an action** card, select **Office 365 Outlook** to filter the actions, and then select the **Send an email (V2) - Office 365 Outlook** action.



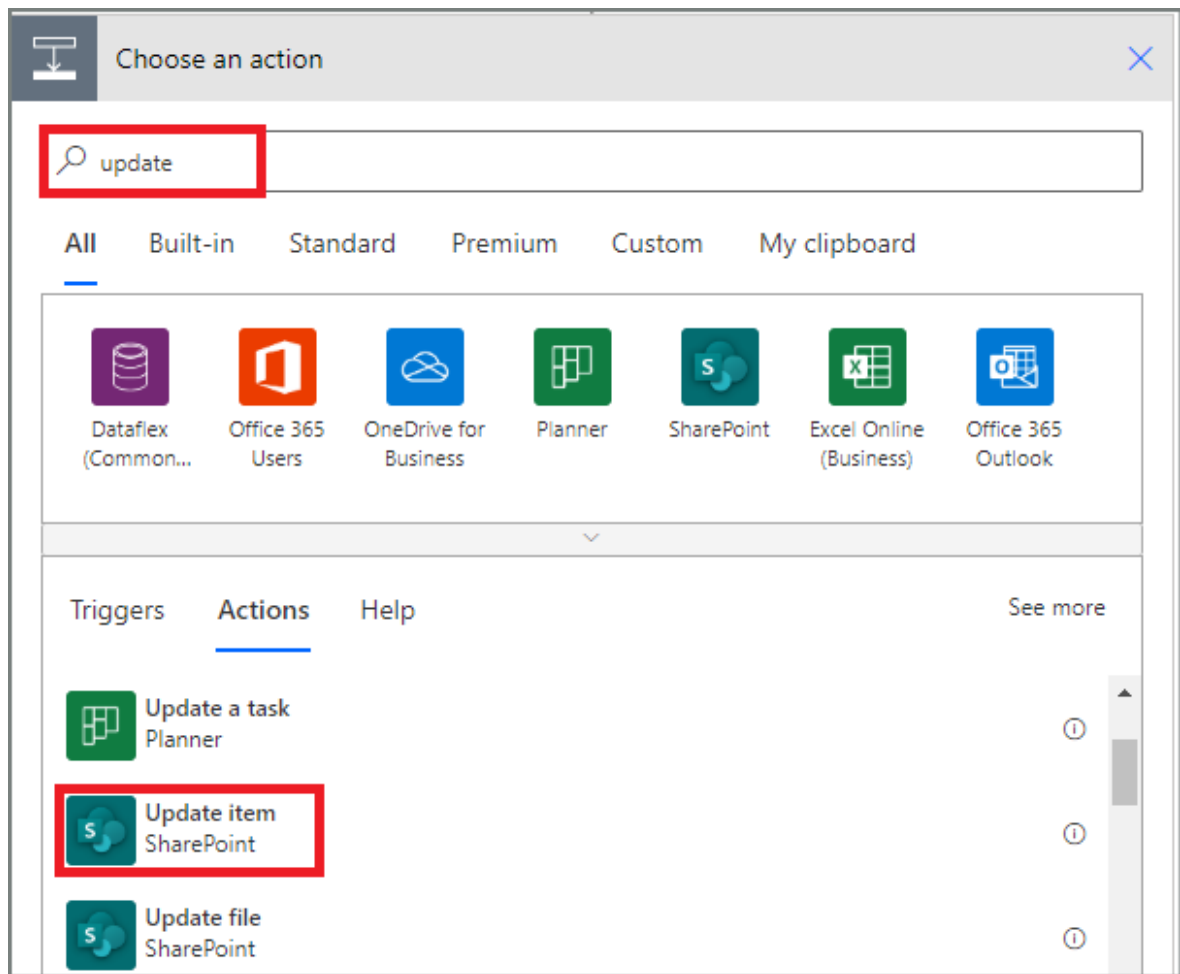
3. Configure the email card to suit your needs.

This card represents the template for the email that's sent when the status of a vacation request changes.



## Add update action for rejected requests

1. Select **Add an action**.
2. Enter **update** into the search box on the **Choose an action** card, and then select the **Update item - SharePoint** action.



3. Configure the card to suit your needs.

ⓘ Note

Site Address, List Name, Id, and Title are required.

**S** Update item 2 (i) ...

\* Site Address  ▼

\* List Name  ▼

\* Id  ×

\* Title  ×

Vacation start date

Vacation end date

Comments

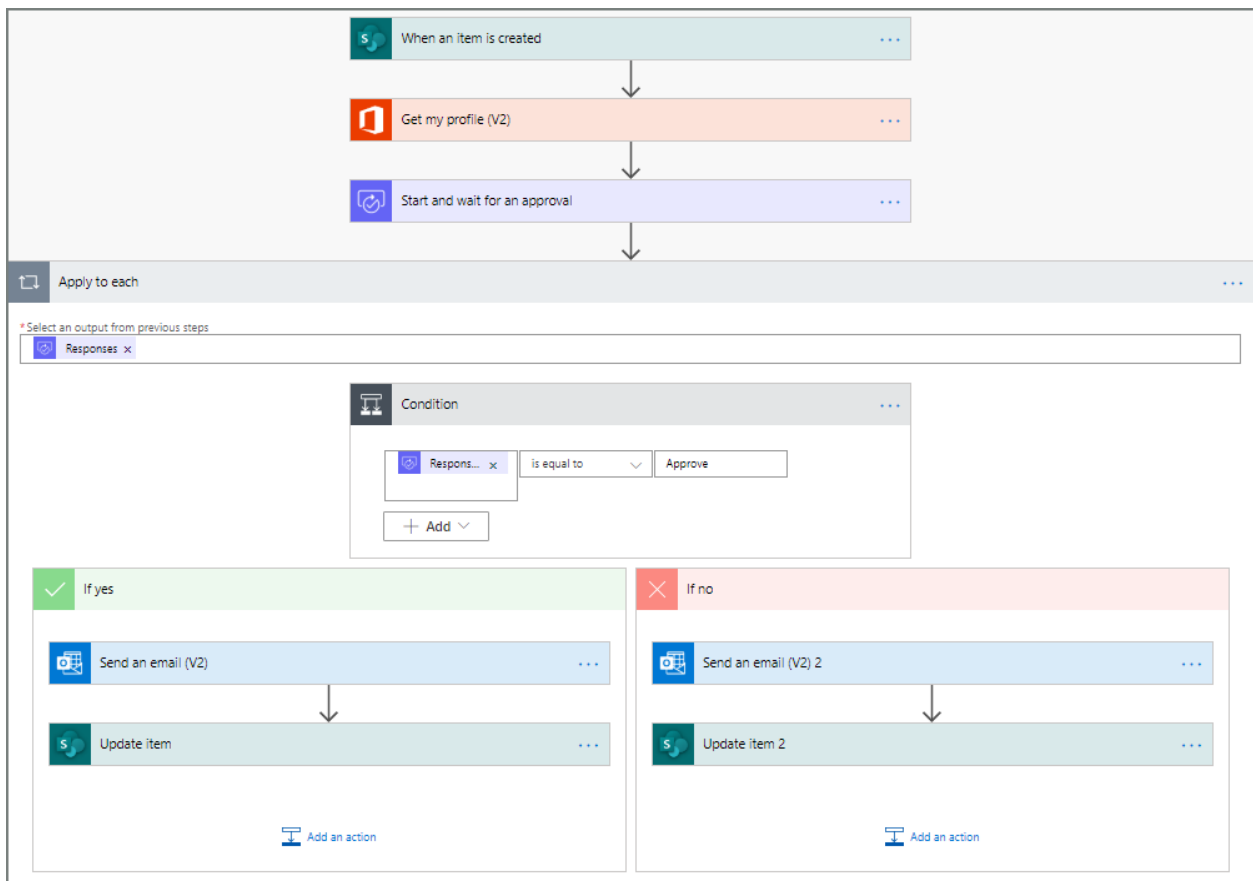
Approved  ▼

Manager comments  ×

[Show advanced options](#) ▼

4. Select **Save** to save the work we've done.

If you've followed along, your flow should resemble this screenshot:



Now that we've created the flow, it's time to test it!

## Request an approval to test your flow

Create a vacation request in the SharePoint Online list you created earlier.

After you save this request, the flow triggers, and then:

1. Creates a request in the approvals center.
2. Sends an approval request email to the approvers.

## Create long-running approvals

If it's likely that your flow will run for more than 30 days, consider storing your approvals in Microsoft Dataverse. This makes it possible for you to create flows that act on responses to approval requests, even after the original flow run times out.

To do this, use two flows, one to send an approval request, and the other to run business logic on the responses to the approval request, based on the **Create an approval (v2)** action. Learn more about [long running approvals](#).

### Tip

If you use modern email clients, you don't have to wonder if a request is still required because Power Automate automatically updates the email to indicate that the approval request is completed.

## Cancel an approval request

Sometimes you might want to cancel an approval request that you've sent. Possibly you made a mistake in the request, or it's no longer relevant. In either case, the person who sent the request can cancel it by following these steps:

1. Select the approval
2. Select **Cancel approval** in the side pane.

### Tip

You can always select the **History** tab to view the approval requests that you've canceled.



### ⓘ Note

The cancel feature is supported on the **Create an approval (v2)** action.

## Request approvals from guest users

You can send approvals requests to persons outside your organization. To do this, use Microsoft Entra guest users by [inviting users from other tenants as guests](#).

When you assign a role to a guest, this gives the guest the permission required to participate in the approval process.

Now that you've created and tested your flow, be sure to let others know how to use it.

### See also

- View and manage [pending approval requests](#)
- Create [sequential approval flows](#).
- Create [parallel approval flows](#).
- Install the Power Automate mobile app for [Android](#) <sup>↗</sup>, [iOS](#) <sup>↗</sup>, or [Windows Phone](#) <sup>↗</sup>.

# Create approval flows with attachments

Article • 07/11/2023

Sometimes, you need to get a file approved for business purposes. Fortunately, you can use Power Automate approvals to do this task. For example, let's say you are an accountant and you want to get approval for an invoice. You could create an instant flow that lets you send the file for approval by tapping a button and selecting the file to send.

In this article, you learn how to create an approval flow that sends an attachment that the approver needs to review before deciding if the request should be approved.

## Create the flow

1. Sign in to [Power Automate](#).
2. Select **My flows** > **New** > **Instant-from blank**.
3. Name your cloud flow > search for, and then select **Manually trigger a cloud flow**, and then select **Create**.
4. Select the **Manually trigger a cloud flow** trigger > **Add an input** > **File**.

The previous steps configure your flow so that when it runs, it requests a file from the user to trigger your flow.

5. Select **New step**.
6. Search for **Approvals** and then select **Start and wait for an approval**.
7. Select **Approve/reject - First to respond** in the **Approval type** list of the **Start and wait for an approval** card.
8. Provide the following information on the **Start and wait for an approval** card:
  - **Title** - This is a short description that tells the approver what the request is about.
  - **Assigned to** - The person to whom the request is sent.
  - **Details** - This text shows up in the approval request.
9. Select **Show advanced options** to reveal the fields in which you'll provide information about the file attached to the request.
10. Provide a file name in **Attachments Name** - 1

Include the file extension that matches the file type that's uploaded.

11. in the **Attachments Content - 1** field, provide the contents for the file that will be sent to the approver.

### ⓘ Note

The file content needs to be binary encoded. In most cases, this is handled correctly within the flow. However, if the attachment appears to be corrupted in the email, check to make sure the file content is binary encoded.

An easy way to do this is to use the **File Content** item from the list of dynamic content that appears when you select the **Attachments Content - 1** field.

The screenshot shows the configuration for a 'Start and wait for an approval' action. The settings are as follows:

- Approval type:** Approve/Reject - First to respond
- Title:** Approve an invoice
- Assigned to:** [User]@microsoft.com
- Details:** Here's my invoice. Kindly approve it.
- Item link:** Add a link to the item to approve
- Item link description:** Describe the link to the item
- Requestor:** [User]@microsoft.com
- Enable notifications:** Yes
- Enable reassignment:** Yes
- Attachments Name - 1:** MyInvoice.xlsx
- Attachments Content - 1:** File Content

At the bottom, there is an 'Add new item' button and a 'Hide advanced options' link.

12. Select **Save** to save your flow.

## Test your flow

You can test your flow by selecting **Test** and then uploading an .xlsx file.

1. Select **Test**.
2. Select **I'll perform the trigger action**.
3. To start the test, select **Test > Continue**.
4. Select **Import**.
5. Find the file, select it, and then select **Open** to upload the file or image you're sending for approval.
6. Select **Run flow**.

The test run starts.

7. To monitor the status of the test, select **Flow Runs Page**.

## Approve the request

The person to whom you send the approval request receives an email where they can view the attachment and then approve or reject the request.

Approvers can also review requests in the approvals center.

## Add a condition to an approval flow

In most approval flows, you'd want to notify the person who requests the approval of the decision. To learn how to add a condition to an approval flow to take specific actions based on the outcome of the request, go to [Create and test an approval workflow](#).

# Manage sequential approvals with Power Automate

Article • 09/08/2023

Some workflows require pre-approval before the final approver is required to sign off. For example, a company may have a sequential approval policy that requires pre-approval for invoices over \$1000.00 before they're approved by the Finance department.

In this tutorial, you create a sequential approval flow that manages employee vacation requests. For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

## ⓘ Note

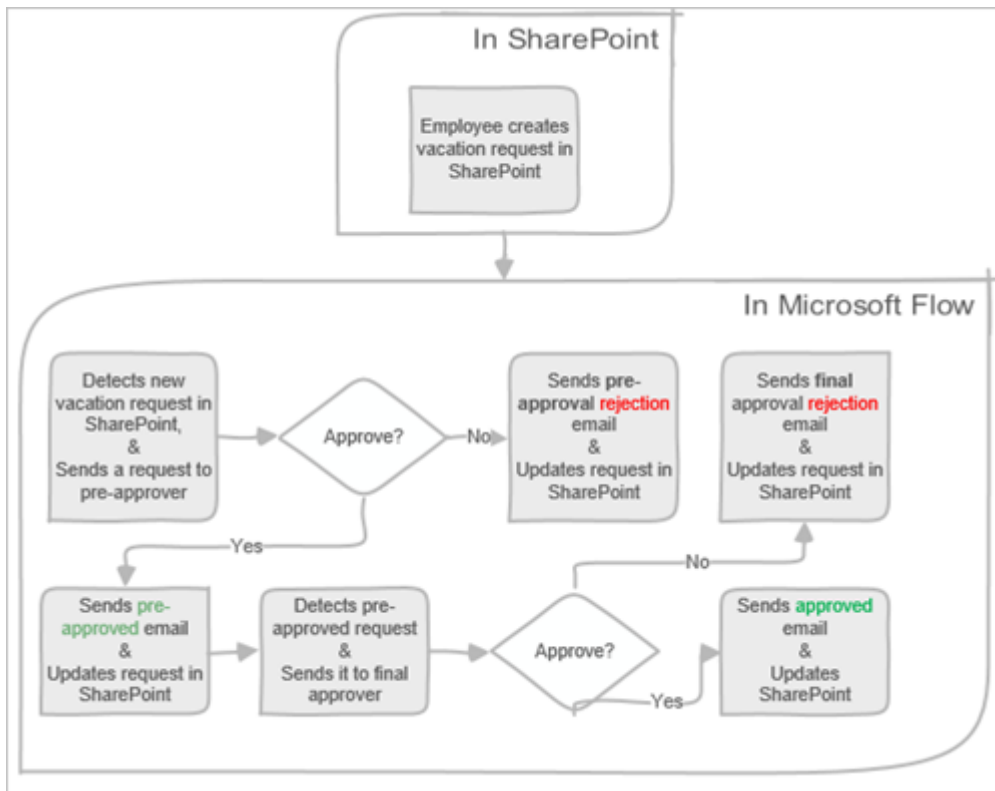
SharePoint is used here only as an example. It isn't required to create approval flows. You can use any of the more than 200 services with which Power Automate integrates to drive your flows. If you're using SharePoint 2010, go to [SharePoint 2010 workflow retirement](#).

## Detailed steps in the flow

The flow:

1. Starts when an employee creates vacation request in a [SharePoint Online list](#).
2. Adds the vacation request to the approval center and then emails the request to the pre-approver.
3. Emails the pre-approval decision to the employee.
4. Updates the SharePoint Online list with the pre-approver's decision and comments.  
Note: If the request is pre-approved, the flow continues with these steps:
5. Sends the request to the final approver.
6. Emails the final decision to the employee.
7. Updates the SharePoint list with the final decision.

This image summarizes the preceding steps:



## Prerequisites

- [Power Automate](#).
- A SharePoint Online list.
- Office 365 Outlook and Office 365 Users account.

### ⓘ Note

While we use SharePoint Online and Office 365 Outlook in this walk-through, you can use other services such as Zendesk, Salesforce, or Gmail. If you are using SharePoint 2010, see [SharePoint 2010 workflow retirement](#).

Before you create the flow, create a [SharePoint Online list](#). Later, we'll use this list to request approval for vacations.

For the purposes of this walkthrough, the SharePoint Online list that you create must include the following columns:

The SharePoint Online list you create must include the following columns:

Title	Single line of text
Vacation start date	Date and time
Vacation end date	Date and time

<b>Title</b>	<b>Single line of text</b>
Comments	Single line Of text
Approved	Yes/No
Manager comments	Multiple lines Of text
Modified	Date and time
Created	Date and time
Pre-approved	Yes/No
Created By	Person or group
Modified By	Person or group

Make note of the name and URL of the SharePoint Online list. We use these items later when you configure the **SharePoint - When a new item is created** trigger.

Power Automate uses either the classic designer or the Edit with Copilot (preview) designer. To identify which designer you're using, go to the **Note** section in [Understand the Edit with Copilot designer \(preview\)](#).

## Create your flow

1. Sign in to [Power Automate](#) <sup>↗</sup>.
2. Select **My flows** in the left-side navigation pane.
3. On the top-left menu, select **New flow** > **Automated cloud flow**.
  1. Give your flow a name.
  2. Under **Choose your flow's trigger**, select **When an item is created - SharePoint**, and then select **Create**.
  3. On the **When an item is created** card, select the **Site Address** and the **List Name** for the SharePoint list that you created earlier.
1. On the **When an item is created** card, select the **Site Address** and the **List Name** for the SharePoint list that you created earlier.

## Get the manager for the person who created the vacation request

1. Select **+New step**, and then type **get manager** into the **Choose an action** search box.
2. Find, and then select the **Get manager (V2) - Office 365 Users** action.
3. Insert the **Created By Email** token into the **User (UPN)** box on the **Get manager** card.

This action gets the manager for the person who created the vacation request in SharePoint.

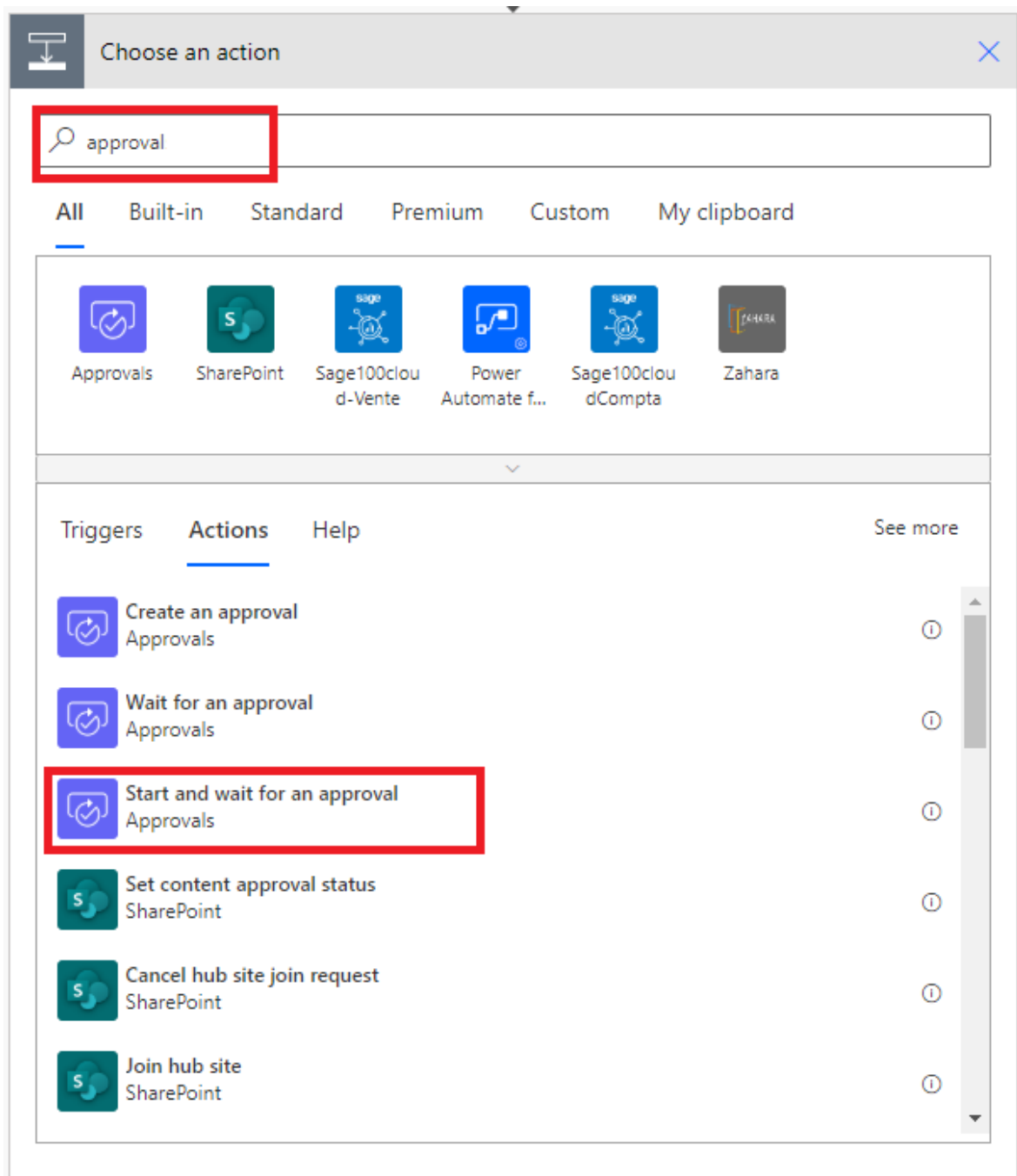
#### 📌 Note

It's a good idea to periodically save changes to your flow as you go.

## Add an approval action for pre-approvals

1. Select **New step**.
2. Type **approval** into the **Choose an action** search box.
3. Select the **Start and wait for an approval** action.





4. Configure the **Start and wait for an approval** card to suit your needs.

ⓘ **Note**

The **Approval type**, **Title** and **Assigned To** fields are required. You can use **Markdown** to format the **Details** field.

Start and wait for an approval
⋮

\* Approval type ▼  
Approve/Reject - First to respond

\* Title  
Vacation request for Created By Dis... ×

\* Assigned to  

M
manager@paintedcork.com ×

Details  

Created By Dis... ×
 wants to go on vacation from  
Vacation start ... ×
 until Vacation end d... ×

Item link  
Add a link to the item to approve

Item link description  
Describe the link to the item

Show advanced options ▼

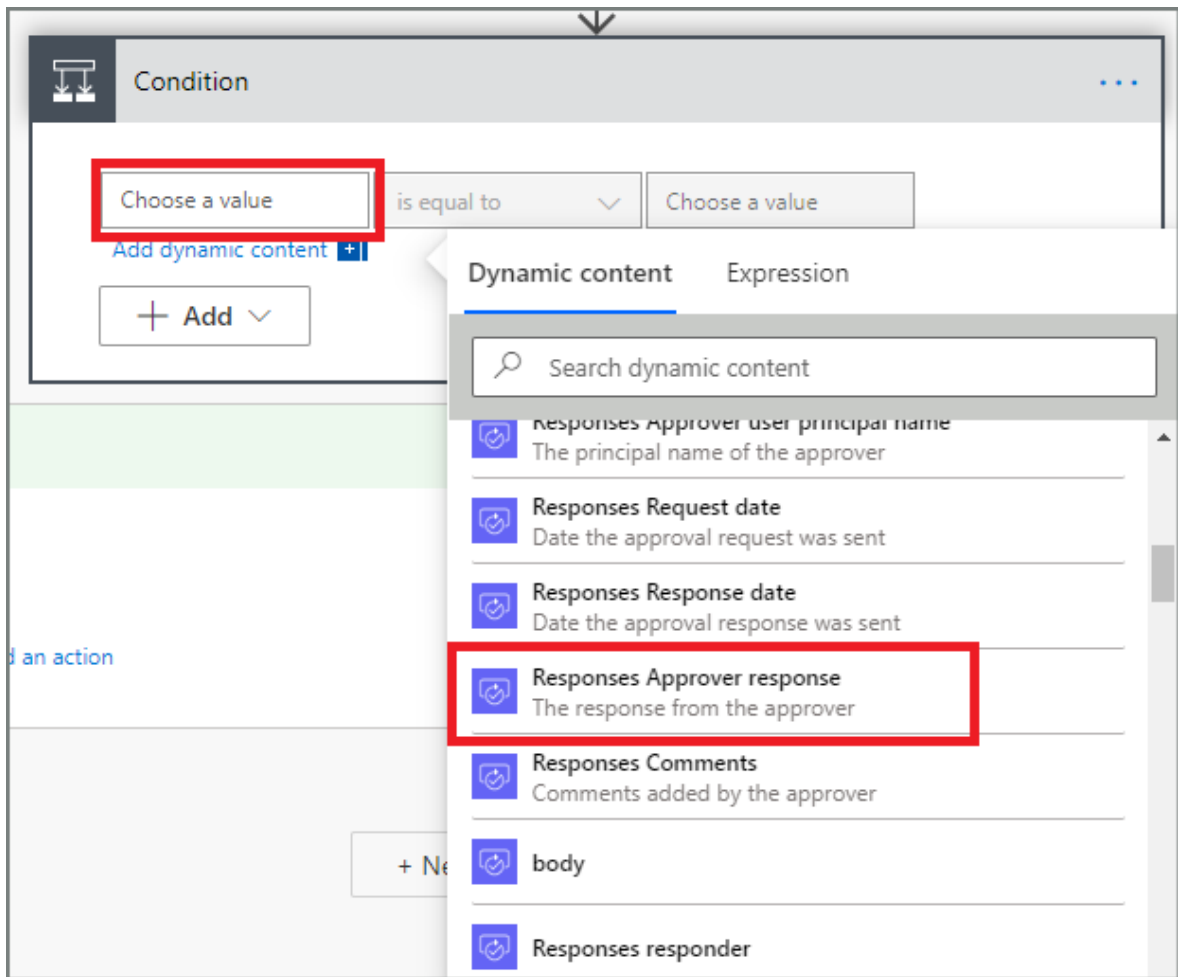
This action sends the pre-approval request to the email address in the **Assigned To** box.

## Add a condition

1. Select **New step**, and then select **Condition** in the list of actions.
2. On the **Condition** card, select **Choose a value** on the left.

A list of dynamic values display.

3. Select **Responses Approver response** from the list of dynamic values.

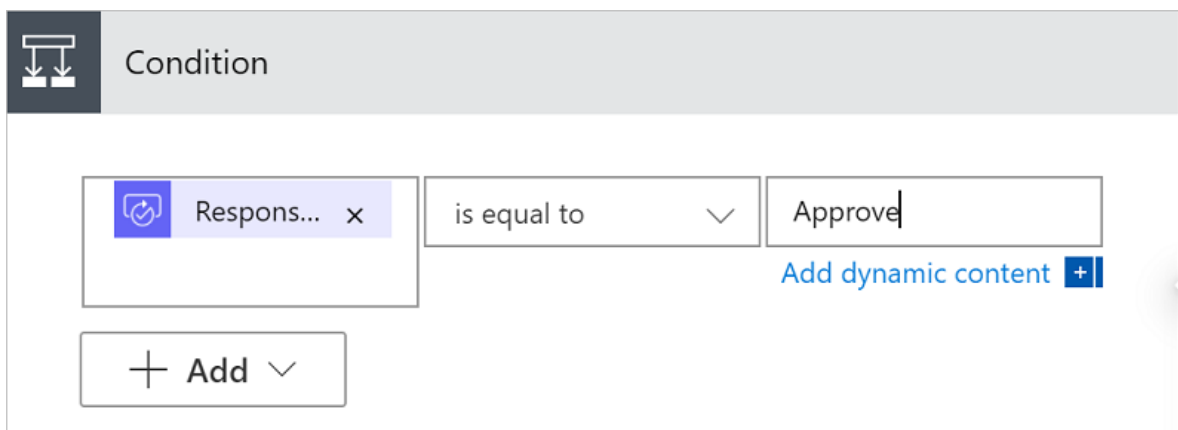


4. Select the **Choose a value** box on the right, and then enter **Approve** into the box.

ⓘ **Note**

The valid responses to the **Approvals - Start an approval** action are "Approve" and "Reject". These responses are case-sensitive.

5. Your **Condition** card should now show:

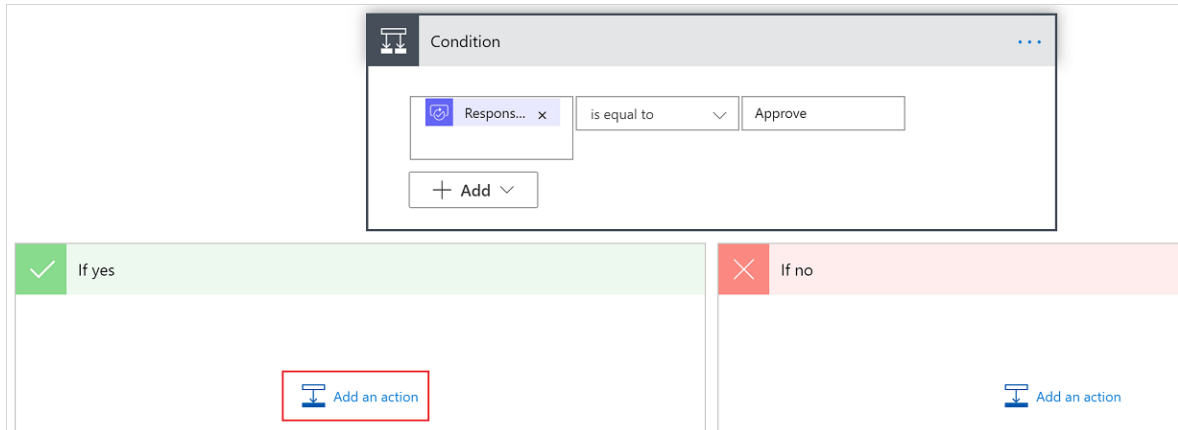


ⓘ **Note**

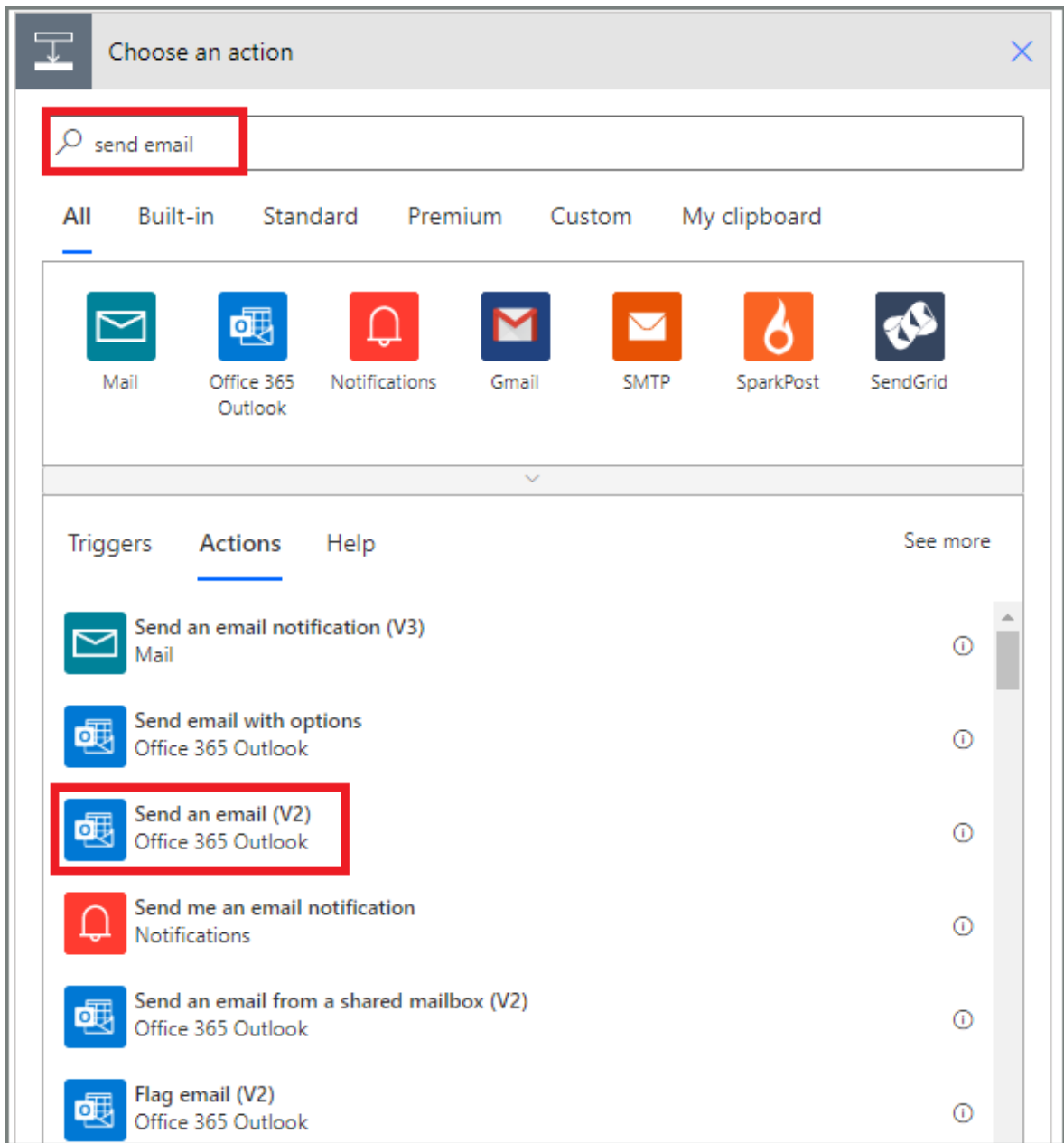
This condition checks the response from the **Start and wait for an approval** action.

## Add an email action for pre-approvals

1. Select **Add an action** on the **If yes** branch of the condition.



2. Enter **send email** into the search box on the **Choose an action** card.
3. Select the **Send an email (V2)** action.



4. Configure the email card to suit your needs.

ⓘ Note

**To**, **Subject**, and **Body** are required.

This card is a template for the email that is sent when the status of the vacation request changes.

In the **Body** box on the **Send an email (V2)** card, use the **Comments** token from the **Approvals - Start an approval** action.

Send an email (V2) 2

\* To: Created By Email x

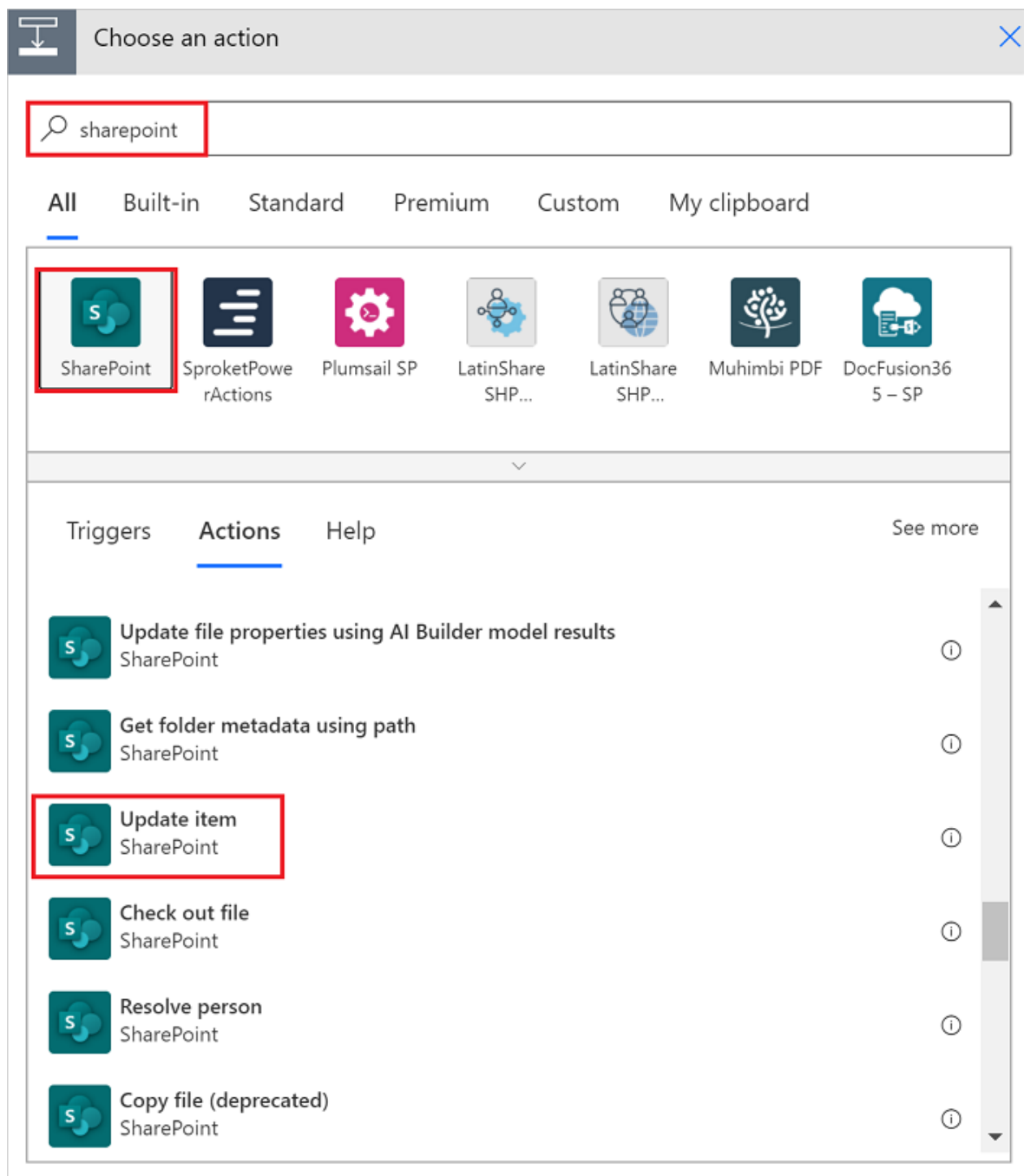
\* Subject: Your request has been approved by

\* Body: Font 12 **B** *I* U approved your request for vacation  
Direct manager comments x

Show advanced options v

## Add an update action for pre-approved requests

1. Select **Add an action** in the **If yes** branch.
2. Enter **SharePoint** in the search box on the **Choose an action** card, select the **SharePoint** filter, and then select the **Update item** action.



3. Configure the **Update item** card to suit your needs.

The screenshot shows a 'Update item' form with the following fields and values:

- \* Site Address: Process Simple Partners -  
https://microsoft.sharepoint.com/teams/processsimplepartners
- \* List Name: Vacation Requests
- \* Id: ID
- \* Title: Title
- Vacation start date: Vacation start ...
- Vacation end date: Vacation end d...
- Comments: (empty)
- Approved: No
- Manager comments: Manager com...
- Pre-approved: Yes

## Get the pre-approver's manager

1. Use the [Get the manager for the person who created the vacation request](#) steps we did earlier to add, and then configure another **Get manager** action. This time we get the pre-approver's manager.
2. The **Get manager 2** card should resemble this image when you're finished. Be sure to use the **Email** token from the **Get manager** category on the **Add dynamic content** from the apps and services used in this flow card.

The screenshot shows the 'Get manager 2' action card with the following configuration:

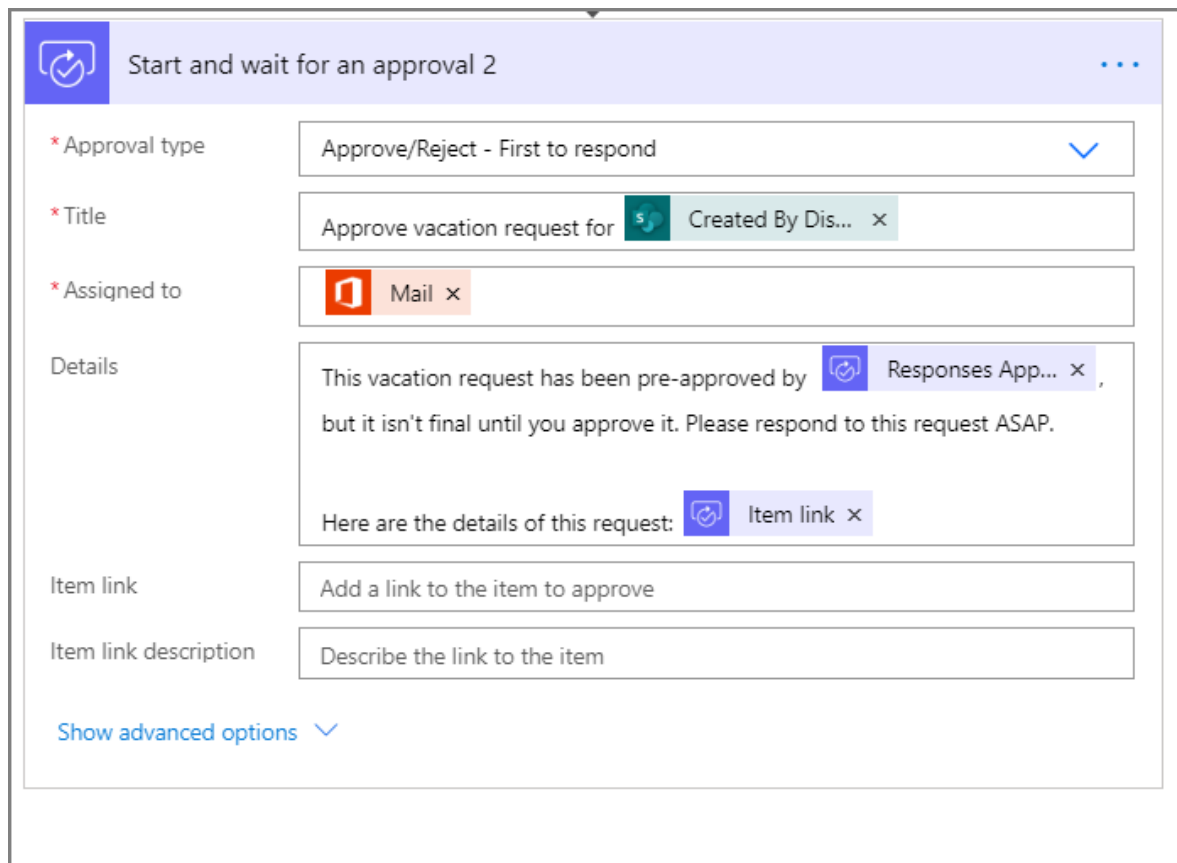
- \* User: Email
- Add dynamic content (+)

## Add the final approval action

1. Use the [add an approval action for pre-approvals](#) steps we did earlier to add, and then configure another **Start and wait for an approval** action. This action sends an email request for final approval.



2. When you're done, the card should resemble this image:



The screenshot shows a configuration card titled "Start and wait for an approval 2". The card is divided into several sections:

- \* Approval type:** A dropdown menu set to "Approve/Reject - First to respond".
- \* Title:** A text field containing "Approve vacation request for" followed by a user icon and "Created By Dis..." with a close button.
- \* Assigned to:** A field containing a "Mail" icon and a close button.
- Details:** A text area containing the message: "This vacation request has been pre-approved by [User Icon] Responses App... , but it isn't final until you approve it. Please respond to this request ASAP." Below this, it says "Here are the details of this request:" followed by a user icon and "Item link" with a close button.
- Item link:** A text field with the placeholder "Add a link to the item to approve".
- Item link description:** A text field with the placeholder "Describe the link to the item".

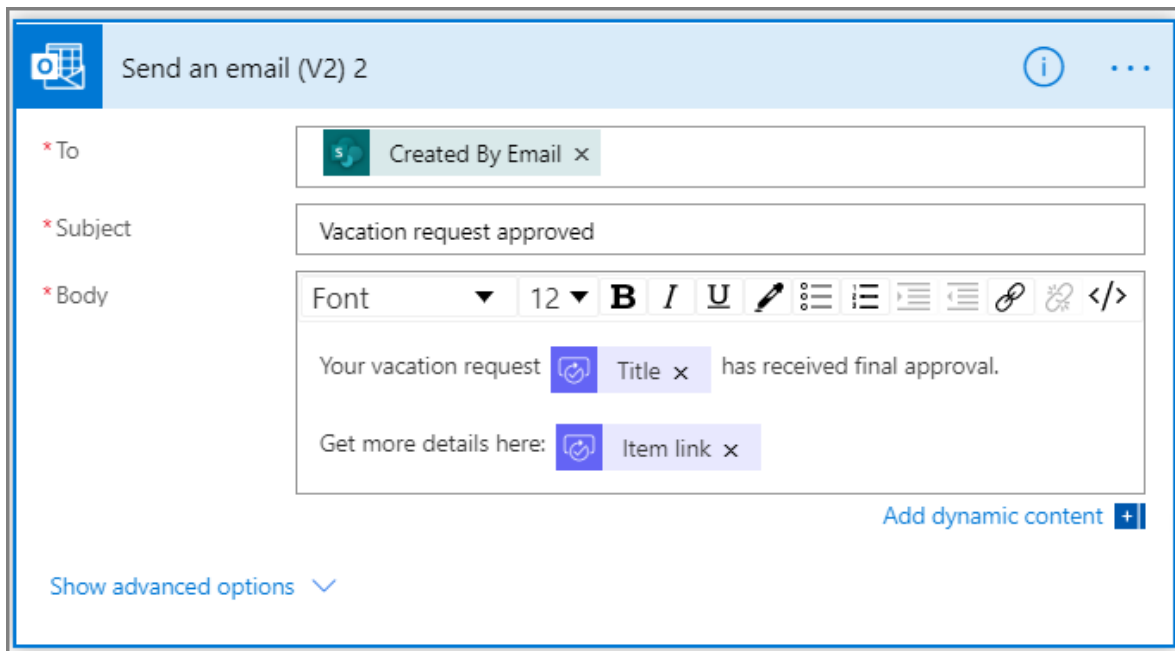
At the bottom left, there is a link "Show advanced options" with a downward arrow.

## Add the final approval condition

Repeat the steps from [add a condition](#) to add, and then configure a **Condition** that checks the final approver's decision.

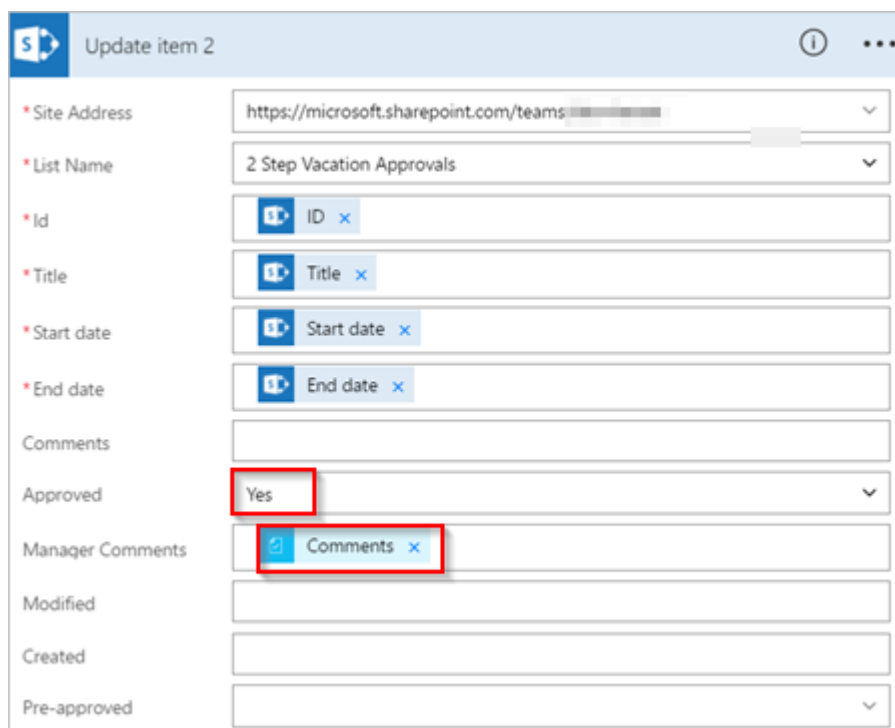
## Send email with final approval

1. Use the steps from [Add an email action for pre-approvals](#) to add, and then configure an action that sends an email when vacation requests are approved.
2. When you're finished, your card should resemble this image:



## Update SharePoint with approval

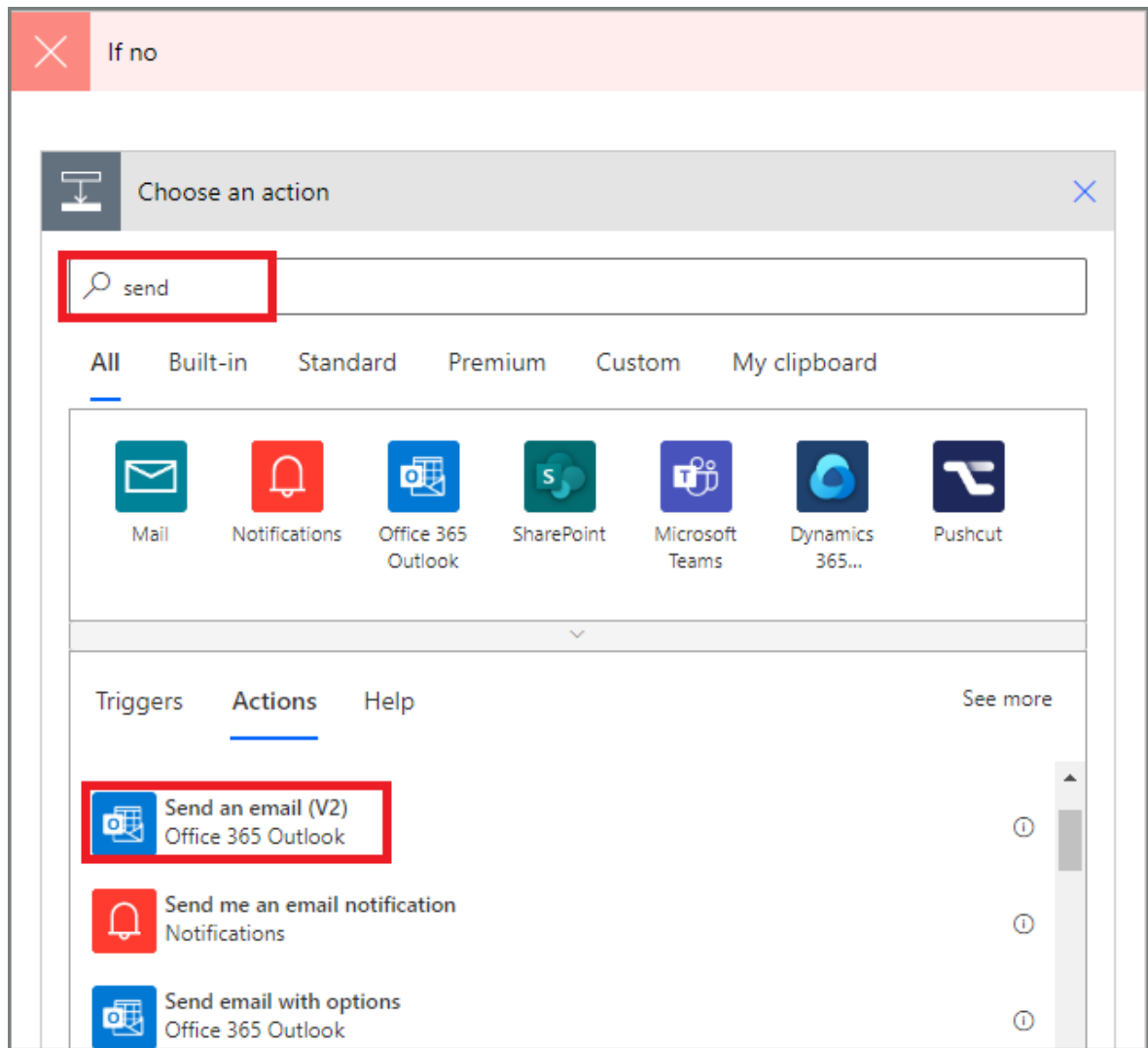
1. Use the steps from [Add an update action for pre-approved requests](#) to add, and then configure an action that updates SharePoint when the vacation request is approved.
2. When you're finished, the card should resemble this image:



## Send email with pre-approval rejection

1. Select **Add an action** on the **If no** branch.

2. Enter **Send** into the search box of the **Choose an action** card, select **Office 365 Outlook** to filter the actions, and then select the **Send an email (V2) - Office 365 Outlook** action.



3. Configure the email card to suit your needs.

This card represents the template for the email that's sent when the status of a vacation request changes.

Send an email (V2) 2

\*To: Created By Email x

\*Subject: Vacation request rejected

\*Body: Font 12 **B** *I* U [Link] [Unlink] [Bulleted list] [Numbered list] [Indent] [Outdent] [Undo] [Redo] [Source code]

Your vacation request [Title x] was rejected.

Get more details here: [Item link x]

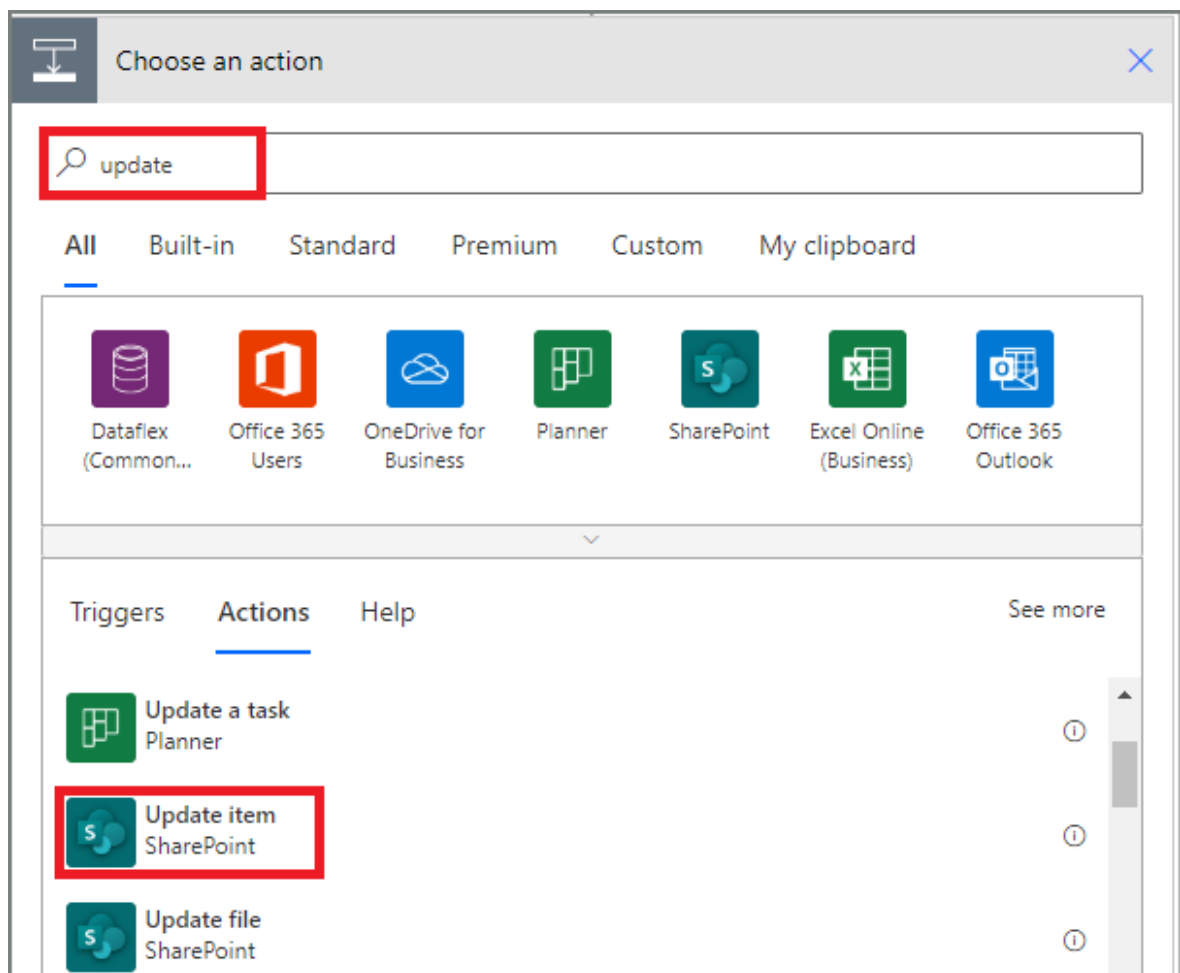
Add dynamic content +

Show advanced options v

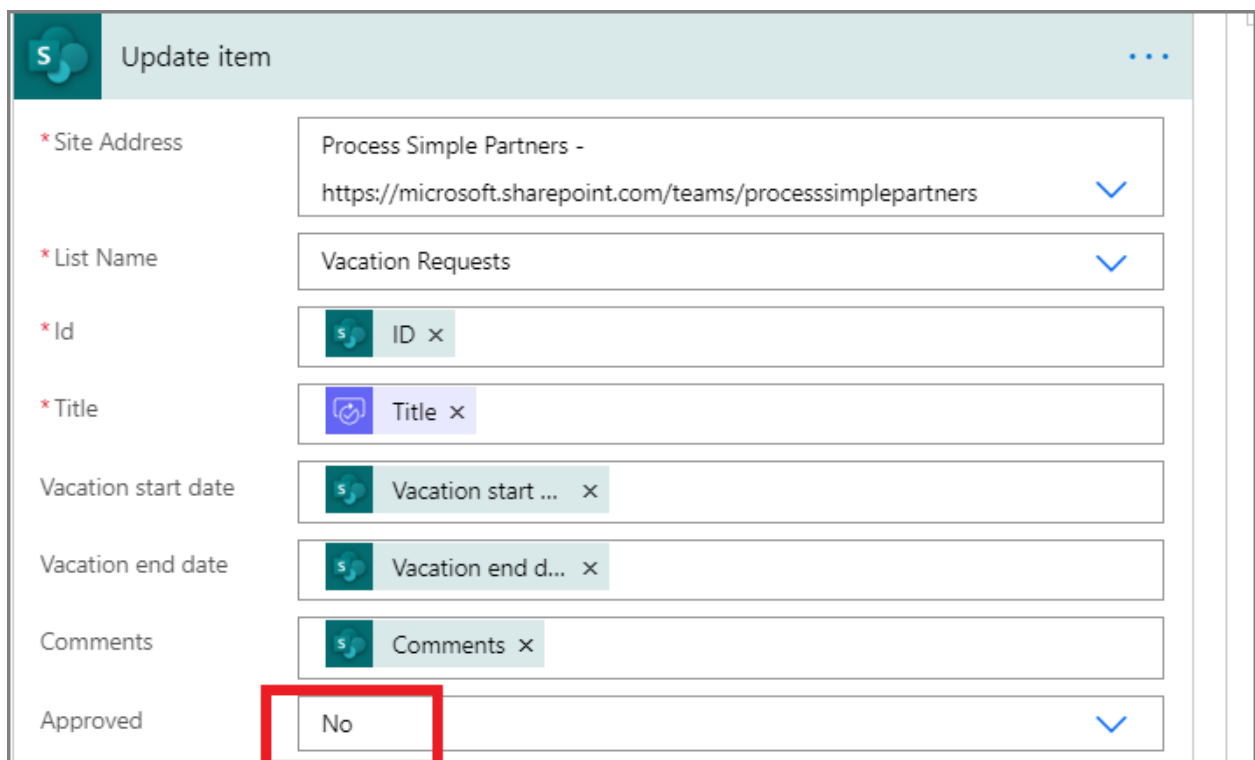
This action must be added to the IF NO, DO NOTHING branch below the Condition card.

## Update SharePoint with pre-approval rejection

1. Select Add an action.
2. Enter update into the search box on the Choose an action card, and then select the Update item - SharePoint action.



3. Configure the card to suit your needs.

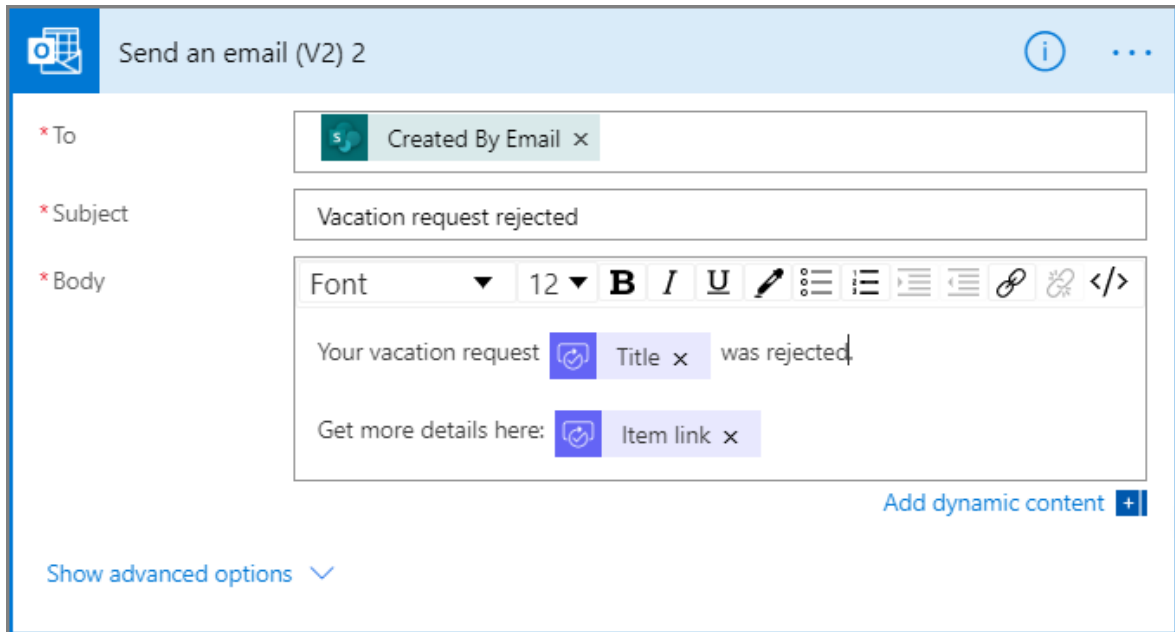


**Send email with final rejection**

1. Use the steps from [Send email with pre-approval rejection](#) to add, and then configure an action that sends an email when the vacation request is rejected by the final approver.

This action must be added to the **IF NO, DO NOTHING** branch below the **Condition 2** card.

2. When you're finished, the card should resemble this image:



## Update SharePoint with final rejection

1. Use the steps from [Update SharePoint with pre-approval rejection](#) to add, and then configure an action that updates SharePoint if the final approver rejects the vacation request.

2. When you're finished, the card should resemble this image:

Update item 4

Site Address:

List Name:

Id:

Title:

Start date:

End date:

Comments:

Approved:

Manager Comments:

Modified:

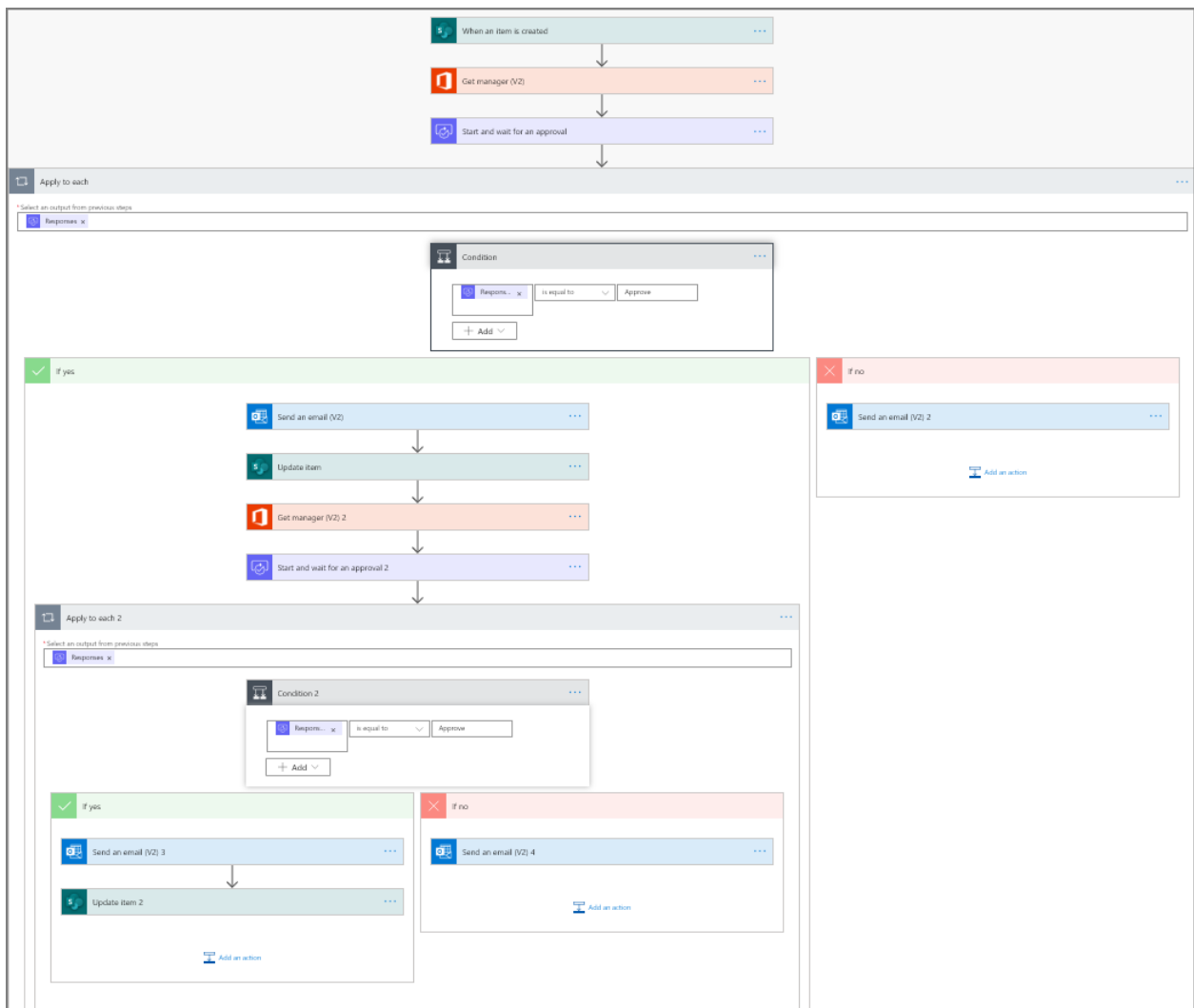
Created:

Pre-approved:

[Add dynamic content](#)

3. Select **Update flow** to save the work we've done.

If you've followed along, your flow should resemble this image:



Now that you've created the flow, let's see it in action.

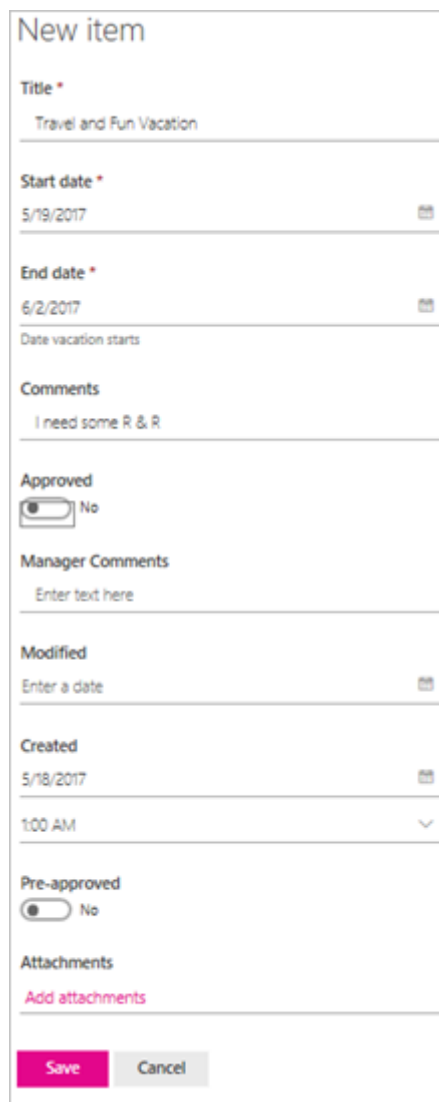
## Request an approval

Create a vacation request in the SharePoint Online list you created earlier.

After you save this request, the flow triggers, and then:

1. Creates a request in the approvals center.
2. Sends an approval request email to the approvers.

Your request should resemble this image:



The image shows a 'New item' form in SharePoint. The form fields are as follows:

- Title \***: Travel and Fun Vacation
- Start date \***: 5/19/2017
- End date \***: 6/2/2017
- Date vacation starts**: (empty)
- Comments**: I need some R & R
- Approved**:  No
- Manager Comments**: Enter text here
- Modified**: Enter a date
- Created**: 5/18/2017
- Time**: 1:00 AM
- Pre-approved**:  No
- Attachments**: Add attachments

At the bottom of the form are two buttons: 'Save' (in a pink box) and 'Cancel' (in a grey box).

## View pending approval requests

View all pending approval requests by following these steps:

1. Sign in to [Power Automate](#).



2. On the left-side navigation pane, select **Action items > Approvals**.

Your pending approval requests appear on the **Received** tab.

## Pre-approve a request

If you're an approver in an approval flow, you receive an email whenever someone creates a request. The approval request is also sent to the approvals center. You can then approve or reject requests from the email, the approvals center, or the Power Automate app.

To approve a request:

### From email

1. Select **Approve** from the email you receive when an item is added to the SharePoint Online list.

Note: If you're using a mobile device with the Power Automate app installed, the Power Automate app launches, otherwise, the approvals center opens in your browser.

2. Enter a comment, and then select the **Confirm** button.

### From the approvals center

1. Sign in to [Power Automate](#).
2. Select **Approvals** in the left-side navigation pane.
3. Select **Approve** on the request you want to approve.
4. Add any comments, and then select **Confirm** at the bottom of the screen.

### From the Power Automate app

1. On your mobile phone with the Power Automate app installed, select **Approve** from the request approval email.
2. Select **Confirm** in the upper right corner of the screen.
3. The success page shows, indicating that your approval has been recorded.

### ⓘ Note

The screens on Android, iOS and Windows Phone may differ slightly, however, the functionality is the same on all devices.

## Approve the request

The steps to approve a request are identical to the steps to [pre-approve a request](#)

The final approver gets the vacation request only after the request has been pre-approved.

## Reject a request

You can reject a request via email, the approvals center, or the Power Automate app. To reject a request, follow the steps for approving a request, but select **Reject**, instead of **Approve**.

After you confirm your decision (rejection of the request), the flow runs the following steps:

1. Sends an email to the person who requested vacation.
2. Updates the SharePoint Online list with the decision, and the comments from the approver.

## See also

[Single approver modern approvals walkthrough](#)

# Create parallel approval workflows with Power Automate

Article • 12/16/2022

In a parallel approval workflow, multiple persons are required to approve items such as invoices, purchase orders, vacation requests, etc. Each person's approval is independent of all other approvers.

In this walkthrough, we use Power Automate to create a cloud flow that automates a parallel approval workflow. This flow automates an employee vacation request process that requires approval from all persons (or teams) that the employee supports regularly. Employees use a [SharePoint list](#) to request vacation. Vacation approvals are required from the employee's direct manager, the Sales team, and the Human Resources team. Each vacation request is routed to each approver for a decision. The flow sends email with status changes and then updates SharePoint with the decisions.

## Tip

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

## Prerequisites

- [Power Automate](#).
- A SharePoint Online list.
- Office 365 Outlook and Office 365 Users account.

## Note

While we use SharePoint Online and Office 365 Outlook in this walk-through, you can use other services such as Zendesk, Salesforce, or Gmail. If you are using SharePoint 2010, see [SharePoint 2010 workflow retirement](#).

Before you create the flow, create a [SharePoint Online list](#). Later, we'll use this list to request approval for vacations.

The SharePoint Online list you create must include the following columns:

<b>Title</b>	<b>Single line of text</b>
Employee comments	Single line Of text
Direct manager comments	Multiple lines Of text
Sales team comments	Multiple lines of text
HR team comments	Multiple lines of text
Direct manager approved	Yes/No
Sales team approved	Yes/No
HR team approved	Yes/No
Vacation start date	Date and time
Vacation end date	Date and time

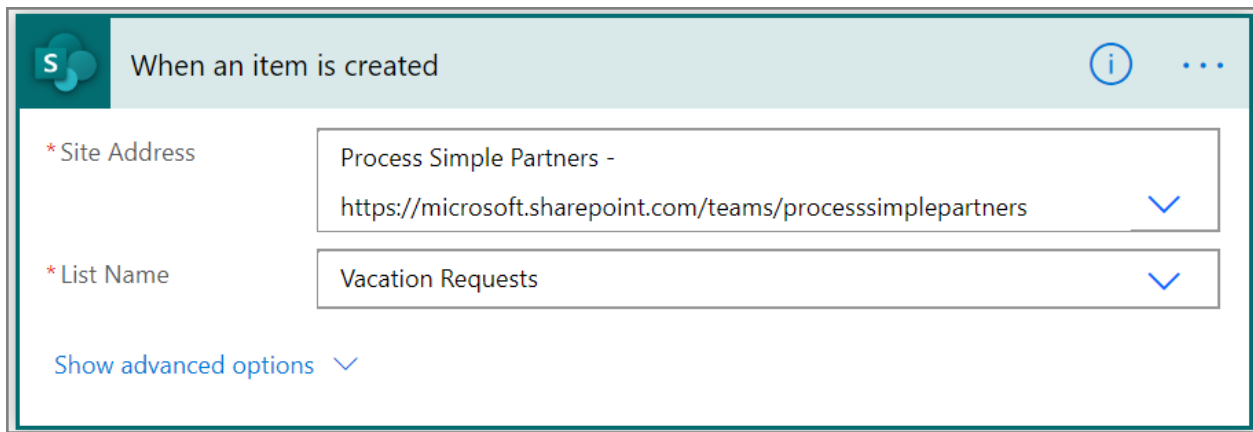
Make note of the name and URL of the SharePoint Online list. We use these items later to configure the **SharePoint - When an item is created** trigger.

## Create your flow from the blank template

1. Sign in to [Power Automate](#).
2. Select **My flows** in the left-side navigation pane.
3. On the top-left menu, select **New flow** > **Automated cloud flow**.

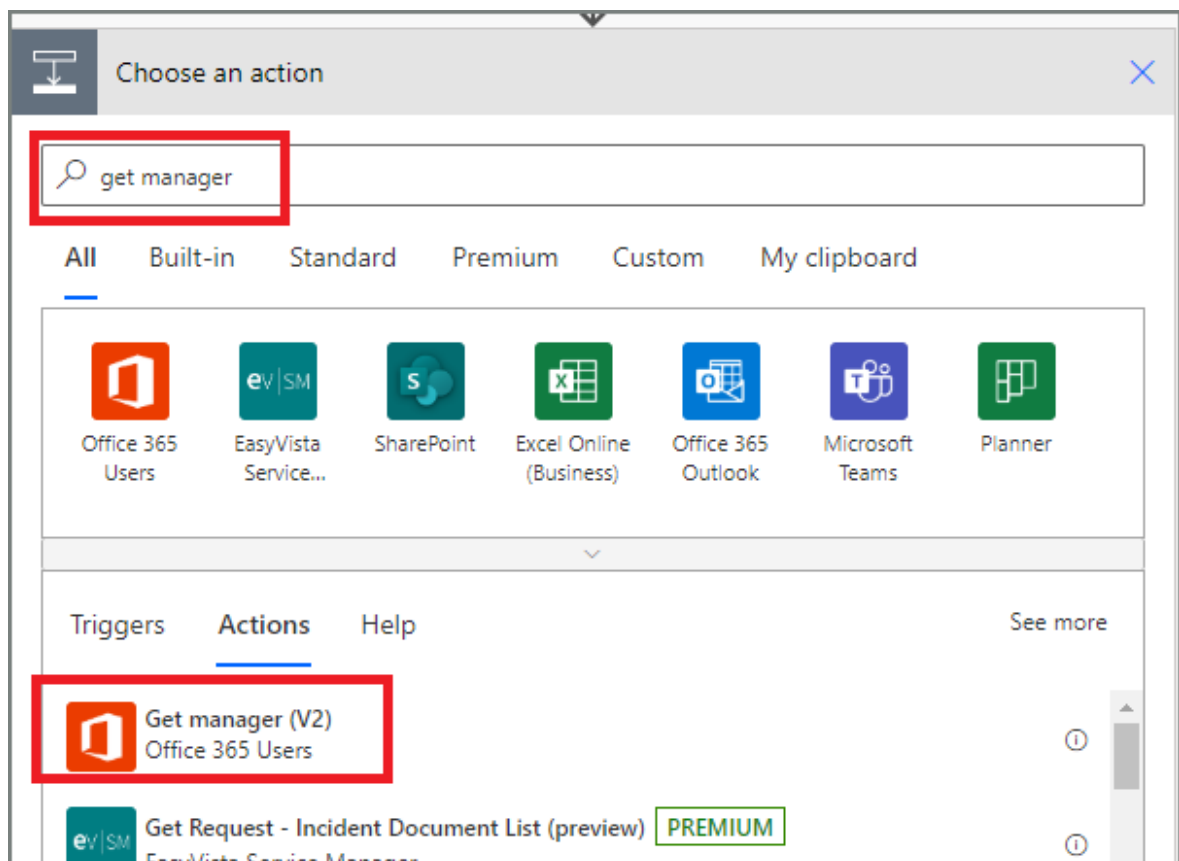
## Add a trigger

1. Give your flow a name.
2. Under **Choose your flow's trigger**, select **When an item is created - SharePoint**, and then select **Create**.
3. On the **When an item is created** card, select the **Site Address** and the **List Name** for the SharePoint list that you created earlier.



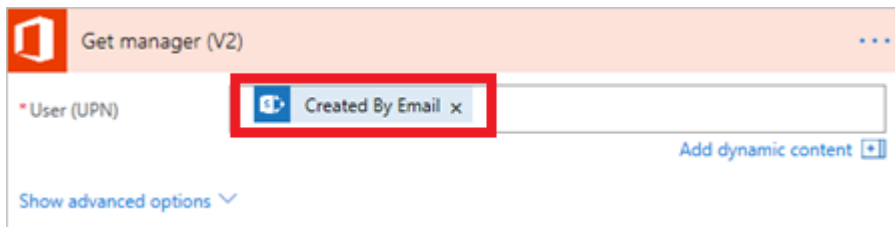
## Get the manager for the person who created the vacation request

1. Select **+New step**, and then type **get manager** into the **Choose an action** search box.
2. Find, and then select the **Get manager (V2) - Office 365 Users** action.



3. Insert the **Created By Email** token into the **User (UPN)** box on the **Get manager** card.

This action gets the manager for the person who created the vacation request in SharePoint.



## Name and save your flow

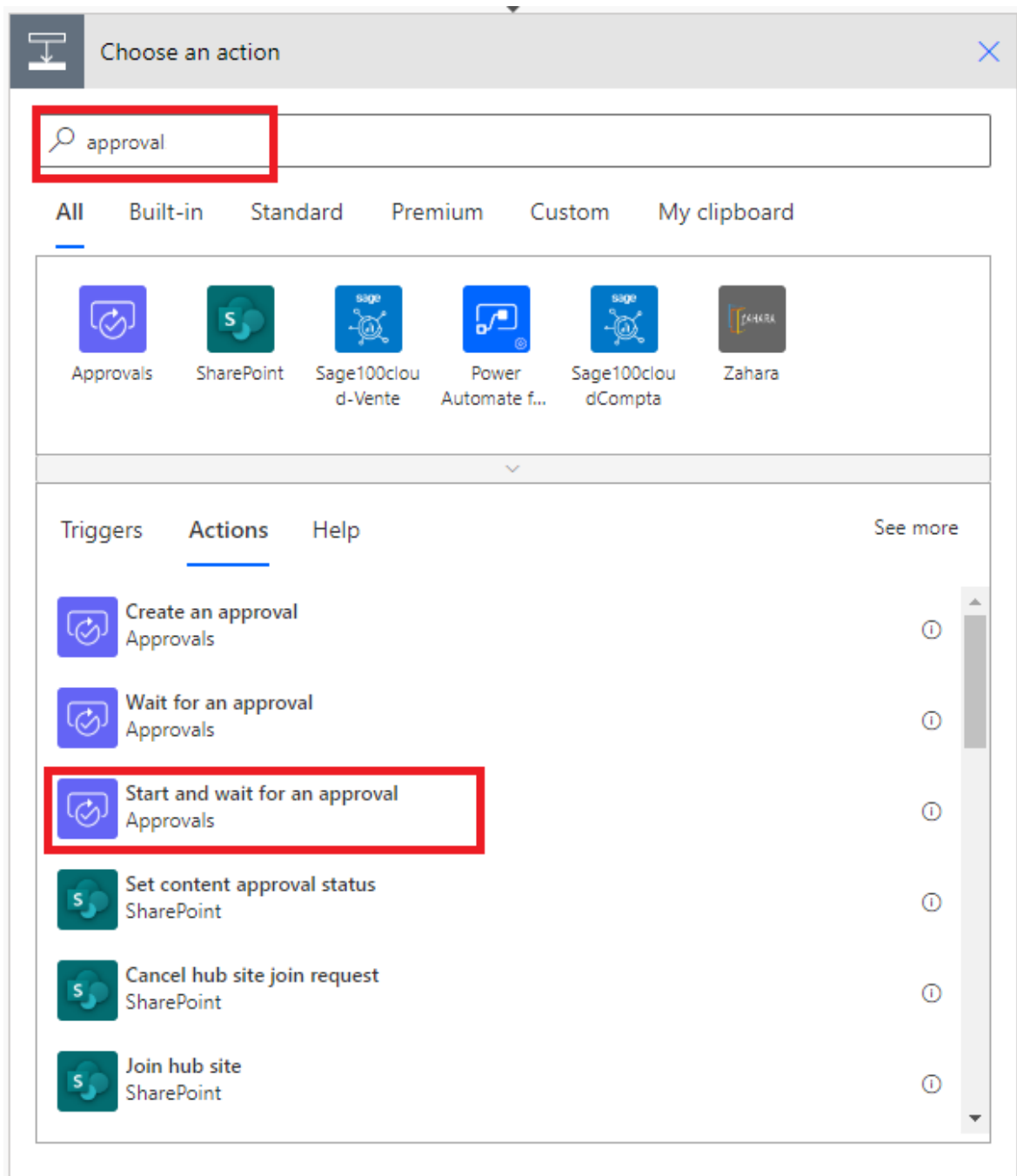
Provide a name for your flow, and then select **Save** to save the work we've done so far.

### ⓘ Note

Select the **Save** icon periodically to save the changes to your flow.

## Add an approval action for immediate manager

1. Select **New step**.
2. Type **approval** into the **Choose an action** search box.
3. Select the **Start and wait for an approval** action.



4. Configure the **Start and wait for an approval** card to suit your needs.

ⓘ Note

The **Approval type**, **Title** and **Assigned To** fields are required. You can use **Markdown** to format the **Details** field.

**Start and wait for an approval**

\* Approval type: Approve/Reject - First to respond

\* Title: Vacation request for Created By Dis...

\* Assigned to: manager@paintedcork.com

Details: Created By Dis... wants to go on vacation from  
Vacation start ... until Vacation end d...

Item link: Add a link to the item to approve

Item link description: Describe the link to the item

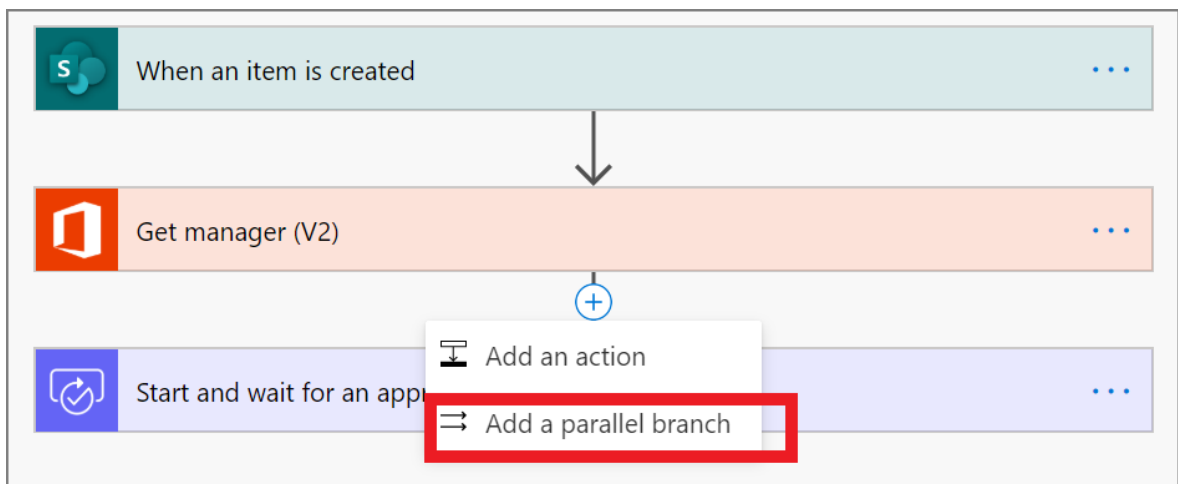
Show advanced options

### Important

This action sends the vacation request to the email address in the **Assigned To** box, so insert the **Email** token from the **Get manager (v2)** list.

## Insert a parallel branch approval action for the sales team

1. Select the down arrow that's located between the **Get manager (v2)** and the **Start and wait for an approval** cards.
2. Select the plus sign that shows up on the down arrow after you select it.
3. Select **Add a parallel branch**.





4. Search for, select, and then configure a **Start and wait for an approval** action that sends the vacation request to the sales team. See the [steps used to Add an approval action for immediate manager](#) if you're not sure how to add the **Start and wait for an approval** action.

**ⓘ Important**

Use the sales team's email address in the **Assigned To** box of the **Start an approval 2** action.

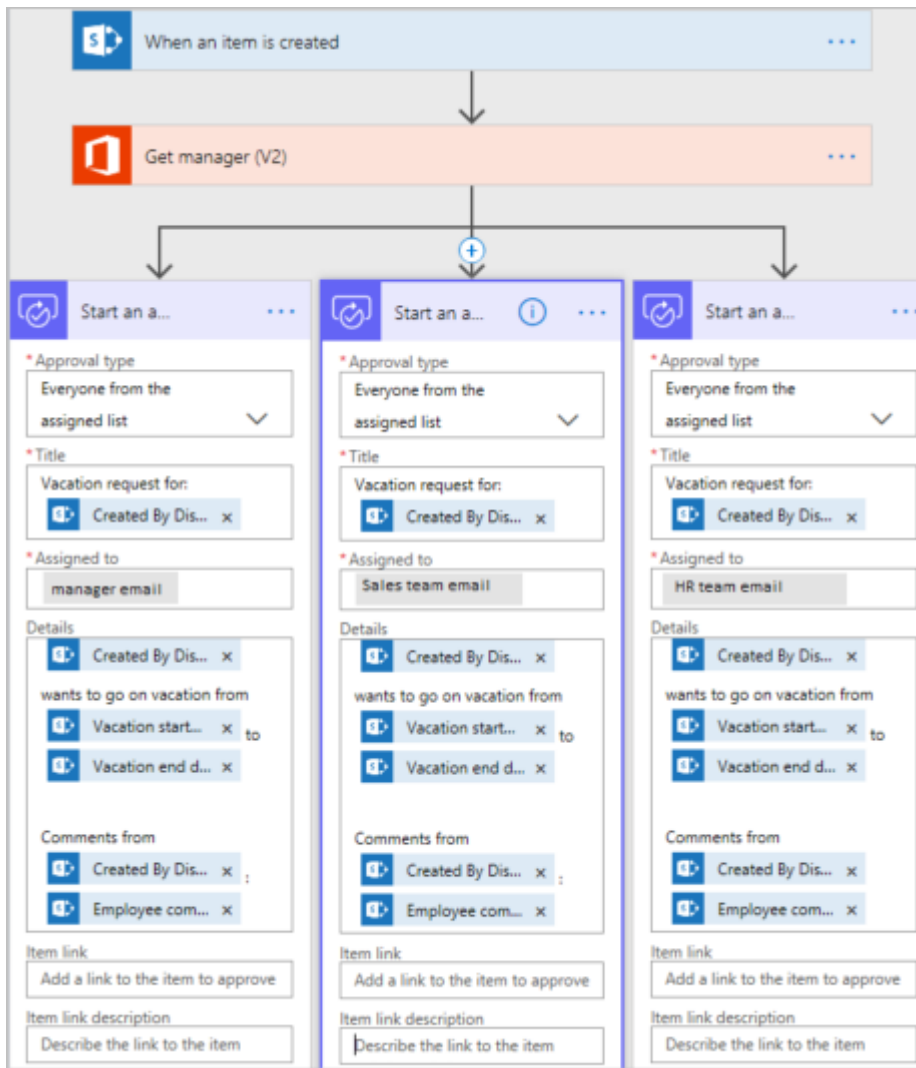
## Insert a parallel branch approval action for the human resources team

Repeat the steps to [insert a parallel branch for the sales team](#) to add, and then configure a **Start an approval** action to send vacation requests to human resources.

**ⓘ Important**

Use the human resources team's email address in the **Assigned To** box of the **Start an approval 3** action.

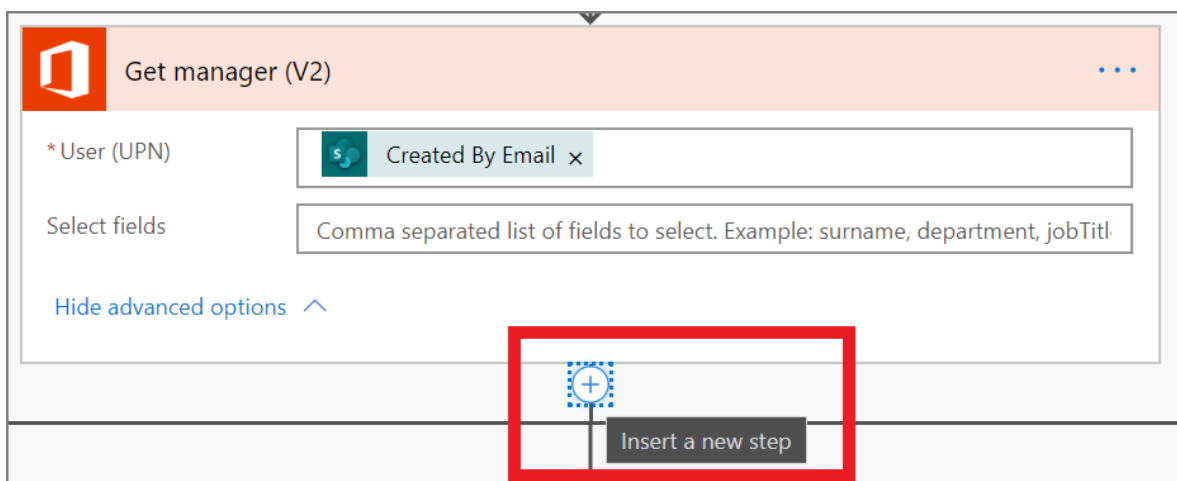
If you've followed along, your flow should resemble this example:



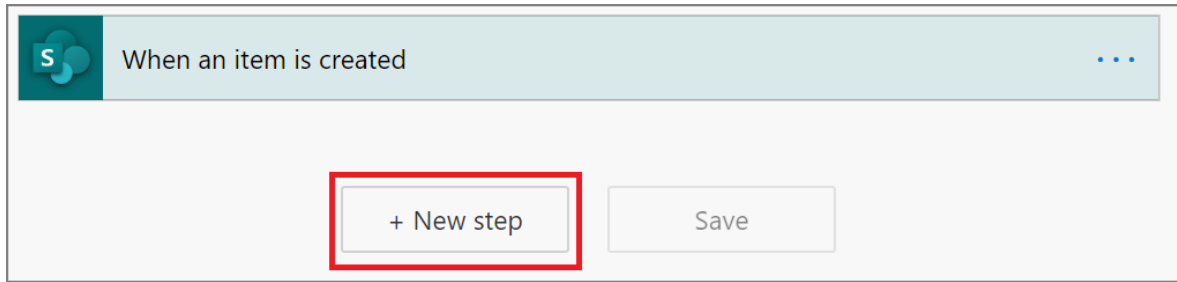
## Options after adding parallel branches

After you've added actions to parallel branches, there are two ways to add steps to your flow:

- **Insert a step within a branch:** Use the *Insert a new step* (+) button above or below the card. This button that appears when you select a branch or hover over the connector arrow). This button adds a step to that **specific branch**. This button is shown here:



- **Add a step to the flow:** Use the larger **+New step** button at the bottom of the entire workflow. Steps you add with this button run after all previous branches complete. This button is shown here:



In the following sections, we add steps within each branch:

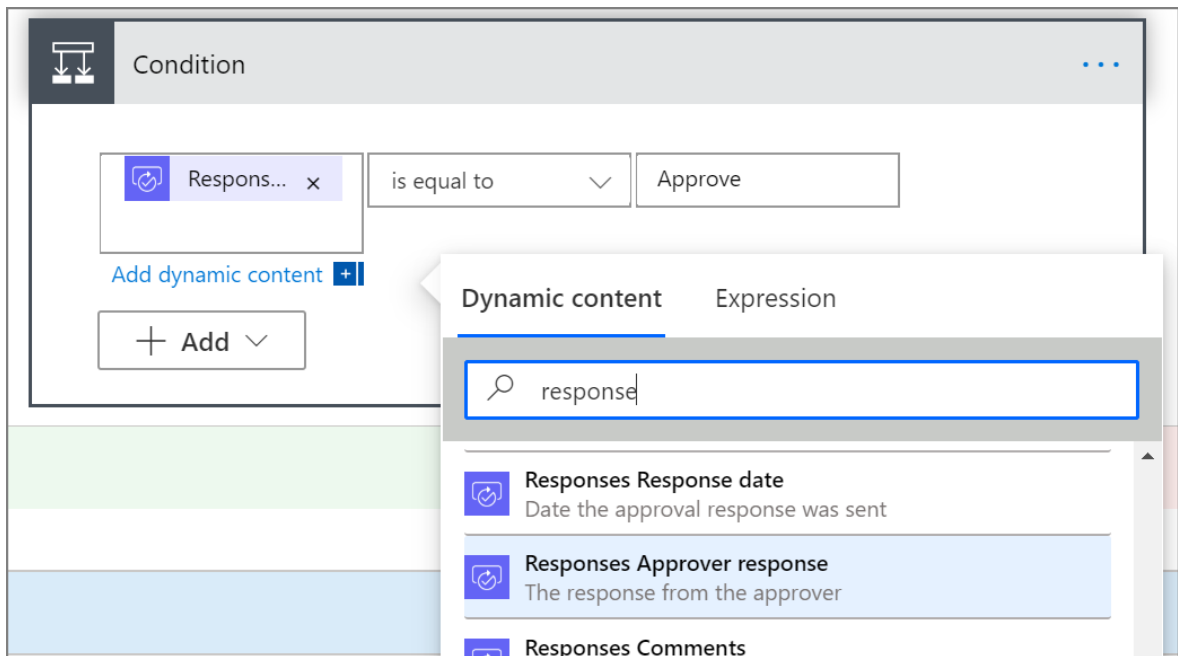
- Add a condition that checks if the vacation request was approved or rejected.
- Send an email that informs the employee of the decision.
- Update the vacation request in SharePoint with the approval decision.

Then, we use the *+New step* button to send an email that summarizes all decisions made on the vacation request.

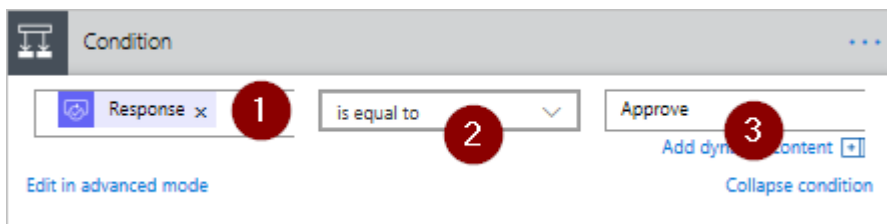
Let's continue:

## Add a condition to each branch

1. Select the first **Start and wait for an approval** branch.
2. Select the small *Insert a new step (+)* button below the card (the circular plus button that appears when you hover over the connector arrow).
3. Select **Add an action** from the menu that appears, and then select **Condition** in the list of actions.
4. Select the first box on the **Condition** card, and then select the **Response** token from the **Start and wait for an approval** category in the dynamic content list.



5. Confirm the list (in the middle of the **Condition card**) is set to **is equal to**.
6. Enter **Approve** (this text is case-sensitive) into the last box.
7. Your condition card should now resemble this example:



### ⓘ Note

This condition checks the response from the **Start an approval** action that goes to the employee's manager.

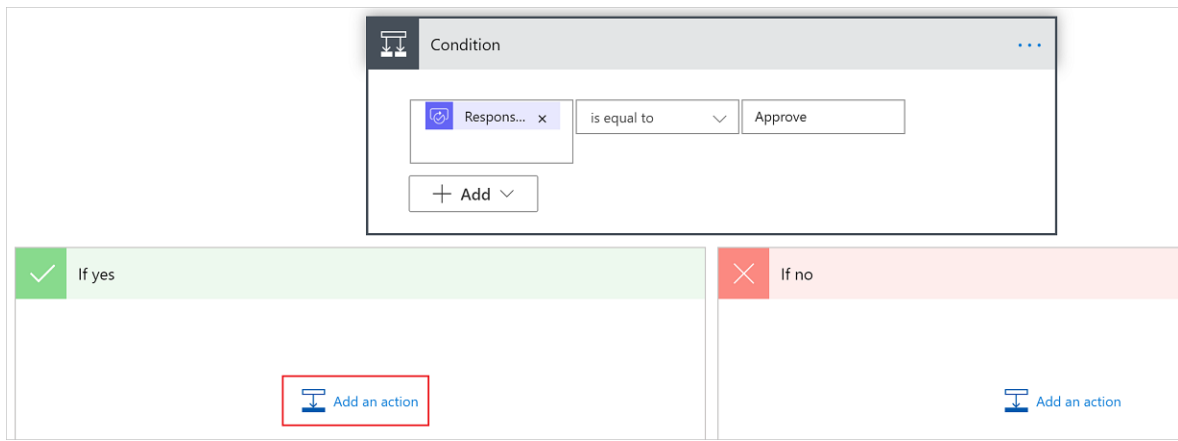
8. Repeat the preceding steps on the **Start an approval 2** (the approval request to sales) and **Start an approval 3** (the approval request to human resources) branches.

## Add email actions to each branch

Perform the following steps on the **IF YES** side of the **Condition** branch.

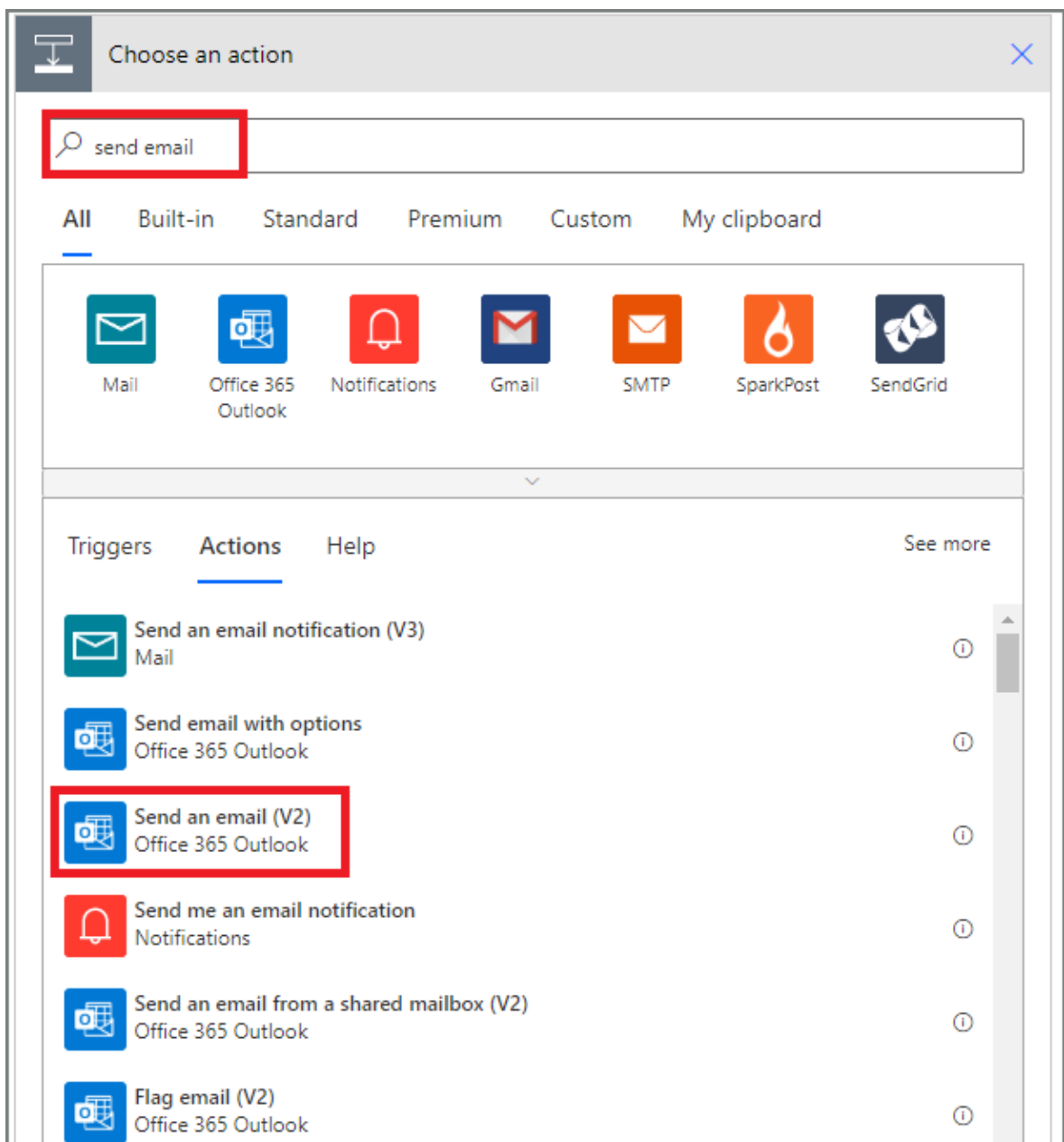
Note: Your flow uses these steps to send an email when the request is approved:

1. Select **Add an action** on the **If yes** branch of the condition.



2. Enter **send email** into the search box on the **Choose an action** card.

3. Select the **Send an email (V2)** action.



4. Configure the email card to suit your needs.

### ⓘ Note

**To**, **Subject**, and **Body** are required.

This card is a template for the email that is sent when the status of the vacation request changes.

In the **Body** box on the **Send an email (V2)** card, use the **Comments** token from the **Approvals - Start an approval** action.

The screenshot shows the configuration for the 'Send an email (V2) 2' card. The 'To' field is populated with 'Created By Email'. The 'Subject' field contains the text 'Your request has been approved by'. The 'Body' field is a rich text editor with a toolbar and contains the text 'approved your request for vacation'. Two tokens are visible in the body field: 'Responses Approver name' and 'Direct manager comments'. A 'Show advanced options' link is located at the bottom left of the card.

To send an email when a request is rejected, use the **IF NO** side of the **Condition** branch, and then repeat the preceding steps to add a template for the rejection email.

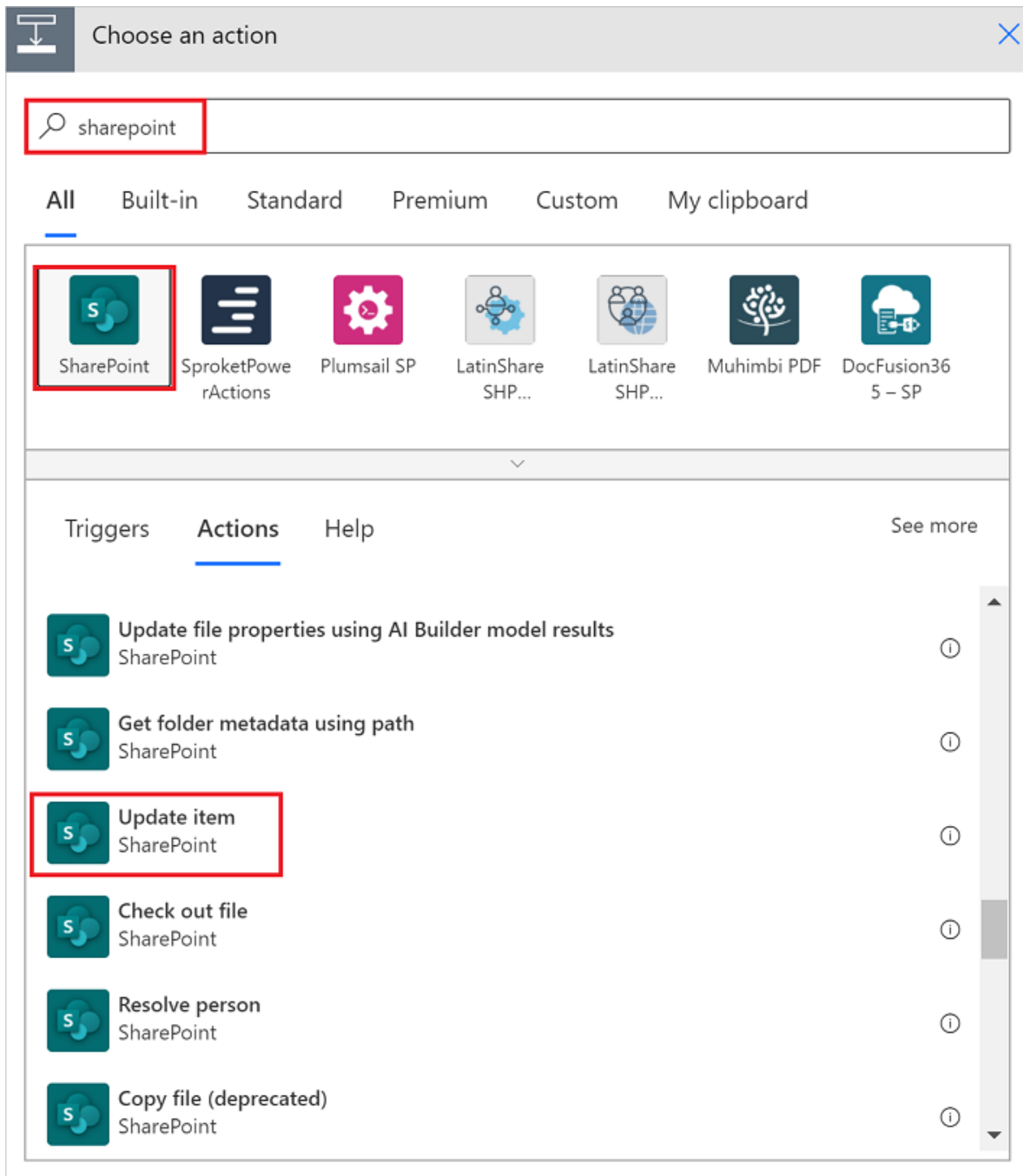
Repeat the preceding steps on the **Start and wait for an approval 2** (the approval request to sales) and **Start and wait for an approval 3** (the approval request to human resources) branches.

## Update the vacation request with the decision

Perform the following steps to update SharePoint when decisions are made.

Note: Be sure perform these steps on both the **IF YES** and the **IF NO** sides of the branch.

1. Select **Add an action** in the **If yes** branch.
2. Enter **SharePoint** in the search box on the **Choose an action** card, select the **SharePoint** filter, and then select the **Update item** action.



3. Configure the **Update item** card to suit your needs.

S Update item ...

* Site Address	Process Simple Partners - https://microsoft.sharepoint.com/teams/processsimplepartners <span style="float: right;">▼</span>
* List Name	Vacation Requests <span style="float: right;">▼</span>
* Id	<span style="background-color: #0070c0; color: white; padding: 2px 5px;">S</span> ID ×
* Title	<span style="background-color: #0070c0; color: white; padding: 2px 5px;">S</span> Title ×
Vacation start date	
Vacation end date	
Comments	<span style="background-color: #0070c0; color: white; padding: 2px 5px;">S</span> Direct manage... ×
Approved	Yes <span style="float: right;">▼</span>
Direct manager comments	
Employee comments	
Sales team comments	
HR team comments	
Direct manager approved	Yes <span style="float: right;">▼</span>
Sales team approved	No <span style="float: right;">▼</span>
HR team approved	No <span style="float: right;">▼</span>

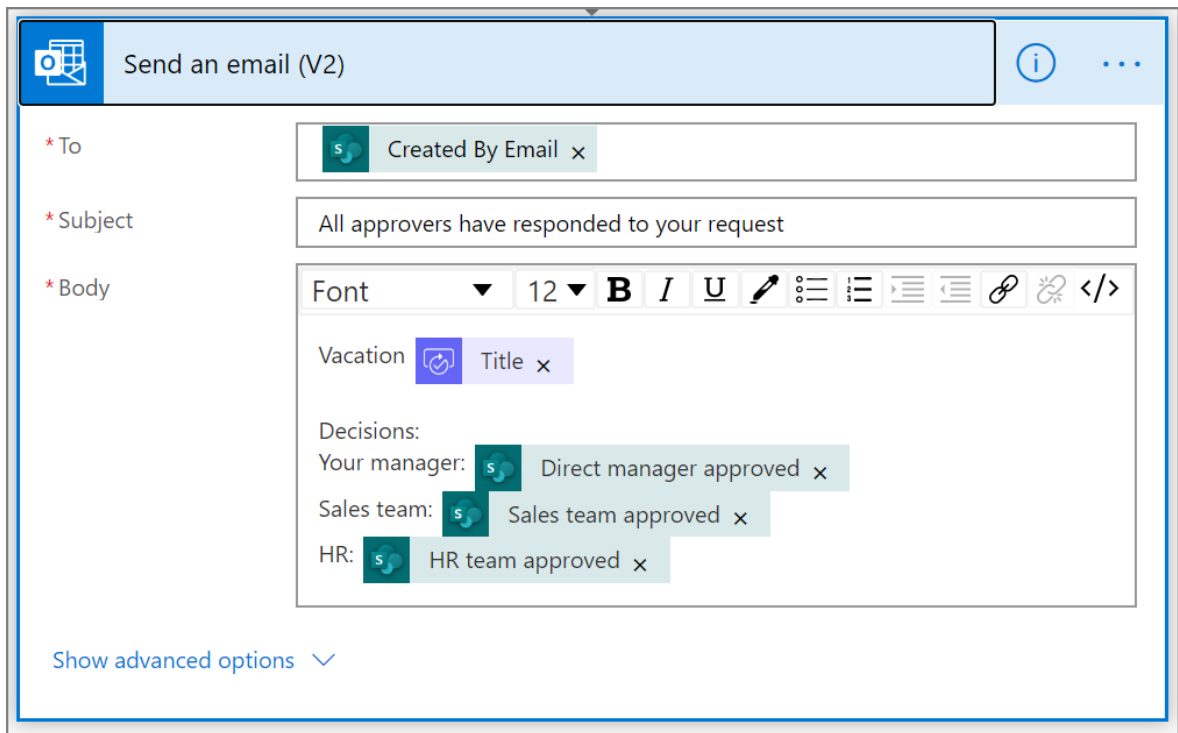
[Show advanced options](#) ▼

Repeat the preceding steps on the **Start an approval 2** and **Start an approval 3** branches.

## Complete the flow

1. Select **+New step**
2. Use the steps provided previously to send an email that summarizes the results of each approval. Send this email to the employee who requested vacation. Your card may resemble this example:





# Learn more about modern approvals

[Introduction to modern approvals](#)

# Create an approval flow that requires everyone to approve

Article • 04/14/2023

This tutorial shows you how to create an approval workflow that requires everyone (all assigned approvers) to agree for a vacation request to be approved, but any approver can reject the entire request.

This type of approval workflow is useful in an organization that requires a person's manager and the manager's manager, to both agree to a vacation request for it to be approved. However, either manager can decline the request without the other person's input.

## ⓘ Note

While this tutorial highlights a vacation approval scenario, you can use this type of approval flow in any situation where multiple approvers are required to approve a request.

Here's a quick video tutorial about approvals.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKXdq?postJsllMsg=true>

## Prerequisites

- Access to [Power Automate](#), Microsoft Office 365 Outlook, and Microsoft Office 365 Users.
- A SharePoint [list](#).

This tutorial assumes you've created a SharePoint list that's used to request vacations. See the [parallel approvals](#) walkthrough for an in-depth example that details what your SharePoint list might look like.

## 💡 Tip

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

- Familiarity with the basics of creating flows.

You can review how to add [actions](#), [triggers](#), and [conditions](#). The following steps assume that you know how to perform these actions.

### ⓘ Note

While we use SharePoint and Office 365 Outlook in this walkthrough, you can use other services such as Zendesk, Salesforce, Gmail, or any of the more than **200 services** [↗](#) that Power Automate supports.

## Create the flow

This tutorial uses tokens. To display the list of tokens, select any input control, and then search for the token in the **Dynamic content** list that opens.

### ⓘ Note

If you haven't created a connection to SharePoint or Office 365 previously, follow the instructions when you're prompted to sign in.

1. Sign in to [Power Automate](#) [↗](#).
2. On the top left of the screen, select **My flows** > **New** > **Automated-from blank**.
3. Name your flow, and then add the **SharePoint - When an item is created or modified** trigger.
4. Enter the **Site Address** for the SharePoint site that hosts your vacation request list, and then select a list from **List Name**.
5. Select **New step**, add another Office 365 **Get manager (V2)** action, and then add the **Mail** token to the **User (UPN)** box.

The **Mail** token is located under the **Get manager (V2)** category of the **Dynamic content** list. This token dynamically provides access to the email address for the manager's manager.

You can also rename the **Get manager (V2)** 2 card to something meaningful like "Skip level manager".

6. Select **New step**, add the **Start and wait for an approval** action, and then select **Approve/Reject - Everyone must approve** from the **Approval type** list.

### Important

If any approver rejects, the approval request is considered rejected for all approvers.

7. Use the following table as a guide to complete the **Start and wait for an approval** card.

Field	Description
Approval type	See the <a href="#">approval types</a> .
Title	The title of the approval request.
Assigned to	The email addresses of the approvers.
Details	Any additional information that you want sent to the approvers listed in the <b>Assigned to</b> field.
Item link	A URL to the approval item. In this example, this is a link to the item in SharePoint.
Item link description	A text description for the <b>Item link</b> .

### Tip

The **Start and wait for an approval** action provides several tokens, including **Responses** and **Outcome**. Use these tokens in your flow to provide rich reporting of the results from a run of an approval request flow.

The **Start and wait for an approval** card is a template for the approval request that's sent to approvers. Configure it in a way that's useful for your organization. Here's an example.

Start and wait for an approval

\* Approval type ▼  
Approve/Reject - Everyone must approve

\* Title  
Vacation request for Created By Dis... x

\* Assigned to  
approverAlias@contoso.com

Details  
 Created By Dis... x wants to go on vacation. Respond promptly  
Add dynamic content

Item link  
 Link to item x

Item link description  
Vacation Request

Show advanced options ▼

When a cloud flow with the **Start and wait for an approval** action is configured with **Approve/Reject - Everyone must approve**, it waits until all **Assigned to** approve or at least one **Assigned to** rejects the approval request.

**Tip**

Add a **Condition** step if you want your flow to check the response of the approval request and perform different actions based on the **Outcome**. The **Outcome** is an array of **Approve** or **Reject** elements, based on the number of responses to the request.

Let's continue with the flow and send an email when a decision is made on the approval request.

8. Select **New Step**, search for "send an email", add the Office 365 Outlook **Send an email (V2)** action, and then configure the action to send an email with the results of the request to the person who wants to go on vacation.

Here's an example of what the **Send an email (V2)** card might look like.

Send an email (V2)

\* To: Created By Email x ;

\* Subject: Your vacation request status: Outcome x

\* Body: Font 12 B I U </> Details x

Show advanced options

### ⓘ Note

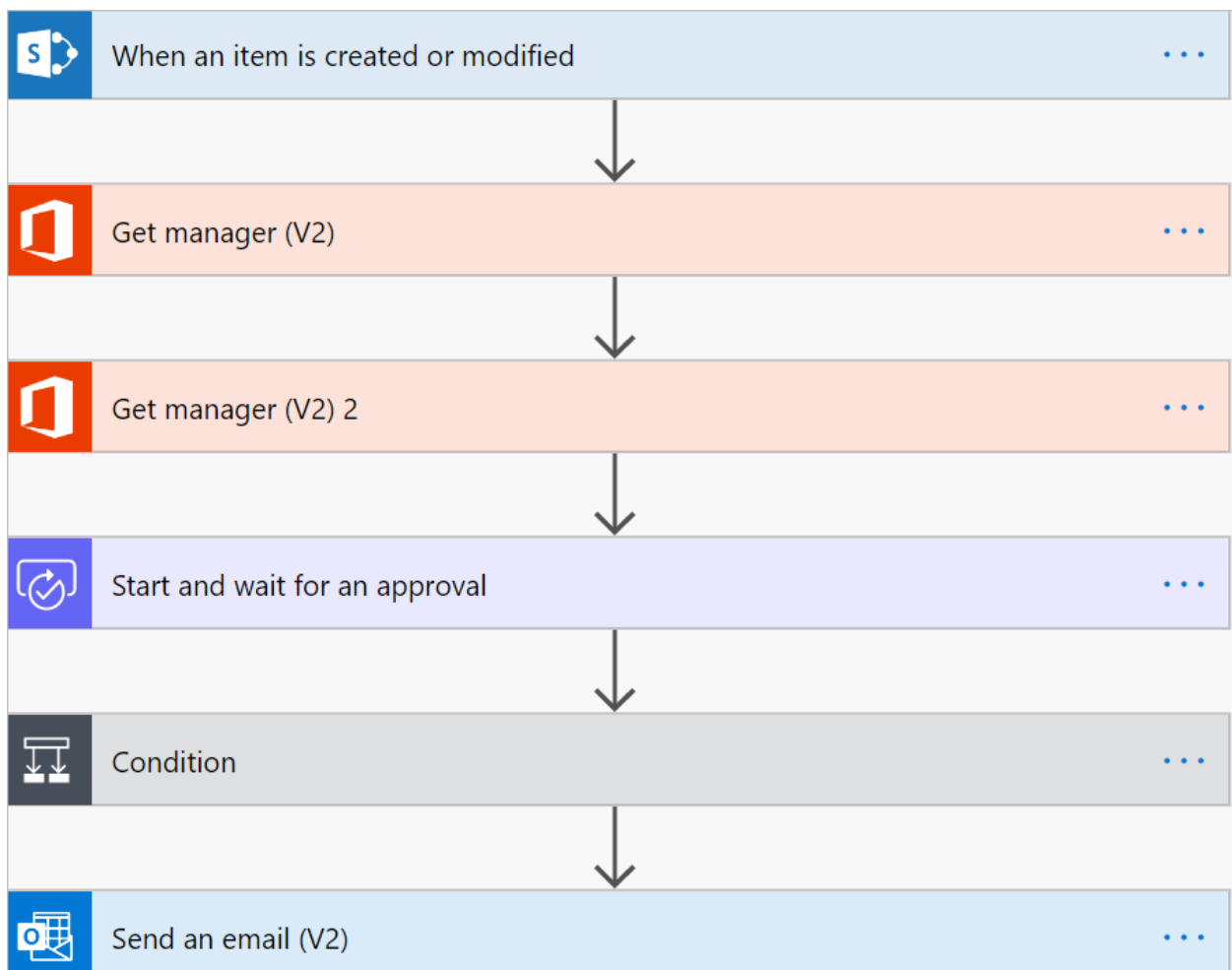
Any action that follows the **Start and wait for an approval** action runs based on your selection in the **Approval type** list on the **Start and wait for an approval** card. The following table lists the behavior based on your selection.

## Approval types and their behaviors

Approval type	Behavior
Approve/Reject - Everyone must approve	Approval or rejection is needed by <b>all</b> approvers to complete the request. The actions that follow the <b>Start and wait for an approval</b> action run after <b>all</b> of the approvers approve, or when a single rejection is done.
Approve/Reject - First to respond	Approval or rejection by any approver completes the request. The actions that follow the <b>Start and wait for an approval</b> action run after any one of the approvers decides.
Custom responses - Wait for all responses	All approvers must respond to complete the process.
Custom responses - Wait for one response	A response from any approver completes the process.

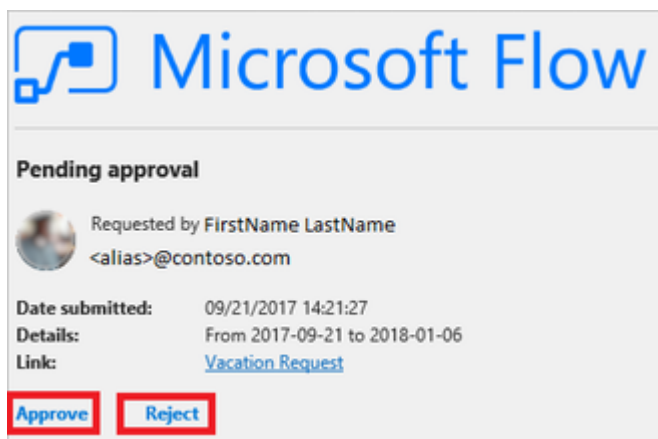
At the top of the screen, select **Save** to save your flow.

Congratulations, your flow is complete! If you followed along, your flow resembles this image.



Now, whenever an item is added to your SharePoint list, or if an item changes, your flow triggers and sends approval requests to all approvers whom are listed in the **Assigned to** box of the **Start and wait for an approval** card. Your flow sends approval requests via the Power Automate mobile app and via email. The person who creates the item in SharePoint gets an email that summarizes the results, clearly indicating if the request was approved or rejected.

Here's an example of the approval request that's sent to each approver.



Here's an example of what a response and a response summary may look like after your flow runs.

<b>Response</b>
Approve
<b>Response summary</b>
Approver: John Doe <jdalias>@contoso.com Response: Approved Request Date: Thursday, September 21, 2017 2:21:27 PM Response Date: Thursday, September 21, 2017 5:13:47 PM

## See also

- [Single approver modern approvals](#)
- [Sequential modern approvals](#)
- [Parallel modern approvals](#)
- [Approvals and Dataverse](#)
- [Approve requests on the go](#)



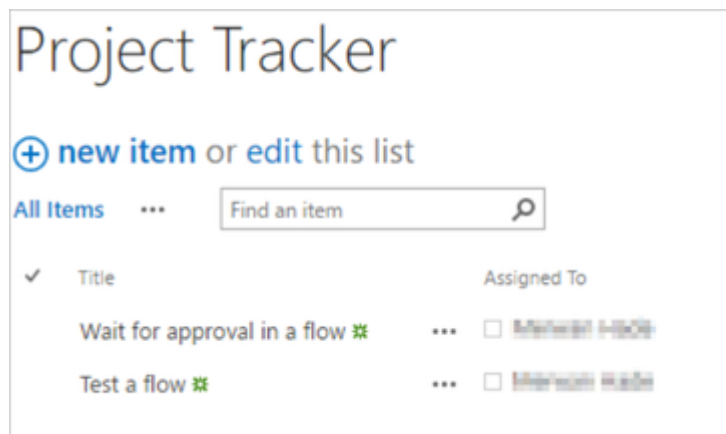
# Wait for approval in Power Automate

Article • 04/14/2023

Create a cloud flow that, if you create an item in SharePoint, sends approval email and then notifies you whether the item was approved or rejected. To follow this tutorial, create a SharePoint list as a trigger action. You can alternatively use another data source such as Dropbox or OneDrive.

## Prerequisites

Create a SharePoint list that's named **Project Tracker**, add a column named **Title**, and then add a person or group column named **Assigned To**.



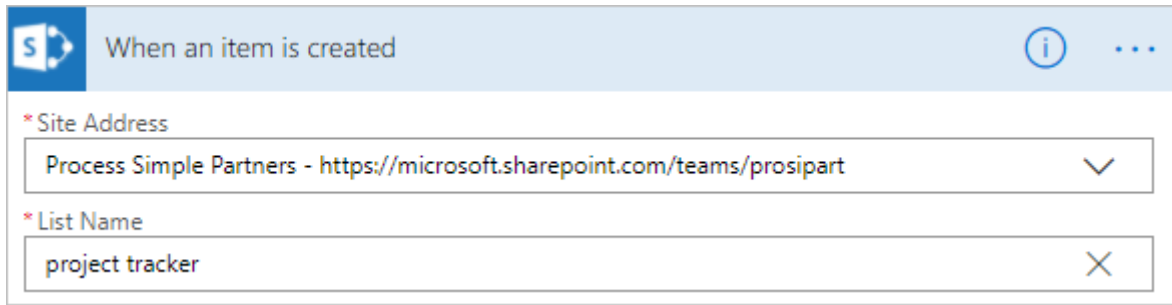
### Tip

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

## Add an event to trigger the flow

1. Sign in to [Power Automate](#).
2. Select **My flows** in the top navigation bar, and then select **Create from blank**.
3. Select the **Search hundreds of connectors and triggers** box, enter **new item**, and then navigate to **SharePoint - when an item is created**.
4. If prompted, sign into SharePoint.
5. Under **Site Address**, enter the URL of the SharePoint site that contains your list.

6. Under **List Name**, select the list you created earlier. If you're following along, the name is **Project Tracker**.



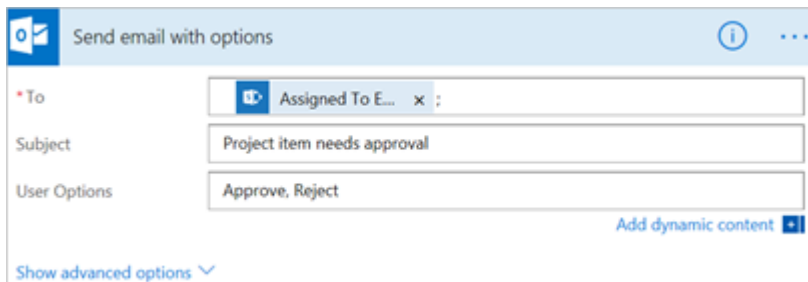
The screenshot shows a configuration window titled "When an item is created". It has two input fields: "\* Site Address" with the value "Process Simple Partners - https://microsoft.sharepoint.com/teams/prosipart" and "\* List Name" with the value "project tracker".

## Add the resulting action

1. Select the **New step** button, and then select **Add an action**.
2. In the **Search all connectors and actions** box, type or paste **send email**, and then select **Office 365 Outlook - Send email with options**.
3. If prompted, sign into Office 365 Outlook.
4. Select the **To** field, and then select the **Assigned to Email** token.

The user in the **Assigned To** column receives the email to approve or reject items. When you create an item to test the flow, specify yourself in this field. That way, you not only approve or reject the item, but also receive the notification email.

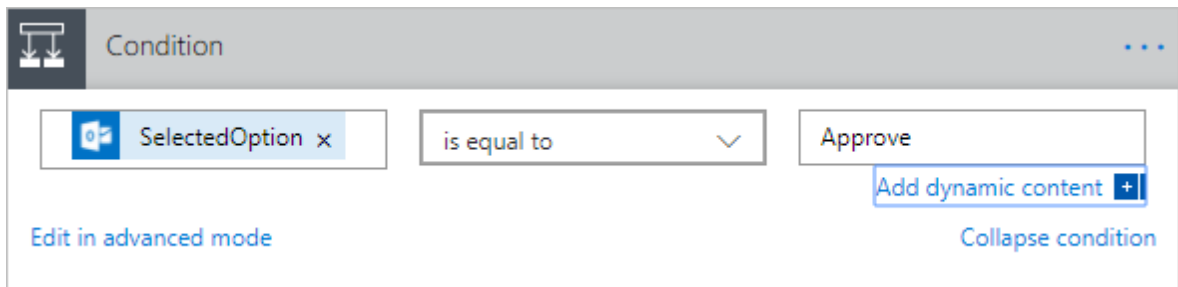
You can customize the **Subject** and **User Options** fields to suit your needs.



The screenshot shows a configuration window titled "Send email with options". It has three input fields: "\* To" with the value "Assigned To E...", "Subject" with the value "Project item needs approval", and "User Options" with the value "Approve, Reject". There is also a "Show advanced options" link and an "Add dynamic content" button.

## Add a condition

1. Select the **New step** button, and then select **Add a condition**.
2. Select the first box, and then select the **SelectedOption** token.
3. Select the last box, and then type **Approve**.



4. In the **If yes** area, select **Add an action**.

5. In the **Search all connectors and actions** box, type or paste **send email**, and then select **Office 365 Outlook - Send an email**.

6. In the **To** field, enter a recipient such as **Created by Email**.

7. In the **Subject** box, specify a subject.

For example, select **Assigned To DisplayName**, type **has approved** with a space on each side, and then select **Title**.

8. In the **Body** box, specify an email body such as **Ready to proceed with the next phase of the project**.

The person who created the item in the SharePoint list will be notified whether the project was approved or rejected.

9. In the **If no** area, repeat the previous steps, except change the **Subject** and **Body** to reflect that the project was rejected.

## Finish and test your flow

Give your flow a name, and then select **Create flow**.

An approval email is sent to the recipient that you specified. When the recipient selects **Approve** or **Reject** in that email, you receive email that indicates the response.

## See also

- [Single approver modern approvals walkthrough](#)
- [Create sequential approvals](#)
- [Create parallel approvals](#)
- [Approve requests on the go](#)

# Approve requests on your mobile device by using Power Automate

Article • 12/16/2022

If a cloud flow identifies you as an approver and you've installed the mobile app for Power Automate, you receive a push notification whenever your approval is requested.

This article walks you through a few common scenarios that you're likely to encounter while you manage approval requests in the mobile app for Power Automate.

## ⓘ Note

The images in this topic are from an Android device; however, the experience on iOS is similar.

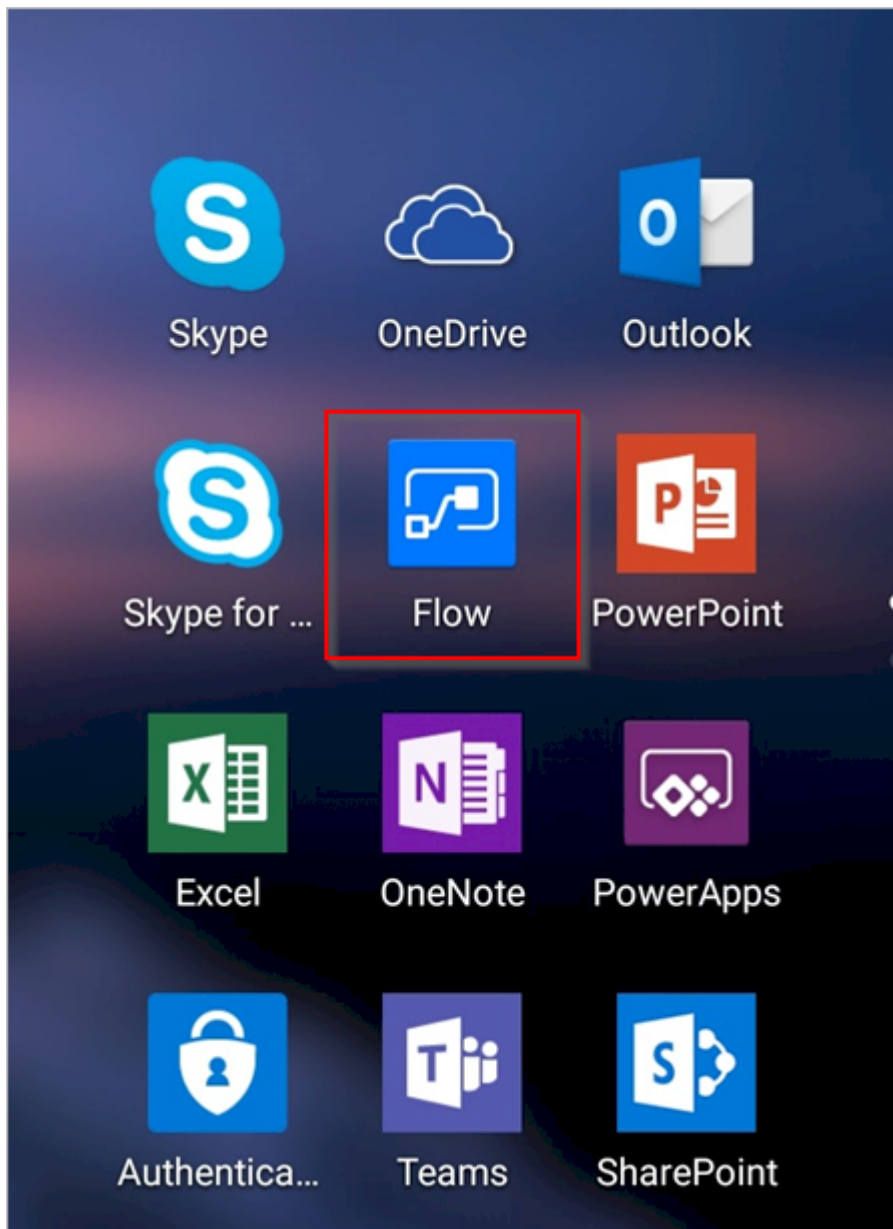
## Prerequisites

To complete this walkthrough, you need:

- An [Android](#) or [iOS](#) device running the mobile app for Power Automate.
- To be designated as the approver in an approval flow.
- Pending requests for approval.

## View pending requests

1. Open the mobile app for Power Automate.




2. Select **APPROVALS** in the upper-right corner.


FEED APPROVALS

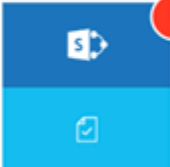
See all activity ▾

06/05/2017

 **Test approval from mobile** 3:42 PM  
Flow successfully ran 1 time

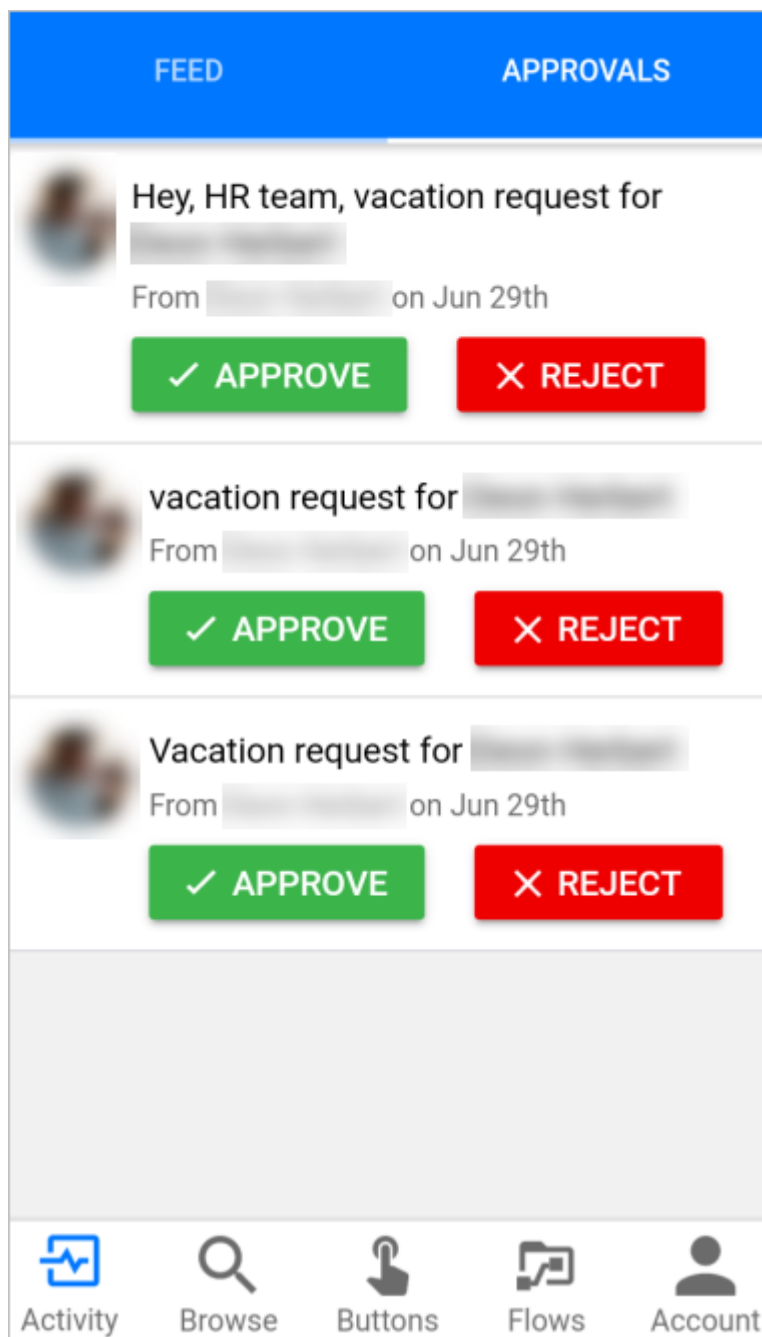
06/03/2017

 **Test approval from mobile** 2:58 AM  
Flow successfully ran 1 time

 **Test approval from mobile** 9:59 PM  
Flow failed

Activity Browse Buttons Flows Account

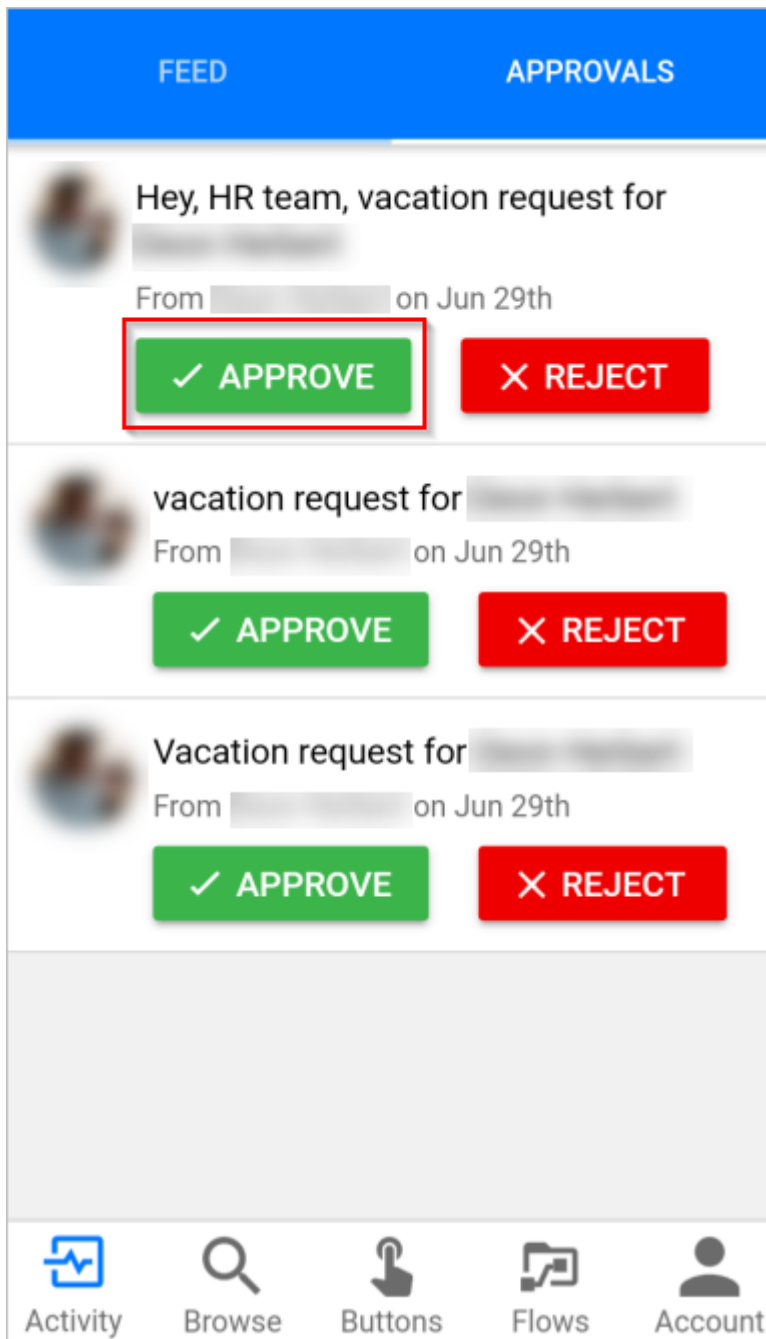
3. View all pending approvals:



If you don't have any pending approval requests, create an [approval flow](#), set yourself as an approver, and then trigger the flow. Approval requests appear in the approval center a few seconds after the flow triggers and sends a request for approval.

## Approve requests and leave an optional comment

1. If you haven't done so, follow the preceding steps to [view pending requests](#).
2. Select **APPROVE** on the request that you want to approve.

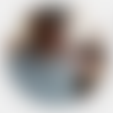


3. (Optional) select **Add comment (optional)**.



✕ Approval d... CONFIRM


Hey, HR team, vacation request for Deon Herbert

From  [Name]

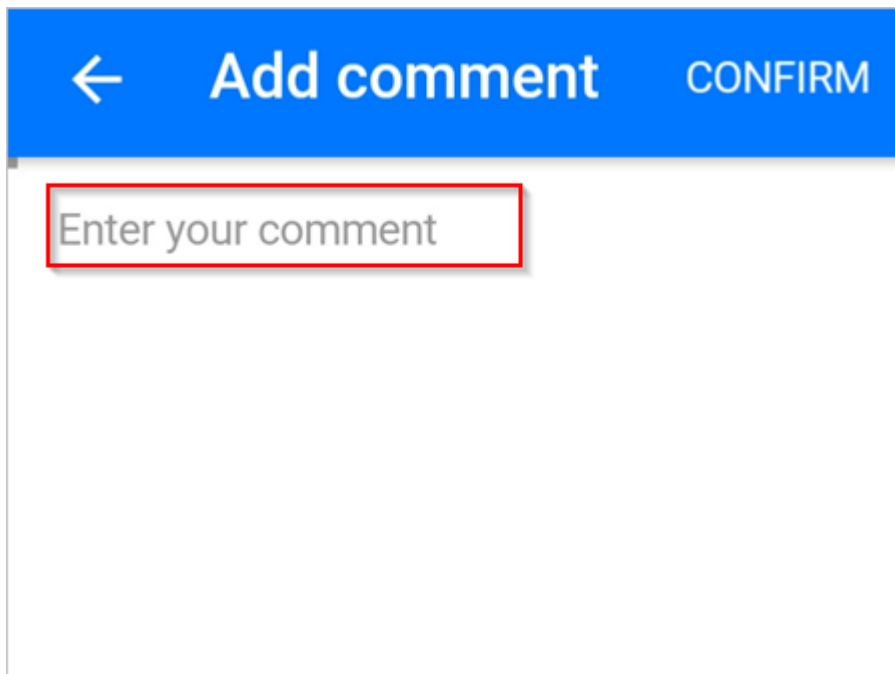
Requested  
🕒 Jun 29, 2017 5:15 AM

Details  
[Name] wants to go on vacation from 2017-06-07 to 2017-06-08. Title of vacation request: Test approval Comments: Oofness

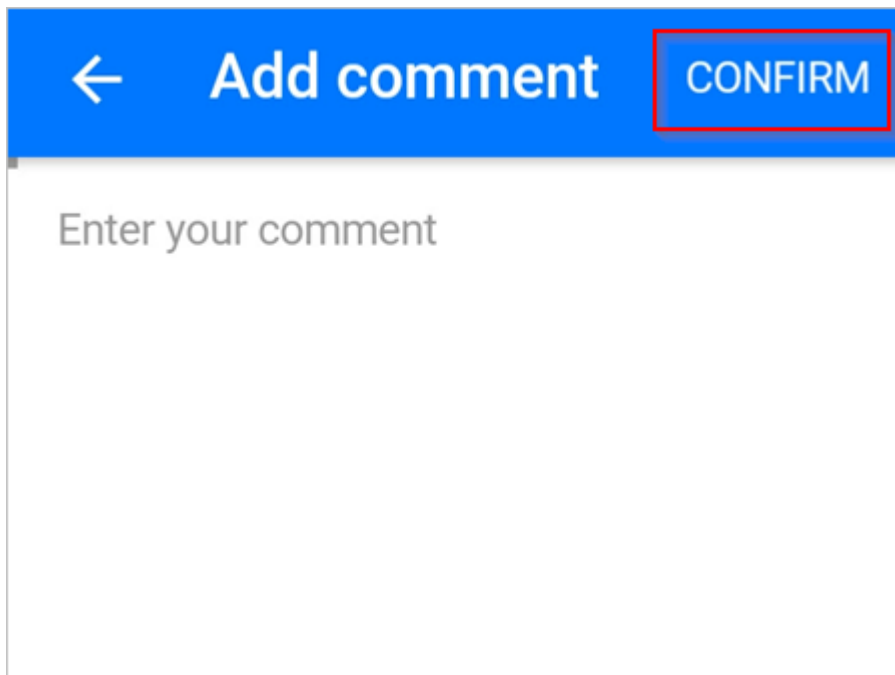
✓ You have chosen to **approve** this request. [Change](#)

 [Add comment \(optional\)](#)

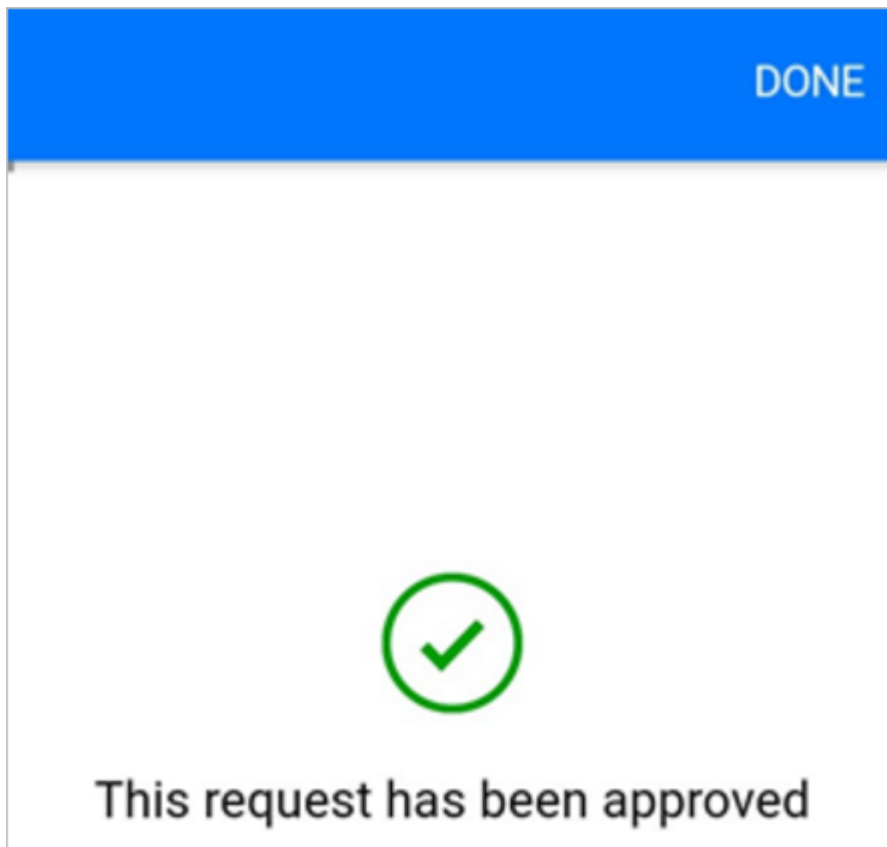
Enter a comment on the **Add comment** screen.



4. Select **CONFIRM** in the upper-right corner.



The success screen displays after the flow records your decision.



## Reject requests and leave an optional comment

Follow the [steps to approve a request](#), but select REJECT in the second step.

### Learn more

[Create modern approval flows.](#)

# Request approvals from Microsoft 365 groups

Article • 04/14/2023

You can send approvals to [Microsoft 365 groups](#) and to individuals. It's useful to send approvals to groups in scenarios where you need an approval from any one person in the group. For instance:

- You need the approval of a representative of the leadership team for a project.
- You want the copy of the new marketing material to be approved by someone on the social media team.

## Tip

Only a single user from the group needs to respond to the approval. That user's response is used to represent the entire group.

## Send an approval to a Microsoft 365 group

Approvals to groups behave exactly like approvals to users, it's just the entity that the approval is being sent to that's different. Let's look at a simple example.

## Note

This example uses the **First to respond** action, but you can combine this action with other types of approvals as well.

## Create the flow

1. Sign in to [Power Automate](#).
2. Select **My flows > New > Instant — from blank**.
3. Give your flow a name.
4. Search for and then select **Manually trigger a flow**.
5. Select **Create**.

6. Select the **Manually trigger a flow** trigger > **Add an input** > **File**.

This step configures your flow so that when it runs, it requests a file from the user to trigger your flow.

7. Select **New step**.

8. Search for **Approvals**, and then select **Start and wait for an approval**.

9. On the **Start and wait for an approval** card, for **Approval type**, select **Approve/reject - First to respond**.

10. Enter the following:

- **Title:** This is a short description that gives the approver some details about the approval request.
- **Details:** This text shows up in the approval request.

11. In the **Assigned to** field, start entering the name of the group to which you want to send the approval. The **Assigned to** field accepts both user and Microsoft 365 group inputs. If you know the email ID associated with the group, you can include that as well.

The screenshot shows the configuration interface for the 'Start and wait for an approval' step. The fields are as follows:

Field	Value
* Approval type	Approve/Reject - First to respond
* Title	Test group approval
* Assigned to	Test Group x ;
Details	testing
Item link	Add a link to the item to approve
Item link description	Describe the link to the item

**Tip**

You can include multiple groups and users in the **Assigned to** field.

12. Select **Save** to save your flow.

## Test your flow

1. Select **Test**.
2. Select **I'll perform the trigger action**.
3. Select **Test** > **Continue**.
4. Select **Run flow**.

You'll see that the test run starts.

5. Select **Flow Runs Page** to monitor the status of the test.

## Approve the request

For mail-enabled groups, the group to which the approval is sent receives a notification to respond to the approval. Members of the group can also view the approval in the Approvals action center on the Power Automate portal and in the Approvals app in Microsoft Teams.

## What to expect when you send approval requests to groups and users

You can choose to send an approval to multiple groups, or even a combination of groups and users. Here are a few examples of such scenarios and their expected outcome:

- The **First to respond** approval sent to group 1 and group 2: At least one user from *either* group 1 or group 2 needs to approve.
- The **Everyone must respond** approval sent to group 1 and group 2: At least one user from *both* group 1 and group 2 needs to approve.
- The **First to respond** approval sent to group 1 and user 1: At least user 1 or one member from group 1 needs to approve.
- The **Everyone must respond** approval sent to user 1 and group 1: Both user 1 and at least one member from group 1 needs to approve.

## Known issues and limitations

1. Only mail-enabled Microsoft 365 groups and security groups are supported.

2. Teams notifications aren't supported with group approvals. Teams notifications are sent only for approvals that are assigned to individual users.
3. The group must allow email from external senders to receive email notifications.
4. When you create an approval for a newly created Microsoft 365 group, there may be a small time period where Outlook actionable emails can present an error.

## Add a condition to an approval flow

In most approval flows, you'd want to notify the person who requests the approval of the decision. To learn how to add a condition to an approval flow to take specific actions based on the outcome of the request, go to [Add an email action for approvals](#).

# Build an approval loop by using Power Automate and Dataverse

Article • 04/14/2023

Dataverse can give you a way to build flows that have information stored in a database independent of a cloud flow. The best example of this is with approvals. If you store the status of the approval in a table, your flow can work on top of it.

In this example, you'll create an approval process that starts when a user adds a file to Dropbox. When the file is added, information about it appears in an app, where a reviewer can approve or reject the change. When the reviewer approves or rejects the change, notification mail is sent, and rejected files are deleted from Dropbox.


By following the steps in this section, you'll build:

- a **custom table** that will contain information about each file added to Dropbox and whether the file's status is approved, rejected, or pending.
- a **flow** that adds information to the custom table when a file is added to Dropbox, sends mail when the file is approved or rejected, and deletes rejected files. These steps demonstrate how to build such a cloud flow from scratch, but you can create a similar flow from a template.
- an **app** in which a reviewer can approve or reject files added to Dropbox. You'll use Power Apps to generate this app automatically based on the columns in the custom table.

## Prerequisites

- Sign up for [Power Automate](#) and [Power Apps](#).
- Create connections to Dropbox and Office 365 Outlook, as [Manage your connections](#).

## Build the table

1. Sign in to [Power Apps](#) .
2. On the left navigation bar, select **Tables**.
3. Select **New table** and then **New table**.



- Specify a display name and a plural name for the new table. In this example, both names are **ReviewDropboxFiles**. Optionally, you can add a description.

## New table

Use tables to hold and organize your data. Previously called entities  
[Learn more](#)

**Properties** Primary column

**Display name \***

**Plural name \***

**Description**

Enable attachments (including notes and files) <sup>1</sup>

[Advanced options](#) ▾

- Select **Save** to save the table.

## Add columns to the table

- Select the **ReviewDropboxFiles** table in the **Tables** page, and then select **New > Column**.

The screenshot shows the configuration interface for a table named 'ReviewDropboxFiles'. At the top, there is a toolbar with options: '+ New', 'Edit', 'Create an app', 'Using this table', 'Import', 'Export', 'Advanced', and 'Delete'. A dropdown menu is open under '+ New', with 'Column' selected and highlighted. The main area shows the table's schema with columns: 'Primary column', 'File identifier', and 'Last modified'. On the right, there are panels for 'Schema', 'Data experiences', and 'Customizations'. At the bottom, there is a '+18 more' button and a text input field labeled 'Enter text'.

2. Create a new column named **Approver** with the following properties:

- Set **Display Name** to **Approver**.
- Set **Data type** to **Single line of text**.
- Set **Format** to **Email**.
- Set **Required** to **Business required**.

3. Create a new column named **Status** with the following properties:

- Set **Display Name** to **Status**.
- Set **Data type** to **Single line of text**.
- Set **Format** to **Text**.
- Set **Required** to **Business required**.

4. Create a new column named **File identifier** with the following properties:

- Set **Display Name** to **File identifier**.
- Set **Data type** to **Single line of text**.
- Set **Format** to **Text**.
- Set **Required** to **Business required**.

## Sign in and create a cloud flow

1. Sign in to [Power Automate](#).

2. On the top right menu, select the environment in which you created the database. If you don't select the same environment, you won't see your table.

3. Go to **My flows** and select **New flow > Automated cloud flow**.

## Start when a file is added

1. In the **Build an automated cloud flow** dialog, enter a name for the flow and search for the **When a file is created** Dropbox trigger.

2. Under **Folder**, select the folder icon, and then browse to the folder where files will be added.

## Add data to the table

1. In the designer, select **New step** and search for the **Add a new row** Dataverse action.

2. Configure the action as presented in the following screenshot:

- a. In the **Table name** drop-down menu, select the **ReviewDropboxFiles** table.
- b. In the **Approver** field, enter the email address of the person who will review the files.
- c. In the **File identifier** field, select **File identifier** from the **Dynamic content** list.
- d. In the **Name** field, select **File name** from the **Dynamic content** list.
- e. In the **Status** field, enter **Pending**.

The screenshot shows a configuration window titled "Add a new row". It contains five fields, each with a red asterisk indicating it is required:

- \* Table name:** A dropdown menu with "ReviewDropboxFiles" selected.
- \* Approver:** A text input field containing "someone@contoso.com".
- \* File identifier:** A dropdown menu with "x-ms-file-id" selected.
- \* Name:** A dropdown menu with "x-ms-file-name..." selected.
- \* Status:** A text input field containing "Pending".

At the bottom left, there is a link "Show advanced options" with a downward arrow.

## Check whether the file has been reviewed

1. Under the **Add a new row** action, select **New step** and search for the **Do until** action.
2. Configure the **Do until** action as presented in the following screenshot:
  - a. Select the left box in the action and select **Status** from the **Dynamic content** list.
  - b. In the middle drop-down menu, select **is not equal to**.
  - c. In the right box, enter **Pending**.
3. Inside the **Do until** action, select **Add an action** and search for the **Get a row by ID** Dataverse action.
4. Configure the **Get a row by ID** action as presented in the following screenshot:
  - a. In the **Table name** drop-down menu, select the **ReviewDropboxFiles** table.

b. In the **Row ID** field, select **File identifier** from the **Dynamic content** list.

## Check whether the item has been approved

1. Under the **Do until** action, select **New step** and search for the **Condition** action.
2. Configure the **Condition** action as presented in the following screenshot:
  - a. Select the left box in the action and select **Status** from the **Dynamic content** list.
  - b. In the middle drop-down menu, select **is equal to**.
  - c. In the box on the right, enter **Approved**.

## Send notification mail

1. Under the **If yes** action, select **Add an action** and search for the **Send an email (V2) Office 365 Outlook** action.
2. Configure the **Send an email (V2)** action as presented in the following screenshot:
  - a. In the **To** field, enter the email address of the person whom you want to notify when an item is accepted.

### Tip

To make testing the flow easier, specify your own address. You can change it when the flow is ready for actual use.

- b. In the **Subject** field, select **File name** from the **Dynamic content** list.
  - c. In the **Body** field, enter **The item has been approved..**
3. Under the **If no** action, repeat the step 2, but specify the body of the email message as **The item has been rejected**.

## Delete rejected files

1. Under the **Send an email (V2)** action for the rejection mail, select **Add an action** and search for the **Delete file Dropbox** action.
2. In the **File** field, select **File identifier** from the **Dynamic content** list.

## Save the flow

1. At the top of the screen, enter a name for the created cloud flow, and select **Save**.
2. In Dropbox, add at least two files to the folder that you specified: one to test approval and one to test rejection.

## Build the app

1. Sign in to [Power Apps](#).
2. Go to the **Create** page and then select **Dataverse**.
3. Select your Dataverse connection, and then the **ReviewDropboxFiles** table.

If this is your first time, you're prompted to create a connection to Dataverse.

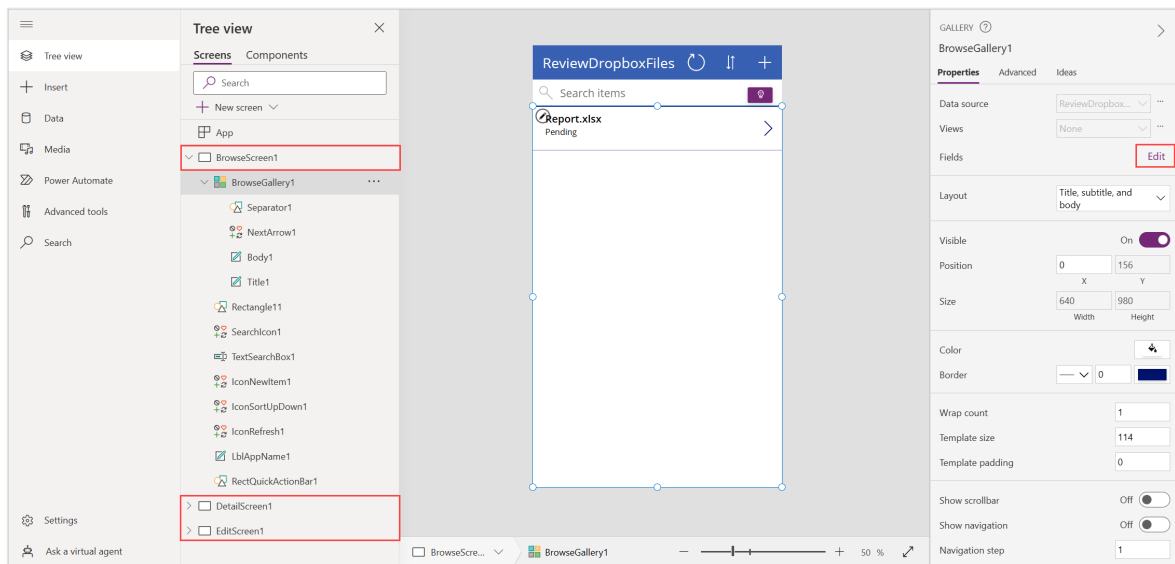
4. If the **Welcome to Power Apps Studio** dialog box appears, you can follow it or skip it.

## Customize the app

At this step, the app should contain three screens to browse, see the details and edit the entries, respectively.

To add or remove fields from a screen:

1. Select the desired screen on the **Tree view**.
2. Select the root element of the screen.
3. Select **Edit** in the right pane.



The current example contains the following fields for each screen:

- In the browse screen, there are fields for the **Name** and **Status** columns of the Dataverse table.
- In the details screen, there are fields for the **Name**, **Status**, **File identifier**, and **Approver** columns of the Dataverse table.
- In the edit screen, there's a field for the **Name** column and an edit text field for the **Status** column of the Dataverse table.

## Test the overall solution

1. In Power Apps, open the preview mode selecting the play button on the toolbar.



2. Select the arrow next to the first file in the list to see the details about it.
3. Select the pencil icon to change the details of the file.
4. In the **Status** box, enter **Approved** and select the checkmark icon to save your changes. In a few minutes, you'll receive an email stating that the file was approved.
5. Repeat the previous steps but enter **Rejected** (or anything except **Approved**) in the **Status** field. In a few minutes, you'll receive an email stating that the file was rejected, and the file will be deleted from Dropbox.

# Use Markdown language in Power Automate approval requests

Article • 07/11/2023

This article shows you how to use [Markdown]

(<https://en.wikipedia.org/wiki/Markdown>) syntax to add rich formatting to your approval requests.

## 📘 Important

- Approval request emails are *actionable messages*. If your **Microsoft Outlook client** doesn't support actionable messages, it displays approval requests in HTML format.
- All markdown renderers have implementation differences. For details, review the **Client Support** section.
- Markdown isn't currently supported for the **Approvals** app on Microsoft Teams.

## Client Support

Markdown support among clients is inconsistent. The Power Automate team works to address these inconsistencies, however, inconsistencies remain. The following table lays out the known limitations among the supported clients.

Feature	Power Automate	Power Automate mobile app	Outlook	Outlook Web	Teams	Teams mobile app	Approvals Teams App
Headers	Yes	Yes	Yes	Yes	No	No	No
Numbered Lists	Yes	Yes	No	Yes	Yes	Yes	No
Nested Numbered Lists	Yes	Yes	No	Yes	Yes	Yes	Yes
Tables	Yes	Yes	Yes	Yes	No	No	No
Images	No	No	No	No	No	No	No

Feature	Power Automate	Power Automate mobile app	Outlook	Outlook Web	Teams	Teams mobile app	Approvals Teams App
Forced Line Breaks	Yes*	Yes*	No (use a blank line instead)	Yes*	Yes*	Yes*	No
Blank Lines	No	No	Yes	Yes	No	Yes	No
Emphasis	Yes	Yes	Yes	Yes	No	No	No

\*Forced line breaks within table cells aren't supported for Power Automate, the Power Automate mobile app, Outlook Web, Teams, and the Teams mobile app.

### ⓘ Note

For Outlook Mobile, the previous parameters can vary depending on the Outlook client app and version that you're using.

## Headers

Structure your comments using headers. Headers segment longer comments, making them easier to read.

Start a line with a hash character `#` to set a heading. Organize your remarks with subheadings by starting a line with additional hash characters, for example `####`. Up to six levels of headings are supported.

### Example:

Markdown

```
# This is a H1 header
## This is a H2 header
### This is a H3 header
#### This is a H4 header
##### This is a H5 header
```



**Result:**

```
This is an H1 header

This is an H2 header

This is an H3 header

This is an H4 header

This is an H5 header
```

## Paragraphs and line breaks

Make your text easier to read by breaking it up with paragraphs or line breaks. Enter two spaces prior to the line break to force most clients to start a new line.

**Example:**

```
Markdown

This is line 1.(space)
Now text will appear on the next line.
```

**Result:** This is line 1.  
Now text will appear on the next line.

**Example 2**

```
Markdown

This is line 1.(space, space)

Line 2 has extra space before it.
```

**Result:**  
This is line 1.  
  
Line 2 has extra space before it.

## Lists

Organize related items with lists. You can add ordered lists with numbers, or unordered lists with just bullets.

Ordered lists start with a number followed by a period for each list item. Unordered lists start with a `*`. Begin each list item on a new line. In a Markdown file or widget, enter two spaces prior to the line break to begin a new paragraph, or enter two line breaks consecutively to begin a new paragraph.

## Ordered or numbered lists

Example:

Markdown

```
1. First item.  
1. Second item.  
1. Third item.
```

Result:

1. First item.
2. Second item.
3. Third item.

## Bullet lists

Example:

Markdown

```
- Item 1  
- Item 2  
- Item 3
```

Result:

- Item 1
- Item 2
- Item 3

## Nested lists

Example:

Markdown

- ```
1. First item.
  - Item 1
  - Item 2
  - Item 3
1. Second item.
  - Nested item 1
  - Nested item 2
  - Nested item 3
```

**Result:**

1. First item.

- Item 1
- Item 2
- Item 3

2. Second item.

- Nested item 1
- Nested item 2
- Nested item 3

## Links

Use HTTPS links, which are rendered as links in all clients. Non-HTTPS links (for example, FTP, HTTP, and mail) can be rendered as regular text.

You can set text hyperlinks for your URL using the standard markdown link syntax:

Markdown

```
[Link Text](Link URL)
```

**Example:**

Markdown

```
[Power Automate](https://make.powerautomate.com)
```

**Result:**

[Power Automate](https://make.powerautomate.com) 

# Tables

Organize structured data with tables.

- Place each table row on its own line
- Separate table cells using the pipe character `|`
- The first two lines of a table set the column headers and the alignment of elements in the table
- Make sure to end each row with a CR or LF.
- Aligning text within a table element is currently not supported.

Example:

```
Markdown

Heading 1	Heading 2	Heading 3
Cell A1	Cell A2	Cell A3
Cell B1	Cell B2	Cell B3
```

Result:

| Heading 1 | Heading 2 | Heading 3 |
|-----------|-----------|-----------|
| Cell A1   | Cell A2   | Cell A3   |
| Cell B1   | Cell B2   | Cell B3   |

## Emphasis (bold, italics, strikethrough)

You can emphasize text by applying bold, italics, or strikethrough to characters.

- To apply italics: surround the text with an asterisk `*` or underscore `_`
- To apply bold: surround the text with double asterisks `**`.
- To apply strikethrough: surround the text with double tilde characters `~~`.

Combine these elements to apply multiple emphases to text.

Example:

```
Markdown

Use _emphasis_ in comments to express **strong** opinions and point out
~~corrections~~
```

```
**_Bold, italicized text_**
**~~Bold, strike-through text~~**
```

Result:

Use *emphasis* in comments to express **strong** opinions and point out ~~corrections~~

***Bold, italicized text***

**~~Bold, strike-through text~~**

## Special characters

| Syntax                                                              | Example/notes                                   |
|---------------------------------------------------------------------|-------------------------------------------------|
| To insert one of the following characters, prefix with a backslash: | Some examples on inserting special characters   |
| <code>\</code> backslash                                            | Enter <code>""\"</code> to get <code>\\</code>  |
| <code>`</code> backtick                                             | Enter <code>""\"</code> to get <code>\_</code>  |
| <code>_</code> underscore                                           | Enter <code>""\"</code> to get <code>\#</code>  |
| <code>{}</code> curly braces                                        | Enter <code>""\"</code> to get <code>\(</code>  |
| <code>[]</code> square brackets                                     | Enter <code>""\"</code> to get <code>\.</code>  |
| <code>()</code> parentheses                                         | Enter <code>""!\"</code> to get <code>\!</code> |
| <code>#</code> hash mark                                            |                                                 |
| <code>+</code> plus sign                                            |                                                 |
| <code>-</code> minus sign (hyphen)                                  |                                                 |
| <code>.</code> dot                                                  |                                                 |
| <code>!</code> exclamation mark                                     |                                                 |

# Create custom response options for approval flows

Article • 04/14/2023

Let's say you want to send an approval request each time an employee uploads an expense report to SharePoint and then allow the approver to respond with one of three options: Accept, Need more info, or Reject.

## Prerequisites

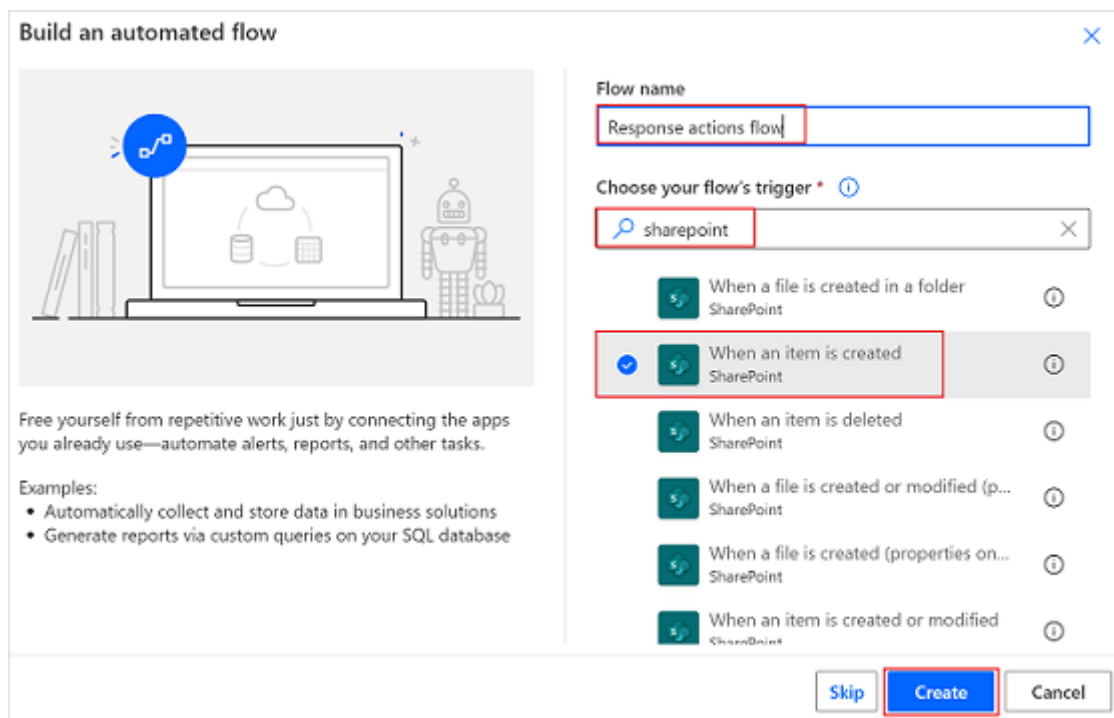
- A Power Automate account.
- A SharePoint list for employees to enter their expense reports.

### Tip

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

## Create approval flow

1. Sign in to [Power Automate](#).
2. On the left navigation bar, select **My flows**.
3. Select **New > Automated-from blank**.
4. On the screen that opens, provide a name for your flow in **Flow name**.
5. In **Choose your flow's trigger** field, search for **SharePoint**.
6. From the list of triggers, select **When an item is created**.
7. Select **Create**.



8. Provide the SharePoint **Site Address** and **List Name**.

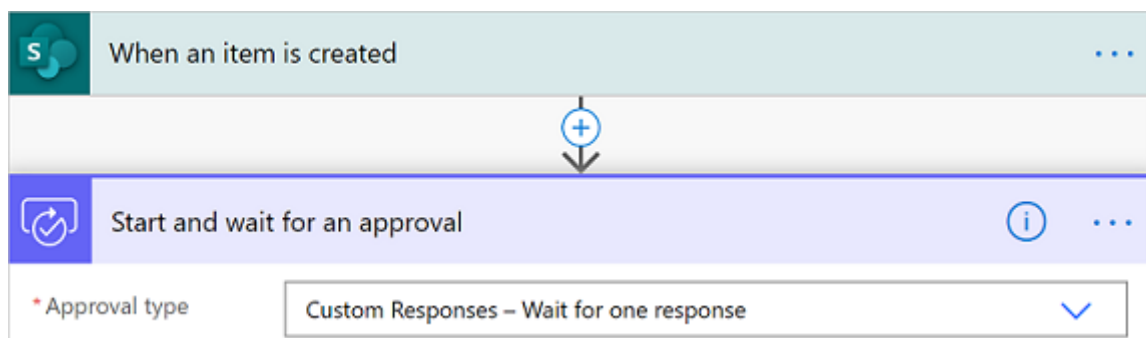
**Tip**

Select **Enter custom value** from the **Site Address** field before you enter text into **Site Address**.

9. Select **New step**, search for **Approval**, and then select **Start and wait for an approval**.

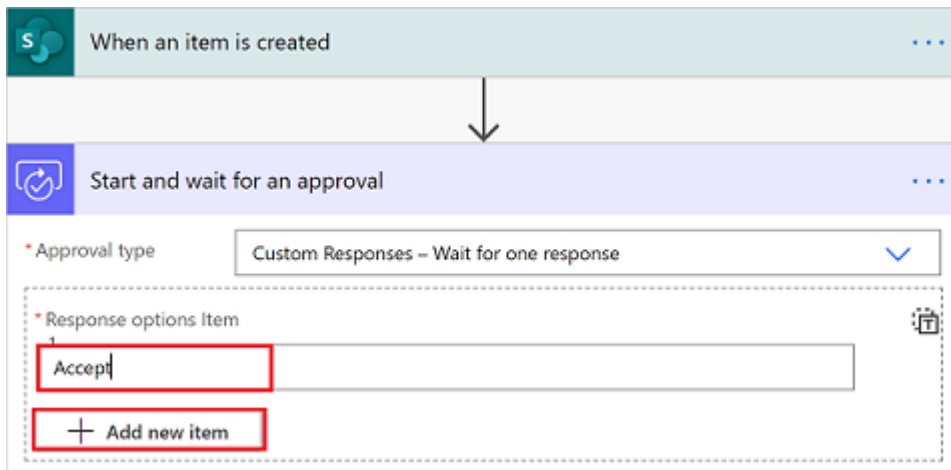
10. On the **Start and wait for an approval** card, select the **Approval type** list.

11. Select **Custom Responses - Wait for one response**.



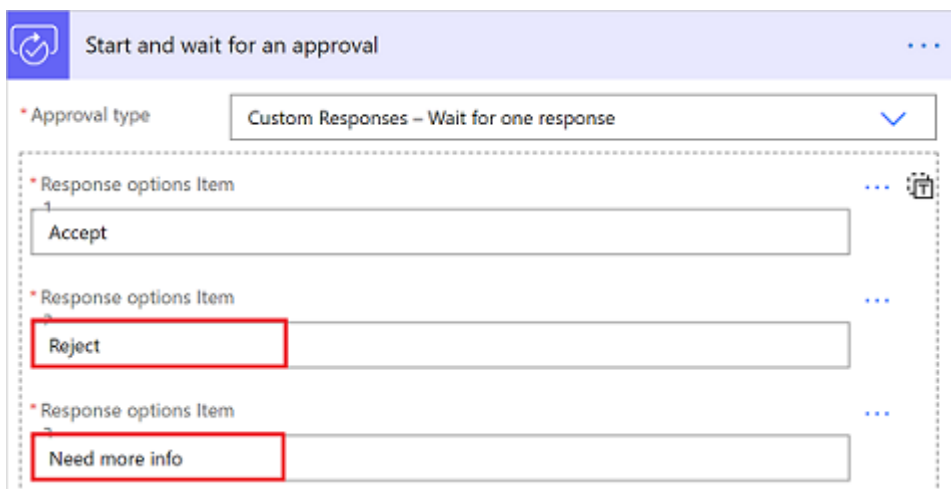
Next, you'll create the custom responses that your approvers will use when they respond to an approval request for an employee expense.

12. In the **Response options Item** box, enter **Accept** and then select **Add new item**.



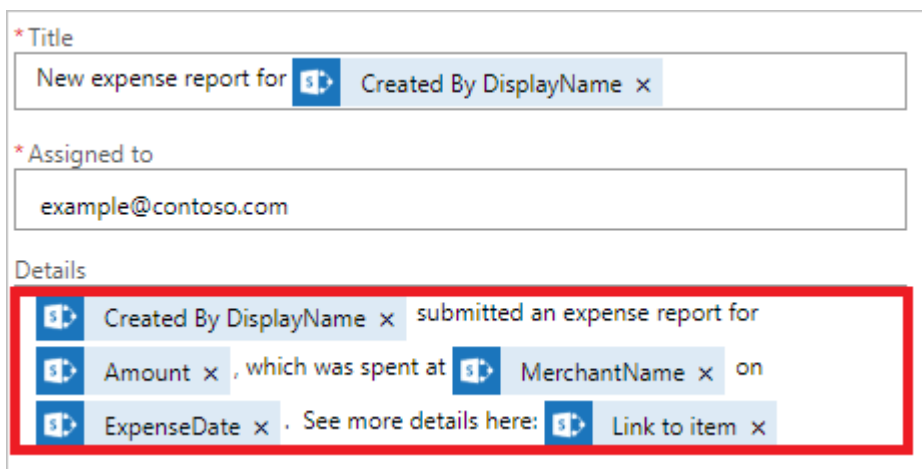
13. In the **Response options Item** box, enter **Reject** and then select **Add new item**.

14. In the **Response options Item** box, enter **Need more info**.



15. Enter a **Title**, **Assigned to** (email for the approver), and **Details** (the details to be contained in the approval request).

Here's an example of what you might include for your organization.



Now that you've created your custom responses, you might want to do different things in your flow, depending on the response from the approver.



# Use approval responses

If the response to the request is **Accept**, you might want to send an email to the accounting department, asking them to reimburse the employee for the expense.

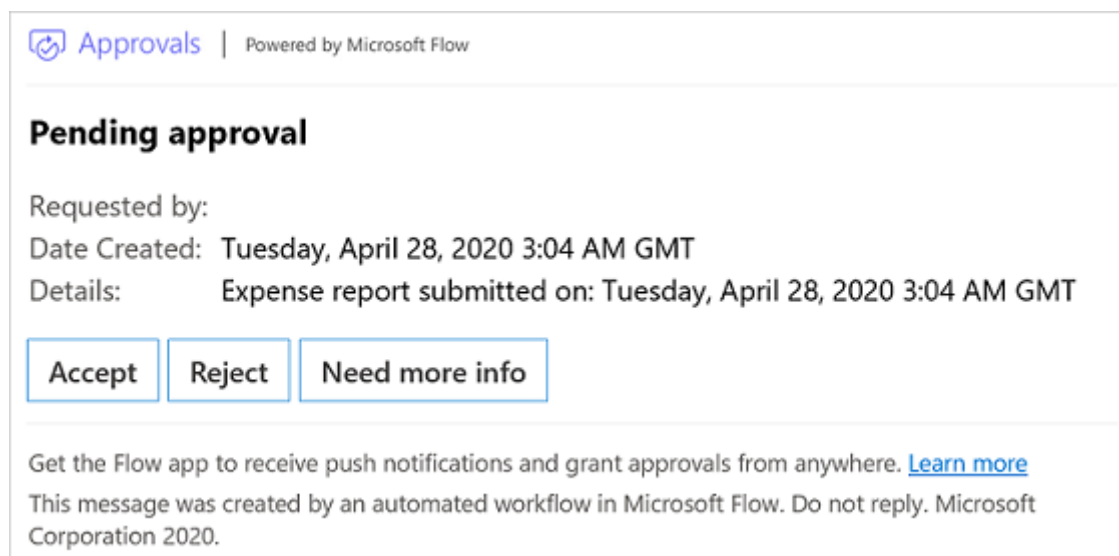
If the response is **Reject**, you might want to send an email to the employee, letting them know that the request was rejected.

And finally, if the response from the approver is **Need more info**, you might want to send an email to the employee, requesting the employee to provide more information.

To do any of these in the flow, add a **Condition** or a **Switch** action to your flow, and then select the **Outcome** field of the approval request from the dynamic content picker. Be sure to confirm whether the value is Accept, Need more info, or Reject.

## Respond to approval requests with a custom response


Approvers receive approval requests in email. The requests are also displayed in the approval center on Power Automate.



## Limitations

Outlook and Outlook Web Access (OWA) actionable messages have a limit of five custom responses. This means that only the first five responses that are defined within the flow will be visible in the actionable section of Power Automate approval emails. You can submit the remaining options via a non-actionable HTML email, the Power Automate approval center, the Power Automate mobile application, or Teams.

Approvals that rely on custom responses can fail if they're sent to many users with the type set to **Everyone must approve**. This failure is due to the data size limitations of the results field.

 **Note**

For approvals using a single custom response, Outlook and OWA expand the response field so users do not need to select a button before they can respond like they do when there are multiple approval options.

## See also

- [Create single approver flows](#)
- [Create sequential approver flows](#)

# Known issues

Article • 01/30/2024

## Work with guest users

If you assign a guest user to an approval, that user can't view or act on the approval by default. The guest user must be assigned a valid Power Automate license (per user license or Microsoft 365-based user license) to view or respond to the approval.

## Adaptive cards mismatch in Microsoft Teams

There are multiple ways in which you can notify an approver when a flow runs. By default, all flows that handle approvals send an email notification. You can also send an adaptive card with the approval to users in Microsoft Teams. If the approver responds through the email notification or through the approval action center, the card in Microsoft Teams won't auto-update. This can lead to situations where there's a mismatch between the status shown on the adaptive card and that of the flow.

To avoid this, you can disable the default notification email sent to the user as part of approval creation.

+ Create an approval ? ...

\* Approval type v  
 Approve/Reject - First to respond

\* Title  
 Test

\* Assigned to  
user x ;

Details  
 Testing approvals with custom options

Item link  
 Add a link to the item to approve

Item link description  
 Describe the link to the item

Requestor  
 Add the email of the person generating this request Show options

Enable notifications v  
 No

Enable reassignment  
Yes

Attachments Name - 1

|                 |                    |
|-----------------|--------------------|
| Attachment name | Enter custom value |
|-----------------|--------------------|

Attachments Content - 1

Attachment content

+ Add new item

ApprovalCreationInput/responseOptions

```
[
  "In Review",
  "Approved",
  "Rejected"
]
```

[Hide advanced options](#) ^

## Abandoned approvals in the approval action center

As part of the flow, you can send an approval request to a user and wait for a response. An approval flow can wait for 28 days. If the wait time exceeds 28 days, that flow fails. This only impacts the flow itself, meaning that the approval continues to exist in the action center. This can lead to cases where there are abandoned approvals in the

approval action center that have no flow waiting on them. The requestor or environment admin then needs to manually delete these approvals from the action center.

## Anchors

Anchor links aren't supported. Unexpected results occur if you use anchors.

## Data templating

Data templating isn't fully supported for adaptive cards in Power Automate. As a workaround, use actions like compose, filter, select, and apply to each to manually construct the card within your flows.

## Approvals with custom responses set to Everyone must approve

Approvals that rely on custom responses can fail if they're sent to many users with the type set to **Everyone must approve**. This failure is due to data size limitations of the results field.

## Update a Power Apps (V2) trigger to invoker connection

The Power Apps (V2) trigger supports both embedded and invoker connections. When you update the connections in your Power Apps (V2) trigger to invoker connections, you must refresh or remove and re-add the flow in the app and save the app.

To learn more, go to [Known issues with Power Apps \(V2\) trigger](#).

## Split create and wait actions

It's possible to create flows with the approval connector where you use the *Create an approval* and *Wait for an approval* as independent actions. If a user immediately responds to an approval request before the flow reaches the wait action, it's possible for the flow to become stuck in the wait stage. To avoid getting the flow stuck, ensure that the create and wait actions are called close together within the flow. Alternately, change the status of the approval in Dataverse before you call the wait action.

# Use approval outcomes in loops

When you use approvals with *do until* loops, users need to account for all possible outcomes of a flow. If not, the flows could be stuck in infinite loops. For *basic* and *await all approvals*, the final states can be **Approved**, **Rejected**, or **Canceled**. Custom approvals are based on what the user chooses to have as the options for the approval. Use a condition or switch statement with approval flow instead of *do until* loops.

## View details of an approval

To view details of an approval, select an individual approval to open it. Formerly, you could also view the details in the **Details** column on the **Received** tab of the Approvals list view, but this column is now removed.

## Issues with email notifications

Here's an explanation of the process for sending an approval email notification, and a description of the possible email notification statuses and troubleshooting.

Sending approval email notifications is a two-step process:

1. Power Automate places a request for the email to be sent.
2. The email goes into a queue.

## Reply to an approval email

When you reply to an approval email notification, you must add your intended recipient(s) to the **To:** line. Previously, the person who sent you the approval request would be automatically added to the **To:** line when you selected **Reply**, but now it must be done manually.

## Email status definitions

 Expand table

| Status    | Description                                                                                                               |
|-----------|---------------------------------------------------------------------------------------------------------------------------|
| Pending   | Power Automate is requesting that the notification is sent.                                                               |
| Requested | Power Automate successfully placed the request for the notification to be sent, but the request is still being processed. |

| Status | Description                                                                                  |
|--------|----------------------------------------------------------------------------------------------|
| Sent   | The email notification was correctly sent.                                                   |
| Failed | The email notification was correctly placed in the queue, but there was an error sending it. |

## Missing emails

If the status of your email notification is **Sent** but you don't see the email notification, try the following options:

- Refresh your inbox and verify that you have an active Internet connection.
- Confirm that the email address is correct for the intended recipient.
- Review your email settings and verify if there are any filters or blocked addresses that may prevent you from seeing the notification.
- Check your spam or promotions folder.

## Troubleshoot failed requests

If the status of your email notification is **Failed**, you can try the following options:

- Make another request to the same recipients.
- Raise a ticket to Microsoft Support, detailing the issue.

# Overview of using Outlook and Power Automate

Article • 12/16/2022

Connectors represent the service to which you want to connect. For example, you can use the OneDrive, SharePoint, or Twitter connectors to use those services. Two of the most popular connectors used in flows to send or receive email are the [Outlook.com](#) connector and the [Office 365 Outlook](#) connector. Both connectors offer similar operations that you can use to manage your mail, calendars, and contacts. You can perform actions such as send mail, schedule meetings, add contacts, and more with either of these connectors.

## Outlook.com or Office 365 Outlook: Which connector should I use?

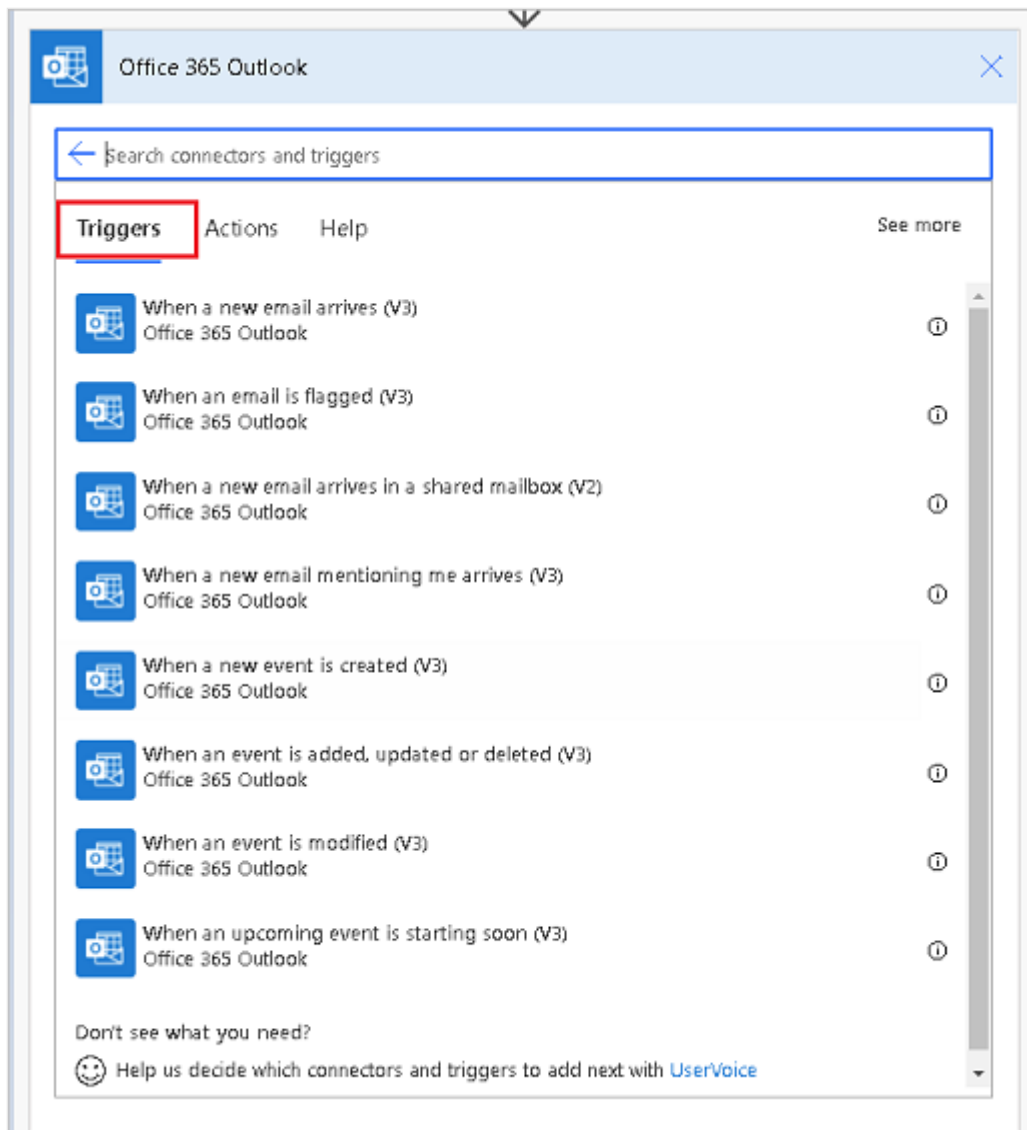
If you're using a work or school email account, use the Office 365 Outlook connector. If you're using a personal account (Microsoft account), use the Outlook.com connector. In this article, we refer only to the Office 365 Outlook [triggers](#) and [actions](#). You can also use the same techniques for the Outlook.com connector.

## Triggers

A *trigger* is an event that starts a cloud flow. For example, **When a new email arrives (V3)** is a trigger that starts a cloud flow when an email arrives into an inbox. You can also trigger flows based on the properties of an email. More information: [Trigger a cloud flow based on email properties](#).

The following screenshot shows a partial list of the Office 365 Outlook triggers. For the full list of triggers you can use to start flows, go to [Office 365 Outlook triggers](#).

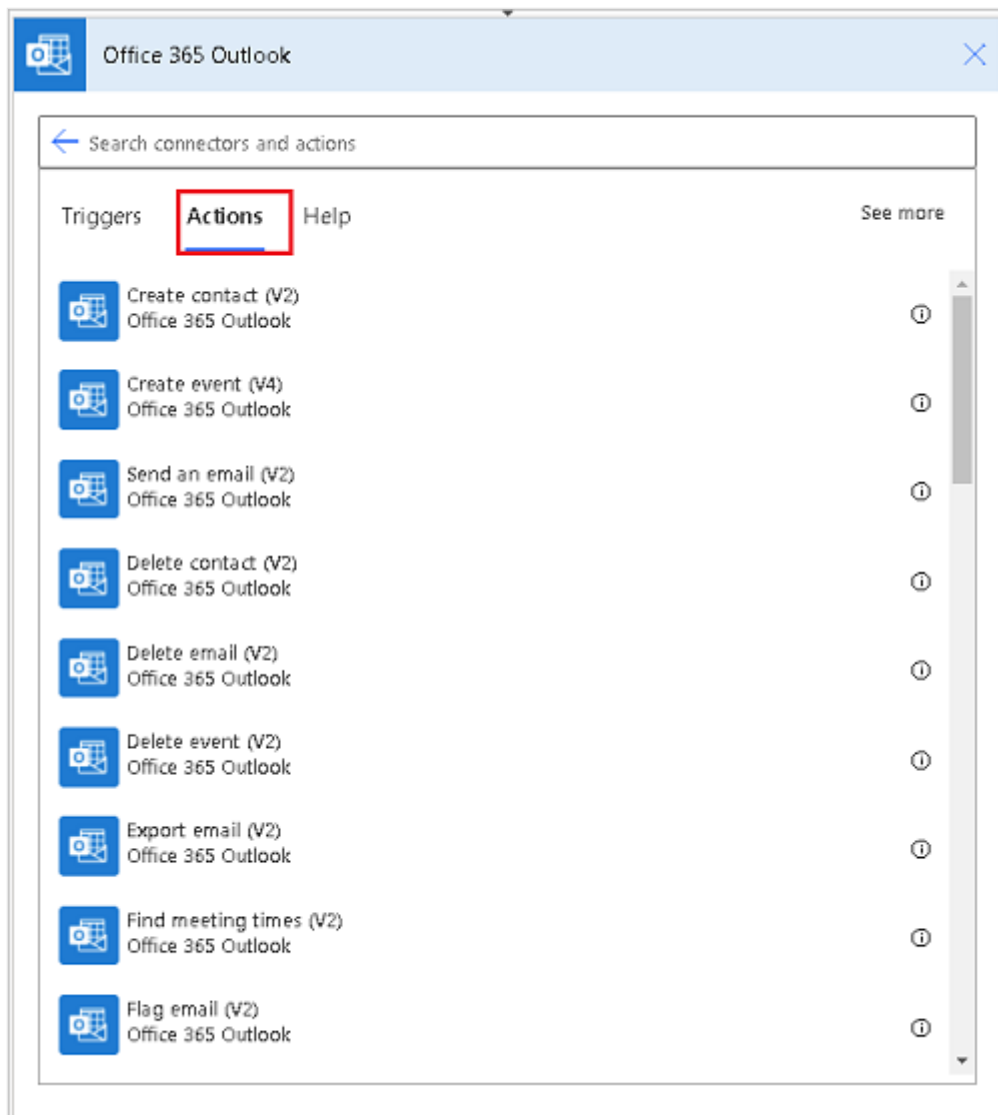




## Actions

*Actions* are the events you want the flow to do after the trigger event takes place. An example of an action is, "when someone sends me an email, save it to OneDrive."

The following screenshot shows a partial list of Office 365 Outlook actions. For the full list of actions you can use in your flows, go to [Office 365 Outlook actions](#).



## See also

[Create flows for popular email scenarios](#)

[Create flows to manage email](#)

[Customize email in flows](#)

# Create flows to manage email

Article • 02/09/2023

Here are some of the most frequently used ways to create flows to manage your email.

Power Automate offers many templates for you to create flows. You can use these templates "as is" or you can make any adjustments that your scenario needs. If you don't find a template that matches your scenario, you can create a cloud flow without a template. You can also create a flow from connectors.

1. **Use a template:** Most likely, there's already a [template](#) that accomplishes your scenario. Search for your scenario among the templates, and then follow the steps to create a cloud flow from the template.
2. **Tweak a template:** If you find a template that's similar to your scenario, but it doesn't do exactly what you want, you can create a cloud flow from that template and then tweak the flow to your liking. You can extend a cloud flow that you created from a template by adding, editing, or removing triggers and actions.

## Tip

You can **copy and paste** actions in the same flow or across flows to speed up the process.

3. **Create a cloud flow from scratch:** If you can't find a template that's similar to your scenario, you can [create a cloud flow from scratch](#) and then connect the services you want.
4. **Create a cloud flow from a connector:** In Power Automate, select **Connectors** from the left side of the screen, search for the connector you want, and then select it to create your flow. For example, search for **outlook** to find connectors for Outlook for Microsoft 365.

## More information

[Overview of using Outlook and Power Automate](#)

[Customize email in flows](#)

[Create flows for popular email scenarios](#)

# Create flows for popular email scenarios

Article • 09/08/2023

Here are some of the top scenarios in which you can use Power Automate to manage your email.

- Send an email from your account.
- Send an email from a distribution list or shared mailbox.
- Send an email with voting options.
- Build an approval process and notify colleagues via email.
- Send a reminder email to approvers.
- Send a daily digest email with a summary table.

## Send email from your account

To send email from your account, use the [Send an email \(V2\)](#) action.

You can send the email to one or more recipients. You can use the rich text editor to make text bold, add color, and format the email similar to the way you do in Outlook. You can add static text or values from previous actions by using dynamic content. You can use the **send as** option to send email as someone else, or on behalf of someone else. To use this option, you'll need the permissions in Outlook to send on another person's behalf. You can find all email you send in your **Sent items** folder in Outlook.

For example, if you have a cloud flow that sends you an email as soon as your item is approved, you can add the link of the approved item as an attachment.

**Send an email (V2)**

\* To: Flow-Test

\* Subject: Item approved

\* Body:
   
Hi Betty,
   
Item name: Title x was approved by Approver name x
   
Check out the attachment to find the link

From (Send as): Email address to send mail from (requires "Send as" or "Send on beh

CC: Specify email addresses separated by semicolons like someone@con

BCC: Specify email addresses separated by semicolons like someone@con

Attachments Name - 1: Approved item

Attachments Content - 1: Item link x

## Send email with voting options

Use the **Send email with options** action to send an email with voting options using actionable email. Provide voting options in the **User Options** field.

**Send email with options**

\* To: FT Flow Test Teams

Subject: Vote for your favorite color

User Options: Red, Black, Pink, Other

Add dynamic content +

The recipients receive an email similar to the following screenshot.

## Request for your input

Select one of the options below to respond

Chutes and ladders

Monopoly

Apples to apples

Message sent via [Microsoft Power Automate](#), enabling you to create automated workflows between your favorite apps and services.

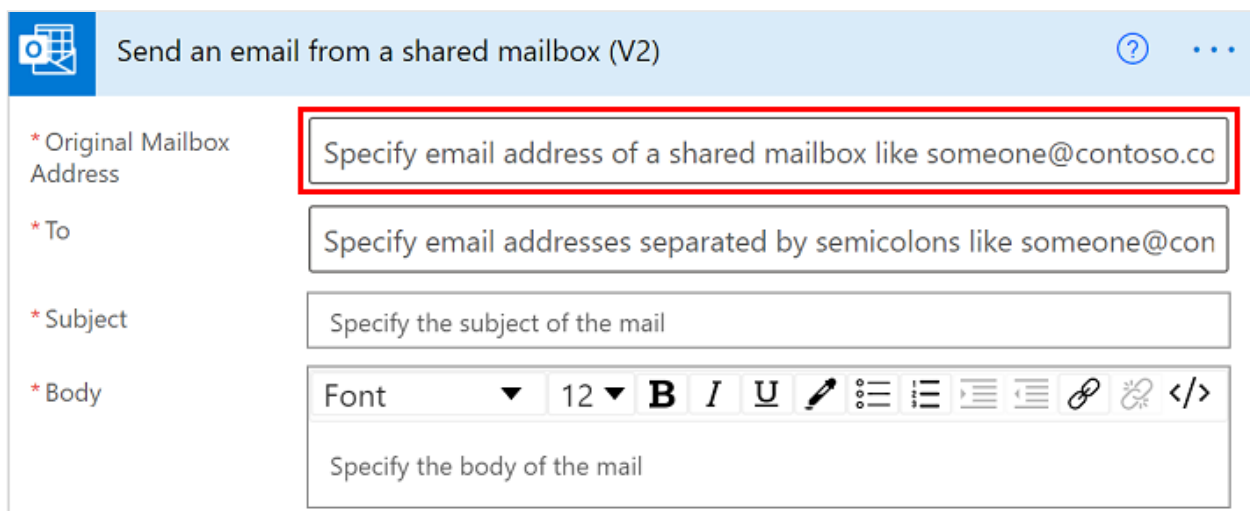
© Microsoft Corporation 2020

In your flow, you must capture that response and save it somewhere. You might email it to yourself, save it to Excel, or post it to Microsoft Teams. Don't forget to save it, otherwise you won't know how people voted.

## Send an email from a distribution list or shared mailbox

Use the [Send an email from a shared mailbox \(V2\)](#) action, and specify the shared mailbox address to send email from a shared mailbox.

The distribution list admin must first give you [permissions](#) to the shared mailbox. When you use this action, email appears in the Sent folder of your shared mailbox because you're sending it from that account directly.



Send an email from a shared mailbox (V2)

\* Original Mailbox Address: Specify email address of a shared mailbox like someone@contoso.cc

\* To: Specify email addresses separated by semicolons like someone@con

\* Subject: Specify the subject of the mail

\* Body: Font 12 **B** *I* U [Rich text editor toolbar] Specify the body of the mail

## Build an approval process and send notifications via email

You can use Power Automate to [build an approval process that notifies users via email](#).

## Send reminder email to approvers

You can also send [reminder emails for approval requests](#).

## Send a daily digest email with a table

Here are three ways you can send a daily digest email with a table.

- Use the [Data Operation – Select](#) action to create a table with the column names and data you'd like to appear in the email. You can further format the data by using expressions. In following example, the flow gets calendar events within a certain timeframe, converts the time zones, and then creates a table with the events.
- Add the [Create HTML Table](#) action, and then add the output from the select action to the HTML action.
- Add the [Send an email \(V2\)](#) action, and then add the output from an HTML table into the body of the email.

### See also

- [Overview of using Outlook and Power Automate](#)
- [Create flows to manage email](#)
- [Customize email in flows](#)

# Trigger a cloud flow based on email properties

Article • 10/02/2023

Use the **When a new email arrives (V3)** trigger to create a cloud flow that runs when one or more of the following email properties match criteria that you provide.

| Property       | When to use                                                                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Folder         | Trigger a cloud flow whenever emails arrive in a specific folder. This property can be useful if you have rules that route emails to different folders.                                 |
| To             | Trigger a cloud flow based on the address to which an email was sent. This property can be useful if you receive email that was sent to different email addresses in the same inbox.    |
| CC             | Trigger a cloud flow based on the CC address to which an email was sent. This property can be useful if you receive email that was sent to different email addresses in the same inbox. |
| From           | Trigger a cloud flow based on the sender's email address.                                                                                                                               |
| Importance     | Trigger a cloud flow based on the importance with which emails were sent. Emails can be sent with high, normal, or low importance.                                                      |
| Has Attachment | Trigger a cloud flow based on the presence of attachments in incoming emails.                                                                                                           |
| Subject Filter | Search for the presence of specific words in the subject of an email. Your flow then runs actions that are based on the results of your search.                                         |

## Important

Each [Power Automate plan](#) includes a run quota. Always check properties in the flow's trigger when possible. Doing so avoids using your run quota unnecessarily. If you check a property in a condition, each run counts against your plan's run quota, even if the filter condition that you defined isn't met.

For example, if you check an email's From address in a condition, each run counts against your plan's run quota, even if it's not from the address that interests you.

In the following tutorials, we check all properties in the **when a new email arrives (V3)** trigger. Learn more by visiting the [frequently asked billing questions](#) and the [pricing](#)



page.

## Prerequisites

- An account with access to [Power Automate](#) <sup>↗</sup>.
- An email account with Outlook for Microsoft 365 or Outlook.com.
- The Power Automate mobile app for [Android](#) <sup>↗</sup>, [iOS](#) <sup>↗</sup>, or [Windows Phone](#) <sup>↗</sup>.
- Connections to Office, Outlook, and the push notification service.

## Trigger a cloud flow based on an email's subject

In this tutorial, we create a cloud flow that sends a push notification to your mobile phone if the subject of any new email has the word "lottery" in it. Your flow then marks any such email as **read**.

Although this tutorial sends a push notification, you're free to use any other action that suits your workflow needs. For example, you might store the email contents in another repository such as Google Sheets or a Microsoft Excel workbook stored on Dropbox.

1. Sign in to [Power Automate](#) <sup>↗</sup>.
2. On the left pane, select **My flows**.
3. Select **New flow** > **Automated cloud flow**.
4. In the **Flow name** field, enter a name for your flow.
5. In the **Choose your flow's trigger** field, enter **new email**.
6. Select **When a new email arrives (V3)** from the list of triggers. This trigger runs each time an email arrives.
7. Select **Create**.
8. Select the folder that you'd like the flow to monitor for incoming emails, and then select **Show advanced options**.

To display all your email folders, select the **Show Picker** icon, which is located on the right side of the **Folder** box on the **When a new email arrives (V3)** card.

## ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in **Understand the cloud flows designer with copilot capabilities**.

### Classic designer

1. Select the folder that you'd like the flow to monitor for incoming emails, and then select **Show advanced options**.

To display all your email folders, select the **Show Picker** icon, which is located on the right side of the **Folder** box on the **When a new email arrives (V3)** card.

2. In the **Subject Filter** box, enter the text that your flow uses to filter incoming emails.

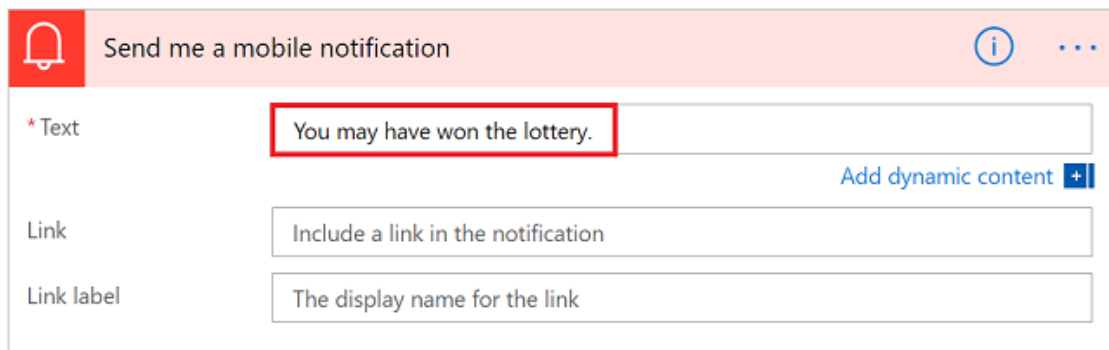
In this example, we're interested in any email that has the word "lottery" in the subject.

The screenshot shows the configuration for the 'When a new email arrives (V3)' card. The 'Subject Filter' field is highlighted with a red box and contains the text 'lottery'. Other fields include 'Folder' (Inbox), 'To', 'CC', 'To or CC', 'From', 'Include Attachments' (No), 'Importance' (Any), and 'Only with Attachments' (No). A 'Hide advanced options' link is visible at the bottom.

| Field                 | Value                                                                |
|-----------------------|----------------------------------------------------------------------|
| Folder                | Inbox                                                                |
| To                    | Recipient email addresses separated by semicolons (If any match, the |
| CC                    | CC recipient email addresses separated by semicolons (If any match,  |
| To or CC              | To or CC recipient email addresses separated by semicolons (If any m |
| From                  | Sender email addresses separated by semicolons (If any match, the ti |
| Include Attachments   | No                                                                   |
| Subject Filter        | lottery                                                              |
| Importance            | Any                                                                  |
| Only with Attachments | No                                                                   |

## Add a mobile notification action

1. Select **New step**.
2. Search for **notification**, and then select **Send me a mobile notification** from the list of actions.
1. Enter the details for the mobile notification you want to receive when you receive an email that matches the **Subject Filter** you specified earlier.



**Send me a mobile notification**

\* Text  [Add dynamic content](#) +

Link

Link label

## Add a read/unread action

1. Select **New step**.
2. Search for **read**, and then select **Mark as read or unread (V3)** from the list of actions.
3. In the **Mark as read or unread** card, add the **MessageId** token in the **Message Id** box.

If the **Message Id** token isn't visible, search for it by entering **Message Id** in the search box.

1. Select **Save** at the top of the page.

Congratulations! You now receive a push notification each time you receive an email that contains the word "lottery" in the subject.

## Trigger a cloud flow based on an email's sender

In this tutorial, you create a cloud flow that sends a push notification to your mobile phone if any new email arrives from a specific sender (email address). The flow also marks any such email as Read.

1. Sign in to [Power Automate](#).
2. On the left pane, select **My flows**.
3. Select **New flow > Automated cloud flow**.
4. In the **Flow name** field, enter a name for your flow.
5. In the **Choose your flow's trigger** field, enter **new email**.
6. Select **When a new email arrives (V3)** from the list of triggers. This trigger runs each time an email arrives.
7. Select **Create**.
8. Select the folder that you'd like the flow to monitor for incoming emails, and then select **Show advanced options**.

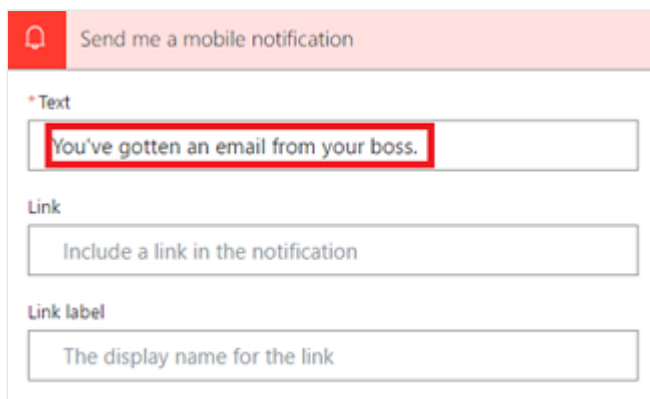
To display all your email folders, select the **Show Picker** icon, which is located on the right side of the **Folder** box on the **When a new email arrives (V3)** card.

1. In the **From** box, enter the email address of the sender.

Your flow takes action on any emails that are sent from this address.

## Add a mobile notification action

1. Select **New step**.
2. Search for **notification**, and then select **Send me a mobile notification** from the list of actions.
3. Enter the details for the mobile notification you'd like to receive whenever a message arrives from the email address that you entered earlier.



The screenshot shows the configuration interface for the 'Send me a mobile notification' action. The title bar is red and contains a bell icon and the text 'Send me a mobile notification'. Below the title bar, there are three input fields: 'Text' with the value 'You've gotten an email from your boss.', 'Link' with the placeholder text 'Include a link in the notification', and 'Link label' with the placeholder text 'The display name for the link'.

## Add a read/unread action

1. Select **New step**.
2. Search for **read**, and then select **Mark as read or unread (V3)** from the list of actions.
3. In the **Mark as read or unread** card, add the **MessageId** token in the **Message Id** box.

If the **Message Id** token isn't visible, search for it by entering **Message Id** in the search box.

4. Give your flow a name, and then save it by selecting **Create flow** at the top of the page.

## Trigger a cloud flow when emails arrive in a specific folder

If you have rules that route emails to different folders based on certain properties, such as the address, you might want this type of flow.

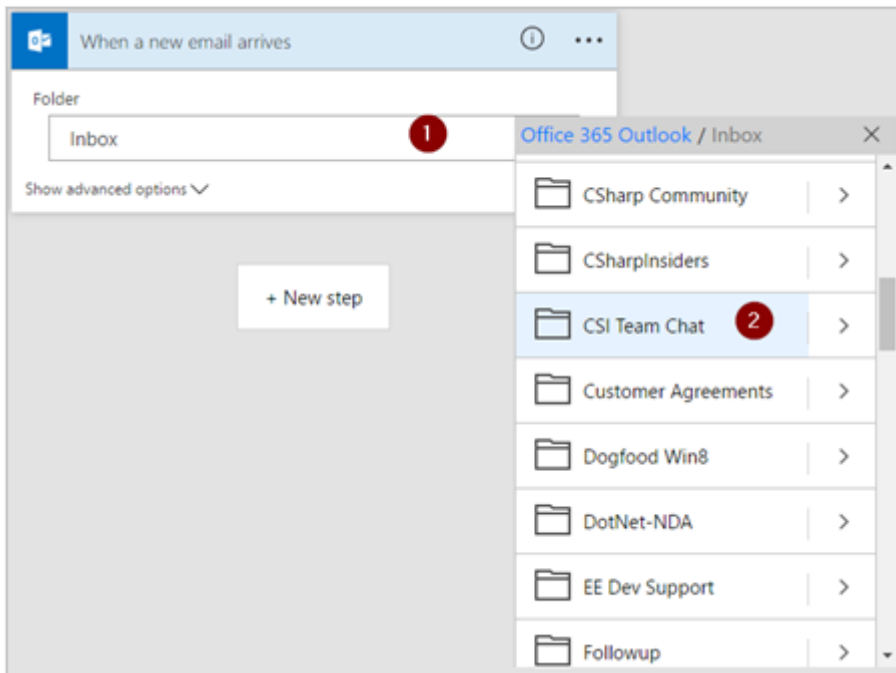
### ⓘ Note

If you don't already have a rule that routes email to a folder other than your inbox, create such a rule and confirm it works by sending a test email.

### Classic designer

1. Sign in to [Power Automate](#).
2. On the left pane, select **My flows**.
3. Select **New flow** > **Automated cloud flow**.
4. Search for **email**, and then select **Office 365 Outlook - When a new email arrives (V3)** from the list of triggers. This trigger runs each time an email arrives.

5. Select the folder to which you're routing specific emails. To display all email folders, first select the **Show Picker** icon, which is located on the right side of the **Folder** box on the **when a new email arrives (V3)** card.



## Add a mobile notification action

1. Select **New step**.
2. Search for **notification**, and then select **Send me a mobile notification** from the list of actions.
3. Enter the details for the mobile notification you'd like to receive when an email arrives in the folder you selected earlier. If you haven't already, enter the credentials for the notifications service.

Send me a mobile notification

\*Text

You got an email in CSI Chat.

Add dynamic content

Link

Include a link in the notification

Link label

The display name for the link

## Add a read/unread action

1. Select **New step**.
2. Search for **read**, and then select **Mark as read or unread (V3)** from the list of actions.
3. In the **Mark as read or unread** card, add the **MessageId** token in the **Message Id** box.

If the **Message Id** token isn't visible, search for it by entering **Message Id** in the search box.

4. Give your flow a name, and then save it by selecting **Create flow** at the top of the page.

Test the flow by sending an email that gets routed to the folder you selected earlier in this tutorial.

# Customize email in flows

Article • 10/02/2023

Here are the top how-to scenarios for email in Microsoft Power Automate, with examples of how to achieve them.

1. Send a [beautifully formatted email](#).
2. [Add an image](#) to your email.
3. Send [email to a distribution list](#).
4. Send automatic replies from a [shared mailbox](#).
5. Change the [date and time format](#) of an email.

## Send a beautifully formatted email

You can use HTML to beautify your email. Following are two options that you can use to beautify your messages with HTML.

### ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in [Understand the cloud flows designer with copilot capabilities](#).

Classic designer

### Option 1: Write HTML directly into the flow

1. Select the `</>` button inside the rich text editor in the Power Automate designer.



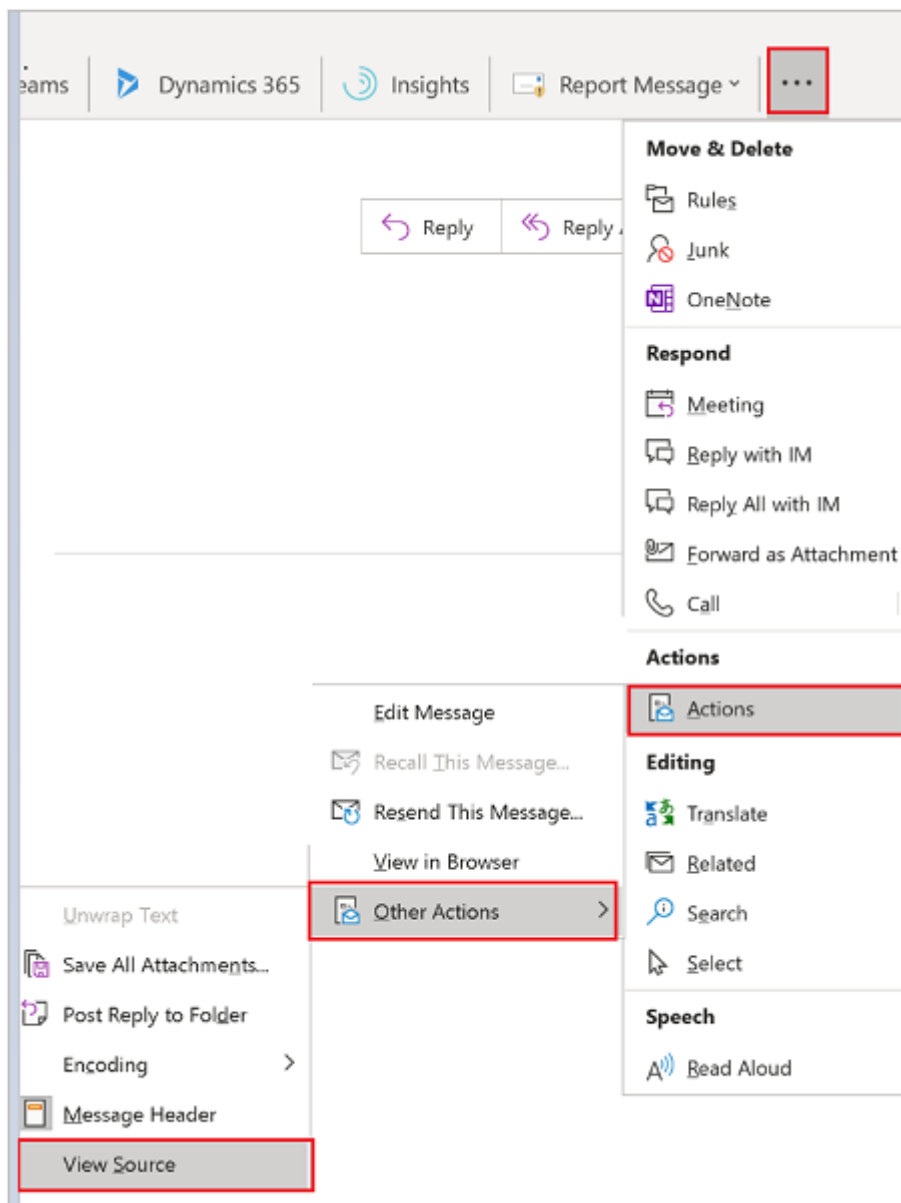
2. Enter any HTML content into the body of the email.

### Option 2: Copy HTML from an Outlook email



Alternatively, if you don't know—or don't feel like playing with—HTML, follow these steps:

1. Create an email in Outlook, styling it with colors, content placeholders, images, and tables.
2. Send the email to yourself.
3. Open the email you sent to yourself in Outlook. Be sure to use a new window; don't use the preview window in Outlook.
4. On the **Message** tab, select **More commands (...)** > **Actions** > **Other Actions** > **View Source**.



The HTML representation of the email opens in your text editor.

5. Find `<html>` in the file.
6. Copy the content between `<html>` and `</html>`.

7. Back in [Power Automate](#), select the `</>` button in the rich text editor of the **Send an email (V2)** action, and then paste the contents that you copied from Outlook.
8. Select **Save** at the bottom of the flow steps to save your flow.
9. Be sure to test your flow to confirm that it works as intended.

## Add an image to your email

Outlook takes the image you included in your email and converts it to plain text. Instead of copying/pasting the plain text into Power Automate, follow these steps:

1. Upload the image to cloud-based storage, such as Google Drive or OneDrive for Business.
2. Get the anonymous visitor URL to the image.
3. In the Power Automate **Send an email** action, do the following:
  - a. Go to the HTML section of the rich text editor.
  - b. Look for `<image src=` in the HTML.
  - c. Change the value of the `src` property to the URL of the image from the cloud-based storage provider where you uploaded the image.

Your `src` should be similar to: `<image src="https://url/to/your/images.png"/>`.

### **Important**

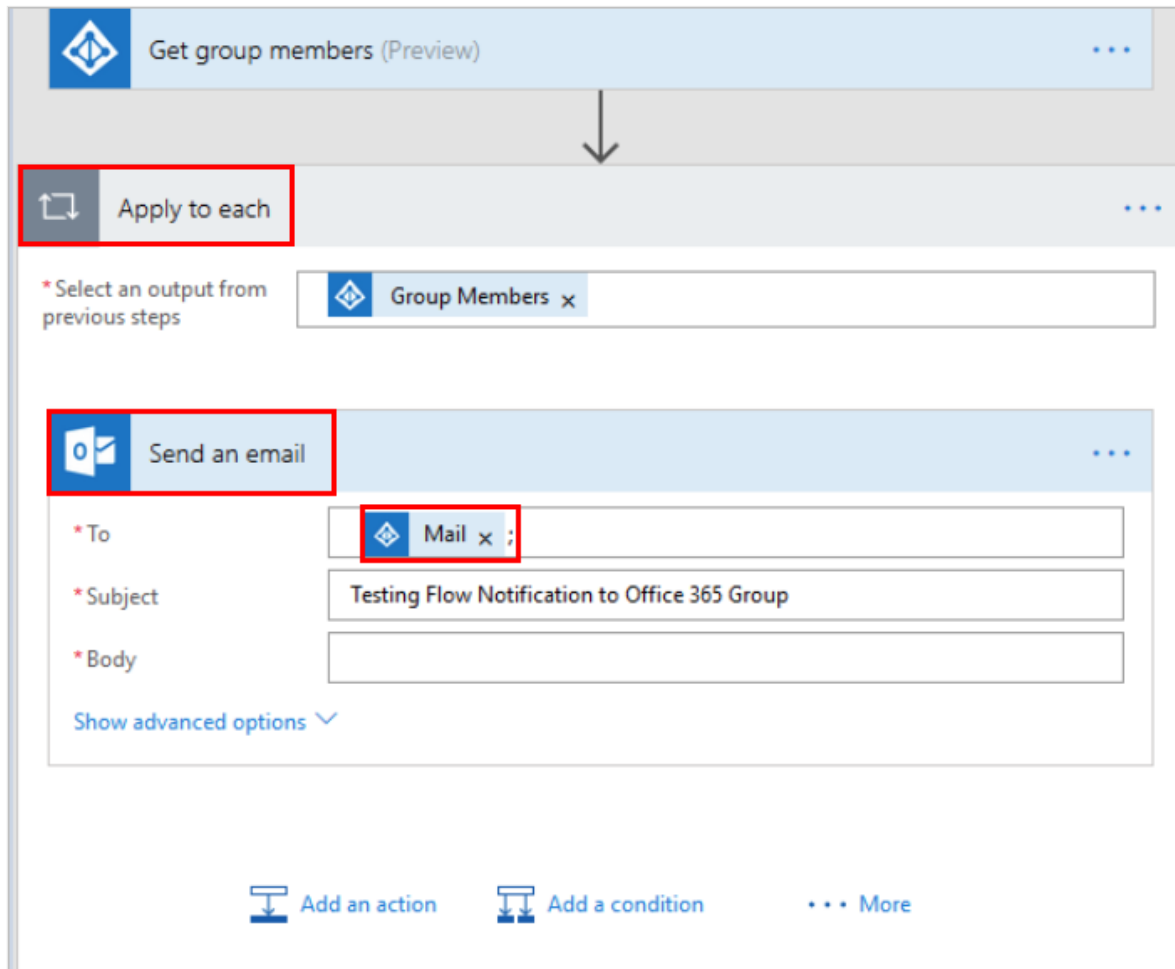
Inline images are limited to a size of 100 KB. This might affect the quality of the image.

## Send email to a distribution list

The **Send an email** action can send messages to an email-enabled security group or distribution list. Each member of the email-enabled security group or distribution list receives the email in their group mailbox rather than their own mailbox.

Alternatively, follow these steps if you want users to receive the email in their mailbox.

1. Add the [Get group members](#) action from the [Azure AD](#) connector, and then select the distribution list.
2. Under the action **Azure AD-Get group members**, add an **Apply to each** action.
3. Inside the **Apply to each** action, add the **Send an email** action, and then add the group members from the **Get group members** action as dynamic content in the **To** field.



## Send automatic replies from a shared mailbox

You can do this in the web version of Outlook.

1. Sign in to the web version of Outlook at <https://outlook.office365.com> with your Office 365 credentials.
2. Select your profile image (or placeholder image) in the upper-right corner.
3. Select **Open another mailbox**.
4. Enter the name or email address of the shared mailbox, and then select it.
5. Select **Settings** in the upper-right corner, and then select **Automatic replies**.
6. Configure your automatic reply.

# Change the date and time format of an email

By default, the email you receive shows the Coordinated Universal Time (UTC) time zone. However, your users might want to change it to their local time zone. For instructions, go to [Converting time zone in Microsoft Power Automate](#) to convert the time zone.

## See also

[Overview of using email with flows](#)

[Create flows to manage email](#)

[Create flows for popular email scenarios](#)

# Troubleshoot common issues with email in flows

Article • 12/16/2022

## Known limitations

For known limitations of the **Send an email** action, go to [Office 365 Outlook: Known issues and limitations](#).

## Frequently asked questions

### I didn't get an email. Why?

1. Confirm that your IT department has approved all Power Automate endpoints to allow it to send email to your email servers. These endpoints include [IP addresses](#) and [domains](#) <sup>↗</sup>.
2. Double-check whether you have any Outlook rules that are moving the email to a different folder.
3. Check whether you're using the **Focused** inbox feature. Check whether the email landed in another folder.

### I didn't get an email, and the send an email action looks stuck in my flow.

If you're using the **Mail** connector, note that it has a limit of 100 API calls per 24 hours. Try the Office 365 Outlook connector, which has a limit of 300 API calls per 60 seconds instead, so you'll be less likely to hit the limit.

### I have a cloud flow that is triggered when an email arrives in a folder. Will my flow trigger if I move email from one folder to another folder?

No. Your flow will be triggered only when a new email arrives.

### I'm trying to send an email to all the approvers. I see an Apply to each action around the Send an email action, causing separate emails. I want to send an email to all of them.

**Apply to each** is added because there are multiple approvers. You can create a string variable (as opposed to an array) and store email addresses, separated by semicolons, in it.

**I don't get an attachment for some of my approvals.**

The **Approval** action attaches files to a notification email until the size of the email reaches 5 MB. If the attachments exceed 5 MB, the approval email directs the approver to check the attachments in the Power Automate approval center.

**How do I increase the email attachment size limit for Power Automate?**

A Microsoft Dataverse administrator can change the limit by going into **Microsoft Dataverse > Email Configuration** settings, and then setting the file size limit for attachments.

**Power Automate stopped working - I get "Item ID doesn't belong to current mailbox" error in Power Automate when using actions with shared mailbox.**

As of May 6, 2020, shared mailbox support was added for certain operations with an optional **Mailbox address** parameter, allowing you to specify a shared mailbox address for your operations to access. If you were using this operation prior to May 6, 2020, you'll need to explicitly [update your operations to specify the shared mailbox address](#).

**I see this error: "REST API is not yet supported for this mailbox".**

This error can occur for accounts that are on a dedicated (on-premises) mail server when:

1. The mailbox is on a dedicated Microsoft Exchange Server, or it isn't a valid Microsoft 365 mailbox.
2. The mailbox is an Outlook.com account that isn't enabled.
3. The mailbox isn't part of a Microsoft 365 plan that includes Power Automate.

To resolve the issue, go to ["REST API is not yet supported for this mailbox" error for request to a mailbox](#).

**Unable to send email with attachment error: "Parameter 'Attachment Content' cannot be null or empty."**

Use expressions to encode the attachment with base64. The attachment will be recognized after you're done.

## More information

[Overview of using Outlook with Power Automate](#)  
[Create flows to manage email](#)

Customize email in flows

Create flows for popular email scenarios

# Use flows with Excel for the web

Article • 09/20/2023

Integrate Power Automate with Excel for the web to automate repetitive tasks, reduce errors, and improve productivity. For example, you can track customer feedback, manage projects, or analyze data. By connecting Excel to apps and services such as SharePoint, Teams, and Planner, Power Automate can make collaboration and data sharing across different platforms seem effortless.

With this feature, you can easily create Power Automate workflows in Excel for the web. To get started, select a Power Automate prebuilt template that closely meets your needs. Then, customize it to fit your Excel workbook.

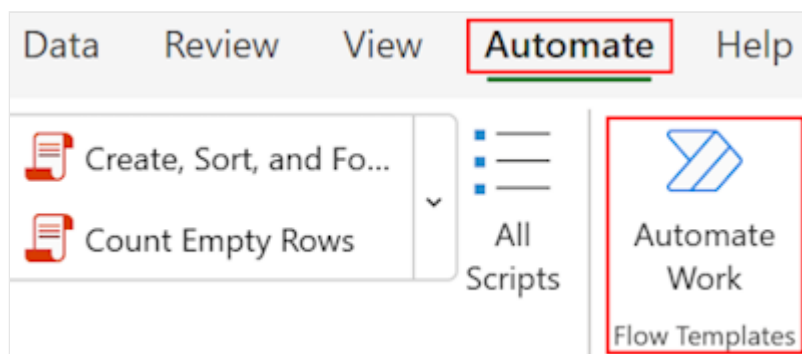
Here are some of the prebuilt templates that you can use in Excel for the web:

- Monitor incoming emails to an alias in an Excel worksheet
- Track Planner tasks in Excel
- Categorize Excel rows with GPT

## Build a flow in Excel for the web

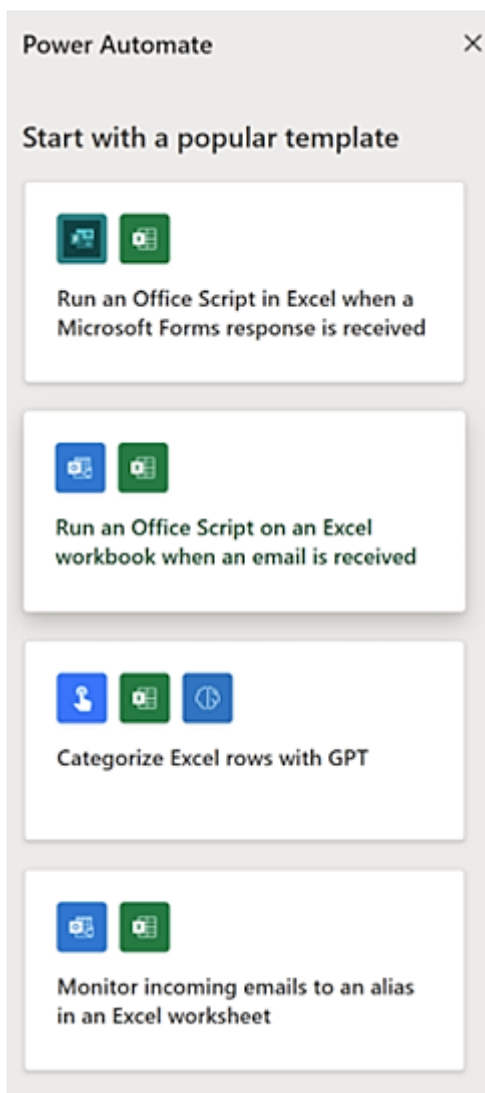
To get started using Power Automate in Excel for the web, follow these steps.

1. Open your Excel workbook in Excel for the web.
2. On the ribbon, on the **Automate** tab, select **Automate Work**.



3. Browse the prebuilt templates, and select one.



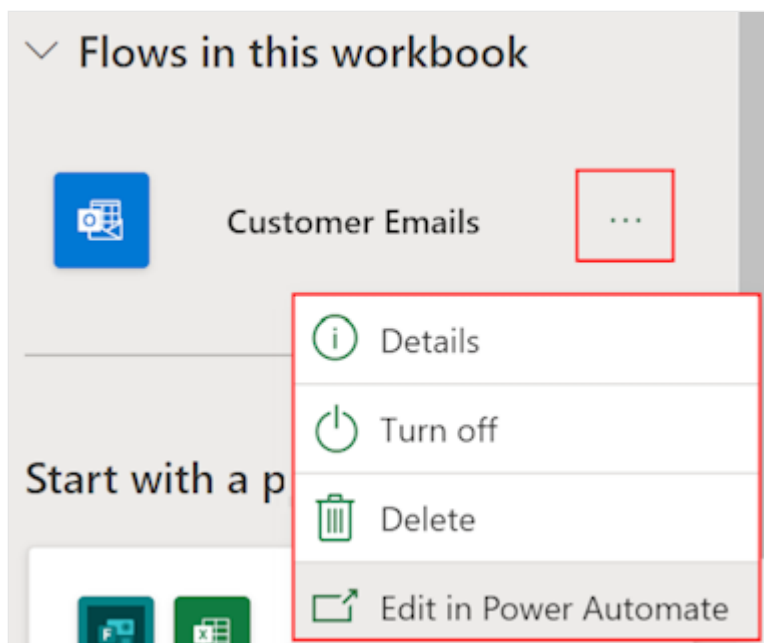


4. Follow the prompts to connect to the app or service that you want to integrate with Excel for the web. Then select **Create flow**.

## Manage your flow

After you create a flow, you can manage it from Excel for the web. Management includes the ability to delete your flow, turn it off, edit it, and view details about it.

To manage your flow, select the ellipsis (...) for it in the **Power Automate** pane, and then select an option on the menu.



## Limitations

- The **Power Automate** pane is currently available only in Excel for the web.
- If your flow uses the Excel Online (Business) connector, you might experience issues. To learn about the issues and limitations, go to [Excel Online \(Business\)](#).

# Use SharePoint and Power Automate to build workflows

Article • 02/10/2023

Power Automate is deeply integrated with SharePoint. You can start with any of the more than [100 SharePoint templates](#), or create your own flow that integrates with SharePoint from scratch.

Learn more about how to use Power Automate with SharePoint in the following video. <https://www.microsoft.com/en-us/videoplayer/embed/RWL7D9?postJsIIMsg=true>

## Top SharePoint workflow scenarios

Here are some of the top scenarios in which you can use Power Automate with SharePoint:

- Manage approval flows.
- Work with files and lists created with Microsoft Lists.
- Migrate from workflows to Power Automate.

### Manage approval flows

- Customize [SharePoint page approvals](#) to meet your needs.
- Require [approval of documents](#) in SharePoint by using Power Automate.
- Route finished documents to a [team for approval](#).

### Work with files and lists

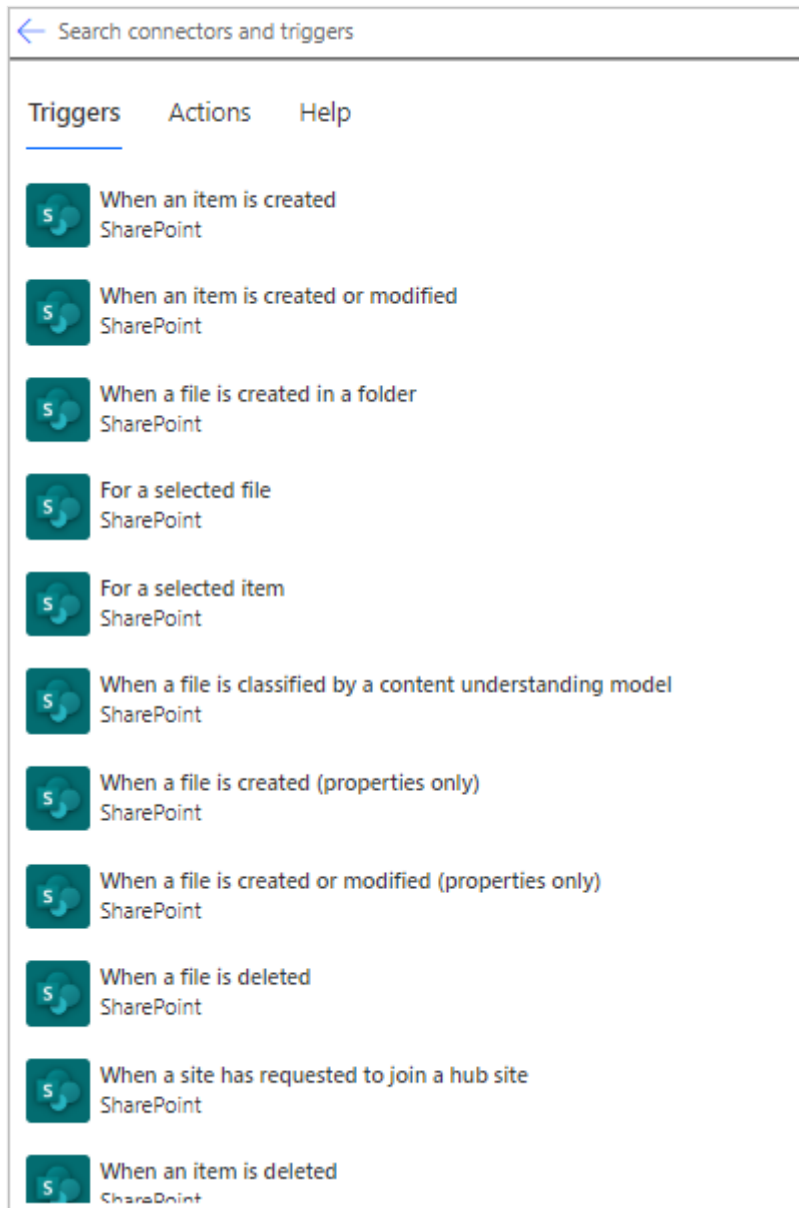
- Manage [list item and file permissions](#).
- [Move files to different folders](#) after they're approved in SharePoint.
- [Create an item in SharePoint](#) when a new order is added in Salesforce.
- [Get items from lists, or get files from libraries](#).
- Create a [flow for a list or library in SharePoint or OneDrive](#).
- [Edit a cloud flow](#).

### Other top scenarios

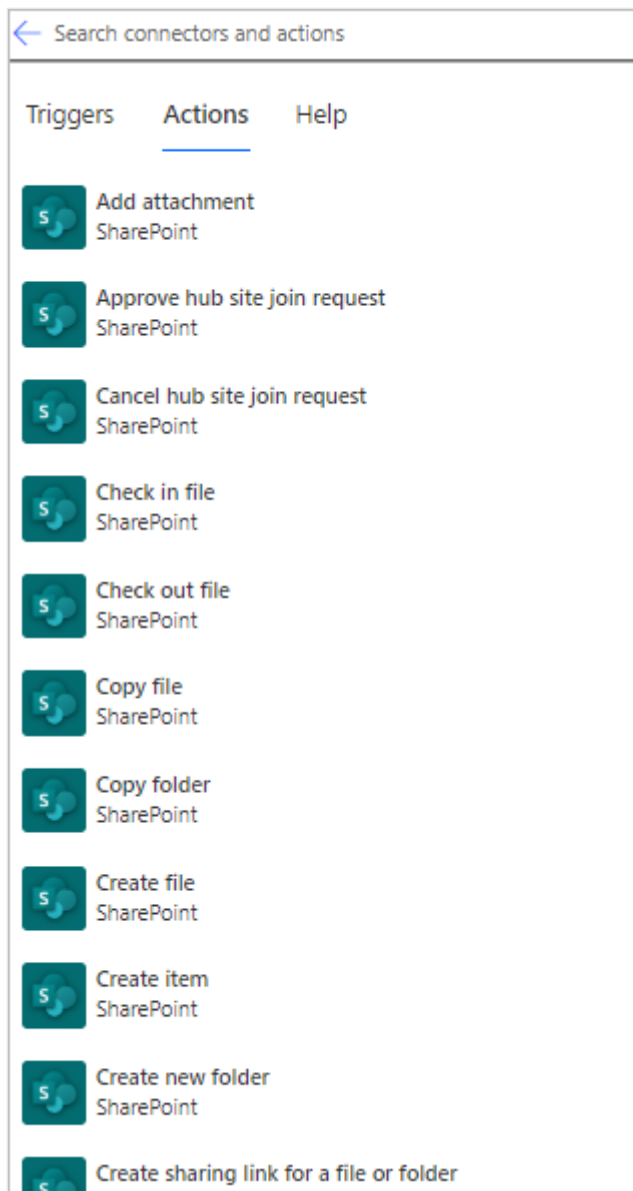
- Use [HTTP requests](#) to manage lists and libraries.
- Create [SharePoint reminder flows](#).

# SharePoint triggers and actions

You can use SharePoint triggers to start flows that monitor changes made to a list or library. For a full list, go to [SharePoint triggers](#).



As soon as your flow starts, you can use any of the more than [40 actions](#) to manipulate your lists.



## Migrate from workflows to Power Automate

- Migrate from [classic workflows](#) to [Power Automate flows](#) in SharePoint.

### Next steps

- Get started with [Power Automate and SharePoint](#).
- Get started with [approvals](#).
- Create modern [approval flows](#) in conditions in advanced mode.

# SharePoint remind me

Article • 02/09/2023

Lists created with Microsoft Lists and SharePoint libraries allow you to define custom metadata columns to track dates. With Power Automate's integration with SharePoint, you can easily create reminder flows, based on DateTime columns in SharePoint. With reminder flows, you receive a personal email alert a predetermined number of days in advance of a date on any document or item in SharePoint.

## Prerequisites

- Access to Microsoft SharePoint Online.
- A list, or library with a DateTime column.
- Access to Power Automate.

### ⓘ Note

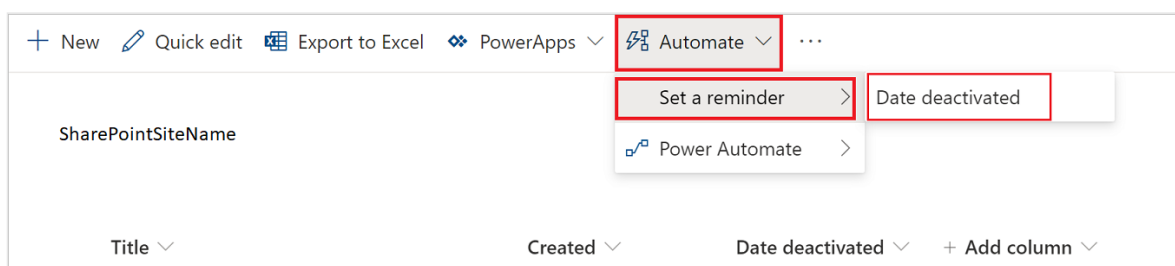
This feature isn't available for GCC, GCC High, DOD, or other sovereign clouds.

### 💡 Tip

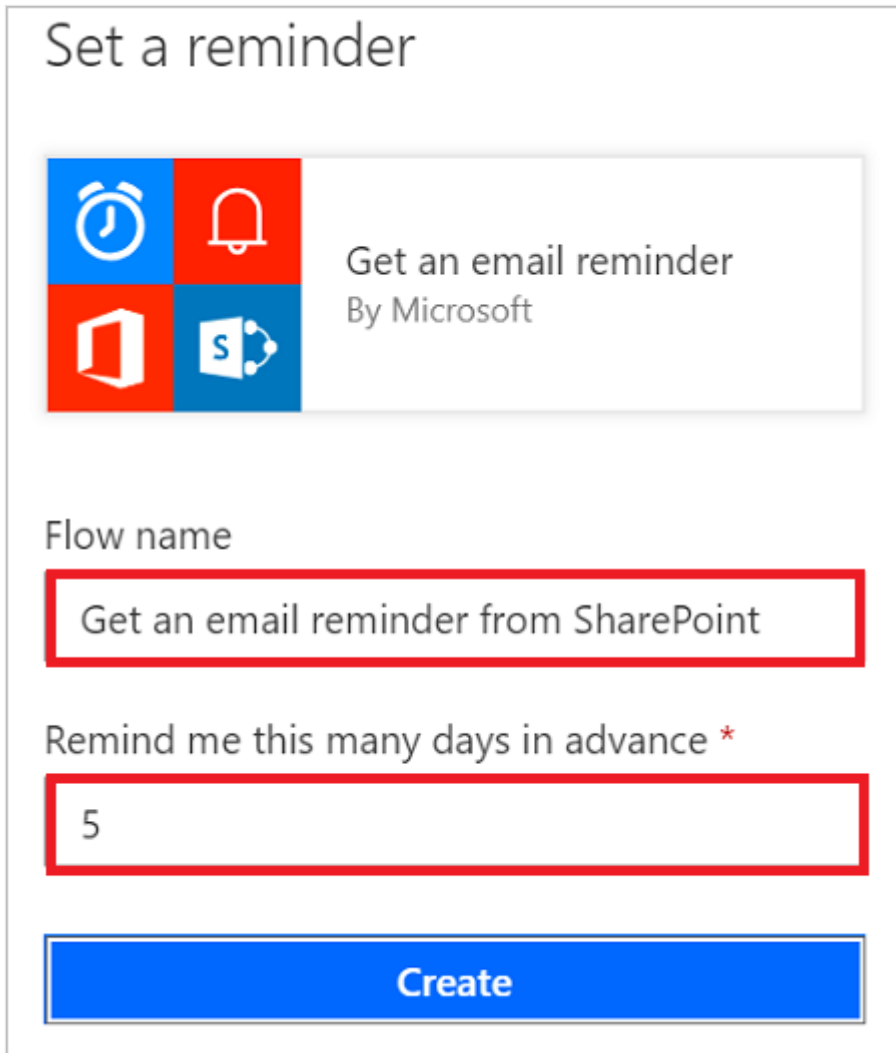
For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

## Create a reminder flow

1. [Create a list in Microsoft Lists](#) with at least one DateTime column in the current view.
2. Select **Automate** > **Set a reminder** > **Date deactivated** (this is the column with the DateTime for the reminder).



3. Optionally, you might need to sign into the services that this Power Automate template uses.
4. Select **Continue**.
5. Provide a **Flow name** and the number of days prior to the DateTime column entry when you want to receive the reminder alert on the **Set a reminder** card.



Set a reminder

Get an email reminder  
By Microsoft

Flow name

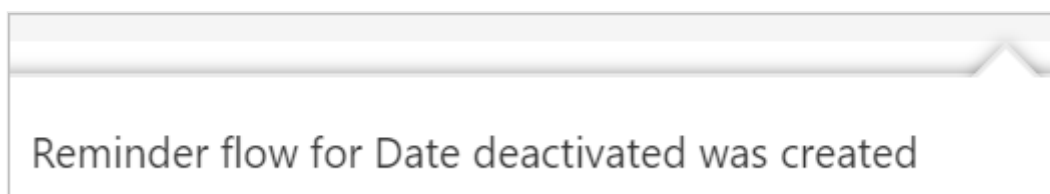
Get an email reminder from SharePoint

Remind me this many days in advance \*

5

Create

6. On the **Set a reminder** card, select **Create**.
7. You'll receive the following message, indicating that the flow was created.



## Confirm reminders received

You'll receive a reminder via email, based on the **Remind me this many day(s) in advance** entry you made on the **Set a reminder** flow you created earlier.

## Edit your flow

The reminder flow is like any other flow, so you can access and edit it through [Power Automate](#).

## More information

- Getting started with [Power Automate](#).
- Set a [reminder flow](#) in SharePoint.



# Manage SharePoint page approvals with Power Automate

Article • 12/16/2022

SharePoint site admins can use Power Automate to require new or updated site pages to be approved before being published.

In this article, you'll learn how to configure your SharePoint site to use a cloud flow to require changes to the site to be approved before they go live.

## ⓘ Note

SharePoint approvals isn't available in government cloud environments.

## Configure SharePoint for page approvals

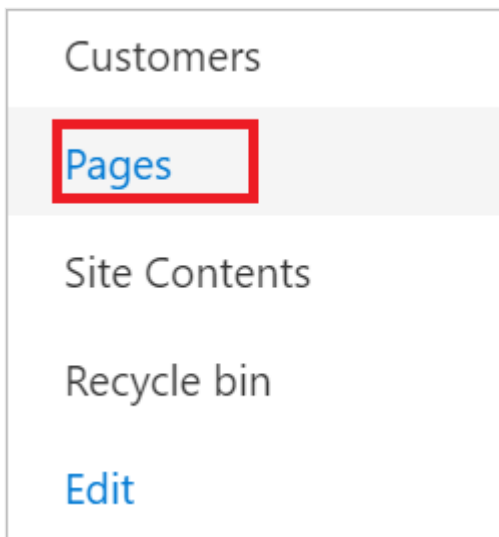
### Prerequisites

You must be a SharePoint site admin to perform the activities in this article.

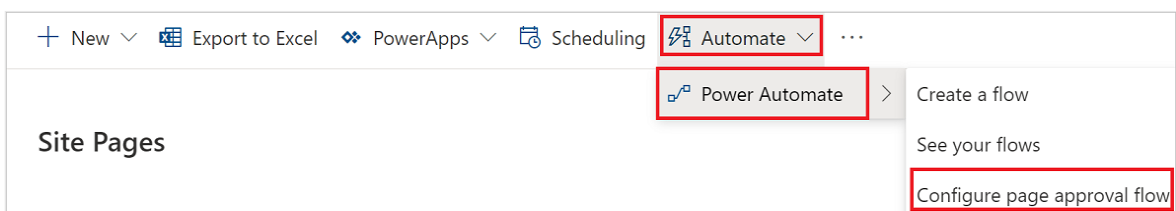
## 💡 Tip

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

1. Sign in to SharePoint as a site admin.
2. Select **Pages** from the navigation bar.



3. Select **Automate > Power Automate > Configure page approval flow.**




4. Select **Create flow.**

5. Optionally, you might need to sign in to the services that this Power Automate template uses.

6. Select **Continue.**

7. Provide a **Flow name**, at least one name in the **Approvers** box, and then select **Create.**

## Create a page approval flow



Submit SharePoint page for approval  
By Microsoft

Flow name

Submit SharePoint page for approval


Approvers \*

ML <approver> ×

Create

Your flow is complete. Now, each time a page is added or modified, an approval request goes to the **Approvers** you listed in the flow.

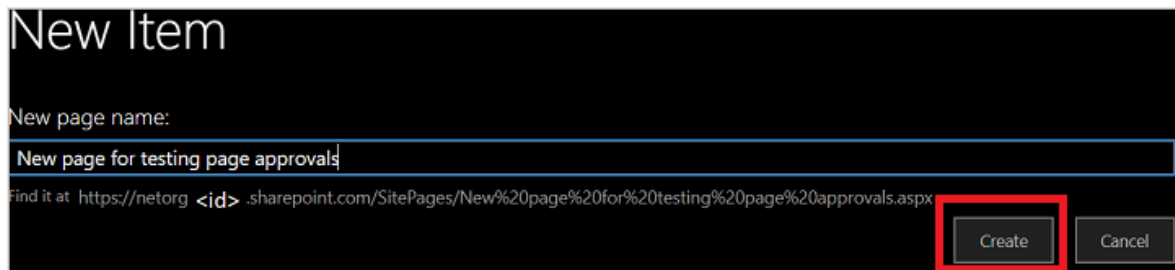
The page approval flow is just like any other flow, so it's listed in the **My flows** tab.

| Flows                                                                                                                                                                                |                                     |           |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------|---------|
| <span style="border: 2px solid red; padding: 2px;">My flows</span> <span style="margin-left: 20px;">Team flows</span> <span style="margin-left: 20px;">Business process flows</span> |                                     |           |         |
|                                                                                                                                                                                      | Name                                | Modified  | Type    |
|                                                                                                   | Submit SharePoint page for approval | 1 min ago | Instant |

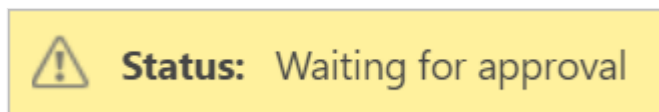
## Submit a page for approval

Now that you've created a page approval flow, anyone who adds or changes a page will need to do the following steps.

1. Make a change to the site (add a new page, for example) and then save the change.



2. Wait for someone to approve the change.



## Approve a page

Approvers receive an email whenever there's a page approval request. They can approve the requests directly in the email if their email client supports actionable messages. Alternatively, they can open the page from the email to review, and then approve the page in SharePoint.

## Customize page approval flows

Because page approvals use Power Automate behind the scenes, the page approval flow is available for site owners to modify and add any custom business logic in the flow. To modify the flow, the site owner can select **Flows** and then select **See your flows** in the pages library to find the page approval flow.

## Limitations

Only the specific triggers and actions that are used by a page approval flow are supported for use on a Pages library. All other SharePoint triggers and actions aren't supported.

## More information

- [Page approval flow](#) 

- [Configure page approval](#) ↗

# Use flows in Microsoft Teams

Article • 03/07/2024

Power Automate flows can be used in three scenarios with Teams.

 Expand table

| Scenario                                                               | Description                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Trigger <a href="#">flows from Teams messages</a> .                    | In this scenario, you can create flows that are triggered when someone selects a Teams message. The flow can then run as any other flow you create.                                                                                                                            |
| Use flows with <a href="#">adaptive cards</a> .                        | Here, adaptive cards can be used as the trigger for flows. The full set of rich adaptive cards is available to you.                                                                                                                                                            |
| Create flows from within the <a href="#">Power Apps app in Teams</a> . | Use the Power Apps app in Teams to create flows that use <a href="#">Dataverse for Teams</a> . Dataverse for Teams is a built-in, low-code data platform for Teams that empowers users to build custom apps and workflows within Teams by using Power Apps and Power Automate. |

## Note

Government Community Cloud (GCC) environments don't support the use of Power Automate actions to post as the bot.

## Licensing

There are no additional licensing requirements when you use Power Automate with Microsoft Teams.

For detailed licensing information about Dataverse for Teams, see [licensing and restrictions](#) in the Microsoft Power Platform admin guide.

## Related topics

[Power Apps and Teams](#)

[Microsoft Copilot Studio overview](#) 

# Install the Workflows app in Microsoft Teams

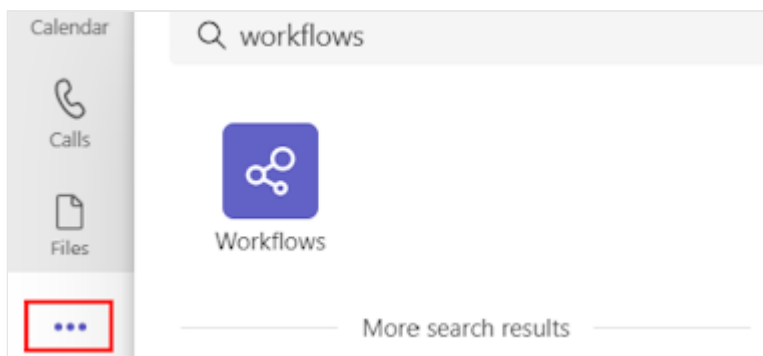
Article • 11/04/2023

The Workflows app lets you automate your Microsoft Teams activities or and connect Microsoft Teams to other apps and services.

## ⓘ Note

The Power Automate app in Teams is now called Workflows. If you still see the Power Automate app, you might need to update the app manually to get the latest changes. To learn how to do this, go to [Update an app in Microsoft Teams](#).

1. Sign in to [Microsoft Teams](#).
2. Select **View more apps (...)**, and then search for the **workflows** app.
3. In the search results list, select the **Workflows** app.



After a few moments, the Workflows app installs.

You can also install the Workflows app from the [Microsoft Teams app store](#).

## ⓘ Note

The Workflows app isn't available in Microsoft 365 Government tenants.

## Get started with the Workflows app

You can access the Workflows app in Microsoft Teams from the left pane.

From the **Home** tab, you can [create](#) and [manage](#) your flows.

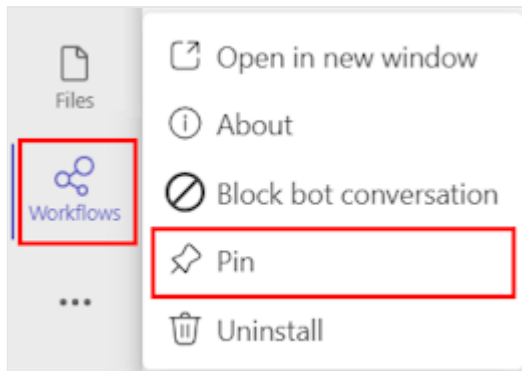
| Flow name              | Status                       | Modified | Owners | Type    | Team and channel |
|------------------------|------------------------------|----------|--------|---------|------------------|
| Follow up on a message | <input type="checkbox"/> Off | 1 yr ago |        | Instant | N/A              |

## Pin the Workflows app

To allow you to access the Workflows app easily at a later time, you can pin it in Microsoft Teams.

To pin the Workflows app in Microsoft Teams:

1. On the left pane, right-click on **Workflows**.
2. Select **Pin**.



## Known issues

The Workflows app in Microsoft Teams shows flows only from your organization's default environment. Any flow that you create from the Workflows app is located in the default environment.

## See also

- [Create flows in Microsoft Teams](#)
- [Manage your flows in Microsoft Teams](#)



# Create flows in Microsoft Teams

Article • 11/04/2023

There are multiple ways in which you can create flows within Microsoft Teams.

- **Power Automate flow templates:** The Microsoft Teams store has templates directly integrated, making it easy for you to get flow templates to get started quickly.
- **Team overflow messages:** You can create flows from the overflow menu of Teams message.
- **Workflows app:** You can use [the Workflows app](#) to create flows from a template or from scratch.

You can manage all flows you create from any of these entry points directly within Power Automate or from within [the Workflows app](#) in Teams.

## Prerequisites

To use the Workflows app, you need an account with access to [Microsoft Teams](#).

## Create a cloud flow from the Microsoft Teams store

Follow these steps to create a flow from the Microsoft Teams store.

1. Sign in to [Microsoft Teams](#).
2. On the left pane in Teams, select **Apps**.
3. At the bottom of the left pane, select **Workflows**.

You see a list of templates that are relevant to Microsoft Teams.

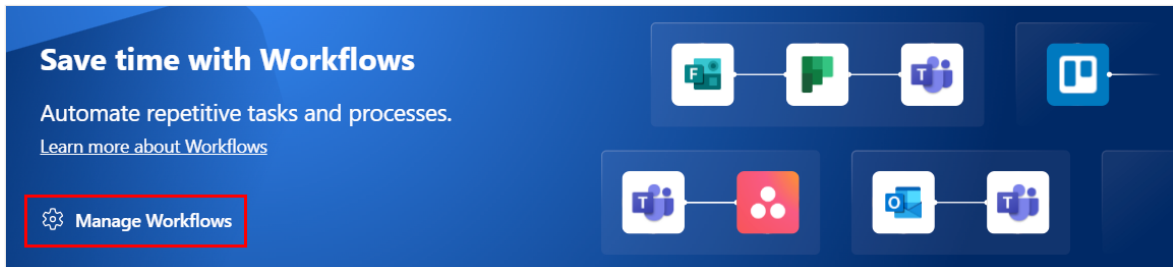
4. Select any of the templates to build your flow.

When you select a template, a new dialog opens. Name the flow, and then sign into the apps and services the flow uses (if you aren't already signed into them).

5. After all the connections are setup, select **Next**.
6. Provide the parameters that the flow requires, and then select **Add workflow** to create the flow.

A confirmation page that states that your flow was created successfully appears.

7. To complete flow creation, select **Done**.
8. You can manage your flows from the Workflows app in Teams or in Power Automate. To open the Workflows app in Teams to manage your flows, select **Manage workflows** in the **Save time with Workflows** section.



## Create a flow from the message menu in Microsoft Teams

You can create manually triggered flows from the overflow menu of a Microsoft Teams message.

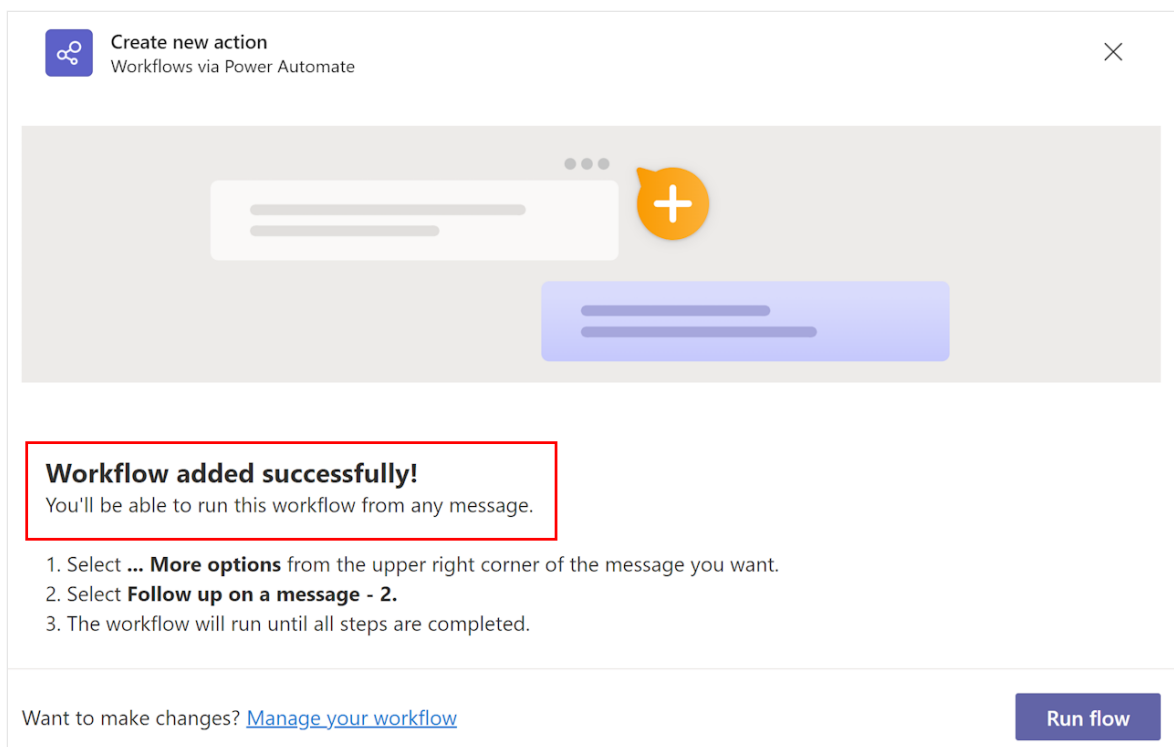
Follow these steps to create a manually triggered flow from the Microsoft Teams store.

1. Sign in to [Microsoft Teams](#) <sup>↗</sup>.
2. On any message in Teams, select the ellipses (...) in the menu.
3. Select **More actions** > **Create new action**.

You see list of templates that use the **For a selected message** manual trigger.

4. Select any template to set up the connections you need.
5. Select **Next** to setup the parameters that the template needs.

A confirmation page appears once your flow is created successfully.



## Create a cloud flow from a template in the Workflows app

By default, the Workflows app shows you templates that have been created for Microsoft Teams. You can switch filters on the top right to view all Power Automate templates.

Follow these steps to create a cloud flow from a Microsoft Teams template.

1. Sign in to [Microsoft Teams](#).

You can also use the Microsoft Teams app.

2. On the left panel, select **Apps**.
3. Search for **workflows**.
4. In the **Search results for "workflows"** panel, select **Open** next to **Workflows**.
5. Select the **Create** tab, and then select the template on which you'd like to base your flow.

If the template that you selected is optimized for Microsoft Teams, a dialog that lets you rename the flow and authenticate with the apps necessary for the flow displays.

ⓘ **Note**

You must login to all connectors so that your flow can run successfully. A green check indicates that you've authenticated.

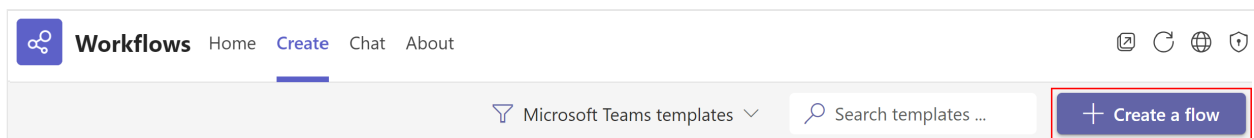
6. Set up the connections as needed.
7. Select **Continue** to get a list of parameters that are necessary for the flow to run successfully. Provide the parameters that are needed.
8. You're all set! You'll get a confirmation that your flow was successfully created. After you create your flow, you can find it on the **Home** tab.

### **Important**

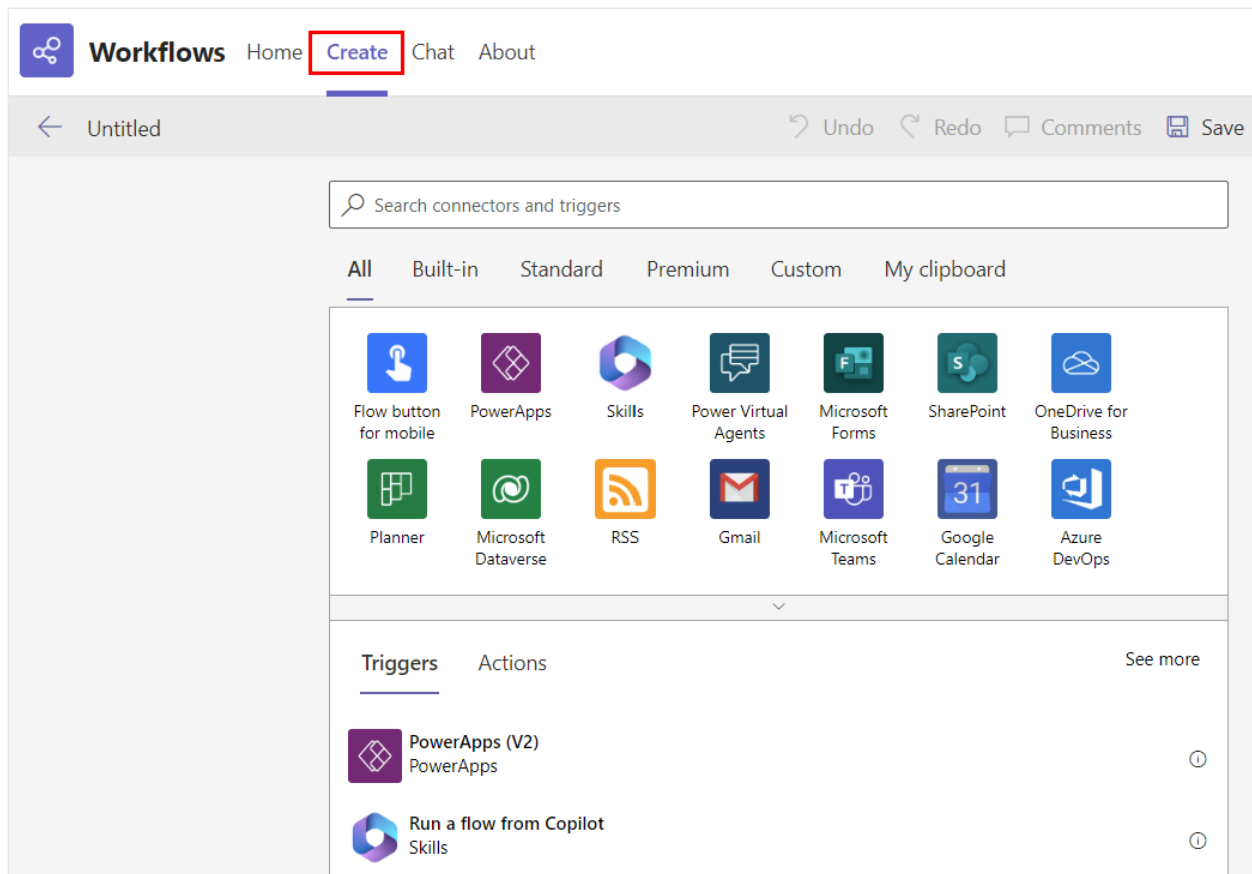
When you create flows from within the Workflows app in Microsoft Teams, they're always created in your organization's default environment. You can also access these flows from [Power Automate](#).

## Create a cloud flow from scratch

If you want full control over the flow that you create, select **Create a flow** from the top right side of the screen, instead of using a template.



This opens the full Power Automate designer experience within Microsoft Teams where you can [create a fully customized flow](#).



## Known issues

- All flows that you create from within the Workflows app are located in your organization's default environment.
- The Workflows app must be enabled in the [Microsoft Teams admin center](#) in order for this functionality to work.

## See also

- [Manage your flows in Microsoft Teams](#)
- [Microsoft Teams connector documentation](#)

# Use flows in teams created from templates

Article • 11/04/2023

Microsoft Teams templates are pre-built definitions of a team's structure that are designed around a specific business need or project.

Power Automate templates and team templates are meant to address similar business scenarios. When you create a team with a Microsoft-provided team template, you get a curated selection of flow templates that are specific to your team scenario.

Here are the five team templates that support scenario-specific flow templates.

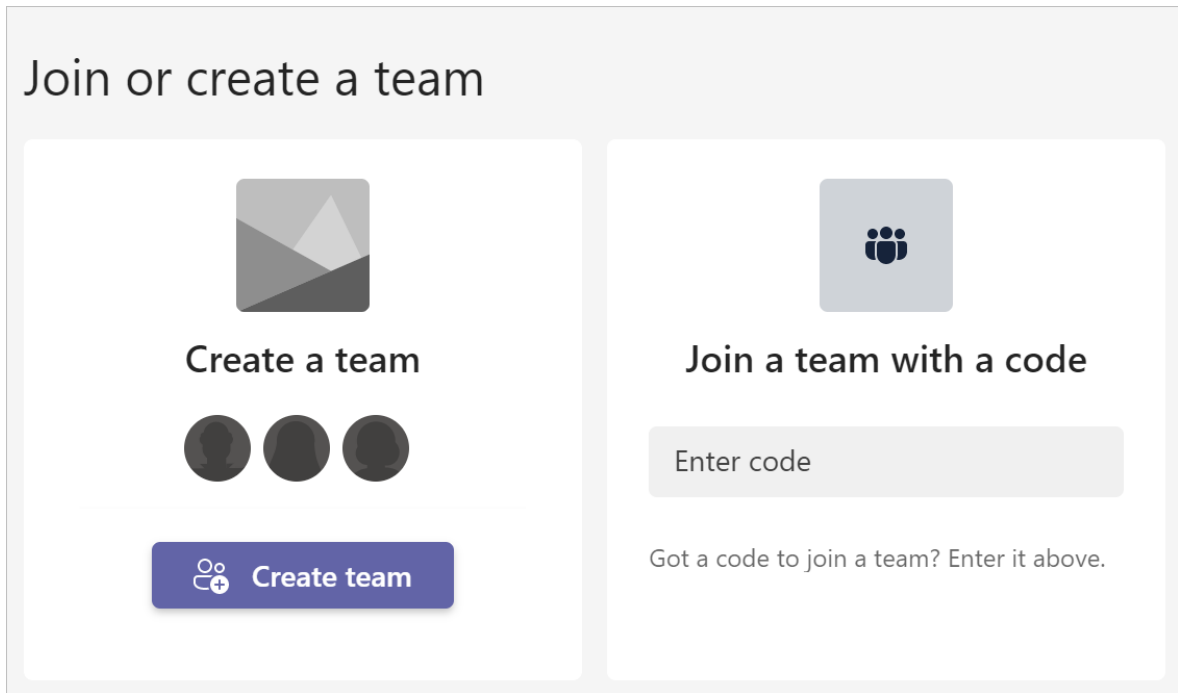
- Manage a Project
- Manage an Event
- Organize a Help Desk
- Incident Response
- Onboard Employees

For example, if you create a team from the **Manage a Project** template, the recommended flow templates on the Power Automate tab in the General channel is filtered to your Manage a Project scenario.

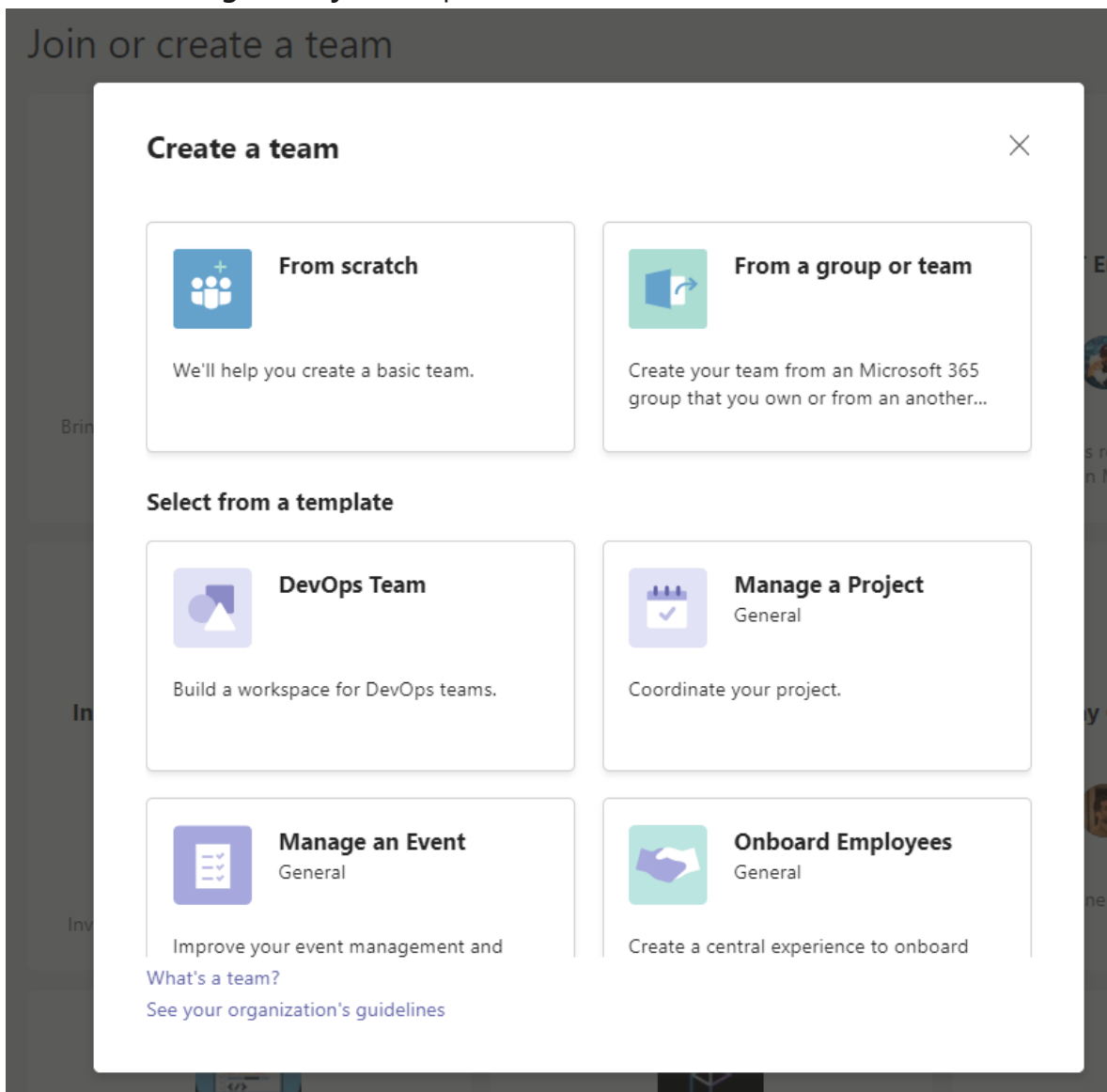
For example, follow these steps to use the **Manage a Project** template from within Microsoft Teams.

1. Open Microsoft Teams.
2. Select **Teams** from the top of the panel on the left.
3. Select **Join or create a team** from the bottom of the **Teams** panel on the left.

4. Select **Create team** from the **Join or create a team** screen.



5. Select the **Manage a Project** template.



6. Select **Next** on the **Manage a Project** screen after you've reviewed the summary and details of the template.

**Manage a Project** ✕

Manage tasks, share documents, conduct project meetings and document risks and decisions with this template for general project management.

**4 channels**

- General
- Announcements
- Resources
- Planning

**6 apps**

- Approvals
- Lists
- OneNote
- Power Automate
- Tasks by Planner and To Do
- Wiki

[< Back](#) [Next](#)



7. Select the Sensitivity and Privacy levels for your team.


### What kind of team will this be? ✕


Sensitivity [Learn more](#)

Highly Confidential \ Internal only ▾

Teams with this sensitivity must be private.

Privacy

 **Private**  
People need permission to join

 **Public**  
Anyone in your org can join ⓘ

[← Back](#)

8. Give your team a **Name**, a **Description**, and then select **Create**.

### Some quick details about your private team ✕

Team name

## All up project management team ✓


Description

Use this team for project-wide docs and discussions.

▸ **Customize channels**

< Back Create

9. Wait while the team is created.

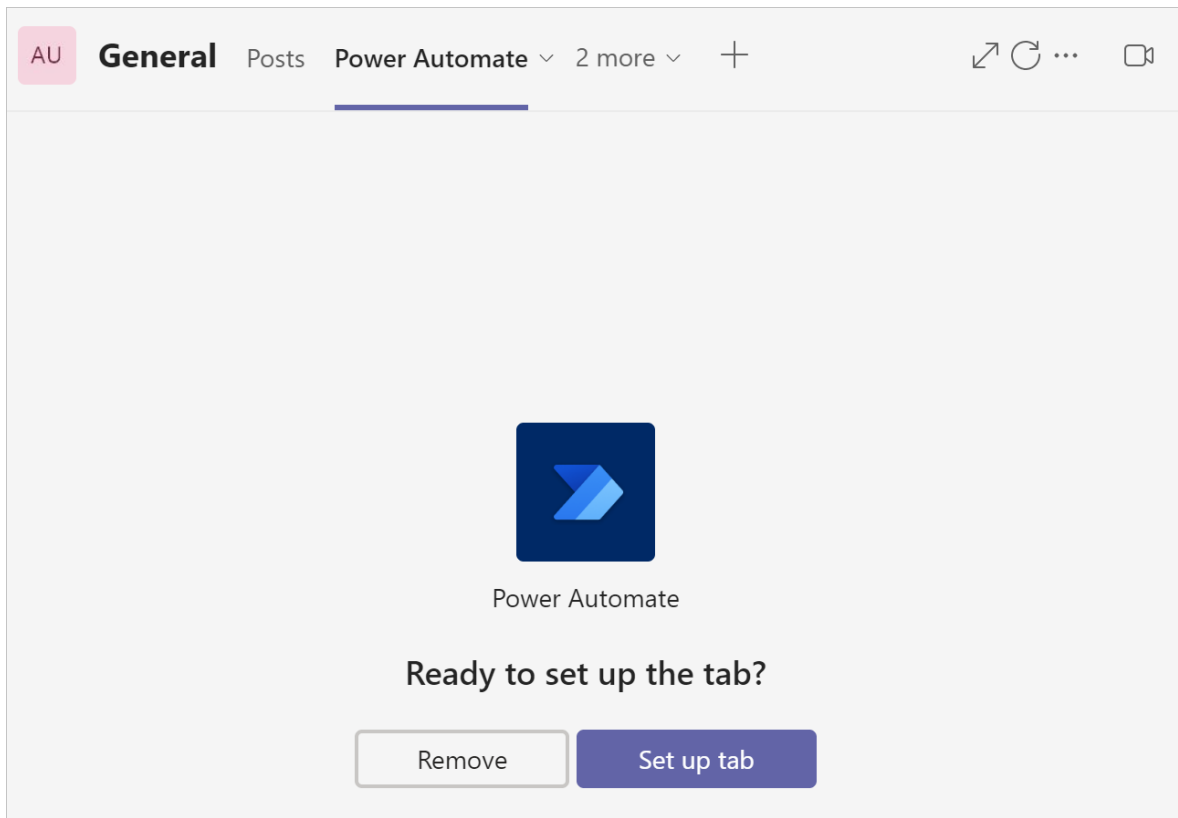


### Creating the team...


Feel free to close this window and go do other things.  
We'll let you know when it's ready.

Close

10. After you create the team, select the **Power Automate** tab in the **General** channel, and then select **Set up tab**.

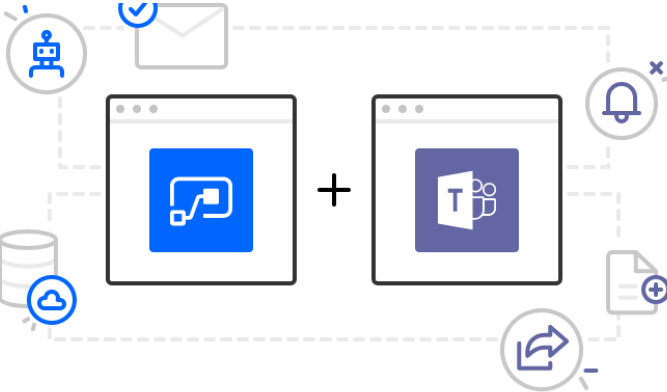


11. Select **Post to the channel about this tab**, and then select **Save** on the **Power Automate** screen.



# Power Automate

About ✕



Power Automate connects your favorite apps to automate business tasks and save your team time. [Learn more](#)








- **Create and manage flows**  
Automate alerts, notifications, and more—all without leaving Teams.
- **Launch with a bot**  
Quickly trigger scheduled flows using the Flow bot in Teams.

Post to the channel about this tab

Back Save

12. Scroll on the **Power Automate** tab to view the list of suggested Power Automate flow templates that are relevant to your team's scenario.

### Start with a popular Teams template

|                                                                                                                                                                               |                                                                                                                                                                                                       |                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>Create a task in Planner from a message</b><br/>By Microsoft</p> <p>Instant 25893</p> |  <p><b>Notify a channel when the status of a task in Planner updates</b><br/>By Microsoft</p> <p>Automated 20046</p> |  <p><b>Alert me when I am mentioned in Microsoft Teams</b><br/>By Microsoft</p> <p>Automated 18184</p>    |
|  <p><b>Save a message to OneNote</b><br/>By Microsoft</p> <p>Instant 16719</p>               |  <p><b>Schedule a meeting with a message sender</b><br/>By Microsoft</p> <p>Instant 14420</p>                        |  <p><b>When a new task is created in Planner notify a team</b><br/>By Microsoft</p> <p>Automated 3420</p> |
|  <p><b>Create an event from a message</b><br/>By Microsoft</p> <p>Instant 1242</p>           |                                                                                                                                                                                                       |                                                                                                                                                                                              |

You can now select any of the flow templates listed to customize your team.

#### Tip

You can use any of the five team templates listed earlier in the article to create a team that's right for your organization.

## Related links

[Use team templates in the admin center](#)

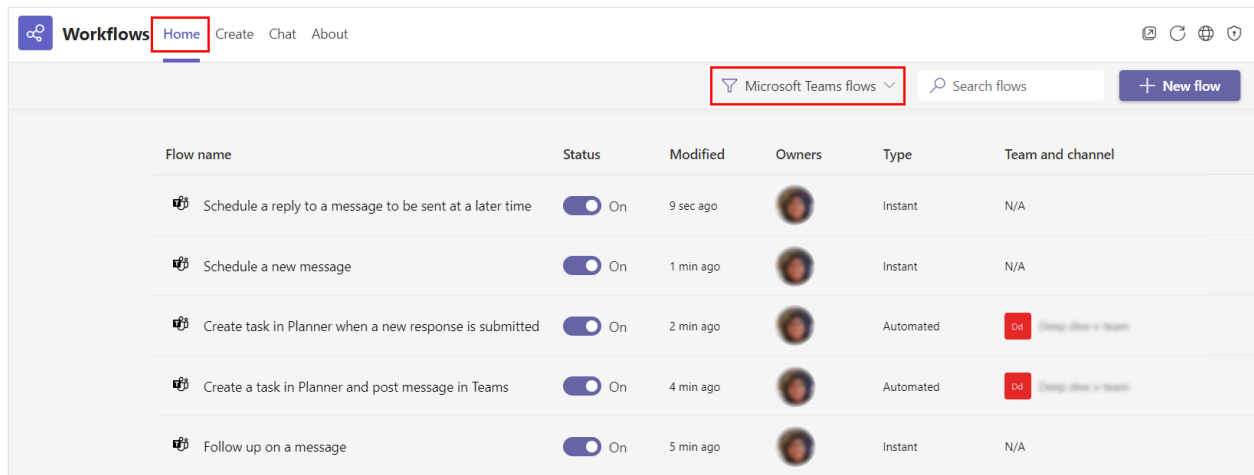
[Create a team with a Teams templates](#) 

# Manage flows in Microsoft Teams

Article • 11/04/2023

The **Home** tab provides an overview of your flows from your organization's default environment.

By default, the **Home** tab is filtered to display flows that use Microsoft Teams triggers and actions. You can select **Microsoft Teams flows** to change the filter to display all your flows.



On the **Home** tab, you can view the information that's displayed in each of the following six columns to get an overview of your flows.

| Column           | Description                                                                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flow name        | Represents the name that you provided for the flow.                                                                                                       |
| Status           | Displays the status of the flow. For example, is the flow enabled or disabled? You can change the status of your flows directly from this list.           |
| Modified         | Displays the amount of time that's passed since the flow was last changed.                                                                                |
| Owners           | Provides a list of the users who own the flow.                                                                                                            |
| Type             | Shows the type of flow. Flows can be <b>Automated</b> , <b>Instant</b> , or <b>Scheduled</b> .                                                            |
| Team and channel | If your flow reads from or writes to any team or channel, that information is provided here so you can get a quick glance of the teams your flow touches. |

## 💡 Tip

You can select any flow to view more details about it.

The screenshot displays the Microsoft Teams Workflows app interface. At the top, there is a navigation bar with 'Workflows', 'Home', 'Create', 'Chat', and 'About'. Below this is a toolbar with options: 'Edit with new designer', 'Edit', 'Share', 'Save As', 'Delete', 'Send a copy', 'Export', 'Turn off', and 'Repair tips off'. The main content area shows a flow titled 'Schedule a reply to a message to be sent at a later time'. A 'Details' tab is selected, showing the following information:

|             |                                                          |          |                            |
|-------------|----------------------------------------------------------|----------|----------------------------|
| Flow        | Schedule a reply to a message to be sent at a later time | Status   | On                         |
| Description | Schedule a reply to a message to be sent at a later time | Created  | Oct 25, 09:51 PM           |
| Owner       | Angie Andrews                                            | Modified | Oct 27, 10:04 AM           |
|             |                                                          | Type     | Instant                    |
|             |                                                          | Plan     | The user who runs the flow |

Below the details is a '28-day run history' section with a message: 'Your flow hasn't been run yet. Select **Run** to see it work.' To the right, there are panels for 'Connections' (listing Microsoft Teams and Office 365 Users Permissions), 'Owners' (listing Angie Andrews), and 'Process mining (preview)' with a link to 'Improve your flow'.

## Known issue

The Workflows app in Microsoft Teams shows your flows that are located only in your organization's default environment.

## See also

- [Create flows in Microsoft Teams](#)
- [Microsoft Teams connector documentation](#)

# Send a message in Teams using Power Automate

Article • 04/14/2023

This article covers different ways in which you can send a message in Teams.

You can use Power Automate to set up a flow that sends messages to a Teams Channel or group chat using the Microsoft Teams connector. Messages can be posted either as the user who's signed into the connector in the flow or by using the Flow bot.

## Flow setup

For the purposes of this document, we're using a scenario where a flow is used to notify a Channel or a Group chat, but the same principles can be used to apply to any flow where the **Post a message in a chat or channel** is used.

1. Sign in to [Power Automate](#).
2. Select **My flows > New > Automated cloud flow**.
3. Enter a name for your flow.
4. Select the **When a file is created (properties only)** trigger.
5. Select **Create**.
6. Set up your trigger by choosing a SharePoint site and Folder ID that you want to monitor.
7. to add an action to this flow, select **+ New Step**.
8. Search for and select the **Post a message in a chat or channel** action.

## Message sender options

The **Post a message in a chat or channel** action can send a message in the following two ways:

- **As the Flow bot:** In this method, the message gets sent as the Flow bot instead of any individual users. Use this sender option if you didn't want to tie the message to any specific user and just want to use a generic sender instead.

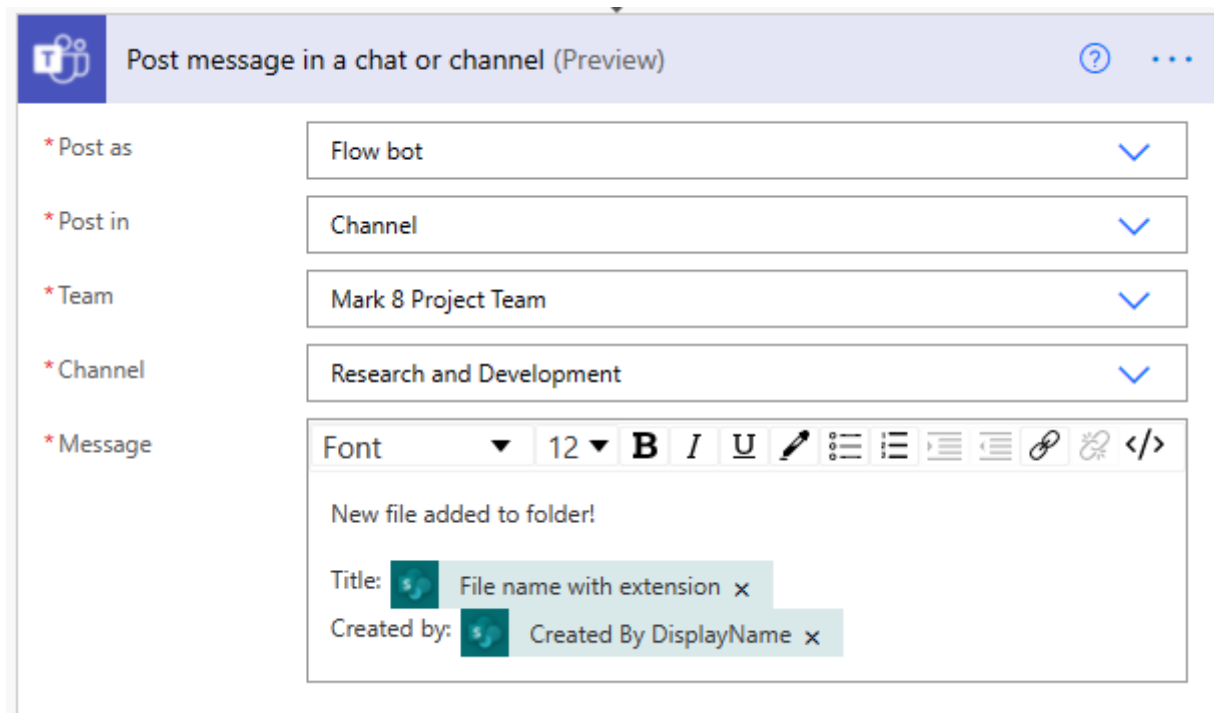


- **As a User:** In this method, the message gets sent as the user who's signed in to the Teams connector in the Flow (generally the Flow owner). This method can be used when the message needs to get sent as a regular user.

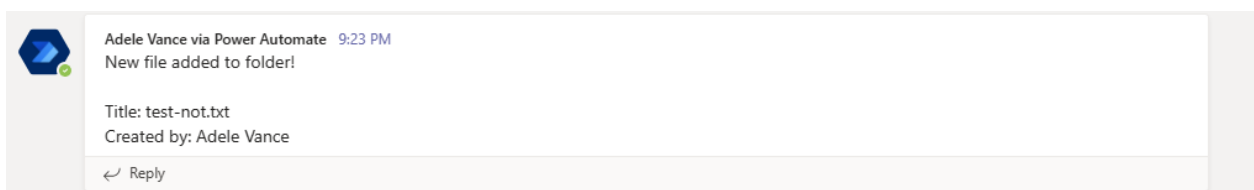
The **Post as** and **Post in** options within the action control all the different combinations of how messages can be posted in Teams.

## Posting a message as the Flow bot in a Teams channel

To send a message as the Flow bot in a Teams Channel select the **Post as** option as **Flow bot** and the **Post in** option as Channel. Once you do two more dynamic inputs show up, which allows you to specify the Team and Channel in which to send the message and add your message in the message field.



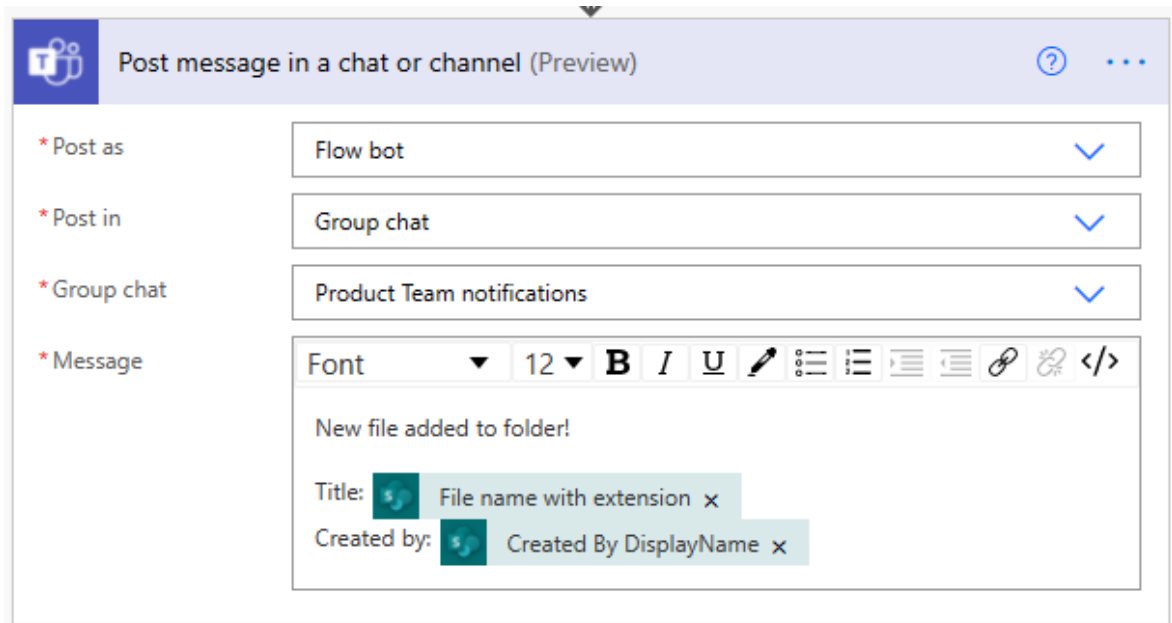
The screenshot shows the configuration for the 'Post message in a chat or channel' action. The 'Post as' dropdown is set to 'Flow bot', 'Post in' is 'Channel', 'Team' is 'Mark 8 Project Team', and 'Channel' is 'Research and Development'. The 'Message' field contains a rich text editor with the text 'New file added to folder!' and two dynamic content blocks: 'Title: File name with extension x' and 'Created by: Created By DisplayName x'. The rich text editor toolbar includes options for font size (12), bold, italic, underline, link, unlink, and code.



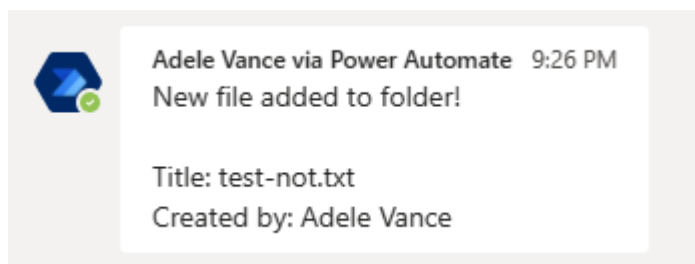
## Posting a message as the Flow bot in an existing named group chat

To send a message as the Flow bot in a group chat:

1. Select the **Post as** option as **Flow bot** and the **Post in** option as **Group chat**.



2. An additional option will show up that lets you select the Group chat to post in. Choose a group chat to post the message in and add your message in the message field.



By default, Teams lists only the 50 most recent **named** group chats in the drop down. If you want to send a message to a new group chat use the option below.

## Create a new group chat and post a message to it as the Flow bot

The **Post message in a chat or channel** action can be combined with the **Create a chat** action to create a new group chat and post a message to it. This is useful in scenarios where a chat might not already exist for this topic and one needs to be created.

1. To create a new group chat, add the **Create a chat** action *before* the **Post message in a chat or channel** action. Add the members who need to be in the chat using their emails. Separate multiple emails with a semi-colon and enter the title for the chat if needed.

**Create a chat (Preview)**

\* Members to add: [redacted]@onmicrosoft.com; [redacted]@onmicrosoft.com;

Title: File notifications chat

2. To send a message as the Flow bot in the new created group chat, select the **Post as** option as **Flow bot** and the **Post in** option as **Group chat**. Once you do, an additional option will show up that lets you select the Group chat to post in.
3. In the Group chat field, choose **Enter custom value** and select the **Conversation id** from the **Create a chat** action in the dynamic token picker.

**Post message in a chat or channel (Preview)**

\* Post as: Flow bot

\* Post in: Group chat

\* Group chat: Conversation Id

\* Message:
   
Font: 12, Bold, Italic, Underline, Link, Unlink, Code
   
New file added to folder!
   
Title: File name with extension
   
Created by: Created By DisplayName

## Post a message as the Flow bot directly to a user

When sending a message as the Flow bot you have the additional option of posting directly to a user. This is useful in notification scenarios where you want to reach out to an individual user using the Flow bot.

For this, select the **Chat with Flow bot** option and specify the user you want to message and the specific message you want to send.

Post message in a chat or channel (Preview)

\* Post as: Flow bot

\* Post in: Chat with Flow bot

\* Recipient: Adele Vance x ;

\* Message:

Font 12 B I U [Rich Text Editor Icons]

New file added to folder!

Title: File name with extension x

Created by: Created By DisplayName x

## Post a message as the user in a Teams Channel

To send a message as the user in a Teams Channel select the **Post as** option as **User** and the **Post in** option as **Channel**. Once you do two additional dynamic inputs show up, which allows you to specify the Team and Channel in which to send the message and add your message in the message field.

Post message in a chat or channel (Preview)

\* Post as: User

\* Post in: Channel

\* Team: Mark 8 Project Team

\* Channel: Research and Development

\* Message:

Font 12 B I U [Rich Text Editor Icons]

New file added to folder!

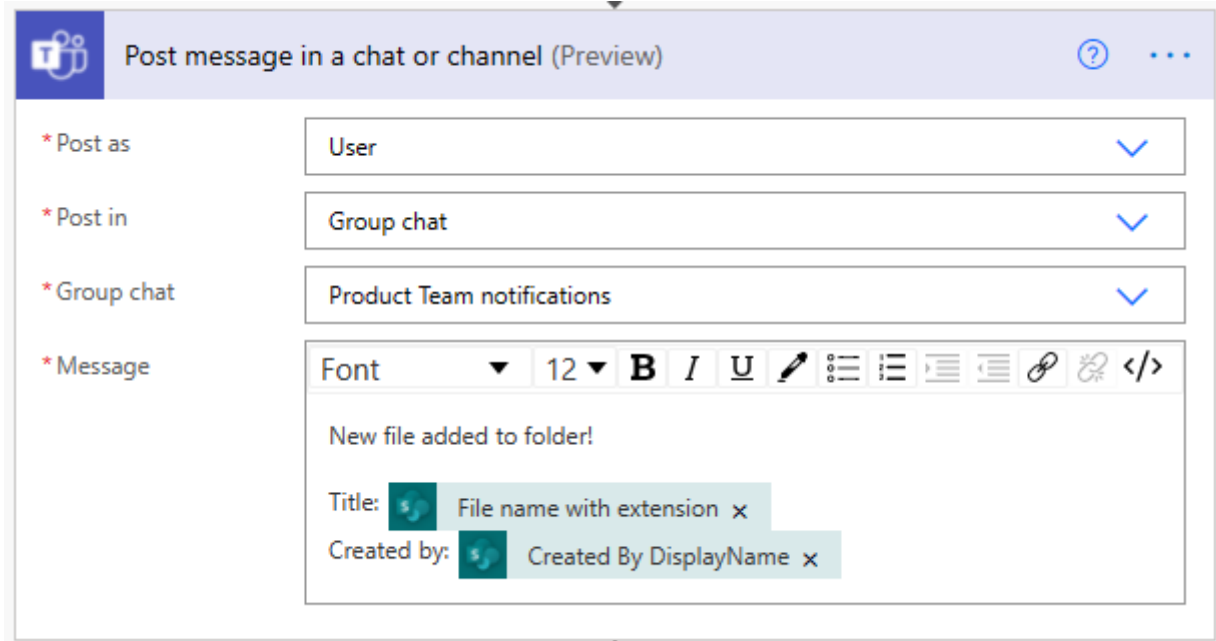
Title: File name with extension x

Created by: Created By DisplayName x

Subject: Add message subject

## Post a message as the user in an existing named group chat

To send a message as the user in a group chat select the **Post as** option as **User** and the **Post in** option as **Group chat**. Once you do an additional option will show up that lets you select the Group chat to post in. Choose a group chat to post the message in and add your message in the message field.

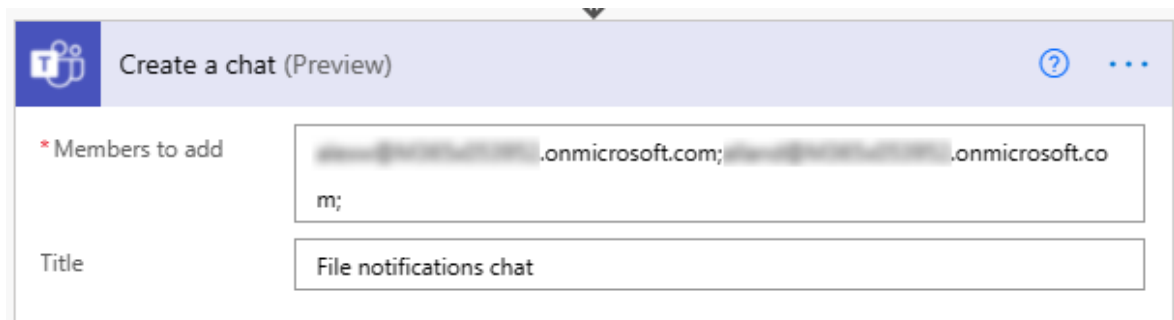


By default, Teams only lists the 50 most recent **named** group chats in the drop down. If you want to send a message to a new group chat use the option below.

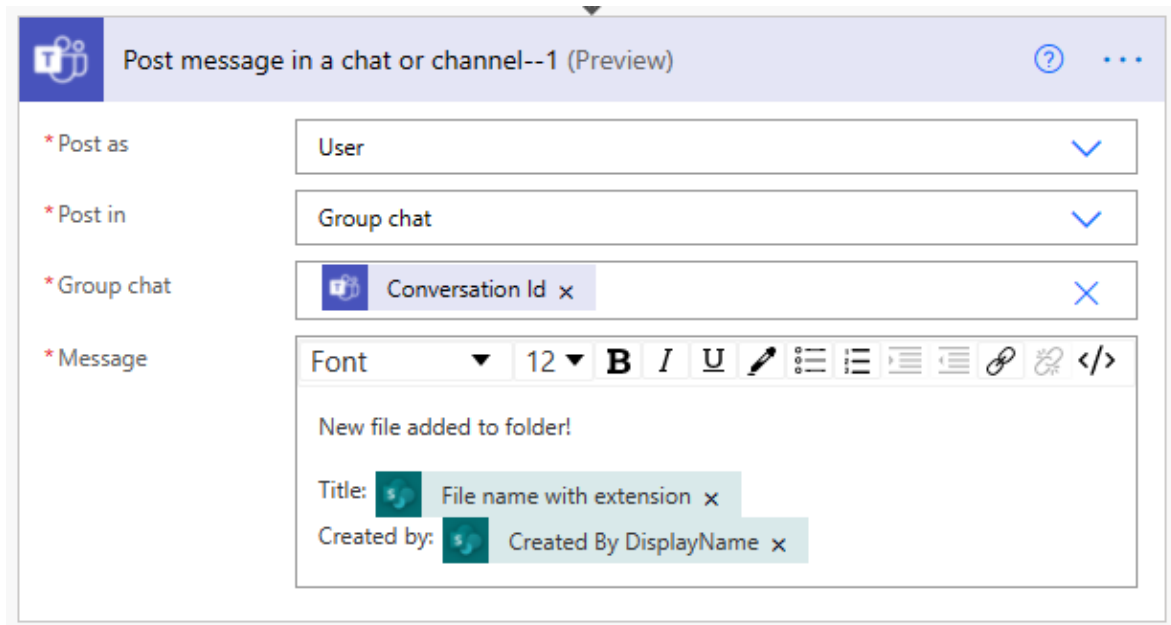
## Create a new group chat and post a message

The **Post message in a chat or channel** action can be combined with the **Create a chat** action to create a new group chat and post a message to it. This is useful in scenarios where a chat might not already exist for this topic and one needs to be created.

1. To create a new group chat add the **Create a chat** action *before* the **Post message in a chat or channel** action. Add the members who need to be in the chat using their emails. Separate multiple emails with a semi-colon and enter the title for the chat if needed.



2. To send a message as the Flow bot in the new created group chat, select the **Post as** option as **User** and the **Post in** option as **Group chat**. Once you do, an additional option will show up that lets you select the Group chat to post in. In the Group chat field, choose **Enter custom value** and select the **Conversation id** from the **Create a chat** action in the dynamic token picker.

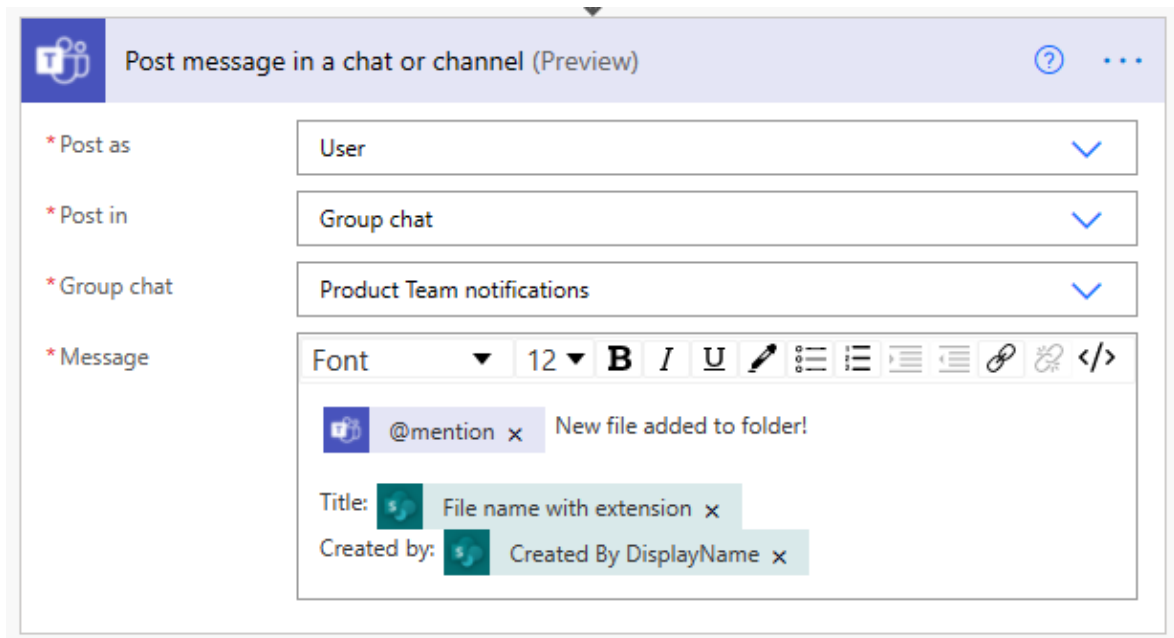


## Mention a user in any message

Mentions are a great way to get the attention of a user in Teams. You can combine any of the above actions and add a mention in the message of to a user or channel.

1. To mention a user, use the **Get @mention token for a user** action and specify the email of the user you want to mention in the **User** field.

The **User** field only accepts a single user input. If you want to mention multiple users, you'll need to add multiple instances of this action within the flow.



2. Add the mention token generated from that action in any of the **Post a message in chat or channel** action scenarios above.

The **Get @mention token for a user** action only supports mentioning users and not channels or Teams at the moment.

## Known issues and limitations

- By default Teams only lists the 50 most recent **named** group chats in the drop-down list. If you want to send a message to a new group chat use the option below.
- The **Get @mention token for a user** can only be used for mentioning users, mentioning channels/teams is currently not supported.
- Sending a message in private channels isn't supported.

# Trigger a cloud flow from any message in Microsoft Teams

Article • 04/14/2023

You can use messages to trigger processes in Teams. For example, you might use a Teams message as a starting point to create a work item in Azure DevOps or create a sales opportunity in Dynamics 365.

Use the **For a selected message** trigger in the Teams connector to trigger a cloud flow directly from within Teams.

## Create the flow

1. Sign in to [Power Automate](#).
2. Enter a name for your flow.
3. Select the **For a selected message** trigger.
4. Select **Create**. You must sign in to Teams if you aren't already signed in.

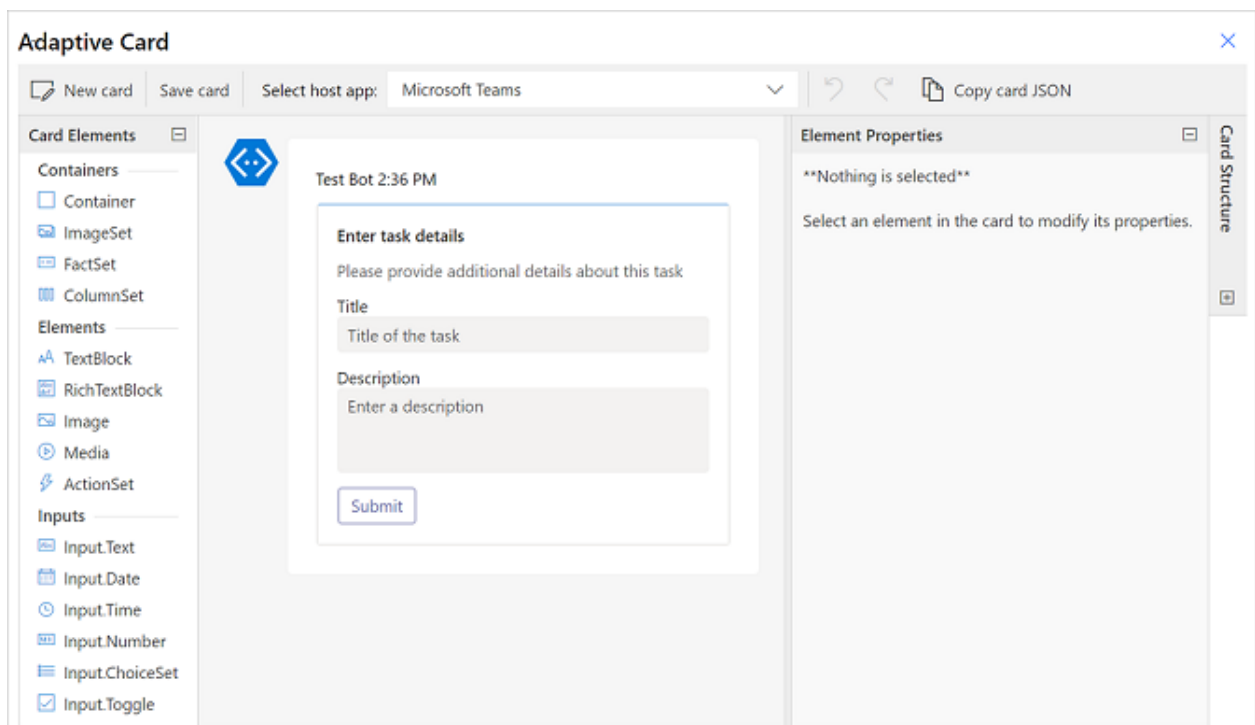
The **For a selected message** trigger has an optional input in the form of an adaptive card. Use an adaptive card to construct a form to collect information from the user who triggers the flow. For instance, if the flow creates a task, you can use an adaptive card to collect information like the title of the task and the description.

## Collect information from the user

To collect information from the user by using a form, users can select **Create Adaptive Card** in the trigger.

This displays an inline adaptive card editor, where you can drag card elements to construct your own form.





Each input within the adaptive card form has an ID. You can use the ID later in the flow through dynamic tokens to reference inputs that a user might have entered as part of running the flow.

## Use the message details within the flow

Several message elements are available as a trigger output for use within the flow. Here's an overview of some of the properties:

- **Message content:** The full HTML content of the Teams message.
- **Plain text message output:** The plain text variation of the Teams message.
- **Link to message:** A direct URL to reference the message.
- **Sender display name, Sender ID:** The details about the user who sent the message.
- **Originating user display name, originating user ID:** The details about the user who invoked the flow.

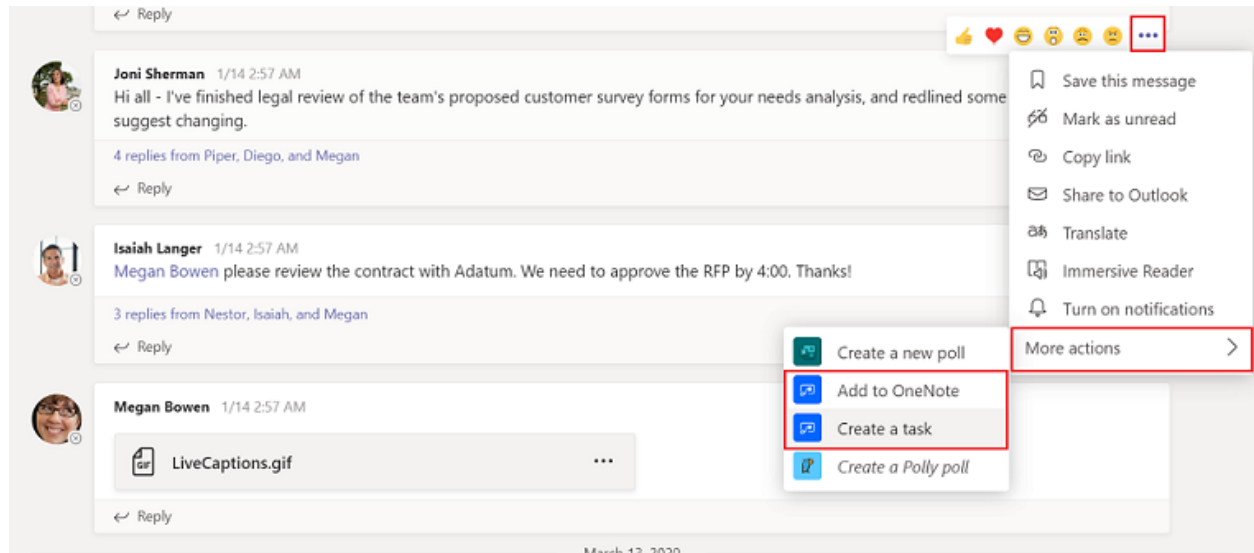
For more information, go to the [full list of trigger outputs](#).

## Trigger the flow

You must create these flows within the *default* environment for them to appear in Teams.

If you don't see the flows you create with the **For selected message in Teams** trigger, ask your admin to confirm whether the Power Automate Actions app is enabled in the Teams admin center <https://admin.teams.microsoft.com/policies/manage-apps> .

Any flow that uses the **For a selected message** trigger shows up as a message action in the Teams message in the **More actions** menu for the flow.



### **i** Important

The name of the flow is used to reference the flow within Teams, so be sure to provide a descriptive name for it.

## Best practices

Be sure to include a form of a confirmation to the user after the flow is completed. We recommend using **Post a message as the flow bot to a user** or **Post a message as the flow bot to a channel** to notify the user in Teams when a triggered flow has been completed.

Here's an example of a cloud flow that creates a work item in Azure DevOps and then posts a confirmation to the originating user.

For a selected message

Create a work item

Post a message as the Flow bot to a user (Preview)

**Headline\***

Task was created successfully

\* Recipient

**Message**

Task [Task Icon] Title [X] was successfully created. Here's a link to the task:  
https://dev.azure.com/ContosoFlow/[Task Icon] Team Project [X] /\_workitems/edit/[Task Icon] Id [X] /

Show advanced options ▾

## Known issues and limitations

- You must create these flows within the default environment to ensure they get listed in Teams.
- Only the flow author can trigger the flow. The flow will only be available to other members of the channel/chat if the author explicitly shares it with them.

# Create flows using the Power Apps app in Microsoft Teams

Article • 11/04/2023

You can build flows to customize and add further value to Teams from within the new Power Apps app in Teams. You can create [instant](#), [scheduled](#), and [automated](#) flows, with access to over 350 connectors. This includes a connector to work with [Microsoft Dataverse for Teams tables](#) within Teams.

## ⓘ Note

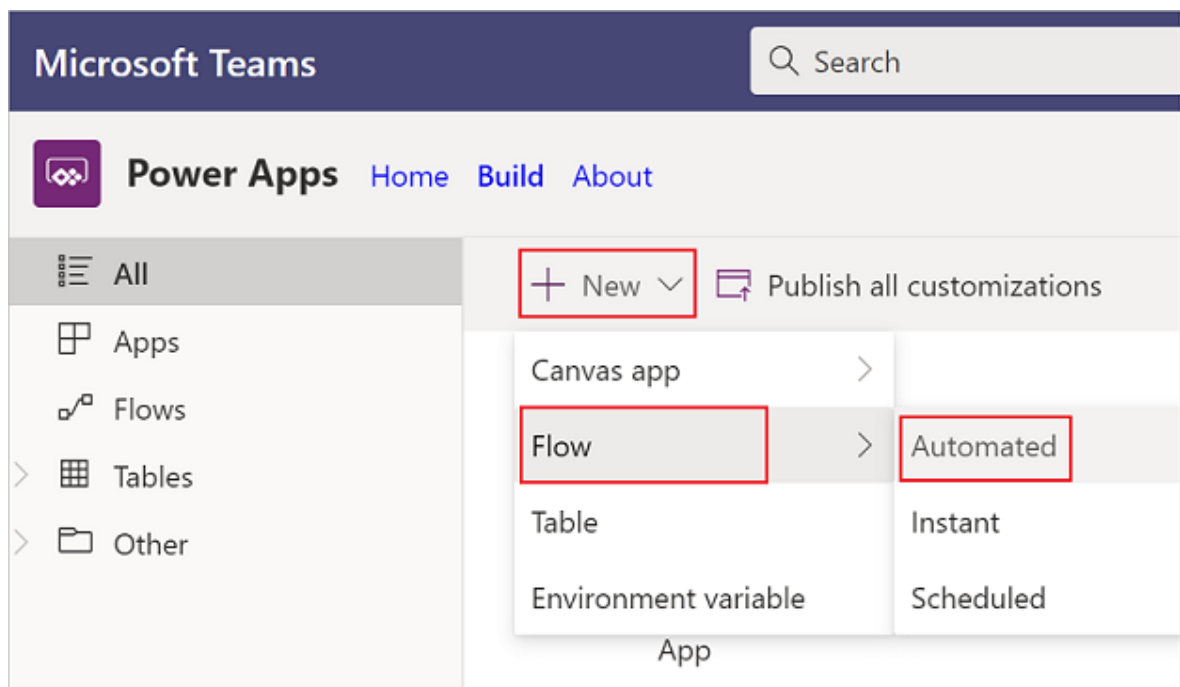
You need a [Power Automate license](#) <sup>↗</sup> to access all Power Automate connectors, including the premium connectors. Users with a Microsoft 365 license can use all standard connectors.

## Prerequisites

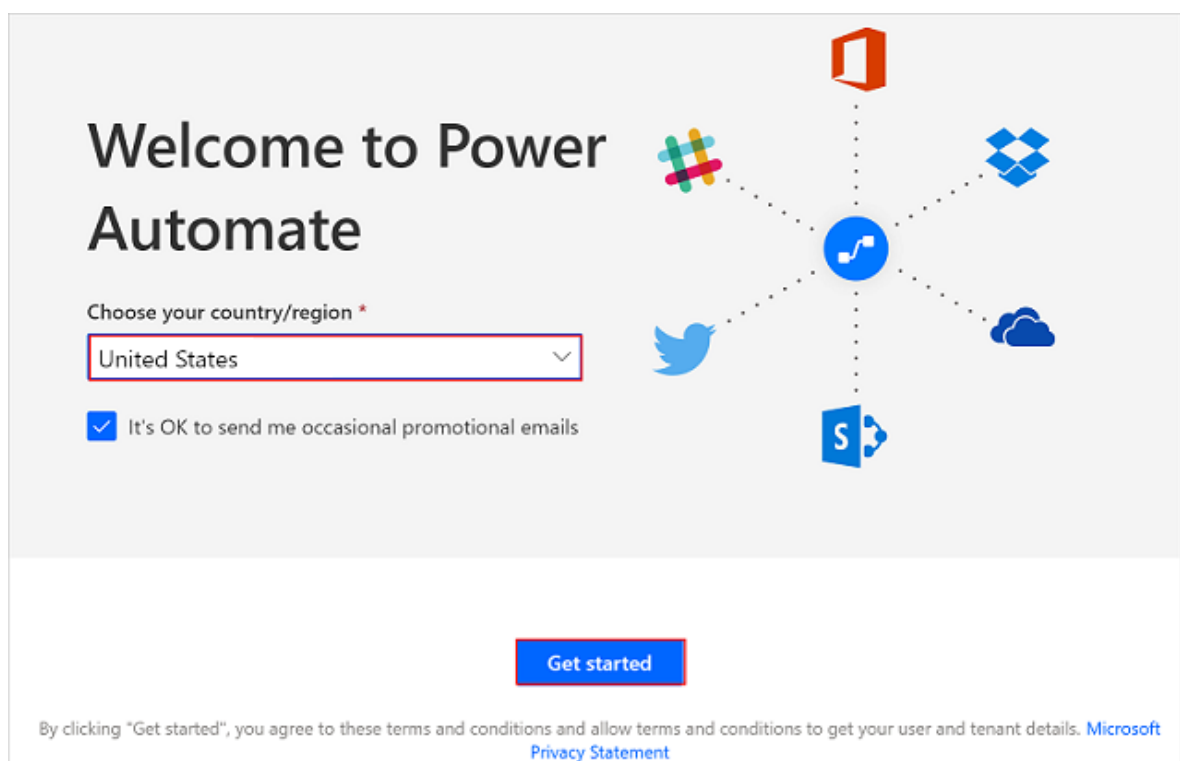
- The Power Apps app must be installed before you can create flows in Teams. More information: [Install the Power Apps personal app in Microsoft Teams](#)
- Before you can use the Power Apps app in Teams to create a cloud flow, a Dataverse for Teams environment must already exist for that team. A Dataverse for Teams environment is automatically provisioned when you [create your first app in Teams](#).

## Create a cloud flow in Teams

1. Go to the **Build** tab in your Power Apps app, and then select **See all**.
2. Select **New**, select **Flow**, and then select the type of flow you want to create. You can create only the following types of flows: [instant](#), [scheduled](#), and [automated](#).



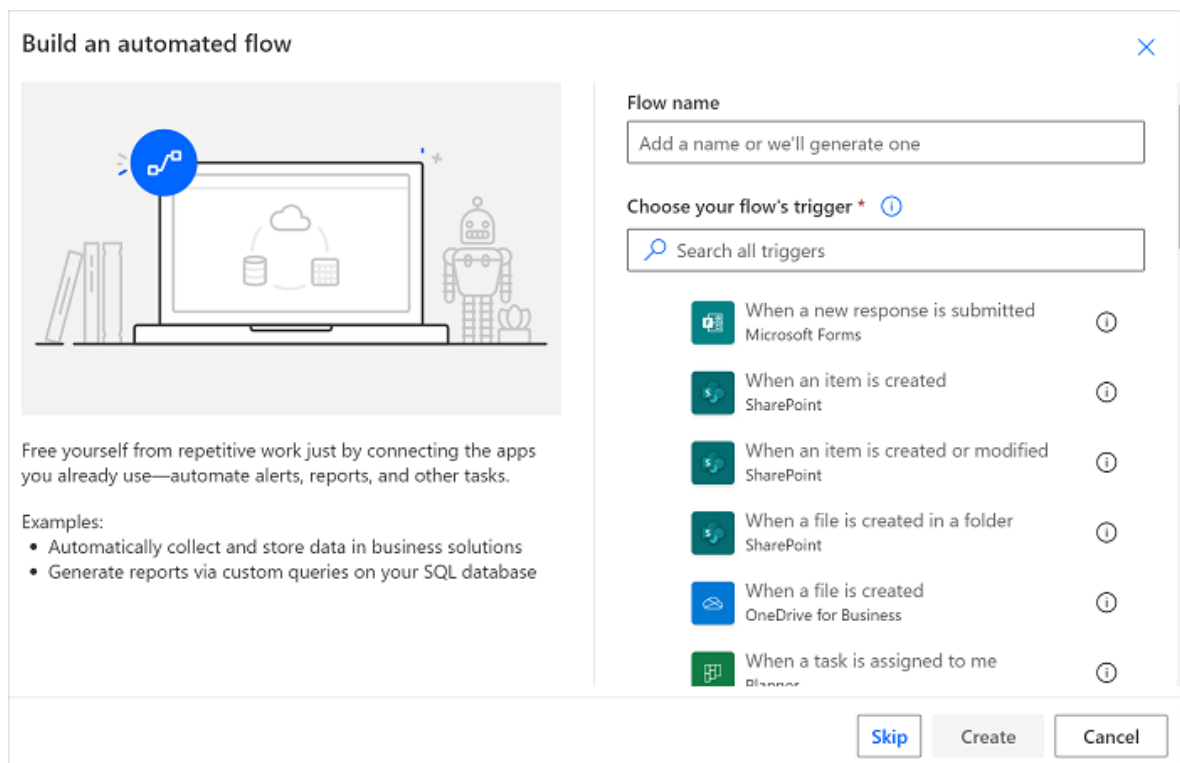
3. If this is your first time creating a cloud flow, you'll have to select your country/region, and then select **Get started**.



4. The **Build an automated flow** screen appears, where you can select a trigger, and create and save your flow.

ⓘ **Note**

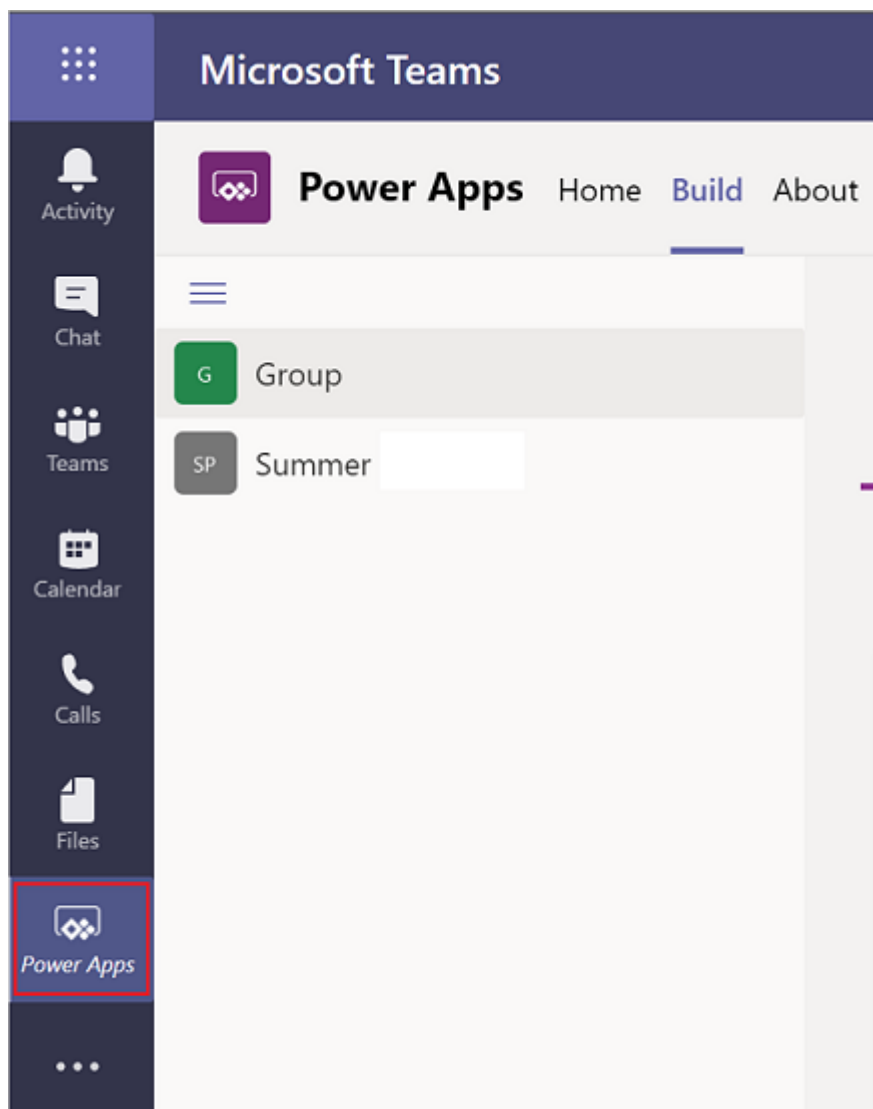
The screen that appears here will be different depending on whether you selected **Instant** or **Scheduled** in step 2 earlier.



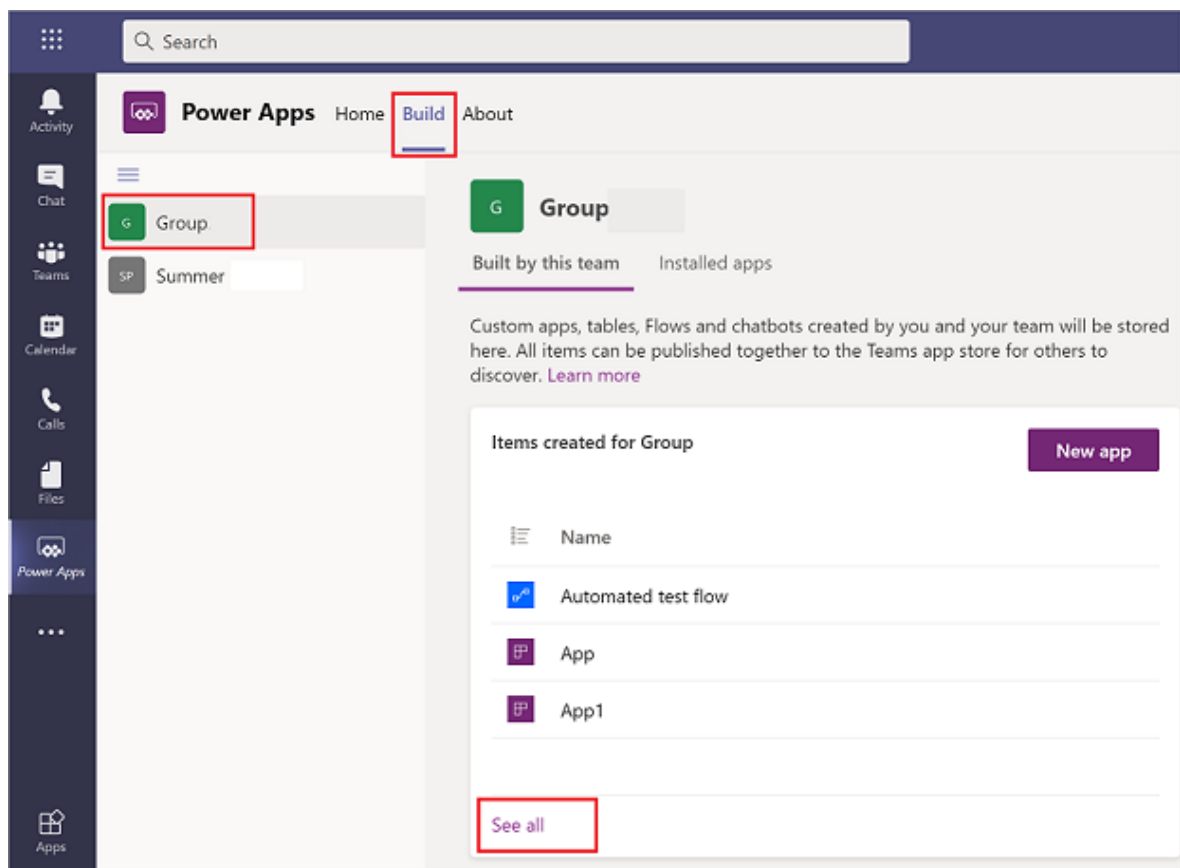
## Work with your flows

To find your saved flows:

1. Sign in to Teams.
2. On the left pane, select **Power Apps**.



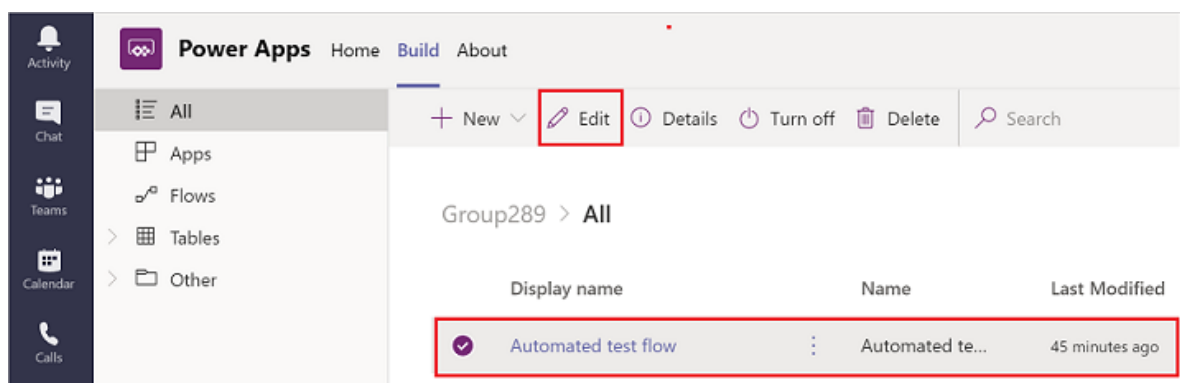
3. On the **Build** tab, select the team in which you created your flow, and then select **See all** in the tree view.



## Customize a cloud flow

In Teams, you might have acquired flows from an installed app or you might have created them yourself. You can update or customize either of these types of flows.

1. To update a cloud flow, select the **Build** tab, and then select **See all** to see all the apps and flows in this team.
2. Select the flow that you want to edit, and then select **Edit**.

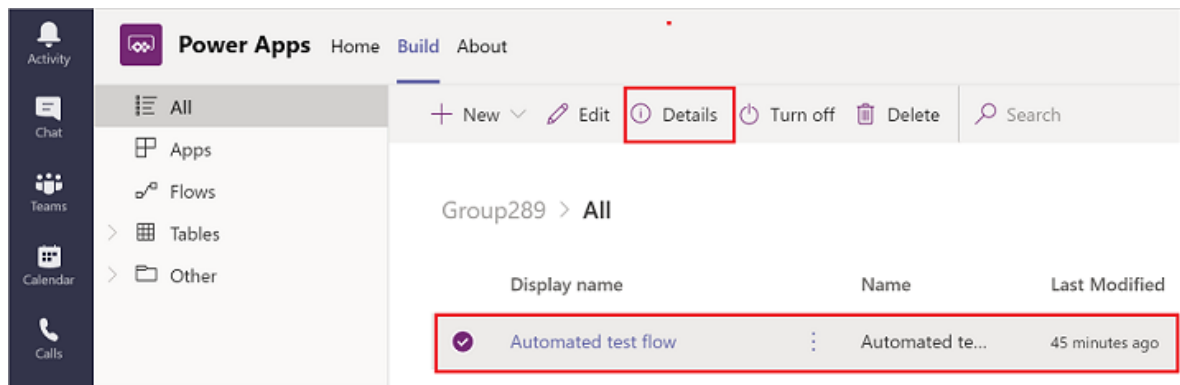


## View details and run history

1. To view the details and run history for a cloud flow, select the **Build** tab, and then select **See all**.



2. Select the flow for which you want to view the details, and then select **Details**.



## See also

- [Use the new Power Apps app in Microsoft Teams](#)
- [What is Dataverse for Teams?](#)
- [About the Dataverse for Teams environment](#)

# Create your first adaptive card

Article • 11/04/2023

Adaptive cards within Power Automate may either share blocks of information or collect data via a form for a given data source.

In either case, you'll need to sketch out which datasets you'll share, and/or what data the form will need to collect.

## Tip

Use simple blocks of data rather than complex table arrays.

## Prerequisites

Microsoft Teams with the Workflows app installed.

## Add an action

In this procedure, you'll add an action that will use the data from previous actions in the flow to post information to a Microsoft Teams channel.

1. Sign in to [Power Automate](#).
2. Select **My flows** in the top navigation bar.
3. Select **New flow** > **Instant cloud flow**.
4. Name your flow.
5. Select **Manually trigger a flow** as the trigger.
6. Select **Create**.
7. In the designer, select **New Step**.
8. Search for **Microsoft Teams**, and then select **Post an adaptive card to a Teams channel and wait for a response** as the action.
9. Select the **Team** and the **Channel** to which you'd like to post the card.
10. Paste this JSON into the **Message** box.

## JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "TextBlock",
      "text": "Poll Request",
      "id": "Title",
      "spacing": "Medium",
      "horizontalAlignment": "Center",
      "size": "ExtraLarge",
      "weight": "Bolder",
      "color": "Accent"
    },
    {
      "type": "TextBlock",
      "text": "Header Tagline Text",
      "id": "acHeaderTagLine",
      "separator": true
    },
    {
      "type": "TextBlock",
      "text": "Poll Header",
      "weight": "Bolder",
      "size": "ExtraLarge",
      "spacing": "None",
      "id": "acHeader"
    },
    {
      "type": "TextBlock",
      "text": "Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer vestibulum lorem eget neque sollicitudin, quis malesuada felis ultrices. ",
      "id": "acInstructions",
      "wrap": true
    },
    {
      "type": "TextBlock",
      "text": "Poll Question",
      "id": "acPollQuestion"
    },
    {
      "type": "Input.ChoiceSet",
      "placeholder": "Select from these choices",
      "choices": [
        {
          "title": "Choice 1",
          "value": "Choice 1"
        },
        {
          "title": "Choice 2",
```

```

        "value": "Choice 2"
      },
      {
        "title": "Choice 3",
        "value": "Choice 3"
      }
    ],
    "id": "acPollChoices",
    "style": "expanded"
  }
],
"actions": [
  {
    "type": "Action.Submit",
    "title": "Submit",
    "id": "btnSubmit"
  }
]
}

```

11. Make the following replacements in the JSON.

### Important

Do not remove any quotation marks when you do the replacements. You can revise the car choices to suit your needs:

| Text to change                                                                                         | New text                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Header Tagline Text                                                                                    | Power Automate Poll                                                                                                                           |
| Poll Header                                                                                            | Preferred Car Model                                                                                                                           |
| Poll Question                                                                                          | Please vote on your preferred car model from the choices listed here.                                                                         |
| Replace the latin text with a reason, or business context, related to why you are conducting the poll. | We are polling our employees in order to determine if we should provide personalized parking places that are sized for the most popular cars. |
| Choice 1 (replace in both places)                                                                      | Tesla                                                                                                                                         |
| Choice 2 (replace in both places)                                                                      | Lexus                                                                                                                                         |
| Choice 3 (replace in both places)                                                                      | Honda                                                                                                                                         |

12. Select **New Step**, and then search for and select one of the **Send an email** actions to which you have access.

13. Provide the email recipient as the person who selected the instant button (use the **Email** tag from the dynamic content from the **trigger**).
14. Configure the **Body** of the email as follows. Replace the words in curly parentheses "{}" with dynamic tokens:  
**Your poll response was {acPollChoices}** (acPollChoices is dynamic content from the wait for a response action). **It was submitted by {User Name}** (User Name is dynamic content from the trigger)

## Test your adaptive card

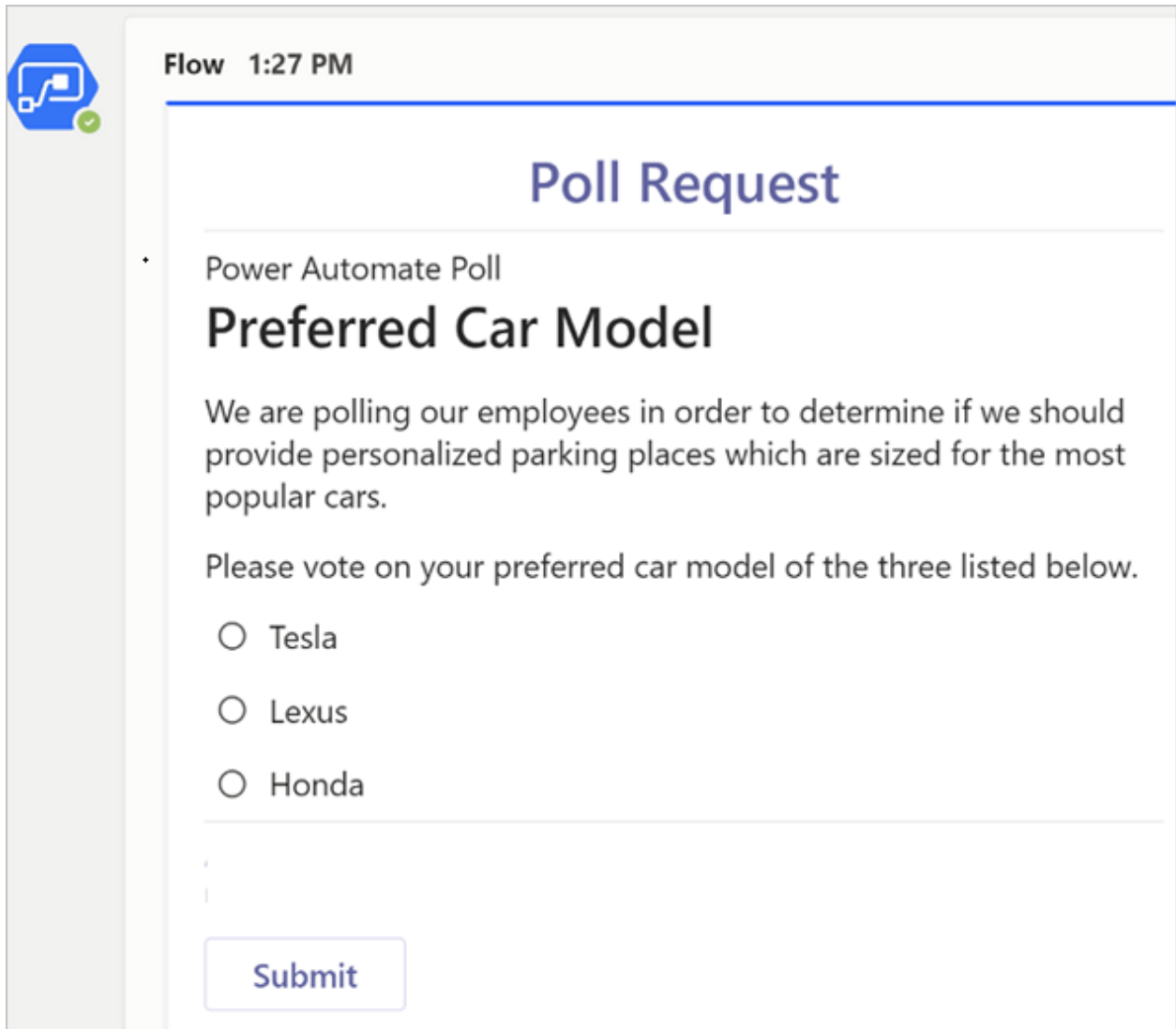
To test your work, run the flow you created earlier and confirm the following:

- The flow run has no errors, and waits for the response, showing the wait indicator for the Adaptive Card action on the run screen.
- The Teams channel has the new adaptive card posted.
- When you respond to the card by selecting a car model, and then selecting the **Submit** button on the bottom section of the adaptive card:
  - No errors should occur on the adaptive card.
  - The flow run completes successfully.
- Card replacement is relevant after submission if you have configured the **Update message** area at the bottom of the **wait for a response** actions (shown next with the corresponding replacement card). Otherwise, all submissions will simply reset the form.

|                                                                                                     |                                                                                                        |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <p>Update message</p> <p>Poll ended.</p> <p>Should update card Yes</p> <p>Show advanced options</p> | <p>Updated</p> <hr/> <p>Adaptive Cards   Power Automate</p> <p>Poll ended.</p> <p>Responded by You</p> |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|

- The email notification contains the body that shows who submitted the response and which car was selected.

Congratulations! you've just made your first interactive adaptive card!



Flow 1:27 PM

## Poll Request

Power Automate Poll

### Preferred Car Model

We are polling our employees in order to determine if we should provide personalized parking places which are sized for the most popular cars.

Please vote on your preferred car model of the three listed below.

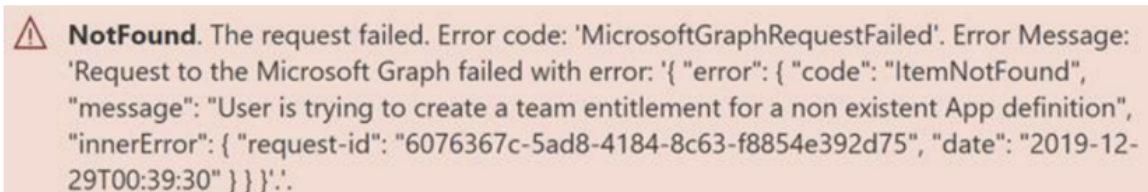
- Tesla
- Lexus
- Honda

## Troubleshooting tips for adaptive cards

The most common problems that you will encounter when creating adaptive cards are:

- Flow run errors are often caused by one of the following factors:
  - The Workflows app isn't installed in Microsoft Teams – [Install the Workflows app in Microsoft Teams](#).

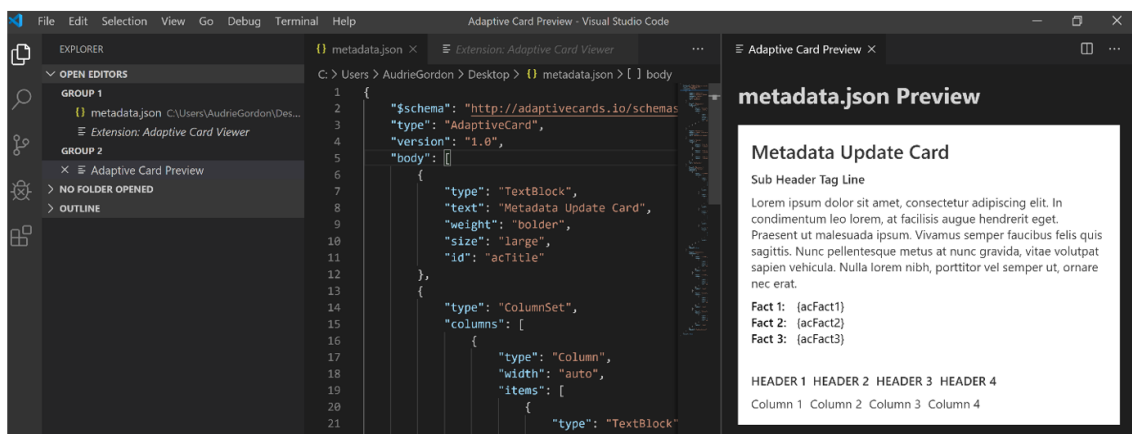
In this case the error may resemble this screenshot:



**⚠ Not Found.** The request failed. Error code: 'MicrosoftGraphRequestFailed'. Error Message: 'Request to the Microsoft Graph failed with error: '{ "error": { "code": "ItemNotFound", "message": "User is trying to create a team entitlement for a non existent App definition", "innerError": { "request-id": "6076367c-5ad8-4184-8c63-f8854e392d75", "date": "2019-12-29T00:39:30" } } }'.'. '

- Improperly formatted JSON – This is not usually as complex as one might expect. These are most often just situations where:

- There are curly quotes, or missing quotes, around values within the JSON. Always check the JSON to ensure all text values are enclosed within double quotes, and that numbers are enclosed in quotation marks. All quotation marks should be straight and not curly.
- You can validate the format of your JSON by pasting the JSON into the [Card Payload Editor](#).
- Missing Image URLs – All image values within Adaptive Cards must refer to a valid URL. Full image content is not be directly supported in an Adaptive Card. Test your image links by pasting the URL into the browser to see if an image is displayed.
- Adaptive Cards may not look like what's expected during to styling and schema constraints:
  - Check that placeholder values, text styles, and any markup language align with Adaptive Card schema requirements (review [Adaptive Card schema best practices here](#))
  - Leverage the **Visual Studio Code Adaptive Card validator**. To install it from the Visual Studio Code application, open the Extensions Marketplace, and search for **Adaptive Card Viewer**.



Truncated screenshot of the Adaptive Card Viewer extension installed in Visual Studio Code (shortcut: Ctrl+V+A once enabled).

- Errors following Adaptive Card submission are often due to:
  - Using an action, which does not include 'wait for response' in the name

**⚠ Unable to reach app. Please try again.**

- Attempting to submit the card more than once. Each Adaptive Card can be submitted only once, after which all further submissions will be ignored.

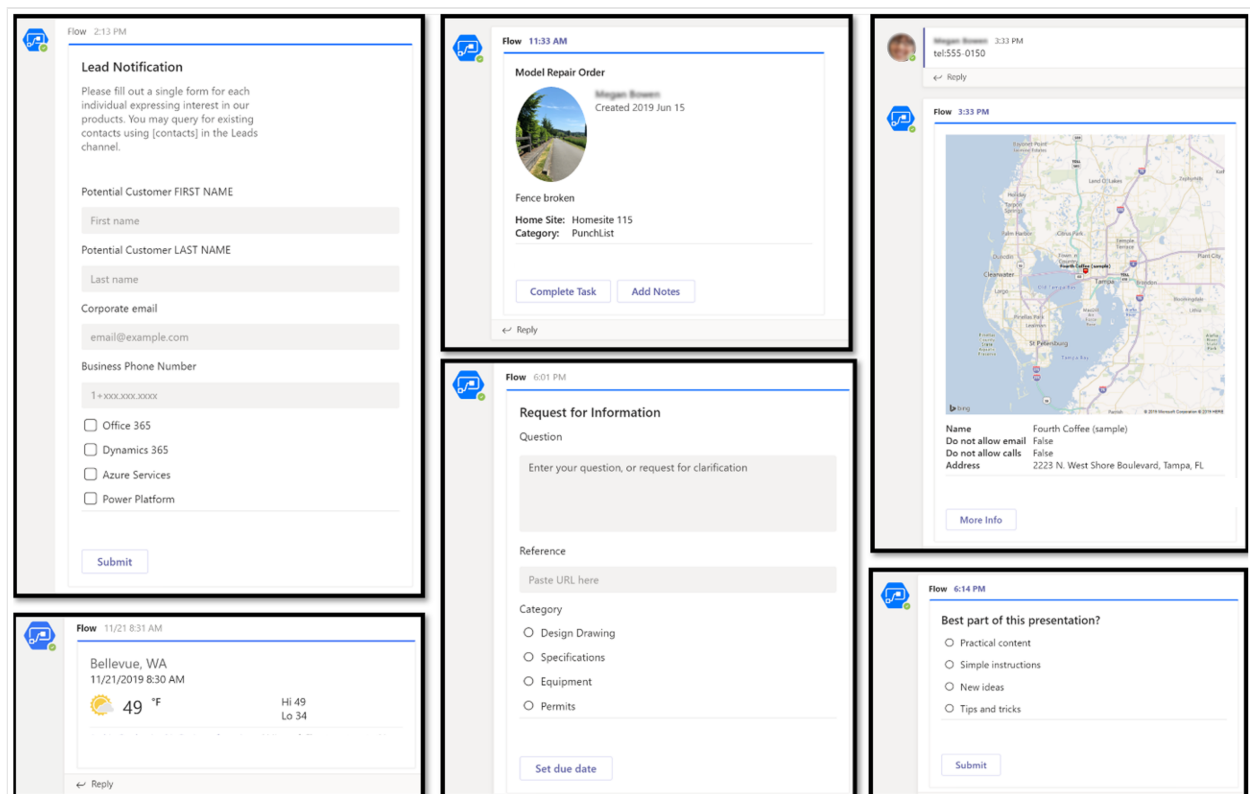


# Overview of adaptive cards for Microsoft Teams

Article • 09/08/2023

Adaptive cards are a platform-agnostic method of sharing and displaying blocks of information without the complexity of customizing CSS or HTML to render them. You author adaptive cards in JSON format, with integrations that cloud apps and services can openly exchange. When delivered to a specific host, such as Microsoft Teams, the JSON file is transformed into native UI that automatically adapts to its host. Therefore, process designers can now offer consistent UI patterns whenever they need to show information as part of a business process/automation.

Since adaptive cards adapt to their host, they're perfect vehicles for sharing information between Microsoft Teams and other services.



## Currently available actions for flows

The following actions enable makers to create adaptive cards for Microsoft Teams. As integration scenarios evolve, other hosts will also be supported by Power Automate, which will extend your opportunities to leverage adaptive cards throughout Microsoft cloud subscriptions.

### ⓘ Note

Adaptive cards aren't available within the DoD (Department of Defense) environment.

## Directing content to Teams members or AAD users

### Post your own adaptive card as the Flow bot to a user

This action posts an adaptive card as a flow bot to a specific user. In this case, you need to provide a recipient email address. Then, the card shows up in that recipient's chat and/or activity feeds during the flow run. There's no requirement for the user to be part of a Teams instance to receive these types of adaptive cards. In this case, only the URL buttons function by redirecting to the URL that's configured within the flow.

### Post an adaptive card as the Flow bot to a Teams user, and wait for a response

This action posts an adaptive card as a Flow bot to a specific user, like the case presented earlier in this article. However, in this case the flow run will not continue after the post until the recipient responds to inputs that are required within the card. The flow continues after the recipient responds. The flow returns dynamic content for one (1) response per recipient and per card.

## Directing content to Teams channels

- **Post your own adaptive card as the flow bot to a channel**

This action posts an adaptive card as a flow bot to a specific Teams channel. In this case, you're prompted for Teams instance, and a channel where the card is posted. The flow maker has to have access to the Teams instance in order to post an adaptive card there. In this case, only URL buttons function by redirecting to the URL configured within the flow.

- **Post an adaptive card as the flow bot to a Teams channel, and wait for a response**

This action posts an adaptive card as a flow bot to a specific Teams channel as in the case above. In this case, the flow doesn't continue until someone on the

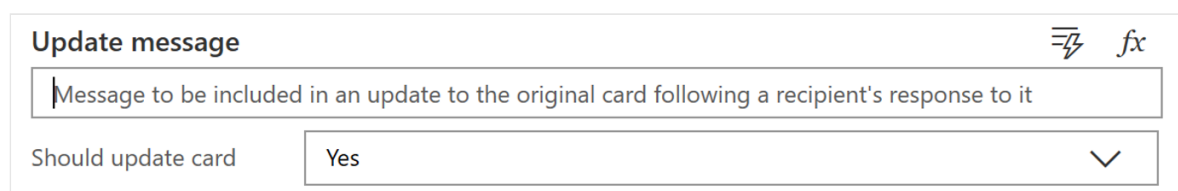
channel responds to inputs required within the card. The flow continues once anyone in the Teams channel responds but only returns dynamic content for one (1) response per responder and per card. When you use this card, the flow waits for a response from any Teams member.

## Known issues

- It isn't possible to collect data from adaptive cards unless they're created using one of the *wait for a response* actions. Adaptive cards that don't wait return an error for all button actions except **OpenURL**. [Learn more about OpenURL buttons](#).
- Selecting **Action.Submit** buttons on a card that doesn't include the *wait for a response* suffix show an error.
- Adaptive cards created using the *wait for response* actions can only be submitted once per card. The flow run continues after the first response, and any further submissions are ignored.
- Only the information within the **Update message** input box show on the replacement card after consumers submit the card.

Additional details, such as the user id of the person submitting the card, are available within the dynamic content in actions following the *wait for a response* action. However, it might be necessary to include the Office 365 Users connector in order to complete desired profile information for the user who submitted the card.

- Once the *wait for a response* adaptive cards are submitted, the card resets and then appears exactly the same, unless the replacement/update message area is configured. Update messages are a best practice. They're recommended in order to update others and prevent consumers from attempting to submit the card more than once.



The screenshot shows a configuration box for an 'Update message' action. At the top left is the label 'Update message' and at the top right are icons for a refresh symbol and a function symbol 'fx'. Below the label is a large text input field containing the placeholder text: 'Message to be included in an update to the original card following a recipient's response to it'. Underneath the input field is a section labeled 'Should update card' which contains a dropdown menu with the value 'Yes' and a downward-pointing arrow.

The **Update Message** and the **Should update card** inputs must be configured if a replacement card is desired.

- Power Automate uses Microsoft adaptive cards' unique features and services to handle the cards within any host. This article is intended to clarify any specifics

related to flow actions. You can also use the full documentation for [building adaptive cards](#).

## See also

- [Create your first adaptive card](#)
- [Microsoft Teams connector](#)
- [Adaptive cards IO](#)

# Create your first adaptive card

Article • 11/04/2023

Adaptive cards within Power Automate may either share blocks of information or collect data via a form for a given data source.

In either case, you'll need to sketch out which datasets you'll share, and/or what data the form will need to collect.

## Tip

Use simple blocks of data rather than complex table arrays.

## Prerequisites

Microsoft Teams with the Workflows app installed.

## Add an action

In this procedure, you'll add an action that will use the data from previous actions in the flow to post information to a Microsoft Teams channel.

1. Sign in to [Power Automate](#).
2. Select **My flows** in the top navigation bar.
3. Select **New flow** > **Instant cloud flow**.
4. Name your flow.
5. Select **Manually trigger a flow** as the trigger.
6. Select **Create**.
7. In the designer, select **New Step**.
8. Search for **Microsoft Teams**, and then select **Post an adaptive card to a Teams channel and wait for a response** as the action.
9. Select the **Team** and the **Channel** to which you'd like to post the card.
10. Paste this JSON into the **Message** box.

## JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "TextBlock",
      "text": "Poll Request",
      "id": "Title",
      "spacing": "Medium",
      "horizontalAlignment": "Center",
      "size": "ExtraLarge",
      "weight": "Bolder",
      "color": "Accent"
    },
    {
      "type": "TextBlock",
      "text": "Header Tagline Text",
      "id": "acHeaderTagLine",
      "separator": true
    },
    {
      "type": "TextBlock",
      "text": "Poll Header",
      "weight": "Bolder",
      "size": "ExtraLarge",
      "spacing": "None",
      "id": "acHeader"
    },
    {
      "type": "TextBlock",
      "text": "Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer vestibulum lorem eget neque sollicitudin, quis malesuada felis ultrices. ",
      "id": "acInstructions",
      "wrap": true
    },
    {
      "type": "TextBlock",
      "text": "Poll Question",
      "id": "acPollQuestion"
    },
    {
      "type": "Input.ChoiceSet",
      "placeholder": "Select from these choices",
      "choices": [
        {
          "title": "Choice 1",
          "value": "Choice 1"
        },
        {
          "title": "Choice 2",
```

```

        "value": "Choice 2"
      },
      {
        "title": "Choice 3",
        "value": "Choice 3"
      }
    ],
    "id": "acPollChoices",
    "style": "expanded"
  }
],
"actions": [
  {
    "type": "Action.Submit",
    "title": "Submit",
    "id": "btnSubmit"
  }
]
}

```

11. Make the following replacements in the JSON.

### Important

Do not remove any quotation marks when you do the replacements. You can revise the car choices to suit your needs:

| Text to change                                                                                         | New text                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Header Tagline Text                                                                                    | Power Automate Poll                                                                                                                           |
| Poll Header                                                                                            | Preferred Car Model                                                                                                                           |
| Poll Question                                                                                          | Please vote on your preferred car model from the choices listed here.                                                                         |
| Replace the latin text with a reason, or business context, related to why you are conducting the poll. | We are polling our employees in order to determine if we should provide personalized parking places that are sized for the most popular cars. |
| Choice 1 (replace in both places)                                                                      | Tesla                                                                                                                                         |
| Choice 2 (replace in both places)                                                                      | Lexus                                                                                                                                         |
| Choice 3 (replace in both places)                                                                      | Honda                                                                                                                                         |

12. Select **New Step**, and then search for and select one of the **Send an email** actions to which you have access.

13. Provide the email recipient as the person who selected the instant button (use the **Email** tag from the dynamic content from the **trigger**).
14. Configure the **Body** of the email as follows. Replace the words in curly parentheses "{}" with dynamic tokens:  
**Your poll response was {acPollChoices}** (acPollChoices is dynamic content from the wait for a response action). **It was submitted by {User Name}** (User Name is dynamic content from the trigger)

## Test your adaptive card

To test your work, run the flow you created earlier and confirm the following:

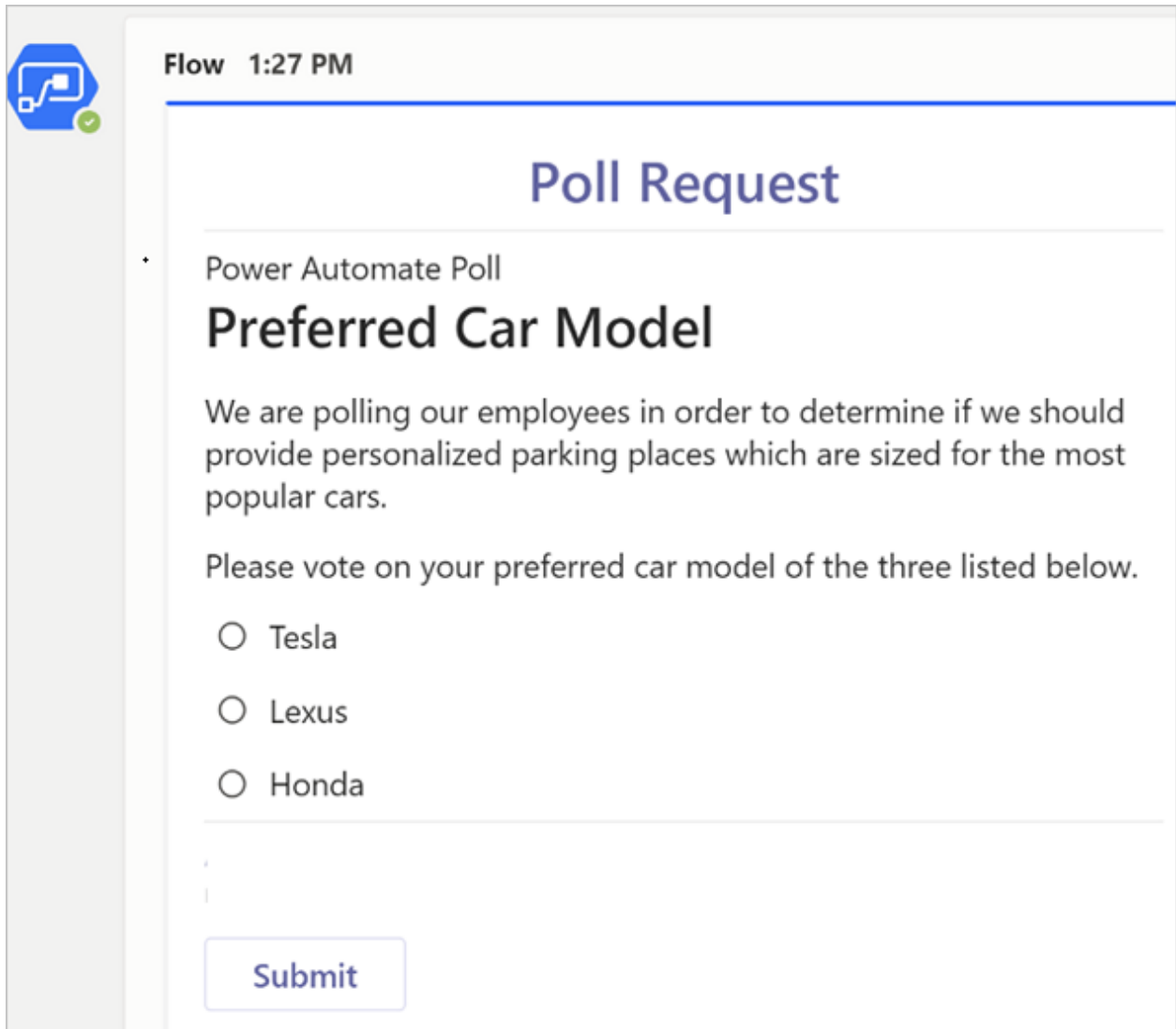
- The flow run has no errors, and waits for the response, showing the wait indicator for the Adaptive Card action on the run screen.
- The Teams channel has the new adaptive card posted.
- When you respond to the card by selecting a car model, and then selecting the **Submit** button on the bottom section of the adaptive card:
  - No errors should occur on the adaptive card.
  - The flow run completes successfully.
- Card replacement is relevant after submission if you have configured the **Update message** area at the bottom of the **wait for a response** actions (shown next with the corresponding replacement card). Otherwise, all submissions will simply reset the form.

|                                                                                                     |                                                                                                        |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <p>Update message</p> <p>Poll ended.</p> <p>Should update card Yes</p> <p>Show advanced options</p> | <p>Updated</p> <hr/> <p>Adaptive Cards   Power Automate</p> <p>Poll ended.</p> <p>Responded by You</p> |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|

- The email notification contains the body that shows who submitted the response and which car was selected.

Congratulations! you've just made your first interactive adaptive card!





Flow 1:27 PM

## Poll Request

Power Automate Poll

### Preferred Car Model

We are polling our employees in order to determine if we should provide personalized parking places which are sized for the most popular cars.

Please vote on your preferred car model of the three listed below.

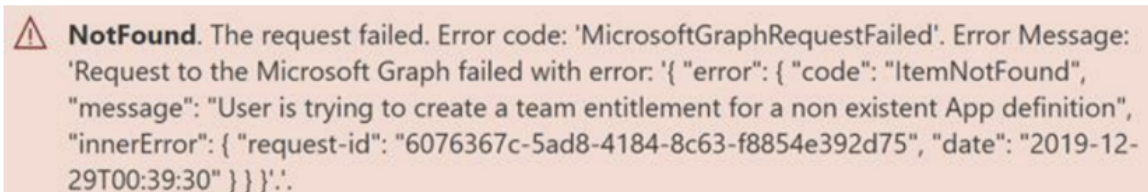
- Tesla
- Lexus
- Honda

## Troubleshooting tips for adaptive cards

The most common problems that you will encounter when creating adaptive cards are:

- Flow run errors are often caused by one of the following factors:
  - The Workflows app isn't installed in Microsoft Teams – [Install the Workflows app in Microsoft Teams](#).

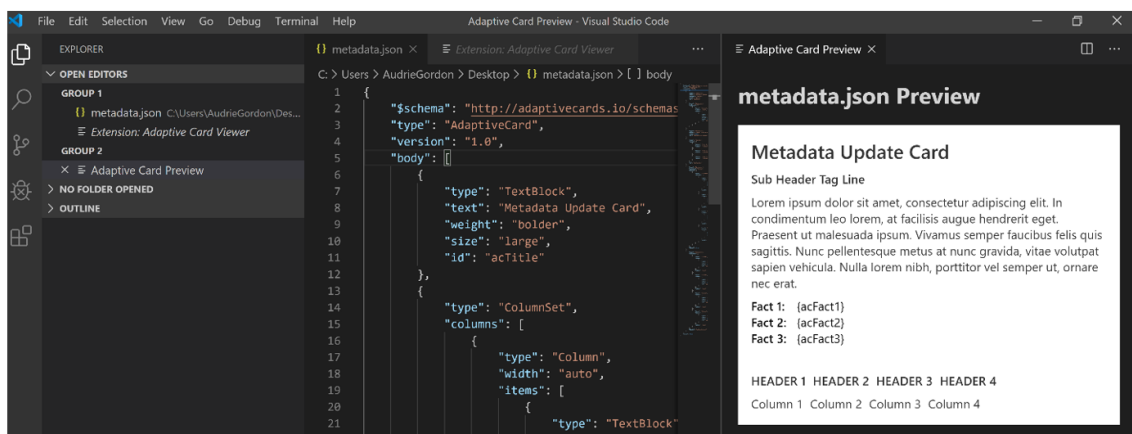
In this case the error may resemble this screenshot:



**⚠ Not Found.** The request failed. Error code: 'MicrosoftGraphRequestFailed'. Error Message: 'Request to the Microsoft Graph failed with error: '{ "error": { "code": "ItemNotFound", "message": "User is trying to create a team entitlement for a non existent App definition", "innerError": { "request-id": "6076367c-5ad8-4184-8c63-f8854e392d75", "date": "2019-12-29T00:39:30" } } }'.'

- Improperly formatted JSON – This is not usually as complex as one might expect. These are most often just situations where:

- There are curly quotes, or missing quotes, around values within the JSON. Always check the JSON to ensure all text values are enclosed within double quotes, and that numbers are enclosed in quotation marks. All quotation marks should be straight and not curly.
- You can validate the format of your JSON by pasting the JSON into the [Card Payload Editor](#).
- Missing Image URLs – All image values within Adaptive Cards must refer to a valid URL. Full image content is not be directly supported in an Adaptive Card. Test your image links by pasting the URL into the browser to see if an image is displayed.
- Adaptive Cards may not look like what's expected during to styling and schema constraints:
  - Check that placeholder values, text styles, and any markup language align with Adaptive Card schema requirements (review **Adaptive Card schema best practices** [here](#))
  - Leverage the **Visual Studio Code Adaptive Card validator**. To install it from the Visual Studio Code application, open the Extensions Marketplace, and search for **Adaptive Card Viewer**.



Truncated screenshot of the Adaptive Card Viewer extension installed in Visual Studio Code (shortcut: Ctrl+V+A once enabled).

- Errors following Adaptive Card submission are often due to:
  - Using an action, which does not include 'wait for response' in the name

**⚠ Unable to reach app. Please try again.**

- Attempting to submit the card more than once. Each Adaptive Card can be submitted only once, after which all further submissions will be ignored.

# Candidate feedback sample

Article • 12/16/2022

The **candidate feedback form** sample is an Adaptive Card input form that's designed for collecting feedback during an interview loop. We recommend using this with a shared instant flow button to enable anyone on the team to provide feedback on candidates during an interview loop. Extend this by recording responses in a database or other desired data sources to support these additional opportunities:

- Facilitate the review of follow-up suggestions before the next session with the candidate.
- Facilitate aggregated data review after all responses are recorded.
- Notify the human resources representative with the hire/no hire vote count at the end of the process

**CANDIDATE FEEDBACK FORM**

{acFullName}

{acComments}

**Decision**

Hire

No Hire

**Suggest follow-up discussion regarding:**

Past experience in the topic area

Inclusive behaviors and work ethics

Ability to work without supervision

**Submit**

*Inputs/Outputs and notes*

| Dynamic Token Name | Placeholder Text | Notes:                 |
|--------------------|------------------|------------------------|
| {acFullName}       | {acFullName}     | Display text           |
| {acComments}       | {acComments}     | Display text           |
| {acDecision}       |                  | Response <b>output</b> |
| {acFollowUp}       |                  | Response <b>output</b> |

JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
```

```
"type": "AdaptiveCard",
"version": "1.0",
"body": [
  {
    "type": "TextBlock",
    "size": "Medium",
    "weight": "Bolder",
    "id": "Title",
    "text": "CANDIDATE FEEDBACK FORM",
    "horizontalAlignment": "Left"
  },
  {
    "type": "Input.Text",
    "placeholder": "{acFullName}",
    "style": "text",
    "isMultiline": false,
    "maxLength": 75,
    "id": "acFullName"
  },
  {
    "type": "Input.Text",
    "placeholder": "{acComments}",
    "style": "text",
    "isMultiline": true,
    "maxLength": 200,
    "id": "acComments"
  },
  {
    "type": "TextBlock",
    "size": "Medium",
    "weight": "Bolder",
    "text": "Decision",
    "horizontalAlignment": "Left",
    "separator": true
  },
  {
    "type": "Input.ChoiceSet",
    "id": "acDecision",
    "value": "1",
    "choices": [
      {
        "title": "Hire",
        "value": "Hire"
      },
      {
        "title": "No Hire",
        "value": "No Hire"
      }
    ]
  },
  {
    "type": "TextBlock",
    "text": "Suggest follow-up discussion regarding:",
    "weight": "Bolder"
  }
]
```

```
},
{
  "type": "Input.ChoiceSet",
  "id": "acFollowUp",
  "isMultiSelect": true,
  "value": "",
  "choices": [
    {
      "title": "Past experience in the topic area",
      "value": "Experience"
    },
    {
      "title": "Inclusive behaviors and work ethics",
      "value": "Inclusivity"
    },
    {
      "title": "Ability to work without supervision",
      "value": "Independent"
    }
  ]
}
],
"actions": [
  {
    "type": "Action.Submit",
    "title": "Submit"
  }
]
}
```

# Image share sample

Article • 12/16/2022

The **Image Share Form** sample is an Adaptive Card designed for sharing photos that have been posted to SharePoint and which may be a dependency for a process to complete (such as processes related to inspection, compliance, and audits). This is a display only adaptive card.



## *Inputs/Outputs and notes*

| Dynamic Token Name (inputs) | Placeholder Text   | Notes                                                   |
|-----------------------------|--------------------|---------------------------------------------------------|
| acphotoTitle                | {acphotoTitle}     | Display text                                            |
| acTimestamp                 | {acTimestamp}      | Display date/time                                       |
| acImageThumbnail            | {acImageThumbnail} | Display image<br>This must be replaced with a valid URL |
| acAltText                   | {acAltText}        | Accessibility alternative text                          |

JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "TextBlock",
```



```
        "text": "{acphotoTitle}",
        "id": "Title",
        "size": "Large"
    },
    {
        "type": "TextBlock",
        "text": "{acTimestamp}",
        "size": "Medium",
        "weight": "Lighter"
    },
    {
        "type": "Image",
        "altText": "{acAltText}",
        "url": "{acImageThumbnail}"
    }
],
"spacing": "None"
}
```

# Lead collection sample

Article • 12/16/2022

The **lead collection** sample is an Adaptive Card input form designed for collecting leads from anyone that may come into contact with individuals interested in a set of products. Feel free to change the choices for the products, remembering that each choice can have display text, as well as an internal value which will be output after someone submits the card (they can also be the same as we show in the sample code block).

## Lead Notification

Please fill out a single form for each individual expressing interest in our products.

Potential Customer FIRST NAME

Potential Customer LAST NAME

Corporate email

Business Phone Number

- Office 365
- Dynamics 365
- Azure Services
- Power Platform

---

## Inputs/Outputs and notes:

| Dynamic Token Name    | Placeholder Text       | Notes                                                                                         |
|-----------------------|------------------------|-----------------------------------------------------------------------------------------------|
| Title                 |                        | Display text                                                                                  |
| acInstructions        |                        | Display text                                                                                  |
| acLeadFName           | {firstName}            | Response output                                                                               |
| acLeadLName           | {lastName}             | Response output                                                                               |
| acLeadEmail           | {emailAddress}         | Response output                                                                               |
| acLeadPrimaryPhone    | {primaryPhone10digits} | Response output                                                                               |
| acLeadProductInterest | {productInterests}     | Response output<br>As multi-select values, where each selection will be separated by a comma. |

## JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "ColumnSet",
      "columns": [
        {
          "type": "Column",
          "width": 2,
          "items": [
            {
              "type": "TextBlock",
              "text": "Lead Notification",
              "weight": "Bolder",
              "id": "Title",
              "size": "ExtraLarge"
            },
            {
              "type": "TextBlock",
              "text": "Please fill out a single form for each individual expressing interest in our products. ",
              "isSubtle": true,
              "wrap": true,
              "id": "acInstructions",
              "size": "Large"
            }
          ]
        }
      ]
    }
  ]
}
```

```

    ]
  },
  {
    "type": "Container",
    "items": [
      {
        "type": "TextBlock",
        "text": "Potential Customer FIRST NAME",
        "wrap": true,
        "size": "Medium"
      }
    ]
  },
  {
    "type": "Input.Text",
    "id": "acLeadFName",
    "placeholder": "{firstName}"
  },
  {
    "type": "TextBlock",
    "text": "Potential Customer LAST NAME",
    "wrap": true
  },
  {
    "type": "Input.Text",
    "id": "acLeadLName",
    "placeholder": "{lastName}"
  },
  {
    "type": "TextBlock",
    "text": "Corporate email",
    "wrap": true
  },
  {
    "type": "Input.Text",
    "id": "acLeadEmail",
    "placeholder": "{emailAddress}",
    "style": "Email"
  },
  {
    "type": "TextBlock",
    "text": "Business Phone Number"
  },
  {
    "type": "Input.Text",
    "id": "acLeadPrimaryPhone",
    "placeholder": "{primaryPhone10digits}",
    "style": "Tel"
  },
  {
    "type": "RichTextBlock",
    "inlines": [
      {
        "type": "TextRun",
        "text": "{productInterests}"
      }
    ]
  }

```

```
    }
  ]
},
{
  "type": "Input.ChoiceSet",
  "placeholder": "Placeholder text",
  "choices": [
    {
      "title": "Office 365",
      "value": "Office 365"
    },
    {
      "title": "Dynamics 365",
      "value": "Dynamics 365"
    },
    {
      "title": "Azure Services",
      "value": "Azure Services"
    },
    {
      "title": "Power Platform",
      "value": "Power Platform"
    }
  ],
  "style": "expanded",
  "id": "acLeadProductInterest",
  "isMultiSelect": true
}
],
"actions": [
  {
    "type": "Action.Submit",
    "title": "Submit"
  }
]
}
```

# Create a poll sample

Article • 01/27/2023

The **create a poll** sample is an Adaptive Card input form that's designed for submitting polls to Microsoft Teams. Replace the display text in this card to customize for the poll. This adaptive card enables you to take different decision paths based on the responses given in the poll values, or voting counts, of card consumers.

**Flow** 12:45 PM

---

## Poll Request

---

Header Tagline Text

### Poll Header

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer vestibulum lorem eget neque sollicitudin, quis malesuada felis ultrices.

Poll Question

Choice 1

Choice 2

Choice 3

---

**Submit**

*Inputs/Outputs and notes*

| Dynamic Token Name | Placeholder Text | Notes:       |
|--------------------|------------------|--------------|
| Title              |                  | Display text |
| acHeaderTagLine    |                  | Display text |
| acHeader           |                  | Display text |

| Dynamic Token Name | Placeholder Text | Notes:                                                   |
|--------------------|------------------|----------------------------------------------------------|
| acPollQuestion     |                  | Display text                                             |
| acPollChoices      |                  | Response <b>output</b><br>Single select as radio buttons |

JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "TextBlock",
      "text": "Poll Request",
      "id": "Title",
      "spacing": "Medium",
      "horizontalAlignment": "Center",
      "size": "ExtraLarge",
      "weight": "Bolder",
      "color": "Accent"
    },
    {
      "type": "TextBlock",
      "text": "Header Tagline Text",
      "id": "acHeaderTagLine",
      "separator": true
    },
    {
      "type": "TextBlock",
      "text": "Poll Header",
      "weight": "Bolder",
      "size": "ExtraLarge",
      "spacing": "None",
      "id": "acHeader"
    },
    {
      "type": "TextBlock",
      "text": "Lorem ipsum dolor sit amet, consectetur adipiscing elit . Integer vestibulum lorem eget neque sollicitudin, quis malesuada felis ultrices. ",
      "id": "acInstructions",
      "wrap": true
    },
    {
      "type": "TextBlock",
      "text": "Poll Question",
      "id": "acPollQuestion"
    },
    {
      "type": "Input.ChoiceSet",
```

```
"placeholder": "Select from these choices",
"choices": [
  {
    "title": "Choice 1",
    "value": "Choice 1"
  },
  {
    "title": "Choice 2",
    "value": "Choice 2"
  },
  {
    "title": "Choice 3",
    "value": "Choice 3"
  }
],
"id": "acPollChoices",
"style": "expanded"
}
],
"actions": [
  {
    "type": "Action.Submit",
    "title": "Submit",
    "id": "btnSubmit"
  }
]
}
```



# Metadata update card sample

Article • 01/27/2023

The **Metadata Update** sample is an adaptive card designed to enable flow makers to notify or update Teams members or channels with metadata related to a record, file, or topic. This card is a display only adaptive card. However, input fields may be added if one of the *wait for response* actions are used to create it.

This card is comprised of three sections:

1. The topic header area with header, sub-header, and description.
2. The fact list area for relevant row metadata.
3. A column set which supports a table array of data

Flow 5:15 PM

**Metadata Update Card**

Sub Header Tag Line

Lorem ipsum dolor sit amet, consectetur adipiscing elit. In condimentum leo lorem, at facilis augue hendrerit eget. Praesent ut malesuada ipsum. Vivamus semper faucibus felis quis sagittis. Nunc pellentesque metus at nunc gravida, vitae volutpat sapien vehicula. Nulla lorem nibh, porttitor vel semper ut, ornare nec erat.

Fact 1: {acFact1}  
Fact 2: {acFact2}  
Fact 3: {acFact3}

| HEADER 1 | HEADER 2 | HEADER 3 |
|----------|----------|----------|
| Column 1 | Column 2 | Column 3 |

**Potential Change Order Report**

Contractor A

Lorem ipsum dolor sit amet, consectetur adipiscing elit. In condimentum leo lorem, at facilis augue hendrerit eget. Praesent ut malesuada ipsum. Vivamus semper faucibus felis quis sagittis. Nunc pellentesque metus at nunc gravida, vitae volutpat sapien vehicula. Nulla lorem nibh, porttitor vel semper ut, ornare nec erat.

Bid value: \$168,000.00  
Current value: \$233,000.00  
Pending PCO Total: \$28,296.00  
Start Date: 2/1/2018

| Last Change | Description                 | Cost Estimate |
|-------------|-----------------------------|---------------|
| 12-31-2019  | Excavation Cost Change      | \$10,560.00   |
| 12-31-2019  | As-built changes            | \$5,780.00    |
| 12-30-2019  | Hard Hat Order              | \$356.00      |
| 04-18-2019  | Frac-Out Protection Screens | \$3,400.00    |
| 04-18-2019  | Additional Truck            | \$0.00        |
| 03-16-2019  | Well Insurance for ROW      | \$7,560.00    |
| 03-16-2019  | Removal of rusted bolts     | \$640.00      |
| 02-12-2019  | Excavation Schedule Change  | \$0.00        |

Sample code

SharePoint list of change orders

## Inputs/Outputs and notes

| Dynamic Token Name (inputs) | Placeholder Text | Notes        |
|-----------------------------|------------------|--------------|
| acHeader                    | {Header}         | Display text |
| acSubHeader                 | {SubHeader}      | Display text |
| acDescription               | Latin Text       | Display text |
| acFact1                     | {acFact1}        | Display text |
| acFact2                     | {acFact2}        | Display text |

| Dynamic Token Name (inputs) | Placeholder Text    | Notes                                         |
|-----------------------------|---------------------|-----------------------------------------------|
| acFact3                     | {acFact3}           | Display text                                  |
| acColumnSetHeader           | Headers 1 through 3 | Display text<br>Column set header display tex |
| acColumnSet                 | Columns 1 through 3 | Replace with array or column values.          |

## JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "TextBlock",
      "text": "Metadata Update Card",
      "weight": "bolder",
      "size": "large",
      "id": "acTitle"
    },
    {
      "type": "ColumnSet",
      "columns": [
        {
          "type": "Column",
          "width": "auto",
          "items": [
            {
              "type": "TextBlock",
              "text": "Sub Header Tag Line",
              "weight": "Bolder",
              "wrap": true,
              "id": "acSubHeader"
            }
          ]
        }
      ]
    },
    {
      "type": "TextBlock",
      "text": "Lorem ipsum dolor sit amet, consectetur adipiscing elit. In condimentum leo lorem, at facilisis augue hendrerit eget. Praesent ut malesuada ipsum. Vivamus semper faucibus felis quis sagittis. Nunc pellentesque metus at nunc gravida, vitae volutpat sapien vehicula. Nulla lorem nibh, porttitor vel semper ut, ornare nec erat.",
      "wrap": true,
      "id": "acDescriptionArea"
    },
    {
      "type": "FactSet",
```

```

"facts": [
  {
    "title": "Fact 1:",
    "value": "{acFact1}"
  },
  {
    "title": "Fact 2:",
    "value": "{acFact2}"
  },
  {
    "title": "Fact 3:",
    "value": "{acFact3}"
  }
],
"id": "acFactSet"
},
{
  "type": "Container",
  "spacing": "Large",
  "items": [
    {
      "type": "ColumnSet",
      "columns": [
        {
          "type": "Column",
          "items": [
            {
              "type": "TextBlock",
              "weight": "Bolder",
              "text": "HEADER 1"
            }
          ],
          "width": "stretch"
        },
        {
          "type": "Column",
          "items": [
            {
              "type": "TextBlock",
              "weight": "Bolder",
              "text": "HEADER 2"
            }
          ],
          "width": "stretch"
        },
        {
          "type": "Column",
          "items": [
            {
              "type": "TextBlock",
              "weight": "Bolder",
              "text": "HEADER 3"
            }
          ],
          "width": "stretch"
        }
      ]
    }
  ]
}

```

```

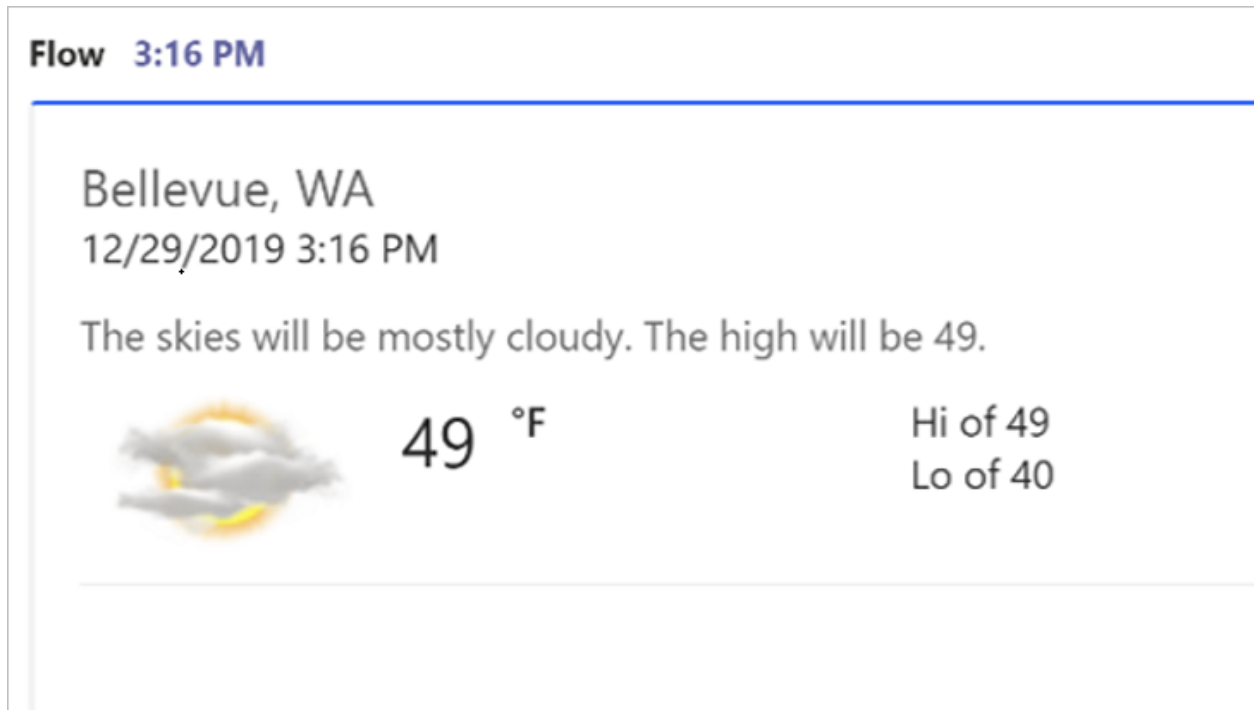
        }
    ]
}
],
"bleed": true
},
{
    "type": "ColumnSet",
    "columns": [
        {
            "type": "Column",
            "items": [
                {
                    "type": "TextBlock",
                    "text": "Column 1",
                    "wrap": true,
                    "id": "acCol1"
                }
            ],
            "width": "stretch"
        },
        {
            "type": "Column",
            "items": [
                {
                    "type": "TextBlock",
                    "text": "Column 2",
                    "wrap": true,
                    "id": "acCol2"
                }
            ],
            "width": "stretch"
        },
        {
            "type": "Column",
            "items": [
                {
                    "type": "TextBlock",
                    "text": "Column 3",
                    "wrap": true,
                    "id": "acCol4"
                }
            ],
            "width": "stretch"
        }
    ],
    "$data": "acDataContext"
}
],
"bleed": true
}

```

# Daily weather report sample

Article • 01/27/2023

The **daily weather report** sample is an Adaptive Card designed to be used with MSN weather to post a daily weather update to a Teams channel.



## Inputs/Outputs and notes

| Dynamic Token Name     | Placeholder Text | Notes                                                                              |
|------------------------|------------------|------------------------------------------------------------------------------------|
| {acCityState}          | See template     | Display text<br>A variable can be used to hold the City, State, or Zip Code values |
| {acDailySummary}       | See template     | Display text                                                                       |
| {acCurrentDateTime}    | See template     | Display text                                                                       |
| {acUrlConditionsImage} | See template     | Display text<br>See template comments This must be replaced with a valid URL       |
| {acCurrentTemperature} | See template     | Display text                                                                       |
| {actempHi}             | See template     | Display text                                                                       |
| {actempLow}            | See template     | Display text                                                                       |

JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "TextBlock",
      "text": "{acCity}, {acState}",
      "size": "Large",
      "isSubtle": true
    },
    {
      "type": "TextBlock",
      "text": "{acCurrentDateTime}",
      "spacing": "None"
    },
    {
      "type": "TextBlock",
      "text": "{acDailySummary}",
      "spacing": "None"
    },
    {
      "type": "ColumnSet",
      "columns": [
        {
          "type": "Column",
          "width": "auto",
          "items": [
            {
              "type": "Image",
              "url": "{acUrlConditionsImage}",
              "size": "Large"
            }
          ]
        },
        {
          "type": "Column",
          "width": "auto",
          "items": [
            {
              "type": "TextBlock",
              "text": "{acCurrentTemperature}",
              "size": "ExtraLarge",
              "spacing": "None"
            }
          ]
        }
      ]
    },
    {
      "type": "Column",
      "width": "stretch",
      "items": [
        {
          "type": "TextBlock",
          "text": "°F",

```

```
        "weight": "Bolder",
        "spacing": "Small"
    }
]
},
{
    "type": "Column",
    "width": "stretch",
    "items": [
        {
            "type": "TextBlock",
            "text": "Hi {actempHi}",
            "horizontalAlignment": "Left"
        },
        {
            "type": "TextBlock",
            "text": "Lo {actempLow}",
            "horizontalAlignment": "Left",
            "spacing": "None"
        }
    ]
}
]
}
]
}
}
```

# Acronyms form sample

Article • 12/16/2022

The **acronym form** sample is an Adaptive Card input form that's designed to collect acronyms and storing them in Dataverse. These acronyms could be queried from anywhere due to this ongoing data collection.

**Flow** 3:50 PM

---

## Acronym Logger

Acronym

Enter the abbreviation for the acronym

Definition

Enter a definition of the acronym above

**Submit**

*Inputs/Outputs and notes*

| Dynamic Token Name | Placeholder Text                        | Notes:                 |
|--------------------|-----------------------------------------|------------------------|
| {acAcronym}        | Enter the abbreviation for the acronym  | Response <b>output</b> |
| {acDefinition}     | Enter a definition of the acronym above | Response <b>output</b> |



## JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "TextBlock",
      "text": "Acronym Logger",
      "id": "Title",
      "spacing": "Medium",
      "horizontalAlignment": "Center",
      "size": "ExtraLarge",
      "weight": "Bolder",
      "color": "Accent"
    },
    {
      "type": "Container",
      "items": [
        {
          "type": "TextBlock",
          "text": "Acronym",
          "wrap": true,
          "spacing": "Medium"
        },
        {
          "type": "Input.Text",
          "id": "acAcronym",
          "placeholder": "Enter the abbreviation for the acronym"
        },
        {
          "type": "TextBlock",
          "text": "Definition",
          "wrap": true
        },
        {
          "type": "Input.Text",
          "placeholder": "Enter a definition of the acronym above"
        },
        {
          "id": "acDefinition",
          "isMultiline": true
        }
      ]
    }
  ],
  "actions": [
    {
      "type": "Action.Submit",
      "title": "Submit", ♂ "id": "btnSubmit"
    }
  ]
}
```



# Lead collection sample

Article • 12/16/2022

The **lead collection** sample is an Adaptive Card input form designed for collecting leads from anyone that may come into contact with individuals interested in a set of products. Feel free to change the choices for the products, remembering that each choice can have display text, as well as an internal value which will be output after someone submits the card (they can also be the same as we show in the sample code block).

## Lead Notification

Please fill out a single form for each individual expressing interest in our products.

Potential Customer FIRST NAME

{firstName}

Potential Customer LAST NAME

{lastName}

Corporate email

{emailAddress}

Business Phone Number

{primaryPhone10digits}

- Office 365
- Dynamics 365
- Azure Services
- Power Platform

---

[Submit](#)

## Inputs/Outputs and notes:

| Dynamic Token Name    | Placeholder Text       | Notes                                                                                                |
|-----------------------|------------------------|------------------------------------------------------------------------------------------------------|
| Title                 |                        | Display text                                                                                         |
| acInstructions        |                        | Display text                                                                                         |
| acLeadFName           | {firstName}            | Response <b>output</b>                                                                               |
| acLeadLName           | {lastName}             | Response <b>output</b>                                                                               |
| acLeadEmail           | {emailAddress}         | Response <b>output</b>                                                                               |
| acLeadPrimaryPhone    | {primaryPhone10digits} | Response <b>output</b>                                                                               |
| acLeadProductInterest | {productInterests}     | Response <b>output</b><br>As multi-select values, where each selection will be separated by a comma. |

## JSON

```
{
  "$schema": "http://adaptivecards.io/schemas/adaptive-card.json",
  "type": "AdaptiveCard",
  "version": "1.0",
  "body": [
    {
      "type": "ColumnSet",
      "columns": [
        {
          "type": "Column",
          "width": 2,
          "items": [
            {
              "type": "TextBlock",
              "text": "Lead Notification",
              "weight": "Bolder",
              "id": "Title",
              "size": "ExtraLarge"
            },
            {
              "type": "TextBlock",
              "text": "Please fill out a single form for each individual expressing interest in our products. ",
              "isSubtle": true,
              "wrap": true,
              "id": "acInstructions",
              "size": "Large"
            }
          ]
        }
      ]
    }
  ]
}
```

```

    ]
  },
  {
    "type": "Container",
    "items": [
      {
        "type": "TextBlock",
        "text": "Potential Customer FIRST NAME",
        "wrap": true,
        "size": "Medium"
      }
    ]
  },
  {
    "type": "Input.Text",
    "id": "acLeadFName",
    "placeholder": "{firstName}"
  },
  {
    "type": "TextBlock",
    "text": "Potential Customer LAST NAME",
    "wrap": true
  },
  {
    "type": "Input.Text",
    "id": "acLeadLName",
    "placeholder": "{lastName}"
  },
  {
    "type": "TextBlock",
    "text": "Corporate email",
    "wrap": true
  },
  {
    "type": "Input.Text",
    "id": "acLeadEmail",
    "placeholder": "{emailAddress}",
    "style": "Email"
  },
  {
    "type": "TextBlock",
    "text": "Business Phone Number"
  },
  {
    "type": "Input.Text",
    "id": "acLeadPrimaryPhone",
    "placeholder": "{primaryPhone10digits}",
    "style": "Tel"
  },
  {
    "type": "RichTextBlock",
    "inlines": [
      {
        "type": "TextRun",
        "text": "{productInterests}"
      }
    ]
  }

```

```
    }
  ]
},
{
  "type": "Input.ChoiceSet",
  "placeholder": "Placeholder text",
  "choices": [
    {
      "title": "Office 365",
      "value": "Office 365"
    },
    {
      "title": "Dynamics 365",
      "value": "Dynamics 365"
    },
    {
      "title": "Azure Services",
      "value": "Azure Services"
    },
    {
      "title": "Power Platform",
      "value": "Power Platform"
    }
  ],
  "style": "expanded",
  "id": "acLeadProductInterest",
  "isMultiSelect": true
}
],
"actions": [
  {
    "type": "Action.Submit",
    "title": "Submit"
  }
]
}
```

# Approvals in Microsoft Teams

Article • 11/04/2023

Approvals in Microsoft Teams is a native Teams application that lets you easily create, manage, and share approvals from your hub for teamwork.

You can quickly start an approval flow from the same place you send a chat, a channel conversation, or from the approvals app itself. Just select an approval type, add details, attach files, and choose approvers. Once submitted, approvers are notified and can review and act on the request.

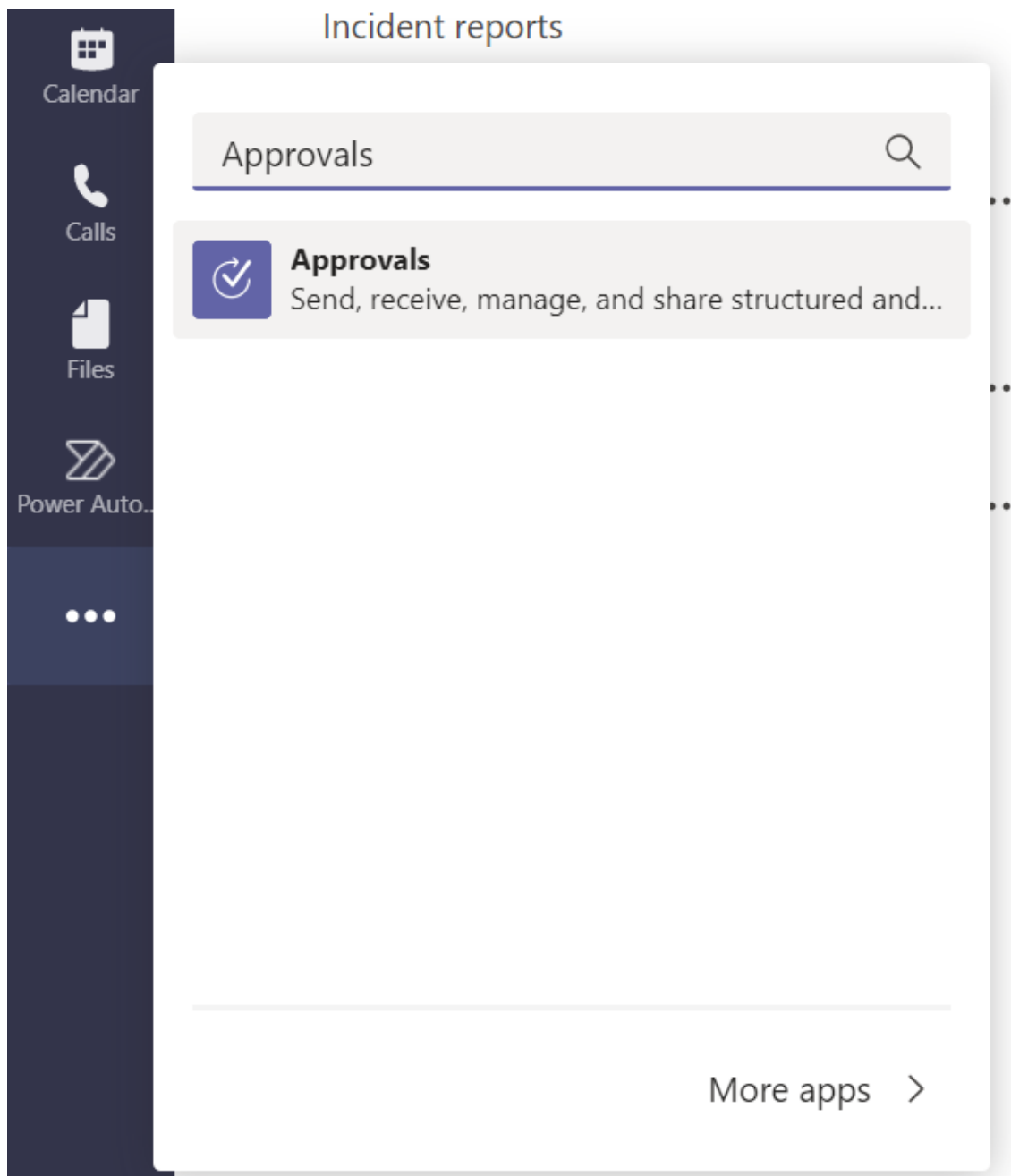
These approvals are triggered directly with the Power Automate infrastructure and don't require a flow with an approvals action. Though, if you wish to modify your approvals, by creating custom pre-approval or post-approvals actions, you can create a flow for your approval.

Learn more about how to use approvals in Teams in the following video.

<https://www.microsoft.com/en-us/videoplayer/embed/RWL2mp?postJsllMsg=true> ↗

## Use the approvals app in Teams

1. Sign into [Microsoft Teams](#) ↗
2. Select **More added apps (...)**, search for **Approvals**, and then select the **approvals** app



### Tip

If you do not see the approvals app in the more apps menu, it is likely that your Teams Administrator has disabled the app in your tenant. Contact your Teams administrator to enable the approvals app from the Teams admin center.

## Known issues

Currently, all the approvals are created in your organization's default environment.



# Create an approval from a chat or channel

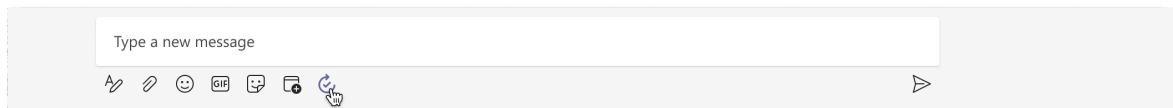
Article • 11/04/2023

With the new approvals experience in Teams, you can create an approval from any chat or channel from the compose box.

## Start an approval in a chat or channel

Follow these steps to create an approval in a chat or channel in Teams.

1. Sign into [Microsoft Teams](#).
2. Navigate to the chat or channel in which you want to send the approval.
3. Select the approvals icon under the compose box.



4. When you select the icon, a modal dialog appears for you to enter the details of the approval.


The screenshot shows the 'Approvals' interface in Microsoft Teams. At the top left is a blue icon with a white checkmark and the word 'Approvals' in bold, followed by the subtitle 'Create a new approval request'. A close button (X) is in the top right corner. Below this is the section 'New request' with a blue underline. The 'Name of request' field contains the placeholder text 'Use a name that's easy to understand'. The 'Approvers' section has a text input field with the placeholder 'Enter names here' and a toggle switch for 'Require a response from all approvers'. The 'Additional details' section has a text area with the placeholder 'If needed, add some extra info that'll help the approvers learn more about the request'. The 'Attachments' section has a button labeled 'Add attachment' with a dropdown arrow. A 'Send' button is located at the bottom right of the form.

5. Enter the details of the approval you want to send, along with who you need the approval from.

 **Tip**

By default, the approvers' input is restricted to the roster of the team or chat in which you are sending the approval.

1. **Optional:** You can also include a file with your approval. To do so, select *Add attachment* in the Approval form. Any files you upload are automatically stored in your OneDrive/SharePoint folder, just like other files shared on Teams.

**Approvals**✕  
Create a new approval request

**New request**

Use a name that's easy to understand

**Approvers**

Enter names here


Require a response from all approvers

**Additional details**

If needed, add some extra info that'll help the approvers learn more about the request

**Attachments**


Add attachment ▾

 Upload from my computer

**Send**

2. Select **Send**.

A card is created and sent in the chat or channel.

**Allan Deyoung via Approvals** 3:01 PM Updated

Requested


**Budget approval**

Please approve the budget for the new promotion

Requested by Allan Deyoung  
Pending response Alex Wilber

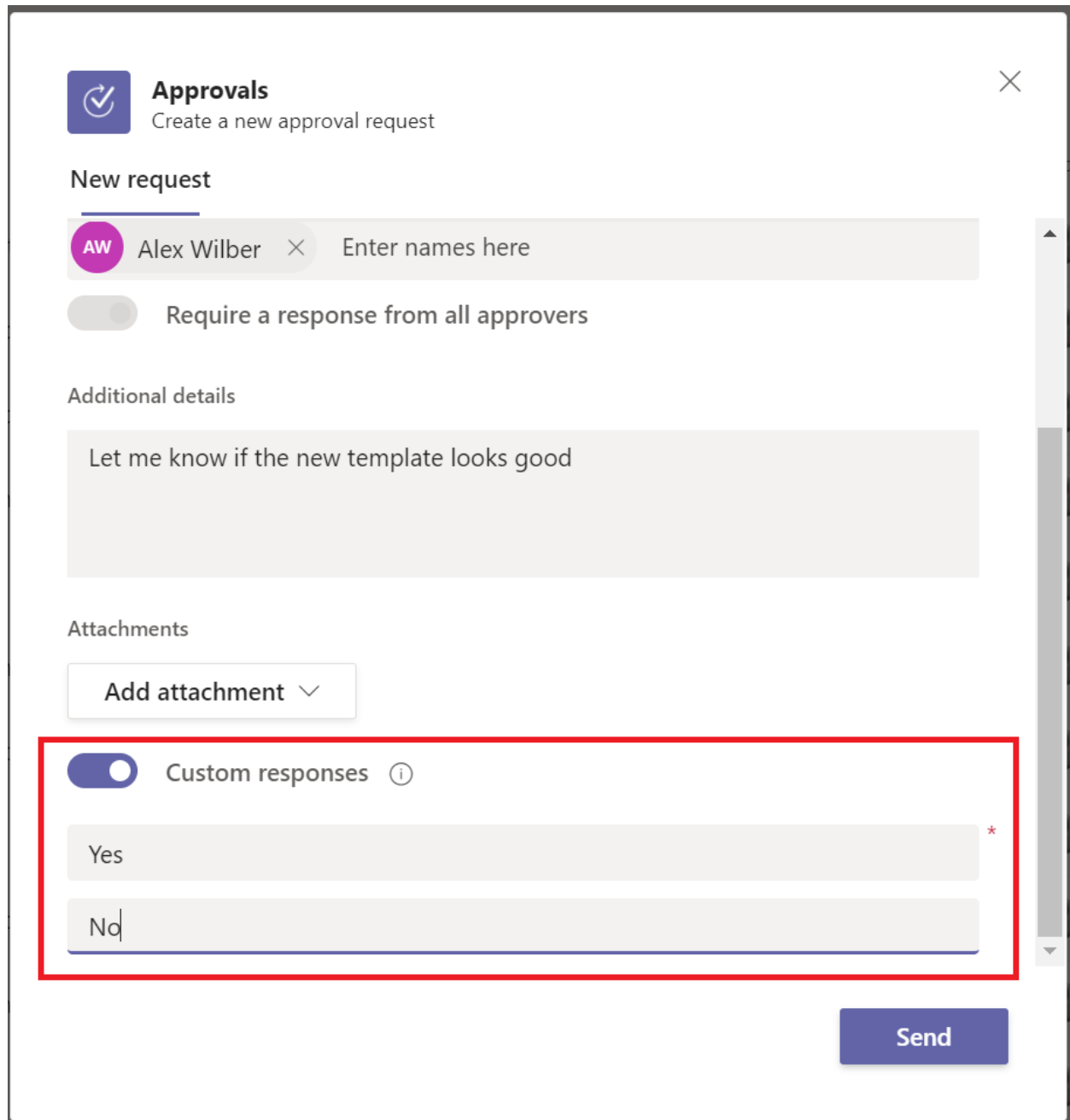
[View details](#)

Type a new message



# Custom responses for approvals

If you want to customize the actions for an approval, use the **Custom responses** option to change the action to anything you want. To do so, follow the same steps mentioned earlier and then toggle the custom responses option in the approvals form.



The screenshot shows the 'Approvals' form interface. At the top, there is a header with a checkmark icon, the title 'Approvals', and the subtitle 'Create a new approval request'. Below this is a 'New request' section with a user selection bar containing 'Alex Wilber' and a placeholder 'Enter names here'. A toggle switch for 'Require a response from all approvers' is currently off. The 'Additional details' section contains a text area with the text 'Let me know if the new template looks good'. Under 'Attachments', there is a button labeled 'Add attachment'. The 'Custom responses' section is highlighted with a red border and contains a toggle switch that is turned on, followed by an information icon. Below the toggle are two text input fields: the first contains 'Yes' and the second contains 'No'. A red asterisk is visible to the right of the 'Yes' field. At the bottom right of the form is a blue 'Send' button.

## Tip

If you want to add more than two custom responses, you will need to use a cloud flow to send the approval. [Learn more about custom responses in approvals.](#)

## Known issue

Currently, all the approvals created using this native Teams experience are created in your organization's default environment.

# Create an approval from the approvals app

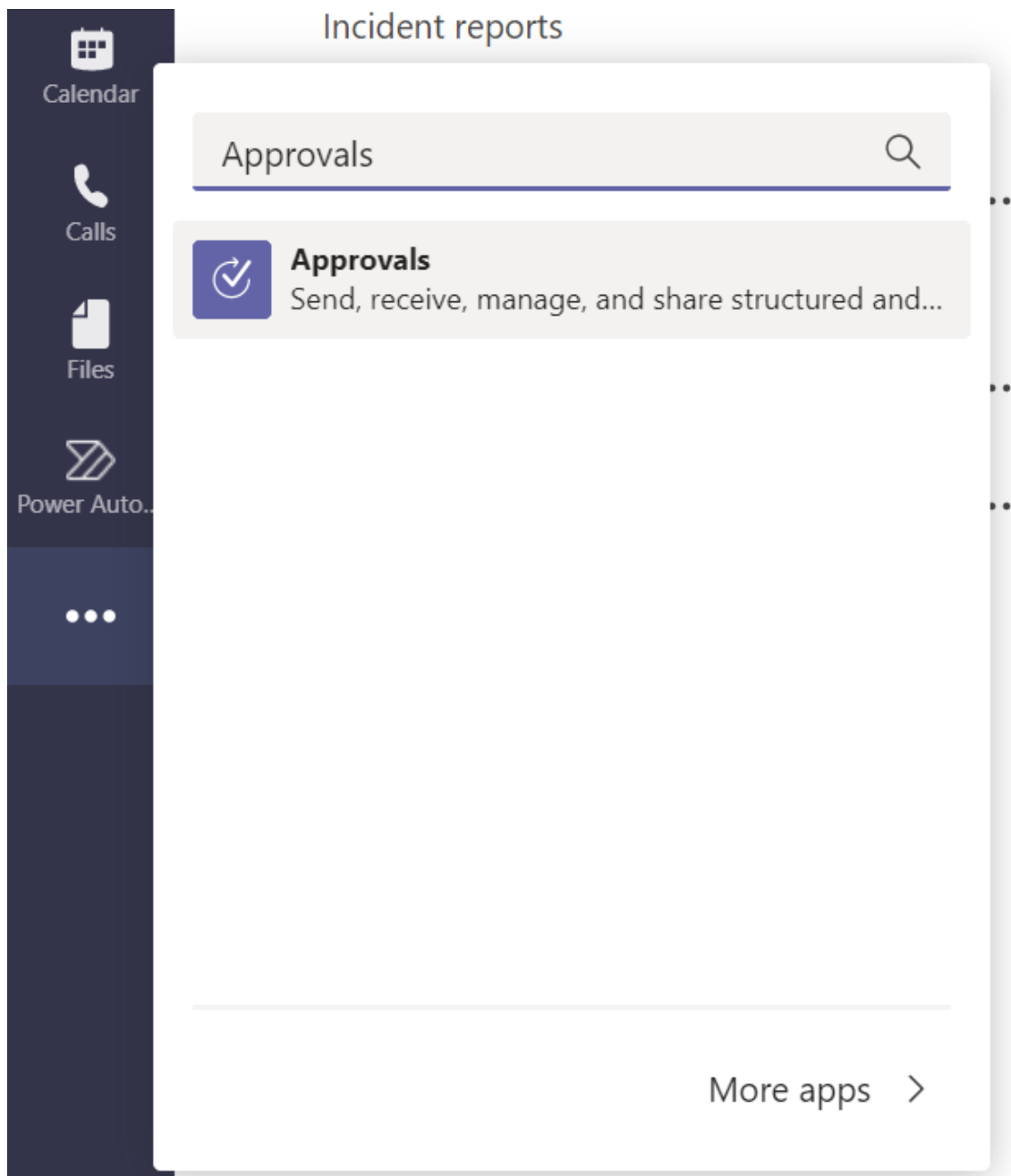
Article • 11/04/2023

You can trigger an approval at any time from the approvals app in Teams.

## Start an approval from the approvals app

Follow these steps to create an approval from the approvals app in Teams.

1. Sign into [Microsoft Teams](#).
2. Select **More added apps (...)**, search for **approvals**, and then select the **approvals** app.



3. Select **New Approval request** on the top right of the app.

Microsoft Teams

Search

Approvals + New approval request

Filter

| Received | Sent | Sent                          |           |                         |               |               |
|----------|------|-------------------------------|-----------|-------------------------|---------------|---------------|
| 7        | 30+  | Request title                 | Status    | Created                 | Requested by  | Sent to       |
|          |      | Budget approval               | Requested | 11/30/2020, 3:02:01 PM  | Allan Deyoung | Alex Wilber   |
|          |      | New GTM Project               | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Allan Deyoung |
|          |      | New Social media post request | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Alex Wilber   |
|          |      | A request for DocuSign        | Approved  | 11/30/2020, 11:38:42 AM | Allan Deyoung | Alex Wilber   |
|          |      | New Social media post request | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Alex Wilber   |
|          |      | New GTM Project               | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Allan Deyoung |
|          |      | New request for budget        | Requested | 11/30/2020, 7:29:07 AM  | Allan Deyoung | Alex Wilber   |
|          |      | New GTM Project               | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Allan Deyoung |
|          |      | New Social media post request | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Alex Wilber   |
|          |      | Hey approve this thing        | Requested | 11/20/2020, 11:07:29 AM | Allan Deyoung | Alex Wilber   |
|          |      | Please approve: 'Luna'        | Approved  | 11/17/2020, 4:36:16 PM  | Allan Deyoung | Alex Wilber   |
|          |      | New GTM Project               | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Allan Deyoung |
|          |      | New Social media post request | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Alex Wilber   |

4. Enter the details of the approval.

**Approvals**

Create a new approval request

×

**New request**

---

**Name of request**

Use a name that's easy to understand

---

**Approvers**

Enter names here

Require a response from all approvers

**Additional details**

If needed, add some extra info that'll help the approvers learn more about the request

**Attachments**

Add attachment ▼

Send



### 💡 Tip

If you are sending an approval to multiple users and you need everyone to respond, ensure that select the **Require a response from all approvers** option. If you only need one of the approvers to approve turn the option off.

The screenshot shows the 'Approvals' app interface. At the top, there is a header with a checkmark icon, the title 'Approvals', and the subtitle 'Create a new approval request'. Below this is a 'New request' section with a horizontal line. The 'Name of request' field contains the text 'New budget request'. Underneath, the 'Approvers' section shows two users: 'Alex Wilber' (with initials 'AW') and 'Megan Bowen' (with initials 'MB'), each with a close button. To the right of the names is a text input field with the placeholder 'Enter names here'. A red rectangular box highlights the 'Require a response from all approvers' toggle, which is currently turned on. Below the approvers is an 'Additional details' section with a text area containing the placeholder text 'If needed, add some extra info that'll help the approvers learn more about the request'. At the bottom, there is an 'Attachments' section with a button labeled 'Add attachment' and a dropdown arrow. A large blue 'Send' button is located at the bottom right of the form.

5. Select **Send**.

The approval shows up in the **Sent** tab in the app.

The screenshot displays the Microsoft Teams 'Approvals' interface. On the left, a sidebar contains navigation icons for Activity, Chat, Teams, Calendar, Calls, Files, Power Auto..., Approvals, and Apps. The main area is titled 'Approvals' and includes a search bar and a '+ New approval request' button. Below the title, there are two tabs: 'Received' (with a count of 7) and 'Sent' (with a count of 30+). The 'Sent' tab is active, showing a list of approval requests with columns for Request title, Status, Created, Requested by, and Sent to. The requests are listed in a table format.

| Request title                 | Status    | Created                 | Requested by  | Sent to       |
|-------------------------------|-----------|-------------------------|---------------|---------------|
| Budget approval               | Requested | 11/30/2020, 3:02:01 PM  | Allan Deyoung | Alex Wilber   |
| New GTM Project               | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Allan Deyoung |
| New Social media post request | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Alex Wilber   |
| A request for DocuSign        | Approved  | 11/30/2020, 11:38:42 AM | Allan Deyoung | Alex Wilber   |
| New Social media post request | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Alex Wilber   |
| New GTM Project               | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Allan Deyoung |
| New request for budget        | Requested | 11/30/2020, 7:29:07 AM  | Allan Deyoung | Alex Wilber   |
| New GTM Project               | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Allan Deyoung |
| New Social media post request | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Alex Wilber   |
| Hey approve this thing        | Requested | 11/20/2020, 11:07:29 AM | Allan Deyoung | Alex Wilber   |
| Please approve: 'Luna'        | Approved  | 11/17/2020, 4:36:16 PM  | Allan Deyoung | Alex Wilber   |
| New GTM Project               | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Allan Deyoung |
| New Social media post request | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Alex Wilber   |

## Known issues

Currently, all the approvals created using this native Teams experience are created in your organization's default environment.

# Respond to an approval from a chat or channel

Article • 11/04/2023

If a user sends you an approval in a chat or channel message or from the approvals app, you can respond to it directly from within the Teams chat or channel or from the approvals app.

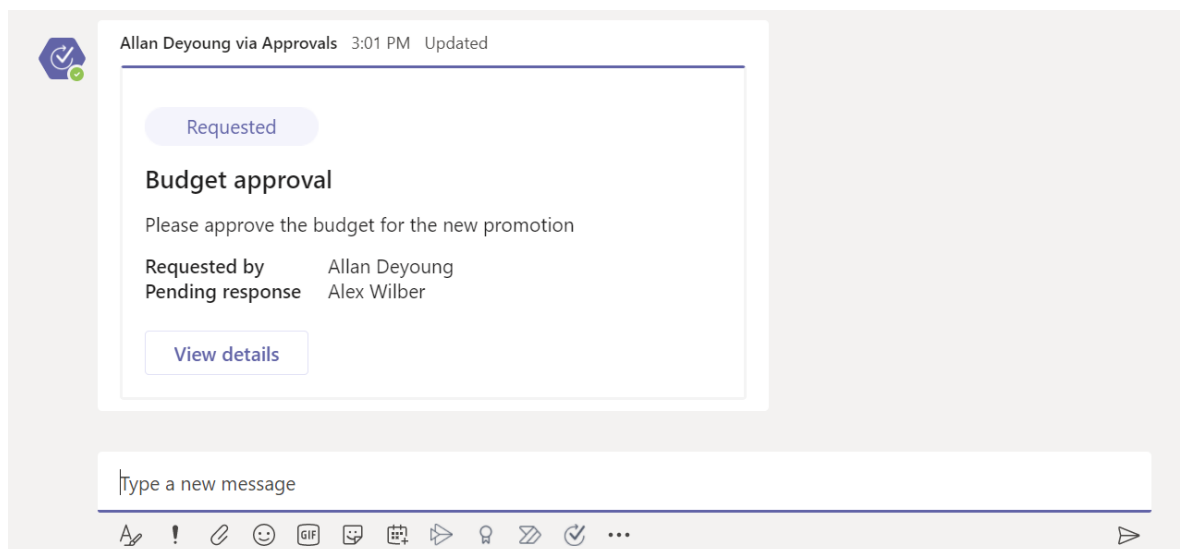
The approvals app also shows you any approvals that were sent using a flow in the same environment. So, you can use the approvals app in Teams to manage all your approvals.

## Approve or reject a request in Teams

Follow these steps to respond to an approval in a chat or channel in Microsoft Teams.

1. Sign into [Microsoft Teams](#).
2. Go to the chat or channel in which you were sent the approval.

You should see a card with the approval.



Alternately, you can open the approvals app in Teams and go to the **Received** tab.

Microsoft Teams

Approvals

Received 27

Sent 0

| Request title                   | Status    | Created                 | Requested by  | Sent to     |
|---------------------------------|-----------|-------------------------|---------------|-------------|
| Budget approval                 | Approved  | 11/30/2020, 3:02:01 PM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Alex Wilber |
| A request for DocuSign          | Approved  | 11/30/2020, 11:38:42 AM | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Alex Wilber |
| New request for budget          | Requested | 11/30/2020, 7:29:07 AM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Alex Wilber |
| Hey approve this thing          | Requested | 11/20/2020, 11:07:29 AM | Allan Deyoung | Alex Wilber |
| Please approve: 'Luna'          | Approved  | 11/17/2020, 4:36:16 PM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Alex Wilber |
| How would you rate it?          | Amazing   | 11/17/2020, 4:14:33 PM  | Allan Deyoung | Alex Wilber |
| Approvals v2                    | Awesome!  | 11/17/2020, 4:12:54 PM  | Allan Deyoung | Alex Wilber |
| Demo with a file to boot        | Approved  | 11/17/2020, 4:11:04 PM  | Allan Deyoung | Alex Wilber |
| Demo approval for the afternoon | Approved  | 11/17/2020, 4:09:01 PM  | Allan Deyoung | Alex Wilber |

3. Select **View details** on the card or select the approval to open the approval form.

Approvals

Approval request details

Requested

**Budget approval**

Please approve the budget for the new promotion

▼ Status: Requested

Pending response  
Alex Wilber

Requested by  
Allan Deyoung

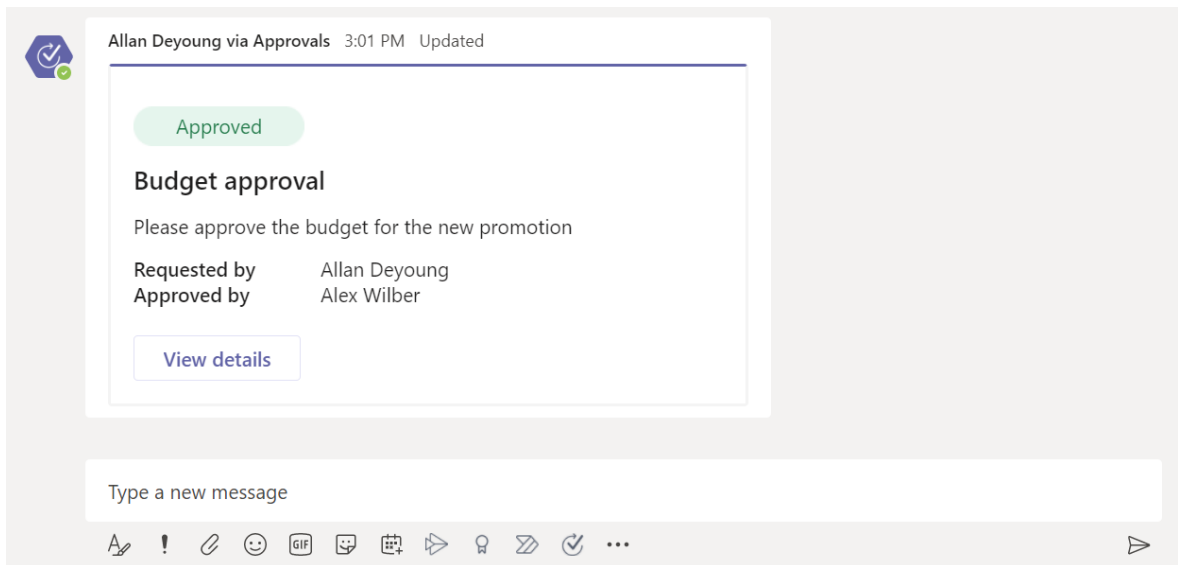
20m ago

Optional comments

Looks good

Reject Approve

4. From here, you can approve or reject the approval. You can also include comments with your decision. Once approved, the state is updated in the card or the app.



The screenshot shows the Microsoft Teams "Approvals" app interface. It features a sidebar with navigation options like Activity, Chat, Teams, Calendar, Calls, Files, Approvals, and Power Auto... The main area displays a table of approval requests. The table has columns for Request title, Status, Created, Requested by, and Sent to. The first row, "Budget approval", has its status "Approved" highlighted with a red box. Other rows include "New Social media post request", "A request for DocuSign", "New request for budget", and "Demo approval for the afternoon".

| Request title                   | Status    | Created                 | Requested by  | Sent to     |
|---------------------------------|-----------|-------------------------|---------------|-------------|
| Budget approval                 | Approved  | 11/30/2020, 3:02:01 PM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Alex Wilber |
| A request for DocuSign          | Approved  | 11/30/2020, 11:38:42 AM | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Alex Wilber |
| New request for budget          | Requested | 11/30/2020, 7:29:07 AM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Alex Wilber |
| Hey approve this thing          | Requested | 11/20/2020, 11:07:29 AM | Allan Deyoung | Alex Wilber |
| Please approve: 'Luna'          | Approved  | 11/17/2020, 4:36:16 PM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Alex Wilber |
| How would you rate it?          | Amazing   | 11/17/2020, 4:14:33 PM  | Allan Deyoung | Alex Wilber |
| Approvals v2                    | Awesome!  | 11/17/2020, 4:12:54 PM  | Allan Deyoung | Alex Wilber |
| Demo with a file to boot        | Approved  | 11/17/2020, 4:11:04 PM  | Allan Deyoung | Alex Wilber |
| Demo approval for the afternoon | Approved  | 11/17/2020, 4:09:01 PM  | Allan Deyoung | Alex Wilber |

### Tip

If the approver has chosen to send an approval with custom responses, the actions at the bottom can differ. For example:



## Approvals

Approval request details



Requested

### New form template

Let me know if the new template looks good

▼ Status: Requested



Pending response  
Alex Wilber



Requested by  
Allan Deyoung

3m ago

Optional comments

If needed, add extra details like why you decided to approve or reject this request

Yes

No

# Manage your approvals from the approvals app in Teams

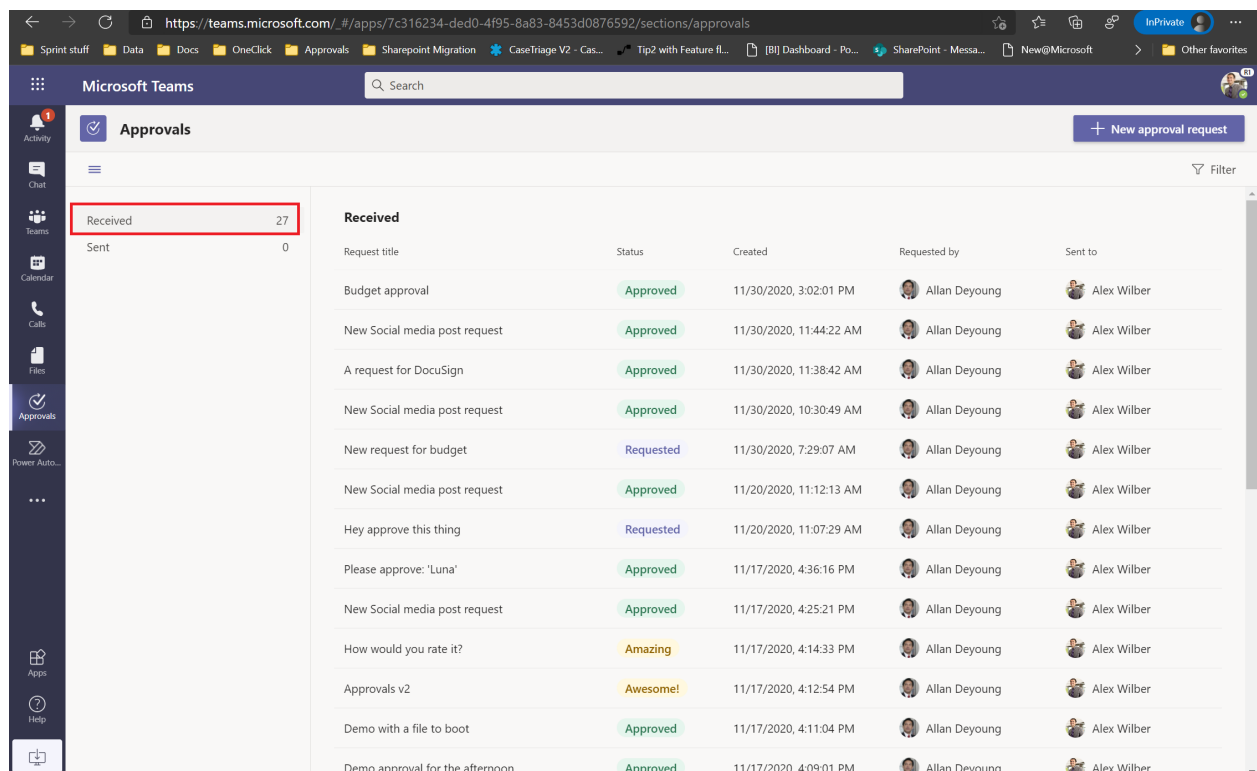
Article • 11/04/2023

The approvals app in Teams gives you an overview of all the approvals that you have sent or received in your organization's default tenant. This includes approvals you might have received through chat or channel messages, direct approvals, and even approvals that come in through a flow.

From here you can either approve or reject an approval you have received, or cancel an approval you have sent out.

## View approvals

From the main approvals app in Teams, you can get a view of all the approvals you have sent or received.



The screenshot shows the Microsoft Teams interface with the Approvals app open. The left sidebar contains navigation options: Activity, Chat, Teams, Calendar, Calls, Files, Approvals (highlighted), and Power Auto... The main content area is titled 'Approvals' and features a '+ New approval request' button and a 'Filter' dropdown. Below this, there are two tabs: 'Received' (with a count of 27) and 'Sent' (with a count of 0). The 'Received' tab is active, displaying a table of approval requests.

| Request title                   | Status    | Created                 | Requested by  | Sent to     |
|---------------------------------|-----------|-------------------------|---------------|-------------|
| Budget approval                 | Approved  | 11/30/2020, 3:02:01 PM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Alex Wilber |
| A request for DocuSign          | Approved  | 11/30/2020, 11:38:42 AM | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Alex Wilber |
| New request for budget          | Requested | 11/30/2020, 7:29:07 AM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Alex Wilber |
| Hey approve this thing          | Requested | 11/20/2020, 11:07:29 AM | Allan Deyoung | Alex Wilber |
| Please approve: 'Luna'          | Approved  | 11/17/2020, 4:36:16 PM  | Allan Deyoung | Alex Wilber |
| New Social media post request   | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Alex Wilber |
| How would you rate it?          | Amazing   | 11/17/2020, 4:14:33 PM  | Allan Deyoung | Alex Wilber |
| Approvals v2                    | Awesome!  | 11/17/2020, 4:12:54 PM  | Allan Deyoung | Alex Wilber |
| Demo with a file to boot        | Approved  | 11/17/2020, 4:11:04 PM  | Allan Deyoung | Alex Wilber |
| Demo approval for the afternoon | Approved  | 11/17/2020, 4:09:01 PM  | Allan Deyoung | Alex Wilber |

The screenshot shows the Microsoft Teams interface with the 'Approvals' section active. The left sidebar contains navigation icons for Activity, Chat, Teams, Calendar, Calls, Files, Power Automate, Approvals, and Apps. The main area is divided into 'Received' (7 items) and 'Sent' (30+ items) tabs. The 'Sent' tab is selected and displays a table of approval requests.

| Request title                 | Status    | Created                 | Requested by  | Sent to       |
|-------------------------------|-----------|-------------------------|---------------|---------------|
| Budget approval               | Requested | 11/30/2020, 3:02:01 PM  | Allan Deyoung | Alex Wilber   |
| New GTM Project               | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Allan Deyoung |
| New Social media post request | Approved  | 11/30/2020, 11:44:22 AM | Allan Deyoung | Alex Wilber   |
| A request for DocuSign        | Approved  | 11/30/2020, 11:38:42 AM | Allan Deyoung | Alex Wilber   |
| New Social media post request | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Alex Wilber   |
| New GTM Project               | Approved  | 11/30/2020, 10:30:49 AM | Allan Deyoung | Allan Deyoung |
| New request for budget        | Requested | 11/30/2020, 7:29:07 AM  | Allan Deyoung | Alex Wilber   |
| New GTM Project               | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Allan Deyoung |
| New Social media post request | Approved  | 11/20/2020, 11:12:13 AM | Allan Deyoung | Alex Wilber   |
| Hey approve this thing        | Requested | 11/20/2020, 11:07:29 AM | Allan Deyoung | Alex Wilber   |
| Please approve: 'Luna'        | Approved  | 11/17/2020, 4:36:16 PM  | Allan Deyoung | Alex Wilber   |
| New GTM Project               | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Allan Deyoung |
| New Social media post request | Approved  | 11/17/2020, 4:25:21 PM  | Allan Deyoung | Alex Wilber   |

## Cancel an approval request

From the **Sent** tab, you can choose to cancel an approval that is still in progress. To do so, select the approval you want to cancel and then select the **Cancel** approval option.





## Approvals

Approval request details



Requested

### Leave request

Taking some time off

▼ Status: Requested



Pending response  
Alex Wilber



Requested by  
Allan Deyoung

9m ago

Cancel request

#### ⓘ Note

You can only cancel approvals that are in progress.

# Customizing approvals in Teams

Article • 11/04/2023

By default, the approvals app only lets you modify custom responses in the app.

If you want to create a custom process with pre and post approval actions that are automatically triggered using an event, you will need to create an approval flow in the Power Automate.

[Visit the approvals documentation section to get started with approval flows](#)

# Microsoft Teams approvals with custom connectors

Article • 04/14/2023

You can use the approvals hub in Microsoft Teams to quickly integrate approvals workflows into existing line of business apps that do not have their own approvals system. You achieve this by using a custom connector to 'connect' to the existing line of business apps.

## Tip

When you use the approvals hub, you get to manage all your approvals in a central location.


This article shows you how to:

- Create a custom connector.
- Add a trigger and actions to a custom connector.
- Create an approval flow.
- Use the approvals hub in Teams to manage approvals that you created with the flow.

## Prerequisites

- One of the following subscriptions:
  - [Power Automate](#)
  - [Power Apps](#)
- Basic experience building [flows](#) and [custom connectors](#).

## Create a custom connector

1. Sign in to [Power Automate](#) .
2. Expand **Data**, and then select **Custom connectors**.
3. Select **New custom connector**, and then **Create from blank** from the dropdown list.

4. In the **Connector name** field, enter a name for the custom connector, and then select **Continue**.
5. In **General Information**, enter a **Description** and a **Host**.
6. At the bottom of the screen, select **Security**.
7. Select the authentication type that your API uses.
8. At the bottom of the screen, select **Definition**.

## Add a trigger

You need a trigger to serve as the first step in the approval flow that you'll create.

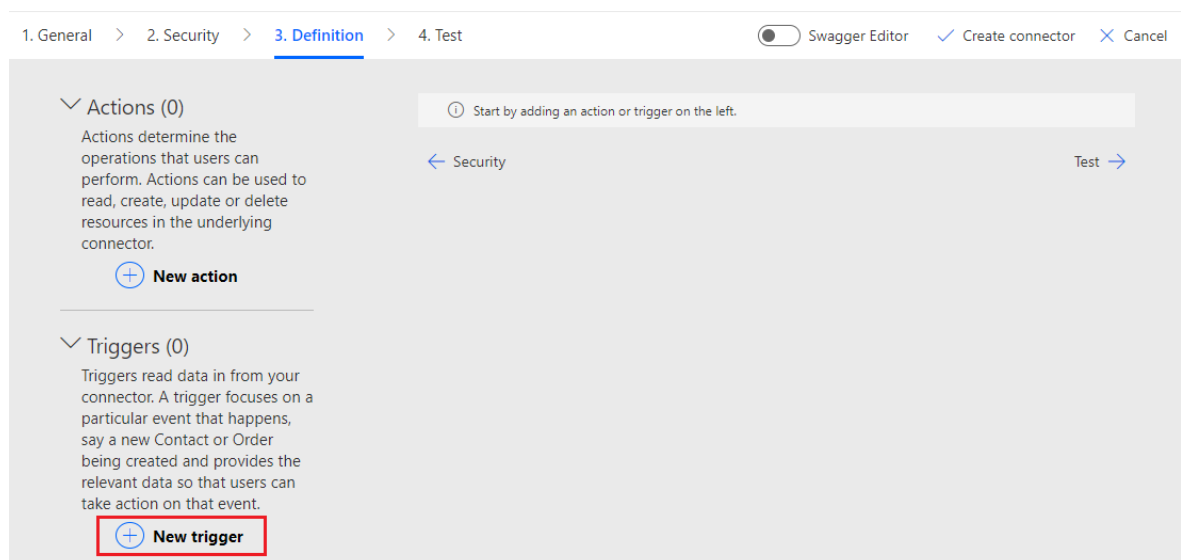
Some common approval triggers are:

- When a new row is created.
- When a row is updated.

### Tip

Both Webhook and polling triggers work with approval flows.

1. Continuing from the earlier steps, select **New Trigger** in the Triggers list.



2. Enter a **Summary**, **Description**, **Operation ID**, and select a **Trigger type**.
3. Select either **important** or **advanced** for the **visibility** the trigger to make the trigger available when you create the approval flow.
4. Below the **Request** heading, select **Import from sample**.

5. Define the **Verb**, **URL**, **Headers**, and **Body** for your trigger.

Import from sample

**Verb \***

GET  DELETE  POST  PUT  HEAD  OPTIONS

PATCH

**URL \***

E.g.

This is the request URL.

**Headers**

Headers separated by a new line, e.g.:  
Content-Type application/json  
Accept application/json

These are custom headers that are part of the request.

**Body**

```
JSON object with body, e.g.:  
{  
  "email": "test@test.com",  
  "name": "Jane Doe"  
}
```

The body is the payload that's appended to the HTTP request. There can only be one body parameter.

6. Add a response.

The response configuration depends on your trigger type (Webhook or polling). Webhook triggers require a callback URL parameter and a location header that contains a value that's used to delete the Webhook registration.

7. Configure the **Webhook Response** and **Trigger** configuration.

8. Configure the **polling response** to meet your needs.

9. Configure the trigger to meet your needs.

## Create an approval flow

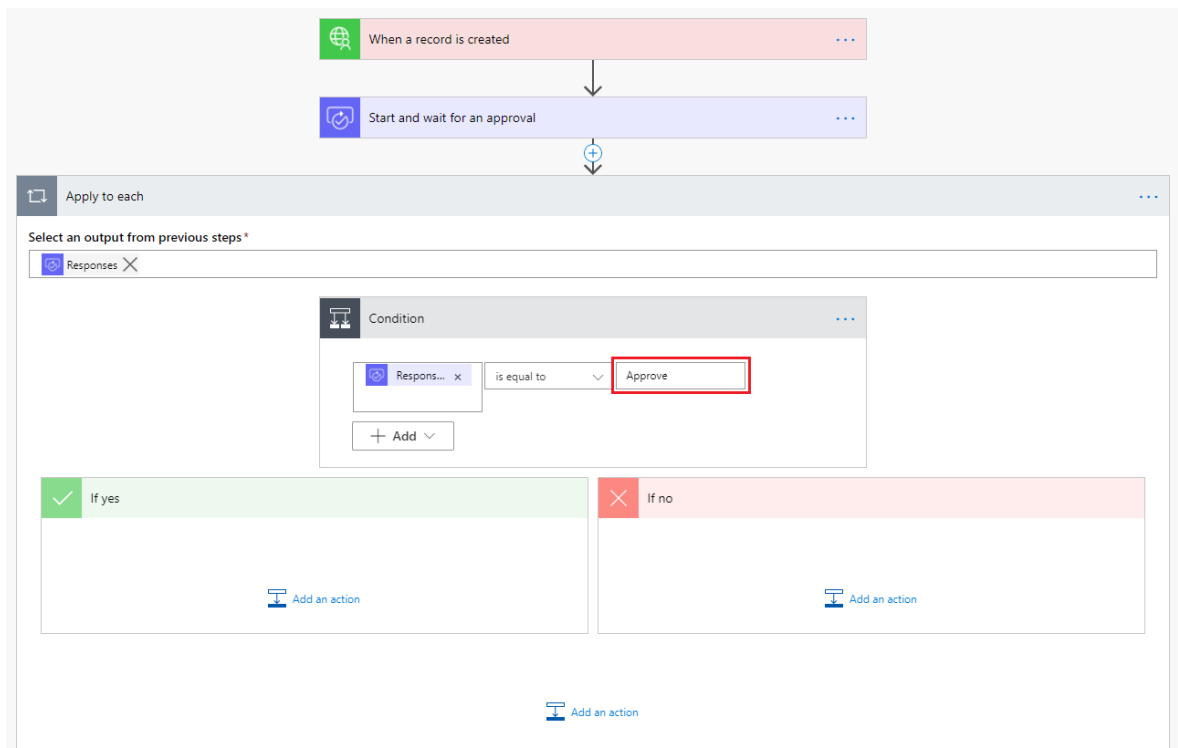
Now that you've created your custom connector, it's time to create your approval flow that uses the custom connector.

1. Sign in to [Power Automate](#).

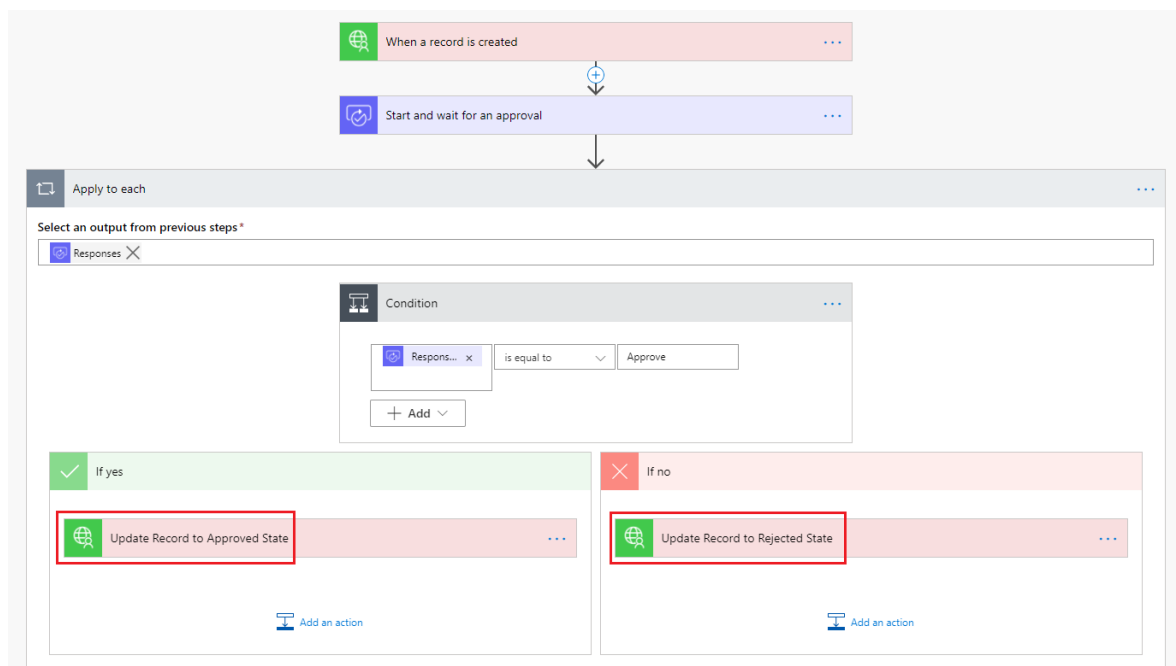
2. Select **New flow**, and then select **Automated cloud flow**.
3. Select **Skip** on the **Build an automated cloud flow** screen.
4. Select the **Custom** tab, and then select your new custom connector.
5. Select a trigger from your custom connector.
6. Select **New step**.
7. Search for "approvals", and then select **Start and wait for an approval**.
8. Select the **Approval type**, and then populate the required fields on the **Start and wait for an approval** card.
9. Select **New step > Control > Condition**.
10. Select the **Choose a value** text box, and then search the dynamic content for "Responses Approver response".
11. Update the condition with the desired result.

**Important**

The "Approve" or "Reject" approval responses are case sensitive.

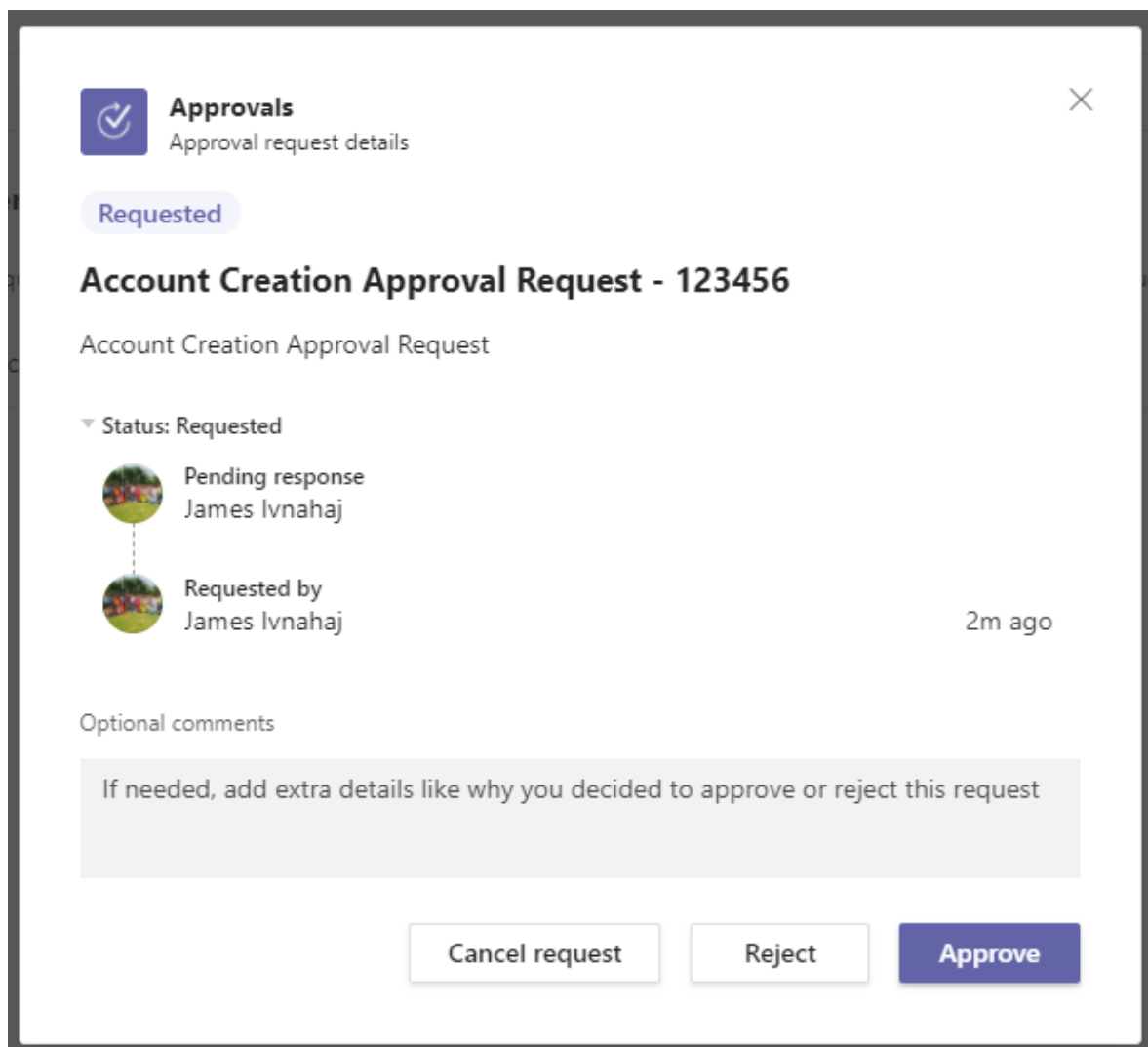


12. Add an action in both condition result sections.



## Manage approvals generated by the approval flow

1. Sign in to [Microsoft Teams](#).
2. Search for the **approvals** app, and then select it.
3. View your received and sent approvals.
4. Take an action that activates your custom connector's trigger.
5. View the new approval request in flow run history.
6. View the new approval request in the approvals app.
7. Select the approval request, review the details, and then select **Reject** or **Approve**.



8. View the completed approval request in flow run history.
9. View the completed approval request in approvals app.
10. Confirm in the target system the approval completion update steps were executed successfully.

## See also

- [Create a custom connector from scratch](#)
- [Use a Webhook as a trigger for Azure Logic Apps and Power Automate](#)
- [Use a polling trigger for Microsoft Power Automate](#)

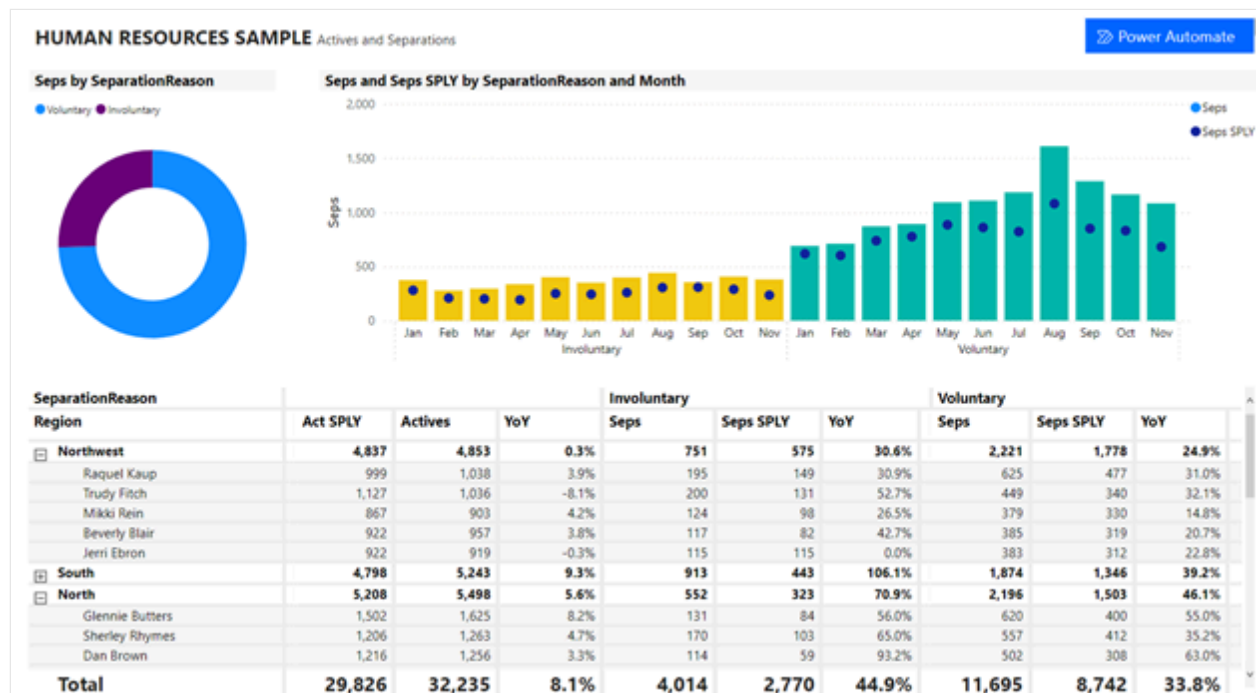


# Create a Power Automate visual for Power BI

Article • 05/14/2024

APPLIES TO:  Power BI Desktop  Power BI service

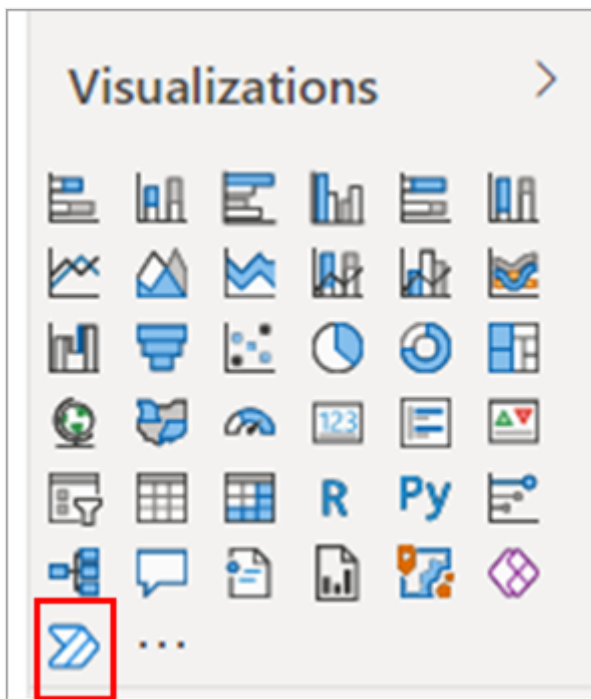
When you create a Power Automate visual in a Power BI report, your end-users can run an automated flow, just by clicking a button in your report. Furthermore, the flow can be data contextual, meaning that the flow inputs can be dynamic, based on the filters the end-users set.



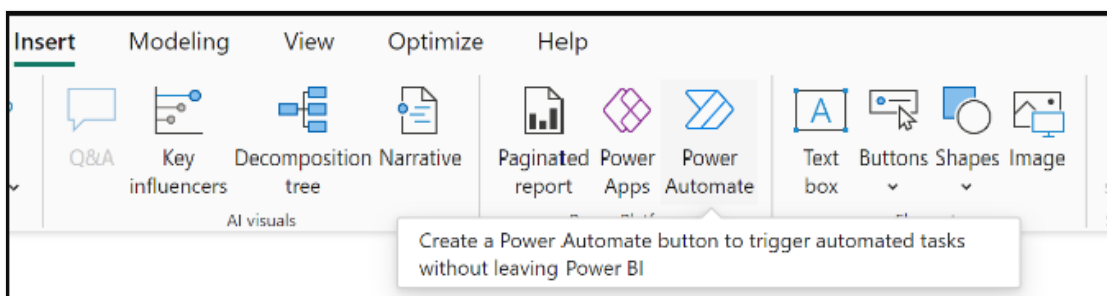
## Add the Power Automate visual

Power BI Desktop

1. Select the Power Automate icon from the Visualizations pane.

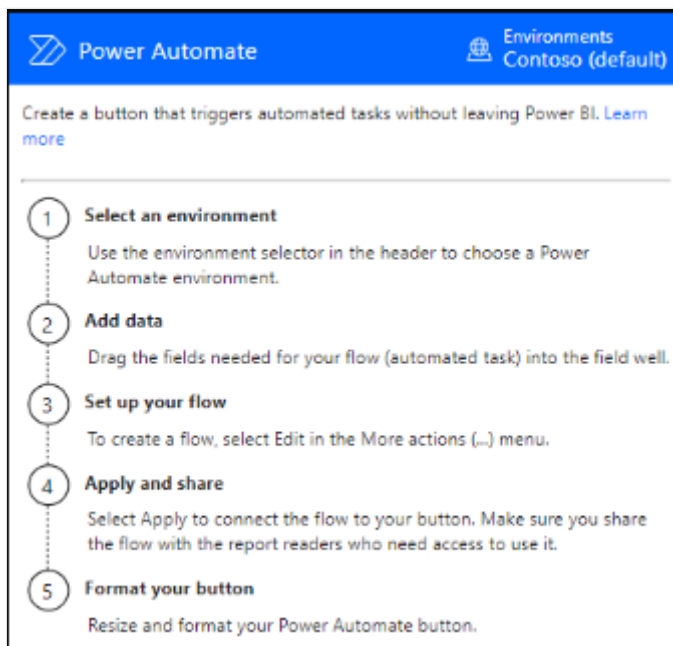


In **Power BI Desktop**, you can also add the visual from the ribbon. On the **Insert** tab, select **Power Automate** in the **Power Platform** section.



Once you select the visual, it automatically gets added to your current report page, with getting started instructions.

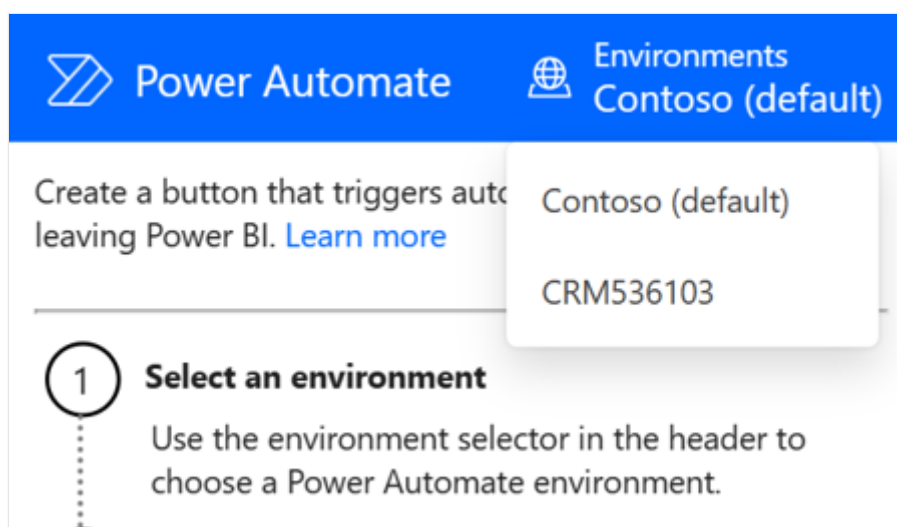
2. Scroll, resize the visual, or select the **Focus mode** icon to see all the instructions.



3. After you've reviewed the instructions, resize the button and place it where you'd like on the report.

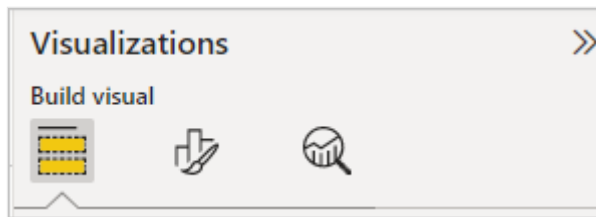
## Change the environment in which your flow is created

To select your preferred environment for creating your flow, use the environment picker in the Power Automate visual. This includes environments where you have any built-in security role, as well as any environments where you are a co-owner of one or more flows. If you cannot find your preferred environment, see the article [Troubleshoot missing environments](#) to learn more about the requirements.

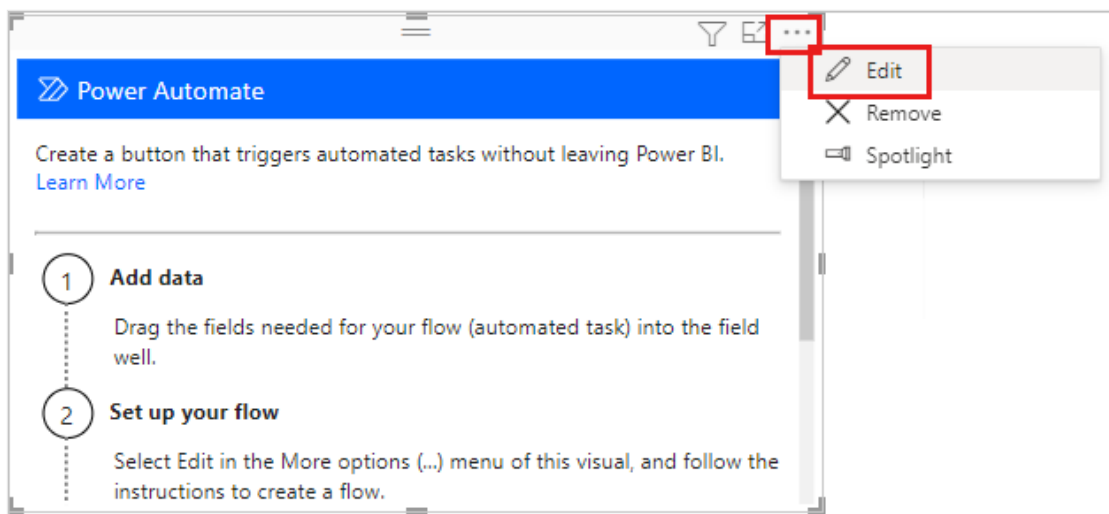


## Edit the flow

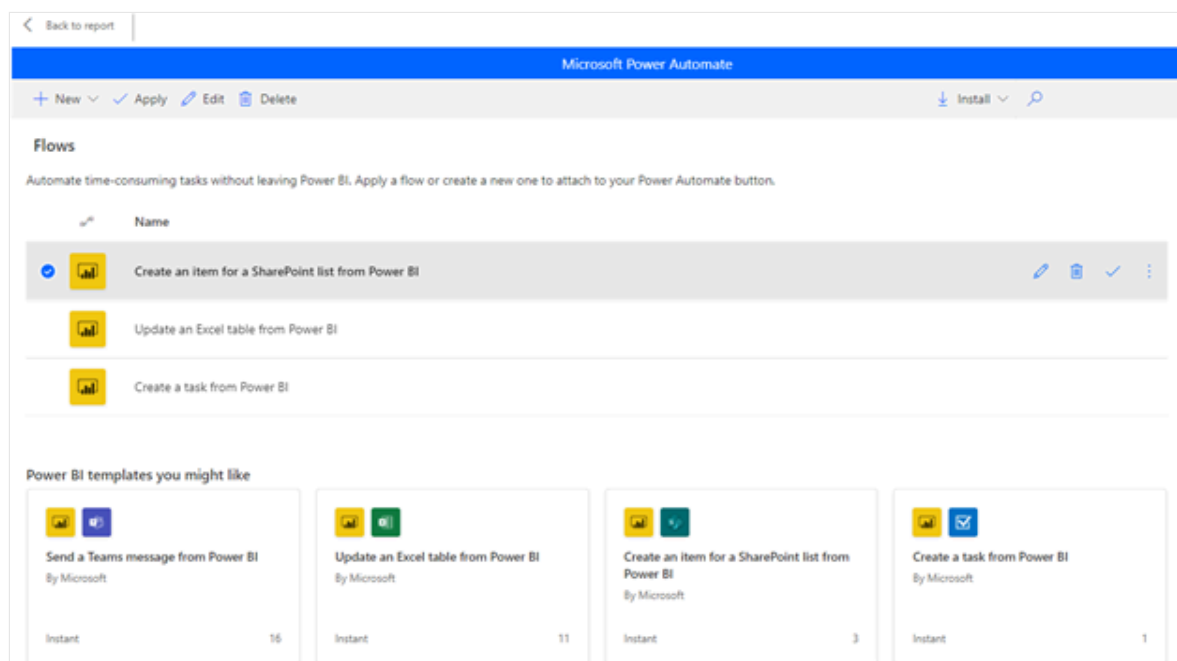
1. With the flow selected, add any data fields to the **Power Automate Data** region, to be used as dynamic inputs to the flow.



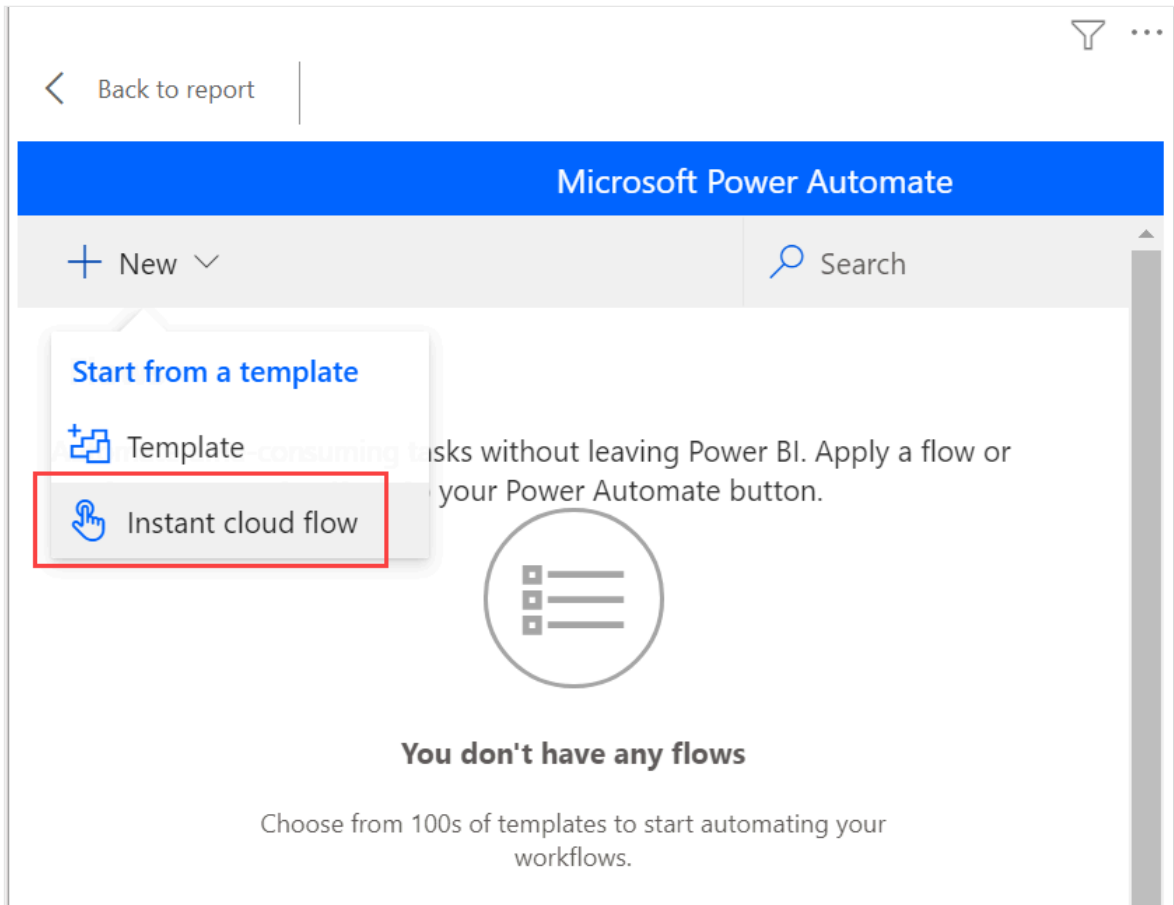
2. Select **More options (...)** > **Edit** to configure the button.



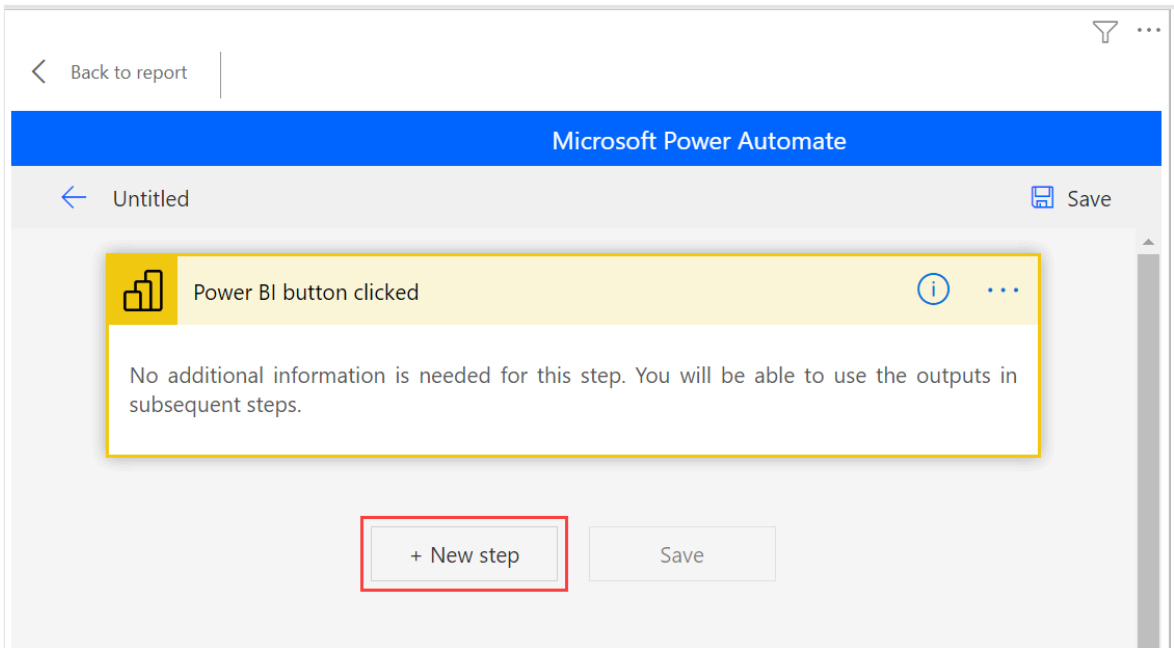
3. In edit mode of the visual, either select an existing flow to apply to the button, or create a new flow to be applied to the button.



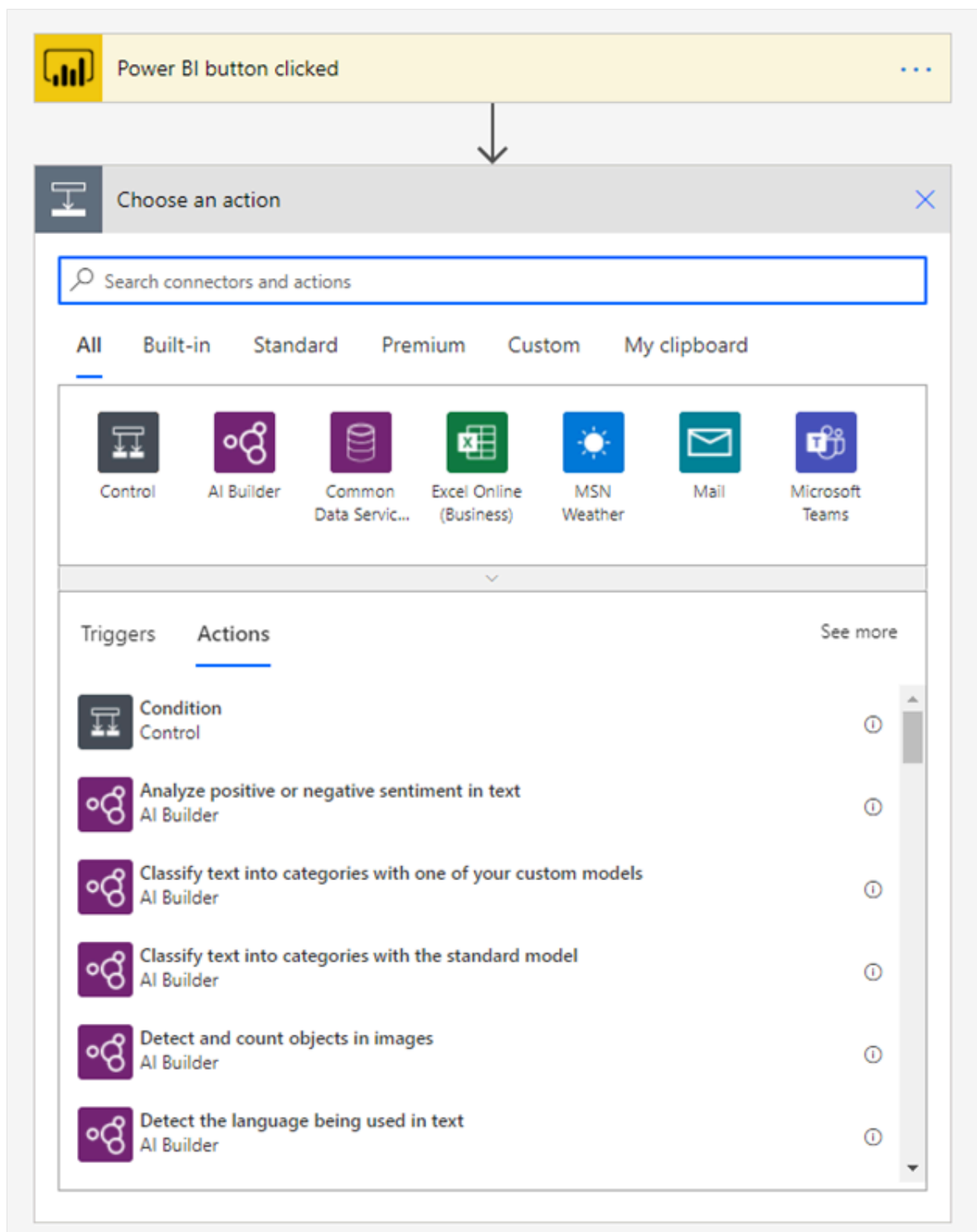
4. You can start from scratch or start with one of the built-in templates as an example. To start from scratch, select **New > Instant cloud flow**.



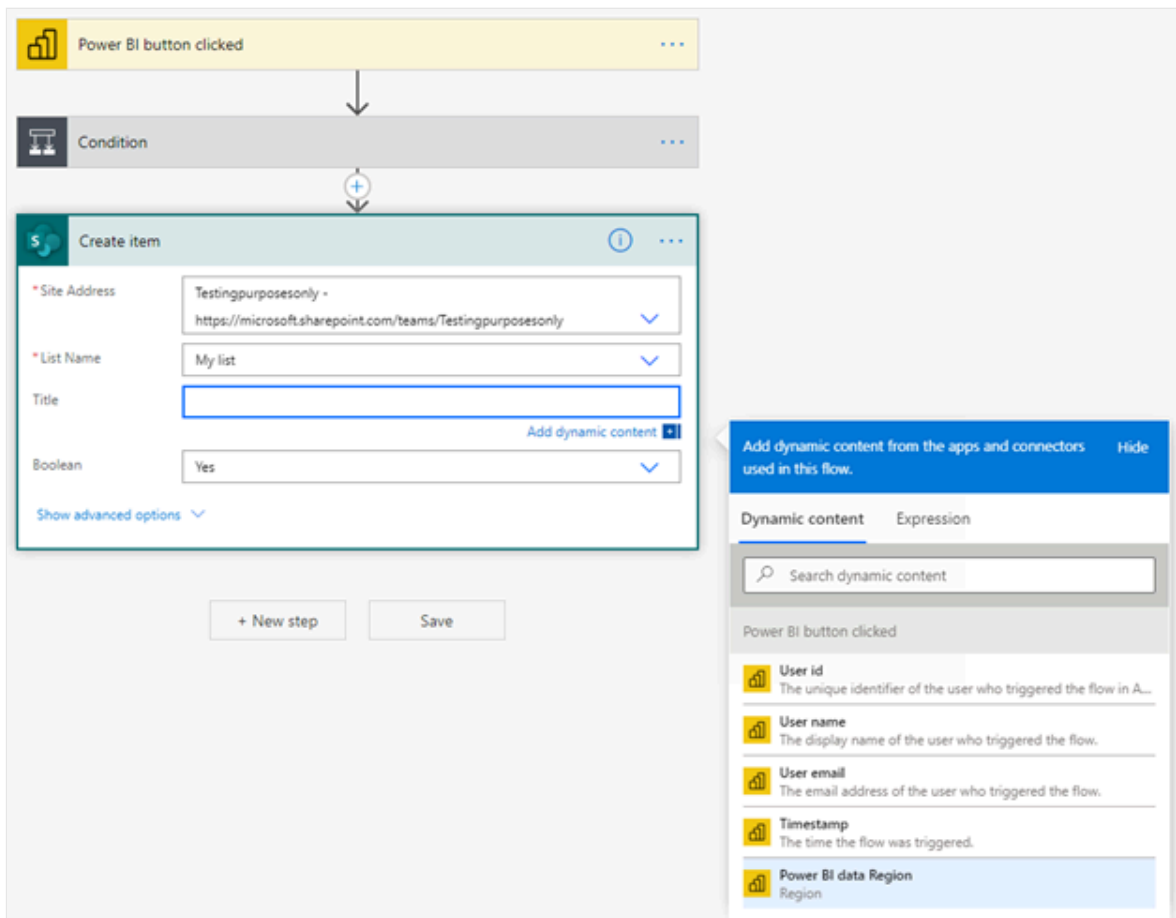
5. Select **New step**.



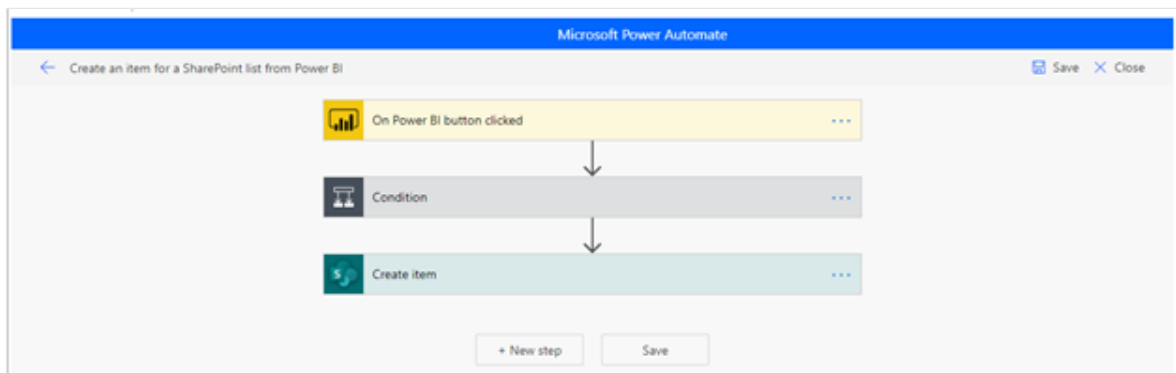
6. Here, you can choose a subsequent action or specify a Control if you want to specify additional logic to determine the subsequent action.



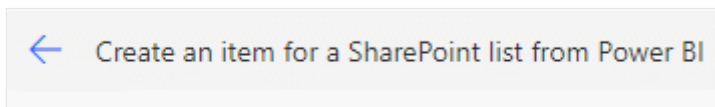
7. Optionally, you can reference the data field(s) as dynamic content if you want the flow to be data contextual. This example uses the Region data field to create an item in a SharePoint list. Based on the end-user's selection, Region could have multiple values or just one.



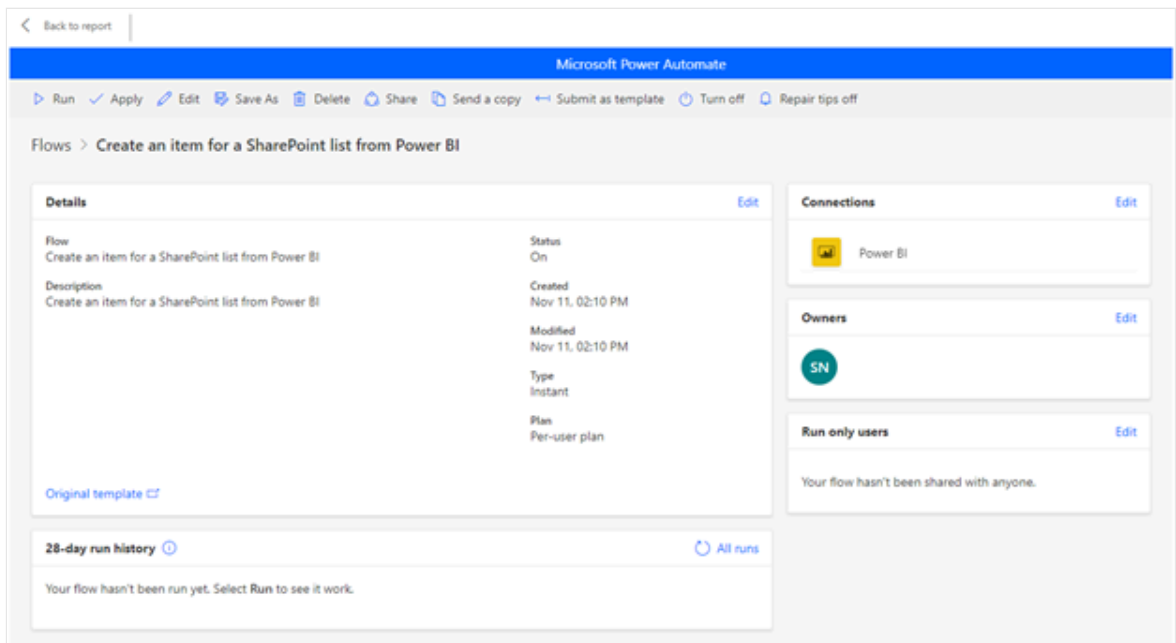
8. After you've configured your flow logic, name the flow, and select **Save**.




9. Select the arrow button to go to the Details page of the flow you just created.



Here's the Details page for a saved flow.

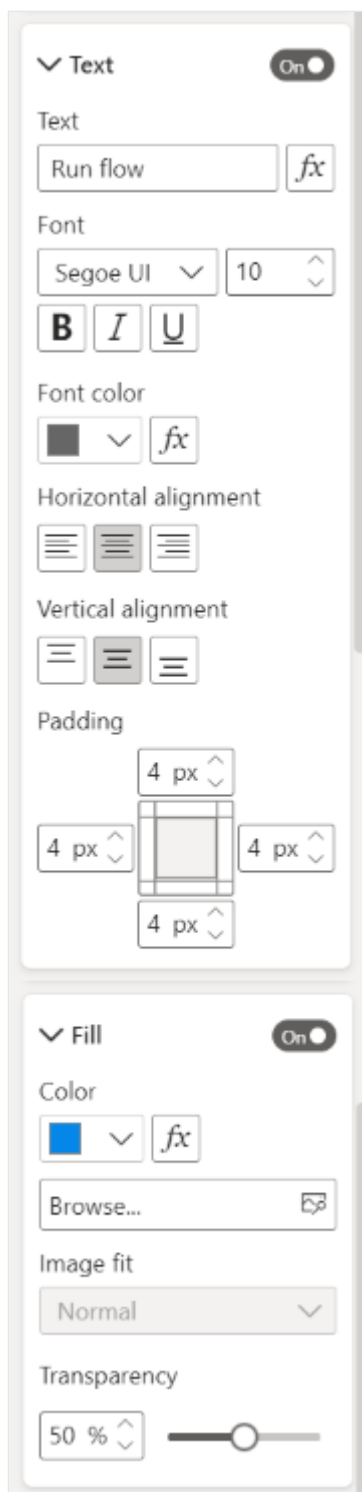


10. Select the **Apply** button  to attach the flow you've created to your button.

## Format the flow

Optionally, you can change the button text, font color, font size, or fill color of the button. These options along with other settings are available in the **Format** pane:



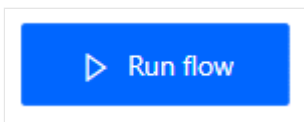


## Test the flow

After you've applied a flow to the button, we recommend testing it before you share the flow with others. These Power BI flows can only run in the context of a Power BI report. You can't run these flows in a Power Automate web app or elsewhere.

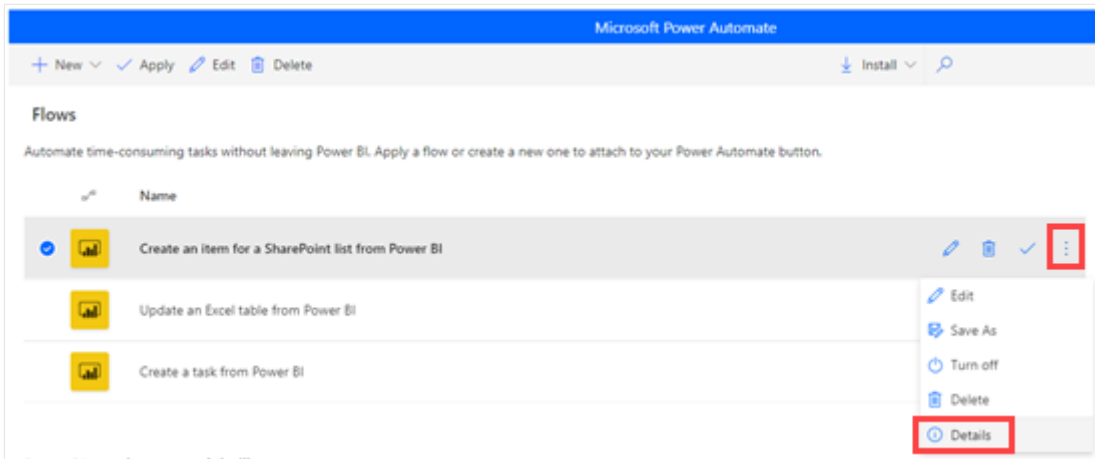
If your flow is data contextual, make sure you test how the filter selections in the report impact the flow outcome.

1. To test the flow in edit mode of the report, select **Back to report**, then press Ctrl while you select the button to run the flow.

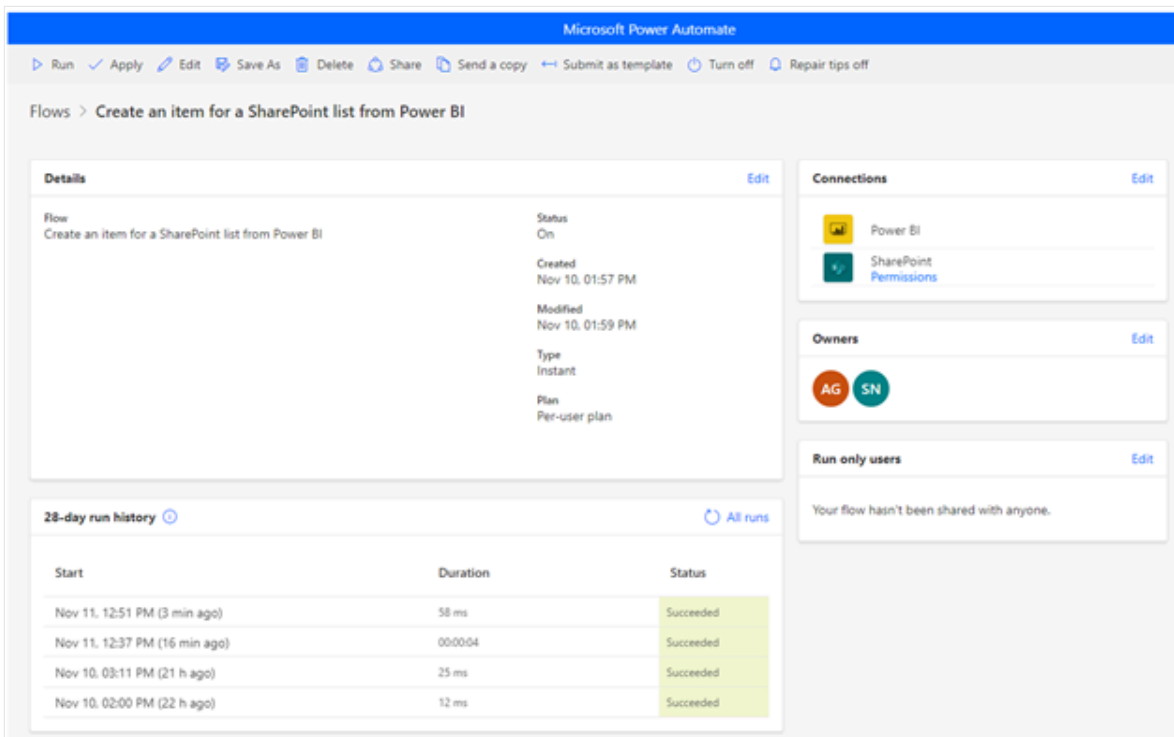


The button text indicates that the flow has been triggered.

2. To check if the flow has run successfully, select the **More commands (...)** menu > **Details** in the flow that has been triggered:



3. On the **Details** page, you can see the **run history** and **status** for the flow:



### **i** Important

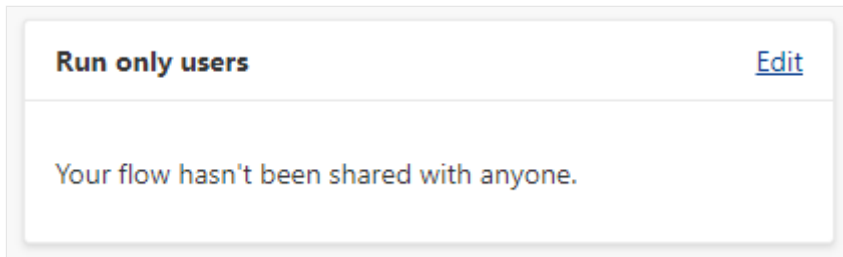
You can only run these Power BI flows within the context of a Power BI report. You can't start flows from the Power Automate portal. To test the flow in edit mode of the report, select **Back to report**, and then press **Ctrl + click** on the button to run the flow in the context of the report. You can also navigate to edit mode or to

Power Automate to view the run history of the flow and ensure it is running successfully.

## Share the flow

When the flow is running successfully, you can share it with your report readers.

1. Select **Edit** in the **Run only users** section:



2. Specify which users or groups you want to give run access to:

## Manage run-only permissions ✕


**Users and groups** SharePoint

**Invite users or groups**  
Let others run this flow and see the results, but not edit in any way.

Enter names, email addresses, or user groups


**Currently shared with**  
This flow has not been shared with any users. Add a person and see their name here.

**Connections Used**  
These connections will provide the users listed here to have run-only access to this flow. Unless providing their own connection, run-only users will not have access to these connections outside this flow.



Power BI  
Access to this connection is provided by the owner of the flow.

Use this connection▼



SharePoint  
Access to this connection is provided by the owner of the flow.

Use this connection▼


---

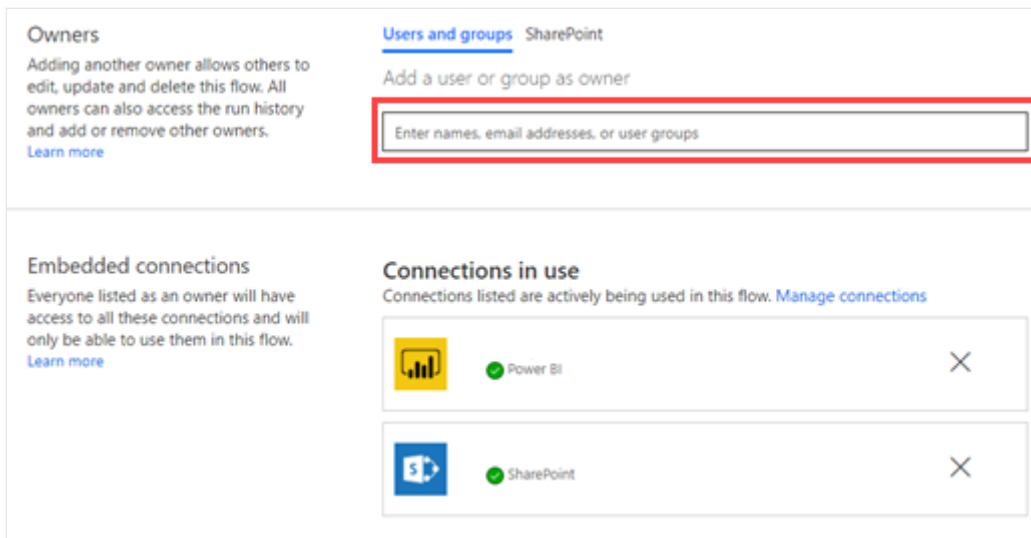
Save

Cancel

## Give users edit access

Alternatively, you can give any users edit access to the flow, not just run permissions.

- Select **Share**  **Share** , and specify the users or groups that you want to add as an owner:



## Considerations and limitations

- Additional manual inputs to the button aren't supported.
- The visual isn't supported for [embedded analytics](#).
- The visual doesn't work in Publish to Web (public) scenarios, because unauthenticated scenarios aren't supported by Power Automate.
- The visual doesn't support export scenarios.
- The Power Automate visual is limited to process a maximum of 1000 records.
- The user running the flow within the Power BI report needs to have permissions to run the flow. Grant these permissions through direct sharing by the user or by sharing to a Microsoft Entra group.
- Create flows that you will **use** with the Power BI button trigger **directly within the Power BI report**. **Avoid** going directly to Power Automate to create these flows, as the trigger will not have access to the data fields necessary for creating the flow.
- Power BI data is sent to, and processed in, a geography where the flow is deployed.

## Related content

For more information about Power Automate, take a look at the following articles:

- [Integrate Power BI data alerts with Power Automate](#)
- [Export and email a Power BI report with Power Automate](#)
- [Get started with Power Automate](#)
- More questions? [Try the Power BI Community](#) [↗](#)

---

## Feedback

Was this page helpful?



Yes



No

[Provide product feedback](#)  | [Ask the community](#) 

# Configure Power Automate cloud flows in Power Pages

Article • 07/25/2024

Power Automate cloud flow allows users to create automated workflows between different applications and services. You can use a Power Automate cloud flow to create logic that performs one or more tasks when an event occurs. For example, configure a button so that when a user selects it, send an email or meeting request, update a record, collect data, synchronize files, and other tasks.

Now, you can securely invoke Power Automate cloud flows from Power Pages to interact with 1000+ external data sources and integrate it into your business site.

## ⓘ Note

- Your Power Pages site version must be 9.5.4.xx or later for this feature to work.
- Your starter site package version must be 9.3.2304.x or higher.

## Prerequisites

To integrate with Power Pages, a Power Automate license is required. It's recommended to use a [Power Automate Process](#) license in the production instance.

## Steps to integrate cloud flow

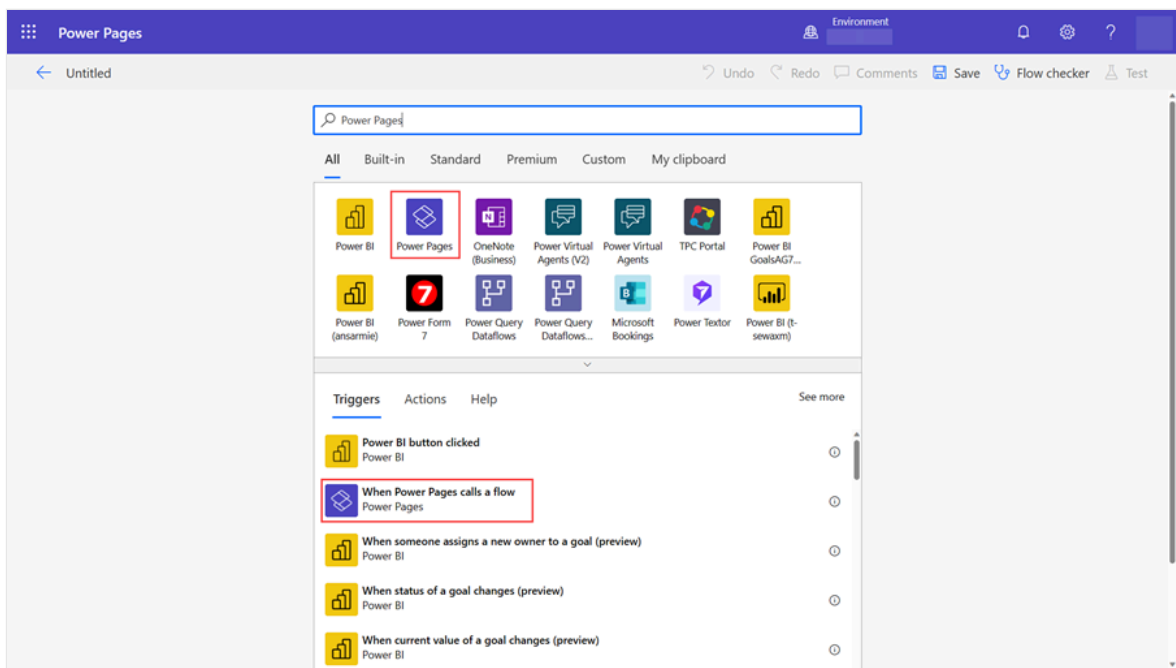
1. Create a cloud flow.
2. Add the flow to your site.
3. Invoke a flow from your website.

## Create a flow

1. Sign into [Power Pages](#).
2. Select site + **Edit**.
3. Navigate to the **Set up** workspace, then select **Cloud flows** under **App integrations**.

4. Select + **Create new flow**.

5. Search for **Power Pages** Select **When Power Pages calls a flow trigger**.



6. Define your flow steps and return values and select **Save**.

### ⓘ Note

Only solution-aware flows can be attached to the Power Pages site.

## Add a flow to your Site

After you create an instant cloud flow, it needs to be associated with the Power Pages site and secured with a web role.

1. Sign into [Power Pages](#).

2. Select site + **Edit**.

3. Navigate to the **Set up** workspace, then select **Cloud flows (preview)** under **App integrations**.

4. Select + **Add cloud flow**.

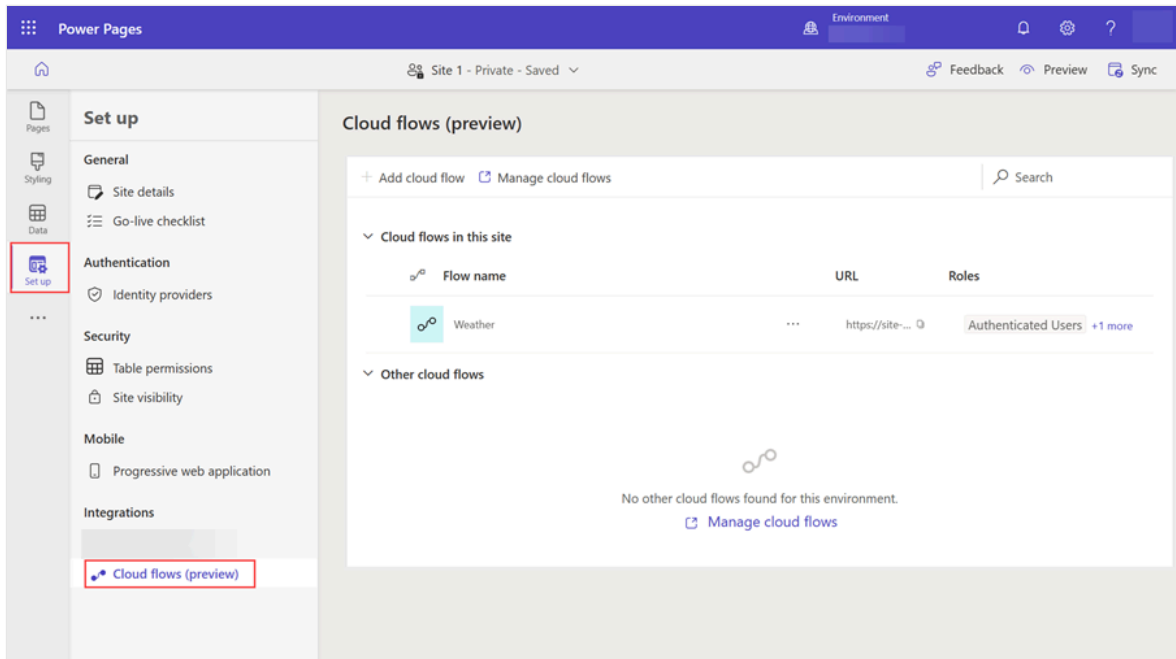
5. Search for the recently created flow.

6. Select + **Add roles** under **Roles**.

7. Select roles that should have access to the flow.



## 8. Select Save.



### ⓘ Note

When you add a flow to your site, a unique URL is generated that allows you to invoke the cloud from your site.

## Invoke a flow from web page

Use Power Pages cloud flow API to interact with Power Automate to perform external service integration. Cloud flow API operations consist of HTTP requests and responses.

[Expand table](#)

| Operation         | Method | URI                                           |
|-------------------|--------|-----------------------------------------------|
| Invoke cloud flow | POST   | [Site URI]/_api/cloudflow/v1.0/trigger/<guid> |

Example:

Request

HTML

POST

```
https://contoso.powerappsportals.com/_api/cloudflow/v1.0/trigger/4d22a1a2-8a67-e681-9985-3f36acfb8ed4  
{
```

```
"Location": "Seattle"
}
```

Response

Cloud flow without response action

HTML

```
HTTP/1.1 Accepted
Content-Type: application/json
```

Cloud flow with response action

HTML

```
HTTP/1.1 200 OK
Content-Type: application/json
Body
{
  "conditions": "Rain",
  "humidity": "93",
  "latitude": "47.60620880126953",
  "longitude": "-122.33206939697266"
}
```

## Authenticating cloud flow API requests

You don't need to include an authentication code, because the application session manages authentication and authorization. All API calls must include a Cross-Site Request Forgery (CSRF) token.

## Passing parameter to cloud flow

In a cloud flow, you can define input parameters of type **Text**, **Boolean**, **File**, and **Number**. The parameter name you define in the request body should match the parameter name defined in the cloud flow trigger.

### Important

- You must pass the request parameters name as defined in the cloud flow.

- Support for passing a parameter to a flow configured with secure inputs is not available.

## Sample JavaScript to call a flow

This sample demonstrates how to call a flow using Asynchronous JavaScript and XML (AJAX).

```
shell.ajaxSafePost({
  type: "POST",
  url: "/_api/cloudflow/v1.0/trigger/44a4b2f2-0d1a-4820-bf93-
9376278d49c4",
  data: JSON.stringify({"eventData":JSON.stringify({"Email":
"abc@contoso.com", "File":{"name":"Report.pdf", "contentBytes":"base 64
encoded string"} })))
})
.done(function (response) {

})
.fail(function(){

});
```

### ⓘ Note

- If no input parameter is defined in the trigger, pass an empty payload in the request.
- For information on cloud flow limitations, see [Limits of automated, scheduled, and instant flows](#).

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# Overview of flows with Microsoft Forms

Article • 04/11/2023

Use the [Microsoft Forms](#) connector in Power Automate to add a form to a flow. Do you need to record a purchase in your sales system when you receive an order form? Maybe you'd like to get an emailed notification when a customer submits a survey or a student turns in a quiz. These are a few examples of how using forms with Power Automate flows can eliminate manual data entry, simplify record keeping, and help you stay on top of your day.

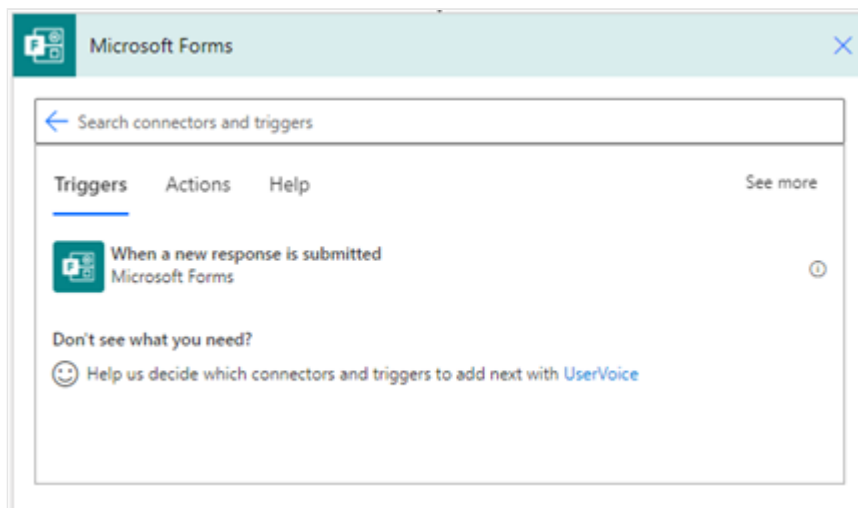
Watch the following video to see how you can use a form in Power Automate.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKXdv?postJsllMsg=true>

## Triggering a form action in a flow

In Power Automate, a trigger is an event that starts a run of a flow. Actions are the steps a flow takes in response to the trigger.

Forms has one trigger. "When a new response is submitted," and one action, "Get response details." The action pulls in the details of the form response as dynamic content that you can use elsewhere in the flow.





← Search connectors and actions

Triggers

Actions Help

See more



Get response details  
Microsoft Forms



Don't see what you need?

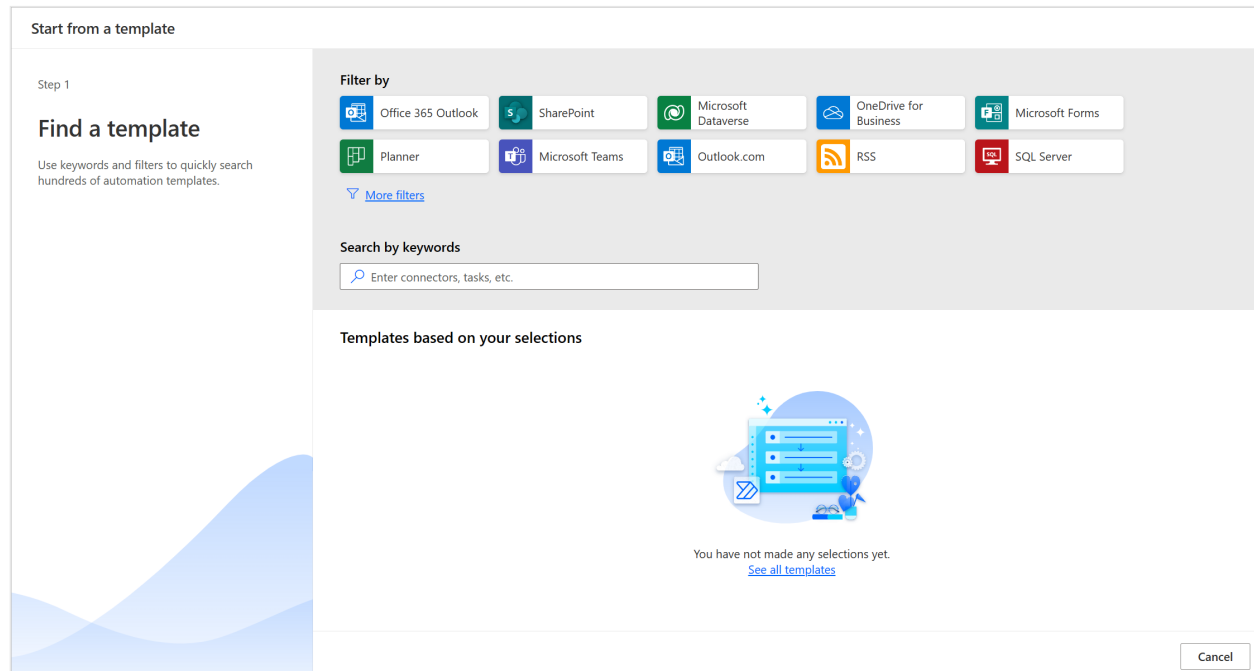


Help us decide which connectors and triggers to add next with [UserVoice](#)

# Get started using flows with Microsoft Forms

Article • 02/09/2023

The easiest way to add a form to a flow is to start with a template. [Search the template gallery](#) for "Microsoft Forms," or browse by category, to find a template that meets your needs. Follow the steps in the template to create your flow.



If you find a template that's similar to what you want to do but it isn't exactly right for your scenario, you can still create a flow from the template and then customize it. You can add, edit, and remove triggers and actions. You can even [copy and paste actions](#) in the same flow or across flows to speed up the process.

If you can't find a template that you like, [Create a flow from scratch](#), connect the services you want to use, and then add the triggers and actions that your scenario requires.

If you need inspiration, check out the list of the most [common ways to use forms in a flow](#).

## More information

- [Create a cloud flow from a template in Power Automate](#)
- [Submit a template to the Power Automate gallery](#)

# Common ways to use a form in a flow

Article • 10/03/2023

If you're not sure where to start, these are some of the most common ways people use Microsoft Forms with Power Automate:

- Send an email when there's a new form response
- Send an email to the form responder
- Send an approval request with the form details
- Add form responses to an Excel worksheet
- Get an attachment from a form and send it in an email

## Send an email when there's a new form response

You can turn on email notifications for the form's owners in your form settings. If you want someone else to be notified when a response is submitted, create a custom email notification with Power Automate.

### ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in [Understand the cloud flows designer with copilot capabilities](#).

### Classic designer

We start with a prebuilt template and customize it to help our managers plan for employees' summer vacations.

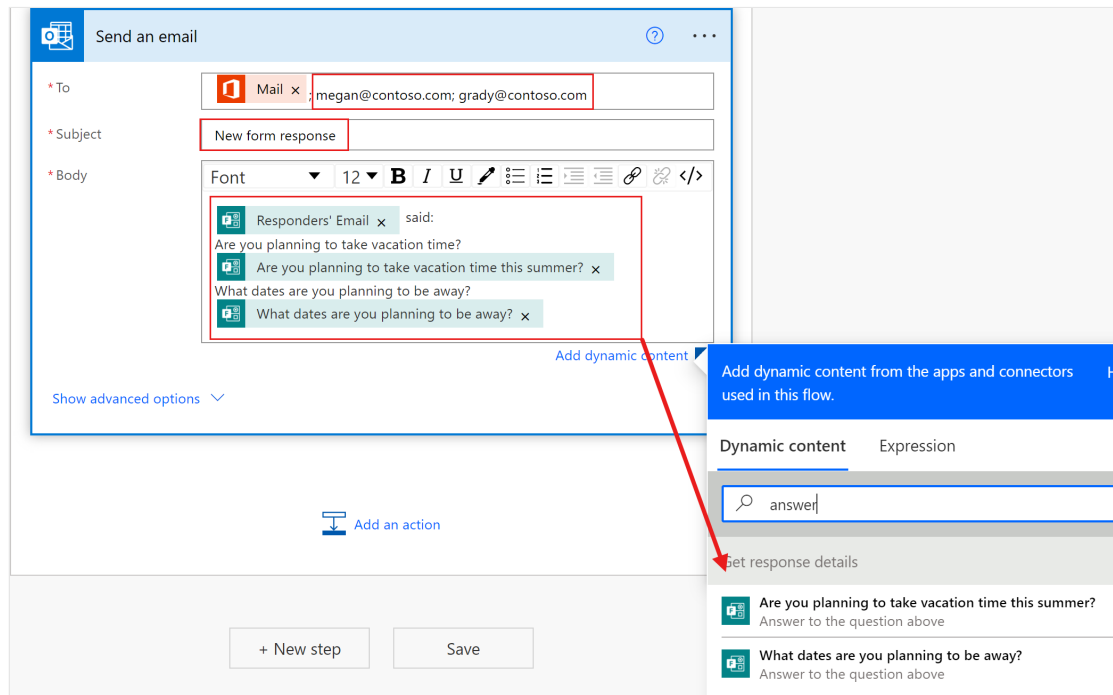
1. Search for **Microsoft Forms** in the [Power Automate template gallery](#), and then select the template named **Notify me in Outlook when a student completes a quiz**.
2. If needed, sign in to the connectors, and then select **Continue**.
3. In the first step in the flow, **When a new response is submitted**, select your form in the **Form Id** box.

4. In the next step in the flow, **Apply to each**, select your form again in the **Form Id** field. Leave everything else as it is.

5. Skip the Office 365 **Get my profile (V2)** step.

If you don't need to send the email to yourself, you can delete this step.

6. In the final step in the flow, **Send an email**, enter the recipients, subject, and body of the email. Select dynamic content to include details from the form response in your email.



7. Select the flow name at the top of the Power Automate canvas and change it as you like.

8. Save and test your flow.

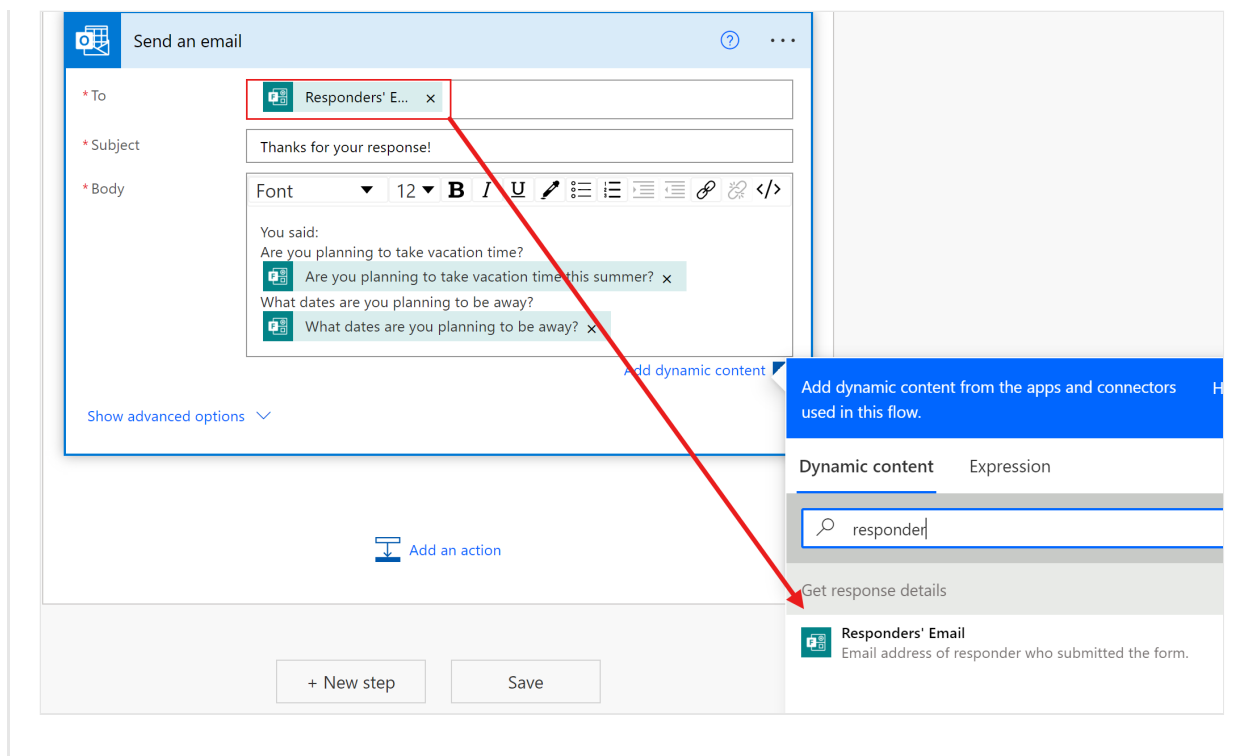
## Send an email to the form responder

You can turn on email receipts for respondents in your form settings. If you want to customize the email they receive, use Power Automate.

### Classic designer

Follow the steps to [send an email when there's a new form response](#), but send the email to the responder.



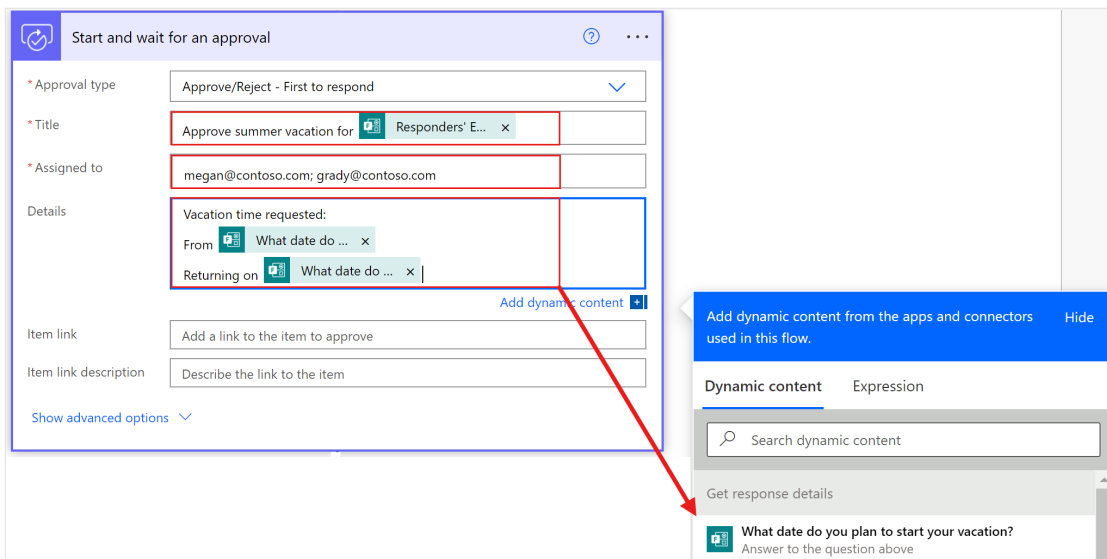


## Send an approval request with the form details

In this example, we'll start with another prebuilt template and customize it to create a vacation approval request.

### Classic designer

1. Search for **Microsoft Forms** in the [Power Automate template gallery](#) and select the template named **Send form responses for approval**.
2. Sign in to or create the connectors, as needed, and select **Continue**.
3. In the first step in the flow, "When a new response is submitted," select your form in the **Form Id** box.
4. In the next step in the flow, **Apply to each**, select your form again in the **Form Id** box. Leave everything else as it is.
5. In the next step in the flow, "[Start and wait for an approval](#)," select the **Approval type**, enter a **Title**, and enter the approvers' email addresses in **Assigned to**. Select dynamic content to include details from the form response in the approval request.



6. Skip the **Condition** action.

7. In the **If yes** step:

- Delete the SharePoint action that comes with the template.
- Add an Office 365 Outlook **Send an email (V2)** action.
- In the **To** box, select the dynamic content **Responders' Email**.
- Enter the subject and body of the email.

8. In the **If no** step:

- Delete the Office 365 "Get my profile (V2)" step that comes with the template.
- In the "Send an email (V2)" action, in the **To** box, select the dynamic content **Responders' Email**.
- Enter the subject and body of the email.

9. At the top of the Power Automate canvas, select the flow name and change it as you like.

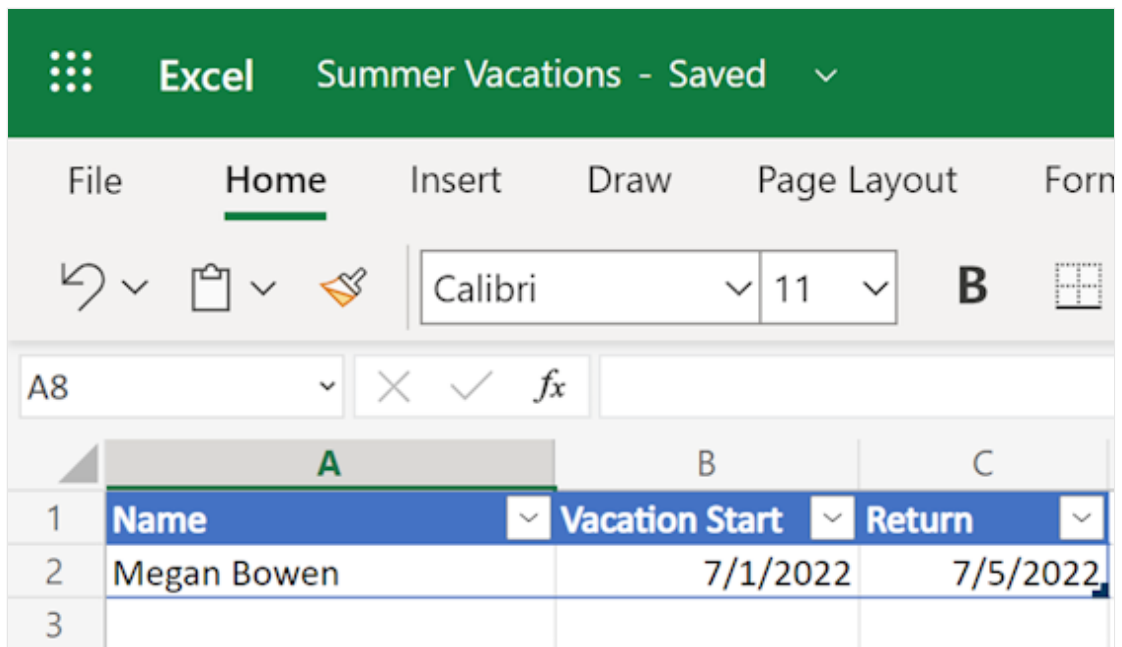
10. Save and test your flow.

For more examples of approval flows, go to [Manage sequential approvals](#).

## Add form responses to an Excel worksheet

In this example, you create a flow from blank. Continuing with the scenario from our earlier examples, we'll use the flow to record employees' names and vacation dates in an Excel table when they submit their summer vacation form.

1. Create a workbook in Excel Online. Add a table with one column for each question on your form. Save and close the workbook.
2. In Power Automate, create an automated cloud flow from blank. Select the Microsoft Forms **When a new response is submitted** trigger.
3. In the first step in the flow, **When a new response is submitted**, select your form in the **Form Id** box.
4. Add this step to your flow:
  - Search for **forms** and select **Microsoft Forms**.
  - Select **Get response details**.
  - Select your form in the **Form Id** box.
5. Add this step to your flow:
  - Search for **profile** and select **Office 365 Users**.
  - Select **Get user profile (V2)**.
  - In the **User (UPN)** box, select the dynamic content **Responders' Email**. This will look up the responder's name by the email address on the form.
6. Add this step to your flow:
  - Search for **excel** and select **Excel Online (Business)**.
  - Select **Add a row into a table**.
  - Select the **Location** and **Document Library**.
  - Select the folder icon and browse to the Excel workbook you created earlier.
  - Select the **Table**.
  - In each column in the table, select the corresponding dynamic content.
7. Select the flow name at the top of the Power Automate canvas and change it as you like.
8. Save and test your flow.



You can use a template to [add an approval step before a form response is added to the Excel table](#).

## Get an attachment from a form and send it in an email

In this example, we'll create another flow from blank. We'll use the flow to create a share link for a file that's uploaded on our summer vacation form, and then email the link.

4. Share a picture of your ideal summer vacation destination! (Non-anonymous question ⓘ)

↑ Upload file

File number limit: 1 Single file size limit: 10MB Allowed file types: Word, Excel, PPT, PDF, Image, Video, Audio

## Select your form

1. In Power Automate, create an automated cloud flow from blank.
2. Select the Microsoft Forms **When a new response is submitted** trigger.
3. In the first step in the flow, **When a new response is submitted**, select your form in the **Form Id** box.
4. Add a step to your flow:
  - Search for **forms**, and then select **Microsoft Forms**.

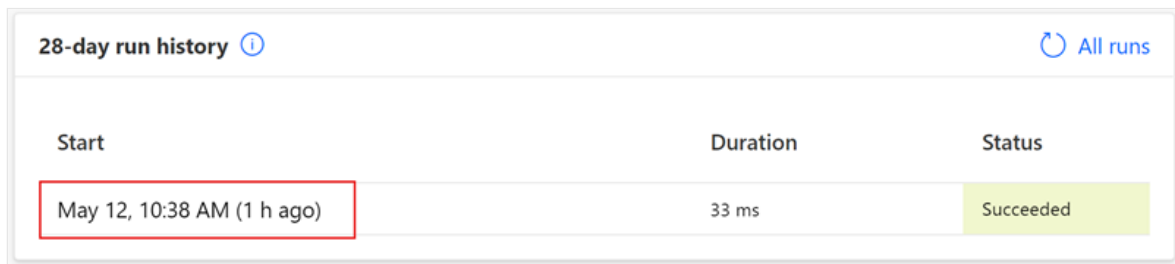
- Select **Get response details**.
- Select your form in the **Form Id** box.

## Use a JSON schema to find the uploaded file

1. Save and test your flow. Be sure to upload a file to your form.


This step allows Power Automate to use the test run to generate a sample JSON schema for the uploaded file.

2. On your flow's information page, under **28-day run history**, select the test run.



| Start                      | Duration | Status    |
|----------------------------|----------|-----------|
| May 12, 10:38 AM (1 h ago) | 33 ms    | Succeeded |

3. Expand the **Get response details** step and copy the contents of the file upload output.

 Get response details 0s

---

**INPUTS** Show raw inputs >

Form Id

Response Id

---

**OUTPUTS** Show raw outputs >

What date do you plan to start your vacation?

What date do you plan to return to the office?

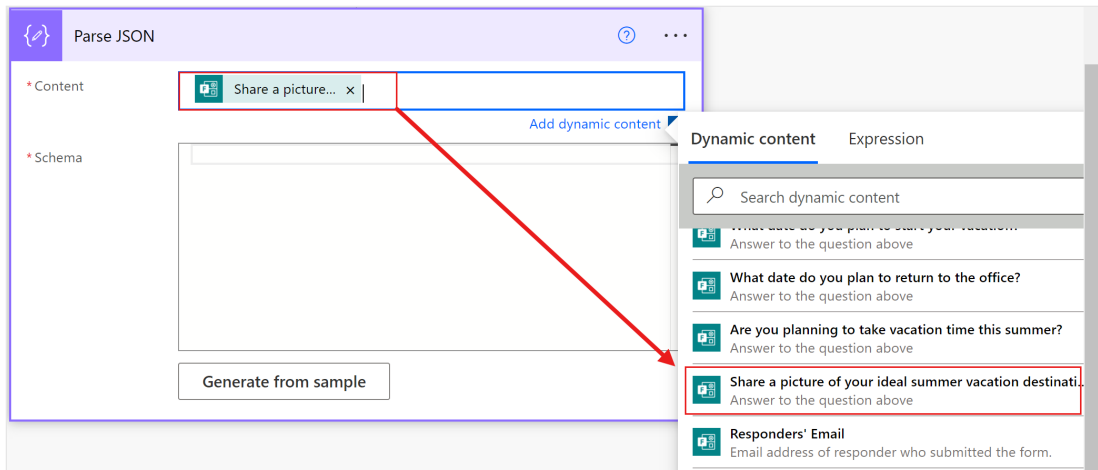
Share a picture of your ideal summer vacation destination!

Are you planning to take vacation time this summer?

4. In the upper-right corner of the window, select the **Edit** pencil icon to open the flow canvas.

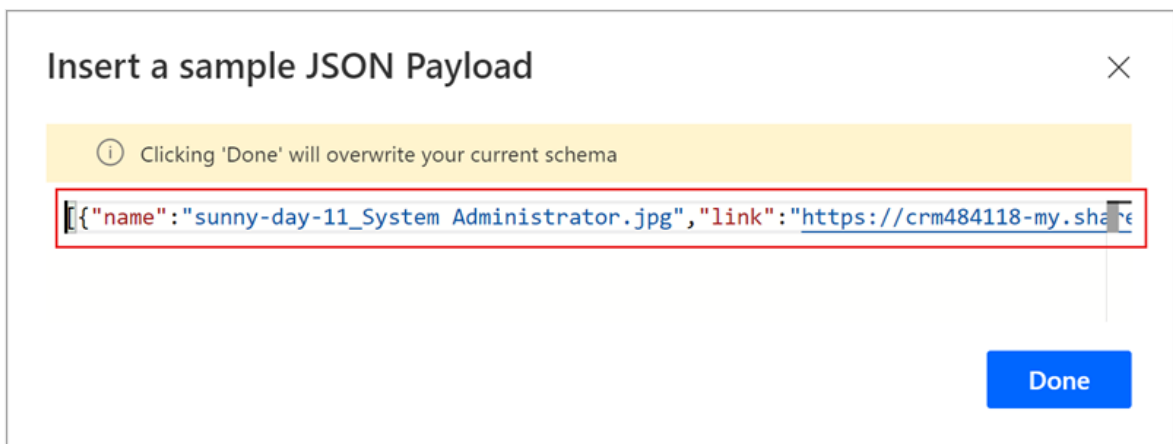
5. Add a step to your flow:

- Search for "parse" and select **Parse JSON**.
- In the **Content** box, select the dynamic content that corresponds to the file upload option on the form.

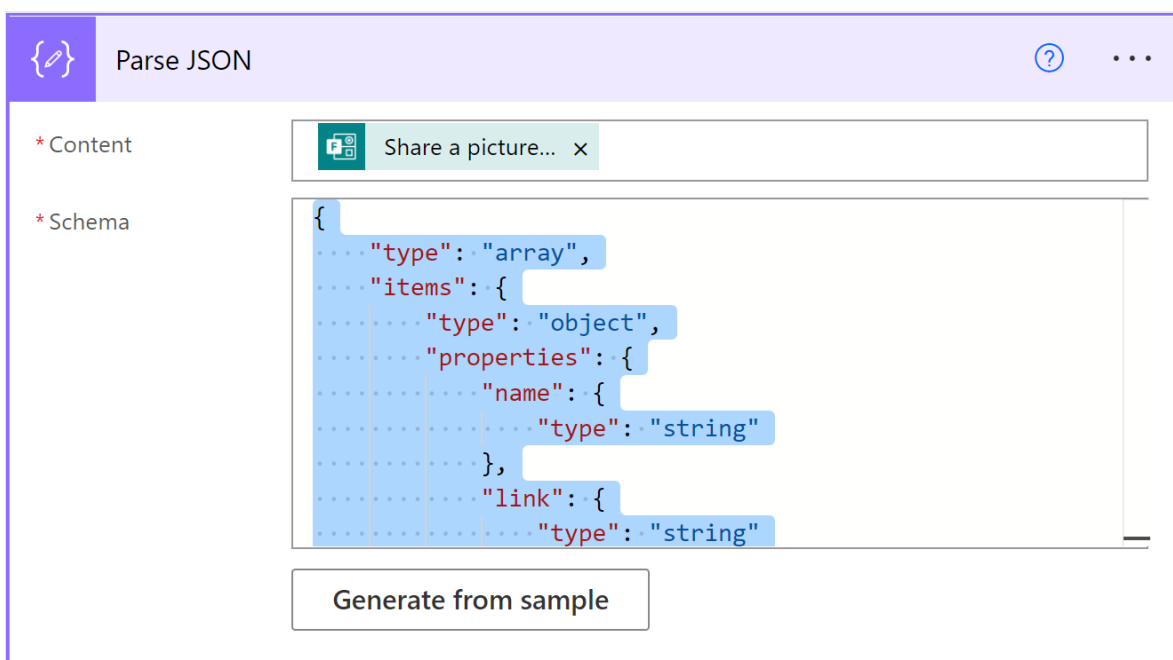


6. Select **Generate from sample**.

7. Under **Insert a sample JSON payload**, select the box and paste the file upload output you copied earlier, and then select **Done**.



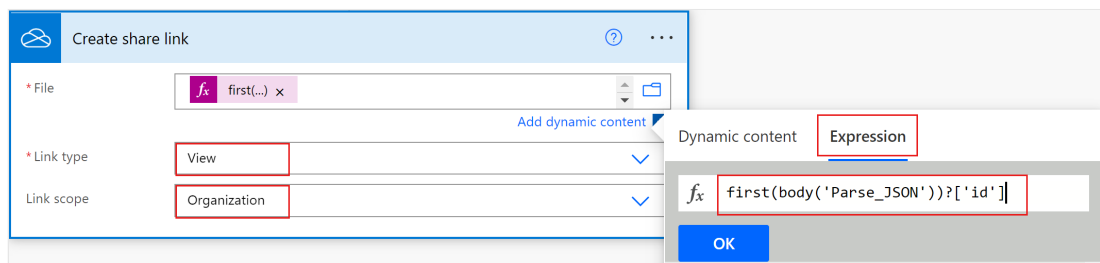
The **Parse JSON** action should look something like this after you select **Done**:



# Create a share link and email the URL

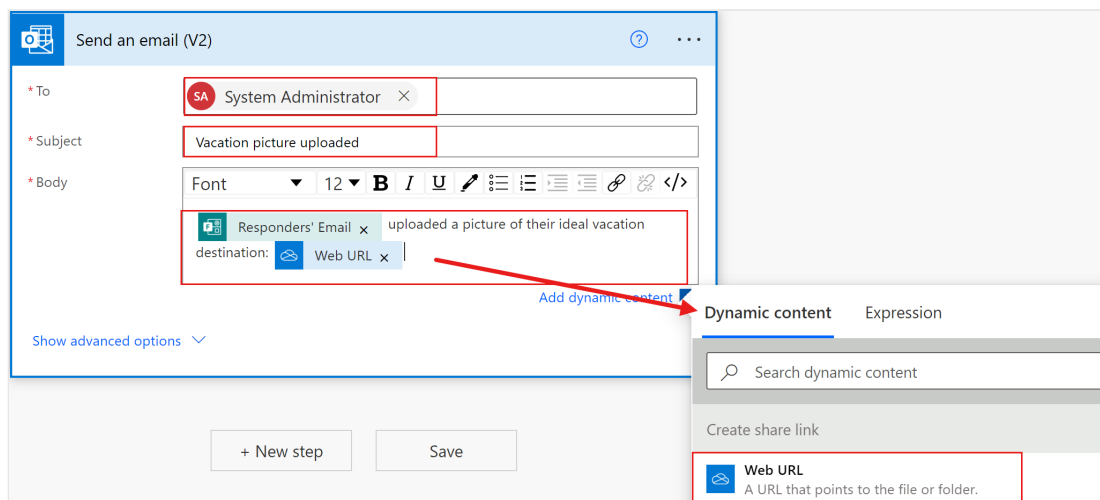
1. Add a step to your flow:

- Search for "create share link" and select the OneDrive for Business action **Create share link**.
- Select the **File** box. The dynamic content panel opens. Select the **Expression** tab.
- Type the following expression: `first(body('Parse_JSON'))?['id']`
- Select the **Link type** and **Link scope**.
- Select **OK**.



2. Add a step to your flow:

- Search for "send email" and select the Office 365 Outlook action **Send an email (V2)**.
- Enter the recipients, subject, and body of the email. Select dynamic content to include details from the form response in your email.



## Convert the URL to a clickable link



To make the URL of the shared file a clickable link in the email, you'll need to use the HTML editor and an anchor tag:

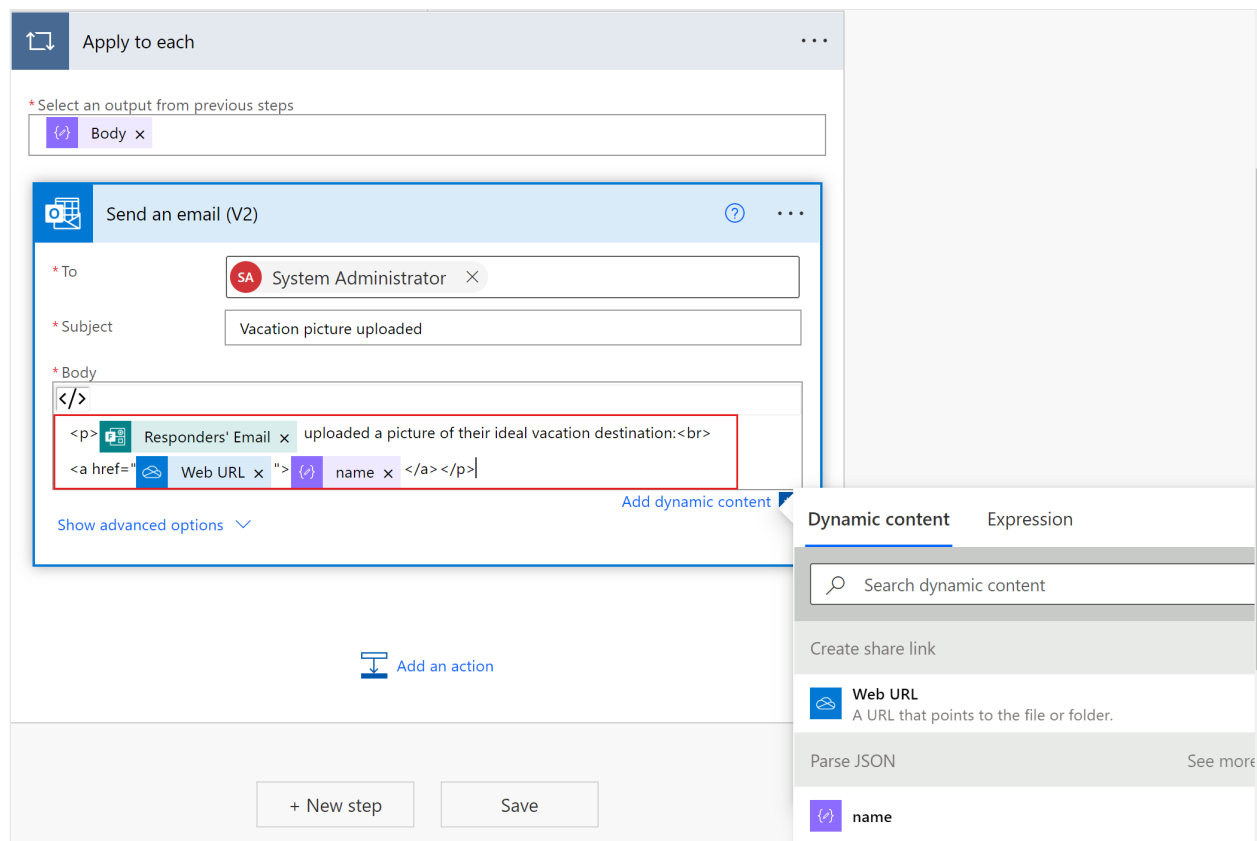
1. In the email body toolbar, select the **HTML view** icon (</>).
2. Enclose the dynamic content **Web URL** and **name** in an anchor tag to turn them into a link and the link title, respectively.

In this example, you entered the following HTML in the email body, where text in curly brackets indicates the dynamic content:

```
HTML

<a href="{WebURL}">{name}</a>
```

Here's an example:



You can combine [getting an attachment from a form](#) and [creating an approval flow](#).

# How to do more with forms in Power Automate

Article • 02/09/2023

Here are some less-common things you can do with a form in your automated flows:

- Change the format of dates in a flow
- Change the response submission time zone
- Add a group form to a flow
- Send an email based on a conditional form response
- Convert an attachment on a form to PDF or other file type
- Upload form responses to a Power BI dataset
- Create a lead from a form response

## Change the format of dates in a flow

[Learn how to customize date formats in a flow](#) .

## Change the response submission time zone

By default, the form shows the response submission timestamp in the UTC time zone.

[Learn how to convert the time zone](#) .

## Add a group form to a flow

If a group is the owner of the form you want to add to a flow, Power Automate doesn't list it in the Form Id.

Go to the form. Copy the Form Id from the URL of the form, and then add it as a custom value.

## Send an email based on a conditional form response

When you use a form in a flow, you can add a [condition](#) that's based on how a user responds to a question in the form. The condition can test a text value or a numerical value. The condition creates two parallel branches, *If yes* and *If no*, to which you can add actions.

For example, you can use a condition to email details about a specific event or a general calendar of events, depending on how customers respond on an interest form. To learn more, follow the step-by-step instructions in [Create an automated workflow for Microsoft Forms](#) <sup>↗</sup>.

## Convert an attachment on a form to PDF or another file type

Add your form to a flow, and then add the following actions.

- [Data Operation - Select](#)
- [Data Operation - Create HTML table](#)
- [OneDrive for Business - Create file](#)
- [OneDrive for Business - Convert file](#)

## Upload form responses to a Power BI dataset

Learn how to [turn Forms surveys into insights with Power Automate and Power BI](#) <sup>↗</sup>.

## More information

- [Troubleshoot common issues](#)
- [Microsoft Forms - known issues and limitations](#)

# Troubleshoot known issues with forms in flows

Article • 12/16/2022

Review the following troubleshooting tips in your form in a flow isn't working as you expect.

## Limitations

Make sure you aren't trying to make a form do something it can't. For information about the limitations of forms, go to [Microsoft Forms - known issues and limitations](#).

## Known issues

### My flow doesn't work or has stopped working

Make sure that your form still exists in the same location.

You might have reached a limit for the connector or for the product. For the Microsoft Forms connector, you're limited to 300 API calls per connection within 60 seconds and one trigger poll every 86,400 seconds. Also check the [response limits](#) for Microsoft Forms.

### I'm getting an invalid connection error

Verify the throttling limits for all connectors in your flow. You can find the throttling limits for each connector in the reference documentation for that connector. For example, the reference documentation for the [SharePoint connector](#) is available.

Temporarily turn off your browser plug-ins, such as the Privacy Badger, that may block the cookies that Power Automate uses.

### When the email sends form responses, the files are corrupt

Make sure you aren't using a `base64()` function, since it might corrupt the files.

### Flows with forms only work sometimes

One common reason this happens is that a user entered more than 255 characters in a single-line text field in the form. Try using a multi-line text field instead.

## Form created by another team isn't listed as an option in Form Id

Check whether the form is listed in the Microsoft Forms **Shared with me** tab.

You can also check the [transfer ownership of the form](#) <sup>↗</sup>, especially if members of the team will leave the company.

## The Form Id field lists duplicate form names

The Form Id list picks up forms that you have deleted but which are still in the Recycle Bin. In Microsoft Forms, delete forms you no longer need, and then empty the recycle bin.

## Unable to find the correct Form Id

Go to your form. copy the Form Id from the URL of the form, and then add it as a custom value.

## I don't get an attachment for some of my approvals

The approval action limits the size of file attachments in email to 5 MB. For attachments that are larger than 5 MB, the approval action redirects approvers to check for the attachment on the Power Automate **Action items > Approvals** page.

## Send email action looks stuck in my flow

If you're using the Mail connector in your flow, try using the Office 365 Outlook connector instead. The Mail connector has a limit of 100 API calls per 24 hours. The Outlook connector has a limit of 300 API calls per 60 seconds, which means that you're much less likely to reach the limit.

# Overview of how to integrate Power Automate flows with Dataverse

Article • 03/07/2024

With [Microsoft Dataverse](#), you can store and manage data for business applications and integrate natively with other Microsoft Power Platform services like Power BI, Power Apps, Microsoft Copilot Studio, and AI Builder from your [cloud flows](#).

The Microsoft Dataverse connector provides [several triggers](#) to start your flows and [many actions](#) that you can use to create or update data in Dataverse while your flows run. You can use Dataverse actions even if your flows don't use a trigger from the Dataverse connector.

Use the Microsoft Dataverse connector to create cloud flows that start when data changes in Dataverse tables and custom messages. For example, you can send an email whenever a row gets updated in Dataverse.

## Overview of triggers

The Microsoft Dataverse connector provides the following triggers to help you define when your flows start:

- When a row is created, updated, or deleted
- When an action is performed
- When a flow step is run from a business process flow

## Overview of actions

The Microsoft Dataverse connector provides the following actions to help you manage data in your flows:

- Create a new row
- Update a row
- Search rows with relevance search
- Get a row
- List rows
- Delete a row
- Relate rows

- Unrelate rows
- Execute a changeset request
- Get file or image content
- Upload file or image content
- Perform a bound action
- Perform an unbound action

The screenshot displays the 'Actions' tab in the Microsoft Dataverse interface. At the top, there are three tabs: 'Triggers', 'Actions' (which is selected and underlined), and 'Help'. To the right of these tabs is a 'See more' link. Below the tabs is a list of ten actions, each represented by a green circular icon with a white swirl. Each action entry includes the action name, a 'PREMIUM' label in a green box, and the provider 'Microsoft Dataverse'. To the right of each action is a small circular icon with an 'i' inside, likely representing an information or help icon. A vertical scrollbar is visible on the right side of the list.

| Action Name                     | Label   | Provider            | Info Icon |
|---------------------------------|---------|---------------------|-----------|
| Add a new row                   | PREMIUM | Microsoft Dataverse | i         |
| Delete a row                    | PREMIUM | Microsoft Dataverse | i         |
| Download a file or an image     | PREMIUM | Microsoft Dataverse | i         |
| Get a row by ID                 | PREMIUM | Microsoft Dataverse | i         |
| List rows                       | PREMIUM | Microsoft Dataverse | i         |
| Perform a bound action          | PREMIUM | Microsoft Dataverse | i         |
| Perform an unbound action       | PREMIUM | Microsoft Dataverse | i         |
| Predict using AI Builder models | PREMIUM | Microsoft Dataverse | i         |
| Relate rows                     | PREMIUM | Microsoft Dataverse | i         |
| Search rows (preview)           | PREMIUM | Microsoft Dataverse | i         |

# Trigger flows when a row is added, modified, or deleted

Article • 10/03/2023

The **When a row is added, modified or deleted** trigger runs a flow whenever a row of a selected table and scope changes or is created.

## Prerequisites

- To create a flow that triggers when you create, modify, or delete a row, you must have user-level permissions for create, read, write, and delete on the **Callback Registration** table.
- Additionally, depending on the scopes defined in the flow, you might need at least that level of read on the same table. You can get more information about [Environment security](#).

The following information is required to use the **When a row is added, modified or deleted** trigger.

- Trigger condition
- Table name
- Scope

### 📌 Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in [Understand the cloud flows designer with copilot capabilities](#).

#### Classic designer

Set the parameters directly on the card for the **When a row is added, modified or deleted** trigger.



## Trigger condition

The trigger condition, **Change type**, precisely defines which combination of changes to a row would run the flow.

When the flow is triggered by the creation, update, or deletion of a row, the value of `triggerOutputs()['body/SdkMessage']` will be `Create`, `Update`, or `Delete`, respectively.

If there are multiple updates to a single row in a table, Power Automate evaluates the trigger for each update, even if the values that are being updated on the row are the same as the previous value. These updates could lead to multiple flow runs.

## Table name

The **Table name** list filters the rows to indicate precisely which kind of rows should change before the flow triggers. See [Tables in Dataverse](#).

The **When a row is added, modified or deleted** trigger doesn't support triggering flows on relationships of type 1:N or N:N.

## Scope

The **Scope** list indicates those rows should be monitored to determine if the flow should be run.

Here's what each scope means:

| Scope         | Row ownership level                                                               |
|---------------|-----------------------------------------------------------------------------------|
| Business Unit | Actions are taken on rows owned by anyone in your <a href="#">business unit</a> . |

|                             |                                                                                                                                     |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Scope: Organization         | <b>Row ownership level</b><br>Actions are taken by anyone within the <a href="#">environment</a> .                                  |
| Parent: Child business unit | Actions are taken on rows that are owned by anyone in your <a href="#">business unit</a> or a <a href="#">child business unit</a> . |
| User                        | Actions are taken on rows owned by you.                                                                                             |

## Advanced options

You can set additional properties to define more granularly when the flow runs and the user profile under which it runs.

Classic designer

To access the advanced options, select **Show advanced options**.

When a row is added, modified or deleted
? ...

**\* Change type**

Choose when the flow triggers
▼

**\* Table name**

Choose a table
▼

**\* Scope**

Choose a scope to limit which rows can trigger the flow
▼

**Select columns**

Enter a comma-separated list of column unique names. The flow triggers if any of them are modified

**Filter rows**

Odata expression to limit rows that can trigger the flow, eg. statecode eq 0

**Delay until**

Enter a time to delay the trigger evaluation, eg. 2020-01-01T10:10:00Z

**Run as**

Choose the running user for steps where invoker connections are used
▼

## Filter conditions

Use filter conditions to set conditions for when to trigger flows.

## Filter columns

Use the **Select columns** box to define the specific columns of the row that should cause the flow to run when changed, as a comma-separated list of unique column names.

This property applies to the **Update** condition only. **Create** and **Delete** apply to all columns of a row.

This property isn't supported on virtual tables.

## Filter expression

The filter expression provides a way for you to define an OData style filter expression to help you to define the trigger conditions even more precisely. The flow runs only when the expression evaluates to *true* after the change is saved in Dataverse. In the following examples, the flow triggers when `firstname` is updated to "John".

Examples for **Filter rows**:

```
firstname eq 'John'
```

```
contains(firstname, 'John')
```

To learn how to construct these filter expressions, go to the examples in [standard filter operators](#) and [query functions](#).

Unlike the examples in the reference links, your expression must not contain the string `$filter=`. This string applies only when you use the APIs directly.

## Wait condition using delay until

Use an OData-style time stamp in the **Delay until** property to delay the flow trigger until a specific UTC time.

The key benefit of using the Dataverse **Delay until** property instead of the standard **Delay until action** is the Dataverse **Delay until** property never expires, allowing the flow run to wait for long periods of time.

## User impersonation using Run As

The flow owner must have the Microsoft Dataverse privilege **Act on Behalf of Another User** (`prvActOnBehalfOfAnotherUser`). The **Delegate** security role includes this privilege by default. You can enable it on any security role. For more details, go to [Impersonate another user](#).

When you create flows with the **When a row is added, modified or deleted** trigger, you can set each Microsoft Dataverse action in the flow to be performed using the context of a user, other than the flow owner.

Follow these steps to impersonate a user.

#### Classic designer

1. In the designer, select a value for **Run as** to tell Microsoft Dataverse which user's context you intend to use for subsequent Dataverse actions.
2. For each Dataverse action that you want to run as a different user, select the ellipses (...) in the upper-right corner and then select the **Use invoker's connection** setting.

For the steps in which it isn't selected, the default user is assumed. This calls the underlying APIs as per the selected user, and not as the flow owner. If nothing is specified, it defaults to the flow owner who created the flow—essentially, the author.

Here are the other options:

- **Flow owner:** The user who created the flow.
- **Row owner:** The user who owns the Microsoft Dataverse row that underwent a change, causing the flow to be triggered. If a row is owned by a team, then this option falls back to run as the flow owner.
- **Modifying user:** The user that took the action on the Microsoft Dataverse row, causing the flow to get triggered or modified.

Additionally, instant flows allow running the steps of any other [connector](#) such as [Microsoft Teams](#), [Microsoft 365 Outlook](#), or [SharePoint](#) in the same flow using the invoker's connection. To do so, follow these steps:

1. Go to the flow overview page.
2. Select **Edit** on the **Run only users** settings.
3. In the **Manage run-only permissions** pane, go to the **User and groups** tab, and then select **Provided by run-only user** under the **Connections Used** list.

# Trigger flows with actions

Article • 12/16/2022

You can create flows that trigger based on a Dataverse action that's included in both a [Catalog](#) and a [Category](#).

Additionally, your role needs [permissions](#) to read it, which may require read access to the *sdkmessage*, *customapi*, or *workflows* tables in Dataverse.



As the name suggests, this trigger runs the flow whenever a specific Dataverse action is performed. A Dataverse action is distinct from a Power Automate action. In Dataverse, custom process actions, or simply actions, are a way of extending out of the box operations on data. You can use them to define reusable custom business logic. To learn more, see [Work with actions](#) and [Use Custom Process Actions with code](#). To learn how to run Dataverse actions from Power Automate, see [Perform bound or unbound actions](#).

Here are the input fields for the trigger.

- **Catalog** – used to organize and manage Dataverse actions, similar to the way you use folders to organize files.
- **Category** – used as a sub-classification within a catalog.
- **Table name** – used to filter the available actions by their associated table (bound actions), or to filter global actions (unbound actions). For unbound actions, select *(none)*.
- **Action name** – used to identify the action that triggers the flow each time it runs successfully. The list of available actions is filtered by the catalog, category, and table name.

When an action is performed (preview)

- \* Catalog: Finance and Operations
- \* Category: Sales Order Header
- \* Table name: Choose a table to filter actions.
- \* Action name: (none), Account

## Using dynamic content and action inputs / outputs

A Dataverse custom action is meant for custom business logic, it accepts input parameters and returns output parameters. When this trigger runs, these parameters are available as dynamic content in the flow and can be used in subsequent steps.

When an action is performed (preview)

Send an email (V2)

- \* To: ActionInputs a...
- \* Subject: Your order has been confirmed!
- \* Body:
 

Font 12 **B** *I* U [Rich Text Editor Icons]

Hello ActionInputs account name

Your order for ActionInputs account accountnumber has been ActionOutputs new\_Confirmorder\_output1

Thank you,  
Customer Support Team

Show advanced options


Here's the naming scheme for the parameters.

- The prefixes *ActionInputs* and *ActionOutputs* specify whether it is an input or output parameter.


- The next literal is the name of the parameter.
- For complex data types such as an entity object, the last literal is the column name, for example, *donotfax*.

Dynamic content   Expression

When an action is performed (preview)

-  ActionInputs new\_Confirmorder\_input1

---

-  ActionInputs account donotfax

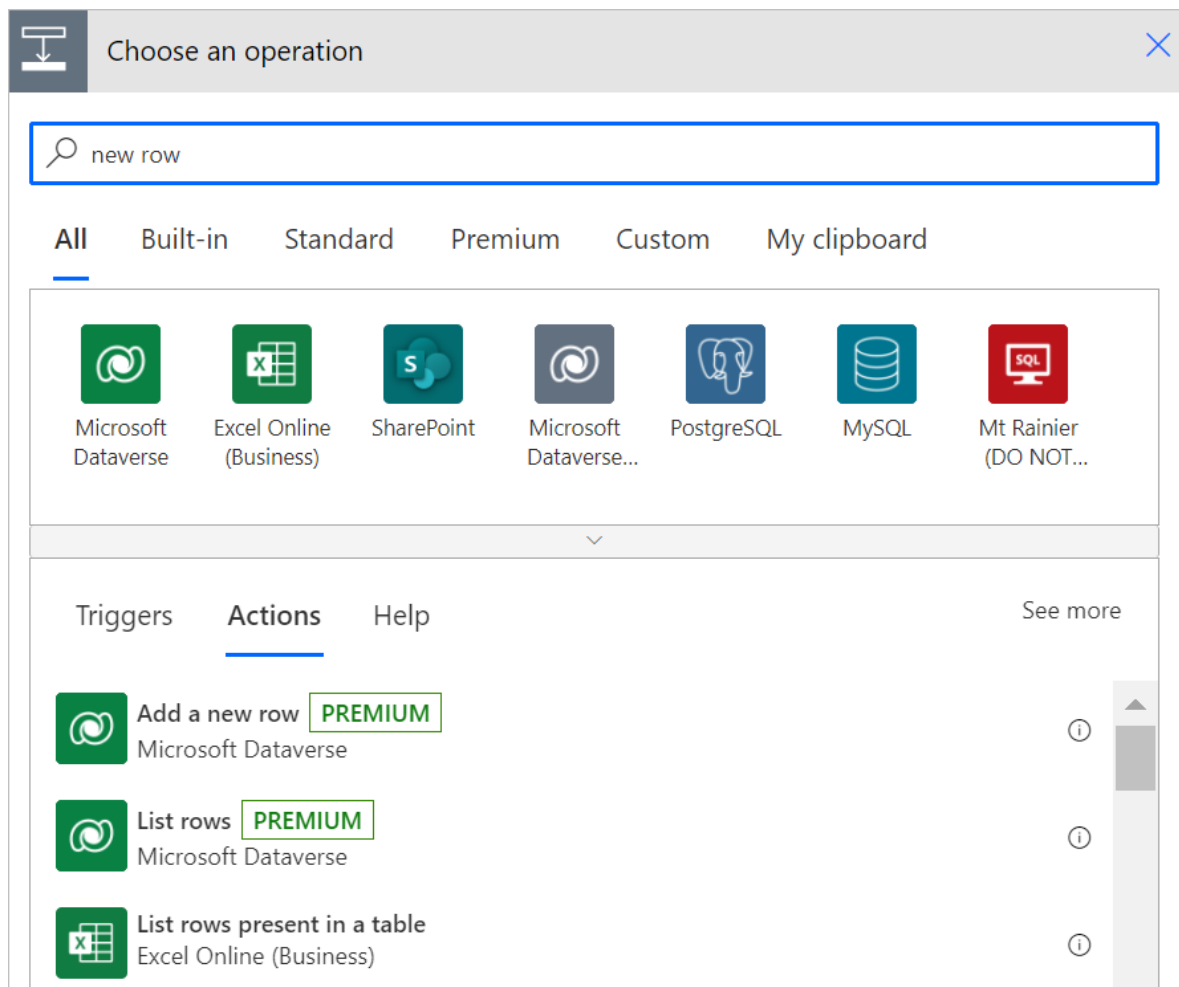
# Use a flow to add a row in Dataverse

Article • 02/09/2023

Use the **Add a new row** action to add a new row in Microsoft Dataverse.

Follow these steps to add a new account in Dataverse when you receive an email to your sign-up address, as shown in the following image:

1. Create a flow with the **When a new email arrives (V3)** trigger to your flow.
2. Select **New step** to add an action to your flow.
3. Enter **new row** into the **Search connectors and actions** search box on the **Choose an operation** card.
4. Select **Microsoft Dataverse**.
5. Select **Add a new row** action.



6. Select the **Accounts** table in the **Add a new row** card.



When a new email arrives (V3)

+

Add a new row Show options

\* Table name  ▼

- aaa
- Accounts
- ACIViewMappers
- Action Approval Models
- Action Card Type

After you select a table, the card expands, displaying both optional and required items. All mandatory items display an asterisk (\*).

- Optional: If you don't see a column that you need, select **Show advanced options** at the bottom of the card to view all columns.

Add a new row Show options

\* Table name  ▼

\* Account Name

Address 1: City

Address 1: Street 1

Address 1: Street 2

Address 1: ZIP/Postal Code

Annual Revenue

Description

Main Phone

Number of Employees

Primary Contact (Contacts)

[Show advanced options](#) ▼

**Tip**

You can use outputs from previous triggers and actions in the **Dynamic content** selector, as shown in the following image, or modify them by building an expression as outlined in [Use expressions in flow actions](#).

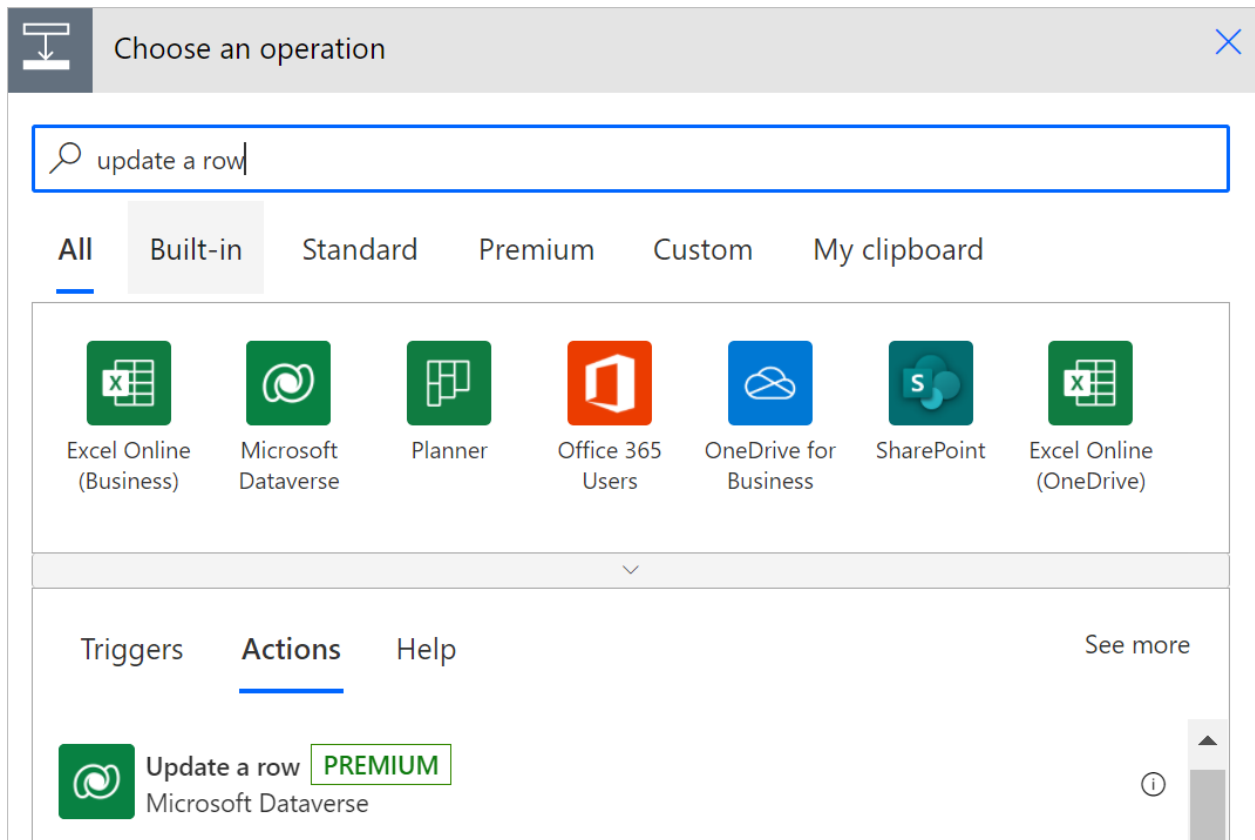
The screenshot displays the Microsoft Power Automate interface. At the top, a flow step is titled "When a new email arrives (V3)". Below this, a table named "Accounts" is shown with several columns: "Account Name", "Address 1: City", "Address 1: Street 1", "Address 1: Street 2", "Address 1: ZIP/Postal Code", "Annual Revenue", "Description", and "Main Phone". Each column has a placeholder text indicating the type of information to be entered. The "Account Name" column is highlighted with a blue border, and a blue box is overlaid on it containing the text "Type the company or business name." To the right of this box is a link that says "Add dynamic content".

On the right side of the interface, a panel titled "Add dynamic content from the apps and connectors used in this flow." is visible. This panel has a "Hide" button and two tabs: "Dynamic content" (which is selected) and "Expression". Below the tabs is a search bar labeled "Search dynamic content". Underneath the search bar, a list of dynamic content items is shown, including "When a new email arrives (V3)" and "From" (with the description "The mailbox owner and sender of the message").

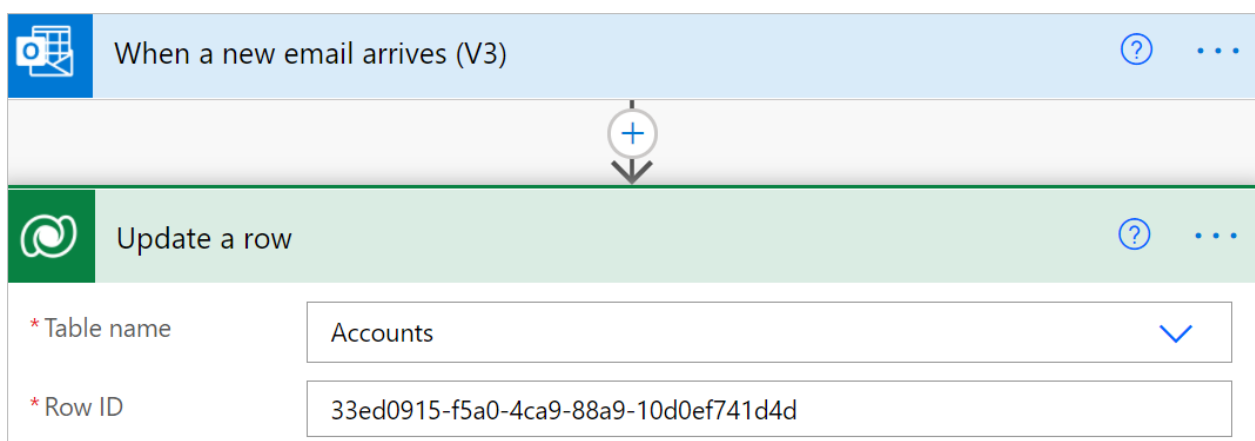
# Use a flow to update a row

Article • 12/16/2022

Use the **Update a row** action to make changes to a row in Microsoft Dataverse.



For example, you can create a flow that updates an **Account** in Dataverse when you receive an email, as shown in the following image.



## Update a row

After you select a table, the action card displays a list of inputs for the row Id that's related to the columns in the table to update. An asterisk (\*) indicates the mandatory columns. The **Row Id** column is the unique Id for the row that's being updated. If you

provide a row Id that doesn't exist or generated with the **guid()** expression, the action performs an update or insert (upsert) operation, creating a new row with the Id you provide.

If you don't see a column, select **Show advanced options** at the bottom of the card. The update doesn't include columns left blank, unless a null value is provided explicitly.

# Get a row by ID from Dataverse

Article • 12/16/2022

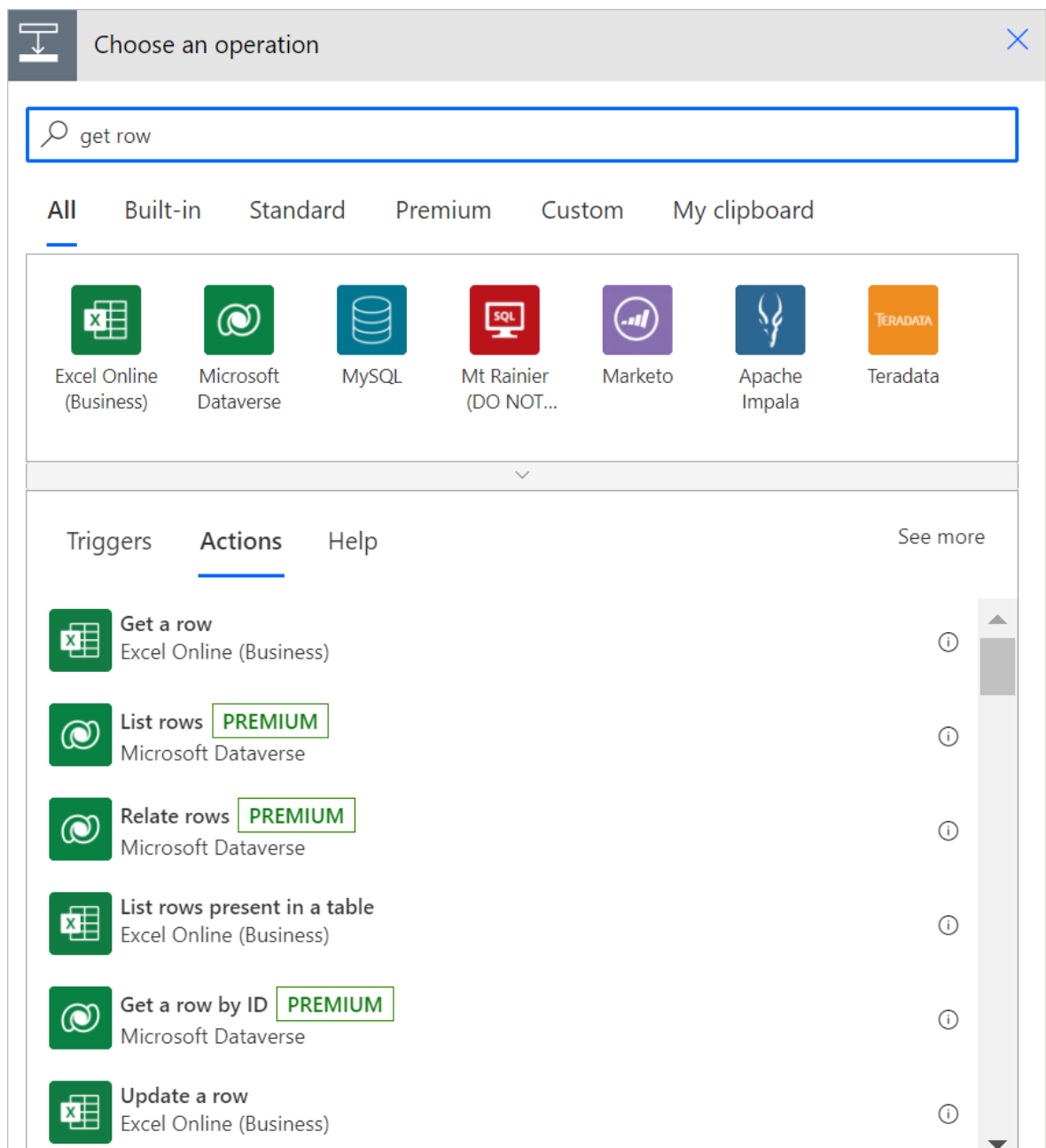
Use the **Get a row by ID** action to retrieve data from Microsoft Dataverse. This action helps you retrieve the columns of a specific row when its unique ID is known.

## Tip

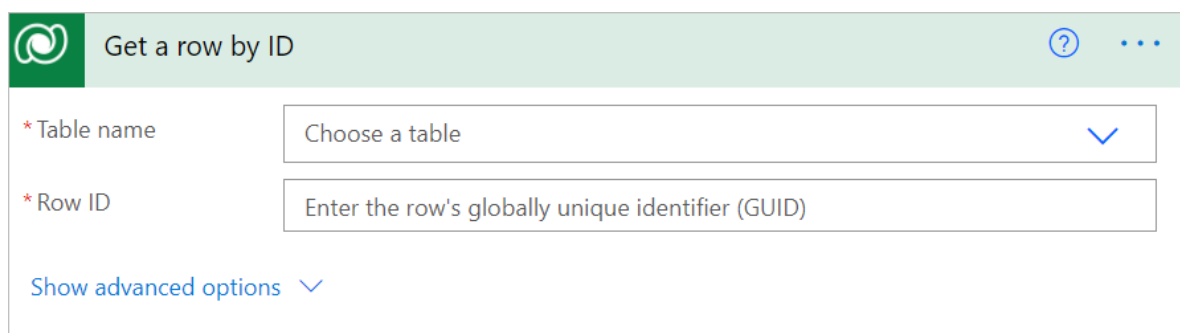
After you get a row by ID, you can use the columns from that row in all steps that come later in your flow.

Follow these steps to use **Row ID** to get a row from the Accounts table.

1. Select **New step** to add an action to your flow.
2. Enter **get row** into the **Search connectors and actions** search box on the **Choose an operation** card.
3. Select **Microsoft Dataverse**.



4. Select the **Get a row by ID** action.



5. Select the **Accounts** table from the **Table name** list, and then enter the row ID in the **Row ID** box for the row that you want to get from the Accounts table.

Get a row by ID

\* Table name Accounts

\* Row ID 33ed0915-f5a0-4ca9-88a9-10d0ef741d4d

Add dynamic content +

Show advanced options ▾

### ⓘ Note

The **Row ID** column is the unique ID of the row that you are retrieving, as shown in the following image. You can get the row Id by using a query in the actions in your flow before you need to use the row id.

## Advanced options

Select **Show advanced options** to set more properties that further define the information that should be returned.

Get a row by ID


\* Table name Accounts

\* Row ID 33ed0915-f5a0-4ca9-88a9-10d0ef741d4d

Show advanced options ▾

The advanced options are:

- Select columns
- Expand Query
- Partition Id

 Get a row by ID ? ...

|                |                                                                              |
|----------------|------------------------------------------------------------------------------|
| * Table name   | Accounts <span>v</span>                        |
| * Row ID       | 33ed0915-f5a0-4ca9-88a9-10d0ef741d4d                                         |
| Select columns | Enter a comma-separated list of column unique names to limit which columns : |
| Expand Query   | Enter an Odata style expand query to list related rows                       |
| Partition Id   | An option to specify the partitionId while retrieving data for NoSQL tables  |

[Hide advanced options](#) ^

## Select columns

Sometimes it's necessary to optimize the amount of data retrieved in a flow, especially if you're performing this step inside a loop. Instead of retrieving all columns, you can specify which ones you want to retrieve by entering unique names of those columns. Separate columns with a comma.

## Expand Query

Use **Expand Query** to specify an OData-style expression that defines which data from related tables is returned. There are two types of navigation properties:

- *Single-valued* navigation properties correspond to **Lookup** columns that support many-to-one relationships and allow you to set a reference to another table.
- *Collection-valued* navigation properties correspond to one-to-many or many-to-many relationships.

If you include only the name of the navigation property, you'll receive all the properties for the related rows. To learn more, see [Retrieve related table rows with a query](#).

To use the **Expand Query** box in a flow step, enter an Odata expression as shown in the following image. This example shows how to get the *contactid* and *fullname* columns for the *primarycontactid* of the *account*.





Show options

\* Table name

Accounts ▼

\* Row ID

33ed0915-f5a0-4ca9-88a9-10d0ef741d4d

Select columns

Enter a comma-separated list of column unique names to limit which columns are listed

Expand Query

primarycontactid(\$select=contactid,fullname)

Partition Id

An option to specify the partitionId while retrieving data for NoSQL tables

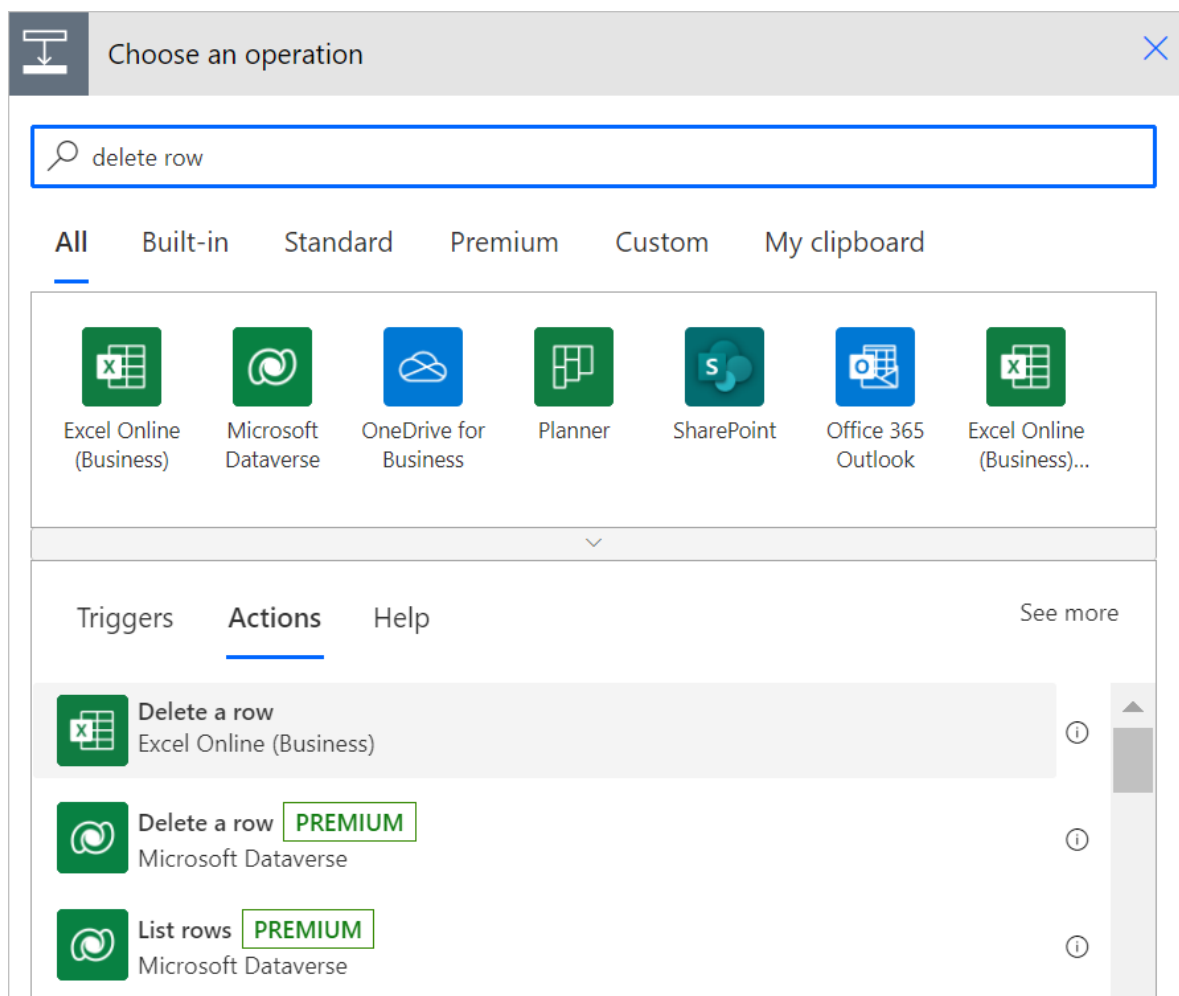
[Hide advanced options](#) ^

# Use a flow to delete a row from Dataverse

Article • 12/16/2022

Follow these steps to delete a row from Dataverse.

1. Create a flow with the **When a new email arrives (V3)** trigger to your flow.
2. Select **New step** to add an action to your flow.
3. Enter **delete row** into the **Search connectors and actions** search box on the **Choose an operation** card.
4. Select **Microsoft Dataverse**.



5. Select **Delete a new row** action.

Delete a row 2

\* Table name Choose a table

\* Row ID Enter the row's globally unique identifier (GUID)

Show advanced options

6. Select the table name, and then enter an ID in **Row ID**.

Delete a row 2

\* Table name Accounts

\* Row ID 33ed0915-f5a0-4ca9-88a9-10d0ef741d4d

Show advanced options

Add dynamic content

The **Row ID** column is the unique ID of the row that you are deleting.

#### Tip

You can retrieve the **Row ID** by using the dynamic content that's generated from earlier steps in your flow.

# Use lists of rows in flows

Article • 10/03/2023

Use the **List rows** action to retrieve multiple rows at once from Microsoft Dataverse with a structured query.

## Get a list of rows

Follow these steps to add the **List rows** action to your flow to return [up to 5,000 accounts](#) from the **Accounts** table in Dataverse.

### ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in [Understand the cloud flows designer with copilot capabilities](#).

#### Classic designer

1. Select **New step** to add an action to your flow.
2. Enter **list rows** into the **Search connectors and actions** search box on the **Choose an operation** card.
3. Select **Microsoft Dataverse** to filter the search results to display only actions and triggers for Microsoft Dataverse.
4. Select **List rows**.
5. Select the **Accounts** table from the **Table name** list.
6. Save and run your flow to confirm that no more than 5,000 rows are returned.

## Turn on pagination to request more than 5,000 rows

To get more than 5,000 rows from a query automatically, turn on the **Pagination** feature from **Settings**.

When pagination is set and the amount of rows exceeds that number of the threshold configured, the response won't include the **@odata.nextLink** parameter to request the next set of rows. Turn pagination off so that the response includes the **@odata.nextLink**

parameter that can be used to request the next set of rows. Go to [Skip token](#) to learn how to use it.

[Content throughput limits](#) and [message size limits](#) apply to ensure general service guarantees.

Classic designer

1. In the upper-right corner of the **List rows** card, select the menu (...).
2. Select **Settings**.
3. Move the **Pagination** slider to the **On** position if it's not already turned on.
4. In **Threshold**, enter the maximum number of rows requested. The maximum configurable threshold is 100,000.

Internally, this number is rounded off in increments of the default page size. For example, if that page size is 5,000, and you enter 7,000, the number of rows returned is 10,000.

## Advanced options

The advanced options for the **List Rows** action allow you to sort, filter, arrange, and extend the results of a query.

Classic designer

You can set advanced options directly on the **List rows** card. To see the options, select **Show advanced options**. When you select it, the name changes to **Hide advanced options**.

List rows
?
⋮

|                 |                                                                                 |
|-----------------|---------------------------------------------------------------------------------|
| * Table name    | Accounts <span style="float: right; font-size: 18px;">▼</span>                  |
| Select columns  | name,createdon,preferredcontactmethodcode,emailaddress1,telephone1              |
| Filter rows     | createdon ge 2021-01-01T00:00:00-00:00                                          |
| Sort By         | name desc                                                                       |
| Expand Query    | primarycontactid(\$select=contactid,fullname)                                   |
| Fetch Xml Query | Enter a Fetch XML query for advanced customization                              |
| Row count       | 10                                                                              |
| Skip token      | Enter the skip token obtained from a previous run to list rows from the next pa |
| Partition ID    | An option to specify the partitionId while retrieving data for NoSQL tables     |

Hide advanced options ^

## Select columns

Enter a comma-separated list of columns to return, such as "name,createdon,preferredcontactmethodcode,emailaddress1,telephone1" for the Account table.

## Filter rows

Use to define an OData-style filter expression to narrow down the set of rows that Dataverse returns, such as "createdon ge 2021-01-01T00:00:00-00:00" for rows with **createdon** greater than or equal to the year 2021.

Learn how to use [standard filter operators](#) and [query functions](#) to construct **Filter Query** expressions.

### i Important

Filter expressions can't contain this string, **\$filter=**, because it only applies when you use the APIs directly.

## Sort by

Use to define an OData-style expression that defines the order in which items are returned, such as "name desc". Use the **asc** or **desc** suffix to indicate ascending or descending order, respectively. The default order is ascending.

## Expand query

Use to specify an OData-style expression that defines the data that Dataverse returns from the related tables, such as `primarycontactid($select=contactid,fullname)` to use the account's **primarycontactid** to retrieve the **fullname** column from the related contact with ID **contactid** in the response.

There are two types of navigation properties that you can use in **Expand Query**:

1. *Single-valued* navigation properties correspond to lookup columns that support many-to-one relationships and allow you to set a reference to another table.
2. *Collection-valued* navigation properties correspond to one-to-many or many-to-many relationships.

If you include only the name of the navigation property, you'll receive all the properties for the related rows. To learn more, see [Retrieve related table rows with a query](#).

To use it in a flow step, enter this Odata expression in the **Expand Query** field:

`primarycontactid(contactid,fullname)`. This is how to get the *contactid* and *fullname* columns for the *primarycontactid* of each *account*.

## Row count

Use to indicate the specific number of rows for Dataverse to return. Here's an example that shows how to request 10 rows.


## Fetch Xml Query

[Aggregation queries](#) aren't currently supported when using the **List rows** action with FetchXML queries. However, the distinct operator is supported.

Classic designer

Use a [Dataverse-style FetchXML query](#), which allows more flexibility in building custom queries. These queries can be useful when you work with a table that has multiple related tables, or handling pagination. The following screenshot shows how to use FetchXML.

Type the following in the **Fetch Xml Query** field.

 List rows ? ...

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| * Table name    | Accounts <span>v</span>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Select columns  | Enter a comma-separated list of column unique names to limit which columns :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Filter rows     | Enter an OData style filter expression to limit which rows are listed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Sort By         | Enter an Odata style orderBy query to sort the rows                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Expand Query    | Enter an Odata style expand query to list related rows                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Fetch Xml Query | <pre>&lt;fetch count="10"&gt;   &lt;entity name="account"&gt;     &lt;attribute name="name" /&gt;     &lt;attribute name="preferredcontactmethodcode" /&gt;     &lt;attribute name="emailaddress1" /&gt;     &lt;attribute name="telephone1" /&gt;     &lt;link-entity name="contact" to="primarycontactid" from="contactid"&gt;       &lt;attribute name="fullname" /&gt;     &lt;/link-entity&gt;     &lt;filter&gt;       &lt;condition attribute="createdon" operator="ge" value="2021- 01-01T00:00:00-00:00" /&gt;     &lt;/filter&gt;     &lt;order attribute="name" descending="true" /&gt;   &lt;/entity&gt; &lt;/fetch&gt;</pre> |
| Row count       | Enter the number of rows to be listed (default = all)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Skip token      | Enter the skip token obtained from a previous run to list rows from the next pa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Partition ID    | An option to specify the partitionId while retrieving data for NoSQL tables                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

[Hide advanced options](#) ^

As the distinct operator isn't currently supported directly in FetchXML queries from the List rows action, the [union function](#) can be used to remove duplicate rows. For example, you can use the [Select action](#) to transform the response of the List rows connection to the specific array format you need, then create a [variable](#) with the expression `union(body('Select'),body('Select'))` to get an array with distinct rows.



# Skip token

Because Power Automate applies [content throughput limits](#) and [message size limits](#) to ensure general service guarantees, it's often useful to use *pagination* to return a smaller number of rows in a batch, rather than the default [limits on number of table rows returned](#).

The default page limit of 5,000 rows applies if you don't use pagination.

To use it, implement a loop to parse the `@odata.nextLink` value in the JSON response, extract the **skip token**, and then send another request until you've listed the number of rows that you need.

JSON

```
HTTP/1.1 200 OK
Content-Type: application/json; odata.metadata=minimal
OData-Version: 4.0
Content-Length: 402
Preference-Applied: odata.maxpagesize=3

{
  "@odata.context": "[Organization
URI]/api/data/v9.1/$metadata#accounts(name)",
  "value": [
    {
      "@odata.etag": "W/\"437194\"",
      "name": "Fourth Coffee (sample)",
      "accountid": "7d51925c-cde2-e411-80db-00155d2a68cb"
    },
    {
      "@odata.etag": "W/\"437195\"",
      "name": "Litware, Inc. (sample)",
      "accountid": "7f51925c-cde2-e411-80db-00155d2a68cb"
    },
    {
      "@odata.etag": "W/\"468026\"",
      "name": "Adventure Works (sample)",
      "accountid": "8151925c-cde2-e411-80db-00155d2a68cb"
    }
  ],
  "@odata.nextLink": "[Organization URI]/api/data/v9.1/accounts?
$select=name&$skiptoken=%3Ccookie%20pagenumber=%22%22%20pagingcookie=%22%25
3ccookie%2520page%253d%2522%2522%253e%253caccountid%2520last%253d%2522%257b
8151925C-CDE2-E411-80DB-
00155D2A68CB%257d%2522%2520first%253d%2522%257b7D51925C-CDE2-E411-80DB-
00155D2A68CB%257d%2522%2520%252f%253e%253c%252fcookie%253e%22%20/%3E"
}
```

## Partition ID

An option to specify the partitionId while retrieving data for NoSQL tables. To learn more, see [Improve performance using storage partitions when accessing table data](#).

# Connect to other environments using the Microsoft Dataverse connector (preview)

Article • 10/23/2023

[This topic is prerelease documentation and is subject to change.]

You can automate apps, data, and processes across Power Platform environments through supported actions and triggers in the Microsoft Dataverse connector.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality.
- These features are available before an official release so that customers can get early access and provide feedback.

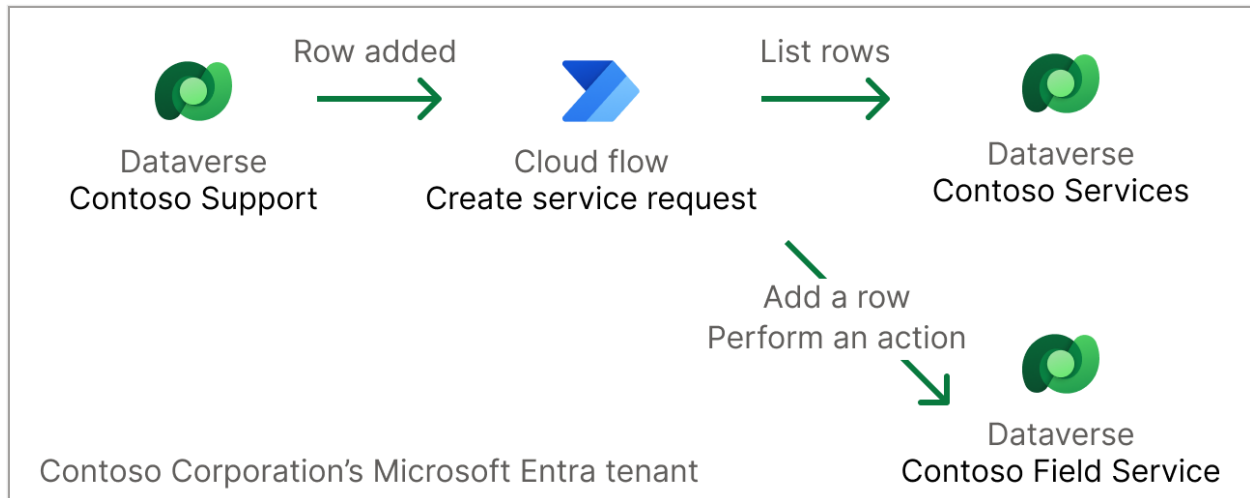
Previously, the Microsoft Dataverse connector supported the flow's current environment. The Dynamic 365 (deprecated) and Microsoft Dataverse (legacy) connectors were the available ways to connect to Dataverse in other environments from cloud flows. With the addition of the **Environment** parameter, the Microsoft Dataverse connector's triggers and action have the same flexibility of connecting to either the flow's current environment or choosing another.

During the preview of this capability, separate actions and triggers with names ending in **selected environment (preview)** are available to add to both new and existing flows. After the preview, Dataverse connector actions in existing flows will be automatically updated to include the **Environment** parameter. There's no action needed from flow owners or changes to existing flow behavior as part of this update.

## Important

The updated actions with the **Environment** parameter are rolling out as a public preview to all **Power Platform regions** by the end of October 2023.

The following diagram shows a Power Automate cloud flow being triggered when a row changes in the Contoso Support environment. It takes actions in other Contoso Services and Contoso Field Service environments to list rows, add a row, and perform an action in the example Contoso Corporation's Microsoft Entra tenant.



## Add actions that connect to other environments


1. Sign in to [Power Automate](#).
2. Create a new cloud flow such as an instant flow with the **Manually trigger a flow** trigger.

Alternatively, you can open an existing flow.

3. In the flow designer, select the plus sign (+) to add a new action.
4. Search for **dataverse**, and then select **See more** on the **Microsoft Dataverse** connector to see all available actions.

## Add an action ✕

[← Return to search](#)



### Microsoft Dataverse

Provides access to the org-based database on Microsoft Dataverse in current environment.

|                                                  |                       |
|--------------------------------------------------|-----------------------|
| Add a new row                                    | In App <span>ⓘ</span> |
| Add a new row to selected environment (preview)  | In App <span>ⓘ</span> |
| Delete a row                                     | In App <span>ⓘ</span> |
| Delete a row from selected environment (preview) | In App <span>ⓘ</span> |

5. Add one of actions that ends in **selected environment (preview)**, such as **List rows from selected environment (preview)**.
6. Use the **Environment** parameter in the action card to choose the environment to connect to. The connection you use for the action must have permissions to perform the operation in the other environment.

### List rows from selected environment (preview) ⋮ <<

Parameters Settings Code View Testing About

Environment \*

Choose an environment ▾

(Current)

Contoso Field Service

Contoso Marketing

Contoso Operations

Contoso Services

Contoso Default environment

[Enter custom value](#)

7. To connect to Dataverse in the same environment as the flow, select **(Current)** in the Environment parameter.

## Actions and triggers that can connect to other environments

The following Microsoft Dataverse connector actions support connecting to other environments. In the flow designer, the preview actions with the environment parameter have names ending in **selected environment (preview)** for each of the following actions.

- [Add a new row](#)
- [Update a row](#)
- [Delete a row](#)
- [List rows](#)
- [Get a row by ID](#)
- [Perform a bound action](#)
- [Perform an unbound action](#)
- [Relate rows](#)
- [Unrelate rows](#)
- [Upload a file or image](#)
- [Download a file or image](#)

The actions to [search rows](#) and [perform a changeset request](#) don't have preview actions with the Environment parameter yet.

The following triggers support connecting to other environments but haven't been released yet:

- [When a row is added, modified or deleted](#)
- [When an action is performed](#)

The following triggers won't support the Environment parameter since they're only applicable to the same environment the flow is located in.

- When a flow step is run from a business process flow
- [When a row is selected](#)

## Features supported by the Environment parameter in the preview actions and triggers

- Connect to other environments in the same tenant as the connection used with the action or trigger.
- Connect to environments in other tenants when using a connection to another tenant.
  - To restrict connections to other tenants from the Microsoft Dataverse connector and other connectors, you can configure Power Platform tenant isolation policies. To learn more, go to [Cross-tenant inbound and outbound restrictions](#).
- [Specify the environment dynamically](#).
- Service principal connections can be used to connect to other environments.

## Add actions that connect to other environments dynamically

To set the Environment parameter dynamically instead of selecting a specific environment, select **Enter custom value** at the end of the Environment parameter selector and provide the root URL of a Power Platform environment in the format `https://<yourenvironmentid>.crm.dynamics.com/`. The URL can be provided as a string, expression, environment variable, or as dynamic content from the trigger or other actions in the flow.

To get the root URL of an environment, you can open the details page of the environment from the [Power Platform admin center](#), or use the output of the **List user environments** action in the [Power Automate Management](#) connector.

For actions like **Add a row** that depend on the specific table schema from one environment, the schema won't be automatically retrieved when specifying the environment dynamically. The request must be manually created using the `LogicalCollectionName` of the table and the body for the request in JSON format, similar to a [Dataverse Web API request](#). For example, `accounts` and `{ "name": "Contoso Marketing" }`.

## Best practices

- For best performance, deploy flows using the Microsoft Dataverse connector to the same Power Platform environment as the data and apps they are connecting to.
  - The Microsoft Dataverse connector in Power Automate is optimized to directly connect to Dataverse through a native integration when the Environment parameter is set to `(Current)`.
  - When connecting to other environments, it connects through the [Power Platform connectors platform](#).

- Review recommended admin and governance practices around your [Power Platform environment strategy](#) when planning solutions that connect to other environments, including staging flows in separate development, test, and production environments for specific business groups and applications.

## Limitations

- Using instant flows with the Dataverse connection set to **Provided by run-only user** isn't supported yet.
- The triggers **When a row is added, modified or deleted** and **When an action is performed** don't support the Environment parameter yet.
- The actions to **Search rows** and **Perform a changeset** request don't have preview actions with the Environment parameter yet.

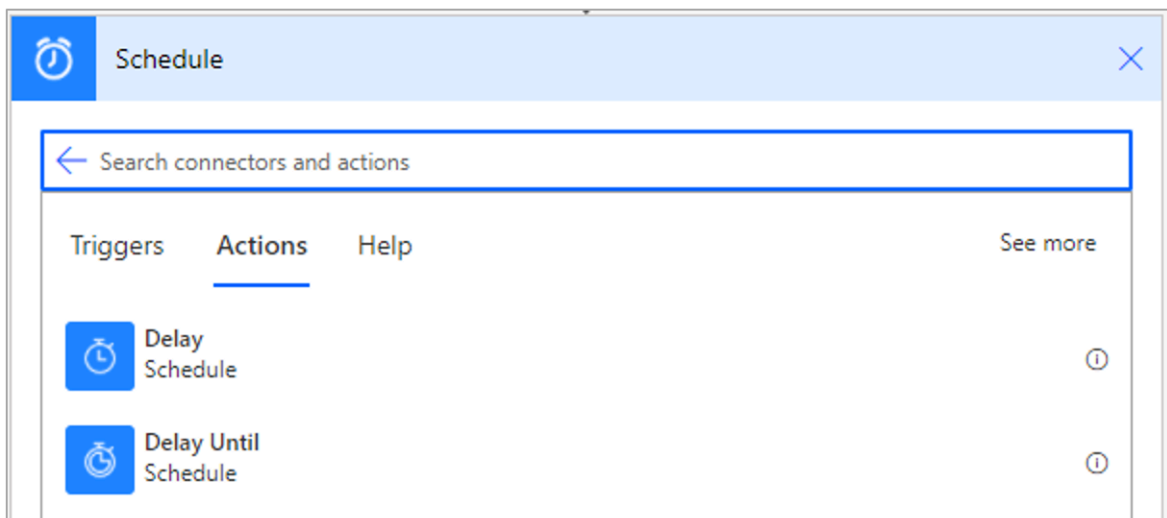


# Use wait conditions to delay flows

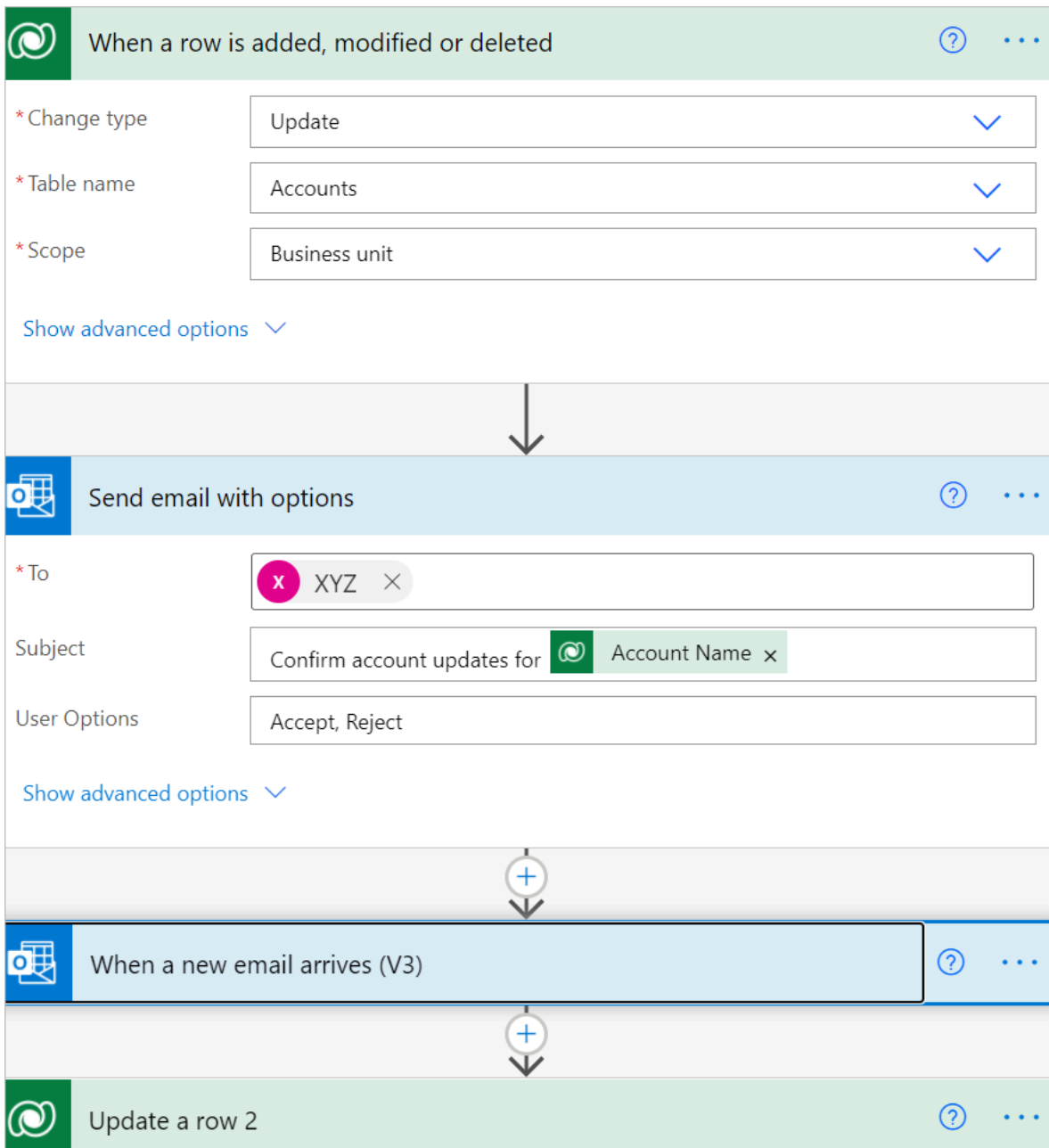
Article • 06/20/2024

The Microsoft Dataverse connector provides four ways to add wait conditions. Use these wait conditions when you need to delay processing in your flows until a particular condition is met.

- Postpone triggering the flow and the first action until a specific time. To learn more, go to [Wait condition using Postpone Until](#).
- Add a fixed delay before the next step.
- Delay an action until a specific timestamp.



- Delay an action until a specific event occurs. You can use this action from the Microsoft Dataverse connector or any other connector as a step in the middle of the flow to delay subsequent steps until a specific event occurs. For example, you can define a flow that's similar to the one in the following image to check for updates to **Account** rows in Dataverse, and then waits for an email confirmation from the **Account** manager before updating the change.



## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#)

# Perform bound actions or unbound actions

Article • 12/16/2022

## Important

In this article, the term "action" means a [Dataverse action](#). Dataverse actions are not the same as Power Automate actions. In Dataverse, you use actions to extend out of the box operations on data. You can use these actions to define reusable custom business logic.

Flows can call [Dataverse actions](#) that are available in the Microsoft Dataverse connector. These actions include everything from fulfilling a sales order to exporting a solution.

Actions represent operations that might have side effects in the database, such as creating or updating rows.

There are two types of Dataverse actions that you can use in flows.

- [Bound actions](#)
- [Unbound actions](#)

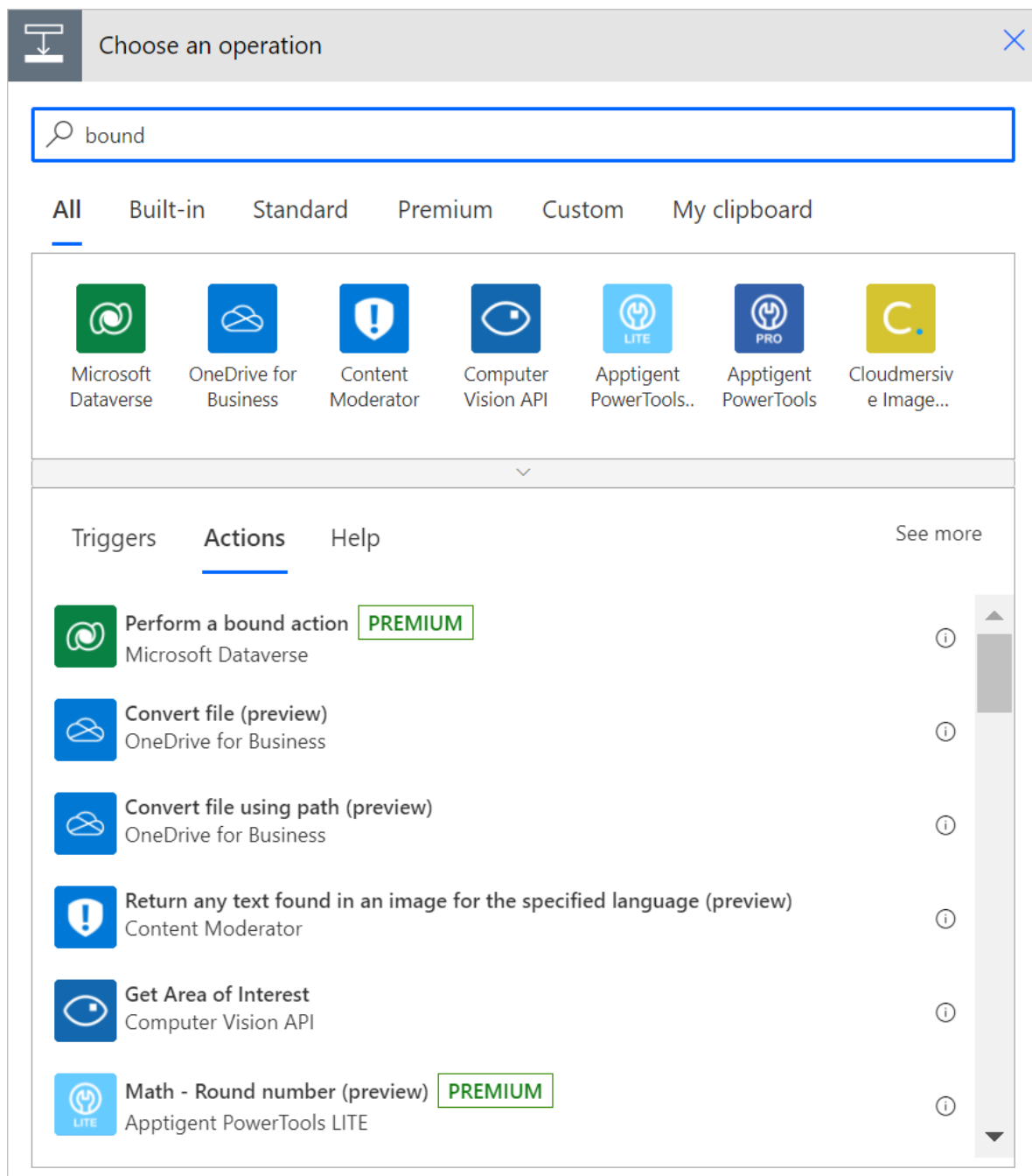
## Bound actions

*Bound actions* target a single table or a set of rows from a single table.

To perform a bound action, add **Perform a bound action** to your flow.

Follow these steps to edit one of your flows to perform a bound action.

1. After any step in your flow, select **Add new step**.
2. Enter **bound** in the search box, select **Microsoft Dataverse** from the list of connectors, and then select **Perform a bound action**.



3. In **Table name**, select the name of a table you want to use.

4. In **Action name**, select the action you'll perform.

5. In **Row ID**, enter the row in the table on which you want to perform the bound action.

Perform a bound action

\* Table name AI Models

\* Action Name Predict

\* Row ID 6ef46a1e-5da8-4243-855f-77229c75be68

version

request

requestv2

Add dynamic content +

6. Save, and then run your flow.

7. Confirm that the bound action completes successfully on the table that you selected.

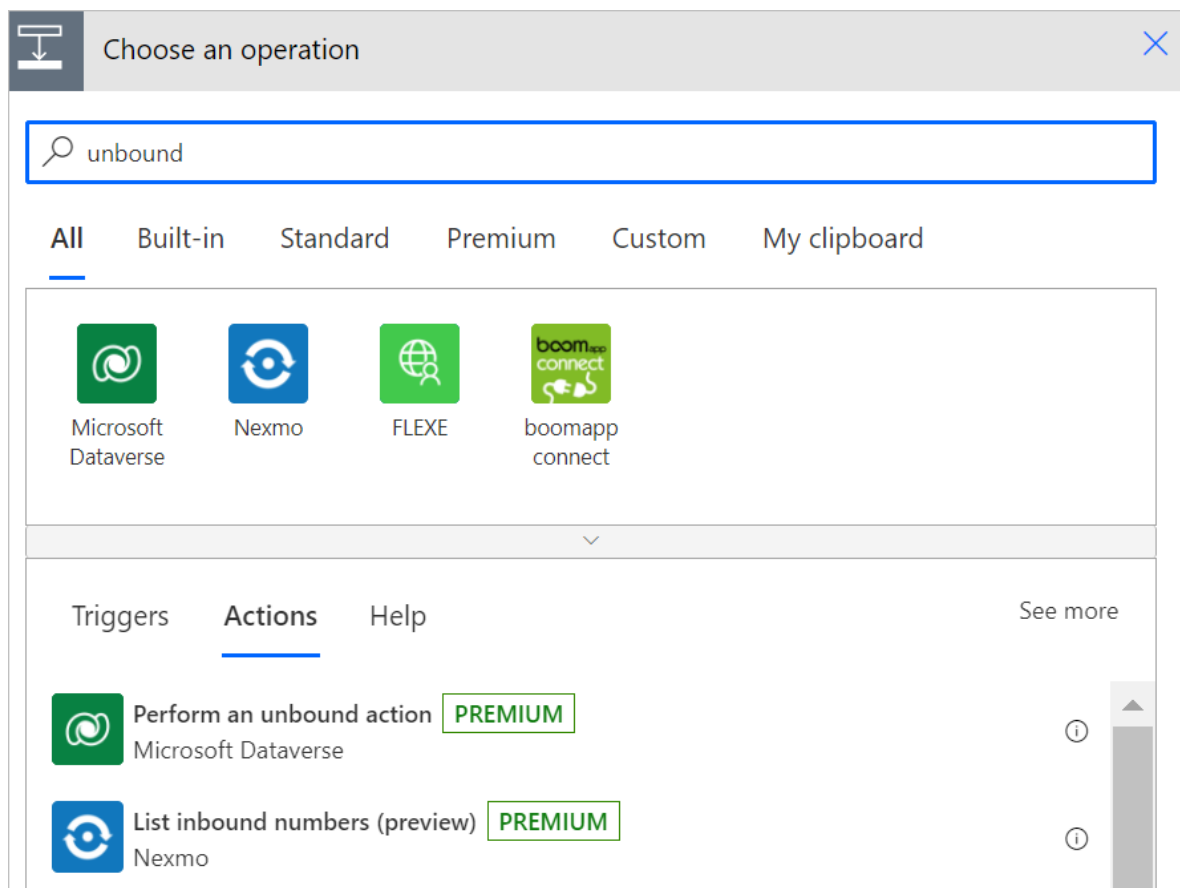
## Unbound actions

*Unbound actions* aren't bound to a table and are called as static operations. Unbound actions are performed on the entire environment, not on specific tables or rows.

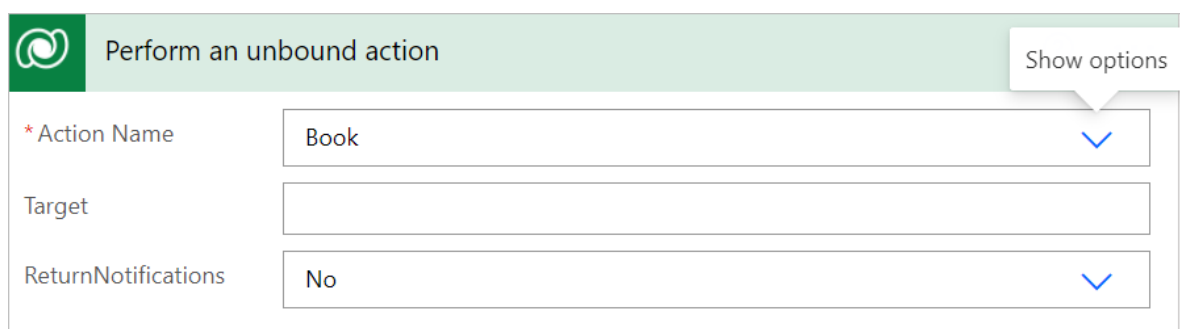
To perform an unbound action in your flow, add **Perform an unbound action** to your flow.

Follow these steps to edit one of your flows to perform an unbound action.

1. After any step in your flow, select **Add new step**.
2. Enter **unbound** in the search box, select **Microsoft Dataverse** from the list of connectors, and then select **Perform an unbound action**.



3. In **Action name**, select an action.



4. Enter or select any of the optional details on the **Perform an unbound action** card.

5. Save, and then run your flow.

6. Confirm that the unbound action completes successfully.

# Use relationships to modify rows

Article • 12/16/2022

Relationships are an important concept in the Microsoft Dataverse. Power Automate allows you to work with these relationships in a few ways.

## Modify or add rows directly with relationships

When you create or modify rows, there are columns that hold relationships. For example, when you create an account, there is a **Primary Contact** column.

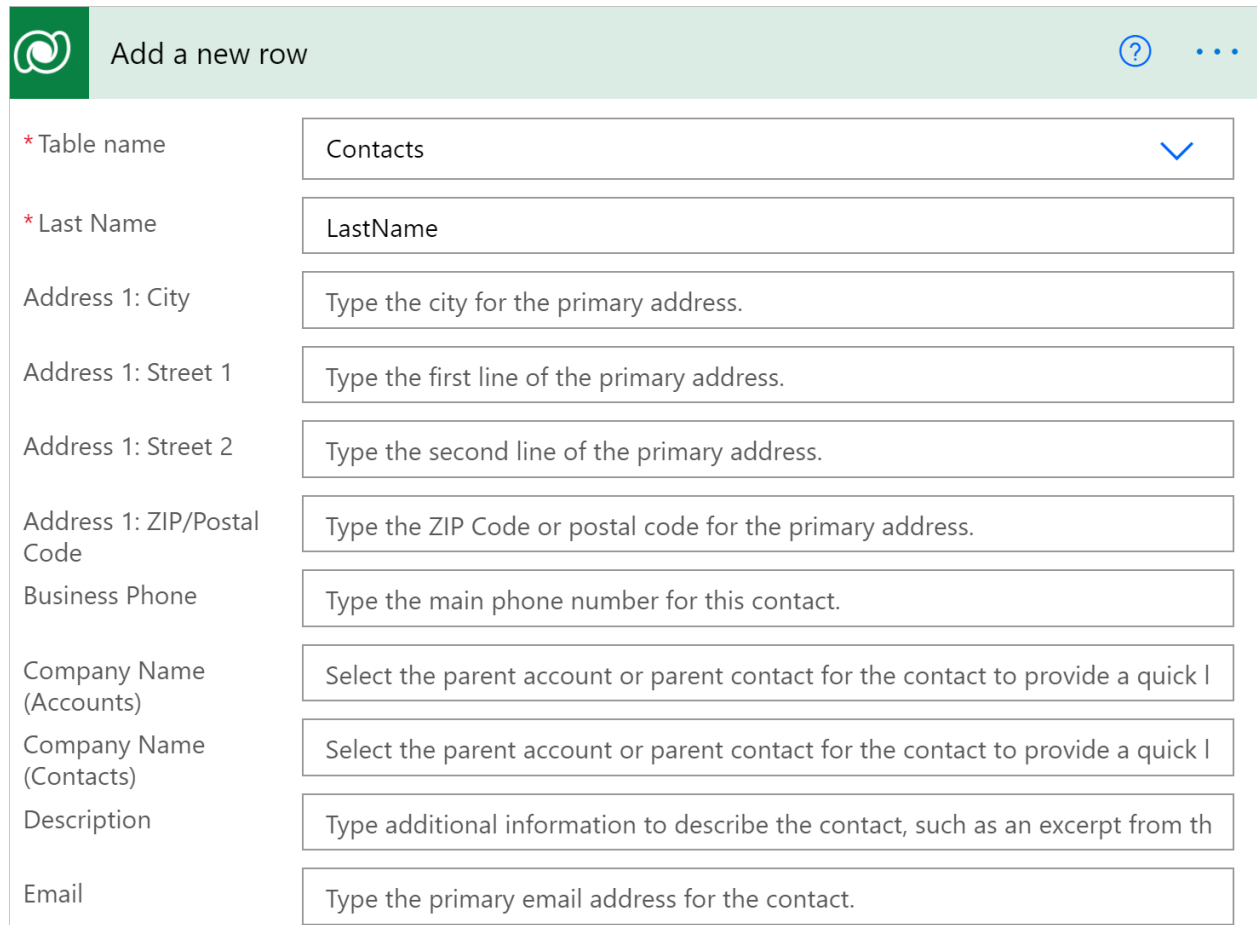
The screenshot shows the 'Add a new row' form in Microsoft Dataverse. The form is titled 'Add a new row' and contains several input fields. The 'Table name' field is set to 'Accounts'. The 'Account Name' field is set to 'Contoso'. The 'Primary Contact (Contacts)' field is highlighted with a red box, and a tooltip 'Add dynamic content +' is visible next to it. Other fields include 'Address 1: City', 'Address 1: Street 1', 'Address 1: Street 2', 'Address 1: ZIP/Postal Code', 'Annual Revenue', 'Description', and 'Main Phone'. A 'Show advanced options' link is at the bottom.

When you want to create or modify a relationship, use standard OData notation. For example, while creating an account row, you should set the **Primary contact** column to the OData ID of a contact row like this: `contacts(c96be312-4ac1-4358-99b6-1e14e2957b15)`.

**Important**

If you try to pass only the GUID from previous step, you'll get an error like this: *Resource not found for the segment <segmentname>*. The Microsoft Dataverse connector expects the full OData ID of the target row, including the type of the row.

If the lookup column is *polymorphic* (meaning it can have more than one possible target type), then the target row OData ID must be provided in the correct column. For example, the **Company name** column for **Contacts** is polymorphic and can take either an account or contact, but not both.



The screenshot shows the 'Add a new row' form for the 'Contacts' table. The form has a green header with the Microsoft Dynamics logo and the text 'Add a new row'. Below the header, there are several input fields with labels and placeholder text:

|                            |                                                                                  |
|----------------------------|----------------------------------------------------------------------------------|
| * Table name               | Contacts                                                                         |
| * Last Name                | LastName                                                                         |
| Address 1: City            | Type the city for the primary address.                                           |
| Address 1: Street 1        | Type the first line of the primary address.                                      |
| Address 1: Street 2        | Type the second line of the primary address.                                     |
| Address 1: ZIP/Postal Code | Type the ZIP Code or postal code for the primary address.                        |
| Business Phone             | Type the main phone number for this contact.                                     |
| Company Name (Accounts)    | Select the parent account or parent contact for the contact to provide a quick I |
| Company Name (Contacts)    | Select the parent account or parent contact for the contact to provide a quick I |
| Description                | Type additional information to describe the contact, such as an excerpt from th  |
| Email                      | Type the primary email address for the contact.                                  |

## Activity party relationships

*Activity parties* are a special type of relationship in Dataverse. For example, when you create an appointment, the values for **Required Attendees** and **Optional Attendees** are related to the System users table.



|                                    |                                                   |     |  |
|------------------------------------|---------------------------------------------------|-----|--|
| Activity Party Attribute Name - 1  | Required Attendees                                | ... |  |
| Activity Party Attribute Value - 1 | systemusers(c75bc527-91ef-e911-a812-000d3a35f9bf) |     |  |
| Activity Party Attribute Name - 2  | Optional Attendees                                | ... |  |
| Activity Party Attribute Value - 2 | systemusers(dae8b701-e855-4180-bca3-f7b2e61bd275) |     |  |
| + Add new item                     |                                                   |     |  |

Select **Add new item**, and then enter the required data to add multiple values for an activity party. As shown earlier in the article, you must use the OData ID syntax for `systemusers(<ID of the user>)`.

You can also pass in a list of different activity parties by toggling from item mode to array mode by using the "T" button in the upper-right corner. When you do that, you can use expressions to pass in data from a previous action, as shown in the following array:

|                  |                                                                                                                                                                                                                                                             |     |  |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--|
| Activity Parties | <pre>[   {     "participationtypemask": 5,     "partyid@odata.bind": "systemusers(c75bc527-91ef-e911-a812-000d3a35f9bf)"   },   {     "participationtypemask": 6,     "partyid@odata.bind": "systemusers(dae8b701-e855-4180-bca3-f7b2e61bd275)"   } ]</pre> | ... |  |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--|

# Use Dataverse search to retrieve rows

Article • 12/16/2022

Use the **Search rows** action in flows to retrieve data from Microsoft Dataverse by using keywords and [Dataverse search](#), which delivers fast, intelligent, and comprehensive results across tables in Dataverse.

## Prerequisites

Your admin must configure [Dataverse search](#) on your environment before you can use the search action on Microsoft Dataverse.



You can add the **Search rows** action to your flows, and then provide a keyword in **Search term** to search for that keyword across all the indexed rows in Dataverse.

You can use dynamic content from a previous step in the flow to parameterize the **Search term** box. For example, you can use a keyword that's entered in a Power Virtual Agent bot and set the following options to initiate an automated search:

The image shows two screenshots of a Power BI flow configuration. The top screenshot, titled "When Power Virtual Agents calls a flow", features a purple header and two input boxes: "Search keyword" and "Please enter your input". Below these is a "+ Add an input" button. A downward-pointing arrow indicates the flow continues to the second screenshot, titled "Search rows", which has a green header. This step includes four configuration fields: "Search term" (with a dropdown showing "Search keyword x"), "Search type" (with placeholder text "Enter whether simple or full search syntax should be used (default is simple)"), "Search mode" (with placeholder text "Enter whether any or all of the search terms must be matched (default is any)"), and "Row count" (with placeholder text "Enter the number of search results to be listed (default = 50)"). A "Show advanced options" link with a dropdown arrow is located at the bottom left of the "Search rows" configuration area.

**Note**

It can take a few hours for newly added rows to be included in the search results.

## Search type

Use the **Search type** option to provide the syntax for the search query. Use **simple** to indicate that you want to use the simple query syntax. Or, use **full** if you prefer to use the Lucene query syntax. The default query syntax is **simple**.

Take a look at the following examples or review the full list of features at [Search across table data using Dataverse search](#).

The simple query syntax supports the following functionality:

| Operator          | Description                                                                           |
|-------------------|---------------------------------------------------------------------------------------|
| Boolean operators | AND operator; denoted by +<br>OR operator; denoted by  <br>NOT operator; denoted by - |

| Operator             | Description                                                                                                                        |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Precedence operators | A search term "hotel+(wifi   luxury)" will search for results containing the term "hotel" and either "wifi" or "luxury" (or both). |
| Wildcards            | Trailing wildcards are supported; for example, "Alp*" searches for "alpine".                                                       |
| Exact matches        | A query enclosed in quotation marks " ".                                                                                           |

The Lucene query syntax supports the following functionality:

| Operator                          | Description                                                                                                                                                                                                                                                                              |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Boolean operators                 | Provides an expanded set compared to simple query syntax.<br>AND operator; denoted by AND, &&, +<br>OR operator; denoted by OR,   <br>NOT operator; denoted by NOT, !, -                                                                                                                 |
| Precedence operators              | The same functionality as simple query syntax.                                                                                                                                                                                                                                           |
| Wildcards                         | In addition to a trailing wildcard, also supports a leading wildcard.<br>Trailing wildcard - "alp*"<br>Leading wildcard - "/*.pine/"                                                                                                                                                     |
| Fuzzy search                      | Supports queries misspelled by up to two characters.<br>"Uniersty~" will return "University"<br>"Blue~1" will return "glue", "blues"                                                                                                                                                     |
| Term boosting                     | Weighs specific terms in a query differently.<br>"Rock^2 electronic" will return results where the matches to "rock" are more important than matches to "electronic".                                                                                                                    |
| Proximity search                  | Returns results where terms are within x words of each other, for more contextual results.<br>For example, "airport hotel"~5" returns results where "airport" and "hotel" are within five words of each other, thus boosting the chances of finding a hotel located close to an airport. |
| Regular expression (regex) search | For example, /[mh]otel/ matches "motel" or "hotel".                                                                                                                                                                                                                                      |

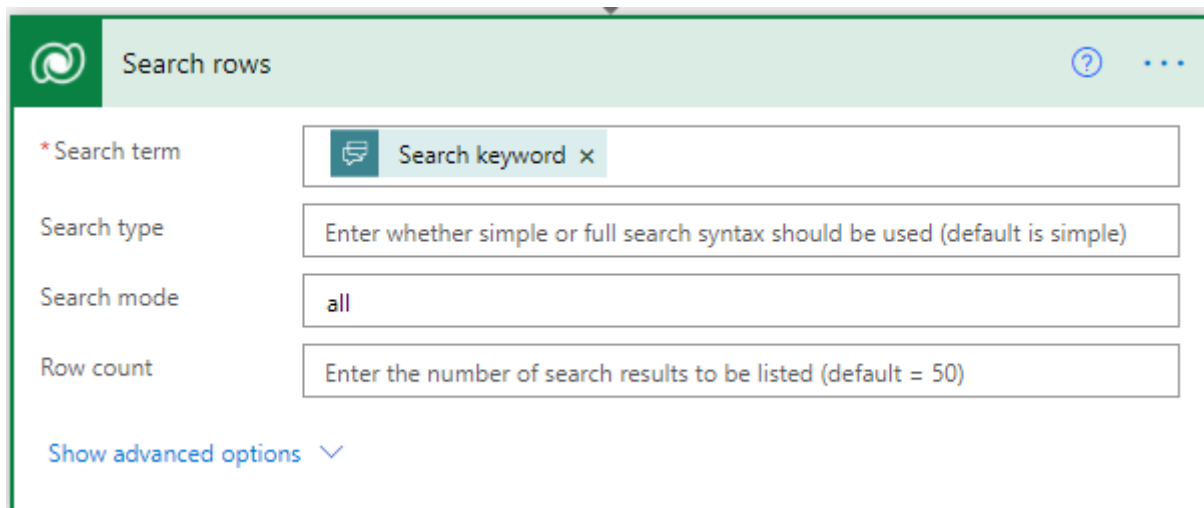
To use any of the search operators as part of the search text, escape the character by prefixing it with a single backslash (\). Special characters that be escaped include the following characters: + - & | ! ( ) { } [ ] ^ " ~ \* ? : \ /

# Search mode

You can specify whether any or all the search terms must be matched to count the document as a match. The default is **any**. It controls whether a term with the NOT operator is AND'ed or OR'ed with other terms in the query (assuming there is no + or | operator on the other terms).

- Using **any** for **Search mode** increases the recall of queries by including more results. By default, it is interpreted as "OR NOT". For example, "wifi -luxury" will match documents that either contain the term "wifi" or those that don't contain the term "luxury".
- Using **all** for **Search mode** increases the precision of queries by including fewer results. By default, it is interpreted as "AND NOT". For example, "wifi -luxury" will match documents that contain the term "wifi" and don't contain the term "luxury".

Go to [Search across table data using Dataverse search](#) for more details.



The screenshot shows a 'Search rows' interface with the following fields and options:

- \* Search term:** A text input field containing 'Search keyword' with a clear button (x).
- Search type:** A text input field with the placeholder text 'Enter whether simple or full search syntax should be used (default is simple)'.
- Search mode:** A dropdown menu currently set to 'all'.
- Row count:** A text input field with the placeholder text 'Enter the number of search results to be listed (default = 50)'.
- Show advanced options:** A link with a downward arrow.

## Advanced Options

You can optimize your search by using other advanced options as described in this section. See [Search across table data using Dataverse search](#) for more examples.

- **Row filter:** You can narrow your search by specifying filters as shown in the following image.
- **Table filter:** You can restrict your search to specified tables as shown in the following image.
- **Sort by:** Use this option to sort by specifying a column name and adding *asc* or *desc* as the suffix, as shown in the following image.

@ Search rows ? ...

\* Search term

Search type

Search mode

Row count

Row filter

Table filter Item - 1 ...

Table filter Item - 2 ...

+ Add new item

Sort by Item - 1 ...

Sort by Item - 2 ...

+ Add new item

Facet query Item - 1

+ Add new item

Skip rows

Return row count  ▼

[Hide advanced options](#) ^

## Using dynamic content and Dataverse rows

You can use the outputs of the action directly from Dynamic content. Here's the meaning of each of the parameters.


| Parameter name | Description |
|----------------|-------------|
|----------------|-------------|

| <b>Parameter name</b> | <b>Description</b>                                                                                                                                         |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Body                  | The object that represents the entire response. It contains the list of rows, total row count, and facet results.                                          |
| List of rows          | An object that represents all the rows returned.                                                                                                           |
| List of rows item     | An individual row in the list of rows, when used inside a loop.                                                                                            |
| Row search score      | The Dataverse score of a row. This score indicates how closely it matched the search keywords and conditions.                                              |
| Row search highlights | Highlights the specific keywords that matched the search keywords in the row.                                                                              |
| Row table name        | The name of the table for a single row. This action aggregates rows from all searchable tables in the environment.                                         |
| Row object id         | This is an identifier for each row. Use this identifier in conjunction with the table name in the <b>Get rows</b> action to read all the columns in a row. |
| Row object type code  | The table name identifier for the row.                                                                                                                     |


When you are building your flow, the dynamic content might appear like this image:

---


Search rows

-  **List of rows Row search score**  
Search score of row


---

-  **List of rows Row search highlights**  
Search highlights of row


---

-  **List of rows Item**


---

-  **Facet results**  
Facet results


---

-  **body**  
The search output.


---

-  **List of rows Row table name**  
Table that contains the row

---

-  **List of rows Row object id**  
Objectid of row

---

-  **List of rows Row object type code**  
Objecttypecode of row

The **Search rows** action returns many other columns for the matched rows in a variable schema, depending on [your Dataverse search configuration](#). To use these columns, parse the JSON response, and then use the dynamic outputs generated from it as shown in the following image.



Apply to each

Select an output from previous steps

List of rows x

Parse JSON

Content: Current item x

Schema

```

{
  "type": "object",
  "properties": {
    "@@search.score": {
      "type": "number"
    },
    "@@search.highlights": {
      "type": "object",
      "properties": {
        "name": {

```

Generate from sample

Append to array variable

Name: SearchResults

Value: emailaddress1 x |

Add dynamic content

Add an action

Create HTML table

Send an email (V2)

+ New step Save

Add dynamic content from the apps and connectors used in this flow. Hide

Dynamic content Expression

Search dynamic content

Parse JSON

- Body
- @search.highlights
- @search.score
- name
- sharedtoprincipalid
- statecode@StringCollection
- statuscode@StringCollection

# Relate or unrelate rows in Dataverse

Article • 12/16/2022

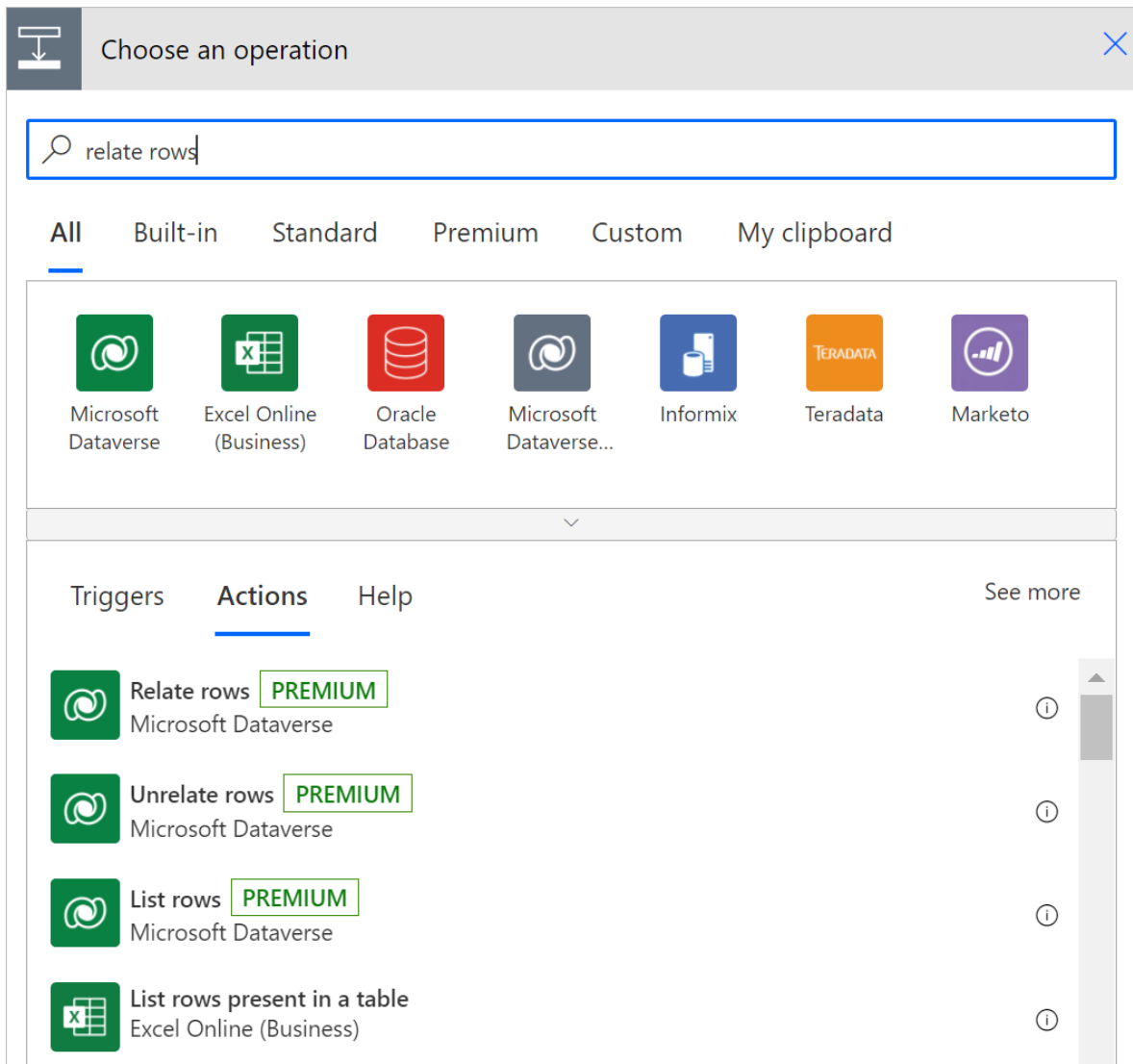
## Important

You can associate two Microsoft Dataverse rows only if they have a one-to-many or many-to-many relationship.

## Relate rows

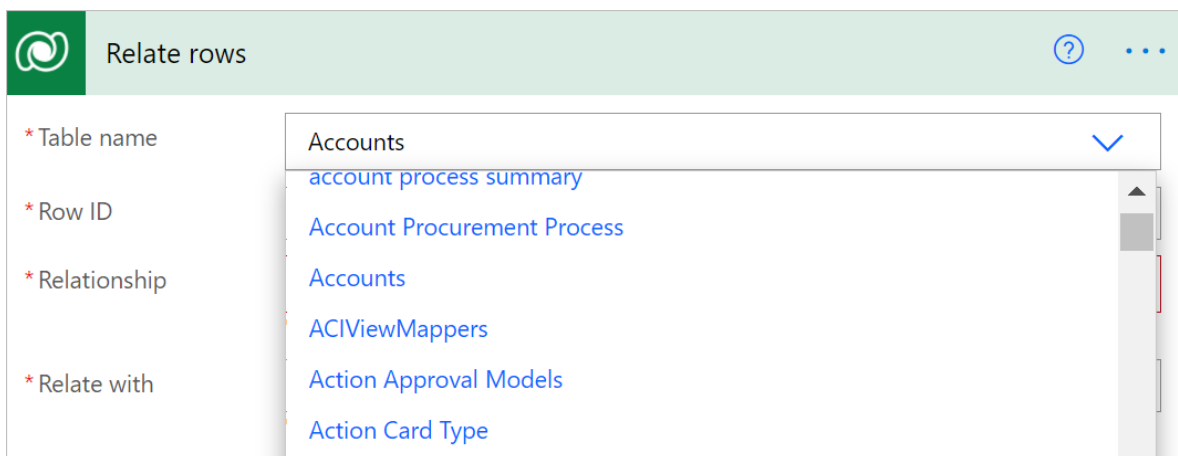
Follow these steps to associate two rows while editing your flow:

1. Select **New step** to add an action to your flow.
2. Enter **relate rows** into the **Search connectors and actions** search box on the **Choose an operation** card.
3. Select **Microsoft Dataverse**.
4. Select the **Relate rows** action.



Like other actions in this connector, a list of supported tables is available.

5. Select the table to which you want to relate or enter a custom value for the table name.



6. You will need to enter the identifier of the row you want to relate.

Relate rows

\* Table name: Accounts

\* Row ID: 33ed0915-f5a0-4ca9-88a9-10d0ef741d4d

The list of supported one-to-many and many-to-many relationships based on the table type selected is populated in the format <Related Table Type> – <Relationship Schema Name>. You can select the relationship to which you want to relate your row.

Relate rows

\* Table name: Accounts

\* Row ID: 33ed0915-f5a0-4ca9-88a9-10d0ef741d4d

\* Relationship: Choose relationship type

\* Relate with:

- Connection - account\_connections2
- Contact - contact\_customer\_accounts
- Contact - msa\_contact\_managingpartner
- Customer Relationship - account\_customer\_relationship\_customer
- Customer Relationship - account\_customer\_relationship\_partner
- Customer Voice alert - account\_msfp\_alerts
- Customer Voice survey invite - account\_msfp\_surveyinvites
- Customer Voice survey response - account\_msfp\_surveyresponses

7. Enter the full resource URL of the row to which you want to add the relationship.

This URL is the full OData identifier of the resource, as shown in the following image:

Relate rows

\* Table name: Accounts

\* Row ID: 33ed0915-f5a0-4ca9-88a9-10d0ef741d4d

\* Relationship: Fax - Account\_Faxes

\* Relate with: Enter the row URL using OData ID from a previous step or typing the full URL (

Rel: Enter the row URL using OData ID from a previous step or typing the full URL (eg. https://org0.crm.dynamics.com/api/data/v9.0/faxes(3ce6c728-3c8a-4b55-a4ee-a251b253c3ee))

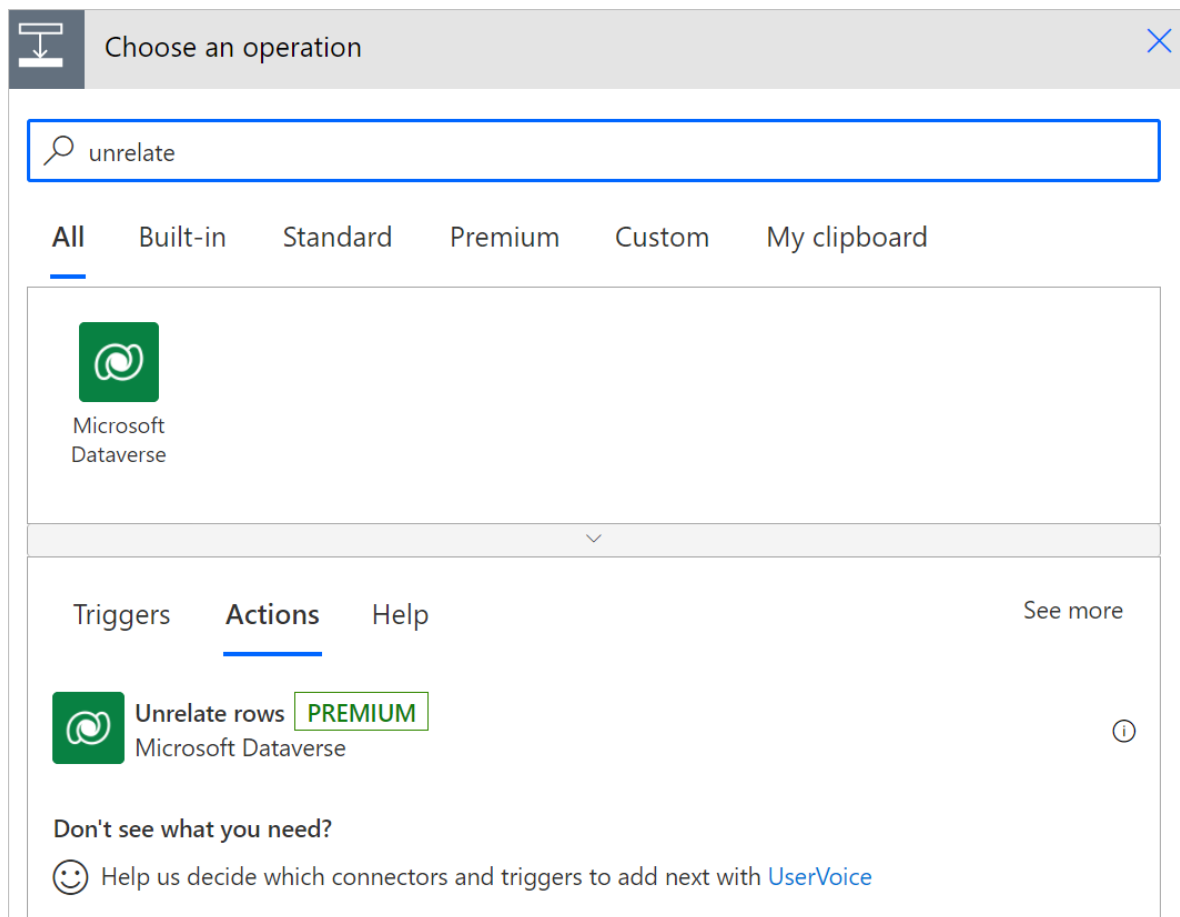
### 💡 Tip

You can get the row identifier URL from a previous step from the available dynamic content.

# Unrelate rows

1. Select **New step** to add an action to your flow.
2. Enter **unrelate rows** into the **Search connectors and actions** search box on the **Choose an operation** card.
3. Select **Microsoft Dataverse**.
4. Select **unrelate rows** action.

Your flow uses this action to disassociate two Dataverse rows if they are linked by a one-to-many or many-to-many relationship.



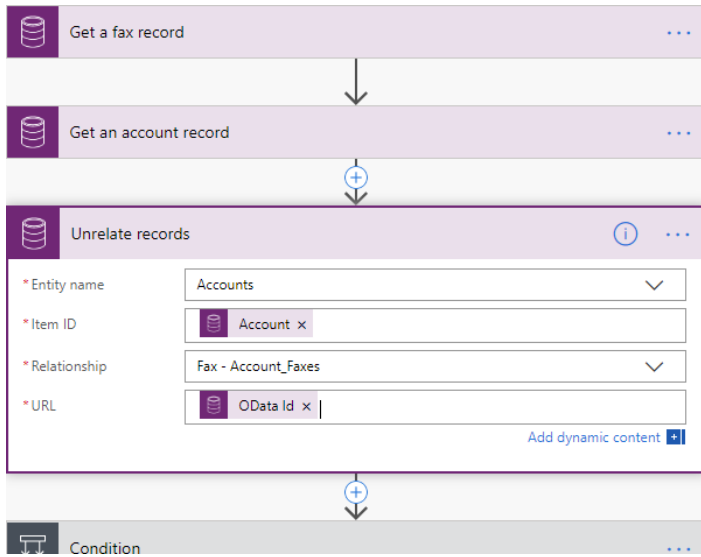
5. Select the type of table you want to unrelate from or enter a custom value for the table name.
6. Enter the identifier of the row that you want to unrelate from.

The list of supported one-to-many and many-to-many relationships based on the table type you selected will be populated in the format <Related Table Type> – <Relationship Schema Name>. Select the relationship you want to unrelate the related table from or enter your custom value for the relationship schema name.

7. Enter the full resource URL of the related table you want to unrelate. This URL will be the full OData identifier of the resource.

### 💡 Tip

You can usually copy the row identifier from a previous step by using dynamic content.



Add dynamic content from the apps and connectors used in this flow. Hide

**Dynamic content** | Expression

Search dynamic content

Type the number of pages included in the fax.

**OData Id**  
OData record id

**On Hold Time (Min** | OData record id

# Use a flow to perform a changeset request in Dataverse

Article • 04/04/2024

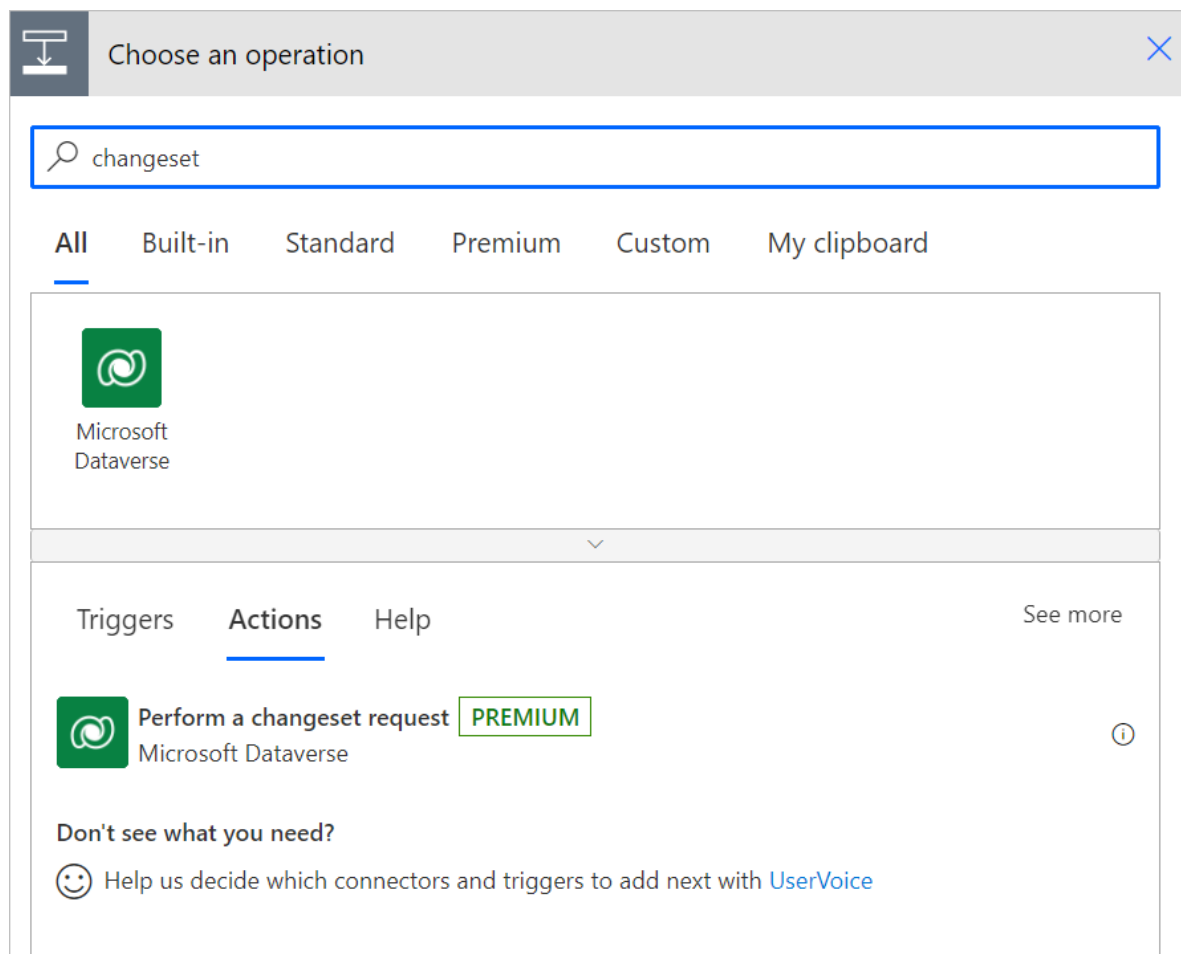
*Change sets* provide a way to bundle several operations that either succeed or fail as a group. When multiple operations are contained in a changeset, all the operations are considered *atomic*, which means that if any one of the operations fails, any completed operations are rolled back.

Follow these steps to get started with change sets.

1. In your flow, select **New step**.
2. Enter **changeset** into the search box of the **Choose an operation** card.

Notice that the operations list now only displays operations with the word "changeset" in its name.

3. Select the **Perform a changeset request** to add its scope to your flow.



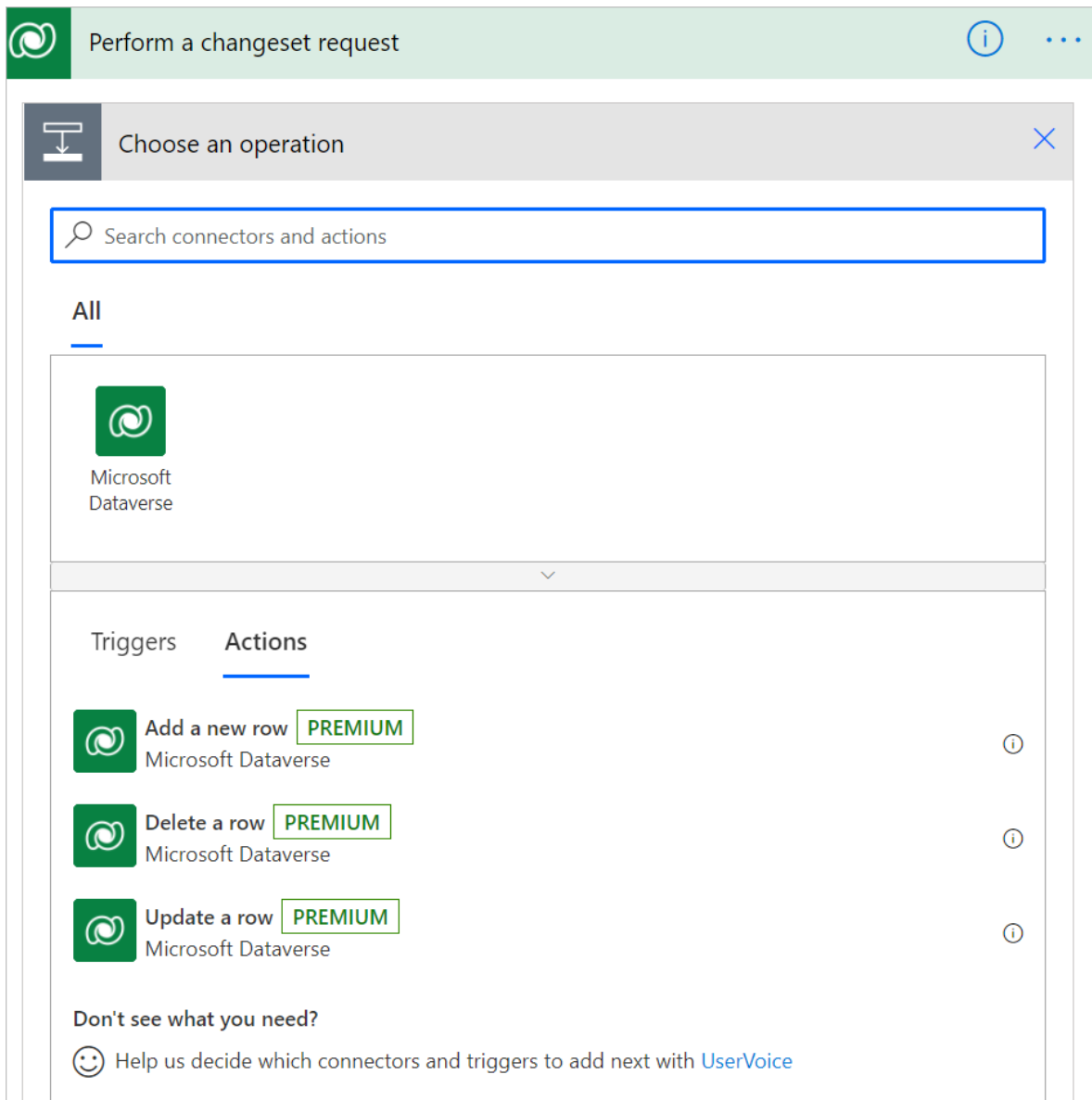
4. Select **Add an action**.





You'll notice that this approach is different from any other action you've added in the following ways:

- Instead of inputs and outputs, this is a container to which you can add actions.
- When you select **Add an action**, you'll see just the following three actions:
  - Add a new row
  - Delete a row
  - Update a row



You can't have additional built-in actions in a changeset scope because all actions are evaluated together in Dataverse. You see that there are no arrows between each of the actions, indicating that there aren't dependencies between these actions (they all run at once).

5. Add all of the actions that you want to perform.

## Limitations

- The only supported actions in a changeset scope are **Add a new row**, **Delete a row**, and **Update a row**. For example, the **Apply to each** action isn't supported in a changeset.
- You can't reference an output of a previous action in the changeset scope.
- Perform a changeset request action (Dataverse) isn't supported yet in the [AI-powered cloud flows designer](#).

# Upload or download image and file content

Article • 12/16/2022

You can use flows to upload or download images and files in Microsoft Dataverse. There are two column data types for handling images and file content in Dataverse.

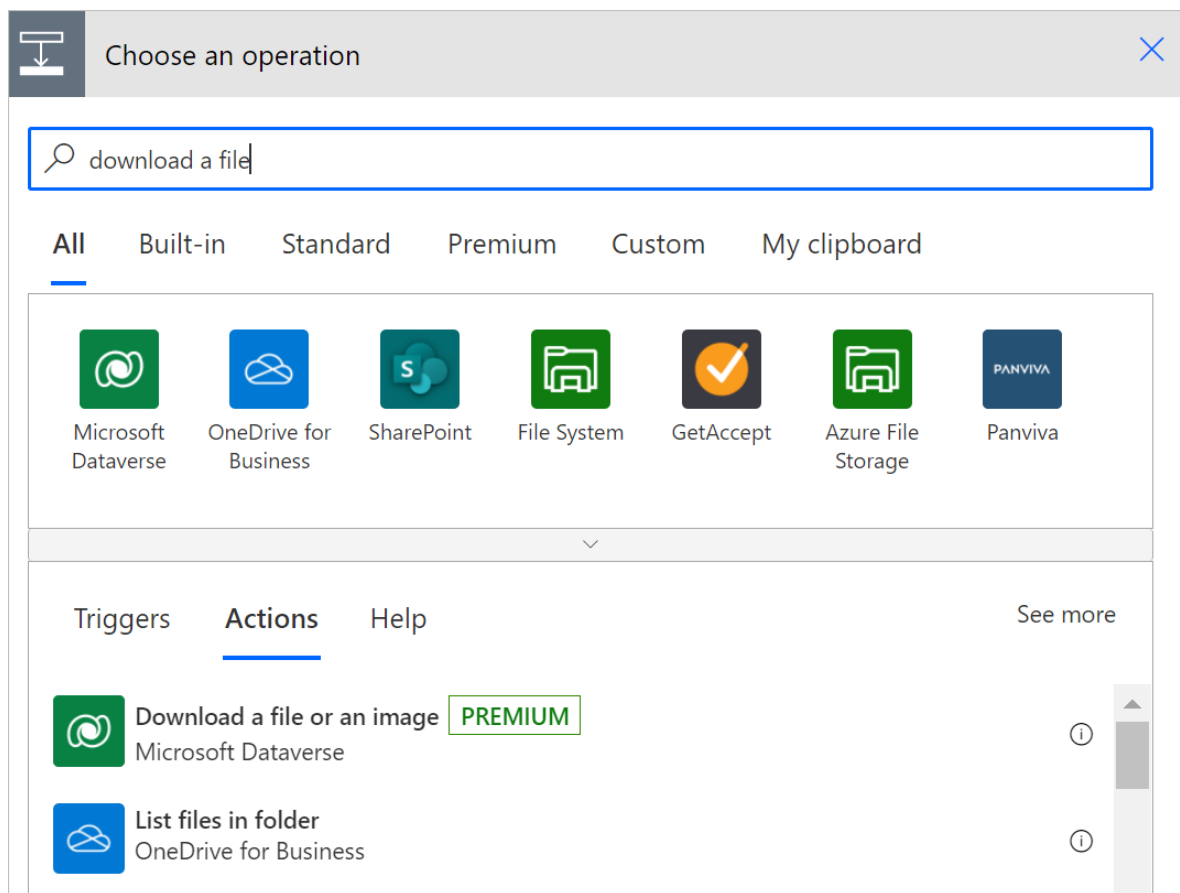
- **File:** You can have a [column that stores arbitrary file data for your table](#).
- **Image:** In addition to a column that stores the full size of an image as a file, the **Image** datatype can also include [thumbnail information](#).

You can use the Microsoft Dataverse connector to work with these data types in Power Automate.

## Download file or image content

Follow these steps to add the **Download a file or an image** action to your flow. You can use the downloaded file contents in suitable actions later in the flow.

1. Select **New step** to add an action to your flow.
2. Enter **download a file** into the **Search connectors and actions** search box on the **Choose an operation** card.
3. Select **Microsoft Dataverse**.
4. Select the **Download a file or an image** *action*.



5. Select the table from which you want to download the file or image content or enter your own custom value for the table name.
6. In **Row ID**, enter the row ID of the row in the table that you just selected.

#### Tip

You can normally copy the row identifier from a previous request by using dynamic content.

The list of supported file and image columns for the table you selected earlier will be populated in the **Column name** list.

7. From **Column name**, select the column that holds the file or image content that you want to download.


Download a file or an image ? ...


\* Table name  ▼

\* Row ID


\* Column name  ▼

[Show advanced options](#) ▼

You now can access the file or image content by using the **File or image content** variable in the **Dynamic content** list.


Download a file or an image ? ...

+  
↓


Create file ? ...


\* Folder Path  📁

\* File Name


\* File Content

[Add dynamic content](#) +


+ New step
Save

| Dynamic content                                                                                                    | Expression                       |
|--------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <input style="width: 90%;" type="text" value="Search dynamic content"/>                                            |                                  |
| Download a file or an image                                                                                        |                                  |
|  <b>File or image content</b> | The content of the file or image |

With the content output of the action, you can pass it to any action later in the flow. In the following example, the file contents are being passed to the **Create file** action.


Download a file or an image ? ...


+  
↓


Create file ? ...

\* Folder Path  📁

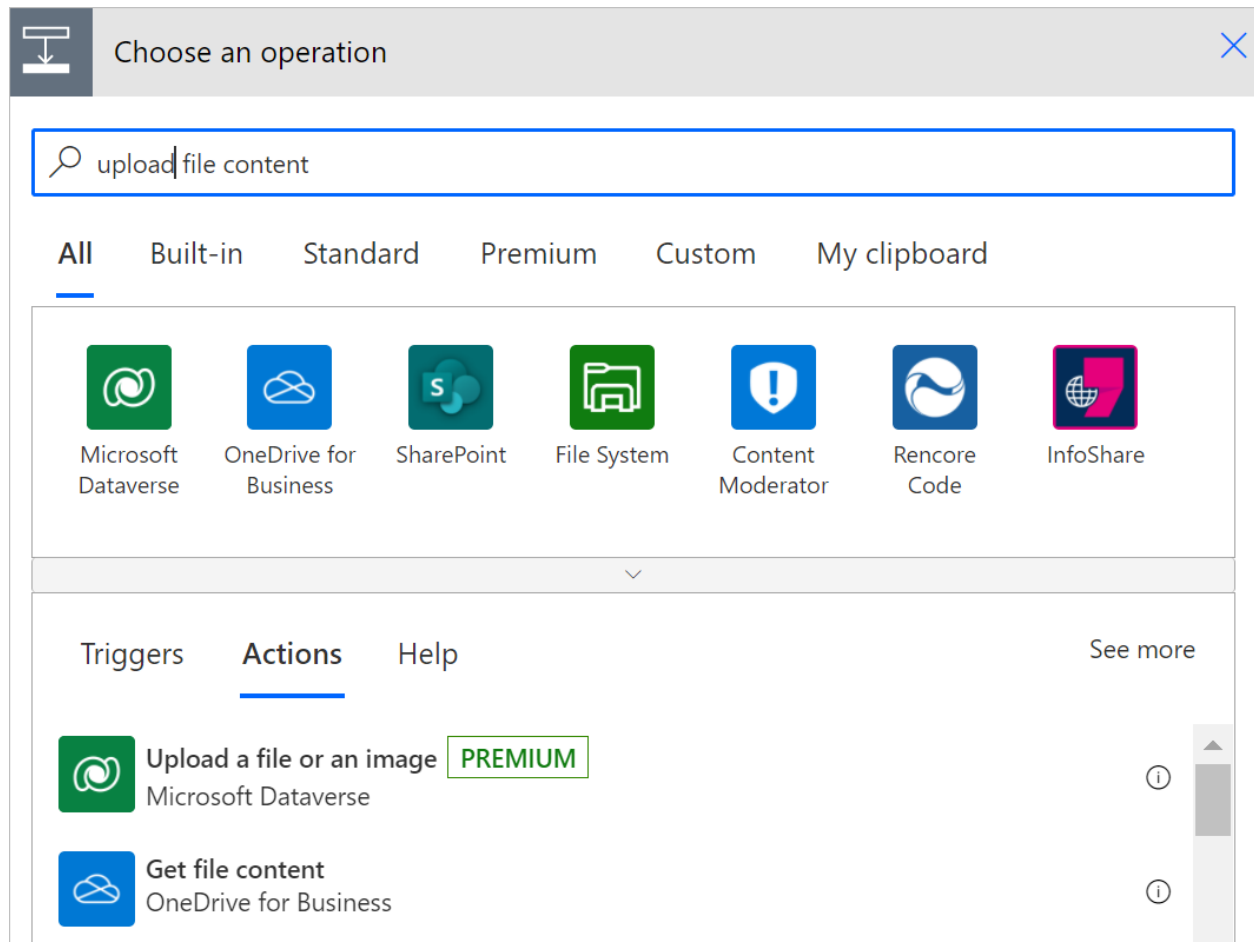
\* File Name

[Add dynamic content](#) +

\* File Content  File or image c... x

# Upload file or image content

Follow these steps to add the **Upload a file or an image** action to your flow. This way, you can upload content to a corresponding file or image column in Microsoft Dataverse.



1. In **Table name**, select the table to which you want to upload the file or image content or enter a custom value.
2. Enter the identifier in **Row ID** for the row to which you want to upload the file or image content.

## Tip

You can normally copy the row identifier from a previous request by using dynamic content.

The list of available file and image columns in the table that you selected is populated.

3. From **Column name**, select the column to which you want to upload the image or enter a custom value.

Your **Upload a file or an image** action card might look like this now.

The screenshot shows the configuration interface for the 'Upload a file or an image' action card. It features a green header with the action name and a help icon. Below the header are four input fields: '\* Table name' with a dropdown menu set to 'Accounts', '\* Row ID' with a text box containing '859b9f71-4fe9-4437-b848-0471959d6df9', '\* Column name' with a dropdown menu set to 'Default Image', and '\* Content' with a text box containing 'Add file or image content'. At the bottom left, there is a link 'Show advanced options' with a dropdown arrow.

4. Enter the content you want to upload.

In this example, the files to upload are the attachments content from an email captured earlier in the flow. You can select **Attachments Content** in the list of dynamic content that's displayed when you select **Add dynamic content** on the **Upload a file or an image** card.

This screenshot shows the same configuration interface as above, but with the 'Add dynamic content' button in the content field clicked. A dropdown menu is open, showing a search bar 'Search dynamic content' and a list of dynamic content items. The first item is 'Attachments Content' with the subtitle 'Attachment content'. The background shows a flow step 'When a new email arrives (V3)' and buttons for '+ New step' and 'Save'.

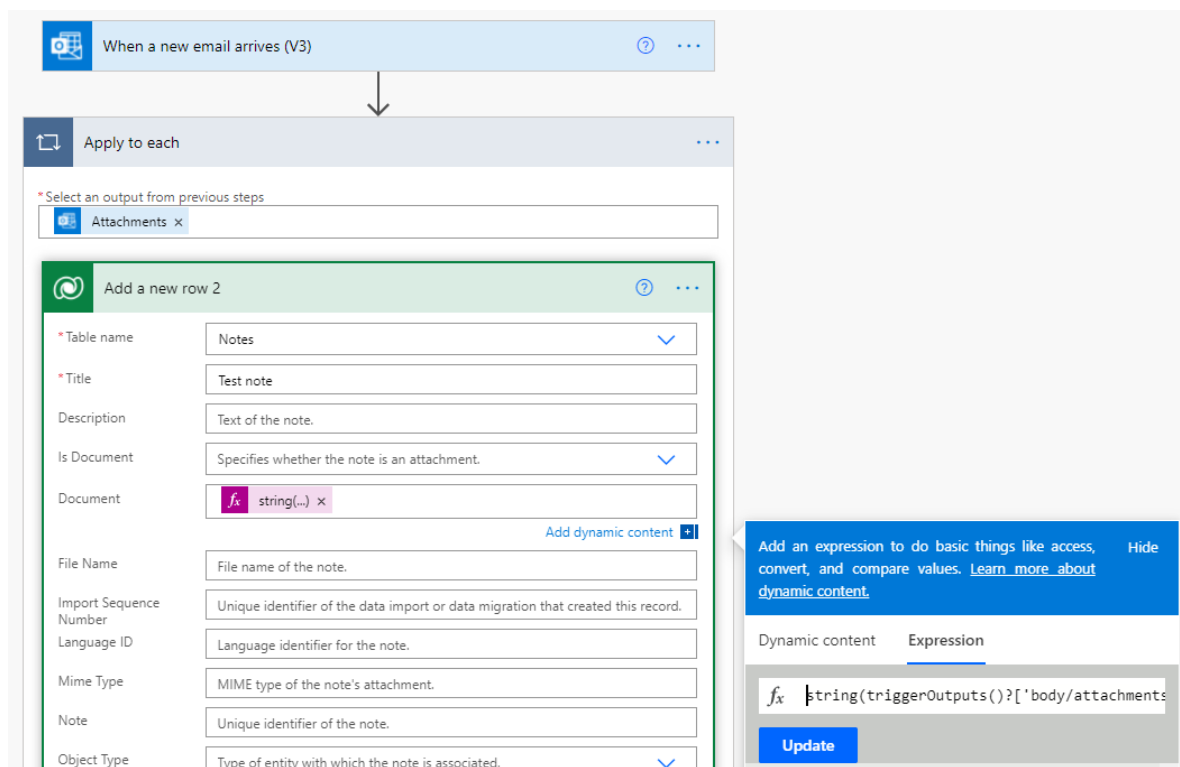
# Troubleshoot known issues with Dataverse

Article • 12/16/2022

Here's a list of known issues with Microsoft Dataverse and Microsoft Power Automate.

- **Localization of metadata** – When you change the Power Automate language and regional locale settings, there's no change to metadata like table and column names. There is no change in the metadata because they display in the language and regional locale settings of your Microsoft Dataverse environment. See [Languages](#) to view your Dataverse settings.
- **Working with lookup fields** – When working with the [Add a new row](#) and [Update a row](#) actions, you must enter lookup fields in the following syntax – `entity_unique_name(Item_ID)`.
- **Working with multi-select fields** – When working with the [\[Add a new row](#) and [Update a row](#) actions, the user interface allows you to select only one option. To select multiple options, you must switch the input method to **custom**, and then enter a unique name for each option, separating each name with a comma.
- **Adding a row with attachments to the Notes table**– When you use an attachment from the dynamic output of a non-Dataverse step, you must use an expression to convert it to a string. For example, when you add a row inside an **Apply to each** loop over the output from the **When a new email arrives** trigger, use `string(triggerOutputs()?['body/attachments'])` instead of `items('Apply_to_each')?['contentBytes']`, as shown in the following image.



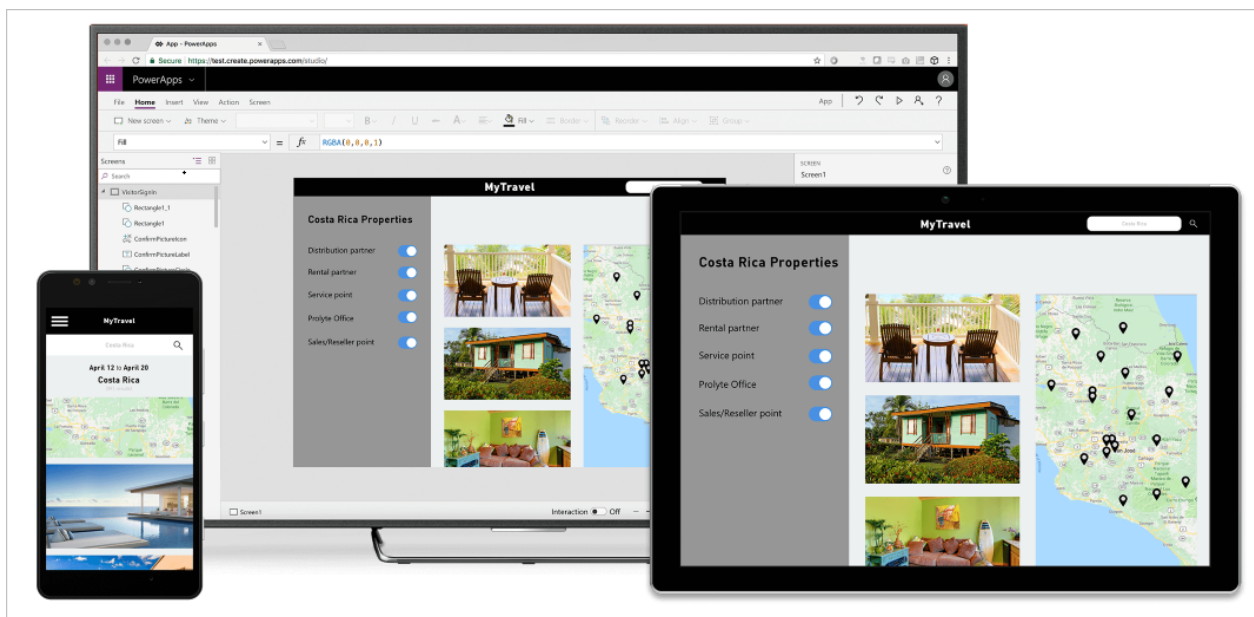


- **SharePoint and OneDrive document tables don't display inputs when you create a flow** - When you create a flow that triggers on the Dataverse SharePoint documents table or the OneDrive documents table, no data from these tables is passed to the editor and the flow inputs array is empty. This behavior occurs because these tables are virtual and their data isn't stored in Dataverse.

# Use Dataverse-based flows in Power Apps

Article • 12/16/2022

Power Apps is a suite of apps, services, connectors, and data platform that provides a rapid application development environment to build custom apps for your business needs. Use Power Apps, to quickly build custom business apps that connect to your business data that's stored *either* in the underlying data platform [Microsoft Dataverse](#) or in various cloud and on-premises data sources, such as SharePoint, Microsoft 365, Dynamics 365, SQL Server, and so on.



Apps built using Power Apps provide rich business logic and workflow capabilities to transform your manual business processes to digital, automated processes. Further, apps built using Power Apps have a responsive design, and can run seamlessly in Web browsers or on mobile devices (phone or tablet).

With Power Apps, you can create [Canvas apps](#) and [Model-driven apps](#), and both types of apps support using data stored in Microsoft Dataverse. You can use the Microsoft Dataverse connector in Power Automate to integrate your apps with an automated flow, setting them off whenever users tap the associated button.

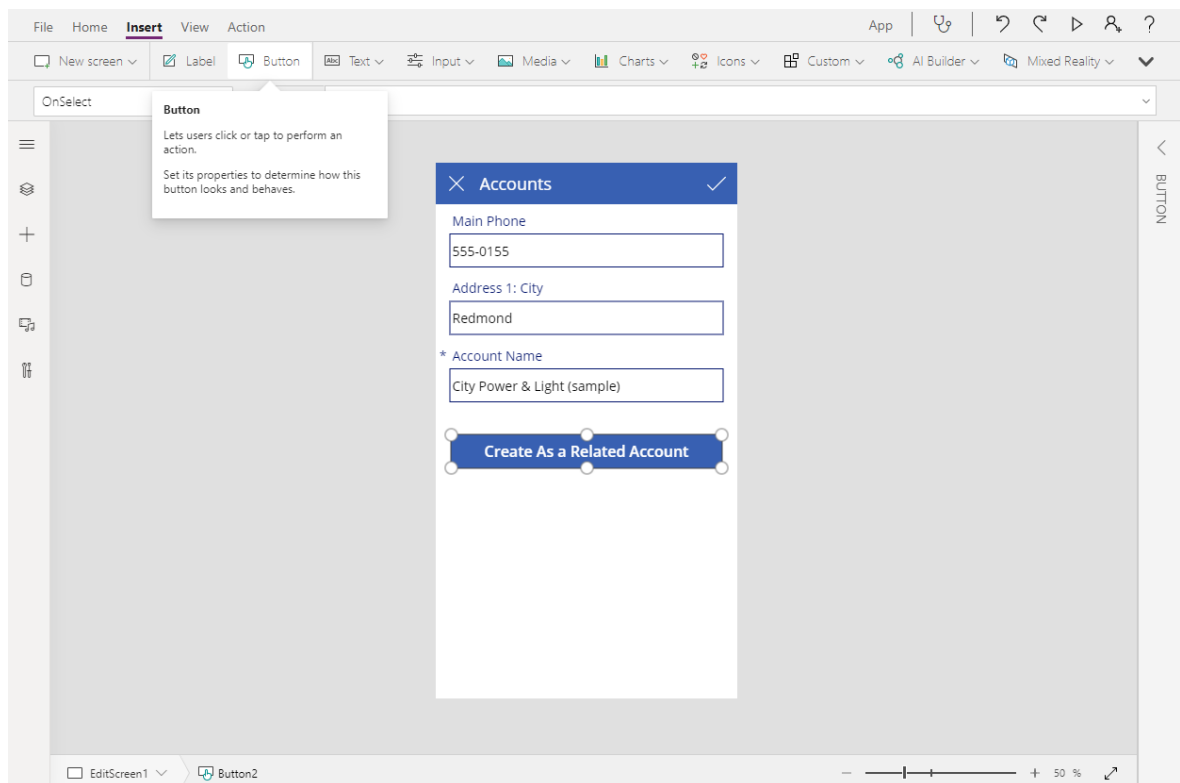
Get started with Power Apps:

- Watch [Power Apps demos](#)
- Watch videos on the [Power Apps channel](#) on YouTube.

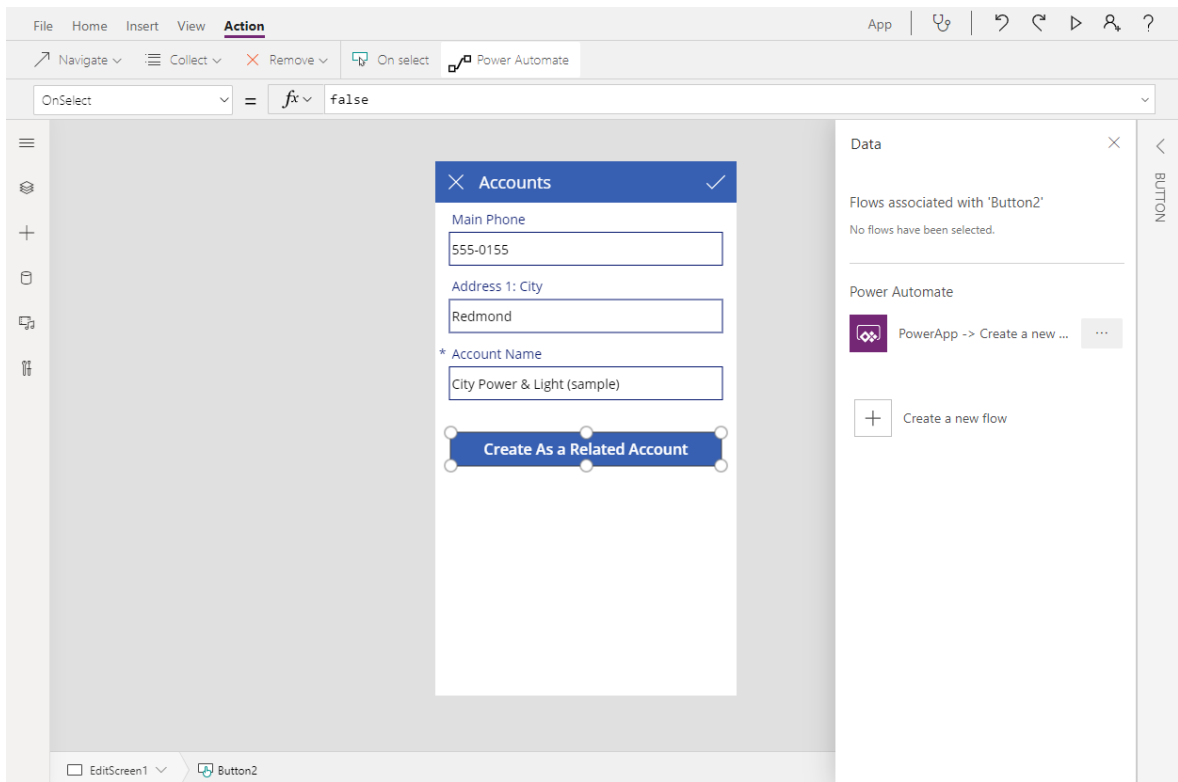
# Canvas apps

You can associate any button in a canvas app with a cloud flow that uses the Microsoft Dataverse. Each time the canvas app user hits the button, the associated flow runs in the background.

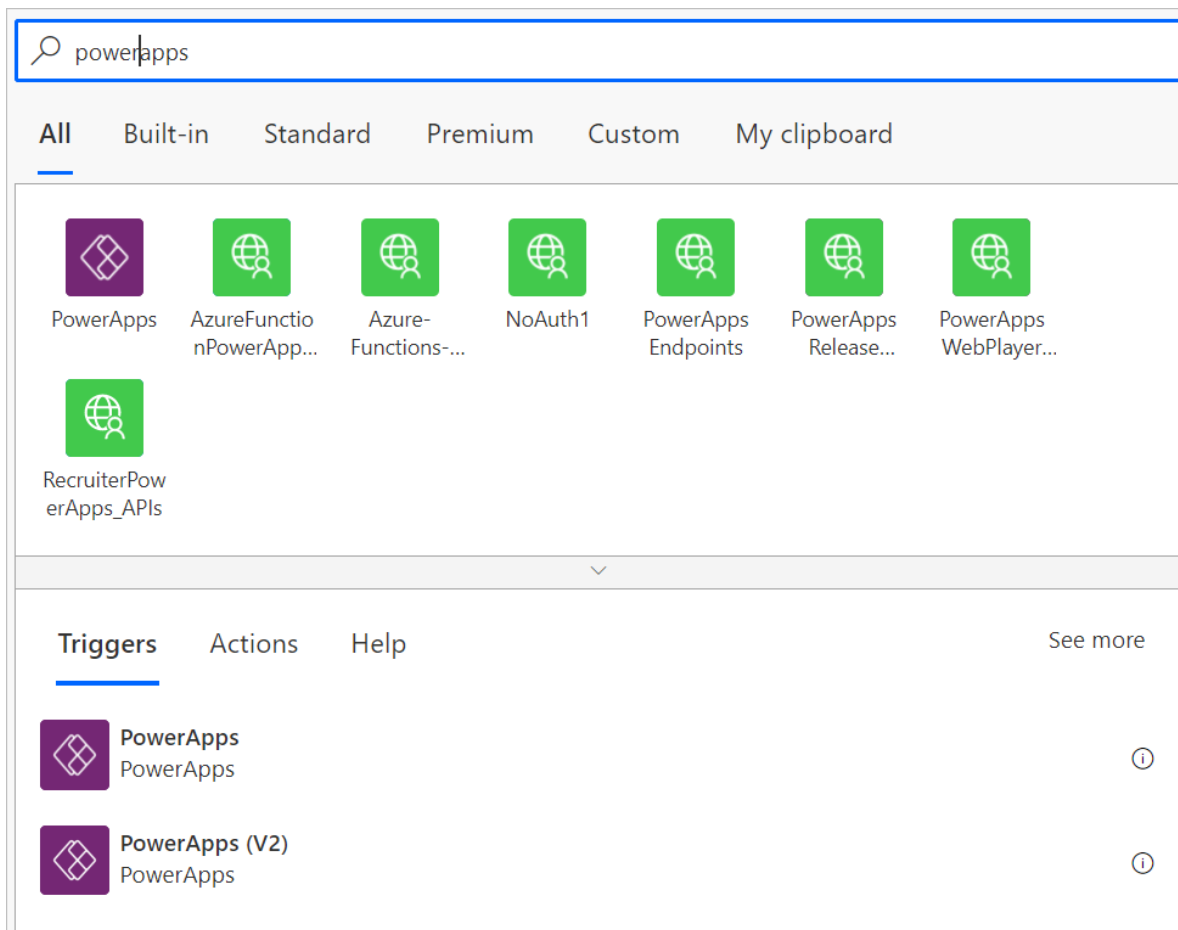
1. Edit an existing canvas app, or create one by following the steps in [Create a canvas app from Microsoft Dataverse in Power Apps](#). Then go to the **Insert** menu and then add a **Button** as shown here.



2. Select the button you just added.
3. Select the **Action** menu.
4. Add a **Power Automate** flow by choosing an existing flow or creating a new one from the panel that appears on the right. If the flow requires any parameters, this step prompts you to provide them in the formula bar.



5. Be sure to use the Power Apps trigger as shown here.



6. Create the flow as shown here.

PowerApps

No additional information is needed for this step. You will be able to use the outputs in subsequent steps.

↓

Add a new row

\* Table name

\* Name

Show advanced options

# Create a cloud flow that uses Microsoft Dataverse

Article • 04/14/2023

Improve operational efficiency with a unified view of business data by creating flows that use [Dataverse](#).

For example, you can use Dataverse within Power Automate in these key ways:

- Create a cloud flow to import data, export data, or take action (such as sending a notification) when data changes. For detailed steps, see the procedures later in this topic.
- Instead of [creating an approval loop through email](#), create a cloud flow that stores approval state in a table, and then build a custom app in which users can approve or reject items. For detailed steps, see [Build an approval loop with Dataverse](#).

In this article, you will create a cloud flow that sends an email notification when a *Qualified Lead Process* creates a new *Opportunity* in Dataverse. The notification includes the *Notes* from the *Lead*.

## Prerequisites

- Sign up for [Power Automate](#) and [Power Apps](#).

If you have trouble, verify whether [Power Automate](#) and [Power Apps](#) support the type of account that you have and your organization hasn't blocked signup.

- If you haven't used Dataverse before, create a [Dataverse environment with a database](#) in the Power Platform admin center.

## Sign in to your environment

1. Sign in to [Power Automate](#).
2. On the top right menu, select the environment where you created the Dataverse table.

 **Important**

If you don't select the same environment, you won't see your Dataverse tables.

## Use a template

1. On the navigation pane to the left, select **Templates**, and then search for **Copy Notes from Lead to Opportunity**.

You could use any template that performs a task in Dataverse that you want to automate. In this example, you'll use the **Copy Notes from Lead to Opportunity in Dataverse** template.

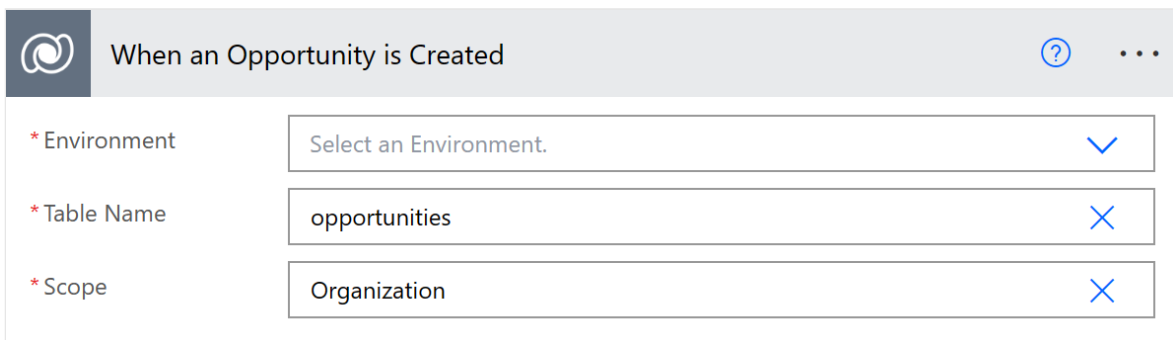
2. (If you haven't already created a connection) Select **Sign in**, and then provide your credentials as needed.
3. Select **Continue**.

You'll now see the template and its connections. In the following steps, you'll customize this template.

## Customize your flow template

1. On the **When an Opportunity is created** card, select the **Environment**, **Table Name**, and **Scope** that you want to use.

For more information on scope, go to [Trigger flows—scope](#).



| When an Opportunity is Created |                                       |
|--------------------------------|---------------------------------------|
| * Environment                  | Select an Environment. <span>▼</span> |
| * Table Name                   | opportunities <span>✕</span>          |
| * Scope                        | Organization <span>✕</span>           |

2. Complete the **Get Opportunity row** card, per your requirements.
3. Configure the **Originate from a Lead** card.
4. Complete the **Get Lead** and the **List Notes for the Lead** cards on the **If yes** side of the decision branch.

✓ If yes

The image shows two integration cards from a workflow builder. The first card, titled "Get Lead", has three input fields: "Environment" (a dropdown menu with "Select an Environment" selected), "Table Name" (a text field with "leads" entered), and "Item identifier" (a text field with "\_originatinglea..." entered). An arrow points down to the second card, titled "List Notes for the Lead". This card has two input fields: "Environment" (a dropdown menu with "Select an Environment" selected) and "Table Name" (a text field with "annotations" entered). Below the input fields is a link that says "Show advanced options" with a downward arrow.

5. Expand the **Apply to each** card, and then delete the **Copy Lead Note to New Note** card.
6. Select **Add an action**, search for **notification**, and then select **Send me an email notification**.

The image shows the configuration screen for an "Apply to each" card. At the top, there is a search bar with the text "\* Select an output from previous steps" and a dropdown menu showing "value x". Below this is a "Notifications" panel with a search bar containing "Search connectors and actions". Under the "Actions" tab, there are two notification options: "Send me a mobile notification" and "Send me an email notification". The "Send me an email notification" option is highlighted with a red box. At the bottom, there is a link that says "Don't see what you need?" and a button that says "Help us decide which connectors and triggers to add next with UserVoice".



7. Configure the notification card to send you an email notification with the details of the notes for the lead.

The image shows a configuration interface for a cloud flow. At the top, there is a grey bar with a blue square icon containing a white refresh symbol, followed by the text "Apply to each" and three dots on the right. Below this is a white box with the text "\*Select an output from previous steps" and a dropdown menu showing "value x".

Below the dropdown is a red bar with a white bell icon, followed by the text "Send me an email notification" and a question mark icon and three dots on the right. Below the red bar are two input fields:

- \*Subject: A text box containing "New opportunity from a lead".
- \*Body: A text box containing a blue square icon with a white refresh symbol and the text "Current item x".

### 💡 Tip

If you can't find a template that does what you need, you can **build a cloud flow from scratch** that operates on top of Dataverse.

# Create a cloud flow to view Dataverse long term retained data (preview)

Article • 05/24/2023

Create a cloud flow to view read-only rows in long term data retention in Microsoft Dataverse. For more information about long term data retention in Dataverse, go to [Dataverse long term data retention overview \(preview\)](#).

The cloud flow described here creates and sends an email that includes an Excel file containing the retained data. If there are retained attachments associated with rows from Dataverse, they are also included as links in the Excel file. For more about the privileges required to run this flow, go to [View long term retained data in Microsoft Dataverse](#)

## Important

- Long term retained data is a preview feature in Microsoft Dataverse.
- This capability is in process of rolling out, and will be available in all public cloud regions by June 8, 2023.

Creating the flow requires the following high level steps:

1. Pass query parameters in FetchXML to create an Excel file with retained data, using a Dataverse action named **Create Excel from RetainedData**.
2. Set a condition to determine if the Excel file has been created. Download the Excel file. Pass the required retrieval criteria parameters (table and FetchXML).
3. When the Excel file has been created:
  - Set an action to download the Excel file.
  - Set an action to send an email to recipients with the Excel file attached.
  - Set an action to delete the Excel file from the Dataverse system table. This step is recommended to avoid Excel documents consuming database storage.

## Tip

If you don't see an email after running a flow successfully, check your junk mail folder.

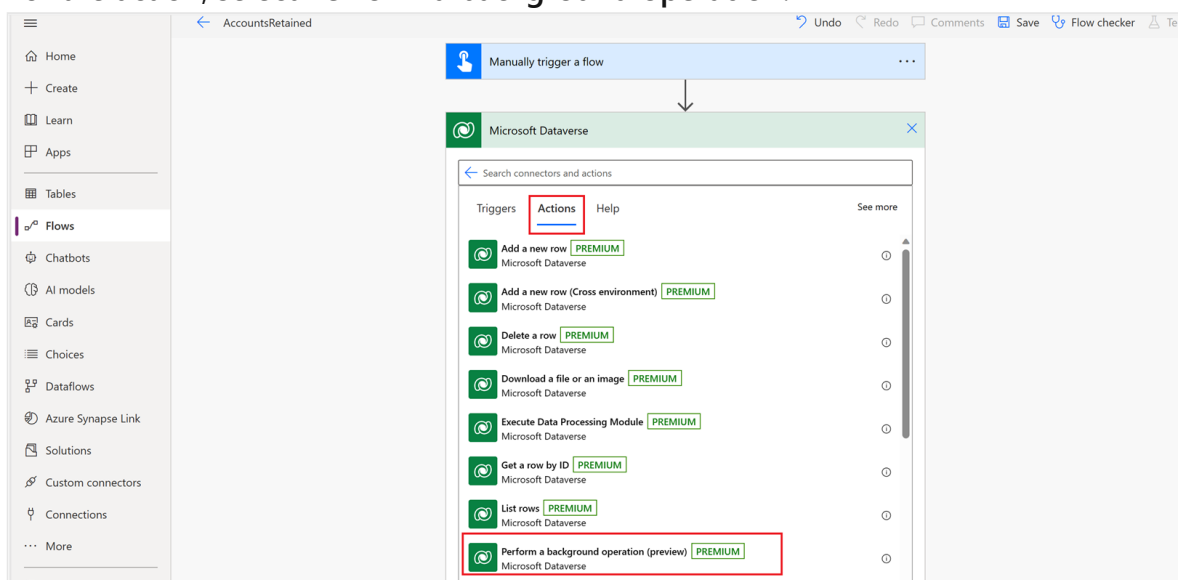
# Create the query and download FetchXML

1. Sign into [Power Apps](#), and then select **Settings** > **Advanced settings**.
2. On the **Dynamics 365 Settings** page, select **Advanced Find** (filter icon) on the command bar.
3. At the top of the Advanced Find pane, select **Change to retained data**.
4. Create the query you want to retrieve the retained data. More information: [Advanced find in model-driven apps](#)
5. In Advanced Find on the **Advanced Find** tab, select **Download Fetch XML**.

## Create the flow

The following steps show you how to use an instant flow to create the Excel file and send it as an attachment to someone in email. You can also use similar steps to create a scheduled cloud flow.

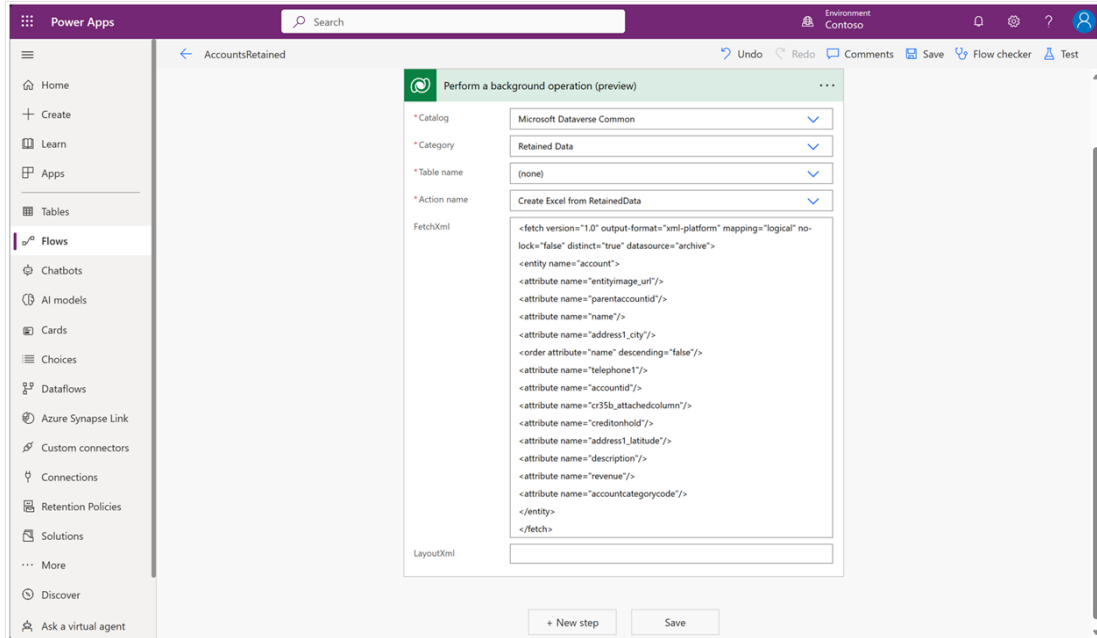
1. On the [Power Apps](#) home page, select **Flows** on the left navigation pane.
2. Select **New flow**, and then select **Instant cloud flow**.
3. Enter a name for the flow, and then select **Manually trigger a flow**.
4. Select **Create**.
5. Select **New step**, and then on the **Choose an operation** step, select **Microsoft Dataverse**.
6. For the action, select **Perform a background operation**.



7. Enter the following information:

- **Catalog: Microsoft Dataverse Common**

- **Category:** Retained Data
- **Table name:** (none)
- **Action name:** Select **Enter custom value** and then enter **Create Excel** from **RetainedData**
- **FetchXml:** Paste in the FetchXML created earlier from the advanced find query.
- **LayoutXML:** Leave blank

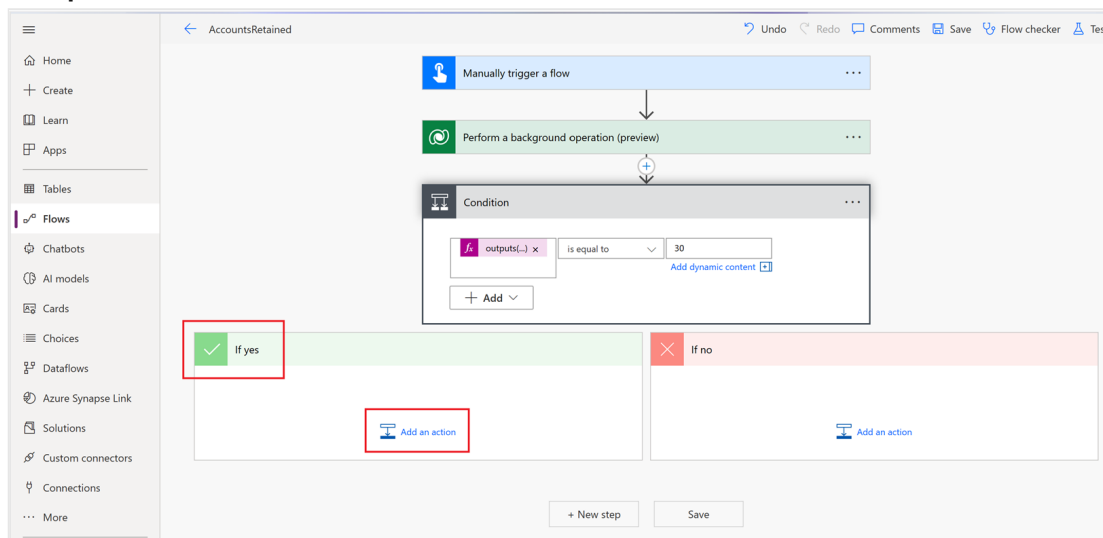


8. Select **New step**.

9. For **Choose an operation**, select **Condition**, and then select the **Expression** tab.

10. Add the following expression:

- `outputs('Perform_a_background_operation_(preview)')? ['body/backgroundOperationStatusCode']`
- **is equal to: 30**

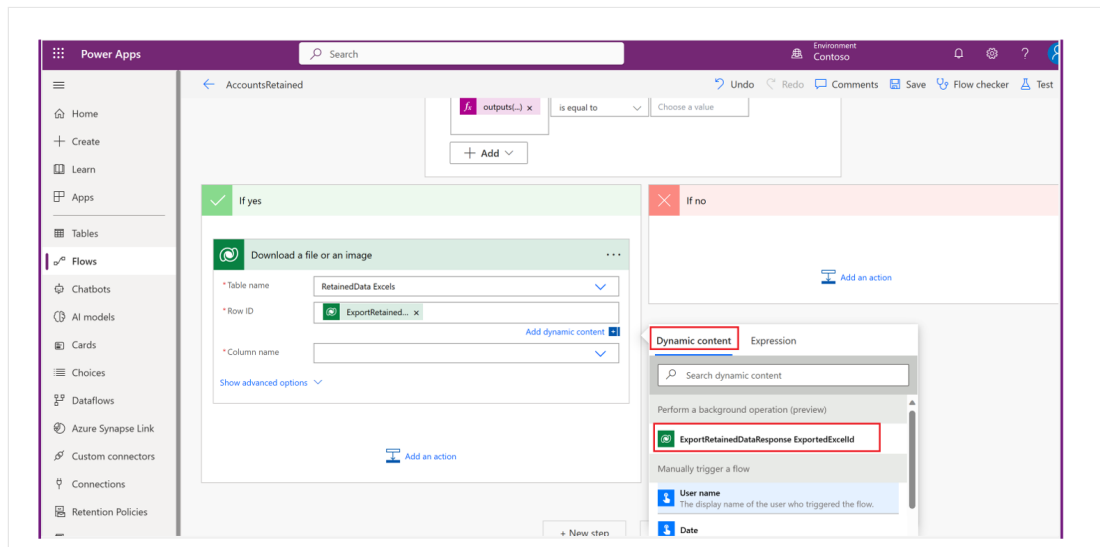


11. In the **If yes** box, select **Add an action**.

12. On the **Actions** tab, select **Download a file or an image**.

13. Select the following values:

- **Table name:** RetainedData Excels
- **Row ID:** Select **Add dynamic content**, and then select **ExportRetainedDataResponse ExportedExcelID**
- **Column name:** ExcelContent

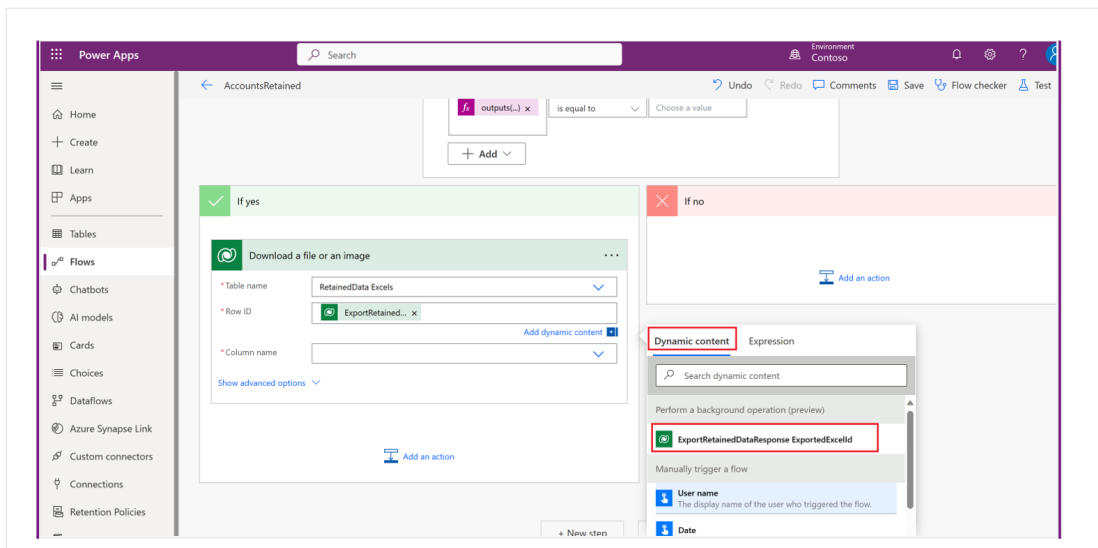


14. Select **Add action** to add another action that sends an email with the Excel file attachment.

15. For **Choose an operation**, select **Office 365 Outlook**, and then for the action select **Send an email (V2)**.

16. Enter the following required values for the email.

- **To:** Enter a valid email address for the email recipient.
- **Subject:** Enter the email subject, such as *Retained Accounts from 2020*.
- **Body:** Enter text for the email body, such as *Attached are the retained accounts from 2020*.
- **Attachments Name -1:** Enter a name for the attachment, such as *accountsretained2020.xls*.
- **Attachments content:** On the **Add dynamic content** tab, select **File or image content**.



17. Select add an action to delete the Excel file created and saved in the Dataverse table **RetainedData** excels:

- Select an operation > **Microsoft Dataverse**.
- Under **Actions**, select **Delete a row**.
- Choose the following values:
  - **Table name: RetainedData Excls**
  - **Row ID: Select Add dynamic content, and then select ExportRetainedDataResponse ExportedExcelID.**

18. Select **Save**

19. Run the flow.

The email recipients receive an email with the attached Excel worksheet containing the retained data rows.

# Create a cloud flow with Microsoft Dataverse (legacy)

Article • 04/25/2024

With the Microsoft Dataverse connector, you can create flows that are initiated by create and update events within Dataverse. You can also perform create, update, retrieve, and delete actions on rows in Dataverse.

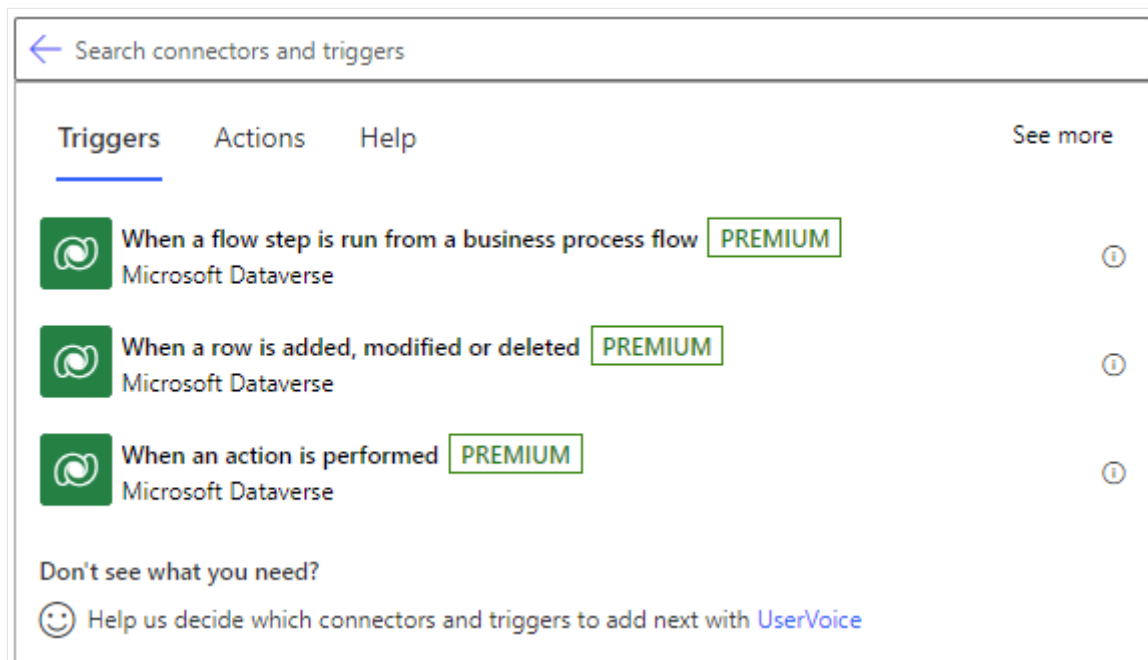
## 📘 Important

Flows that are created with the Dataverse (legacy) connector will no longer work after a date that is announced during 2024. To automatically migrate from the Dataverse (legacy) connector to the Microsoft Dataverse connector, use the migration tool in Power Automate.

## Initiate a cloud flow from Dataverse

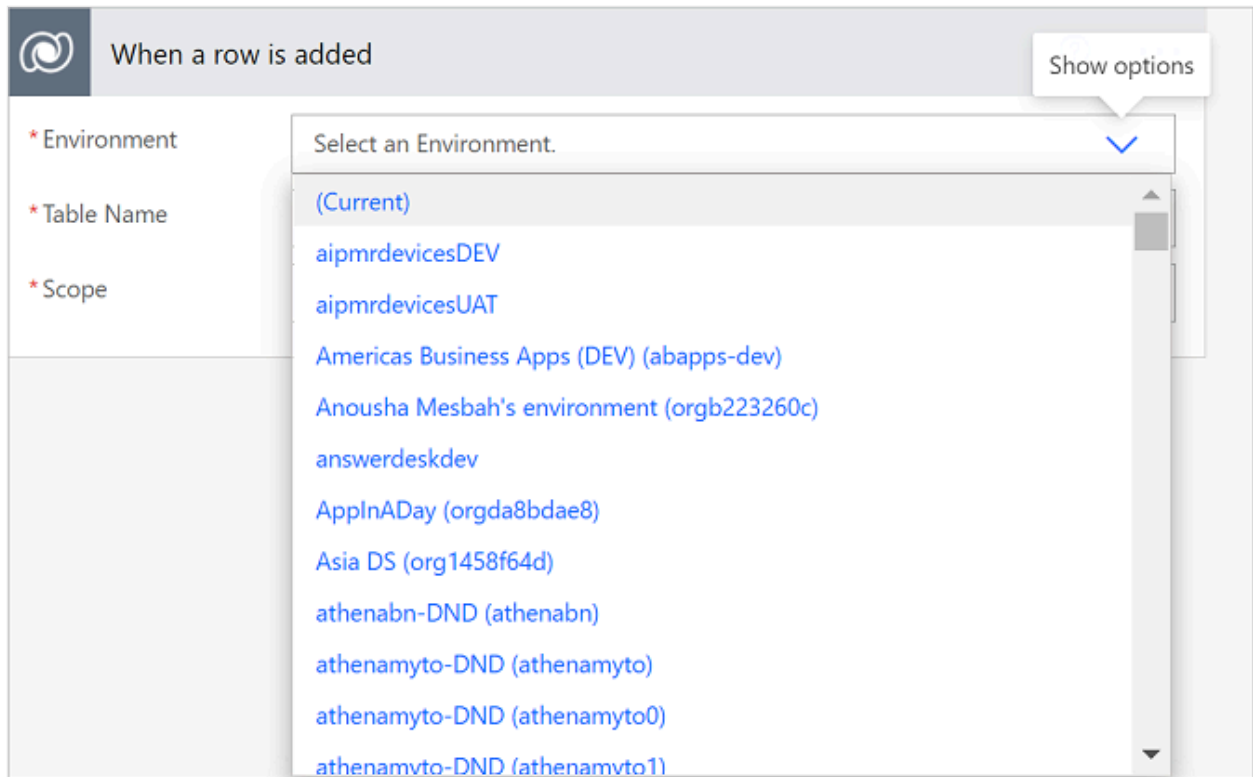
You can use any of the following triggers to initiate your flow.

- When a flow step is run from a business process flow.
- When a row is added, modified, or deleted.
- When an action is performed.



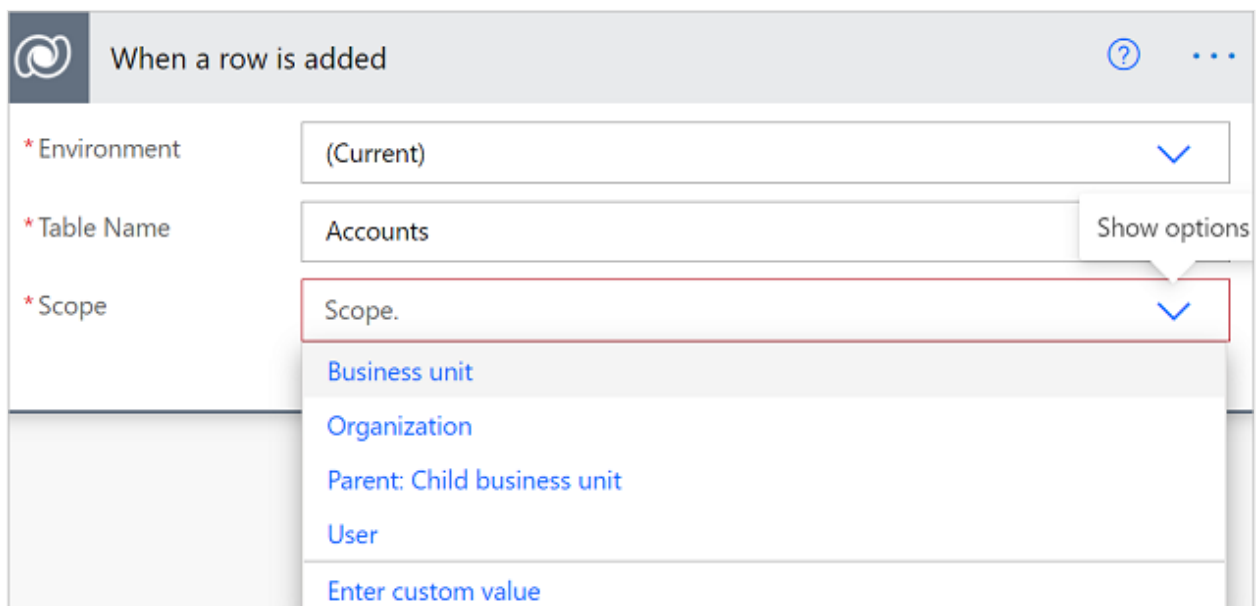
If the selected trigger requires an environment to be selected, then you can choose (Current), which always uses the database in the environment in which Power

Automate runs. If you want your flow to always trigger based on an event in a specific environment, select that environment.



You can use scopes to determine if your flow runs in any of the following scenarios:

- If you add row.
- If a user within your business unit adds a new row.
- If any user in your organization adds a new row.





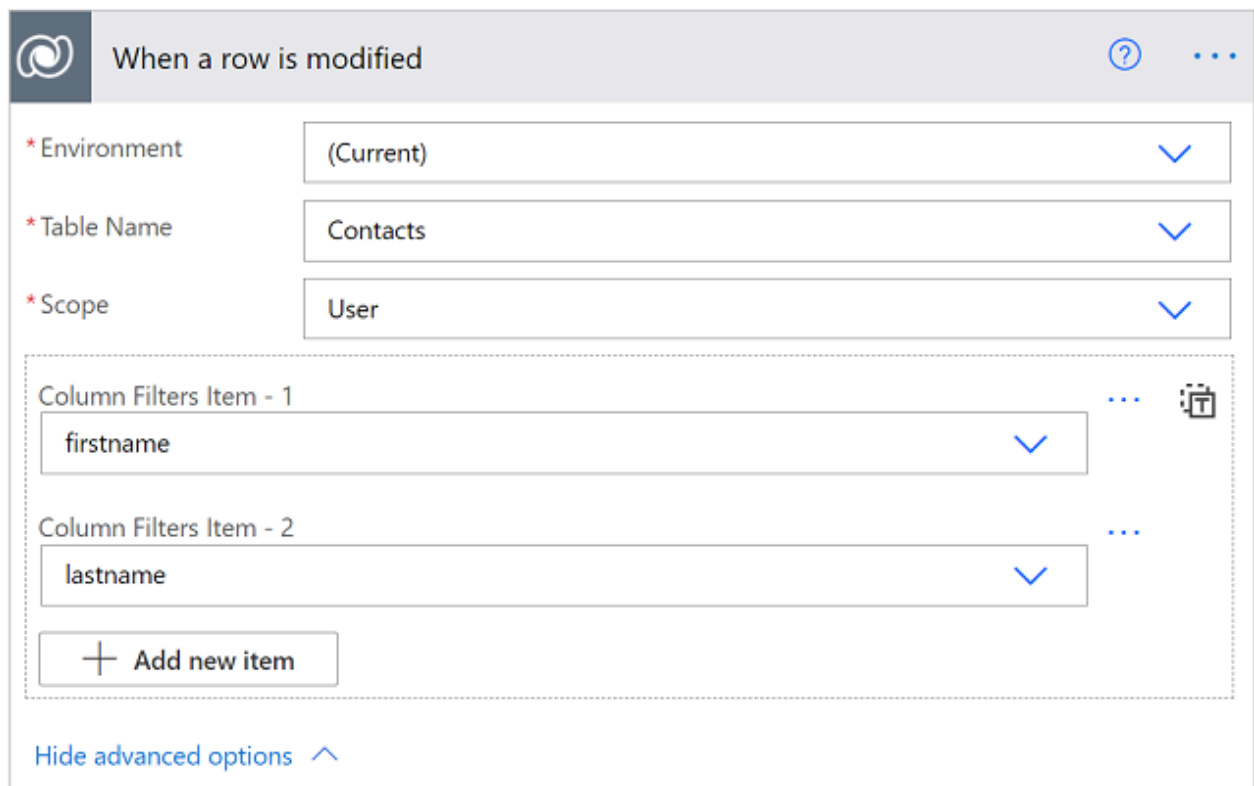
| Scope                       | Trigger timing                                                                |
|-----------------------------|-------------------------------------------------------------------------------|
| Business Unit               | Action is taken on a row owned by your business unit                          |
| Organization                | Action is taken by anyone within the organization or database                 |
| Parent: Child business unit | Action is taken on a row owned by your business unit or a child business unit |
| User                        | Action is taken on a row owned by you                                         |

Triggers that run when a row is modified can also use filtering columns. This ensures that the flow only runs when any of the defined columns are modified.


### Important


To prevent your flow from unnecessarily running, use filter columns.


This flow triggers anytime the first or last name of a contact that the flow user owns is modified.






When a row is modified


\* Environment (Current) 


\* Table Name Contacts 

\* Scope User 


Column Filters Item - 1  

firstname 

Column Filters Item - 2 

lastname 

+ Add new item

[Hide advanced options](#) 

## Trigger privileges

To create a cloud flow that triggers based on create, update, or delete on a row, the user needs to have user level permissions for create, read, write, and delete on the Callback

Registration table. Additionally, depending on the scopes defined, the user might need at least that level of read on the same table. [Learn more](#) about environment security.

## Write data into Dataverse

Use any of the following actions to write data into Dataverse:

- Create a new row
- Update a row

Here's an example of creating a follow-up task when the given user creates a new account row.

⌂ When a row is added ? ...

\* Environment  ▼

\* Table Name  ▼

\* Scope  ▼

↓

⌂ Add a new row ? ...

\* Environment  ▼ Show options

\* Table Name  ▼

\* Subject

Description

Due Date

Duration

Priority Value  ▼

Owner

Owner Type  ▼

Regarding

Regarding Type

[Show advanced options](#) ▼

## Advanced concepts

### Write data into customer, owner, and regarding columns

To write data into customer, owner, and regarding columns, two columns must be populated.

| Column category | Example settings                                                                                  |
|-----------------|---------------------------------------------------------------------------------------------------|
| Regarding       | Regarding = ID of the row (for example, account ID) and Regarding Type as selected from the list. |
| Customer        | Represents the ID of the row and the customer type as selected from the list.                     |
| Owner           | Represents the ID of the system user or team, and owner type as selected from the list.           |

## Enable upsert behavior

You can use the **update a row** command to provide upsert actions. This command updates the row if it already exists, or creates a new row. To invoke upsert, provide the table and a GUID key. If the row with the specified type and key exists, an update occurs. Otherwise, a row with the specified key is created.

## Trigger behavior

If you have a trigger registered on the update of a row, the flow runs for every *committed* update to the given row. The service invokes your flow asynchronously, and with the payload that it captures at the time the invocation occurs.

Flow runs might be delayed if there's a backlog of system jobs in your environment. If this delay occurs, your flow is triggered when the system job to invoke the flow runs.

## See also

[Add canvas apps and cloud flows to a solution by default](#)

# Manage cloud flow run history in Dataverse (preview)

Article • 07/11/2024

[This article is prerelease documentation and is subject to change.]

With cloud flow run history in Dataverse, you can apply the extensibility of [Dataverse](#) to track the results of your cloud flow executions at scale. With this feature, you can use the power of Dataverse's common data architecture, including [Role-Based Access Control \(RBAC\)](#), to manage the [FlowRun](#) data. Only solution cloud flows, with their definitions in Dataverse, can have their run history stored in Dataverse.

As part of this feature, each cloud flow execution has an entry in the table [FlowRun](#). This feature is using Dataverse's nonrelational database, [elastic tables](#), to store the cloud flow run history.

Cloud flow run history in Dataverse is used by the [automation center](#) to provide comprehensive monitoring and troubleshooting experiences for automation processes across Power Automate.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and might have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.
- This feature is in the process of rolling out and isn't available in the sovereign clouds region yet.

## Cloud flow run elements

The [FlowRun](#) table contains key elements of a cloud flow run, including the following:

 [Expand table](#)

| Element | Description                                       |
|---------|---------------------------------------------------|
| Name    | Primary key and the logic app Id of the flow run. |

| Element       | Description                                                                                   |
|---------------|-----------------------------------------------------------------------------------------------|
| Start time    | When the cloud flow execution was triggered.                                                  |
| End time      | When the cloud execution was finished.                                                        |
| Run duration  | Time, in seconds, for the cloud flow to finish the run.                                       |
| Status        | End result of the flow execution ( <b>Success</b> , <b>Failed</b> , or <b>Cancelled</b> ).    |
| Trigger type  | The trigger type of this flow run ( <b>Automated</b> , <b>Scheduled</b> , or <b>Manual</b> ). |
| Error code    | Error code returned from the flow execution.                                                  |
| Error message | Detailed error message, if applicable, returned from the flow execution.                      |
| Owner         | Owner of the flow.                                                                            |
| Workflow name | Display name of the cloud flow.                                                               |
| Workflow Id   | WorkflowID of the specific cloud flow,                                                        |
| IsPrimary     | Binary value to denote whether this flow run has any parent cloud flow triggering it.         |
| Parent Run Id | Name of the parent cloud flow run instance, if this record is for a child flow.               |
| Partition Id  | Partition Id of this user in the elastic table instance.                                      |
| Time to live  | Time in seconds of when this run record is automatically deleted.                             |

You can view and update the details through [standard Dataverse APIs](#), the [Dataverse connector](#), or directly from the **Tables** view in the maker portal.

Since this feature is built on elastic tables, we store the cloud run history data in specific logical partitions for optimized performance. The run history data is partitioned based on users, so each user in an organization has a dedicated partition.

**FlowRun** data uses [Dataverse database storage capacity](#). Storage use across environments [can be monitored in the Power Platform admin center](#).

## Storage use for FlowRun records

By default, flow run data is stored for 28 days (2,419,200 seconds). If you want to modify the duration of how long the executions can be stored, you can update the [Time to live \(in seconds\) for the flow run in the Organization table](#) in an environment backed with

Dataverse. Depending on your environment's storage capacity, you can adjust the length of storage for these run records.

The [FlowRunTimeToLiveInSeconds](#) value on the [Organization table](#) can be changed in the [PowerApps table browser](#) or using the [Dataverse Web API](#) [↗](#).

## Turn on or reduce storage of cloud flow run history

If the [FlowRunTimeToLiveInSeconds](#) value in the [Organization table](#) is changed, then the lifetime of any new **FlowRun** records is retained for that length of time. Lowering the value can reduce the number of **FlowRun** records, and storage used, over time.

### Set FlowRun time to live in Dataverse

Setting the [FlowRunTimeToLiveInSeconds](#) value in the [Organization table](#) to zero stops all ingestion of new **FlowRun** records.

### Set FlowRun time to live in Power Platform admin center

The [FlowRunTimeToLiveInSeconds](#) value in the [Organization table](#) can be set in the [Power Platform admin center environments experience](#). To choose the **FlowRun** entity time to live that's used in an environment:

1. Sign in to [Power Platform admin center](#).
2. Navigate to **Environments**.
3. For the desired environment, open the **Settings** page.
4. Select **Product > Features**.
5. Under **Cloud flow run history in Dataverse**, set the **FlowRun entity time to live** retention value to 28 days (the default), 14 days, 7 days, or Disabled.

### Set custom TTL values to store a longer or more specific amount of cloud flow run history

If you want a specific Time To Live (TTL) value that isn't available through the [Power Platform admin center](#) experience, then you can set that value directly as the [FlowRunTimeToLiveInSeconds](#) value in the [Organization table](#).

# Reduce number of FlowRun records immediately

If the environment is running short on storage, then customers can choose to clean up database space by setting the [TTLInSeconds](#) value for a set of [FlowRun](#) records. The records are then automatically cleaned up and permanently deleted within a minute or two. Ensure that the records are no longer needed, because they can't be recovered once deleted.

## Time To Live (TTL) value calculations


Time to live (TTL) values for [Organization.FlowRunTimeToLiveInSeconds](#) and [FlowRun.TTLInSeconds](#) are specified in seconds. The following table contains common values that can be used in the Organization and FlowRun tables.

 Expand table

| Days    | Seconds           |
|---------|-------------------|
| 1 day   | 86,400 seconds    |
| 3 days  | 259,200 seconds   |
| 7 day   | 604,800 seconds   |
| 14 days | 1,209,600 seconds |
| 28 days | 2,419,200 seconds |
| 60 days | 5,184,000 seconds |

## Use FlowEvent data to get visibility into FlowRun data completeness

[FlowRun](#) records might be incomplete for many reasons. The [FlowEvent](#) table is used to provide signals that runs were skipped and the data set is incomplete. The lack of signals doesn't mean that the data set is complete.

You can view the [FlowEvent](#) records in the [PowerApps table browser](#) or using the [Dataverse Web API](#) . All of the relevant records have a [FlowEvent.EventType](#) value of "FlowRunIngestion" and then the [FlowEvent.EventCode](#) value explains the event.



The following table contains a list of [FlowEvent.EventCode](#) values that might be used to signal that [FlowRun](#) data isn't complete:

 Expand table

| EventCode                          | Reason                                                                                                                                                                                                                                                               |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| isFlowRunIngestionECSDisabled      | Cloud flow run history isn't being saved in Dataverse due to service configuration, so no cloud flow data can be shown. The ECS service configuration is set automatically and there's no way for an admin to change the ingestion behavior in this state.           |
| TtlSettingEqual0                   | Your current environment's TTL (time-to-live) configuration for cloud flow runs is set to not retain data. As a result, some cloud flow run history might be missing. This state occurs when <a href="#">Organization.FlowRunTimeToLiveInSeconds</a> is set to zero. |
| IngestionDisabledByOrgSettings     | Cloud flow run history isn't being saved in Dataverse due to environments settings, so some of the run history for cloud flows might be missing. This occurrence happens when <a href="#">Organization.FlowRunTimeToLiveInSeconds</a> was set to zero in the past.   |
| ElasticTableStorageCapacityReached | You reached your Dataverse storage capacity limit, causing a pause in cloud flow run data synchronization.                                                                                                                                                           |
| ElasticTablePartitionLimitReached  | You reached your Dataverse storage partition limit, causing a pause in cloud flow run data synchronization.                                                                                                                                                          |
| IngestionRateDataLoss              | Some of the run history for cloud flows might be missing due to high volume of runs in this environment during the preview.                                                                                                                                          |
| FlowRunsEventLoadingFailed         | Unable to load the events for cloud flow runs in your current environment. As a result, some historical cloud flow run data might not be available.                                                                                                                  |
| FlowRunsTTISettingFailedMessage    | Unable to retrieve your environment's TTL (time-to-live) setting for cloud flow runs. As a result, some historical cloud flow run data might not be available.                                                                                                       |
| ElasticTableNoRoleForUser          | A user who owns one or more flows doesn't have read permissions to the FlowRun table in Dataverse, so some cloud flow run history isn't saved in Dataverse. The reason is because that user can't be set as the owner.                                               |

## Known limitations

- [FlowRun](#) records are assigned to a specific owner when they're written into the table, so the concept of shared [FlowRun](#) records for shared flows currently isn't supported.
- Flow owners need at least read access to the [FlowRun](#) table to store their run records in Dataverse. The system writes [FlowRun](#) records into the table and then ownership is assigned to the primary owner of the flow. If the primary owner of the flow doesn't have read permission to the [FlowRun](#) table then the [FlowRun](#) record isn't stored and a [FlowEvent.EventCode](#) of *ElasticTableNoRoleForUser* is seen in the [FlowEvent](#) table. To fix this situation, ensure that flow owners have [FlowRun](#) table read permission.
- Currently, there's a limit of 20 GB per partition within elastic tables. Further run record insertions, only for that specific user, would fail once the limit is reached.
- [FlowRun](#) records might be throttled and skipped if a user has many flows with high run rates. When throttling occurs, an entry is created in the [FlowEvent](#) table to signal that runs were skipped and the data set is incomplete.

#### ⓘ Note

The underlying data stream used for powering the cloud flow run record insertions isn't transactional, and hence isn't 100 percent lossless. Small data losses on this data stream might happen due to temporary, non-repeating service issues. Those missing records aren't represented by [FlowEvent](#). Flow execution history within flow details in the Power Automate portal is transactional, and therefore provides a lossless view of runs.

## FAQ

### Why do all of my environments have a [FlowRunTimeToLiveInSeconds](#) value of zero?

If all of your environments have a [FlowRunTimeToLiveInSeconds](#) value in the [Organization table](#) of zero, then it could be one of these situations:

1. If [FlowRun](#) data isn't available, then your environments might not be automatically enabled for [FlowRun](#) ingestion because there wasn't enough [Dataverse database storage capacity](#) available.
2. If [FlowRun](#) data was previously available, then an administrator might have turned off ingestion of new records.

## When is this going to be generally available (GA)?

Currently, there's no committed timeline for transitioning this capability from public preview to General Availability (GA). Due to architectural and performance restrictions that require throttling, the FlowRun history might have gaps. However, we understand the importance of complete flow run history data. We're actively evaluating strategies for lossless synchronization that allows us to move this feature to GA in the future.

The FlowRun data is used by the [Automation center \(preview\)](#) in the Power Automate maker portal. Although FlowRun data might have certain gaps during the preview phase, there's value in making this data accessible for public preview, both as a standalone feature and as part of the automation center.

## Does writing cloud flow run history into Dataverse use Power Platform request quota?

Writing cloud flow run history into Dataverse as [FlowRun](#) data doesn't count towards the [Power Platform Request limits](#). APIs executed to read that [FlowRun](#) data do count towards [Power Platform Request limits](#).

## How does this data compare to the data available in Application Insights?

Admins can [set up Application Insights](#) to provide monitoring data from Power Automate flow executions. The Application Insights data is:

- More complete because of data pipeline issues obtaining the [FlowRun](#) data.
- Deeper because it has information about triggers and actions executed.
- Able to be correlated with [Power Apps and Dataverse Application Insights data](#) through correlation identifiers.

## Related information

[Automation center](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) ↗

# Overview of solution-aware flows

Article • 03/10/2023

When you host your flows in a [solution](#), they become portable, making it effortless to move them and all their components from one environment to another. A typical use case is for an independent software vendor (ISV) to develop flows in a sandbox environment, and then move those flows to a test environment. After testing, the ISV would then move the flows to a production environment for clients who purchase these flows. This process is much easier when you create your flows in solutions, and then move the solutions and their contents.

Flows that you create in a solution are known as *solution-aware* flows. You can add multiple flows to a single solution.

## Tip

The [Application lifecycle management \(ALM\) with Microsoft Power Platform](#) guide provides detailed information about solution concepts and how to implement a healthy ALM practice in your organization.

## Prerequisites

You must have the following components to create solutions, and solution-aware flows.

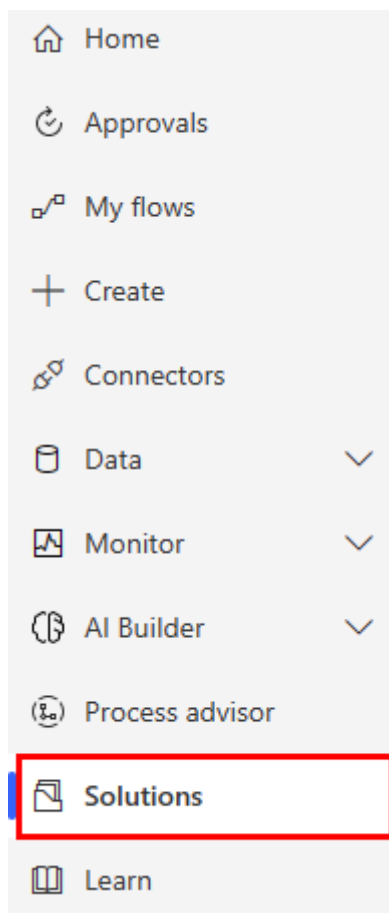
- [Dataverse](#).
- An environment with version 9.1.0.267 or later.

To check your version, go to [Power Platform admin center](#), select **Environments**, and then select the environment in which you are interested. The **Details** tab displays all configuration information for the environment that you selected.

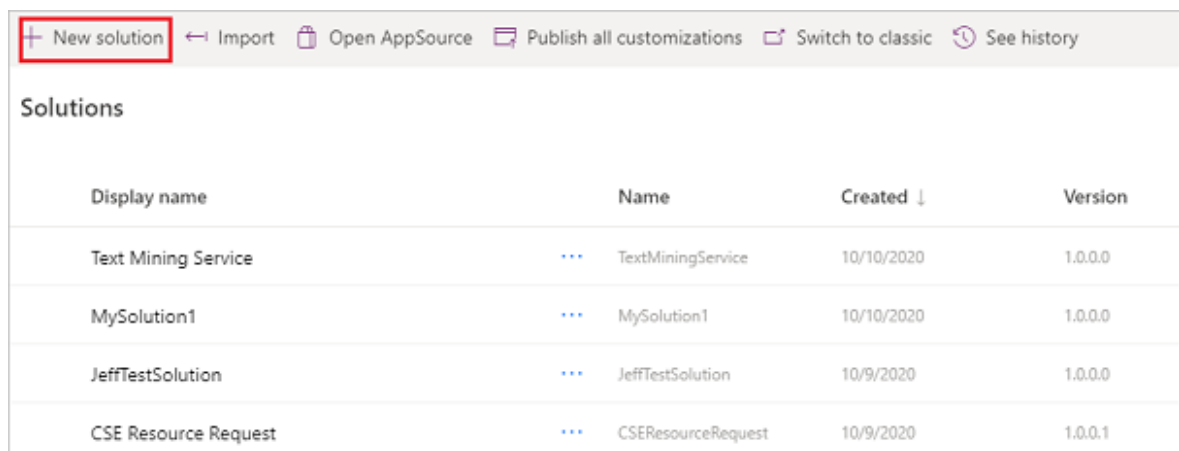
## Create a solution

Follow these steps to create a solution.

1. Sign in to [Power Automate](#).
2. On the menu to the left, select **Solutions**.



3. Select **New solution**.



4. Provide all required information for your new solution, including the **Display Name, Name, Publisher, and Version**.

5. Select the **Create** button.

Display name \*

Name \*

Publisher \*

Select a Publisher

+ New publisher

Version \*

More options

---

Your new solution might appear like this image.

| Solutions             |      |                      |           |                     |                          |                 |
|-----------------------|------|----------------------|-----------|---------------------|--------------------------|-----------------|
| Display name          | Name | Created ↓            | Version   | Managed externally? | Solution check           |                 |
| MyNewSolution03302022 | ...  | MyNewSolution0330... | 3/31/2022 | 1.0.0.0             | <input type="checkbox"/> | Hasn't been run |

Now that you've created your solution, it's time to [add your flows](#) to it.

## Known limitations

There are certain limitations when using flows with solutions. For information about these limitations, see [Known limitations](#) in the Power Apps docs.

## See also

- [Create a cloud flow in a solution](#)

- [Export a solution](#)
- [Import a solution](#)
- [Edit a solution-aware flow](#)
- [Remove a solution-aware flow](#)



# Create a cloud flow in a solution

Article • 02/23/2024

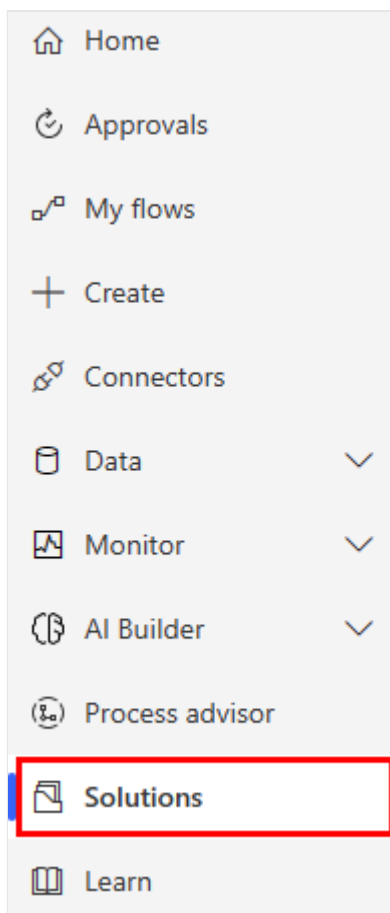
Cloud flows you create in a solution are known as *solution-aware cloud flows* or *solution cloud flows*. Follow these steps to create a solution-aware cloud flow.

## Prerequisites

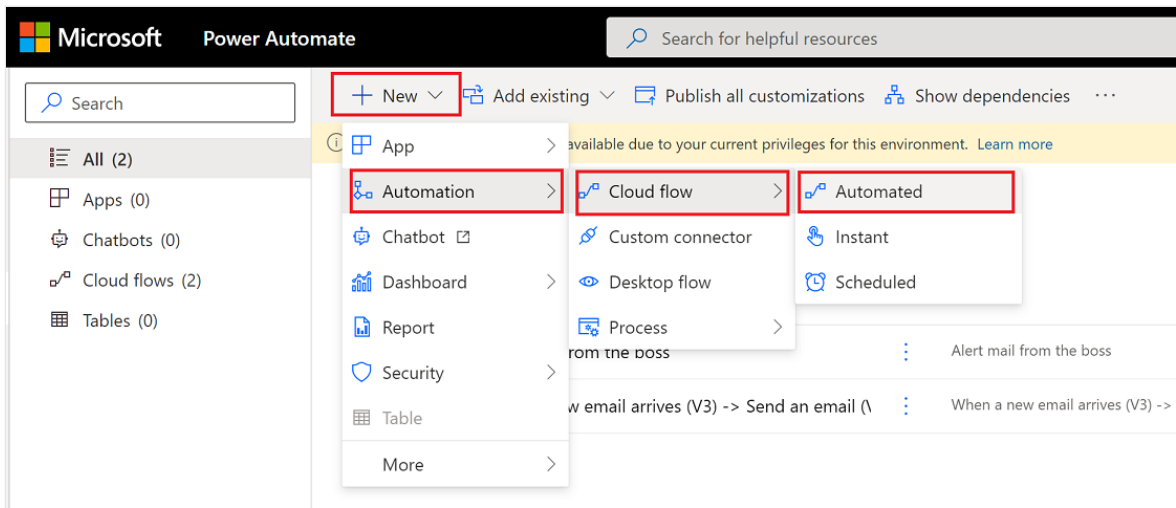
You need to have at least one solution before you can create a solution-aware flow.

## Create a solution-aware cloud flow

1. Sign into [Power Automate](#).
2. On the menu to the left, select **Solutions**.



3. Select the solution in which you'll create your flow.
4. Select **New > Automation > Cloud flow > Automated**.



### 💡 Tip

If an automated cloud flow doesn't meet your requirements, you can create any other **type of flow**.

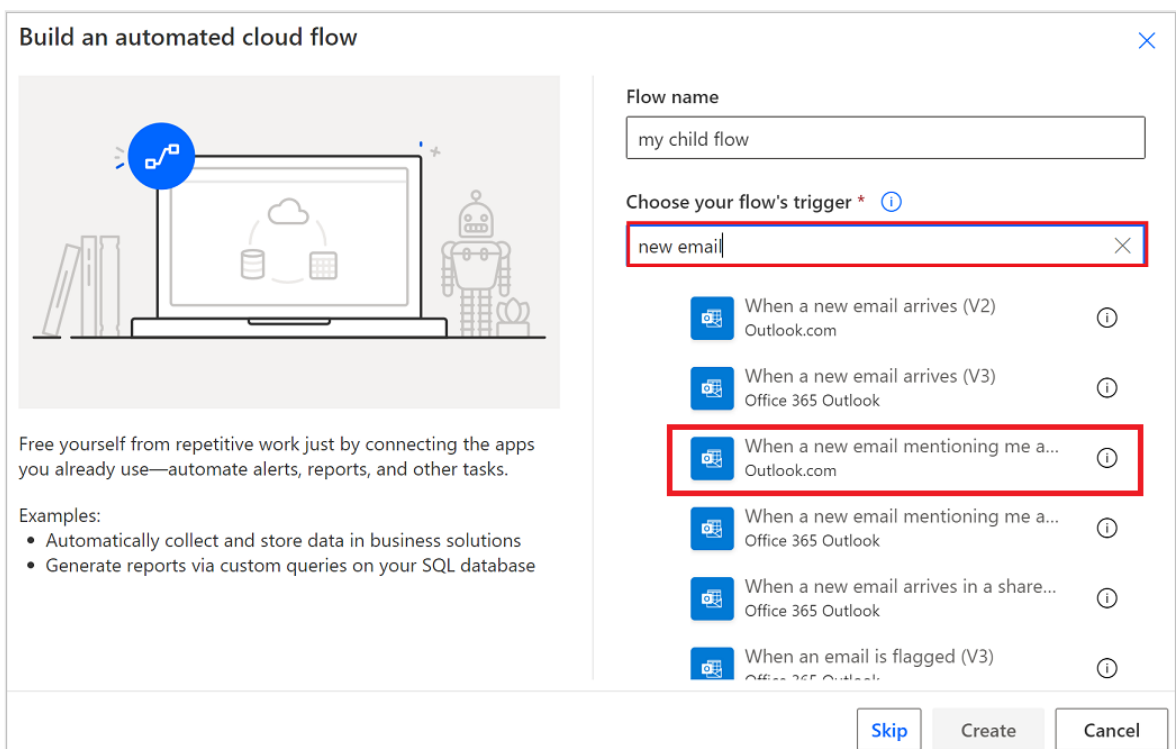
Power Automate opens.

5. Use the available connectors and triggers to build your flow.

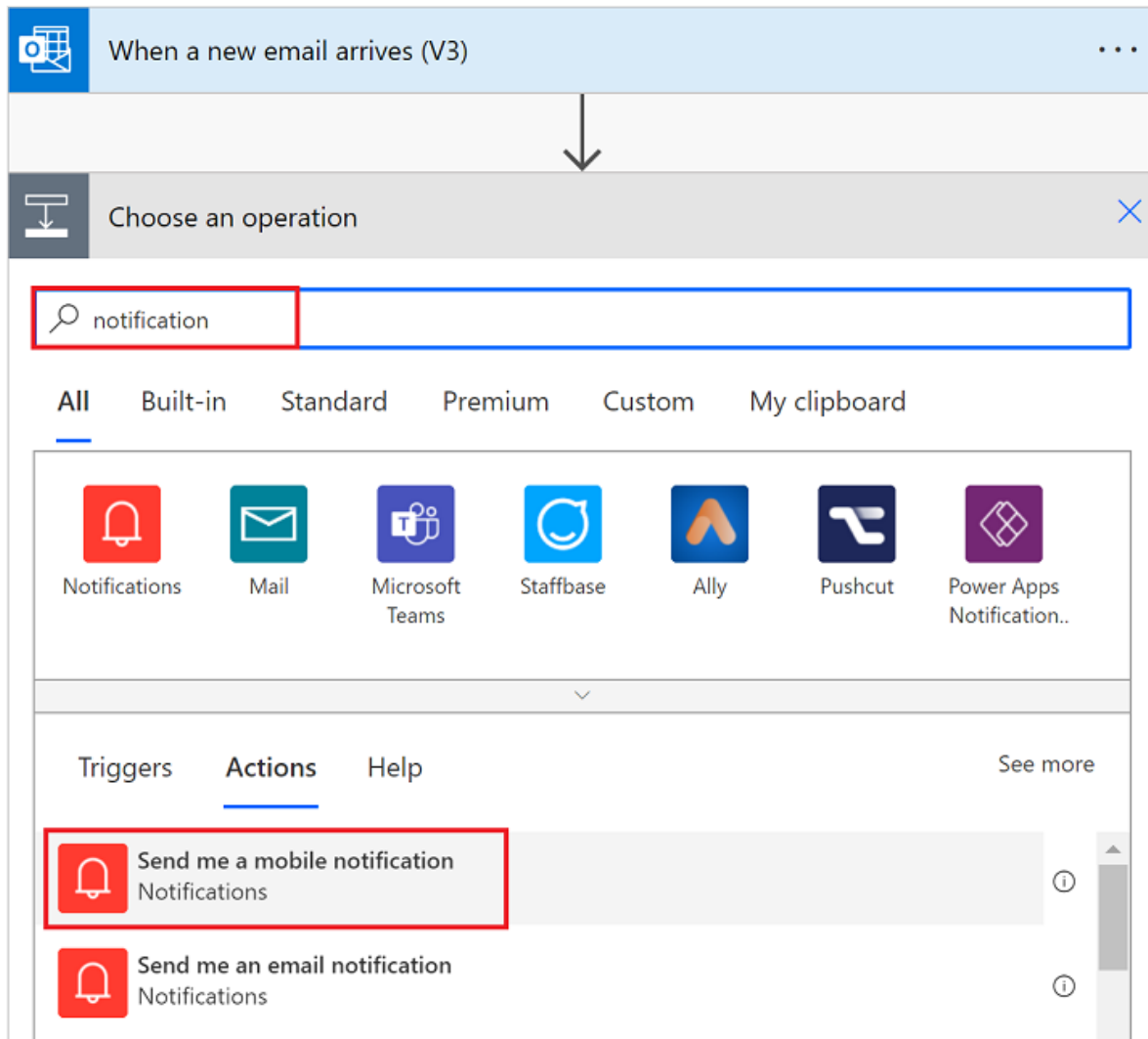
In this example, we'll build a flow that sends a notification when an email arrives in your inbox.

6. Give your flow a name.

7. Search for, **new email** in the **Search all triggers** box.



8. Select the **When a new email arrives (V3)** trigger.
9. Select **Create**.
10. Select **New step**.
11. Search for **Notification**, and then select the **Send me a mobile notification** action.



12. Add the **Subject** dynamic token to the **Text** field of the **Send me a mobile notification** card.
13. Select **Save** to save your flow.

Your flow should look like the following screenshot.

When a new email arrives (V3) ...

Folder:

Show advanced options ▾

+ (Add step icon)

Send me a mobile notification ...

\* Text:

Link:

Link label:

+ New step    Save

14. Select **Solutions** to see your flow in the solution.

Search

+ New ▾    + Add existing ▾    Edit    Details    See analytics    Turn off    + Add required objects

All (4)

- Apps (0)
- Chatbots (0)
- Cloud flows (3)
- Connection references (1)
- Tables (0)

TestSolution > All

| Display name ↑ ▾                               | Name ▾                   |
|------------------------------------------------|--------------------------|
| Alert mail from the boss                       | Alert mail from the boss |
| <input checked="" type="radio"/> my child flow | my child flow            |

## Find a solution-aware cloud flow

Solution-aware cloud flows can be found either in the **My flows** lists or in **Solutions** on the left navigation pane.

### Find a solution-aware cloud flow with 'My flows'

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **My flows**.
3. Find the flow that you want to edit.

### Tip

Cloud flows you own are on the **Cloud flows** tab and flows for which you're a co-owner are on the **Shared with me** tab.

The **Shared with me** tab shows the following solution cloud flows.

- Flows you co-own.
- Flows that are owned by a Dataverse team in which you're a member.
- Flows that are co-owned by a Dataverse team in which you're a member

If you're the owner of a solution cloud flow, you can always find it on the **Cloud flows** tab. If you have the 'run only' permission to a flow, you'll only see that flow on the **My flows** tab if you're an owner or a co-owner too.

## Find a solution-aware cloud flow via Solutions

1. Sign in to [Power Automate](#).
2. On the menu to the left, select **Solutions**.
3. Select the solution that contains the flow you want to edit.

## Find a solution that contains a solution-aware cloud flow

Solution-aware cloud flows have a **Solutions** card in the flow details page that provides a list of the solutions that reference that cloud flow. To open the solution, select the solution name.

The **Objects** tab of a solution shows all the solution objects in the solution, such as connection references, environment variables, or child flows that the flow might reference. The **Overview** tab shows the details of the solution, such as the description and status, and provides access to solution actions, such as [export](#).

## Add an existing cloud flow into a solution

1. Sign in to [Power Automate](#).
2. On the menu to the left, select **Solutions**.

3. Select the solution that you want to add a cloud flow into.

4. Select **Add existing** > **Automation** > **Cloud flow**.

Solution-aware cloud flows will be in the **From Dataverse** tab and non-solution cloud flows will be in the **Outside Dataverse** tab.

5. Select the desired cloud flow.

Some non-solution cloud flows can't be added into a solution. To learn more, go to [known limitations](#).

6. Select **Add**.

## Add many flows into Dataverse solutions using PowerShell

Administrators can use PowerShell to quickly add many or all non-solution cloud flows into Dataverse solutions using the [Add-AdminFlowsToSolution](#) cmdlet. To learn more, go to [Add flows into Dataverse solutions via PowerShell](#).

### See also

- [Add canvas apps and cloud flows to a solution by default](#)
- [Create a solution](#)
- [Export a solution](#)
- [Import a solution](#)
- [Edit a solution-aware flow](#)
- [Remove a solution-aware flow](#)

# Create child flows

Article • 09/25/2023

Today, people are building flows that need dozens or hundreds of steps; however, if you try to put all of these actions into a *single* flow, it can be difficult to navigate and maintain that flow.

You can use child flows to easily manage flows, avoiding flows with hundreds of steps. This approach is especially beneficial if you want to reuse tasks in multiple places in a cloud flow, or even across multiple flows.

Let's look at an example where you have a child flow that you want to create or update a contact in Dataverse based on that contact's name.

You will need a solution with two flows.

- A *child* flow. This is the flow that is nested inside the *parent* flow and contains the smaller tasks you want to run. You can have multiple child flows inside a parent flow.
- A *parent* flow. This flow can have any type of trigger and will call into the child flow.

## Create the child flow in a solution

1. Sign into Power Automate, select **Solutions**, and then select an existing solution.

Alternatively, you can create a solution if you don't want to use an existing solution.

2. Select **New > Automation > Cloud flow > Instant**.

The **Build an instant cloud flow** screen appears.

3. Give your flow a name so that you can easily identify it later.

4. Select the **Manually trigger a flow** trigger.

5. Select **Create**.

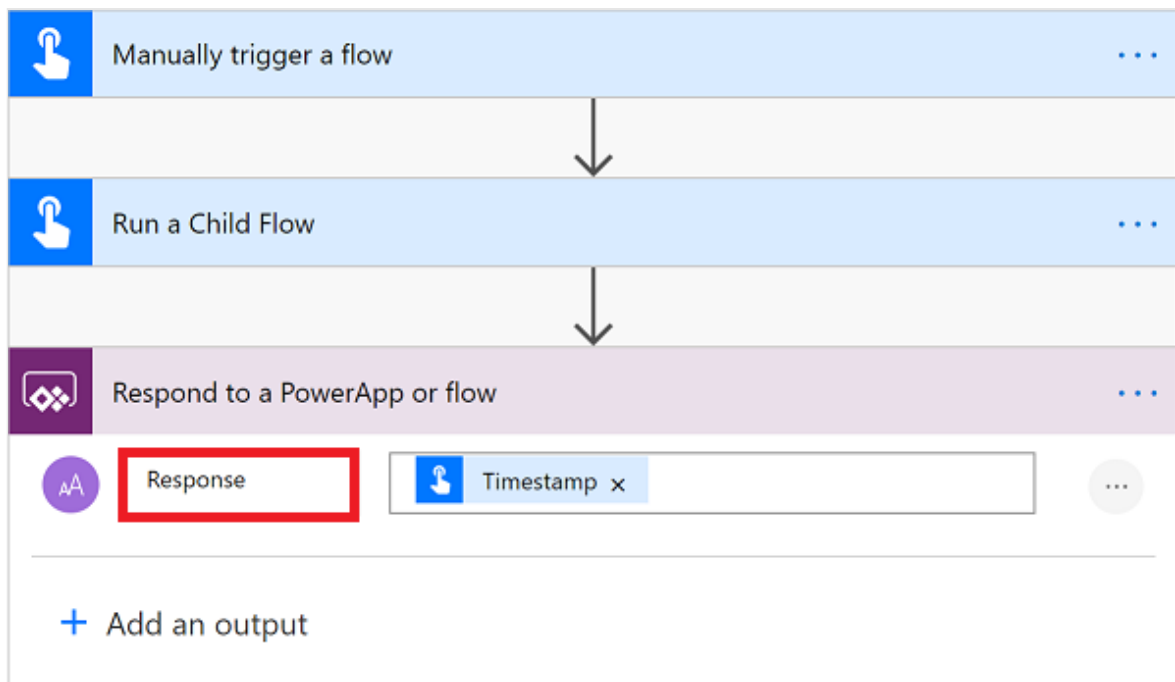
6. Select **Add an input**.

The input you define here will be passed to the child flow from the parent flow.

7. For this walkthrough, the child flow creates a contact, so it needs input fields for the **Contact name** and **Contact email**. Add a **ContactName** and a **ContactEmail** input to the **Manually trigger a flow** card.
8. Build the logic that you want the child flow to run. This logic can contain as many steps as you need.

After your steps, you need to return data to the parent flow. In this case you can use one of the following two actions.

- i. **Respond to a Power App or flow** (under the Power Apps connector).
  - ii. **Response** (on the premium HTTP request/response connector).
9. As with the trigger, you can define as many outputs as you want the child flow to return to the parent flow. In the following screenshot, the child flow responds with the ID of the contact.



You need to then test your child flow. You can manually trigger instant flows, so you can test it right inside of the designer. Try it out with a couple different inputs, and verify that the outputs are what you expect.

10. Lastly, if your flow uses anything other than built-in actions or the Microsoft Dataverse connector, you need to update the flow to use the connections **embedded** in the flow. To do this, go to the child flow's properties page, and then select **Edit** in the **Run only users** tile.
11. In the pane that appears, for each connection used in the flow, you will need to select **Use this connection (<connection name>)** instead of **Provided by run-only**



user.

## 12. Select **Save**.

### ⓘ Note

At this time, you can't pass connections from the parent flow to the child flow. If you don't do this, you receive an error that states that the name cannot be used as a child workflow because child workflows only support embedded connections.

## Create the parent flow in a solution

1. Build the parent flow in the same solution in which you created the child flow.

Alternatively, you can bring an existing flow into that solution. The parent flow can have any type of trigger.

2. Find the place in your *parent flow* from which you want to call the child flow and then add the **Run a Child Flow** action that's located under the **Flows** connector on the **Built-in** tab.

3. Pick the child flow that you created earlier.

### ⓘ Note

You only see the flows to which you have access and are located in a solution. Child flows must also have one of the three triggers mentioned previously.



4. After you select your child flow, you see the *inputs* that you defined in the child flow. After the child flow action, you're able to use any of the *outputs* from that child flow.

The screenshot shows a configuration interface for a flow. At the top, there is a button labeled "Manually trigger a flow" with a hand icon and a three-dot menu. Below it, a downward arrow points to another button labeled "Run a Child Flow" with a hand icon and a three-dot menu. Underneath the "Run a Child Flow" button, there is a form with four fields, all enclosed in a red border:

- \* Child Flow: A dropdown menu with "Batch Jobs Insights" selected and a blue checkmark icon.
- \* Day: A text input field with the placeholder text "Enter day of week (0 is Sunday)".
- \* Hour: A text input field with the placeholder text "Enter hour on 24 hour scale".
- \* Email Address: A text input field with the placeholder text "Enter comma separated values".

When the parent flow runs, it waits for the child flow to complete for the lifetime of the flow (one year for flows that use built-in connections and Dataverse or 30 days for all other flows).

5. Save and test this flow.

#### Tip

When you export the solution that contains these two flows and import it into another environment, the new parent and child flows are automatically linked, so there's no need to update URLs.

## Known issue

We are working to address the following known issue and limitation.

You should create the parent flow and all child flows *directly* in the same solution. If you import a flow into a solution, you might get unexpected results.

# Export a solution

Article • 01/20/2024

Follow these steps to move your solution and its dependencies to a new environment.

## 📘 Important

Before you export a solution, consider removing environment variable values in the solution.

1. Sign in to [Power Automate](#).
2. Select **Solutions** from the navigation bar on the left side of Power Automate.
3. Select the unmanaged solution that you want to export.
4. Select **Export** from the menu at the top of the screen.
5. The **Before you export** right pane appears. Choose from the following options.
  - **Publish all changes** - Notice that, when you export an unmanaged solution, only published components are exported. We recommend that you select **Publish** to confirm that all components are in the exported solution.
  - **Check for issues** - Run the solution checker against the solution to detect performance and stability issues.
6. Select **Next**.
7. The **Export this solution** page appears on the right. Enter or select from the following options, and then select **Export**.
  - **Version number** - Power Automate automatically increments your solution version. You can accept the default version or enter your own.
  - **Export as** - Select the package type, either **Managed** or **Unmanaged**. More information: [Managed and unmanaged solutions](#)

## ⚠️ Note

The export can take several minutes to complete.

8. After the solution file export succeeds, you'll see a success notification on top of the screen. Select **Download** from the top-right side of this notification to

download the solution zip file.

The downloaded solution zip file is available in the downloads folder for your web browser.

9. Find the flows in the **Workflows** folder in the solution zip file.

Each exported workflow is represented as a JSON file. Flow definitions were traditionally a compact block of JSON in a single line. In February 2022 the export format was changed to multi-line formatted JSON to make them easier to read and make them friendlier to revision tracking in source control.

## Export a specific solution cloud flow

[Solution cloud flows](#) are exported and moved between environments in a [solution](#). The solution should contain all the solution components that the flow uses, such as [connection references](#), [environment variables](#), and [tables](#). Depending on the desired scenario, the solution could also contain solution components that reference the flow, such as [apps](#) and [bots](#).

The flow details page contains a *Solutions* card that lists all the solutions that reference a flow. If the flow is only in the default solution (the "all solution components" view), then either [add the flow into an existing solution](#), or [create a new solution](#).

## Tips

- You can also find your solutions via the **Solutions** card in the flow details page of solution-aware cloud flows. Alternatively, select the solution in which you're interested from the **Solutions** card, select the **Overview** tab, and then use the **Export** button there.
- You can't export managed solutions. More information: [Managed and unmanaged solutions](#)
- Once a flow is solution-aware and in Dataverse, you must use the steps in this article to export it. You cannot export a solution-aware cloud flow from the flow details page.
- To implement healthy application lifecycle management (ALM) in your organization, use a source control system to store and collaborate on your solutions, and automate the solution export process. More information: [ALM basics](#) in the Power Platform ALM guide.

## See also

- [Create a solution](#)
- [Create a cloud flow in a solution](#)
- [Import a solution](#)
- [Edit a solution-aware flow](#)
- [Environment variables overview](#)

# Import a solution

Article • 07/16/2024

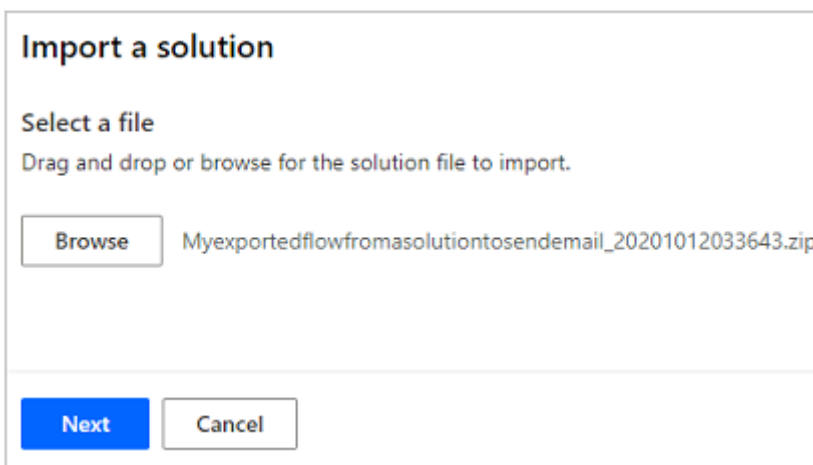
After you exported your solution, you can import it into any environment that meets the prerequisites. To import a solution, follow these steps.

## 💡 Tip

If you want to have your flows start automatically after you import a solution, use the Microsoft Dataverse connector in your flow when you create it.

1. Sign in to [Power Automate](#).
2. On the navigation bar to the left, select **Solutions**.
3. Select **Import**.
4. On the **Import a solution** page that opens, select **Browse**.
5. Find and select the solution that you want to import.
6. Select **Open**.

You should now see the **Import a Solution** page similar to the following image.



**Import a solution**

Select a file  
Drag and drop or browse for the solution file to import.

Myexportedflowfromasolutiontosendemail\_20201012033643.zip

7. Select **Next**.

If there are no errors, the importation completes within a few moments.

## 📌 Note

You can't import a solution into an environment in which the solution already exists.

## Solution component ownership after import

When the solution is imported, all components in that solution are owned by the user who performs the import. These components include cloud flows, connection references, apps, and any other components in the solution.

## FAQ

### What will the flow state be after import?

When you import a solution containing flows, the import process attempts to restore them to the state they were in when exported. If the flows were on when exported and any connection references get connections, then the flows should be turned on as part of the import process.

If the flow already exists in the target environment, then the import of an update to that flow doesn't affect the flow state. For example, if the flow is turned off in the target environment and then an update is imported, the flow remains turned off.

### If the importing user doesn't have permissions to all the connections in the flow, will the flow be turned on?

If the importing user doesn't have permissions to all the connections in the flow, then the [connections need to be shared](#) with the importing user so that they can turn on the flow.

### Does importing a solution cause flows to turn off?

When a solution is being imported, the flows in that solution are turned off and turned on again. This impact can be minimized by using multiple smaller solutions.

## Related information

- [Create a solution](#)
- [Create a cloud flow in a solution](#)

- [Export a solution](#)
  - [Edit a solution-aware flow](#)
  - [Remove a solution-aware flow](#)
  - [Use connection references](#)
  - [Manage connections in Power Automate](#)
  - [Import solutions \(Power Apps\)](#)
- 

## Feedback

Was this page helpful?

[Provide product feedback](#) 



# Edit a solution-aware cloud flow

Article • 03/04/2024

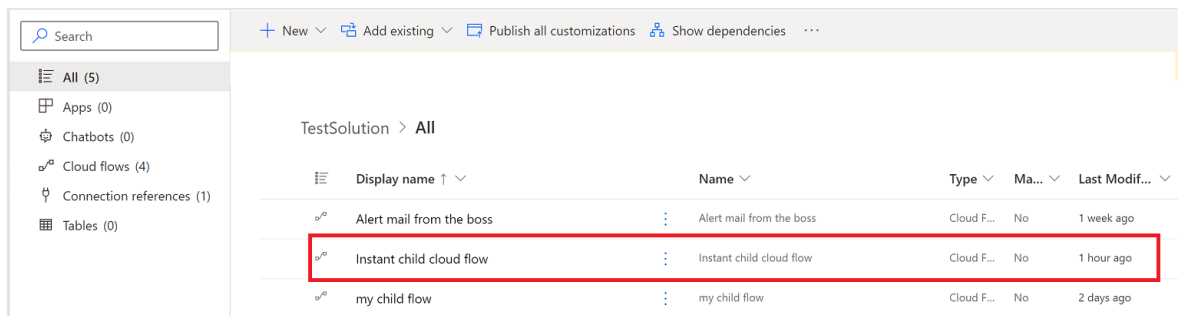
You can edit solution-aware cloud flows in [solutions](#) or in [my flows](#).

## 📘 Important

Stop your flow before you edit it so that you don't lose your changes.

## Edit a solution-aware cloud flow via Solutions

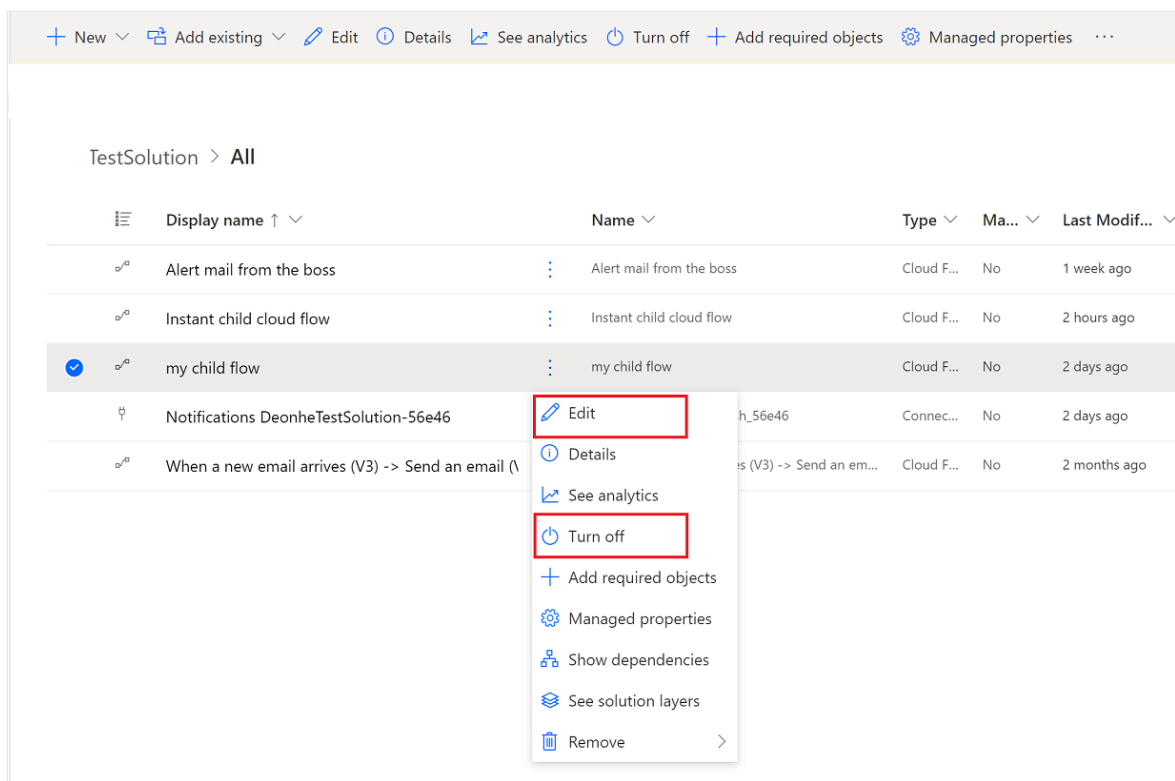
1. Sign in to [Power Automate](#), and then select **Solutions** from the menu on the left.
2. Select the solution that contains the flow you want to edit.



The screenshot shows the Power Automate interface for a solution named 'TestSolution'. The left sidebar contains a navigation menu with categories: All (5), Apps (0), Chatbots (0), Cloud flows (4), Connection references (1), and Tables (0). The main area displays a table of cloud flows under the heading 'TestSolution > All'. The table has columns for 'Display name', 'Name', 'Type', 'Ma...', and 'Last Modif...'. The 'Instant child cloud flow' row is highlighted with a red border.

| Display name             | Name                     | Type       | Ma... | Last Modif... |
|--------------------------|--------------------------|------------|-------|---------------|
| Alert mail from the boss | Alert mail from the boss | Cloud F... | No    | 1 week ago    |
| Instant child cloud flow | Instant child cloud flow | Cloud F... | No    | 1 hour ago    |
| my child flow            | my child flow            | Cloud F... | No    | 2 days ago    |

3. Select the vertical ellipsis (:) for your flow, and then select **Turn off**.
4. Select the vertical ellipsis (:) for your flow, and then select **Edit**.



5. Make your edits in the Power Automate designer, test your changes, and then save your flow.
6. Turn on your flow if you'd like it to run.

## Edit a solution-aware cloud flow via My flows

1. In [Power Automate](#), select **My flows** from the menu on the left.
2. Find the flow you want to edit. Cloud flows that you own will be in the **Cloud flows** tab and flows that you have co-ownership of will be in the **Shared with me** tab.
3. Select the vertical ellipsis (:) for your flow, and then select **Turn off**.
4. Select the vertical ellipsis (:) for your flow, and then select **Edit**.
5. Make your edits in the Power Automate designer, test your changes, and then save your flow.
6. Turn on your flow if you'd like it to run.

### Warning

When you edit solution-aware flows, it's possible for you to introduce unmanaged customization layers into your managed solution-aware flows. Unmanaged customization layers can impact your ability to update these flows in the future.

# Duplicate a solution-aware cloud flow using Save As

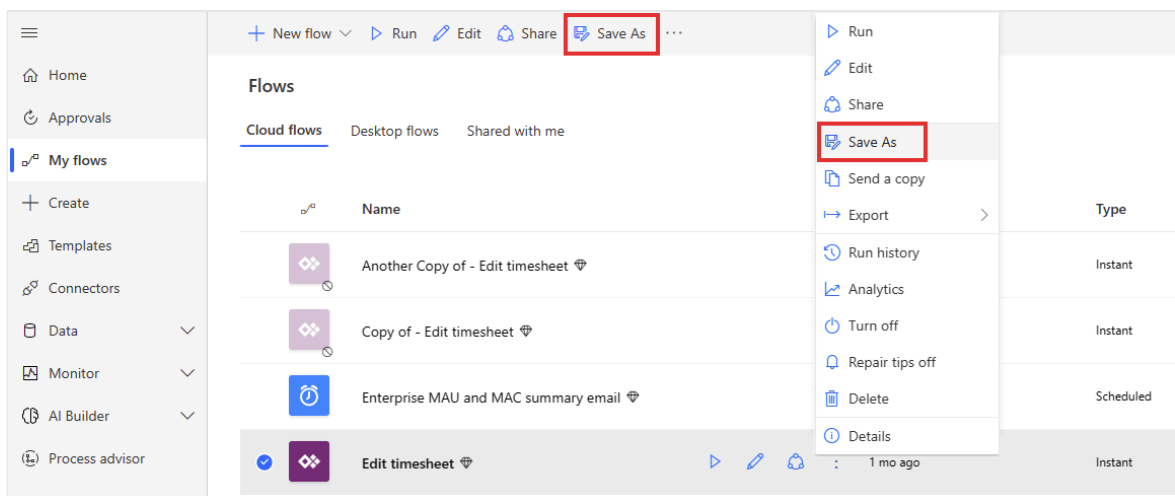
The **Save As** capability can be used to duplicate a solution cloud flow. If an unmanaged solution is in context when **Save As** takes place, the flow will be added into that solution. Solution cloud flows won't be added into a solution if there's no context, or if a managed solution has context, so those flows can be located in the **My flows** list or in the **Default Solution**.

## Save As without solution context

1. In [Power Automate](#), select **My flows** from the menu on the left.
2. Open the cloud flow you want to duplicate.

The flow details page will show a **Solutions** card listing any custom solutions the flow is referenced by.

3. Select **Save As**.



4. On the **Create a copy of this flow** screen, enter a custom flow name if desired and select **Save**.

The flow will now be visible in **My flows**.

### ⓘ Note

If the save takes a few seconds, it's possible to return to **My flows** before that's completed. If that happens, refresh the browser screen to view the flow.

# Save As with unmanaged solution context

1. In [Power Automate](#), select **Solutions** from the menu on the left.
2. Open an unmanaged solution. This solution is now providing solution context.
3. Inside that solution, find and open the cloud flow you want to duplicate.

The flow details page will show a **Solutions** card listing the current solution and any other custom solutions the flow is referenced by.

4. Select **Save As**.
5. On the **Create a copy of this flow** screen, enter a custom flow name if desired and select **Save**.

The flow will now be visible in the solution. Upon opening that flow, it will have the solution in the **Solutions** card in the flow details page.

## See also

- [Manage and edit a cloud flow](#)
- [Create a solution](#)
- [Use drafts and versioning](#)
- [Create a cloud flow in a solution](#)
- [Set a preferred solution](#)
- [Export a solution](#)
- [Import a solution](#)
- [Remove a solution-aware flow](#)

# Remove a solution-aware flow

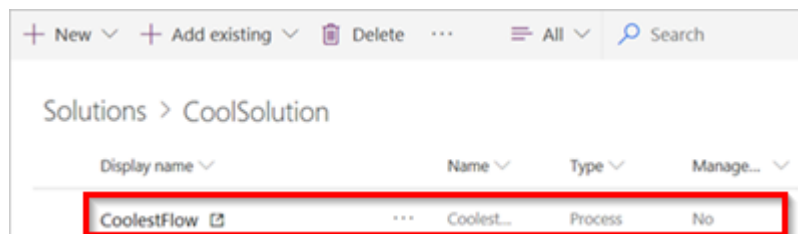
Article • 12/16/2022

You can either remove a cloud flow from a solution, or delete the flow from an environment entirely.

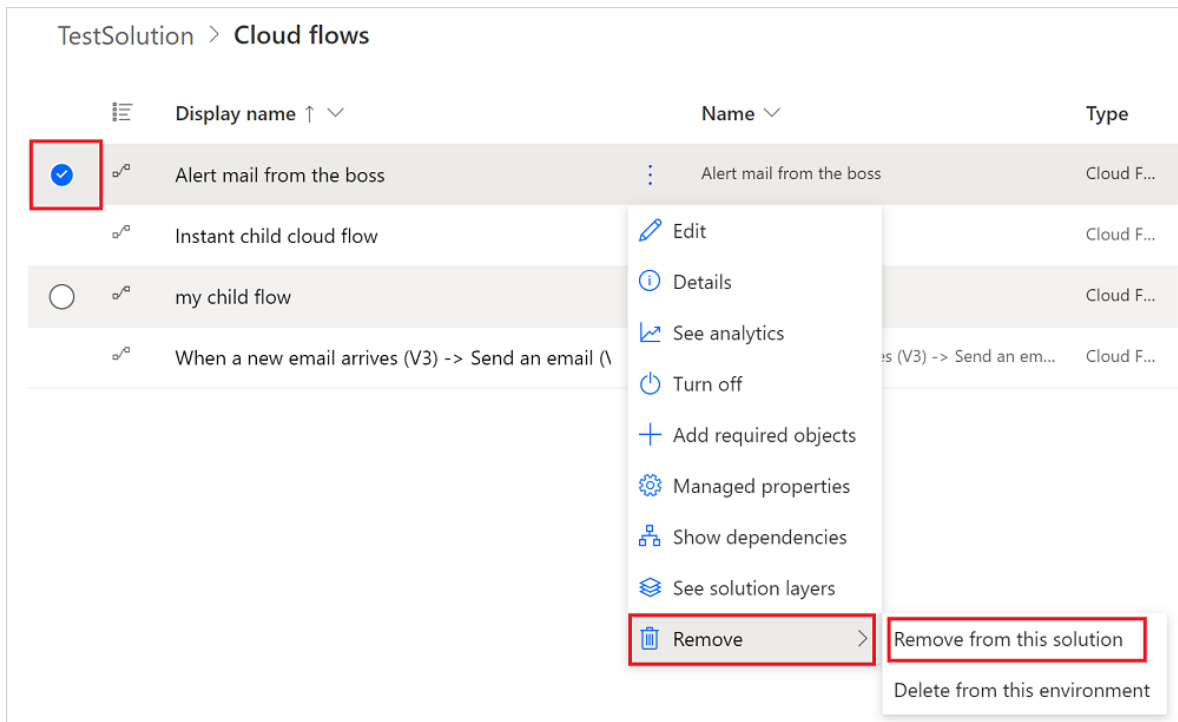
| Action                       | Result                                                                                                                                                         |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Remove from this solution    | The flow is removed from the selected solution, but it remains in the environment. You can use the flow in other solutions in the environment at a later date. |
| Delete from this environment | The flow is deleted; it is not available in the environment.                                                                                                   |

## Remove a cloud flow from a solution

1. Sign in to Power Automate, and then select **Solutions** from the navigation bar.
2. Select the solution that contains the flow you want to remove from the solution.



3. Select ... (Commands) for your flow, select **Remove**, and then select either **Remove from this solution**.

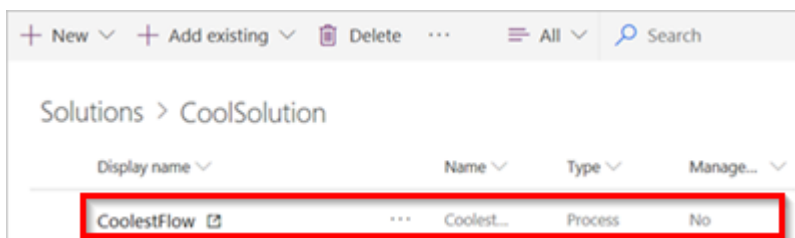


### Important

When you remove a cloud flow, it gets moved to the **Default Solution**, where you can edit or delete the flow, or add it to another solution.

## Delete a cloud flow from an environment

1. Sign in to Power Automate, and then select **Solutions** from the navigation bar.
2. Select the solution that contains the flow you want to delete from the environment.



3. Select ... (Commands) for your flow, select **Remove**, and then select **Delete from this environment**.

TestSolution > Cloud flows

|                                     | Display name ↑ ↓                                  | Name ↓                                         | Type       |
|-------------------------------------|---------------------------------------------------|------------------------------------------------|------------|
| <input checked="" type="checkbox"/> | Alert mail from the boss                          | Alert mail from the boss                       | Cloud F... |
| <input type="checkbox"/>            | Instant child cloud flow                          |                                                | Cloud F... |
| <input type="checkbox"/>            | my child flow                                     |                                                | Cloud F... |
| <input type="checkbox"/>            | When a new email arrives (V3) -> Send an email (\ | When a new email arrives (V3) -> Send an em... | Cloud F... |

- Edit
- Details
- See analytics
- Turn off
- Add required objects
- Managed properties
- Show dependencies
- See solution layers
- Remove >

- Remove from this solution
- Delete from this environment

## Learn more

- [Create a solution](#)
- [Create a cloud flow in a solution](#)
- [Export a solution](#)
- [Import a solution](#)
- [Edit a solution-aware flow](#)

# Troubleshoot common issues with triggers

Article • 10/02/2023

Here are a few tips and tricks for troubleshooting issues with triggers.

## Identify specific flow run

Sometimes, you might need to [Identify specific flow runs](#) to troubleshoot your flows.

## My trigger doesn't fire

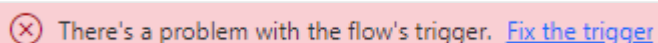
1. A data loss prevention policy could be to blame.

Admins can create [data loss prevention \(DLP\)](#) policies that can act as guardrails to help prevent users from unintentionally exposing organizational data. DLP policies enforce rules for which connectors can be used together by classifying connectors as either **Business** or **Non-Business**. If you put a connector in the **Business** group, it can only be used with other connectors from that group in any given app or flow.

If your flow violates a DLP policy, it's suspended, causing the trigger to not fire. To know if your flow is suspended, try to edit the flow and save it. The flow checker will report it if the flow violates a DLP policy. Your admin can change the DLP policy.

2. The trigger may be failing. Follow these steps to confirm:

- a. Sign in to [Power Automate](#).
- b. Go to **My flows**, and then select your flow.
- c. Do you see the following error in the **Details**?



⊗ There's a problem with the flow's trigger. [Fix the trigger](#)

This error means that Power Automate tried multiple times to establish a connection to register the trigger and failed. Your flow won't trigger until this problem is resolved.



One of the common reasons for this failure is that the Power Automate service endpoints are not part of the allow list. To fix it, confirm that your IT department has added these endpoints to the allow list.

Here is the list of [IP addresses](#) and [domains](#) that need to be added to your allow list.

Refer to this [support article](#) to learn more about how to fix issues with triggers.









After the problem is resolved, modify the flow and then save it. You can then change it back to its original state, and then save it again. The flow becomes aware that its configuration changed, and it tries to register its trigger again.

## Verify connections

With the default settings, users only need to sign in to a connection once. They can then use that connection until it's revoked by an admin. A possible scenario is that the password for the connection can expire or there might be a policy in your organization which sets the connector's authentication token to expire after a specific amount of time. Token lifetime policies are configured on Azure Active Directory. For more information, review this [Azure article](#) or this [support article](#).

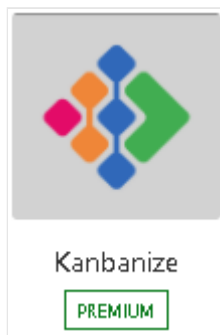
Follow these steps to verify if your connections are broken:

1. Sign in to [Power Automate](#).
2. Go to **Data > Connections**.
3. Find the connection that your flow uses.
4. Select **Fix connections**, and then update the credentials for your connection if there is a **Fix connection** message next to the **Status** column.

| Connections in MS Personal Productivity (msdefault)                                                                              |             |               |                                |
|----------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|--------------------------------|
| Name                                                                                                                             | Modified    | Status        |                                |
|  {BaseResourceUrl}<br>HTTP with Azure AD        | ⋮ 6 m o ago | Can't sign in | <a href="#">Fix connection</a> |
|  Azure Blob Storage<br>Azure Blob Storage       | ⋮ 1 yr ago  | Connected     |                                |
|  AzBackup CoS Flow<br>Azure Blob Storage        | ⋮ 1 yr ago  | Connected     |                                |
|  Azure Blob Storage<br>Azure Blob Storage       | ⋮ 1 yr ago  | Connected     |                                |
|  Azure Blob Storage<br>Azure Blob Storage       | ⋮ 3 m o ago | Connected     |                                |
|  BCAudit Image Storage<br>Azure Blob Storage    | ⋮ 2 yr ago  | Connected     |                                |
|  Azure Blob Storage Skink<br>Azure Blob Storage | ⋮ 3 m o ago | Connected     |                                |
|  Azure Blob Storage<br>Azure Blob Storage       | ⋮ 2 yr ago  | Connected     |                                |

## Verify if the flow uses a premium connector trigger

1. Edit your flow to find the connector name for the trigger.
2. Go to the [list of connectors](#) and then search for that connector. If the connector is a premium connector, **PREMIUM** displays below the name of the connector.



A standalone Power Apps or Power Automate license is required to access all premium, on-premises, and custom connectors. You can [purchase licenses](#) at any time.

## Check your license type

Follow these steps to view the type of license that you have:

1. Sign in to [Power Automate](#).
2. Go to **My flows** in the left pane.
3. Select any flow.

4. In the **Details** section, find **Plan**. Your current license plan is listed.

## Verify if trigger check is skipped

You just completed an event. For example, you added a new list item or sent an email that should have triggered the flow, but the flow didn't run.

Go to **My flows** in the left pane, and then select the flow. In the **28-day run history**, select **All runs**.



| Start                       | Duration | Status    |
|-----------------------------|----------|-----------|
| Nov 16, 09:03 AM (1 h ago)  | 00:00:02 | Succeeded |
| Nov 16, 07:09 AM (3 h ago)  | 00:00:04 | Succeeded |
| Nov 16, 03:02 AM (7 h ago)  | 00:00:04 | Succeeded |
| Nov 15, 11:02 AM (23 h ago) | 00:00:01 | Succeeded |
| Nov 15, 11:02 AM (23 h ago) | 00:00:02 | Succeeded |
| Nov 14, 11:03 AM (1 d ago)  | 00:00:03 | Succeeded |
| Nov 14, 11:02 AM (1 d ago)  | 00:00:01 | Succeeded |
| Nov 13, 04:04 PM (2 d ago)  | 00:00:03 | Succeeded |
| Nov 13, 11:01 AM (2 d ago)  | 00:00:02 | Succeeded |
| Nov 13, 11:01 AM (2 d ago)  | 00:00:02 | Succeeded |

If you expect the flow to run but it didn't run, see if it shows the trigger check was skipped at that time. If the trigger check was skipped, it means that the trigger condition wasn't met for the flow to trigger. Verify the flow the inputs and trigger conditions to confirm if you are using the latest configuration to trigger the flow.

## Verify inputs and trigger conditions

Sometimes, the inputs and trigger conditions may cause failures. Follow these steps to verify your inputs and conditions.

### ⓘ Note

Power Automate uses either the classic cloud flows designer or the cloud flows designer with Copilot. To identify which designer you're using, go to the **Note** section in **Understand the cloud flows designer with copilot capabilities**.

Classic designer

1. Sign in to [Power Automate](#).

2. Edit the flow.
3. Expand the first card to see what folders, sites, mailboxes, etc. are used in the trigger.
4. On the card, select the ellipses (...) > **Settings**.
5. Find **Trigger conditions**.

If the field is empty, it means that there are no additional customizations and that the title of the card (in this case, **When an item is created or modified**) indicates when the trigger fires.

If there are additional customizations in **Trigger Conditions**, confirm that you're using the expected or correct inputs to trigger the flow.

Settings for 'When an item is created'

**Split On**  
Enable split-on to start an instance of the workflow per item in the selected array. Each instance can also have a distinct tracking id.

Split On  On

Array

Split-On Tracking Id

**Custom Tracking Id**  
Set the tracking id for the run. For split-on this tracking id is for the initiating request.

Tracking Id

**Secure Inputs (Preview)**  
Secure inputs of the operation.

Secure Inputs  Off

**Secure Outputs (Preview)**  
Secure outputs of the operation and references of output properties.

Secure Outputs  Off

**Retry Policy**  
A retry policy applies to intermittent failures, characterized as HTTP status codes 408, 429, and 5xx, in addition to any connectivity exceptions. The default is an exponential interval policy set to retry 4 times.

Type

**Concurrency Control**  
Limit number of concurrent runs of the flow, or leave it off to run as many as possible at the same time. Concurrency control changes the way new runs are queued. It cannot be undone once enabled.

Limit  Off

**Trigger Conditions**  
Specify one or more expressions which must be true for the trigger to fire.

✕

+ Add

## Check permissions

Verify that you have access to the folders, sites, or mailboxes that are used in the trigger. For example, to be able to send email from a shared inbox via Power Automate, you need permissions to send an email via the shared inbox. Send a test email from that shared mailbox in Outlook.

## Verify if admin mode is turned on

If an environment's admin mode is turned on, all background processes, including flows will be turned off, causing the flow to not trigger.

Follow these steps to disable the admin mode.

1. Go to the [Power Platform admin center](#) and sign in with Environment Admin or System Administrator role credentials.
2. From the left-side menu, select **Environments**, and then select a sandbox or production environment.
3. On the **Details** page, select **Edit**.
4. Under **Administration mode**, set the slider to **Disabled**.

If everything looks good but your flow is still not triggering, verify if your flow triggers after every step.

## Try these steps

1. Test the flow manually.
2. Remove, and then re-add the trigger.
3. Switch the connection.
4. Turn off, and then turn on the flow.
5. [Export](#), and then [import](#) the flow.
6. Create a copy of the flow.
7. If the trigger uses special conditions, like when an email arrives in a specific folder, remove the folder, and then add it again.

## My trigger is firing for old events

There are two types of triggers—polling triggers and Webhook triggers.

If you turned off your flow and then turned it back on, depending on your trigger type, your old triggers may be processed.

A polling trigger periodically makes a call to your service to look for new data, whereas a Webhook trigger responds to a push of new data from the service.

See the following table to understand how your flow responds when it's turned back on.

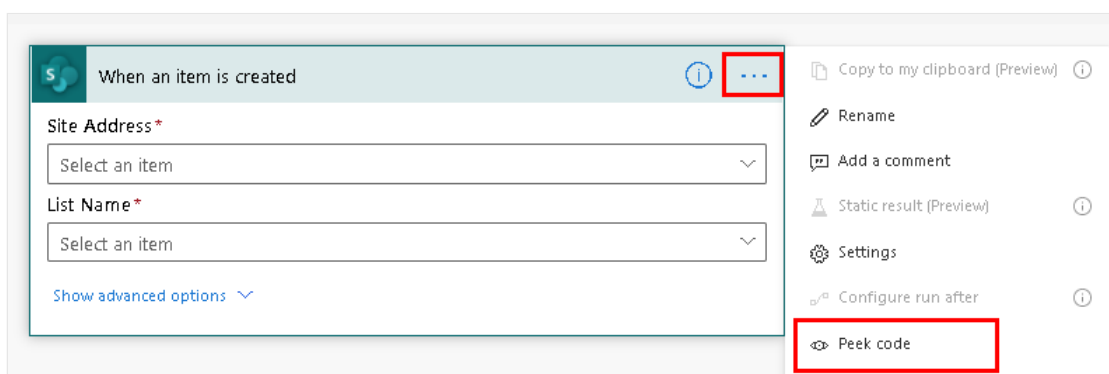
| Trigger type                                         | Description                                                                                                                   |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Polling, such as the <code>recurrence</code> trigger | When the flow is turned on again, all unprocessed or pending events are processed. If you don't want to process pending items |

| Trigger type | Description                                                                                               |
|--------------|-----------------------------------------------------------------------------------------------------------|
|              | when you turn your flow back on, delete and then recreate your flow.                                      |
| Webhook      | When the flow is turned on again, it processes new events that are generated after the flow is turned on. |

Follow these steps to determine the type of trigger that your flow uses.

## Classic designer

1. On the title bar, select the ellipsis (...) > **Peek code**.



2. Find the **recurrence** section with an interval **frequency** element. If this section is available, the trigger is a *polling* trigger.

```
'When an item is created' (code view)

1 {
2   "inputs": {
3     "host": {
4       "connectionName": "shared_sharepointonline",
5       "operationId": "GetOnNewItems",
6       "apiId": "/providers/Microsoft.PowerApps/apis/
shared_sharepointonline"
7     },
8     "parameters": {
9       "dataset": "",
10      "table": ""
11    },
12    "authentication": "@parameters('$authentication')"
13  },
14  "recurrence": {
15    "interval": 1,
16    "frequency": "Minute"
17  },
18  "splitOn": "@triggerOutputs()?['body/value']"
19 }
```

Done

## My flow is triggered multiple times or some of my actions run multiple times

You may encounter a scenario where a single flow run has some (or all) of its actions duplicated. While the UI doesn't show this problem, you might see the results of the flow being duplicated. For example, duplicate emails sent, or duplicate list items created.

One of the reasons this might happen is because of the "at-least-once" design of Azure Logic Apps.

Most of the times, this indicates that there was an issue with the Azure service. Usually, these issues are self-healed quickly. To ensure that your flows don't create duplication, ensure you design them to be **idempotent**—which is to say that the flow needs to account for the possibility of duplicate inputs.

An example of idempotency would be checking to see if a duplicate SharePoint document already exists before trying to create it, or using key constraints in Dataverse to prevent duplicate records getting created.



Another possibility is for flow triggering multiple times might be having copies of the flow active in different environments that are triggering based on same condition. Use trigger conditions to customize triggers to reduce the number of times it triggers.

## My recurrence trigger runs ahead of schedule

Confirm that you've set the **Start time** on the **Recurrence** card to ensure it runs only at the time that you need. For example, set **Start time** to '2022-10-10T10:00:00Z' to start your trigger at 10:00 AM.

## There's a delay before my trigger fires

If the trigger is a polling trigger, it wakes up periodically to check if any new events have occurred. The wake-up time depends on the license plan on which the flow runs.

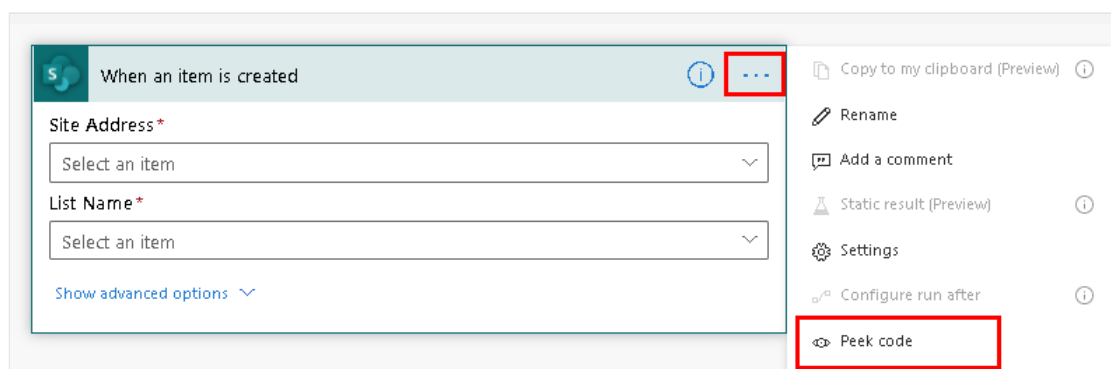
For example, your flows may run every 15 minutes if you're on the **Free** license plan. On the **Free** plan, if a cloud flow is triggered less than 15 minutes after its last run, it's queued until 15 minutes have elapsed.

And, if your license is the **Flow for Office 365** plan (from your Enterprise license E3, E5, etc.) or the **Flow for Dynamics 365** plan, your flow won't run again until five minutes have elapsed. So, it may be a few minutes between the time the triggering event occurs and the time the flow begins.

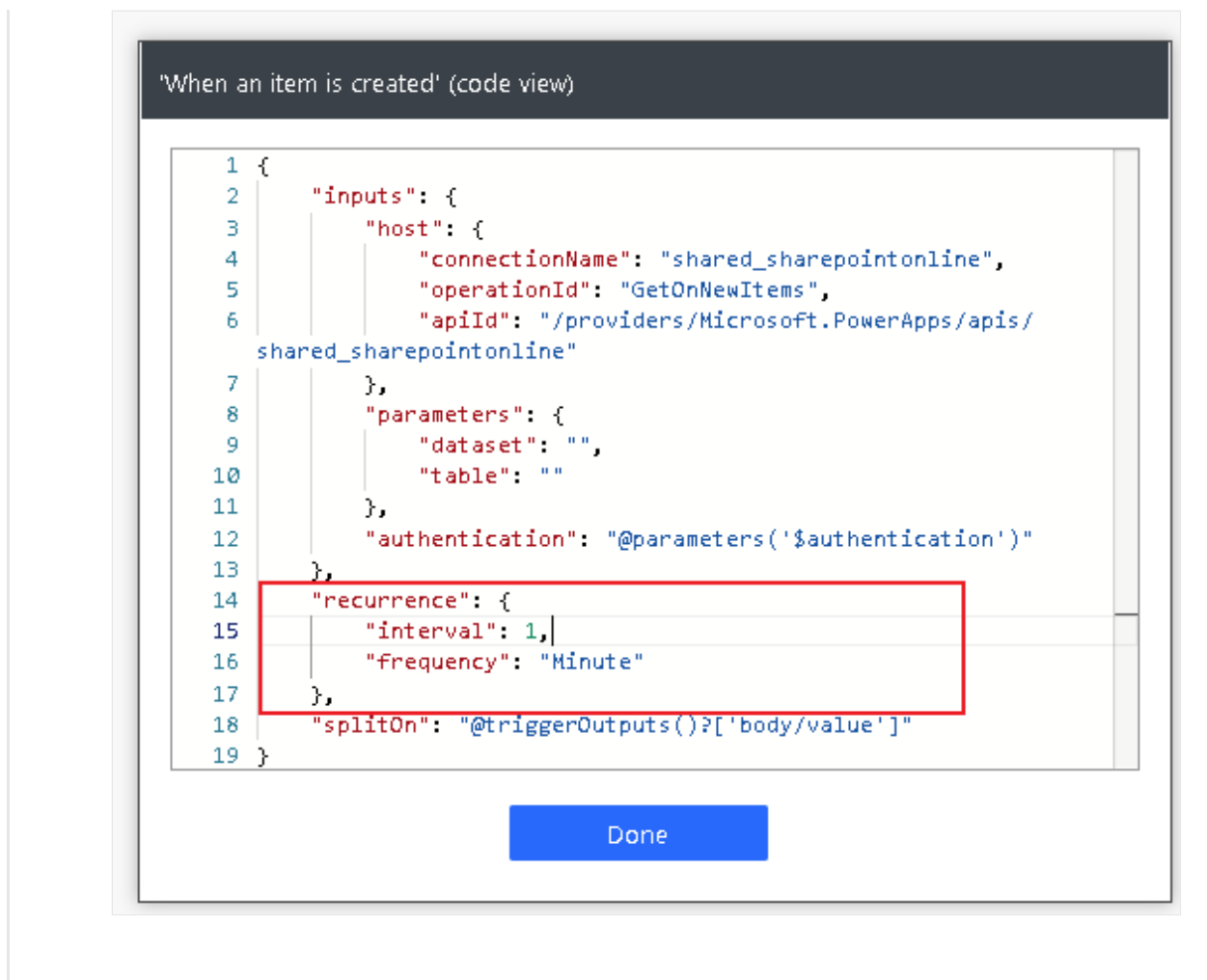
Follow these steps to check the trigger wake up frequency.

Classic designer

1. Go to your flow trigger, and then select the ellipsis (...) > **Peek code**.



2. Find the interval frequency.



If it's taking much longer than expected for your flow to trigger, here are the two likeliest reasons:

1. There's been too many calls to the connector or flow, causing it to be throttled. To verify if your flow is being throttled, manually test the flow to see if it triggers immediately. If it triggers immediately, it is not throttled.

You can check the [Power Automate analytics](#) to learn more about your flows.

If your flow is frequently throttled, redesign your flow to use fewer actions. Learn more about [plan limits and tips to optimize flows to use fewer actions](#) [↗](#).

Additional tips:

- a. Acquire a Power Automate Premium (previously Power Automate per user) or Power Automate Process license (previously Power Automate per flow). After this is acquired, open and then save the flow, in order to refresh the entitlement associated with it, and to change the throttling mode.
- b. Split the flow into several instances. If the flow processes data, you can divide this data into subsets (per country/region, per business area, etc.).

- c. After this, you can use **Save As** on the flow to create several instances that will process their own data. Since the quota is per flow, this can be used as a workaround.
2. There was a communication issue that prevents Power Automate from reacting to trigger events. Potentially, because of a service outage, policy change, password expiry, and so on, that caused the delay. You can view [Help + support](#) to find out if there are any active outages. You can also clear the cache of the browser and then retry.

## Power Apps trigger issues

Unable to rename actions in a cloud flow – This is a known issue for flows that use Power Apps triggers. As a workaround to rename actions, remove the trigger. Rename the actions, add your Power Apps trigger, and then configure variables wherever needed.

After an app is published, make copies of the flows used by that app to make any updates. Any update to a cloud flow that's referenced by a published app can break existing users. Do not delete or turn off existing flows until all users have been upgraded to the new published version of the app.

## SharePoint trigger issues

SharePoint triggers, for example **When a file is created or modified**, will not fire if a file is added or updated in a subfolder. If you need the flow to trigger on subfolders, create multiple flows.

## Users are unable to run flows that are shared with them, but the owner can run the flow

You can try one of the following:

1. Fix or update connections.

If your flow uses a **Manual** trigger, it needs the connection of the user who is triggering the flow. If it uses the **Recurrence** trigger, it can run on the flow maker's connections.

2. Confirm the user has the appropriate license for the connections in the flow.

A Power Automate license is required for the user to perform any actions like save, turn off, and more. A Power Apps, Dynamics 365, or Microsoft 365 license is not sufficient. Users with whom flows that use premium connectors are shared will each need a Power Automate Premium (previously Power Automate per user) or Power Automate Process license (previously Power Automate per flow) license to edit or manually trigger the flow. If the user was previously able to save or modify the flow, it's possible that their license has expired.

Alternatively, you can start a trial for the **Per User** plan for 90 days, after which you will need a paid plan to run or edit flows that use premium connectors. See the [licensing page](#) or this [support article](#) for more details.

## My flows don't trigger after I change the environment URL

To resolve this issue, edit each flow and save it. The triggers should start firing again.

# Watch your flows in action

Article • 12/16/2022

To ensure that your flows run as you expect, perform the trigger, and then review the inputs and outputs that each step in your flow generates.

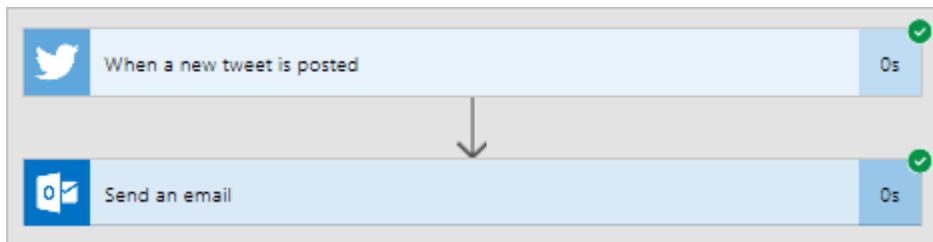
1. Create or update a cloud flow, and then leave the designer open after you select **Create flow** or **Update flow**.

For example, [create a cloud flow](#) that sends email whenever someone tweets using the **#azure** hashtag.

2. Perform the starting action for your flow.

For example, send a tweet that contains the **#azure** hashtag.

The starting action and each subsequent step indicates whether it succeeded and how long it took.



3. Select the trigger or action to see its inputs and outputs.

When a new tweet is posted 0s

**INPUTS**

Search text

#azure

**OUTPUTS**

Headers

| Key               | Value           |
|-------------------|-----------------|
| Pragma            | no-cache        |
| Transfer-Encoding | chunked         |
| Retry-After       | 60              |
| Vary              | Accept-Encoding |

Body

```
{
  "TweetText": "Wizards World of Harry Potter awaits #Microsoft Office exam winner",
  "TweetId": "935372702965207040",
  "CreatedAt": "Tue Nov 28 05:00:05 +0000 2017",
  "CreatedAtIso": "2017-11-28T05:00:05.000Z",
  "RetweetCount": 0,
  "TweetedBy": "Microsoft"
}
```

4. Select **Edit flow** to make more changes or select **Done** if the flow works as you expect.

# Troubleshoot a cloud flow

Article • 05/21/2024

Here are some tips and tricks for troubleshooting cloud flows.

## Identify specific flow runs

Once you build and deploy your flows, you might need to debug specific flow runs to confirm that your flow ran as expected. By default, the flow owner can look at the **Start**, **Duration**, and **Status** columns in the run history view in Power Automate to help them identify the flow run they're interested in debugging. The owner can also expand the troubleshooting section to identify the specific run in which they're interested, however, for flows that run frequently, this can be time-consuming.

To make it more efficient to identify flow runs when debugging, Power Automate provides the ability for flow owners to configure the list of columns that displays on the run history page for each flow run. These columns map to the trigger outputs for your flow. When you display the columns you want, you save time since you see the relevant columns by default on the run history view.

Follow these steps to add one or more columns to your run history view.

1. Sign in to [Power Automate](#).
2. On the left side of the screen, select **My flows**.
3. Select the flow for which you want to get more details.
4. On the flow details page, select **Edit columns**.
5. Select the columns that you want to add to your run history view for the flow that you selected, and then select **Save**.
6. View the list of columns that displays on the run history view for the flow you selected.

The **hasAttachments** and **isHTML** columns are now visible for the flow so that you can quickly see those values to help you debug the flow.

28-day run history ⓘ Edit columns ↻ All runs

| Start                       | Duration | hasAttachments | isHtml | Status    |
|-----------------------------|----------|----------------|--------|-----------|
| Aug 22, 11:56 AM (5 d ago)  | 00:00:04 | false          | true   | Succeeded |
| Aug 17, 12:00 PM (1 wk ago) | 00:00:03 | false          | true   | Succeeded |
| Aug 17, 11:00 AM (1 wk ago) | 00:00:04 | false          | true   | Succeeded |
| Aug 16, 06:36 PM (1 wk ago) | 00:00:05 | true           | true   | Succeeded |
| Aug 16, 06:01 AM (1 wk ago) | 00:00:08 | false          | true   | Succeeded |
| Aug 10, 04:13 PM (2 wk ago) | 00:00:04 | false          | true   | Succeeded |
| Aug 9, 10:02 AM (2 wk ago)  | 00:00:06 | false          | true   | Succeeded |
| Aug 1, 05:15 PM (3 wk ago)  | 00:00:03 | false          | true   | Succeeded |
| Jul 28, 02:59 PM (1 mo ago) | 00:00:07 | false          | true   | Succeeded |

 **Tip**

You can also configure the list of columns that displays with the **All runs** view.

## Repair tips in email

Repair tips are sent to flow owners via email whenever a cloud flow fails. These repair tips emails contain specific, actionable feedback about certain errors. For example, one common error is setting up a cloud flow that attempts to get a person's manager in Office 365—but there's no manager configured in Microsoft Entra ID. If this or several other conditions cause your flow to fail, you get a repair tips email.

The repair tips email contains the following sections:

 **Expand table**

| Name            | Description                                                                   |
|-----------------|-------------------------------------------------------------------------------|
| Time            | Displays the time the flow first failed.                                      |
| What happened   | Provides a description of the problem that caused the failure in the flow.    |
| How do I fix    | Provides tips for resolving the issue that caused the failure in the flow.    |
| Troubleshooting | Provides details including the number of times the flow failed, and a link to |



| Name | Description                              |
|------|------------------------------------------|
| tips | retry the flow with the same input data. |

To fix the reported errors, select **Fix my flow** and follow the steps in the repair tips email.

Repair tips emails are optional. If you don't want to receive them, turn them off from the properties menu for the specific flow.

If your flow fails, you can also troubleshoot it directly in Power Automate. Here are some common failure scenarios and tips on how to fix them.

## Identify the error

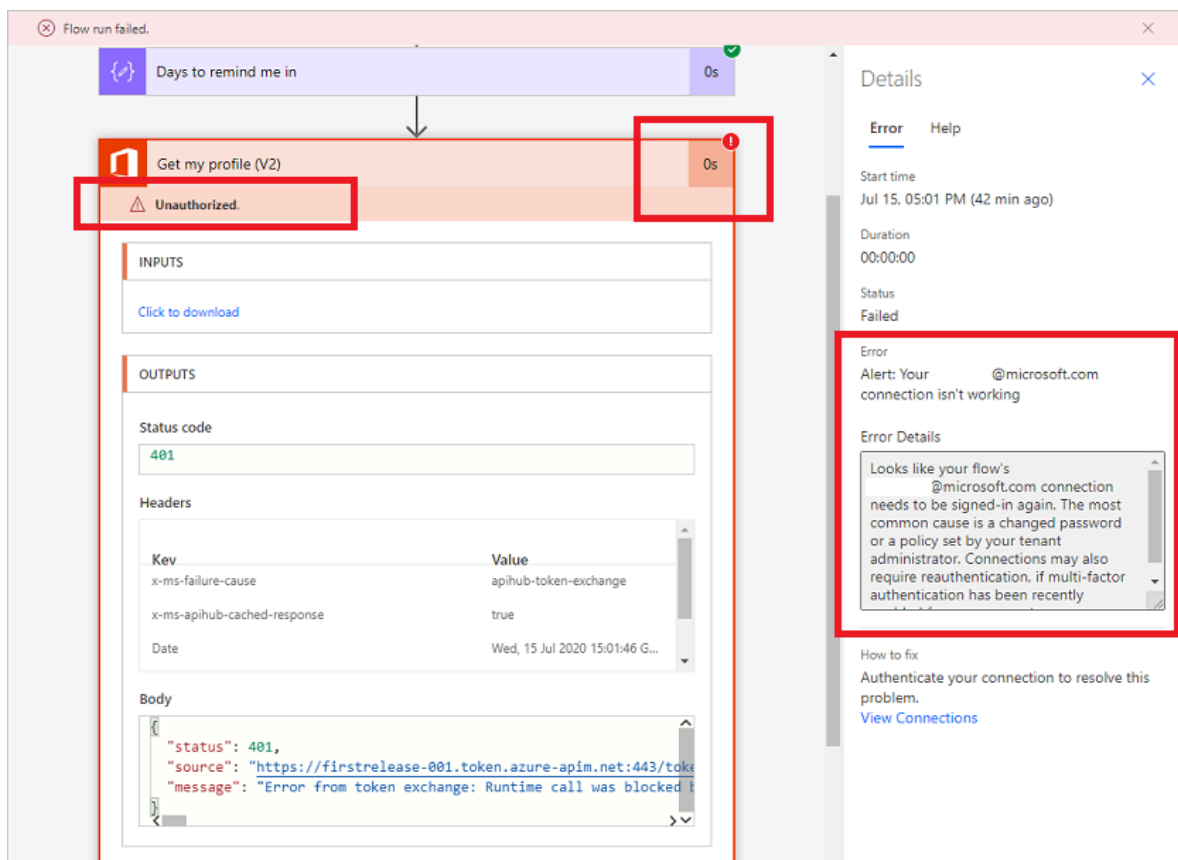
Follow these steps to find the error and learn how to fix it,

1. Select **My flows**.
2. Select the flow that failed.
3. In the **28-day run history** section, select the date of the failed run.

Details about the flow appear, and at least one step shows a red exclamation icon.

4. Open that failed step, and then review the error message.

On the right pane, you can see the details of the error and how to fix it.



## Authentication failures

In many cases, flows fail because of an authentication error. If you have this type of error, the error message contains **Unauthorized** or an error code of **401** or **403** appears. You can usually fix an authentication error by updating the connection:

1. On the right pane below **How to fix**, select **View Connections**.
2. Scroll to the connection for which you saw the **Unauthorized** error message.
3. Next to the connection, select the **Fix connection** link in the message about the connection not being authenticated.
4. Verify your credentials by following the instructions that appear.
5. Return to your flow-run failure, and then select **Resubmit**.

The flow should now run as expected.

## Troubleshoot in Copilot

The new troubleshoot in Copilot feature in Power Automate can assist you in identifying and resolving errors that might occur during the testing of cloud flows or when

reviewing flow run history. You can use this Copilot feature when the new designer experience is enabled.

Troubleshooting in Copilot provides a human-readable summary of the error and, when possible, attempts to provide a solution to correct the error. This can greatly enhance your experience by reducing the time and effort required to troubleshoot and resolve issues.

### ⓘ Note

The troubleshooting in Copilot feature might not work in all scenarios. The good news is, it's continuously learning and improving over time, which means its ability to assist users and resolve issues only gets better. This is a great example of how AI and machine learning can be leveraged to improve your experience and productivity.

The image shows a Power Automate flow designer interface on the left and a Copilot chat window on the right. The flow consists of three steps: 'Recurrence' (0.1s, green checkmark), 'Get my profile (V2)' (2s, green checkmark), and 'Post message in a chat or channel' (0.3s, red exclamation mark, BadRequest error). The Copilot chat window displays a message about sending a message in Teams and a red-bordered error message: 'I found the following error: Post message in a chat or channel teams. In your 'Post message in a chat or channel' operation, the 'recipient' parameter is set to 'Dimitri', but no user details with that email or UPN were found in Graph. Double-check the email or UPN you are using and ensure it is correct. Edit flow'.

# Action configuration

Flows also fail if a setting in an action of the flow doesn't function as expected. In this case, the error message contains **Bad request** or **Not found**, or an error code of **400** or **404** appears.

The error details should specify how to correct the failure. To update the configuration:

1. Select **Edit** and then correct the problem inside the flow definition.
2. Save the updated flow.
3. Select **Resubmit** to try the run again with the updated configuration.

## Other failures


If the error code **500** or **502** appears, the failure is temporary or transient. To try the flow again, select **Resubmit**.

## Get help from support or the community


When you need help, you can use our **Self Help** options, or you can **Ask for help** from others.

### Self help

The Power Automate Support site offers you several self help options.

1. Go to [Power Automate Support](#) .
2. In the **Self Help** category, select **Learn**, **Samples**, or **Documentation**.

### Ask for help from others

1. Go to [Power Automate Support](#) .
2. In the **Ask for help** section, select **Contact support**.
3. Type or select the environment to help identify the issue.
4. To search recommended solutions, complete the **Tell us what you need help with** field, and then select the right arrow next to the field.
5. If you found your solution, select **Yes** in the **Were these solutions helpful** field.
6. If you don't find a solution, select **Ask virtual agent**.

7. In the **Virtual Agent** screen, type your message, and then select **Send**.
8. If you need more help from others, return to the [Power Automate Support](#) , and select [Community](#) .

On the **Microsoft Power Automate Community** page, you can customize your search and get answers and tips directly from other Power Automate users.

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#)

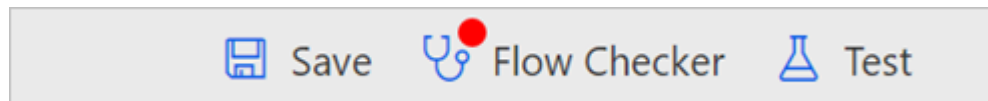
# Find and fix errors with Flow Checker

Article • 12/16/2022

Flow Checker in Power Automate promotes higher quality flows by ensuring you follow best practices when you design flows. When you run the checker, you get insights into questions like "which areas of my flow's implementation pose a performance or reliability risk?"

For each issue the checker identifies, the checker points to specific occurrences within the flow where you should consider making improvements. And, you learn how to implement these improvements by following detailed guidance.

The checker is always active, appearing in the command bar in the designer. The checker shows a red dot when it finds one or more errors, potential errors, or warnings in your flow.



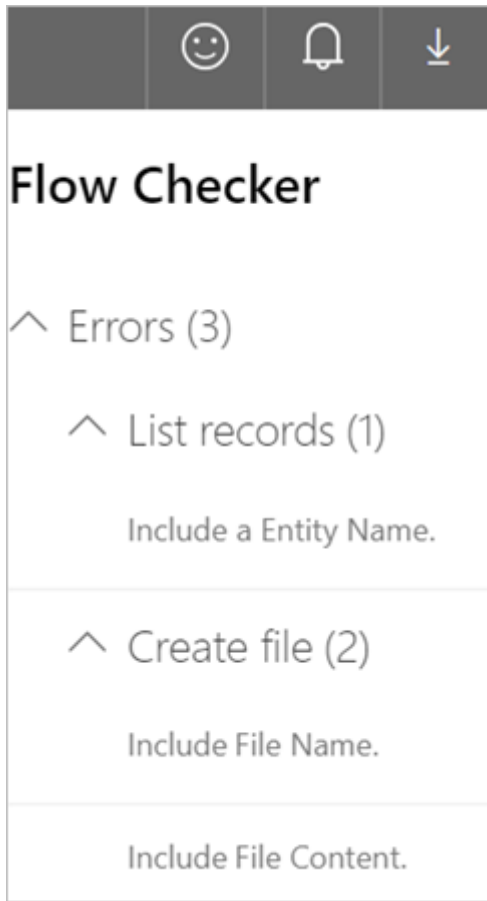
## View errors or warnings in the checker

While designing your flow, you can select the **Flow Checker** button to open the checker to view errors and warnings.

The checker also opens automatically when you save the flow if there are errors or warnings. Once the checker opens, it shows all errors and warnings in your flow. In each section, the checker calls out the actions where the error or warning occurs.

## Learn to fix errors and warnings

Expand each section to learn more about how to fix the errors or warnings.



## Learn more

[Get started with Power Automate](#)

# Introduction to desktop flows

Article • 06/20/2024

Desktop flows broaden the existing robotic process automation (RPA) capabilities in Power Automate and enable you to automate all repetitive desktop processes. Automating is quicker and easier than ever with the new intuitive Power Automate desktop flow designer using the prebuilt drag-and-drop actions or recording your own desktop flows to run later.

Desktop flows are addressed to essentially everyone who is performing simple or complex rule-based tasks on their workstations. Users at home, small businesses, enterprises, or larger companies can leverage automation capabilities in Power Automate to create flows, interact with everyday tools like email and Excel, or work with modern and legacy applications. Examples of simple and complex tasks you can automate are:

- Quickly organize your documents using dedicated files and folders actions
- Accurately extract data from websites and store them in Excel files using web and Excel automation
- Apply desktop automation capabilities to put your work on autopilot

If you're a home user who is accessing a weather website to see tomorrow's forecast or a self-employed businessperson extracting information from vendors' invoices or even an employee of a large enterprise who automates data entry on an ERP system, Power Automate is designed for you.

It allows you to automate both legacy applications, such as terminal emulators, modern web and desktop applications, Excel files, and folders. You can interact with the machine using application UI elements, images, or coordinates.

Sign in to Power Automate Windows application using one of the following accounts and automate your tedious tasks:

- [Getting started with a Microsoft account](#)
- [Getting started with a work or school account](#)
- [Getting started with an Organization premium account](#)

A full comparison of the features included in each account can be found at [Sign-in account comparison](#).

Here's a list of [Known issues and limitations](#) for Power Automate.

---



# Feedback

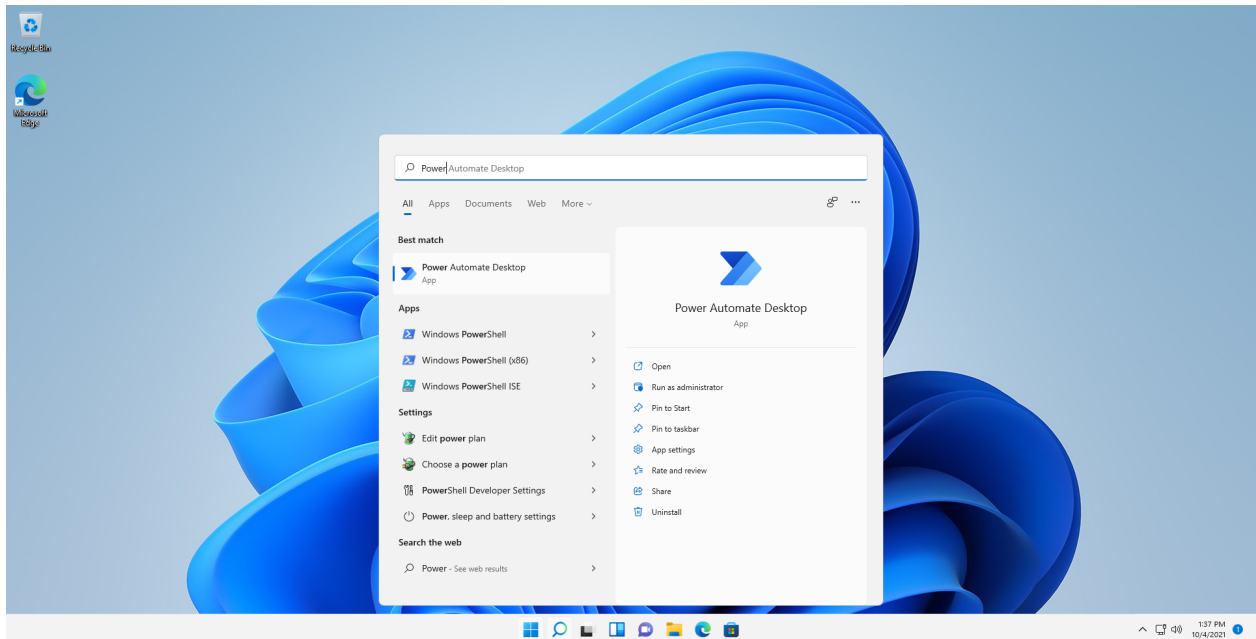
Was this page helpful?

[Provide product feedback](#) ↗

# Get started with Power Automate in Windows 11

Article • 02/24/2023

Windows 11 allow users to create automations through the preinstalled Power Automate app. Power Automate is a low-code platform that enables home and business users to optimize their workflows and automate repetitive and time-consuming tasks.



Any Windows user can build flows with little-to-no coding experience. A collection of more than 400 premade actions and a recorder that captures mouse and keyboard functions make robotic process automation (RPA) intuitive for both regular and power users.

Using the available actions, you can automate virtually any Microsoft and third-party application on Windows and exchange data between different applications and webpages.

For example, you can extract prices from shopping websites, compare them, and store them to Excel spreadsheets by deploying some easy-to-configure actions.

Using Power Automate, you can populate any form and reduce the time needed to enter data on regularly used applications. Performing repetitive online orders, tracking price changes, populating fields on web pages and desktop applications, creating backups, and converting files are all tasks that can be fully automated with desktop flows.

<https://www.microsoft.com/en-us/videoplayer/embed/RWLTqj?postJsllMsg=true>

Apart from the premade actions, Power Automate enables you to record your activity and automatically convert these steps into actions. The recording feature makes RPA friendly to all non-technical users and allows you to develop simple flows effortlessly.

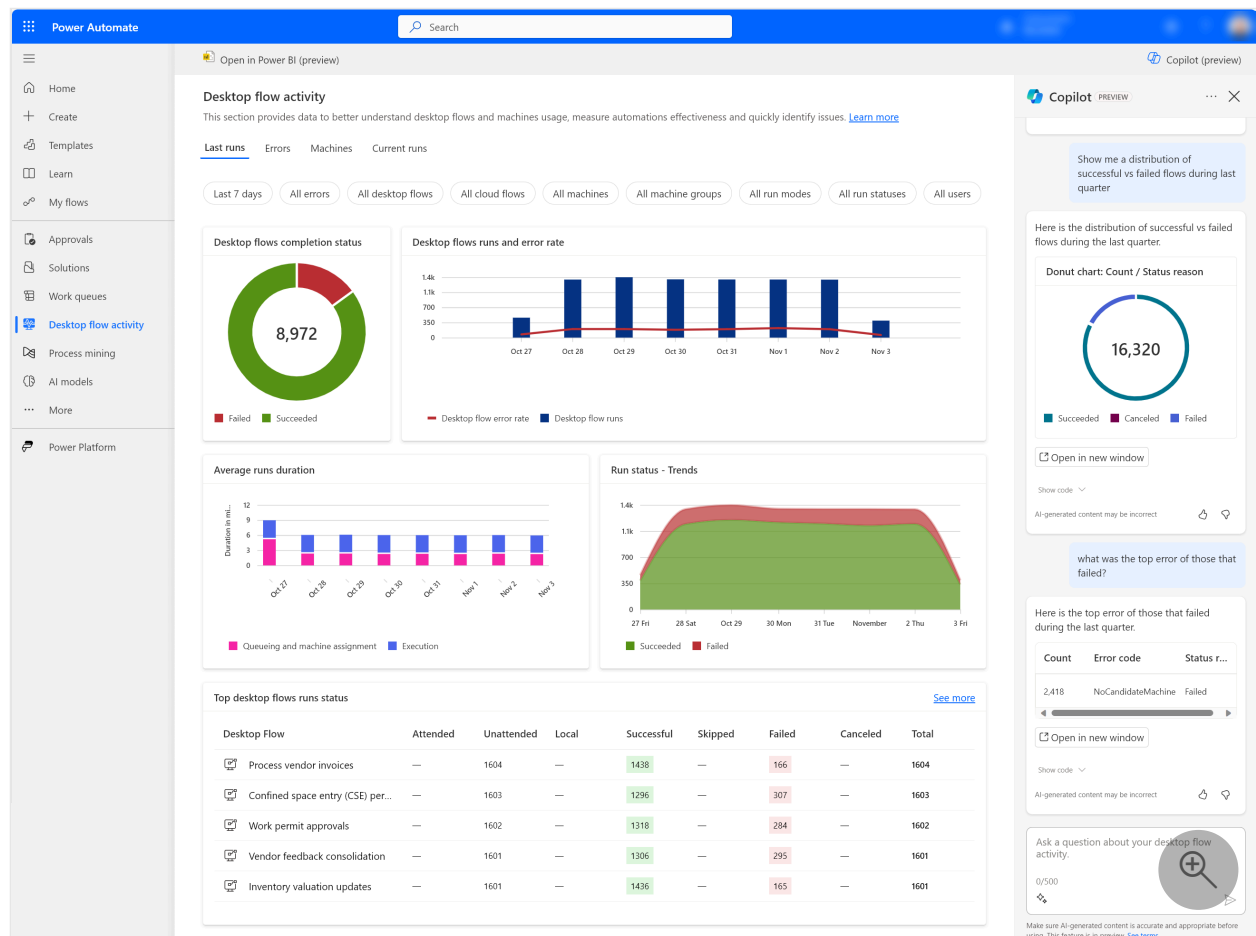
To start your journey with desktop flows, follow our [getting started guide](#). More technical starting guides are available for users with a [work or school account](#) and [organization premium account](#). Check the [Sign-in account comparison](#) to view what each version offers.

# Use copilot to analyze desktop flow activity (preview)

Article • 11/14/2023

[This article is prerelease documentation and is subject to change.]

Understanding automation performance is key to achieving operational excellence and reliability goals, regardless of the size of the automation estate, team or role within the organization. To reach those goals requires advanced and dynamic monitoring capabilities that provide you with valuable insights that highlight areas of success and identify potential bottlenecks, trends and areas for improvement. Having more detailed insights allows you to make informed decisions that optimize your automation processes, leading to increased efficiency and effectiveness.



## Important

- This is a preview feature.

- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

The latest advancements in AI provide us with unprecedented opportunities to explore new automation health monitoring use-cases that could include anything from simple data exploration to anomaly detection, smart recommendations, and even self-healing bots.

With copilot now able to analyze desktop flow activity we're taking the first step in a new direction, allowing you to democratize access to insights by asking copilot desktop flow activity-specific questions using natural language.

### Important

- This capability is powered by [Azure OpenAI Service](#).
- Copilot is a new technology that is still being developed. It is optimized for use with English language and has limited support with other languages. As such, parts of it might appear in English rather than your preferred language.
- Read the [responsible AI FAQs for copilot in desktop flow activity \(preview\)](#) to learn more about this new copilot experience.
- More FAQs: [Responsible AI FAQs for Power Automate](#), [FAQ for copilot data security and privacy in Microsoft Power Platform](#)

## Prerequisites

- A work or school account with access to a Power Automate [environment](#) that's based in the United States.
- During initial preview, you must have an environment in the United States region to use this feature. If you don't have access to an environment that's based in the United States, you can ask your administrator to [create a new environment in Power Platform admin center and select United States](#) as its region.
- Check [known limitations](#) for more information.

## How does it work?

This copilot experience is powered by the [Azure Open AI](#) service and is capable of translating user prompts into valid [Dataverse FetchXML queries](#). Initially, these queries

are focused on and optimized for desktop flow activity, such as runs, flows, errors, and machines.

## High-level process

1. Once the user inputs a valid prompt, copilot generates a valid [FetchXML](#) query based on the input.
2. If the generated FetchXML is valid, the query is then executed against the Dataverse backend under the current user's security context to retrieve matching data. This ensures that users only see data that they're already authorized to access.
3. Copilot then determines the most suitable output visualization, such as a table, pie chart, bar chart, or line chart, to effectively present the insights and data to the user.

## What are FetchXML queries?

Microsoft Dataverse [FetchXML](#) is a language used for retrieving data from a Dataverse database. It's designed to be easy to create, use and understand. For example, you might want to ask Dataverse to give you a list of all flow runs for a specific flow. The FetchXML query is the way you phrase that question so the database understands it and can give you the right results.

## Prompting best-practices

- **Be specific:** The more specific you are with your prompt, the better the AI will understand and respond. If the AI isn't producing the desired output, don't worry, try again by adjusting your prompt.
- **Experiment with prompts:** If you're not getting the results you were expecting, try rephrasing your prompt or provide more context.
- **Provide feedback:** If the AI produced great or unsatisfactory responses, let us know by selecting the thumbs up or down with an option to provide more feedback via the **Tell Microsoft what you liked about this feature** link that appears underneath.

## Prompt examples

Examples of prompts that can be used as starter prompt for your own use-cases are explained in this section. Some of these prompts might not be applicable or return incorrect results, since the accuracy might be influenced by model understanding or the actual prompt and the data available to you based on your permissions. We recommend

that you review and validate the returned results and FetchXML query. More information: [Validate FetchXML query results generated by copilot.](#)

## Runs

- Which flows ran the most last week?
- What were yesterday's top five flows by number of completed runs?
- What was the average run duration of the '*[insert your flow name here]*' flow during last semester?

## Errors

- Show me the most frequent run errors during last month.
- Show me a distribution of successful versus failed flows during last quarter.
- What were the number of failed runs during the week prior to the last one?

## Machines

- Which bots had the most run failures today?
- Which machines are in maintenance mode?
- What are the machines with the most run failures?

## Makers

- Show me the top flows by number of runs together with their owner info.
- Who were the top 10 users running flows during last month?
- When and by whom were desktop flows modified last week?

## Multi-turn prompts

In the context of AI, *multi-turn* prompts allow you to have an ongoing conversation with the copilot, where it remembers the context of the previous messages in the conversation. It's not just answering one-off questions; it's engaging in a dialogue with you, where each response is based on what's been said before.

### Note

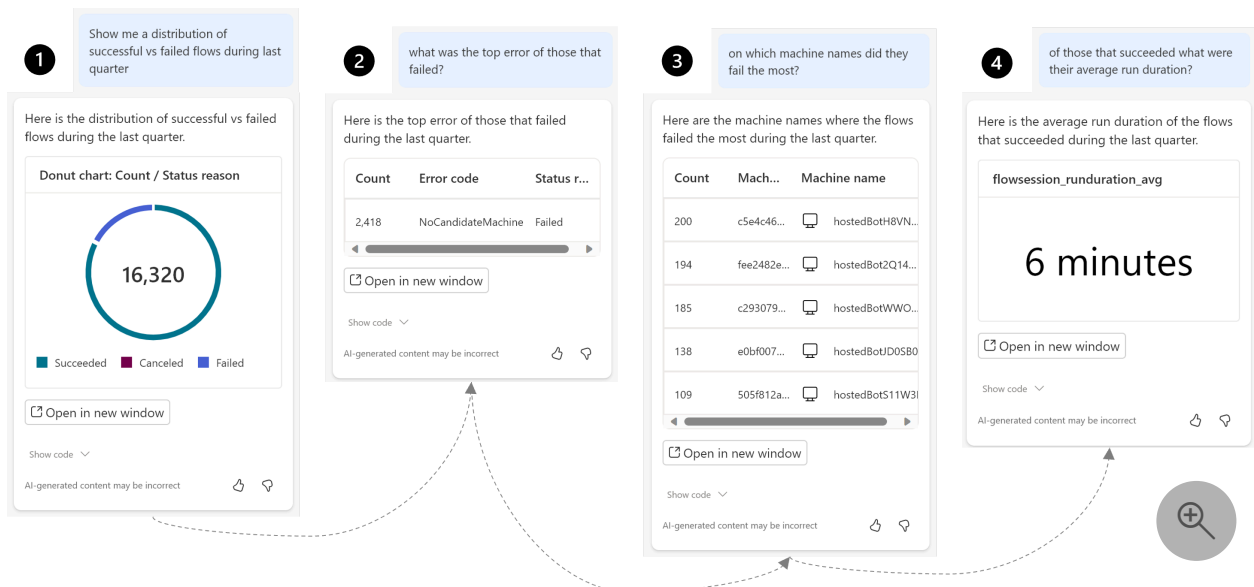
When engaging in a multi-turn conversations, note that copilot keeps track of the five most recent questions only. This means that copilot starts clearing the prompts that were entered first and only keeps the latest five. To improve response quality,

we suggest limiting your follow-up questions to four and then restart the chat. More information: [Clearing previous prompt context to start over.](#)

## Example

 Expand table

| Turn | Prompt and reply                                                                                                                                                                     |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | User: show me a distribution of successful vs failed flows during last quarter<br><br>Copilot: <i>Here's the distribution of successful vs failed flows during the last quarter.</i> |
| 2    | User: what was the top error of those that failed?<br><br>Copilot: <i>Here's the top error of those that failed.</i>                                                                 |
| 3    | User: on which machine names did they fail the most?<br><br>Copilot: <i>Here are the machine names where the most failures occurred.</i>                                             |
| 4    | User: of those that succeeded what were their average run duration?<br><br>Copilot: <i>Here's the average run duration of the flows that succeeded.</i>                              |



The image displays four sequential chat interactions, each with a numbered prompt and a corresponding Copilot response. Each response includes a data visualization:

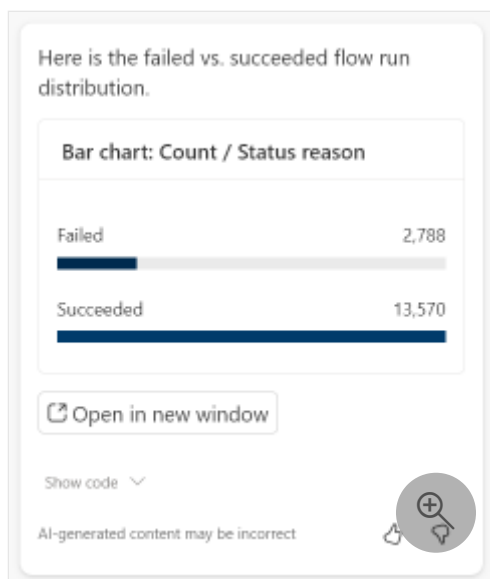
- 1:** Prompt: "Show me a distribution of successful vs failed flows during last quarter". Response: "Here is the distribution of successful vs failed flows during the last quarter." Includes a donut chart titled "Donut chart: Count / Status reason" showing a total of 16,320. The chart is divided into three segments: Succeeded (green), Canceled (red), and Failed (blue). A legend below the chart identifies the colors. An "Open in new window" button is present.
- 2:** Prompt: "what was the top error of those that failed?". Response: "Here is the top error of those that failed during the last quarter." Includes a table with columns "Count", "Error code", and "Status r...". The table shows one row: "2,418", "NoCandidateMachine", "Failed". Below the table is an "Open in new window" button and a "Show code" dropdown.
- 3:** Prompt: "on which machine names did they fail the most?". Response: "Here are the machine names where the flows failed the most during the last quarter." Includes a table with columns "Count", "Mach...", and "Machine name". The table lists five rows of machine names and their counts. Below the table is an "Open in new window" button and a "Show code" dropdown.
- 4:** Prompt: "of those that succeeded what were their average run duration?". Response: "Here is the average run duration of the flows that succeeded during the last quarter." Includes a card titled "flowsession\_runduration\_avg" showing "6 minutes". Below the card is an "Open in new window" button and a "Show code" dropdown.

A magnifying glass icon is located at the bottom right of the visualization area.

## Influencing the output format

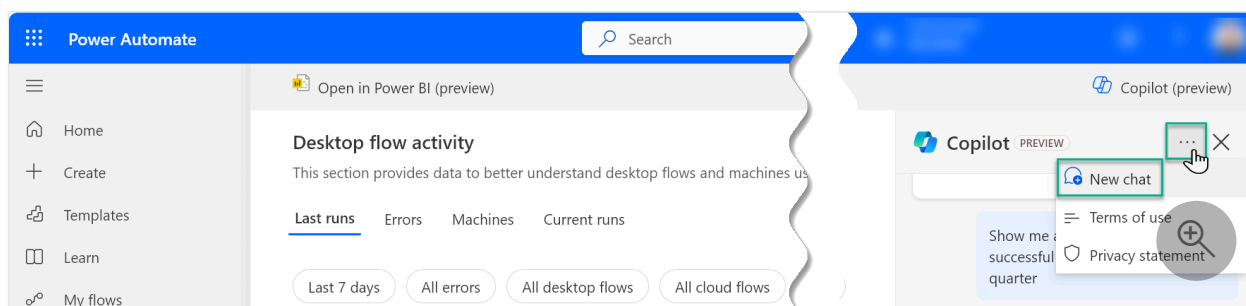
You can influence copilot's output format by asking for explicit output types like "show me failed vs. succeeded flow run distribution as a bar chart." This likely produces the following outcome:





## Clearing previous prompt context to start over

If you wish to reset the conversation with copilot you can select the three dots **...** next to the copilot name, and then select **New chat**.



## Validate FetchXML query results generated by copilot

The following steps guide you through the process to validate (and potentially reuse) [FetchXML](#) queries in Power Automate cloud flows.

### Step 1: Make a copy of the FetchXML query

After submitting your query to the copilot, you get a reply that includes a link labeled **Show code**. Select this link and then select the copy icon located in the upper right corner of the `FetchXML` box to copy the code.

### Step 2: Create cloud flow and test FetchXML query

1. Navigate to the [Power Automate portal](#) and select **My flows** from the left-navigation menu.
2. Continue by selecting **+ New flow** on the command bar, and then select **Instant cloud flow** from the dropdown menu.
3. Enter a flow name, select **Manually trigger a flow**, and then select **Create**.
4. The cloud flow designer appears. Find and then select the **+ New Step** button.
5. On the search bar that appears, enter **Dataverse**, and then select the **Dataverse** connector from the results.
6. Various actions are displayed. Scroll through until you find and select the **List rows** action.
7. Within the **List rows** action, select the **Show advanced options** link.
8. A FetchXML query field appears. This is where you input the copied FetchXML query that copilot previously generated.
9. After pasting in your FetchXML, select **Save**.
10. Test your flow by selecting **Test**.
11. Follow the prompts on your screen to start your flow manually to review its results.

## Step 3: Understanding the results

Let's assume you asked the copilot 'how many failed vs succeeded flows did we have last month?' This produces a [FetchXML](#) query similar to the following:

XML

```
<fetch version="1.0" mapping="logical" aggregate="true" count="3" page="1">
  <entity name="flowsession">
    <attribute name="flowsessionid" alias="flowsession_count"
aggregate="count" />
    <attribute name="statuscode" alias="flowsession_statuscode"
groupby="true" />
    <filter type="and">
      <condition attribute="completedon" operator="last-x-months"
value="1" />
    </filter>
  </entity>
</fetch>
```

If data matches the given FetchXML query, the **List rows** Dataverse action configured in [step 2](#) returns data in a format called [JSON](#) (JavaScript Object Notation), which is essentially a method used to present data in a well-organized manner, making it easy to read and write digitally.

For distribution-based questions like previously mentioned, data is grouped by one or more fields (`statuscode`), together with an aggregation (`count`) that returns the number

for each group (that is, `failed`, `succeeded`, and so on).

Each of the returned records contains fields such as:

- `flowsession_count`: The number of times the workflow ran.
- `flowsession_regardingobjectid`: The unique identifier for the flow run.
- `flowsession_statuscode`: The status of the flow run (for example, `Failed`).
- `workflow_name`: The name of the flow.

If you want to know how many times a specific flow ran, look at the `flowsession_count` column of the record where `workflow_name` is *your flow name*.

## Understanding copilot replies on problematic prompts

This table shows default responses that are returned when the copilot is unable to understand your question, intent, or generate a valid answer.

 Expand table

Copilot reply	Details
<i>Sorry, something went wrong. Please try again.</i>	Indicates that an unexpected error occurred. Rephrase your question and try again.
<i>Sorry, I couldn't understand your question. Please rephrase it and try again. I'm able to answer questions that are about the data on this page. For more examples of prompts that you can ask the copilot, you can visit the <a href="#">prompt example section</a> on our <a href="#">documentation page</a>.</i>	Indicates that your question couldn't be translated into a valid FetchXML query. Rephrase your question and try again.
<i>Sorry, Copilot is at capacity and temporarily unavailable — please try again in a little while.</i>	Indicates there are resource constraints on the backend. Retry your question after a short time.
<i>Sorry, your message contains potentially harmful content. Please ensure your input is appropriate and try again.</i>	Indicates that your question might include potentially harmful content and has been blocked by the backend service. Remove any potentially harmful content from your question and try again.
<i>Sorry, I was not able to generate a valid answer based on your question. Please rephrase it and try again. I'm able to answer questions that are about the data on</i>	Indicates that the generated FetchXML is invalid or that the query failed when

Copilot reply	Details
<i>this page. For more examples of prompts that you can ask the copilot, you can visit the <a href="#">prompt example section</a> on our <a href="#">documentation page</a>.</i>	copilot tried to execute it. Rephrase your question and try again.
<i>Sorry, your search includes too many results. Please refine your query and try again. For examples on how to limit search results returned by the copilot, visit our <a href="#">documentation page</a>.</i>	Indicates that the filter(s) applied to your query exceed current aggregation <a href="#">limits in FetchXML</a> . Add more appropriate filters such as asking for <i>yesterday's</i> or <i>last month's</i> data to your query to ensure that it returns data within those limits.

## Known issues and limitations

The following list contains known limitations of the copilot in desktop flow activity.

- Copilot is a new technology that is still being developed. It's optimized for use with English language and has limited support with other languages. As such, parts of it might appear in English rather than your preferred language.
- Copilot is currently only available in Dataverse environments based in the United States.
- Copilot might return wrong or incomplete data and FetchXML queries.
- Copilot is initially only capable to answer questions about desktop flow activity such as errors, machines, and past and current runs.
- In multi-turn conversations, copilot keeps context of the last five question only. If you encounter wrong or incomplete results, consider resetting the conversation. More information: [Clearing previous prompt context to start over](#).
- For queries that return large result-sets, copilot might not be able return or render these.

## Related information

- [Get started with Copilot in cloud flows \(preview\)](#)
- [FAQ for Copilot in desktop flow activity \(preview\)](#)
- [FAQ for Copilot in cloud flows](#)
- [FAQ for Copilot in Power Automate Process Mining](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

---

## Feedback

Was this page helpful?



[Provide product feedback](#) 

# Use the Power Automate plug-in for Windows Copilot (preview)

Article • 02/22/2024

[This topic is prerelease documentation and is subject to change.]

With the Power Automate plug-in for Windows Copilot, you can use automations to work with Excel, PDF, and other files directly in Windows Copilot.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

## Prerequisites

- To use the plug-in, sign in to Power Automate for desktop in Windows Copilot with your personal Microsoft Account.

Support for work and school accounts isn't currently available.

- Install [Power Automate for desktop](#) from the Microsoft Store.

The plug-in isn't yet available for Power Automate for desktop installations with the MSI installer.

## Enable the plug-in

To use the Power Automate plug-in in Windows Copilot, you need to enable it in the plug-in's menu. Once you install Power Automate for desktop, you see the Power Automate plug-in in the list where you can turn it on.

## Excel actions

You can create a new Excel file and write data to it from Windows Copilot. Here's an example prompt you can try once you enable the plug-in:

**Write to an Excel file the names and heights of the five highest mountains in the world in both meters and feet**

If you allow it, Windows Copilot can also access content from PDF files and websites that you open in Microsoft Edge. You can use this feature with the Excel action in the plug-in. For example, you can ask Windows Copilot to move data from a PDF file to Excel.

## Email actions

The email action allows you to ask Windows Copilot to compose a new email in your default email client. Here's a sample prompt you can try:

**Write an email to express gratitude to a colleague for their help to get the presentation ready**

## PDF actions

The plug-in lets you use PDF actions to merge and split PDFs directly in Windows Copilot. Here are two sample prompts:

- **I need to split a PDF by the first page. Can you help?**
- **Assist me in combining two PDF documents**

Power Automate displays a file picker dialog when you use the merge PDF action. You can use the Ctrl key to choose multiple PDF files that you want to combine into one.

## File management

You can use the Power Automate plug-in to request to rename and move files directly from Windows Copilot. Here are two examples you can try:

- **Add the word -final to the end of all PDF files in a folder**
- **Move all Word documents to a different folder**

Power Automate shows you a folder selection dialog when you use these actions. This dialog allows you to verify the location where the operation should happen.

## Control and privacy

The automation actions operate on your Windows machine locally. Power Automate doesn't receive user data.

# Disable the Power Automate plug-in for Windows Copilot with Registry Editor

If you want to disable the Power Automate plug-in for Windows Copilot from running on a machine, use the Registry Editor. Proceed to the Registry Editor path

**Computer\HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Power Automate Desktop.**

At this location, create a new DWORD value named **DisableWindowsCopilotFlowRuns** and set its value to 1.

To learn more about how Copilot in Windows uses your data to assist you, go to [Copilot in Windows: Your data and privacy](#).

## Send us your input

If you want to share your thoughts on the plug-in, contact us at [powerautomate-ai@microsoft.com](mailto:powerautomate-ai@microsoft.com).



# Power Automate for desktop architecture

Article • 06/20/2024

## 📘 Important

- Gateways for desktop flows are no longer supported. Switch to our machine-management capabilities. Learn more about [switching from gateways to direct connectivity](#).

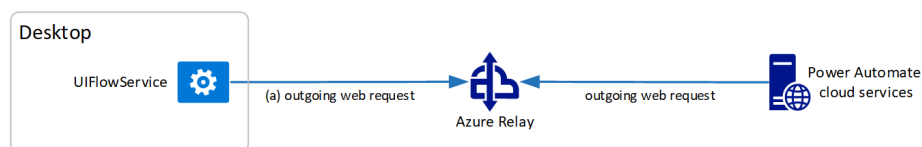
There are two different methods that Power Automate can use to connect to the cloud services in order to receive flow execution jobs. The first option is direct connectivity, while the second option requires the on-premises data gateway to be installed.

The data flow between the desktop and the cloud is the same in both options; only the application and user account that initiates the web requests are different.

## Attended/Unattended desktop direct connectivity to the cloud service

The **UIFlowService** is a Windows service that is installed with Power Automate on the desktop machine. By default, it's set to start automatically and runs as the new user **NT SERVICE\UIFlowService**. This user is created during installation.

### 1. Attended/Unattended desktop 'direct' connectivity to the cloud service



Azure Relay is a service that facilitates communication channels that are established entirely by making outgoing requests to the service. It achieves this functionality either by establishing a WebSocket connection or using HTTP long-polling, if necessary.

## 📘 Note

The Azure Relay and Power Automate cloud services are both cloud resources in Azure. You can find more information about Azure Relay in [What is Azure Relay](#).

The outgoing web requests from the **UIFlowService** on the desktop machine to Azure Relay in the cloud use HTTPS to make requests to FQDN `*.servicebus.windows.net` over port 443.

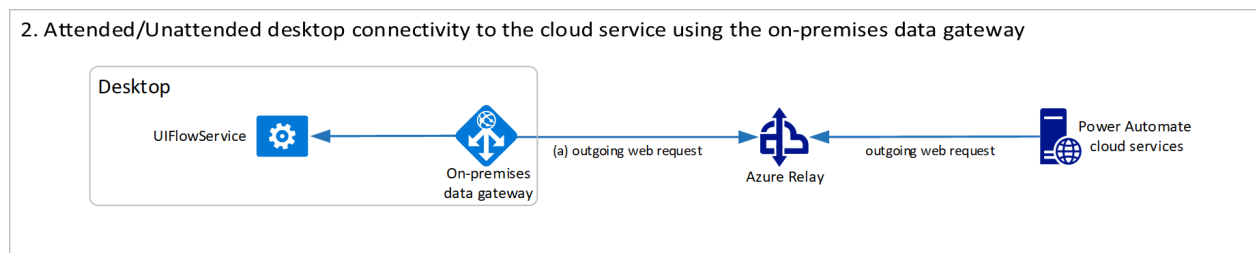
Destination IP addresses for Azure Relay can be found at [Azure IP Ranges and Service Tags](#) for the public cloud under the name **ServiceBus**. Similar documents are available for the other Azure national clouds. No inbound ports are required to be open on the desktop machine.

## Attended/Unattended desktop connectivity to the cloud service using the on-premises data gateway

### ⓘ Note

Power Automate now offers direct connectivity to the cloud without the use of on-premises data gateways. You can find more information in [Attended/Unattended desktop direct connectivity to the cloud service](#).

The **UIFlowService** is a Windows service that is installed with Power Automate on the desktop machine. The **on-premises data gateway** Windows service is a separately installed component that acts as a communications gateway between the **UIFlowService** and Azure Relay.



By default, the data gateway service is set to start automatically and run as the new user **NT SERVICE\PBIEgwService**. This user is created during installation.

Azure Relay is a service that facilitates communication channels that are established entirely by making outgoing requests to the service. It achieves this functionality either by establishing a WebSocket connection or using HTTP long-polling, if necessary.

### ⓘ Note

The Azure Relay and Power Automate cloud services are both cloud resources in Azure. You can find more information about Azure Relay in [What is Azure Relay](#).

The details about this data flow are documented in [Adjust communication settings](#). The firewall requirements for execution are exactly the same as the direct connectivity option, but a different service and user account will be making the outgoing requests.

## Other Power Automate outgoing web requests

Power Automate makes some additional outgoing web requests at runtime, which are documented in [Desktop flows services required for runtime](#).

The CRL endpoints are only required if you use the on-premises data gateway. They use HTTP over port 80 and are initiated by the **UIFlowService**.

## Session credential lifecycle

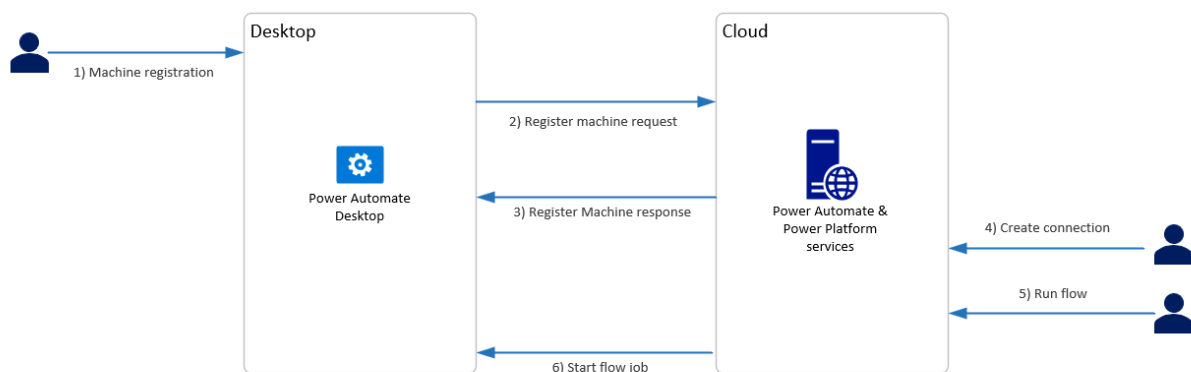
1. A desktop machine is registered by signing in to the on-premises data gateway or registering inside Power Automate using the direct connectivity feature. This process generates a public and private key to be used for secure communication with this machine.
2. The machine registration request is sent by the desktop application to the Power Automate cloud services. The request contains the newly generated machine's public key. This key is stored along with the machine registration in the cloud.
3. When the request completes, the machine is successfully registered and appears in the Power Automate web portal as a resource that can be managed. However, the machine cannot be used by a flow until a connection to it is established.
4. To establish a Power Automate connection in the web portal, users must select an available machine and provide the username and password credentials of the account to use to run the desktop flow.

Users can select any previously registered machine, including machines that have been shared with them. When a connection is saved, the credentials are encrypted using the public key associated with the machine and stored in this encrypted form.

The cloud service is storing the encrypted user credentials for the machine. However, it can't decrypt the credentials because the private key only exists on the desktop machine. The user can delete this connection at any point, and the stored encrypted credentials will also be deleted.

5. When a desktop flow is run from the cloud, it uses a previously established connection selected in the **Run a flow built with Power Automate for desktop** action.
6. When the desktop flow job is sent from the cloud to the desktop, it includes the encrypted credentials stored in the connection. These credentials are then decrypted on the desktop using the secret private key, and they're used to sign in as the given user account.

#### Session credential lifecycle



Although the logical data flow is from the cloud to the desktop, the connection is established from the desktop to the cloud. It uses Azure Relay to connect to the cloud using an outgoing web request.

If a gateway cluster is created using the on-premises data gateway, the private key used to decrypt credentials is generated on all machines in the cluster. The private key is generated using the recovery key that is requested during machine registration. The recovery key is never sent to the cloud.

If a machine group is created using direct connectivity, the group's private key is encrypted using a user-defined group password. Then, it's sent to the cloud for storage as part of the register machine request.

The encrypted private key is shared with other machines that join the group. However, as the user must first provide the password to decrypt this private key, the service can't read any stored credentials in the connection.

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗

# Premium RPA features


Article • 04/26/2024

This article lists the premium robotic process automation (RPA) features and benefits that are included in the Power Automate Premium plan (previously Power Automate per user with attended RPA) and are available to [organization premium accounts](#).

## Premium feature list

 Expand table

Feature/Benefit	Description	Additional information
Automatic triggering/scheduling and integration with cloud flows	Trigger/schedule attended or unattended desktop flow runs from cloud flows. Integrate with cloud flows and connect to hundreds of cloud apps and services.	<a href="#">Learn how to trigger desktop flows from cloud flows</a>
Flow triggering via desktop shortcut	Trigger local attended desktop flows through their desktop shortcuts.	<a href="#">Learn how to trigger a desktop flow via shortcut</a>
Flow triggering via URL	Trigger local attended desktop flows through their run URLs from anywhere on your machine.	<a href="#">Learn how to trigger a desktop flow via URL</a>
Flow triggering in Picture-in-Picture	Trigger attended desktop flows within a virtual window.	<a href="#">Learn how to trigger a desktop in Picture-in-Picture</a>
Access to premium and custom connectors	Access all premium cloud connectors and create custom connectors.	<a href="#">Learn about premium connectors</a> <a href="#">Learn about custom connectors</a>
AI Builder capacity	Infuse AI into your cloud flows through custom or prebuilt models with AI Builder.	<a href="#">Learn about AI Builder</a>
Access to process mining	Visualize and analyze your business processes with process mining.	<a href="#">Learn about process mining</a>
Access to cloud connectors from desktop flows	Use cloud connectors directly in desktop flows.	<a href="#">Learn how to invoke the SharePoint cloud</a>

Feature/Benefit	Description	Additional information
		<a href="#">connector from desktop flows</a>
Custom actions	Ability to use custom developed automation actions in desktop flows	<a href="#">Learn how to create and use custom actions in desktop flows</a>
UI elements collections (preview)	Ability to create, share and use groups of predefined UI elements in multiple desktop flows	<a href="#">Learn how to create and use UI elements collections in desktop flows</a>
Sharing and collaboration	Share flows between team members and select access levels such as co-owner or user. View and manage the flows shared with you.	<a href="#">Learn how to share desktop flows</a>
Access to multiple environments	Organize, store, and manage flows across multiple environments, and benefit from environment isolation and role-based access.	<a href="#">Learn about environments</a>
Centralized flow management and reporting	Manage desktop flows and view their detailed run logs centrally from the Power Automate portal.	<a href="#">Learn how to manage desktop flows</a>
Flow monitoring	Monitor all your desktop flow runs centrally from the Power Automate portal.	<a href="#">Learn about monitoring</a>
Flow queues management	Monitor, manage, and visualize all your queued desktop flow runs and set priorities.	<a href="#">Learn about queues</a>
Centralized bot orchestration and management	Manage the machines and machine groups that host your desktop flows and run unattended automation at scale with hosted RPA bots.	<a href="#">Learn about machine management</a>
Desktop flow analytics	Access analytics for desktop flows in the Microsoft Power Platform admin center.	<a href="#">Learn about analytics</a>
Customer support	Receive prompt technical assistance from a Microsoft support professional.	<a href="#">Power Automate support</a> 
Work queues	Use work queues to store, prioritize, distribute and process work items.	<a href="#">Learn more about work queues</a>

### Important

- Unattended desktop flow executions require the Power Automate Process plan (previously named Power Automate per flow).
- AI Builder is licensed as an add-on for existing subscription plans. A certain number of AI Builder credits are included in the Power Automate Premium plan (previously Power Automate per user with attended RPA).

## Plans that provide entitlements for the premium RPA features

### Trial plan

The Power Automate for desktop free trial plan is available for 90 days. Free users in an organization can sign up for this trial through the **Start trial** option found within the **Go premium** section of Power Automate for desktop or the **desktop flows** sections of the Power Automate portal. Free users are also prompted to start a trial while they attempt to add the **Run a flow built with Power Automate for desktop** action in a cloud flow.

### Standalone plan


The Power Automate Premium plan (paid or trial, previously Power Automate per user with attended RPA) gives full access to all RPA premium features and benefits. Both Power Platform admins and individual users and makers can purchase licenses for Power Automate. You can find more information about purchasing Power Automate licenses in [Buy Power Automate licenses](#).

### Pay-as-you-go plan

Pay-as-you-go is a new way to pay for Power Automate using an Azure subscription. This allows you to get started building and sharing flows without any license commitment or upfront purchasing. Desktop flow users in a pay-as-you-go-enabled environment have access to most of the premium features listed above in the scope of that specific environment. You can find more information regarding the pay-as-you-go plan in [Pay-as-you-go plan](#).



# More information about Power Automate licensing

- [Power Automate pricing](#) 
  - [Overview of Power Automate licensing](#)
- 

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Prerequisites and limitations

Article • 06/20/2024

This article presents all the prerequisites and limitations you should consider before installing and using Power Automate on your desktop.

## Prerequisites

- An account with administrator privileges to [install Power Automate](#) using the MSI installer
  - If you install it from the Microsoft Store, a standard Windows account is acceptable.
- An account to sign in to Power Automate
  - [Learn what features are available for each account type](#).
- A device with the following hardware (these requirements don't include the resources required for the applications involved in your desktop flows):

### ⓘ Note

The following hardware requirements apply only to single-user sessions with Power Automate for desktop open.

Minimum hardware:

- Processor: 1.00 GHz or faster with two or more cores. For unattended mode, four or more cores are needed.
- Storage: 1 GB
- RAM: 2 GB

Recommended hardware:

- Processor: 1.60 GHz or faster with two or more cores. For unattended mode, four or more cores are needed.
  - Storage: 2 GB
  - RAM: 4 GB
  - GPU acceleration
  - .NET Framework 4.7.2 or later
- A device that runs Windows 10 (Home, Pro, Enterprise), Windows 11 (Home, Pro, Enterprise), Windows Server 2016, Windows Server 2019, or Windows Server 2022 (devices with ARM processors aren't supported)

If your device runs Windows 10 Home or Windows 11 Home, you can use Power Automate to create desktop flows and monitor them on the [Power Automate portal](#). However, you can't trigger desktop flows from the cloud.

 Expand table

Activity	Description	Windows Home	Windows Enterprise/Pro/Server
Authoring	Create with Power Automate for desktop	Yes	Yes
Runtime	Local runtime (attended)	Yes	Yes
Runtime	Cloud runtime (attended/unattended)	No	Yes
Monitoring	Manage desktop flows	Yes	Yes
Monitoring	View run logs	Yes	Yes

- Access as described in [IP Address configuration](#)
- TLS 1.2
- A browser: Microsoft Edge (version 80 or later), Google Chrome, or Mozilla Firefox
- An [environment](#) with a [Microsoft Dataverse database](#) (applicable only for work or school accounts)
- A supported keyboard attached
- An active connection to the Internet

## Supported languages

Power Automate for desktop uses the display language selected in Windows. [Learn how to manage display language settings in Windows](#).


The following table shows all the languages that Power Automate for desktop supports in addition to English.

 Expand table

A - E	F - J	K - Q	R - T	U - Z
Basque	Finnish	Kazakh	Romanian	Ukrainian
Bulgarian	French	Korean	Russian	Vietnamese
Catalan	Galician	Latvian	Serbian (Cyrillic, Serbia)	
Chinese (Simplified)	German	Lithuanian	Serbian (Latin, Serbia)	
Chinese (Traditional)	Greek	Malay	Slovak	
Croatian	Hindi	Norwegian	Slovenian	
Czech	Hungarian	Polish	Spanish	
Danish	Indonesian	Portuguese (Brazil)	Swedish	
Dutch	Italian	Portuguese (Portugal)	Thai	
Estonian	Japanese		Turkish	

## Sign-in account comparison

The following table describes what features are available for different account types. You can find more information regarding accounts in the [Power Platform license guide](#).

 Expand table

	Microsoft account	Work or school account	Organization premium account
<b>Storage</b>	OneDrive Personal account	Dataaverse of default environment	Dataaverse across environments
<b>Accessible recorder:</b> Add different actions and record desktop apps and web apps in a single desktop flow.	Yes	Yes	Yes
<b>Easy-to-use designer:</b> Use the drag-and-drop visual designer to organize your flow logically, while using desktop and web recorders to capture core logic of your automation in a single desktop flow.	Yes	Yes	Yes

	<b>Microsoft account</b>	<b>Work or school account</b>	<b>Organization premium account</b>
<b>Robust browser support:</b> Use intelligent data extraction across all major web browsers (Microsoft Edge, Internet Explorer, Google Chrome, Mozilla Firefox)	Yes	Yes	Yes
<b>Pre-built actions:</b> Apply a diverse set of 400+ prebuilt actions that connect to many different systems.	Yes	Yes	Yes
<b>Access to new actions:</b> Automate more non-API systems with new support for SAP, legacy terminals such as mainframes and AS/400, Java apps, Citrix, etc.	Yes	Yes	Yes
<b>Exception handling:</b> Take advantage of exception handling to enable automation of complex cases that require validation and proactively manage flow settings to ensure a flow is completed without the need for human interaction.	Yes	Yes	Yes
<b>Connectivity</b> with cloud flows (triggering/scheduling flows)	No	No	Yes
<b>Dataverse storage:</b> Save new desktop flows built with Power Automate centrally in Dataverse, benefiting from environment isolation and role-based access.	No	No	Yes
<b>Sharing and collaboration:</b> Share flows with team members and select access level such as codevelopment or run-only.	No	No	Yes
<b>Centralized management and reporting:</b> New flows and any execution logs are automatically saved to the Power Automate service to provide centralized management and reporting.	No	No	Yes
<b>Additional capabilities</b> such as AI Builder, integration with cloud flows, use of more than 400 premium and custom connectors, unattended RPA (with unattended add-on), and much more.	No	No	Yes

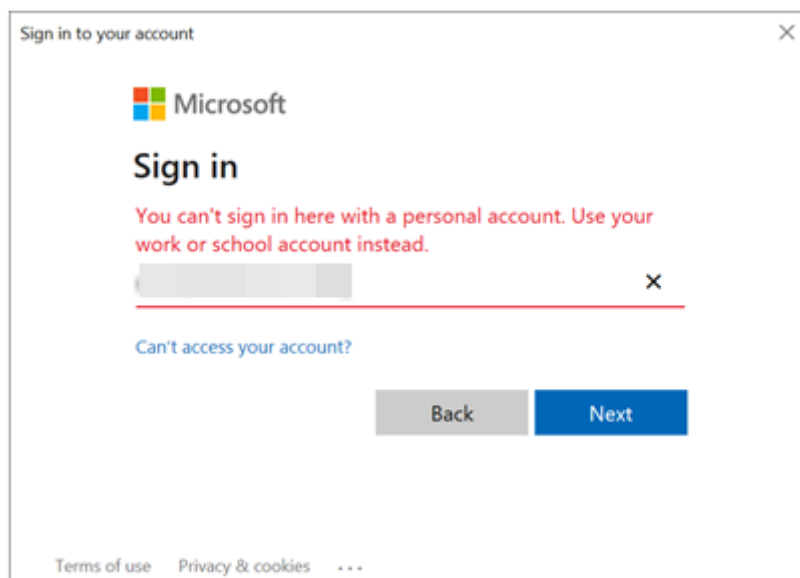
# Known issues and limitations

- Desktop flows in v1 [schema](#) environments can't exceed 100 MB in size. If a desktop flow exceeds the size limit, separate its logic into smaller desktop flows.
- Only work or school account users with a Dataverse database provisioned in their default environment can create Power Automate desktop flows. Power Automate desktop flows are stored in the default environment with the Dataverse database.

If the Dataverse database doesn't exist in the default environment, the user won't be able to create desktop flows, and will be prompted to create a database. There will be no connectivity of Power Automate desktop flows with cloud flows.

After users create the Dataverse in the Power platform admin center, they might be prompted to create it again. In this scenario, exit Power Automate for desktop from the system tray icon and restart it.

- If users have signed in with trial or paid accounts and want to connect their free Microsoft accounts, they must use Power Automate for desktop version 2.6.48.21069 or above. Otherwise, they'll encounter the following error:



- Power Automate applies the proxy configuration specified in Windows proxy settings. If the proxy server requires authentication, the administrator must exclude Power Automate from using it or use another server that doesn't require authentication. Learn more about [configuring Power Automate to bypass a corporate proxy server](#).
- The number of actions that can be logged in a single desktop flow run is limited to 10,000. Extra actions will be performed but won't be logged.

- Power Automate for desktop is fully backwards compatible. However, forward compatibility isn't guaranteed. Each update might introduce action upgrades that change their signature (properties or values of an action) and/or a change in the engine powering runtime and authoring. Attempting to run or edit a desktop flow created with a newer version of Power Automate for desktop might result in the following error message:

"This flow has been generated by a newer Power Automate version than the one currently installed. Download and install the latest version of Power Automate and try again."

To resolve this issue, edit and run the flow with the version that was used to create or edit it, or use a newer version of Power Automate for desktop.

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Install Power Automate

Article • 05/29/2024

Before you install Power Automate on your device, make sure that it meets the [system requirements](#).

Download and install Power Automate [using an MSI installer](#) or [from Microsoft Store](#). The Microsoft Store installation doesn't require you to have admin rights on your device and is updated automatically regularly. The MSI installer requires admin rights and requires manual updates. However it also includes an option to install the machine runtime application, which allows you to [manage machines from the Power Automate portal](#). You can use the Power Automate for desktop store installation in conjunction with the runtime application, which you can install from the MSI.

## ⓘ Note

Having both versions of Power Automate on your machine isn't supported. You must choose between Power Automate MSI installer or Microsoft Store (MSIX).

By default, Power Automate for desktop honors the proxy settings specified in Windows. To learn how to override this configuration for the Power Automate console, go to [Power Automate for desktop using a proxy server](#). To learn how to configure proxy settings for the machine runtime, go to [override them after install](#) [↗](#).

## Install Power Automate using the MSI installer

## ⓘ Note

Admin permissions on your local computer are required to install Power Automate for desktop using the MSI installer.

1. [Download the Power Automate installer](#) [↗](#). Save the file to your desktop or Downloads folder.
2. Run the **Setup.Microsoft.PowerAutomate.exe** file.
3. Follow the instructions in the **Power Automate for desktop setup** installer.
4. Make your selections for each feature:



- **Power Automate for desktop** is the app you use to build, edit, and run desktop flows.
- **Machine-runtime app** allows you to connect your machine to the Power Automate cloud and harness the full power of robotic process automation (RPA). [Learn more about machine management](#).
- Install required files for UI automation in Java applets. Close all Java-related processes before you install these files.

5. Select the check box to agree to the terms of use, and then select **Install**.

If the installation fails, go to the [troubleshooting guide](#) for help.

#### Note

There is only one Power Automate installer for both 32-bit and 64-bit computers. It automatically identifies the architecture of your operating system and proceeds to install the suitable version of the files accordingly.

## Install Power Automate from Microsoft Store

1. Find Power Automate in Microsoft Store:

- Launch Microsoft Store and search for **Power Automate for desktop**.
- Open a browser and go to [this Microsoft Store page](#). Then, select **Get in Store app** to launch Microsoft Store on your device.
- Go to the [Power Automate product page](#) and select the appropriate option for installing.

2. After Microsoft Store is open, select **Get** to download and install Power Automate.

## Update Power Automate

By default, Power Automate for desktop notifies you when a new version is available. Select **Update** to automatically download and open the latest installer for your region. You must have admin permissions on your local computer to perform the update. Updating to the latest version is recommended to have the latest features and bug fixes.

Autoupdate isn't currently supported with the MSI installation. To learn about managing Power Automate for desktop using System Center Configuration Manager, go to

[Manage Power Automate for desktop on Windows.](#)

## Uninstall Power Automate

1. Open the **Start** menu > **Settings** > **Apps**.
  2. Search for **Power Automate**, and then select it.
  3. Select **Uninstall**.
- 

## Feedback

Was this page helpful?

Yes

No

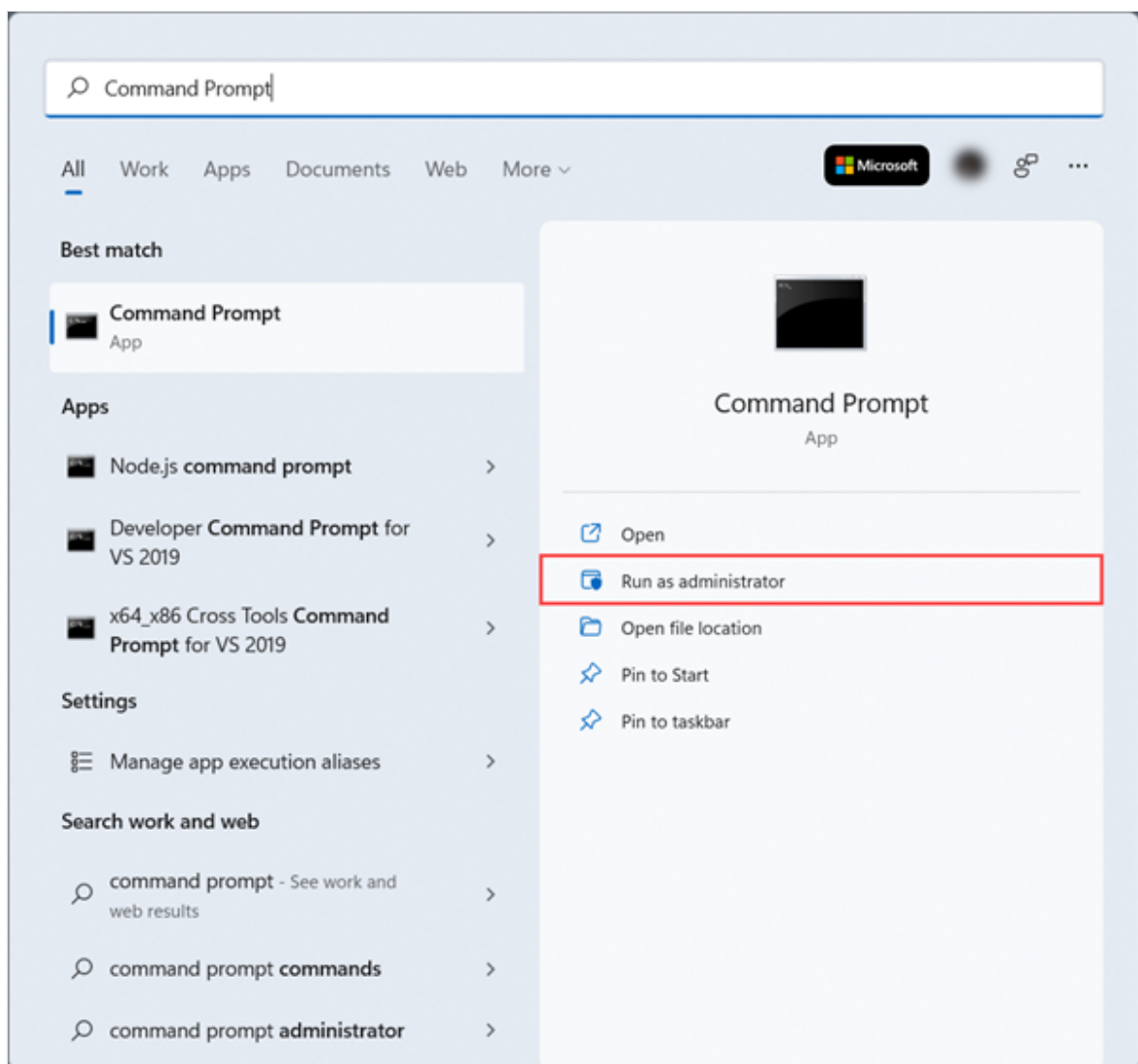
[Provide product feedback](#) 

# Install Power Automate silently

Article • 01/30/2024

You can use the same installer for both [manual](#) and silent installation of Power Automate. Silent installation means that no user intervention is required during installation.

1. Download [Power Automate for desktop](#). Save the file to your desktop or Downloads folder.
2. Open the **Start** menu, search for **Command Prompt**, and then run it as administrator.



3. Navigate to the directory to which you downloaded the Power Automate installer; for example:

```
CMD
```

```
cd C:\Users\Admin\Downloads\
```

4. Run the following command to run the installer silently:

CMD

```
Setup.Microsoft.PowerAutomate.exe -Silent -Install -ACCEPTTEULA
```

### Important

You must include the "-ACCEPTTEULA" argument to indicate that you accept the [terms and conditions](#) for Power Automate.

## Command line arguments

You can use more arguments in the command line to customize the installation. Use the help menu to view command line arguments you can use.

CMD

```
Setup.Microsoft.PowerAutomate.exe -HELP
```

 Expand table

Command	Description
-INSTALLPATH:Value	Specify the full path of the installation folder that will be created. Default: %PROGRAMFILES(X86)%\Power Automate
-ALLOWOPTIONALDATACOLLECTION	Enables sending optional usage data to Microsoft.
-DISABLEPADSHORTCUT	Doesn't create a shortcut for Power Automate for desktop.
-DISABLETURNONRDP	Doesn't turn on Remote Desktop on the machine.
-ACCEPTTEULA	Accepts the end user license agreement needed for the installation.
-RESTOREDEFAULTCONFIG	Restores to the default installation settings during an upgrade.
-DONOTINSTALLPAD	Doesn't install Power Automate for desktop.

Command	Description
-DONOTINSTALLMACHINERUNTIME	Doesn't install Power Automate machine-runtime app.
-SKIPINSTALLINGJAVAAutomation	Doesn't install files that are required for enabling UI automation in Java applets.
-SKIPENABLEPIPMODE	Doesn't enable Picture-in-Picture run mode on the machine.
-SKIPGATEWAYSUPPORT	Doesn't install certificates or start the http server required for use with the on-premises data gateway.
-ADDGATEWAYSUPPORT	Re-enables on-premises data gateway support after it has been disabled with the SKIPGATEWAYSUPPORT parameter.

Here's an example of a command that installs Power Automate silently in the folder My Programs\foo on the D: drive:

CMD

```
Setup.Microsoft.PowerAutomate.exe -Silent -Install -ACCEPTTEULA -INSTALLPATH:  
D:\My Programs\foo
```

## Update Power Automate silently

To update Power Automate silently, use the same command line arguments that you use to install it.

### ⓘ Note

All your data and settings, including telemetry, shortcuts, and more, are retained when you update Power Automate. Therefore, if you want to change the settings that were enabled or disabled on installation, you need to uninstall and reinstall Power Automate.

## Uninstall Power Automate silently

Use the following command to silently uninstall Power Automate:

CMD

```
Setup.Microsoft.PowerAutomate.exe -Silent -Uninstall
```

# Install an on-premises data gateway with PowerShell cmdlets

## Important

Gateways for desktop flows are deprecated except for China region. Switch to our machine-management capabilities. Learn more about [switching from gateways to direct connectivity](#).

To find information about how to install, configure, and manage a gateway using PowerShell cmdlets, go to [PowerShell Cmdlets for On-premises data gateway management](#). To use the cmdlets, you must run them from PowerShell 7.0.0 or higher with elevated permissions.

# Install Power Automate browser extensions

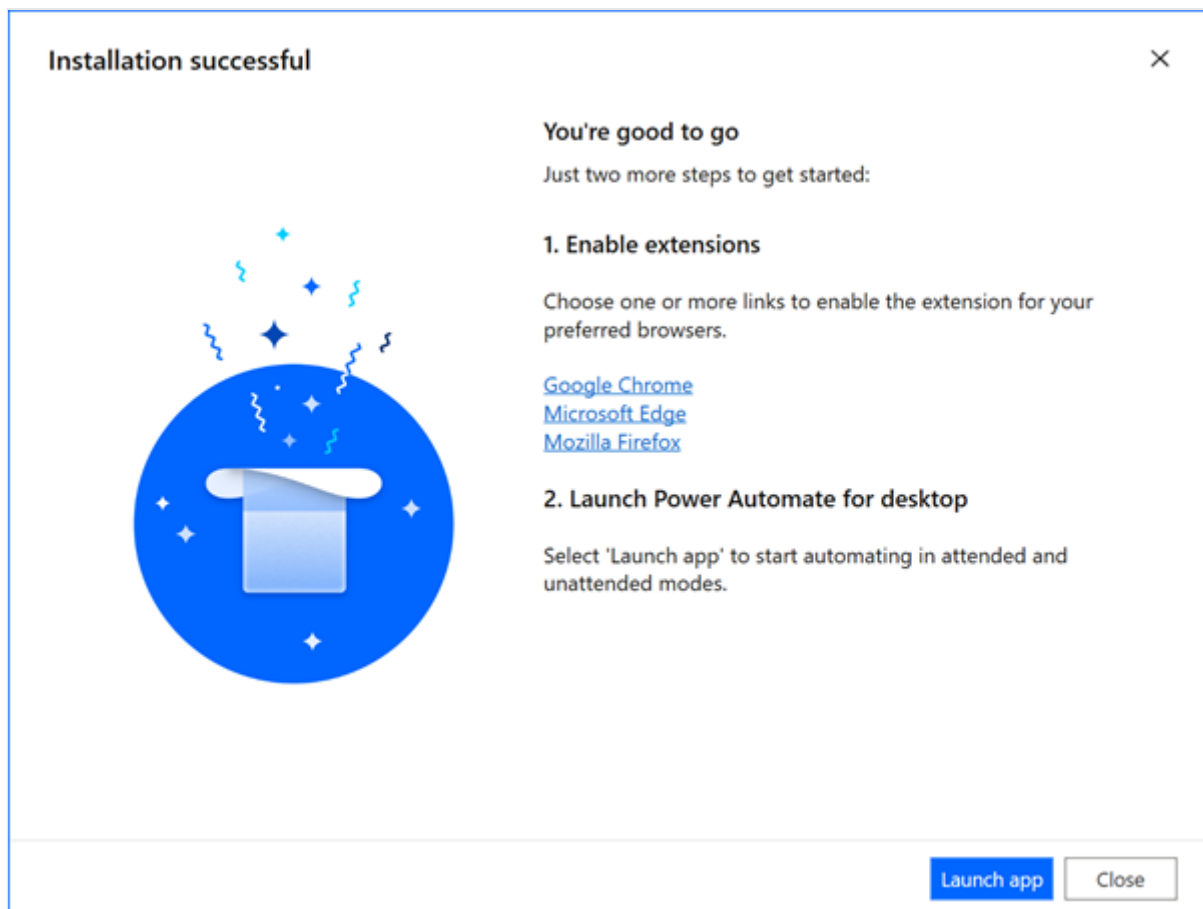
Article • 02/02/2023

To automate web-related tasks, Power Automate provides a built-in Automation browser that's set up for you and works out of the box.

Power Automate also supports the four most popular browsers: Microsoft Edge, Internet Explorer, Google Chrome, and Mozilla Firefox. These browsers need extra setup and extensions to work with Power Automate.

## Install browser extensions

When installation of Power Automate for desktop is complete, the installer prompts you to install the Power Automate extension for your browser. The links in the installer send you to the appropriate extension store.



If you skip the automatic installation of the browser extension, you can do it yourself later. Use the following links or go through the **Tools > Browser extensions** options in the [flow designer](#).

For Power Automate for desktop v2.27 or later:

- [Microsoft Edge](#) ↗
- [Google Chrome](#) ↗
- [Mozilla Firefox](#) ↗

For Power Automate for desktop v2.26 or earlier (legacy):

- [Microsoft Edge](#) ↗
- [Google Chrome](#) ↗

## Alternative ways to install browser extensions

After Power Automate for desktop version 2.27, the Microsoft Edge, Google Chrome, and Mozilla Firefox browser extensions are part of the installation. Find the extension files in the following path: **C:\Program Files (x86)\Power Automate Desktop\BrowserExtensions.**

### Install extension for Microsoft Edge

1. Go to **Edge extensions** through the browser's settings or enter **edge://extensions/** in the address bar.
2. Make sure that **Developer mode** is turned on.
3. While you are on the Edge extension page, drag and drop the extension file in the area.

### Install extension for Google Chrome

1. Go to **Chrome extensions** through the browser's settings or enter **chrome://extensions/** in the address bar.
2. Make sure that **Developer mode** is turned on.
3. While you are on the Chrome extension page. drag and drop the extension file in the area.

### Install extension for Mozilla Firefox

1. Go to the **Firefox Add-ons Manager** through the browser's settings or enter **about:addons** in the address bar.



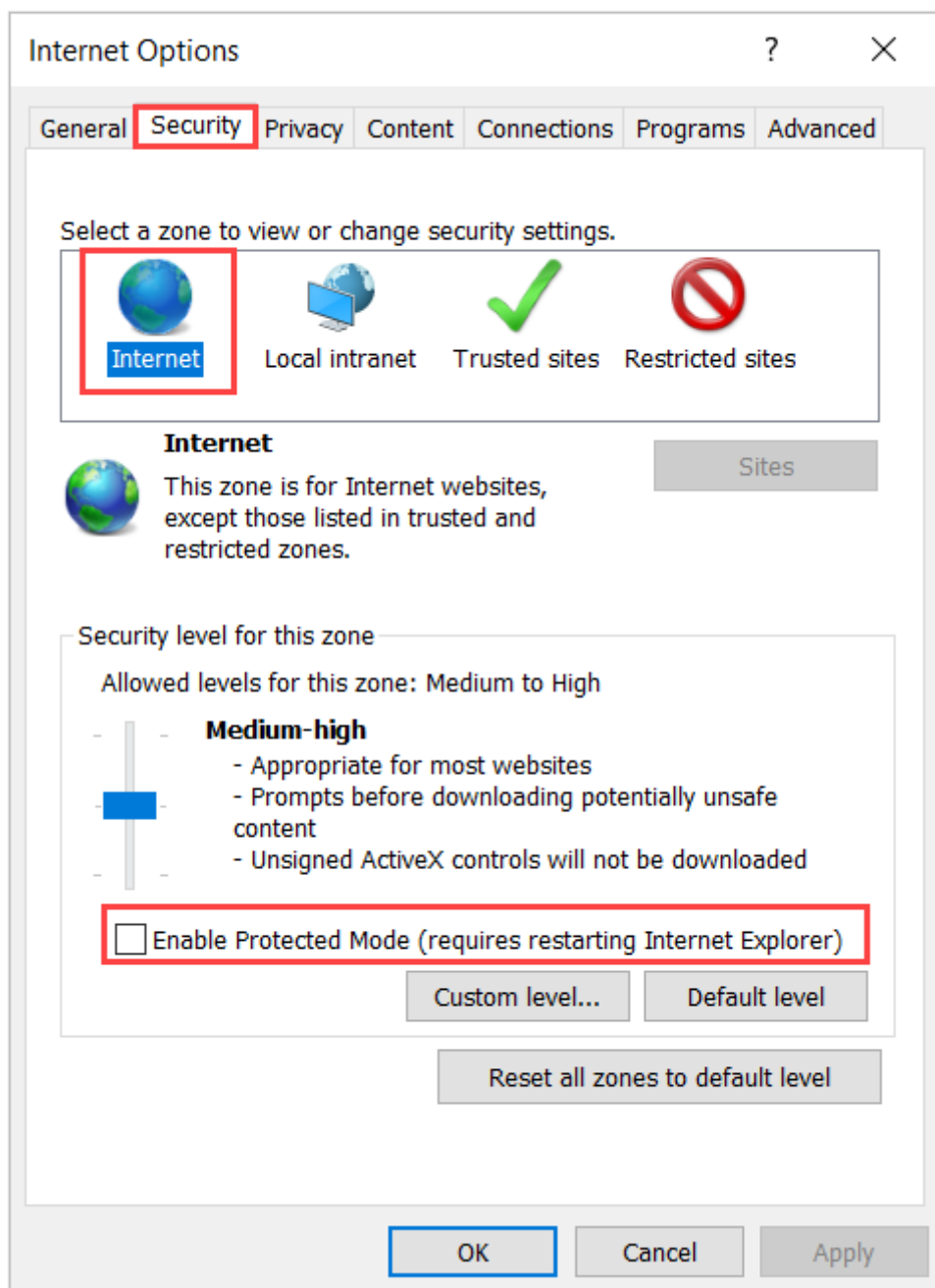
2. Select the gear icon, and then select **Install Add-on From File....**
3. Browse to the browser extension folder of your Power Automate installation.
4. Select **Open**, and then select **Add**.

Alternatively, you can launch Mozilla Firefox and drag the extension file to the browser window.

## Set up browsers

To make sure that your browser works as expected with Power Automate, you'll need to turn off a couple of features.

- Microsoft Edge: Go to **Settings > System** and turn off **Continue running background apps when Microsoft Edge is closed**.
- Google Chrome: Go to **Settings > Advanced > System** and turn off **Continue running background apps when Google Chrome is closed**.
- Mozilla Firefox: Firefox alerts that freeze the browser and prevent users from switching to other tabs or windows may affect your desktop flows. Turn off this feature.
  1. Enter **about:config** in the address bar.
  2. Search for the **prompts.tab\_modal.enabled** preference in the list and change it to **false**.
- Internet Explorer: By default, Internet Explorer works in protected mode to prevent any external application from controlling it. While Power Automate can still work with this setting turned on, it won't be able to clear the browser's cache or cookies. Turn off protected mode.
  1. Select the **gear icon**, and then select **Internet options**.
  2. Navigate to **Security > Internet** and turn off **Enable Protected Mode**. Repeat the same step for the **Local intranet** and **Trusted sites** zones.



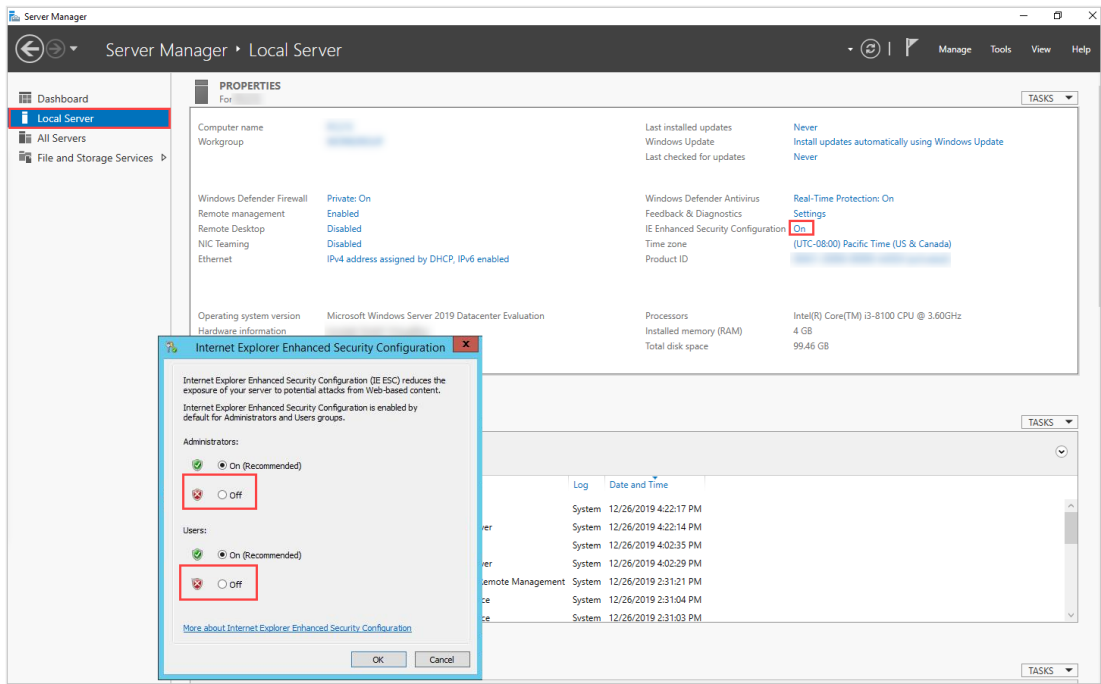
3. Select **OK**.

- Internet Explorer for servers: To use Internet Explorer in Windows Servers, you must turn off **Internet Explorer Enhanced Security Configuration**. This feature prohibits all desktop flows from properly launching an Internet Explorer or Automation browser instance through the **Launch new Internet Explorer** action. Additionally, it prevents web helpers from working as expected.

1. Launch **Server Manager** and select the **Local Server** tab.

2. Select **Internet Explorer Enhanced Security Configuration**.

3. Turn off **IEESC** for both administrators and users.



4. Select OK.

# Migration to Manifest V3

Article • 02/13/2023

After a certain date that the respective products will announce, Google Chrome and Microsoft Edge browsers will no longer run Manifest V2 extensions. Until December 2022, the Power Automate browser extensions for both browsers were based on Manifest V2. Therefore, the web extensions must be migrated to Manifest V3 to be functional after the deprecation date (TBD).

A manifest file is the blueprint of an extension. It includes information such as the version number and the title of the extension and permissions it needs to run. Migrating from Manifest V2 to V3 will bring several structural changes to how browsers handle the extensions. Manifest V3 extensions enjoy enhancements in security, privacy, and performance. They can also use more contemporary open web technologies such as service workers and promises.

## Manifest V2 deprecation plan

<b>Timeframe</b>	<b>Microsoft Partner Center and Chrome Web Store changes</b>	<b>Microsoft Edge and Google Chrome changes</b>
July 2022	No longer accepts new Manifest V2 extensions with visibility set as Hidden or Public.	No change
TBD Google Chrome, TBD Microsoft Edge	No longer accepts updates to existing Manifest V2 extensions. Developers can submit updates for migrating a V2 extension to V3.	Both browsers will stop running Manifest V2 extensions. Enterprises can allow Manifest V2 extensions to run on both browsers using Enterprise policies.
TBD Google Chrome, TBD Microsoft Edge	No change	Manifest V2 extensions will no longer function in both browsers even with the use of Enterprise policy.

Chromium has revised the timelines for Manifest V2 sunset. We'll independently decide on Manifest V3 migration timelines for Microsoft Edge add-ons and share an update in this article. We continue to analyze the concerns raised by the extension developers and

explore the optimal path for the Microsoft Edge add-ons ecosystem. Meanwhile, refer to the [Chromium timelines](#) for planning your extension's migration.

For more information, go to:

- [Manifest V2 support timeline](#)
- [Overview and timelines for migrating to Manifest V3](#)

## Power Automate plan for deprecating Manifest V2 and migrating to V3

A new browser extension, **Microsoft Power Automate**, was released in December 2022. The extension follows the Manifest V3 standard, taking advantage of its benefits. The extension is compatible with Power Automate for desktop v2.27 (December 2022 release) or later. After the deprecation date (TBD), you should upgrade to Power Automate for desktop v2.27 (or later) and install the new extension.

The old web extension will continue to exist after the release of the new one. It will be renamed to **Microsoft Power Automate (Legacy)** and continue using Manifest V2. If you want to keep Power Automate for desktop v2.26 or earlier installed, use the legacy web extension until the deprecation date (TBD).

After then, enterprise users have two options:

- Upgrade to Power Automate for desktop v2.27 or later and use the new browser extension.
- (Only for enterprises) Use Enterprise policies to allow Manifest V2 extensions to run on Microsoft Edge/Google Chrome. By enabling it, you may use Power Automate for desktop v2.26 or earlier and the legacy web extension until a date that will be announced by the respective products and will be a few months after the deprecation date (end of extension date). After the end of extension date (TBD), everyone must upgrade to Power Automate for desktop v2.27 or later.

After the deprecation date (TBD), users without the Enterprise policy applied must upgrade to Power Automate for desktop v2.27 or later and use the new browser extension.

## Run JavaScript function on web page action

 **Important**

Due to security limitations issued by Mozilla Firefox, you can't use the **Run JavaScript function on web page** action with an instance of it. For this action, use one of the other browser options in your desktop flow.

Due to limitations in the way Manifest V3 works, injecting JavaScript on a web page is impossible when Developer tools are disabled by Group Policy, making the action not functional.

If you upgrade to Power Automate for desktop v2.27 or later and use the new browser extension, the **Run JavaScript function on web page** action will be functional with the use of its debugger capability.

The action won't be impacted if you use the legacy browser extension and Power Automate for desktop v2.26 or earlier.

When the action runs, you'll see a "**Microsoft Power Automate**" started debugging this browser message with no real effect on the execution.

#### Note

The new version of the browser extension requires the browser's Developer tools to be enabled. The extension uses its debugger capabilities to run the JavaScript code of the respective action.

To ensure that Developer tools aren't disabled in Microsoft Edge, go to [Microsoft Edge - Policies](#).

To ensure that Developer tools aren't disabled in Google Chrome, go to [Chrome Enterprise policy](#).

## Upgrade to Power Automate for desktop v2.27 (or later) and the new browser extension

With the December 2022 release of Power Automate for desktop, you're able to download and upgrade as usual.

The new browser extensions will be installed automatically during Power Automate installation. If you want to install them manually, go to [Install Power Automate browser extensions](#).

# Extend the usage of Manifest V2 extensions

If you want to wait to install the new version of the browser extension, you can extend the use of the Manifest V2 extensions until the end of extension date (TBD). You can extend the use through an enterprise group policy. However, by the end of the extension date (TBD), you'll have to upgrade to the new version of the extension.

Google hasn't yet officially announced the way to enable the enterprise policy.

# Power Automate v2 schema

Article • 05/07/2024

## ⓘ Note

The Power Automate and Dataverse feature described in this article is applicable to users who sign in [with work, or school accounts, or organization premium accounts](#).

Power Automate stores desktop flows in Microsoft Dataverse, which lets you securely store and manage data used by business applications.

This functionality enables you to use features like solutions for Application Lifecycle Management (ALM). However, handling data stored in this way might be challenging.

Thus, a new storage schema for desktop flows in Dataverse (v2) is available. It makes working with Dataverse APIs easier and enables future product enhancements with desktop flows. The new storage schema is publicly available along with Power Automate for desktop (v2.29).

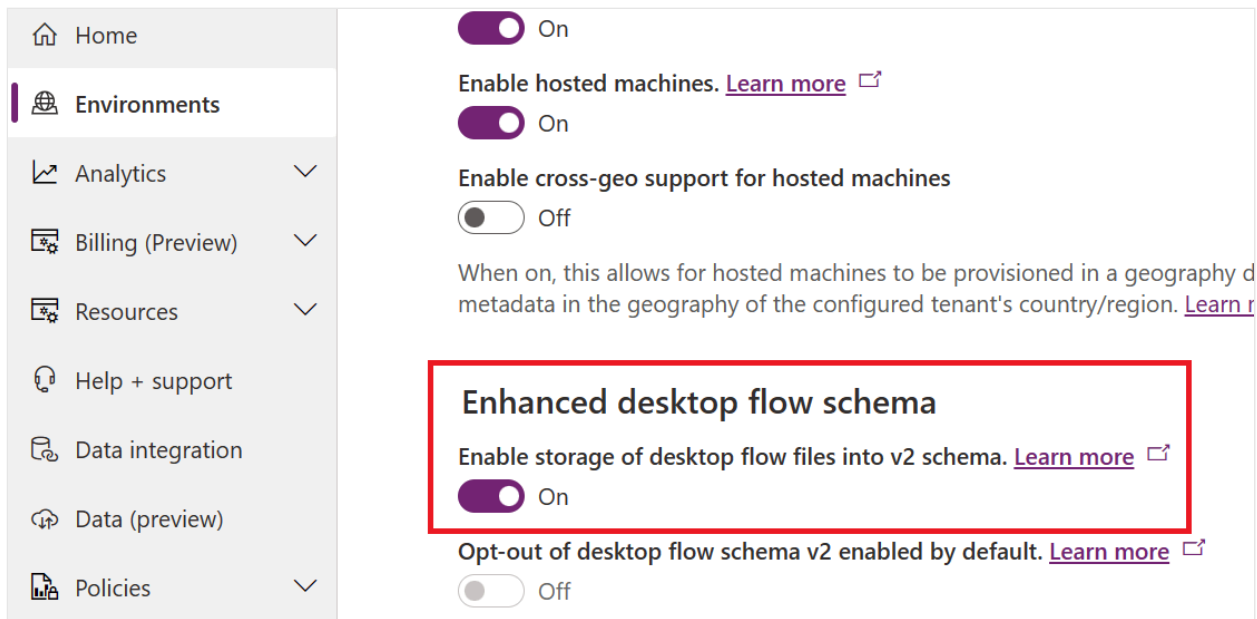
## Enable the v2 schema

The v2 schema effectively reduces Dataverse database consumption for paid license users. Also, it offloads components of your desktop flows into your [Dataverse for Apps File Capacity](#), which is part of your current subscription.

There's no immediate need to act, although we recommend you to enable future product enhancements. Before enabling the new schema, ensure that users and unattended runtime machines have been updated to the appropriate Power Automate for desktop version.

Power Platform administrators can choose when to enable the v2 storage schema. To enable it, go to the [Power Platform Admin Center](#) > **Environments** > **Settings** > **Product** > **Features** > **Enable storage of desktop flow files into v2 schema**. This setting applies at the environment level.

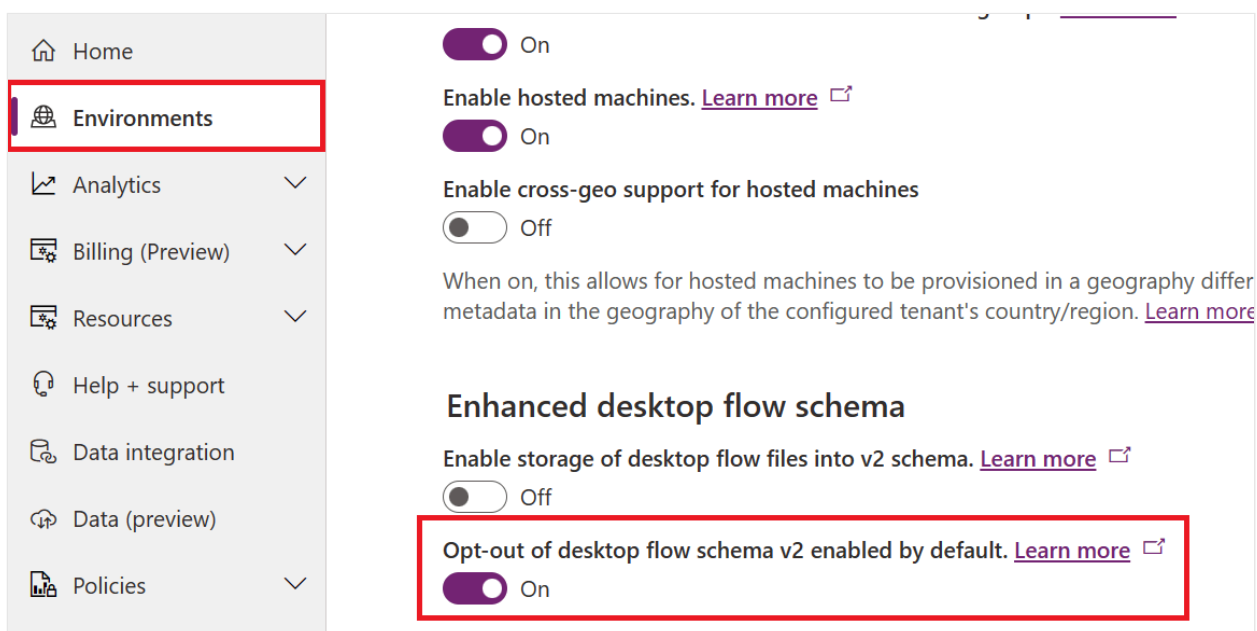




Convert desktop flows stored in the v1 schema to the v2 schema by end of 2024, as then the v1 schema will be deprecated. You need Power Automate for desktop v2.29 or later to author and run desktop flows using environments where the v2 schema is enabled. This requirement ensures desktop flow makers and attended and unattended users can take advantage of the new functionality.

## Schema v2 enabled by default

Starting January 2024, v2 schema is automatically enabled for all environments. Although not recommended, the option to opt-out of the autoenablement is available in the Power Platform admin center. Turning on the opt-out delays the enablement of v2 schema on this particular environment.



Later in 2024, v2 schema will be turned on for all environments without the option to disable the feature and the option won't be visible in Power Platform admin center. As a

best practice, we recommend that you enable the feature in advance so users can benefit from the product enhancements, which come with it.

As of April 25th, 2024, the v2 schema is enabled by default in the following geographies:

- Canada
- South Africa
- Switzerland
- Norway
- Korea
- South America
- Australia
- Singapore
- United-Kingdom
- India
- France
- Germany
- UAE
- Asia
- Japan

## Manage desktop flows in environments with the v2 schema enabled

Power Automate desktop flows currently stored in the v1 schema continues functioning as intended in environments where the v2 schema is enabled. New, modified, and resaved desktop flows are stored in the v2 schema.

If a desktop flow belongs to a solution in a v2-enabled environment, follow [these additional steps](#) to ensure the solution package contains all the binaries required for the flow to function correctly.

## Roll back converted desktop flows

Power Automate for desktop version 2.29 or later allows organizations that moved ahead with the v2 schema to roll back until the v1 schema becomes deprecated.

You can roll back a desktop flow converted to the v2 schema by resaving the desktop flow to an environment where the Power Platform administrator has the feature disabled.

For most scenarios, there's no need to downgrade your version of Power Automate for desktop. However, desktop flows that use v2-related features that aren't supported by the v1 schema can't roll back.

A rollback from v2 to v1 can result in some screenshots associated with UI elements not being saved. Although those screenshots aren't necessary for the desktop flow to run, you can save them:

1. Go to the **UI Elements** right panel in Power Automate desktop.
2. Select each UI element in the list.

This ensures that the screenshots are saved when you rollback to v1.

## Limitations of v2 schema desktop flows

Desktop flows stored in the v2 schema only function in environments with the v2 schema feature enabled.

V1 schema desktop flows in a managed solution might operate in an environment where the v2 schema is enabled, but first you should resave them into another environment where the v2 schema is enabled.

Then, you can import the updated v2 schema version of the same process to the managed environment where it's intended to run. The active layer can be replaced by the v2 schema version of the automated process.

 Expand table

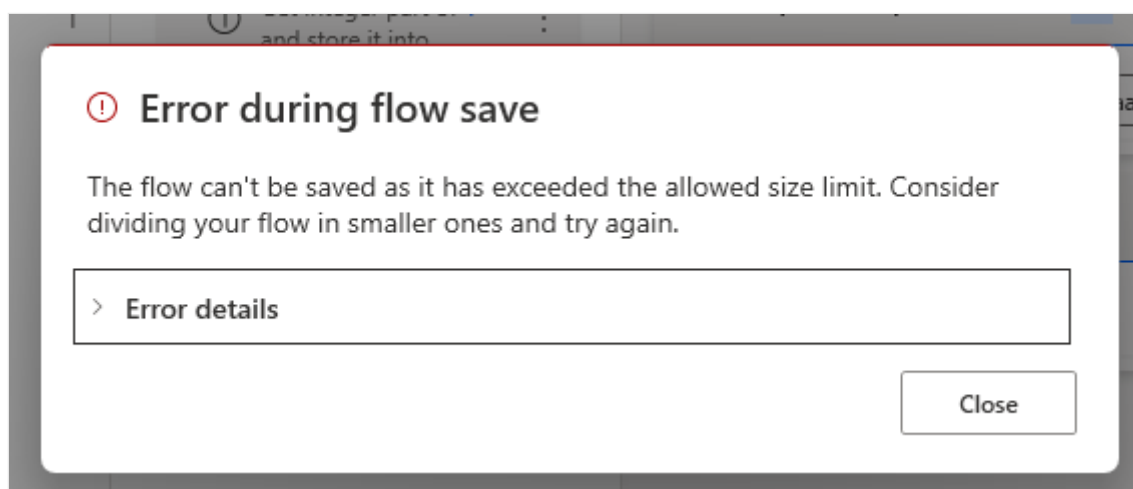
<b>Scenario</b>	<b>Power Automate for desktop prior to February 2023 release</b>	<b>Power Automate for desktop after to February 2023 release</b>
Can run v1 schema desktop flows in environments with the v2 schema enabled?	Yes	Yes
Can run v2 schema desktop flows in environments with the v2 schema enabled?	No (user notified of error)	Yes
Can run v2 schema desktop flows in environments with the v2 schema disabled?	No (user notified of error)	Yes
Can edit/save v1 desktop flows into v1 schema in environments with the	Yes	Yes

Scenario	Power Automate for desktop prior to February 2023 release	Power Automate for desktop after to February 2023 release
v2 schema disabled?		
Can edit/save v1 desktop flows into v1 schema in environments with the v2 schema enabled?	Yes	No (flows are upconverted and saved in the v2 schema)
Can edit/save v2 desktop flows into v1 schema in environments with the v2 schema disabled?	No (user notified of error)	Yes (flows are downgraded to and saved in the v1 schema)
Can edit/save v2 desktop flows into v2 schema in environments with the v2 schema enabled?	No (user notified of error)	Yes

## Exceeded size limit

When you save a desktop flow in v2 schema, you might see the following error:

"The flow can't be saved as it has exceeded the allowed size limit."















The limit applies to the definition of the desktop flow saved in Dataverse, which can't exceed 10 MB. The issue can happen when you have a large desktop flow, which could occur when actions have a large value in their properties or variables have a large default value. One example could be an image saved as base64 and put into the default variable value.

We recommend to not store a large payload in the action properties or in the variable default value. Instead retrieve the value from other actions or pass the value as an input variable. You can also split your desktop flow into multiple child desktop flows.

# Dataverse schema

With v2 schema, we change the data model stored in Dataverse. In addition to the workflow entity, we use the desktop flow binary entity to store data related to the desktop flow including images and metadata.

 Display name ↑ ▾		Name ▾	Type ▾
Desktop flow connector definition		Desktop flow connector definition	Desktop Flow Binary
Desktop flow connector definition		Desktop flow connector definition	Desktop Flow Binary
Desktop flow image screenshot		Desktop flow image screenshot	Desktop Flow Binary
Desktop flow image screenshot		Desktop flow image screenshot	Desktop Flow Binary
Desktop flow images		Desktop flow images	Desktop Flow Binary
Desktop flow manifest file		Desktop flow manifest file	Desktop Flow Binary
Desktop flow ui element screenshot		Desktop flow ui element screenshot	Desktop Flow Binary
Desktop flow ui element screenshot		Desktop flow ui element screenshot	Desktop Flow Binary
Desktop flow ui elements		Desktop flow ui elements	Desktop Flow Binary
 First test		First test	Desktop Flow

## Important

The desktop flow binary objects are required components of the desktop flow as they store required data for the desktop flow to be able to open or run. Don't delete these binary objects. Deleting them results in permanent data loss for the desktop flow, which makes the respective flow non-editable.

The number of desktop flow binaries might vary depending on the size of the desktop flow.

## Roles and privileges

With the v2 schema, the desktop flow binary table is used. For desktop flows to work as expected, you need additional privileges. If you're using the default security roles

`Environment Maker` and `Basic User`, there's no change needed.

If you use custom security roles to manage the access to your desktop flow, Power Platform admins need to add the following list of privileges to the role:

- `prvCreatedesktopflowbinary`
- `prvReaddesktopflowbinary`
- `prvWritedesktopflowbinary`
- `prvDeletedesktopflowbinary`
- `prvSharedesktopflowbinary`
- `prvAssigndesktopflowbinary`
- `prvAppenddesktopflowbinary`
- `prvAppendTodesktopflowbinary`

The minimum access level for each privilege is basic (user). More information: [Security roles and privileges](#)

Table	Create	Read	Write	Delete	Append	Append To	Assign	Share
Desktop Flow Binary								

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#)

# Desktop flow action logs configuration

Article • 07/25/2024

This page provides configuration guidance for desktop flow logs, located under the environment's feature section in the [Power Platform admin center](#).

## Important

- This feature is only applicable to desktop flows that are launched from a cloud flow and isn't available yet for local attended runs from Power Automate desktop.
- While desktop flow logs configuration is now generally available, certain configurations labeled as "Preview" such as the Logs V2 action log type are still in preview and made available before an official release so that customers can get early access and provide feedback. Preview features aren't meant for production use and might have restricted functionality.

The **Activation status of run action logs** setting defines when desktop flow run action logs should be captured and even allows you to turn them off completely.

## Desktop flow run action logs configuration

Activation status of run action logs [Learn more](#)

Enabled (default)

Action logs version [Learn more](#)

V2 - Stored in the FlowLogs entity (Prev...)

FlowLogs entity time to live in minutes (Preview)

40320

Activation status	Details
Enabled (default)	This option is the default for both existing and new environments where logs are captured as usual.
On run failure	This option only captures desktop flow actions logs when there's a runtime error. This means that logs aren't available for every single run, but only when an error occurs. However, if an error does occur, all logs for that particular run are available, including both successful and failed actions.
Disabled	This option effectively disables desktop flow run action logs completely.


### ⊗ Caution

Changing any of these settings can have a significant impact on features such as run failure troubleshooting and auditing. Consider the implications of changing these settings before proceeding.


## Configure desktop flow action log version (preview)

The Action logs version allows you to choose V1, V2, or both.

### Desktop flow run action logs configuration

Activation status of run action logs [Learn more](#) 


Enabled (default) ▼

Action logs version [Learn more](#) 

V2 - Stored in the FlowLogs entity (Prev... ▼

FlowLogs entity time to live in minutes (Preview)

40320 ▲▼





 Expand table

Logs version	Explanation
V1 - Stored in the AdditionalContext field of the FlowSession entity	This option is the default. Logs are stored in the AdditionalContext field of the Flow Session table, which is a file attribute stored as a blob in Microsoft Dataverse. Logs V1 consumes <a href="#">Dataverse file capacity</a> . This feature is generally available (GA).
V2 - Stored in the FlowLogs entity (Preview)	This new preview option allows you to store logs in the Flow Logs table, which is stored in <a href="#">Elastic Tables</a> . Logs V2 consumes <a href="#">Dataverse database capacity</a> . This feature is currently in public preview.
Both (Preview)	This preview setting allows logs to be stored in both the traditional AdditionalContext field of the Flow Session table and the Flow Logs table. This feature is in preview and consumes both Dataverse file and database capacity. This setting is intended for debugging or testing purposes as it consumes both <a href="#">Dataverse database and file capacity</a> . This feature is currently in public preview.

The **FlowLogs entity time to live in minutes (Preview)** value determines how long action logs should be retained in the Flow Logs elastic table. Dataverse automatically deletes records that are older than the specified time-frame. Here are some example values for your convenience.

 Expand table


Days	Minutes
One day	1,440 minutes
Three days	4,320 minutes
Seven days	10,080 minutes
14 days	20,160 minutes
28 days	40,320 minutes
60 days	86,400 minutes
90 days	129,600 minutes
180 days	259,200 minutes
365 days	525,600 minutes
Forever	Less than or equal to 0 (zero) minutes

### ⓘ Note

Before enabling logs V2 (preview), make sure you have sufficient Dataverse database capacity that would support the data retention settings and aligns with your capacity planning, entitlement and adjust as necessary. See the [Sample Dataverse capacity demand calculations for logs V2](#) following section for some sizing examples.

## Key differences of desktop flow logs V1 and V2

The following table describes the differences between desktop flow logs V1 and V2:

 Expand table

Feature	Logs V1	Logs V2	Details
Automatic Data Retention	Not Available	Available	V2 uses <a href="#">Elastic Tables</a> , which are powered by Azure Cosmos DB and comes with a built-in time-to-live feature for automatic data retention.
Support for large log sizes	Roughly up to 50,000 to 80,000 action logs (maximum)	Roughly twice the number of V1 action logs (initially)	V2 could theoretically scale up to gigabytes worth of action logs per run in future, whereas V1 can only scale to the volume specified in this table.
Support for advanced reporting and governance	Not Available	Available	In V1, the AdditionalContext attribute is a file type, stored as a blob in Dataverse, making it challenging to parse for reporting and governance controls. Logs are much more accessible in V2.
Support for Azure Synapse Link for Dataverse integration	Not Available	Available	In V1, the AdditionalContext attribute is a file type, stored as a blob in Dataverse, which isn't supported for synchronization to Azure Synapse.
Support for Dataverse auditing	Not Available	Available	In V1, the AdditionalContext attribute is a file type, stored as a blob in Dataverse, which isn't supported in Dataverse auditing.
Support for Dataverse long-term retention	Not Available	Planned	In V1, the AdditionalContext attribute is a file type, stored as a blob in Dataverse,

Feature	Logs V1	Logs V2	Details
			which isn't supported in Dataverse long-term retention.
Based on Dataverse Role-Based Access Control (RBAC)	Available	Available	Both versions use Dataverse RBAC, inheriting action log permissions from their parent flow session record.

Logs V2 offers significant enhancements over the previous version, V1. V2 uses the [elastic tables](#) feature, which is great for handling large data volumes, like action log scenarios, and has built-in data retention (TTL). Ideal for organizations needing to access significant amount of data for reporting, governance, and integration with automatic data retention control.

## Dataverse capacity demand calculations for logs V2 (preview)

The following table shows sample Dataverse database storage consumption estimates per desktop flow run when using logs V2. It outlines the approximate storage demand for different numbers of actions, assuming an average of 3 KB of storage per action.

[Expand table](#)

Number of actions	Storage demand per action (KB)	Total storage consumption (MB)
1,000	3	2.93
10,000	3	29.3
30,000	3	87.9
60,000	3	175.8
100,000	3	293
160,000	3	480

### Important

The figures shown in the above table are just estimates and the actual storage consumption can vary significantly. The exact storage demand will depend on the specific details and complexity of each action log. Therefore, these numbers should

be used as a rough guide for understanding the potential storage demand and planning your storage requirements accordingly.

## Querying logs V2 (preview) data

Accessing desktop flow action logs data can be achieved by making an API call to the Dataverse backend, either using the traditional API call syntax or using the new [ExecuteCosmosSqlQuery](#) method. This method allows you to execute a SQL query against Dataverse, enabling the retrieval and filtering of data.

The data model of logs V2 is based on a parent-child relationship between the Flow Session and Flow Log tables. Every record inherits permissions from its parent flow session record. In order to query action logs of a specific desktop flow run, you can use the following query syntax.

### Traditional Dataverse API call syntax

The following API call retrieves a specific flow session by its ID (9d51aa1f-315e-43ab-894f-bc445dfb049b) and then accesses the associated action logs using the `flowsession_flowlog_parentobjectid` relationship.

HTTP

```
[Organization URI]/api/data/v9.0/flowsessions(9d51aa1f-315e-43ab-894f-bc445dfb049b)/flowsession_flowlog_parentobjectid
```

### New ExecuteCosmosSqlQuery API call syntax using FlowLogs table

HTTP

```
[Organization URI]/api/data/v9.2/ExecuteCosmosSqlQuery(  
QueryText=@p1,EntityLogicalName=@p2,PartitionId=@p3,QueryParameters=@p4,Page  
Size=@p5)?  
@p1: 'SELECT c.props.flowlogid as flowlogid, c.props.createdon as  
createdon, c.props.data as data, c.props.level as level, c.props.type as  
type, c.ttl as ttlinseconds, c.props.cloudflowid as cloudflowid,  
c.props.cloudflowrunid as cloudflowrunid, c.props.desktopflowid as  
desktopflowid, c.props.flowmachineid as flowmachineid,  
c.props.flowmachinegroupid as flowmachinegroupid, c.props.flowsessionid as  
flowsessionid, c.props.workqueueid as workqueueid, c.props.workqueueitemid  
as workqueueitemid FROM c WHERE c.props.type IN (10000001) ORDER BY
```

```
c.props.data.startTime DESC '  
  @p2: 'flowlog'  
  @p3: 'flowsession_40590757-a9c0-4f4c-abfc-e2f389049d90'  
  @p4: {"Keys":  
["@referencingParentId", "@referencingParentLogicalName"], "Values":  
[{"Type": "System.Guid", "Value": "40590757-a9c0-4f4c-abfc-e2f389049d90"},  
{"Type": "System.String", "Value": "flowsession"}] }  
  @p5: 50
```

Learn more about [querying JSON columns in elastic tables](#).

## Breaking down the call into individual pieces

- The base URL ([https://\[my org\].api.crm\[my region\].dynamics.com/api/data/v9.2/](https://[my org].api.crm[my region].dynamics.com/api/data/v9.2/)) is the endpoint for the Dataverse Web API.
- `ExecuteCosmosSqlQuery` is the method being called. This method allows the execution of a SQL query against Dataverse.
- The parameters for the `ExecuteCosmosSqlQuery` method are provided in parentheses following the method name. These are:
  - `QueryText=@p1`: The SQL query to be executed. In this case, the query selects various properties from a table where the *type* is 100000001 (desktop flow action log type) and orders the results by the `startTime` property in descending order.
  - `EntityLogicalName=@p2`: This is the logical name of the table (`flowlog`) that stores the action logs.
  - `PartitionId=@p3`: This parameter is used to identify the partition within Azure Cosmos DB where the query is to be executed. It's set to `flowsession_[flowsessionid]`.
  - `QueryParameters=@p4`: This is a JSON object specifying parameters for the query. In the previous example, it's specifying a key-value pair where the keys are `@referencingParentId` and `@referencingParentLogicalName` with values of `flowsessionid` (GUID) and type of the table `flowsession`.
  - `PageSize=p5`: This is the query page size.

## Known limitations

- Logs V2 (preview) are only available for desktop flow runs that are launched from a cloud flow through the desktop flow connector action.
  - Changing action log version doesn't migrate previous desktop flow action logs to the new log storage type.
-

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗

# Application lifecycle management (ALM) for Power Automate v2 schema

Article • 05/25/2024

In the Dataverse data model, desktop flows stored in the [v2 schema](#) consist of multiple binaries. This article explains how to update a desktop flow within a solution that resides in an environment with the v2 schema enabled.

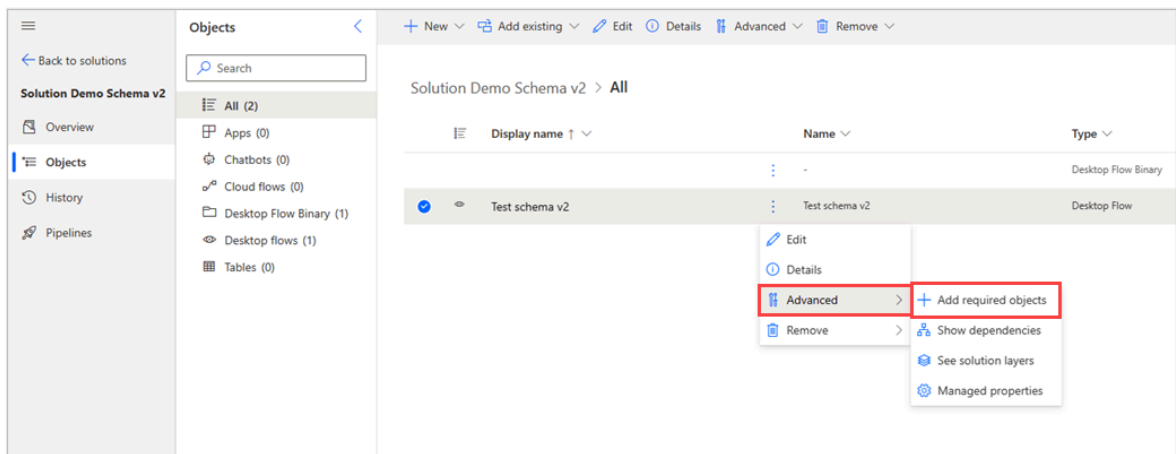
## Update a v2 desktop flow and export the solution

To update a desktop flow with v2 schema and export the solution, follow these steps:

### ⓘ Note

- Importing a managed solution into the same environment as the originating unmanaged solution isn't possible.
- New binaries are automatically added to the solution in which the desktop flow is located, we still recommend to use the following procedure before exporting to ensure all binaries are added to the solution.
- You can use [solution checker](#) to validate that your solution is not missing any dependencies.

1. Go to [Power Automate](#) and select **Solutions**.
2. Select the solution you want to modify.
3. Select the ellipses next to the flow display name, and then **Advanced > Add required objects**.



4. In the **Add Required Objects** dialog, select **OK**.
5. Some new **Desktop Flow Binary** items should appear in the solution.
6. Go back to the solution summary and export the solution as a managed solution.
7. Import the solution into the required environment. This environment must have the v2 schema enabled.

## Manage v1 and v2 schema migrations with solutions

When using solution to manage the lifecycle of your desktop flows, it's important to note the following considerations for importing v2 desktop flows into an environment that contains both v1 and v2 desktop flows.

### Managed solutions

#### ⓘ Note

As a best practice, you shouldn't update a managed desktop flow directly. Instead, import a new version of the solution. Updating a managed desktop flow in v2 schema is now blocked.

If you meet all of the following criteria, you first need to remove the managed solution from the target environment before importing it again:

- You use a managed solution to export desktop flows from your test environment to production environment.
- You have a desktop flow that was updated from v1 to v2 in your target environment.



- You want to import a new version in v2 from another environment.

If you can't remove the solution because you have other dependencies on this solution, you need to remove any unmanaged layer on the desktop flow, including related data. To see the related data, in the desktop flow in the solution, select **Dependencies** and then select the **Used by** tab. The list of unmanaged binaries associated with this desktop flow are shown and you can delete them.

If the desktop flows on the target environment are still v1, you can safely import the solution containing the v2 desktop flow.

## Unmanaged solutions

### ⓘ Note

An unmanaged solution should only be used for sharing a desktop flow with other makers and shouldn't be use to import into production. Instead, a managed solution is recommended to have a proper ALM.

If you meet all of the following criteria, you need to first delete the desktop flows from the target environment using an unmanaged solution:

- You use an unmanaged solution to share desktop flows.
- You have a desktop flow that was updated from v1 to v2 in your target environment.
- You want to import a new version in v2 from another environment.

If the desktop flows in the target environment are still v1, you can safely import the solution containing the v2 desktop flow.

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Create a Microsoft Dataverse database

Article • 02/24/2023

All the flows you create in Power Automate for desktop are stored in a Microsoft Dataverse database. There are several ways to create a Dataverse database. Environment administrators can create them in the [Power Platform admin center](#) and in [Power Apps](#) and in [Power Automate for desktop](#). Non-admins can [create a Dataverse database in Teams](#).

## Create a Dataverse database in Power Automate for desktop


Users with administrative rights on their device can create a Dataverse database in Power Automate for desktop.

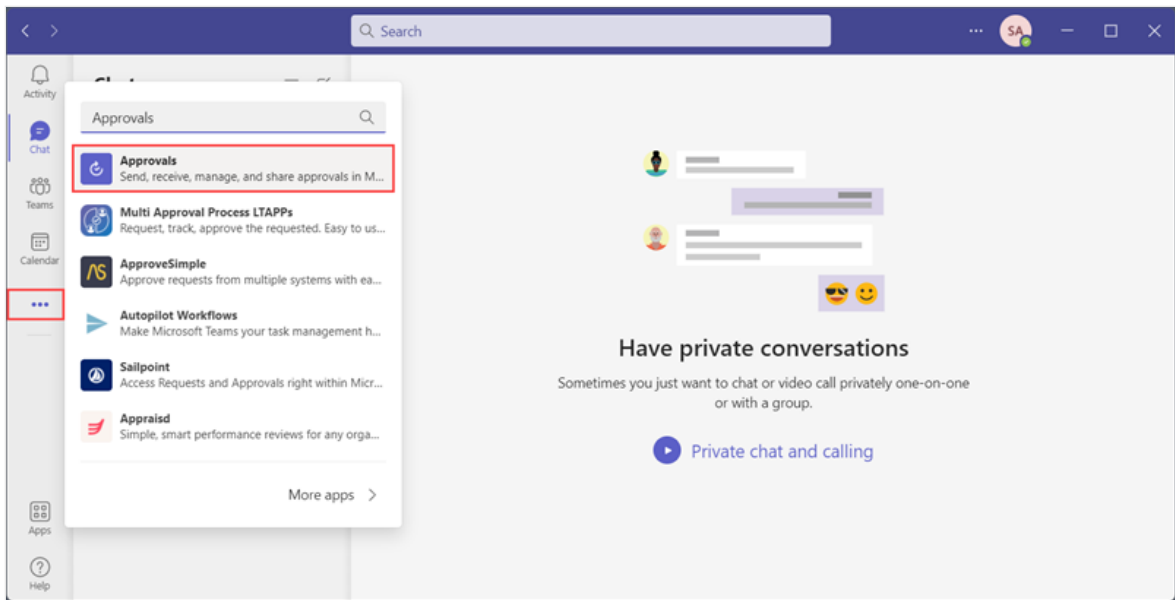
If you're using a free work or school account, a database is created automatically the first time you sign in with your account after you install Power Automate.

If your account is a premium account, select **Create database** the first time you sign in to Power Automate to create a Microsoft Dataverse database.

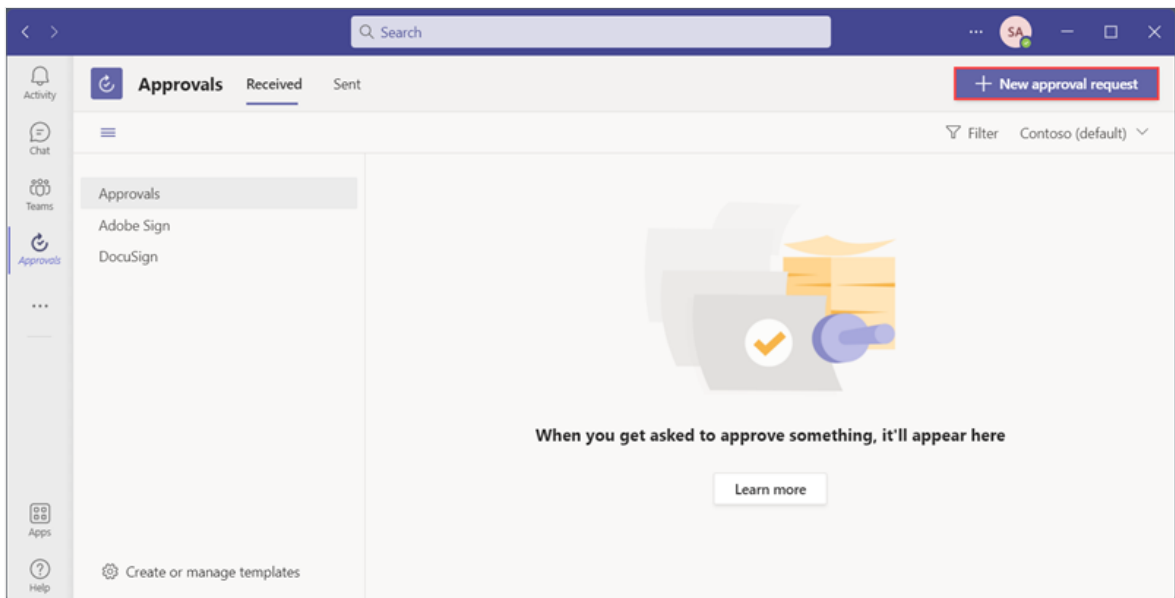
## Create a Dataverse database in Teams

You can use the approvals workflow in Teams to automatically create a Dataverse database that Power Automate can use to store flows. You need to follow this process only once per tenant, and even non-admins can do it.

1. Sign in to [Microsoft Teams](#) .
2. Select **More added apps (...)**.
3. Search for and install the **Approvals** app.



4. In the upper-right corner of the **Approvals** page, select **New approval request**.



5. Name your request; for example, `Test`.

6. Search for and select your username in the **Approvers** list.

**Approvals**  
Create a new approval request

**New request** Templates

Request type\*

Basic

Name of request \*

**Test**

Approvers \*

SA System Administrator

Require a response from all recipients

Additional details

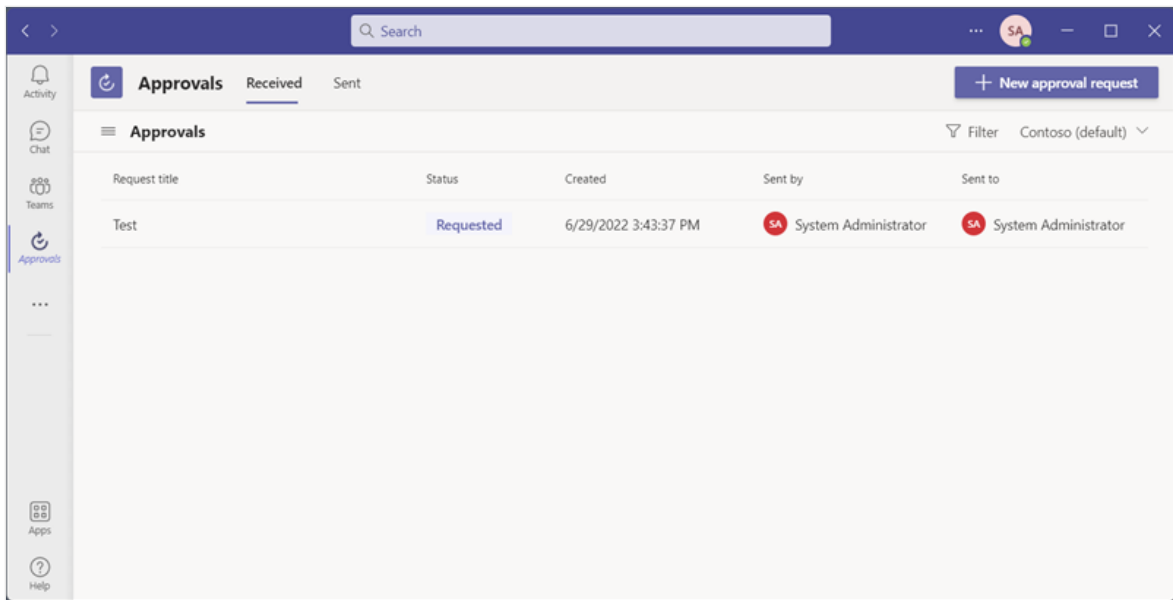
If needed, add some extra info that'll help the recipients learn more about the request

Switch to new view

Send

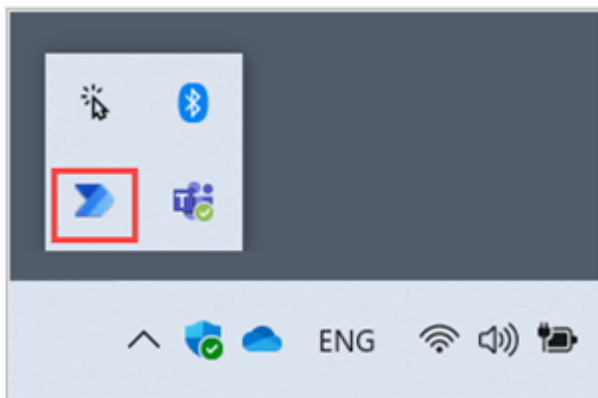
7. Select **Send**.

Sending the approval request starts the creation of a Dataverse database. It may take a few minutes to complete. When it's done, you'll receive a notification in Teams that you have a request for approval.



8. Approve the request. Your Dataverse database is now added to the default environment.

9. Exit Power Automate for desktop from the system tray icon to restart it.



# Governance in Power Automate for desktop

Article • 07/02/2024

You can use the Windows registry to control who can do what with Power Automate for desktop.

## ⊗ Caution

Modifying Windows registry settings incorrectly can cause serious problems that may prevent your computer from booting properly. Microsoft cannot guarantee that any problems resulting from the configuring of registry settings can be solved. Modification of these settings is at your own risk. We strongly recommend that you [back up your Windows registry](#) before proceeding.

## ⓘ Note

If a registry key doesn't exist in the Windows registry, first create the key and then add the registry value.

## Prevent users manually updating Power Automate for desktop

You can use the following registry entry to keep users from manually updating Power Automate for desktop and receiving update notifications.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	DisableOptionalUpdates	DWORD

### Value

- 1: Users can't manually update Power Automate for desktop.

## Prevent users accessing Power Automate for desktop using certain kinds of accounts

## ⓘ Note

Setting any value other than 1, or not setting a value at all, in the following registry keys will allow users to sign in to Power Automate for desktop. If all the following registry keys are set to 1, users can't sign in to Power Automate for desktop using any type of account.

## Prevent users accessing Power Automate for desktop using their Microsoft accounts

You can use the following registry entry to keep users from signing in to Power Automate for desktop using a Microsoft account.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	RestrictMSAAccountsSignIns	DWORD

#### Value

- 1: Users can't sign in to Power Automate using their Microsoft account.

## Prevent users accessing Power Automate for desktop using their work or school accounts

You can use the following registry entry to keep users from signing in to Power Automate for desktop using their work or school account without a per-user plan with attended RPA license.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	RestrictNoLicenseOrgIDAccountsSignIns	DWORD

#### Value

- 1: Users can't sign in to Power Automate using their work or school account without a per-user plan with attended RPA license.

## Prevent users accessing Power Automate for desktop using their work or school accounts or organization premium accounts

You can use the following registry entry to keep users from logging into Power Automate for desktop using their work or school accounts or organization premium accounts.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	RestrictOrgIDAccountsSignIns	DWORD

#### Value

- 1: Users can't sign in to Power Automate using their work or school account or organization premium account.

## Restrict access to Power Automate for desktop

To restrict access to Power Automate for desktop on a workstation with Windows 10 or Windows 11, use [App locker](#).

# Configure Power Automate for desktop to use the Web Account Manager (WAM) as a fallback sign in method

By default, Power Automate for desktop uses the Web Account Manager (WAM) for user authentication. If any sign in errors occur, it uses an Internet Explorer client as a fallback method.

You can use the following registry entry to set Power Automate for desktop to sign in with the Windows Web Account Manager (WAM) as a fallback sign in method.

## ⓘ Note

For older versions of Power Automate for desktop prior to version 2.41, this registry entry configures Power Automate for desktop to sign in with the Web Account Manager (WAM) as the primary sign in method.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	UseMsalWindowsBroker	DWORD

## Values

- 1: Power Automate for desktop authenticates users using the WAM functionality as a fallback sign in method.

# Configure Power Automate for desktop to check for revoked certificates

Certificates ensure the security of your connections to online data sources. You can use the following registry entry to configure the level of certificate check, based on the certificates' revocation information status.

## ⓘ Note

The default configuration when no registry entry is set is **Basic check**.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop\Global	CertificateRevocationCheck	DWORD

## Values

- 0: No check - Power Automate for desktop doesn't check the revocation information. All valid certificates are allowed through.
- 1: Basic check (default) - Power Automate for desktop rejects only certificates that are revoked. Certificates without revocation information are allowed through. This is important for some organizations with corporate proxy services.



- 2: Comprehensive check – Power Automate for desktop rejects both certificates that are revoked and certificates without revocation information.

## Allow users to select an organization in Power Automate for desktop

You can use the following registry entry to allow users to select the organization of their preference in Power Automate for desktop.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	EnableOrganizationPicker	String

### Values

- **"isEnabled":1**: Signed-in users can select the organization of their preference through the **Switch organization** option in the Power Automate for desktop console.
- **"isEnabled":0**: Signed-in users can't select the organization of their preference and the **Switch organization** option is disabled.
- **"organizationList":[OrgID(s)]** (for example, `organizationList:["10z677m8-14v6-9cm5-c6n6-r1747rp5338k","86d487j7-y1t2-9gk7-k7n2-x5079jq4619r"]`): The organizations with the specified IDs are available to connect during sign-in.
- **"selectOrganizationFromListIsEnabled":1**: Power Automate for desktop tries to connect to each of the organizations specified in the **organizationList** value, in order, during sign-in.
- **"selectOrganizationFromListIsEnabled":0**: The specified list in the **organizationList** value isn't taken into consideration during sign-in.

#### ⓘ Note

The "isEnabled" values aren't related to the **organizationList** and **selectOrganizationFromListIsEnabled** values. The **isEnabled** values define whether the **Switch organization** option is available to signed-in users, whereas the **organizationList** and **selectOrganizationFromListIsEnabled** values define the organizations that Power Automate for desktop tries to connect to automatically during sign-in.

## Configure Power Automate for desktop to connect to a region

You can use the following registry entry to set the region where users will connect to by default during sign-in.

#### ⓘ Note

Values 0 and 1 apply to older versions of Power Automate for desktop, prior to version 2.41.

 Expand table

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	Cloud	DWORD

#### Value

- 0: The user can select the region to connect to through another option in the sign-in screen.
- 1: The user is automatically connected to the first available region they're registered to.
- 2: The user connects to the global public region.
- 3: The user connects to the US Government GCC region.
- 4: The user connects to the US Government GCC High region.
- 5: The user connects to the US Government DoD region.
- 6: The user connects to the China (operated by 21Vianet) region.

## Configure Power Automate for desktop to interact with a corporate proxy server

IT administrators can set the following registry key to configure how Power Automate interacts with a corporate proxy server.

#### Important

From Power Automate for desktop version 2.45, all proxy settings can be configured through the Power Automate proxy configuration files. Learn more at [Configure Power Automate for desktop proxy settings](#).

 Expand table

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	ProxyServer	String

#### Value

- **ProxyAddress:Port** (for example, `https://myproxy.com:3128`): The proxy server and port configured override the proxy server and port configured in Windows.

## Configure Power Automate for desktop to bypass a corporate proxy server

IT administrators can set the following registry key to configure the Power Automate's bypassing of a corporate proxy server.

#### Important

From Power Automate for desktop version 2.45, all proxy settings can be configured through the Power Automate proxy configuration files. Learn more at [Configure Power Automate for desktop proxy settings](#).

 Expand table

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	DisableWindowsProxy	DWORD

#### Value

- 1: Power Automate for desktop doesn't honor the Windows Proxy settings and the proxy server is bypassed for Power Automate's traffic.

## Configure Power Automate for desktop to authenticate to a corporate proxy server using the current user's credentials

IT administrators can set the following registry key to configure how Power Automate authenticates with a corporate proxy server.

#### Important

From Power Automate for desktop version 2.45, all proxy settings can be configured through the Power Automate proxy configuration files. Learn more at [Configure Power Automate for desktop proxy settings](#).

 Expand table

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	UseDefaultProxyCredentials	DWORD

#### Value

- 1: Power Automate for desktop authenticates to the corporate proxy server using the current user's credentials.

## Configure Power Automate for desktop to authenticate to a corporate proxy server using Windows credentials

IT administrators can set the following registry key to configure Power Automate to use a generic credential from Windows' Credential Manager to authenticate to a corporate proxy server.

#### Note

To use this registry key, it's a prerequisite to first configure the proxy server's address and port through the **ProxyServer** registry key.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	ProxyNetworkCredentialsKey	String

#### Value

- **Internet or network address:** The **Internet or network address** value of the generic Windows credential's entry.

## Configure Power Automate for desktop to bypass a set of addresses while interacting with a corporate proxy server

IT administrators can set the following registry key to configure a list of IP addresses that are bypassed while Power Automate interacts with a corporate proxy server.

#### Note

To use this registry key, it's a prerequisite to first configure the proxy server's address and port through the **ProxyServer** registry key.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	ProxyBypassList	String

#### Value

- **Address1,Address2** (for example, `192.168.1.1, 10.10.10.*`): The list of addresses to be bypassed.

## Configure optional diagnostic usage data collection in Power Automate for desktop

You can use the following registry entry to enable or disable the collection of optional diagnostic usage data in Power Automate for desktop.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\WOW6432Node\Microsoft\Power Automate Desktop\LogShipper	AllowOptionalDataCollection	DWORD

### Value

- 0: Power Automate for desktop won't collect optional diagnostic usage data.
- 1: Power Automate for desktop collects optional diagnostic usage data.

## Prevent Power Automate for desktop from taking screenshots for action logs upon error

You can use the following registry entry to prevent Power Automate for desktop from taking a screenshot for the actions logs when an error occurs during a flow run.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop\Global	DisableScreenshotCaptureOnError	DWORD

### Value

- 1: Power Automate for desktop won't take a screenshot for the action logs when an error occurs during a flow run.

## Prevent Power Automate for desktop from uploading action logs after a desktop flow execution

You can use the following registry entry to prevent Power Automate for desktop from uploading detailed logs per action for the respective run of the flow's run history, after a desktop flow execution.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop\Global	DisableFlowExecutionActionLogging	DWORD

### Value

- 1: Power Automate for desktop won't upload detailed action logs for the respective run of the flow's run history.

## Configure or disable desktop flow action logs per environment (preview)

See [Desktop flow action logs configuration \(preview\)](#).

## Configure Power Automate for desktop notification settings

You can use the following registry entry to configure how Power Automate for desktop displays notifications and monitoring information.

[Expand table](#)

Hive	Key	Name	Type
HKEY_CURRENT_USER	SOFTWARE\Microsoft\Power Automate Desktop	NotificationsType	DWORD

#### Value

- 1: Power Automate for desktop displays notifications through the flow monitoring window.
- 2: Power Automate for desktop uses the integrated Windows notifications.
- 3: Power Automate for desktop doesn't display notifications.

## Configure Power Automate for desktop confirmation dialog when invoking flows using a URL or desktop shortcut

You can use the following registry entry to configure the behavior of the confirmation dialog when invoking flows using a URL or desktop shortcut.

[Expand table](#)

Hive	Key	Name	Type
HKEY_CURRENT_USER	SOFTWARE\Microsoft\Power Automate Desktop	EnableAskBeforeRunningAFlowExternally	DWORD

#### Value

- 0: Power Automate for desktop doesn't display a confirmation dialog when invoking flows using a URL or desktop shortcut. The user can change this option through the console settings.

## Configure Power Automate for desktop to invoke flows using a URL or desktop shortcut

You can use the following registry entry to enforce the confirmation dialog or disable invoking flows using a URL or desktop shortcut.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	ConfigureExternalRuns	DWORD

#### Value

- 1: Power Automate for desktop always displays a confirmation dialog when invoking flows using a URL or desktop shortcut. Users aren't allowed to change this option through the console settings.

- 2: Users aren't allowed to invoke flows using a URL or desktop shortcut.

## Configure Power Automate for desktop to keep the flow run details

You can use the following registry entry to configure Power Automate for desktop to keep the flow run detail logs in a local folder.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	KeepRunDefinitionFilesCopy	DWORD

### Value

- 1: Power Automate for desktop creates a copy of the `RunDefinition.json` file, preventing the local flow run details from getting cleaned up.

## Configure Power Automate for desktop to prevent cleanup of flow run action details

You can use the following registry entry to configure the cleanup of local flow run action detail logs.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop\Global	DisableRunFilesCleanup	DWORD

### Value

- 1: Flow run action details stored in the `Actions.log` file aren't deleted from the local disk after the run is completed.

## Prevent Power Automate for desktop from running flows containing cloud connectors

You can use the following registry entry to disable the execution of flows containing cloud connectors.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop\Global	DisableCloudConnectors	DWORD

### Value

- 1: The machine can't run desktop flows containing cloud connectors. An error message informs users about the limitation.

# Improve troubleshooting of the Power Automate troubleshooter

You can use the following registry entry to permit the use of the verbose logging functionality in the troubleshooter.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\Microsoft\Power Automate Desktop	AllowVerboseLogging	DWORD

## Value

- 1: The verbose logging feature will be available to use via the troubleshooter of Power Automate for desktop.

# Turn on verbose logging state in Power Automate for desktop

You can use the following registry entry to turn on the verbose logging state for Power Automate for desktop.

[Expand table](#)

Hive	Key	Name	Type
HKEY_CURRENT_USER	SOFTWARE\Microsoft\Power Automate Desktop	UseVerboseLogging	DWORD

## Value

- 1: The verbose logging state will be turned on for Power Automate for desktop.

# Allow users to register their machine to a different tenant in Power Automate machine-runtime app

## Note

This registry entry applies to Power Automate desktop version 2.24 and later.

You can use the following registry entry to allow machine registrations to tenants that are different from the machine joined Microsoft Entra tenant.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\WOW6432Node\Microsoft\Power Automate Desktop\Registration	AllowedRegistrationTenants	String



## Value

- "AllowedRegistrationTenants": (for example, 3EF1D993-CBD4-4DEA-A50E-939AEDB23F21, 5B19777D-814C-43F3-9317-CDBAD0846ED8): The tenants with the specified IDs can be used during machine registration.

# Allow users to register their machine to any tenant in Power Automate machine-runtime app

### ⓘ Note

This registry entry applies to Power Automate desktop version 2.24 and later.

You can use the following registry entry to allow machine registrations to any tenant.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\WOW6432Node\Microsoft\Power Automate Desktop\Registration	AllowRegisteringOutsideOfAADJoinedTenant	DWORD

## Value

- 1: Machines can register to any tenant.

# Allow users to switch registration of their machine to a different tenant in Power Automate machine-runtime app

### ⓘ Note

This registry entry applies to Power Automate desktop version 2.24 and later.

You can use the following registry entry to allow switching machine registration to a different tenant.

[Expand table](#)

Hive	Key	Name	Type
HKEY_LOCAL_MACHINE	SOFTWARE\WOW6432Node\Microsoft\Power Automate Desktop\Registration	AllowTenantSwitching	DWORD

## Value

- 1: Machine registration can switch to another tenant.

# Prevent users from using the copilot's generative answers capability

To prevent your users from using the copilot's generative answers capability, Power Platform administrators turn off the Copilot help assistance in Power Automate via Bing setting in the Power Platform admin center.

## Prevent users from sending copilot related feedback

As a Power Platform admin you can prevent users from sending feedback to Microsoft by disabling the `disableSurveyFeedback` tenant setting. Find more information about viewing and setting tenant settings here:

- [List tenant settings \(preview\)](#)
- [Set TenantSettings](#)

## Prevent your users from using any copilot capability

To prevent your users from using any copilot capability contact Microsoft Customer Support to disable all copilot functionality in your tenant. More information: [Get Help + Support](#)

### See also

- [Create Power Automate desktop flows.](#)
- [Run desktop flows.](#)
- [Manage desktop flows.](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# Manage security for Power Automate

Article • 02/27/2024

In order to manage security for Power Automate, it's important to understand the security concepts and terminology of [Microsoft Dataverse](#), which is the underlying data platform for Power Platform components. Microsoft Dataverse has a strong security model that uses security roles, teams, and business units to control access to tables, fields, and records using permission and row-level access control. Learn more: [Dataverse security roles and privileges](#).

This article explains the built-in security roles that are available for Power Automate Desktop flows.

## ⓘ Note

**Dataverse data and configurations are environment-based.** Environments can be used to segregate data, security settings, customizations and resources by department, project, data residency and data privacy requirements, or organization. For example, you might have one environment for your sales team, another for your marketing team, and a third for your customer service team. This allows you to control access to resources and data at a granular level, and ensures that each team has access only to the resources they need.

## Dataverse access prerequisites

To access an environment, a user must meet the following criteria:

1. Be enabled for sign-in in Microsoft Entra ID.
2. Have a valid license that has a Microsoft Power Platform or Dynamics 365 recognized service plan.
3. Be a member of the environment's Microsoft Entra group (if one has been associated with the environment).
4. Have at least one Dataverse security role assigned directly to them or to a group/team they're a member of.

If you have difficulties connecting to Dataverse, review this troubleshooting page for [Common user access issues](#).

## Dataverse security-related features

The following components are related to key security configurations in Dataverse.

- **Security role:** A security role is a collection of privileges that define the level of access that a user or team has to resources in Dataverse. Security roles are used to control access to tables, columns, and other resources in Dataverse.
- **Business unit:** A business unit is a logical container for users, teams, and other resources in Dataverse. Business units are used to define security boundaries and to control access to resources in Dataverse.
- **Team:** A team is a group of users in Dataverse that share a common set of privileges. Teams 's used to simplify security management and to control access to resources in Dataverse.
- **User:** A user is an individual who has access to Dataverse. Users are assigned security roles and are members of one or more business units.
- **Privilege:** A privilege is a permission that controls access to tables, columns, and other resources in Dataverse. Privileges are used to define the level of access that a user or team has to a particular resource in Dataverse.
- **Access level:** An access level is a combination of privileges that define the level of access that a user or team has to a particular resource in Dataverse. Access levels are used to simplify security management and to control access to resources in Dataverse.
- **Sharing:** Sharing is the process of granting access to a row or other resource in Dataverse to another user or team. Sharing is used to provide temporary or ad-hoc access to resources in Dataverse.
- **Record-level security:** Record-level security is the process of controlling access to individual rows (records) in Dataverse. Record-level security is used to ensure that users can only access the rows that they're authorized to view or modify.
- **Field-level security:** Field-level security is the process of controlling access to individual columns in Dataverse. Field-level security is used to ensure that users can only view or modify the columns that they're authorized to access.

Overall, these concepts and terminology are used to define the security model in Dataverse, and are used to control access to resources in a granular and flexible way. By understanding these concepts and terminology, you can better manage security in Dataverse and ensure that your users have the appropriate level of access to resources.

## Dataverse privileges

The following table provides details about each specific table privilege:

 [Expand table](#)

Privilege	Description
<b>Create</b>	Required to make a new row. Which rows can be created depends on the access level of the permission defined in your security role.
<b>Read</b>	Required to open a row to view the contents. Which rows can be read depends on the access level of the permission defined in your security role.
<b>Write</b>	Required to make changes to a row. Which rows can be changed depends on the access level of the permission defined in your security role.
<b>Delete</b>	Required to permanently remove a row. Which rows can be deleted depends on the access level of the permission defined in your security role.
<b>Append</b>	Required to associate the current row with another row. For example, a note can be attached to an opportunity if the user has append rights on the note. The rows that can be appended depend on the access level of the permission defined in your security role. In case of many-to-many relationships, you must have append privilege for both tables being associated or disassociated.
<b>Append to</b>	Required to associate a row with the current row. For example, if a user has append To rights on an opportunity, the user can add a note to the opportunity. The records that can be appended to depend on the access level of the permission defined in your security role.
<b>Assign</b>	Required to give ownership of a row to another user. Which rows can be assigned depends on the access level of the permission defined in your security role.
<b>Share</b>	Required to give access to a row to another user while keeping your own access. Which rows can be shared depends on the access level of the permission defined in your security role.

For each specific privilege, there's a drop-down menu that allows you to define the access level. Access levels determine how deep or high in the business unit hierarchy the user can perform the specified privilege in the organization.

The following table lists the levels of access in the table, starting with the level that gives users the most access. Organization-owned tables, miscellaneous privileges, and privacy-related privileges will only have **Organization** or **None** types.

 [Expand table](#)

Type	Description
<b>Organization</b>	This access level gives a user access to all rows in the organization, regardless of the business unit hierarchical level that the environment or the user belongs to. Users who have organization access automatically have the other types of access as well. Because this access level gives access to information throughout the organization, it should be restricted to match the organization's data

Type	Description
	security plan. This level of access is typically reserved for managers with authority over the organization.
<b>Parent: Child Business Unit</b>	This access level allows a user to access rows in their business unit and all business units below it. Users with this access level automatically have business unit and user access. Since this access level provides access to information across the business unit and its subordinates, it should be restricted to align with the organization's data security plan. This level of access is typically reserved for managers with authority over the business units.
<b>Business Unit</b>	This access level gives a user access to rows in the user's business unit. Users who have business unit access automatically have user access. Because this access level gives access to information throughout the business unit, it should be restricted to match the organization's data security plan. This level of access is reserved for managers with authority over the business unit.
<b>User</b>	This access level gives a user access to rows that the user owns, objects that are shared with the organization, objects that are shared with the user, and objects that are shared with a team that the user is a member of. This is the typical level of access for sales and service representatives.
<b>None</b>	No access is allowed.

Privileges with their access levels are combined to create security roles, which are used to control access to resources in Dataverse. Security roles are assigned to users and teams to define their level of access to resources in Dataverse.

For example, you might create a security role that allows users to create, read, and update Desktop flows, but not delete them. You might also create a security role that allows users to access all tables and fields in Dataverse, or a security role that allows users to access only tables and fields that are owned by their team.

Overall, privileges are a key component of the security model in Dataverse, and are used to control access to resources in a granular and flexible way.

#### ⓘ Note

To run a desktop flow, you need these minimum privileges:

- Basic Append, AppendTo, Create and Write privileges on the `flowsession` table.
- Basic Append, AppendTo, Create and Write privileges on the `workflowbinary` table.
- Basic Read privilege on the `workflow` table.

- Basic Read privilege on the `desktopflowbinary` table.

## Power Automate specific security roles

Following security roles are available out-of-the-box with Power Automate.

### Environment maker

The environment maker role in Dataverse is a built-in security role that lets users create and manage their resources associated with an environment. This includes apps, connections, custom APIs, gateways, cloud flows, and desktop flows, as long as the user has the appropriate license for the intended product area.

**Security Role: Environment Maker** Working on solution: Default Solution

Table	Create	Read	Write	Delete	Append	Append To	Assign	Share
DataflowRefreshHistory	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
Desktop Flow Binary	User	User	User	User	User	User	User	User
Entity Image Configuration								
Entity link chat configuration	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
EntityRefreshHistory	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
Environment Variable Definition	User	User	User	User	User	User	User	User
ExportSolutionUpload	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
FeatureControlSetting	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Flow Machine	User	User	User	User	User	User	User	User
Flow Machine Group	User	User	User	User	User	User	User	User
Flow Machine Image	User	User	User	User	User	User	User	User
Flow Machine Network	User	User	User	User	User	User	User	User
Flow Session	User	User	User	User	User	User	User	User
Help Page	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected		
Image Attribute Configuration								
Insights Store Data Source	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected		
Integrated search provider	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Internal Catalog Assignment	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected		
Key Vault Reference	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Knowledge article language setting	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Knowledge Federated Article	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Knowledge Federated Article Incident	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Knowledge Management Setting	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected

**Key**

- None Selected
- 👤 User
- 🏢 Business Unit
- 👤 Parent: Child Business Units
- 🟢 Organization

### Desktop flows machine configuration admin

This role is typically assigned to CoE or IT admins that manage VM images and virtual networks. Users with this role have full privileges on the VM image and VNet specific tables, which are used for hosted machine scenarios. In particular, this allows users with this role to add VM images, image versions and share/unshare VM images to be used

for created hosted machine scenarios in their environment.

Table 1	Name	Record ownership	Permission Settings	Create	Read	Write	Delete	Append	Append to	Assign	Share
Custom Tables (3)											
Flow Machine Image	flowmachineimage	User or Team	Full Access	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
Flow Machine Image Version	flowmachineimageversion	User or Team	Full Access	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
Flow Machine Network	flowmachinenetwork	User or Team	Full Access	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization

## Desktop Flows Machine Owner

This role allows users to manage machines and machine groups they own, including creating, editing, sharing, and deleting machines and machine groups.

Table 1	Name	Record ownership	Permission Settings	Create	Read	Write	Delete	Append	Append to	Assign	Share
Custom Tables (9)											
Desktop Flow Binary	desktopflowbinary	User or Team	Private	User	User	User	User	User	User	User	User
Flow Machine	flowmachine	User or Team	Private	User	User	User	User	User	User	User	User
Flow Machine Group	flowmachinegroup	User or Team	Private	User	User	User	User	User	User	User	User
Flow Machine Image	flowmachineimage	User or Team	Custom	None	User	None	None	None	User	None	None
Flow Machine Image Version	flowmachineimageversion	User or Team	Custom	None	User	None	None	None	User	None	None
Flow Machine Network	flowmachinenetwork	User or Team	Custom	None	User	None	None	None	User	None	None
Flow Session	flowsession	User or Team	Private	User	User	User	User	User	User	User	User
ProcessStageParameter	processstageparameter	User or Team	Custom	User	User	User	User	None	None	None	None
Workflow Binary	workflowbinary	User or Team	Private	User	User	User	User	User	User	User	User

## Desktop flows machine user

This role allows users to run Desktop flows but not configure machines. A CoE might assign this role to other users in the environment, so that they can use machines created and shared by the CoE, but not edit or share them.

Table 1	Name	Record ownership	Permission Settings	Create	Read	Write	Delete	Append	Append to	Assign	Share
Custom Tables (6)											
Desktop Flow Binary	desktopflowbinary	User or Team	Private	User	User	User	User	User	User	User	User
Flow Machine	flowmachine	User or Team	Custom	None	User	None	None	None	User	None	None
Flow Machine Group	flowmachinegroup	User or Team	Custom	None	User	None	None	None	User	None	None
Flow Session	flowsession	User or Team	Private	User	User	User	User	User	User	User	User
ProcessStageParameter	processstageparameter	User or Team	Custom	User	User	User	User	None	None	None	None
Workflow Binary	workflowbinary	User or Team	Private	User	User	User	User	User	User	User	User

## Desktop flows machine user can share

This role extends the **desktop flows machine user** role and allows users to share machines that have been shared with them.

Table 1	Name	Record ownership	Permission Settings	Create	Read	Write	Delete	Append	Append to	Assign	Share
Custom Tables (6)											
Desktop Flow Binary	desktopflowbinary	User or Team	Private	User	User	User	User	User	User	User	User
Flow Machine	flowmachine	User or Team	Custom	None	User	None	None	None	User	None	User
Flow Machine Group	flowmachinegroup	User or Team	Custom	None	User	None	None	None	User	None	User
Flow Session	flowsession	User or Team	Private	User	User	User	User	User	User	User	User
ProcessStageParameter	processstageparameter	User or Team	Custom	User	User	User	User	None	None	None	None
Workflow Binary	workflowbinary	User or Team	Private	User	User	User	User	User	User	User	User

## Desktop flows runtime application user



This role is used by Power Automate cloud services when interacting with the Dataverse environment.

Table	Name	Record ownership	Permission Settings	Create	Read	Write	Delete	Append	Append to	Assign	Share
Business Management (2)											
Organization	organization	Organization	Reference		Organization	None			None		
User	systemuser	Business Unit	Reference	None	Organization	None	None	None	None	None	
Custom Tables (9)											
Connection Reference	connectionreference	User or Team	Reference	None	Organization	None	None	None	None	None	None
Desktop Flow Binary	desktopflowbinary	User or Team	Custom	Organization	Organization	Organization	None	None	None	None	None
Desktop Flow Module	desktopflowmodule	User or Team	Reference	None	Organization	None	None	None	None	None	None
Flow Machine	flowmachine	User or Team	Custom	None	Organization	Organization	None	None	Organization	None	None
Flow Machine Group	flowmachinegroup	User or Team	Reference	None	Organization	None	None	None	None	None	None
Flow Session	flowsession	User or Team	Custom	Organization	Organization	Organization	None	Organization	None	None	None
Work Queue	workqueue	User or Team	Custom	None	Organization	Organization	None	None	Organization	None	None
Work Queue Item	workqueueitem	User or Team	Custom	None	Organization	Organization	None	Organization	None	None	None
Workflow Binary	workflowbinary	User or Team	Custom	Organization	Organization	Organization	None	None	None	None	None

## Desktop flows machine application user

This role is used by Power Automate cloud services when interacting with the Dataverse environment.

Table	Name	Record ownership	Permission Settings	Create	Read	Write	Delete	Append	Append to	Assign	Share
Custom Tables (5)											
Flow Machine	flowmachine	User or Team	Full Access	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
Flow Machine Group	flowmachinegroup	User or Team	Full Access	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
Flow Machine Image	flowmachineimage	User or Team	Reference	None	Organization	None	None	None	None	None	None
Flow Machine Image Version	flowmachineimageversion	User or Team	Reference	None	Organization	None	None	None	None	None	None
Flow Session	flowsession	User or Team	Custom	None	None	Organization	None	None	None	None	None

### ! Note

The desktop flows runtime application user and desktop flows machine application user Group roles are used by the Power Automate cloud services when interacting with the Dataverse environment. Modifying privileges and configuration for these roles may break desktop flow features.

## More resources

- [Security in Microsoft Dataverse](#)
- [Security concepts in Microsoft Dataverse](#)
- [Security roles in Microsoft Dataverse](#)

# Diagnostic data collection in Power Automate

Article • 02/24/2023

We use diagnostic data to keep Power Automate client software secure and up-to-date; to detect, diagnose, and fix problems; and to make product improvements. This data doesn't include a user's name or email address, the content of the user's files, or information about apps unrelated to the product.

Microsoft is dedicated to being transparent with our customers about the data we collect from our client software and giving them more control over their data. As part of this work, diagnostic data we collect from our client software as customers use their devices is classified as either *Required* or *Optional*. This classification will make it easier for our customers to make informed choices about their privacy.

Power Automate client software doesn't collect optional diagnostic data by default unless the user specified otherwise during the initial installation process or later in the product's settings.

This article provides an overview of the types of diagnostic data that are required and optional, and the specific categories of diagnostic data that are collected by Power Automate client products.

## Required data

Data classified as *Required* is necessary to keep our products up-to-date, secure, and working as expected. Required diagnostic data includes the type and version of a customer's device or software configuration so we can provide connectivity to our cloud services and security patches to help keep our customers' experiences safe, secure, and functioning with a high degree of performance; detect significant feature failures; and then diagnose and fix those failures more quickly to reduce their impact on customers.

Required diagnostic data is the minimum data necessary to help keep Power Automate client software performing as expected on the device it's installed on. Examples include summary details about the health and security of the running service, version information about infrastructure, configuration details, success or errors received, and aggregated information about failures and security concerns, flow runs, service interactions, and more.

Required diagnostic data is managed with your organization's and your employees' security and privacy in mind. You can learn more about our commitments to protect data in the [Microsoft Trust Center](#).

## Required diagnostic data summary

Required diagnostic data in Power Automate client software is organized into various data categories.

Data category	Description	Examples
Device connectivity and configuration	This type of <b>Required diagnostic data</b> includes details about the device, its configuration, and connectivity capabilities	<ul style="list-style-type: none"><li>• Data about the user's device, screen resolution, screen orientation, and other configuration details</li></ul>
Product and service performance	This type of <b>Required diagnostic data</b> includes details about device or service health and performance	<ul style="list-style-type: none"><li>• Information about memory, processor, and disk usage</li><li>• Information about form load times</li><li>• Information about process completion times</li></ul>
Product and service usage	This type of <b>Required diagnostic data</b> includes details about the usage of the device, operating system, applications, and services	<ul style="list-style-type: none"><li>• Details about navigation patterns</li><li>• Details about form usage</li><li>• Details about frequency of use of activities and actions</li></ul>
Software setup and inventory	This type of <b>Required diagnostic data</b> includes software installation and update information on the device	<ul style="list-style-type: none"><li>• An event used to ensure new users can successfully launch and run Power Automate client applications for the first time</li><li>• An event that ensures critical regression detection for installed client applications</li></ul>

## Optional data

Data in the *Optional* category isn't essential to the product or service experience. Opting in to this feature allows us to identify usage trends, which enhances our ability to make product improvements.

Power Automate client products don't collect optional data unless the user consents during the product installation process or has enabled the feature through the application settings later. If users choose to send optional diagnostic data, it's collected in addition to required diagnostic data.

<b>Data category</b>	<b>Description</b>	<b>Examples</b>
Enhanced anonymized product usage	This type of <b>Optional diagnostic data</b> includes details about the usage of advanced flow objects, such as selectors	<ul style="list-style-type: none"><li>• Process names that the user is trying to automate such as EXCEL.exe</li></ul>

# Get started with a Microsoft account

Article • 02/24/2023

Power Automate enables regular and power users to automate processes on their desktops, saving time and eliminating human error.

Focus on other activities by automating routine and repetitive tasks like organizing or backing up your files and folders. Create flows to extract product prices from websites, save them in Excel spreadsheets, and then [email them](#) as attachments. [Fill in web forms](#) by supplying information dynamically from your files.

Create automated workflows with step-by-step guidance and an intuitive, no-code interface anyone can use, regardless of their technical expertise. Build flows from a wide variety of premade actions, or [record your interactions as steps](#) to be played back anytime.

Using Power Automate with a Microsoft account is available at no extra cost.

## ⓘ Note

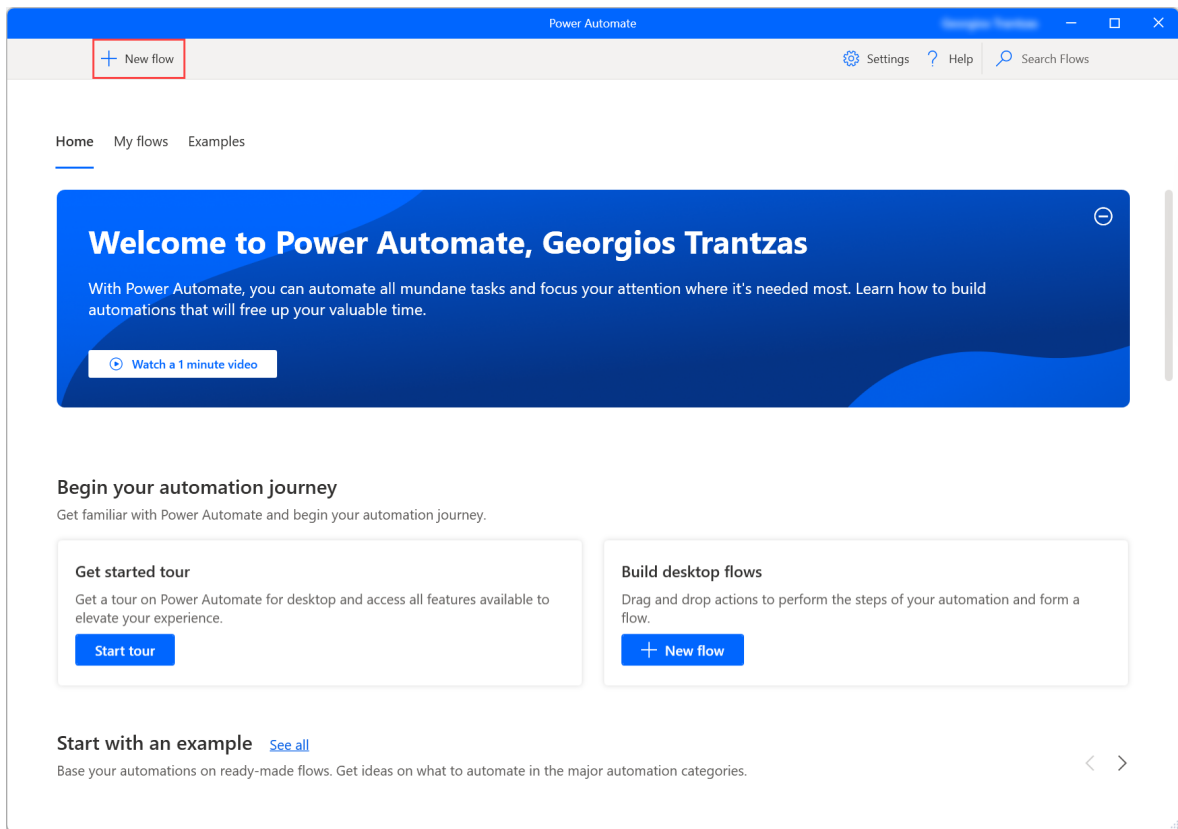
Desktop flows built with Power Automate using a Microsoft account are stored automatically on your OneDrive.

## Build your first flow

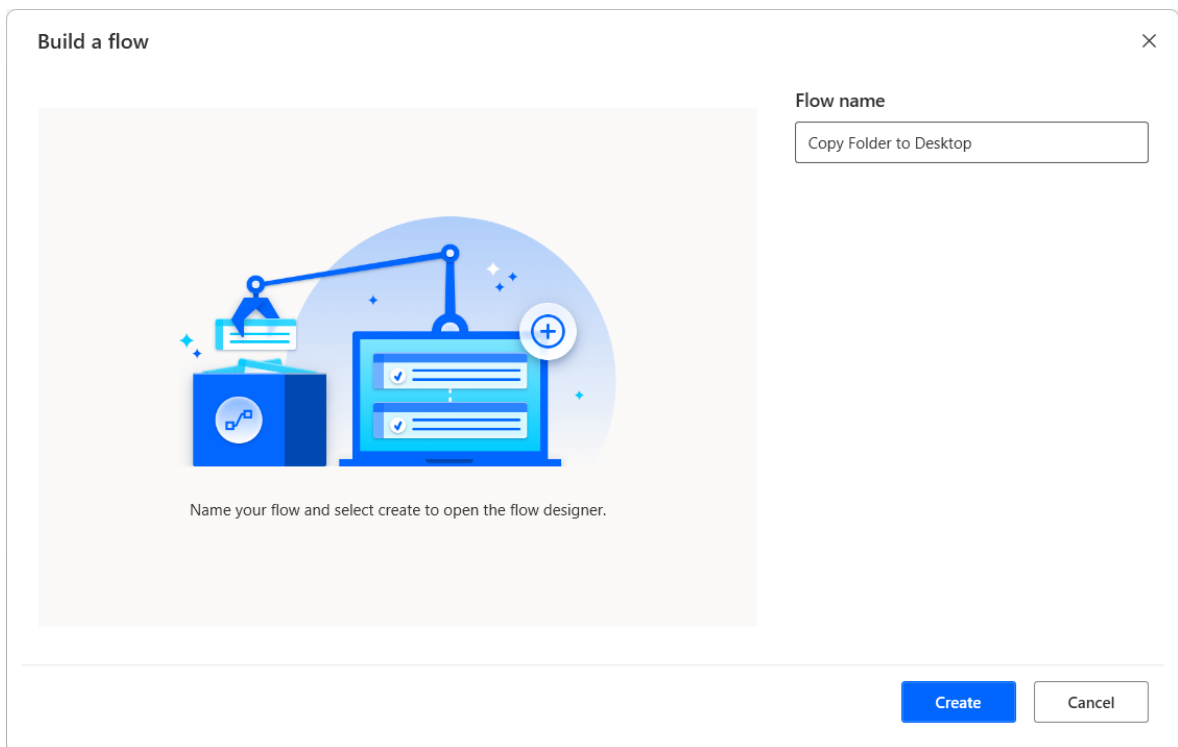
The following example demonstrates the creation of a short flow. The completed flow will prompt you to select a folder. Then, it will copy the folder to another folder named **backup** on your desktop.

To create the desktop flow:

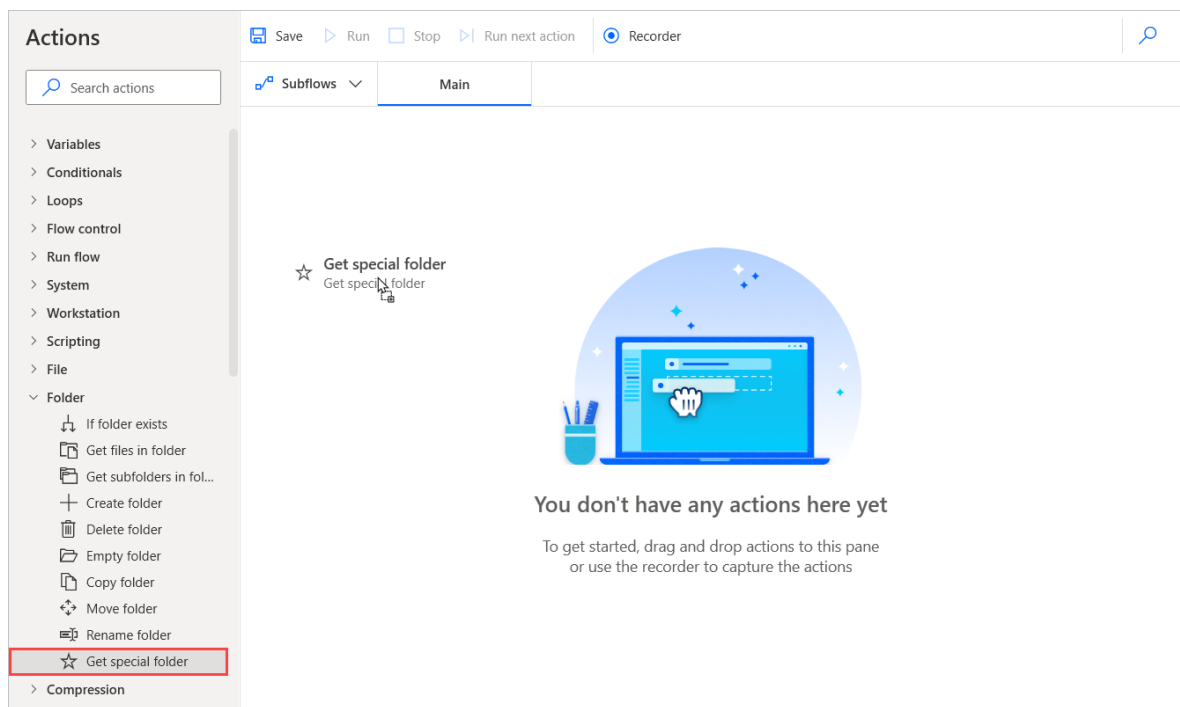
1. Launch Power Automate and select the **New flow** button in the console.



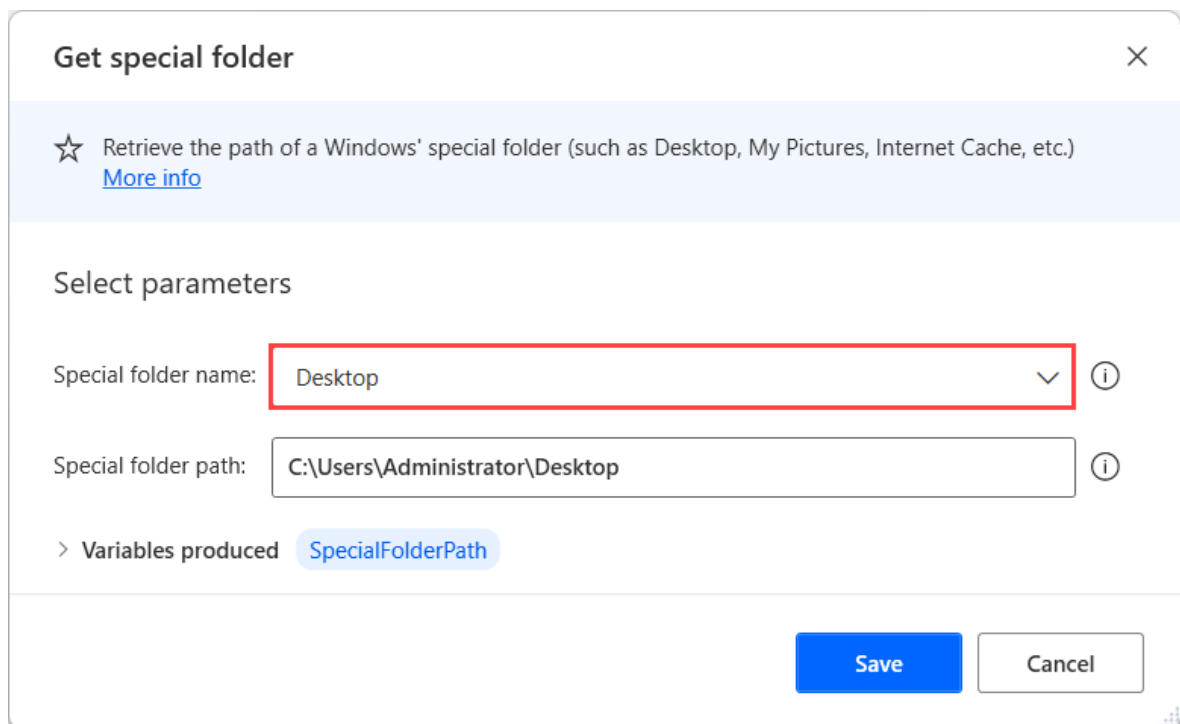
2. Enter a name for the flow and then select **Create**. In this example, the name of the flow is **Copy Folder to Desktop**.



3. When the flow designer opens, go to the actions pane, open the **Folders** group of actions, and drag the **Get special folder** action into the workspace.



4. In the modal of action, the desktop folder is selected by default as a parameter. Select **Save** to add the action to the flow.



5. Similarly to step 3, go to the **Message boxes** group of actions, and add the **Display select folder dialog** action to the flow. Set **Dialog description** to **Select a folder to back up:**.

**Display select folder dialog** ✕

🗨 Displays the select folder dialog and prompts the user to select a folder [More info](#)

Select parameters

Dialog description:  ⓘ

Initial folder:  📁 {x} ⓘ

Keep folder selection dialog always on top:  ⓘ

> Variables produced SelectedFolder ButtonPressed

🛡 On error Save Cancel

6. Next, add the **Create folder** action to the flow. Set the **Create new folder into** field to **%SpecialFolderPath%** and **New folder name** to **backup**.

**Create folder** ✕

+ Create a new folder [More info](#)

Select parameters

Create new folder into:  📁 {x} ⓘ

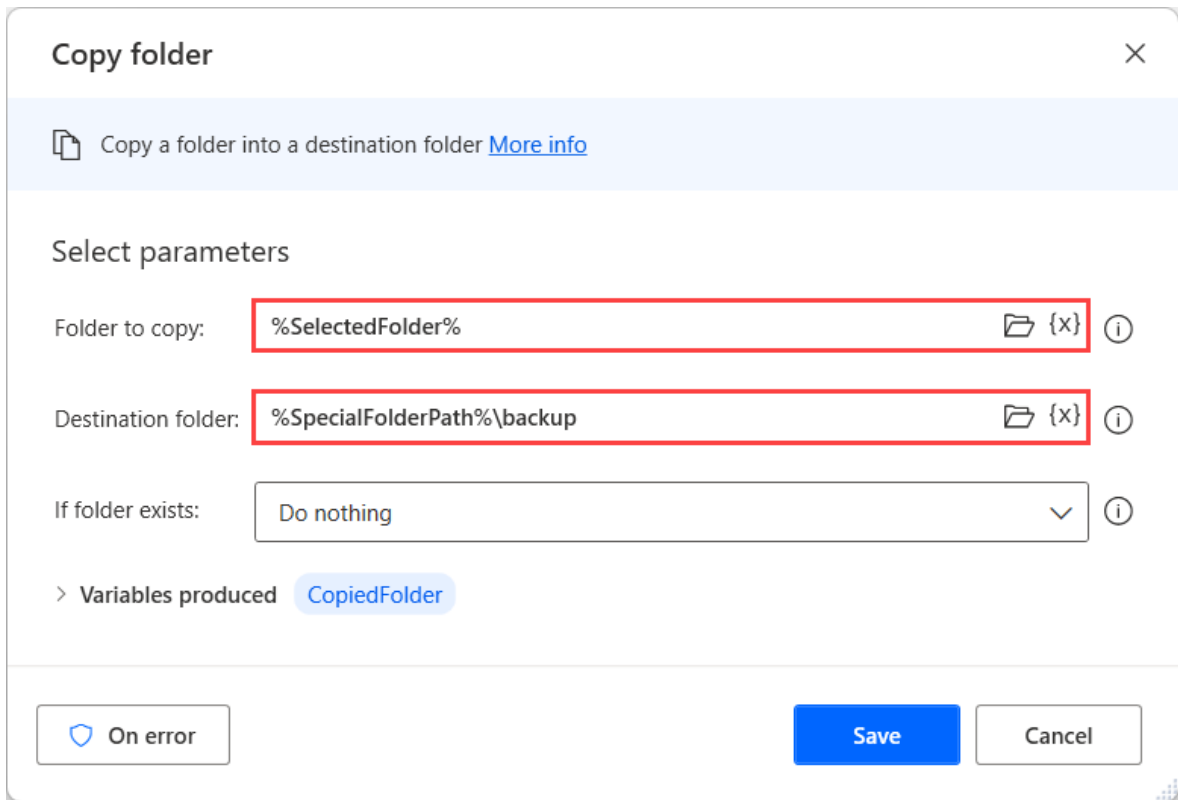
New folder name:  {x} ⓘ

> Variables produced NewFolder

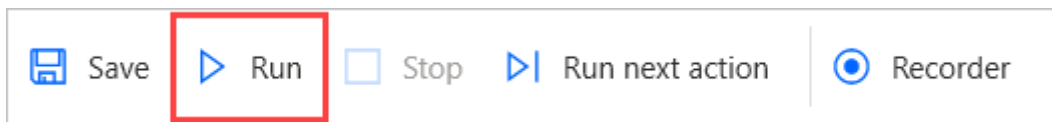
🛡 On error Save Cancel

7. Using the same group of actions, select the **Copy folder** action. Set **Folder to copy** to **%SelectedFolder%**, **Destination folder** to **%SpecialFolderPath%\backup**, and add the action to the flow.

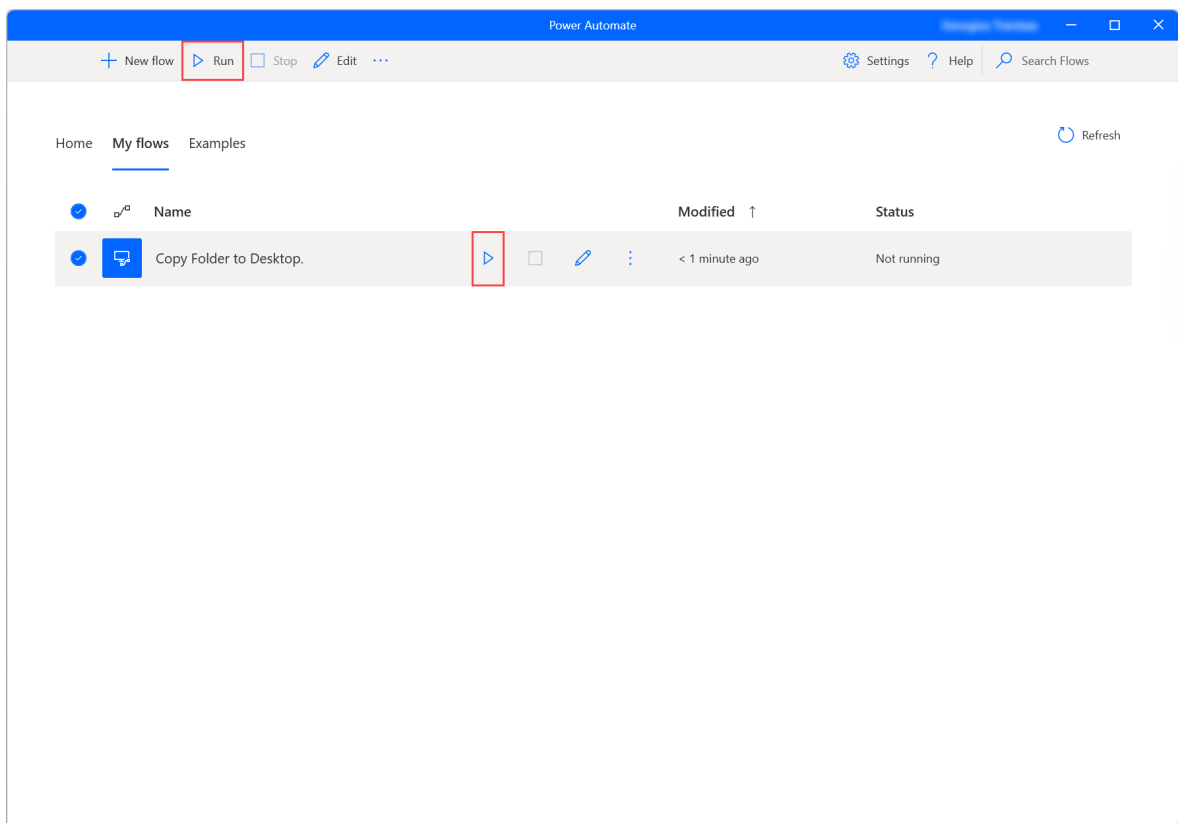




8. Select **Run** to run the flow and test that it works as expected.



9. Close the flow designer and save the flow. Now, you can run the flow from the console.



When prompted for a folder, select any folder you want to copy. The flow will create a new folder on your desktop called **backup** with the selected folder inside.

Following this example, it's possible to imagine a wide range of scenarios where these actions could be combined with other actions. Among the many possibilities, you could:

- Select a folder on a flash drive to back up to.
- Back up files based on specific criteria.
- Create a file structure for the backup.
- Iterate through a list of folders and only back up selected folders.

## Next steps

- Learn how to [set up Power Automate](#).
- Begin your journey in Power Automate by [creating a Power Automate desktop flow](#).
- Get familiar with the [console](#) and the [flow designer](#).
- Find the list of actions available in the [Actions reference](#).

# Get started with a work or school account

Article • 02/24/2023

Power Automate enables users to automate repetitive desktop tasks through a collection of premade actions.

Using the available actions and [built-in recorder](#), you can automate any business procedure, such as [filling forms](#), [retrieving data from the web](#) or [desktop applications](#), and [sending standardized emails](#).

Combining these features allows you to create robust flows that disengage humans from repetitive, unproductive procedures. Tasks like copying data across different systems are common in business environments, and Power Automate can entirely handle them.

Apart from third-party applications, Power Automate automates integrated Windows applications and features. Creating backups of critical files and running diagnostics or custom scripts can be performed effectively through desktop flows.

Using Power Automate with a work or school account is available at no extra cost. To use Power Automate for desktop, your default environment must contain a [Dataverse database](#). To unlock more RPA features, such as running flows automatically, premium cloud connectors, and flow sharing and monitoring, start a trial or upgrade to an [Organization premium account](#).

To start a trial, select **Go premium** on the Power Automate console.

## Flow example

To become familiar with the available features of Power Automate, follow the steps below to create a desktop flow.

The presented flow copies all the files located in the documents folder and creates a backup to a secondary drive. The original location of each file is appended to an existing log file.

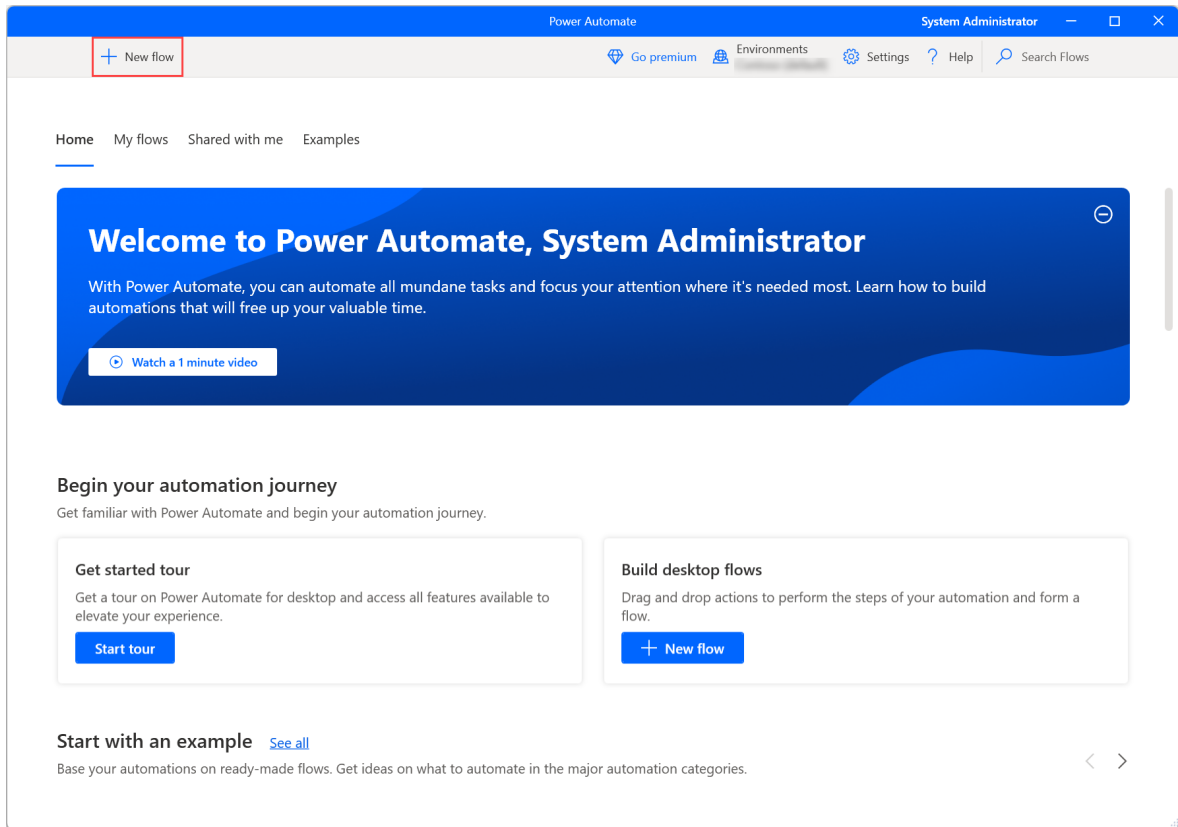
### ⓘ Note

To implement this example, a secondary drive has to be connected to your machine. If a secondary drive isn't available, select a different destination folder for

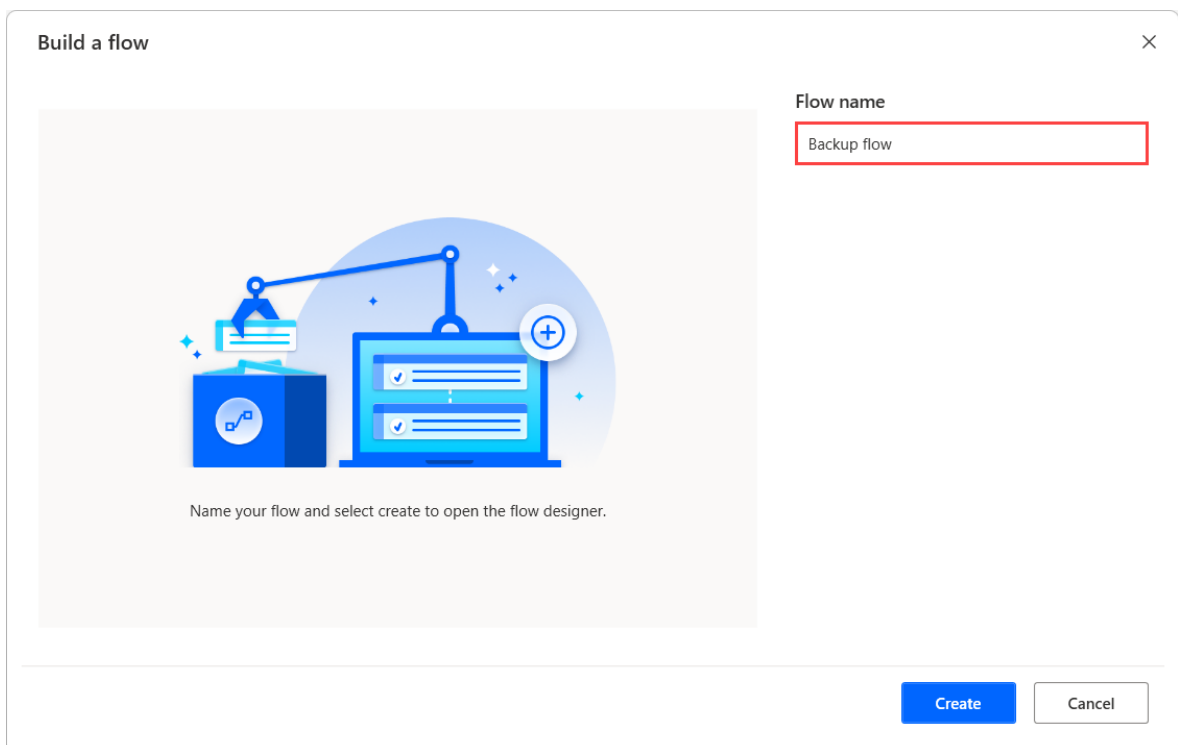
the files.

To create the desktop flow:

1. Launch Power Automate and select the **New flow** button in the **Console**.



2. Enter a name for the flow and then select **Create**. In this example, the name of the flow is **Backup flow**.



- When the flow designer is open, add the **Get special folder** action in the workspace and retrieve the path of the documents folder.

**Get special folder** [X]

☆ Retrieve the path of a Windows' special folder (such as Desktop, My Pictures, Internet Cache, etc.) [More info](#)

Select parameters

Special folder name: **Documents** [i]

Special folder path: C:\Users\Administrator\Documents [i]

> Variables produced **SpecialFolderPath**

**Save** **Cancel**

- Add the **Get files in folder** action to retrieve all the files located in the previously retrieved folder. Optionally, set the action to retrieve the files located in subfolders of the selected folder.

**Get files in folder** [X]

📁 Retrieve the list of files in a folder [More info](#)

Select parameters

Folder: **%SpecialFolderPath%** [i]

File filter: \* [i]

**Include subfolders:**  [i]

> **Advanced**

> Variables produced **Files**

**On error** **Save** **Cancel**

- Deploy a **For each** loop to access and handle each file of the retrieved list independently.

**For each** ✕

Iterates over items in a list, data table or data row, allowing a block of actions to be executed repeatedly [More info](#)

Select parameters

Value to iterate:  {x} ⓘ

Store into:  {x}

6. Inside the **For each** loop, add the **Get file path part** action to retrieve the path of the currently selected file.

**Get file path part** ✕

Retrieve one or more parts (directory, filename, extension, etc.) from a text that represents a file path [More info](#)

Select parameters

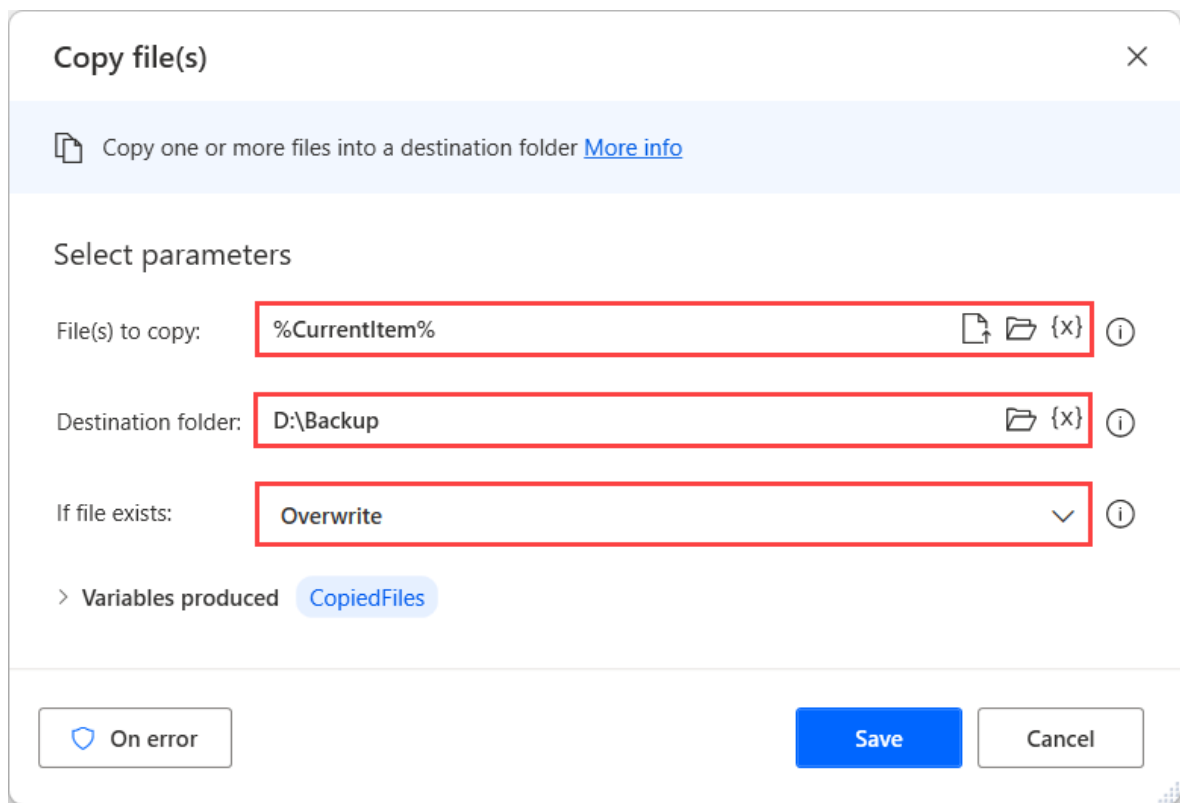
File path:  ⓘ

> Variables produced

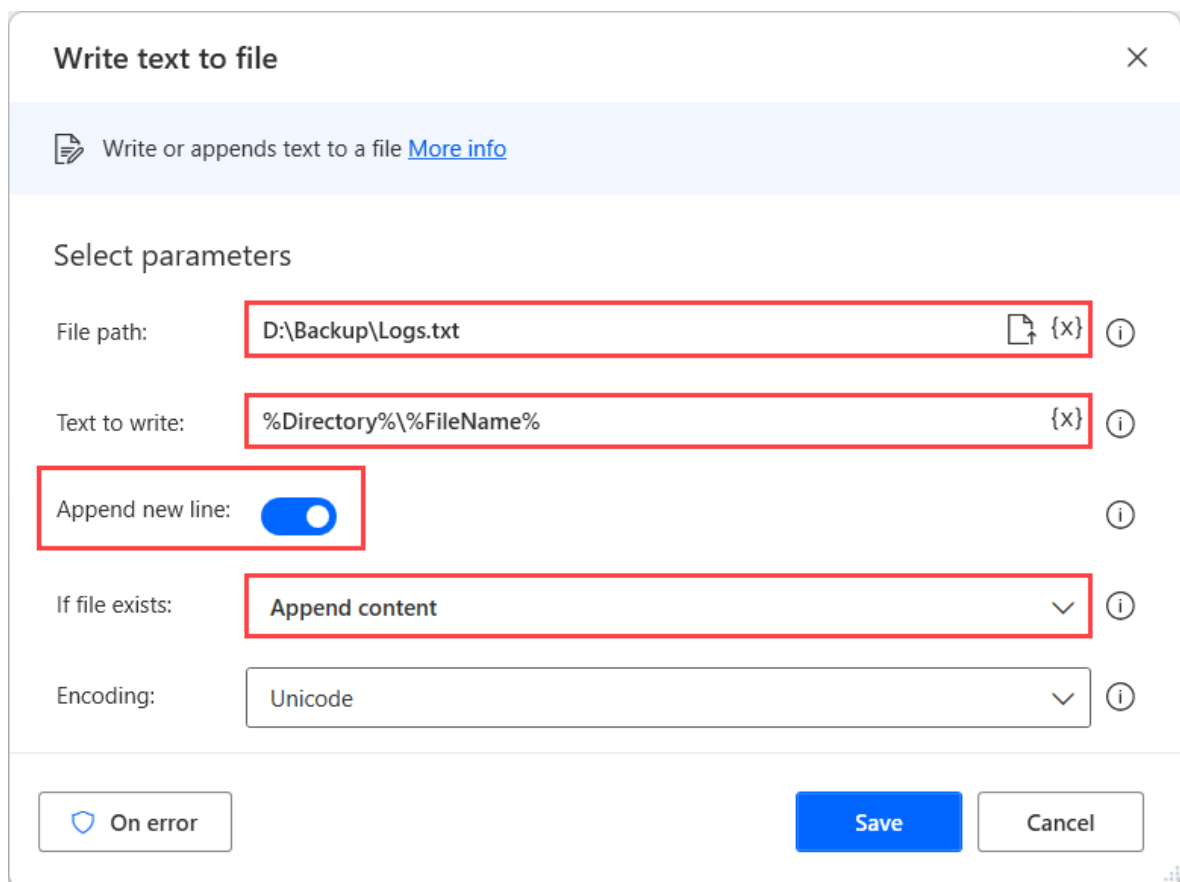
7. Add the **Copy file** action to copy the currently selected file to the desired location. In this example, the destination folder is called **Backup** and it's located in the D drive.

ⓘ **Note**

If a secondary drive isn't available, select a different destination folder for the copied file.



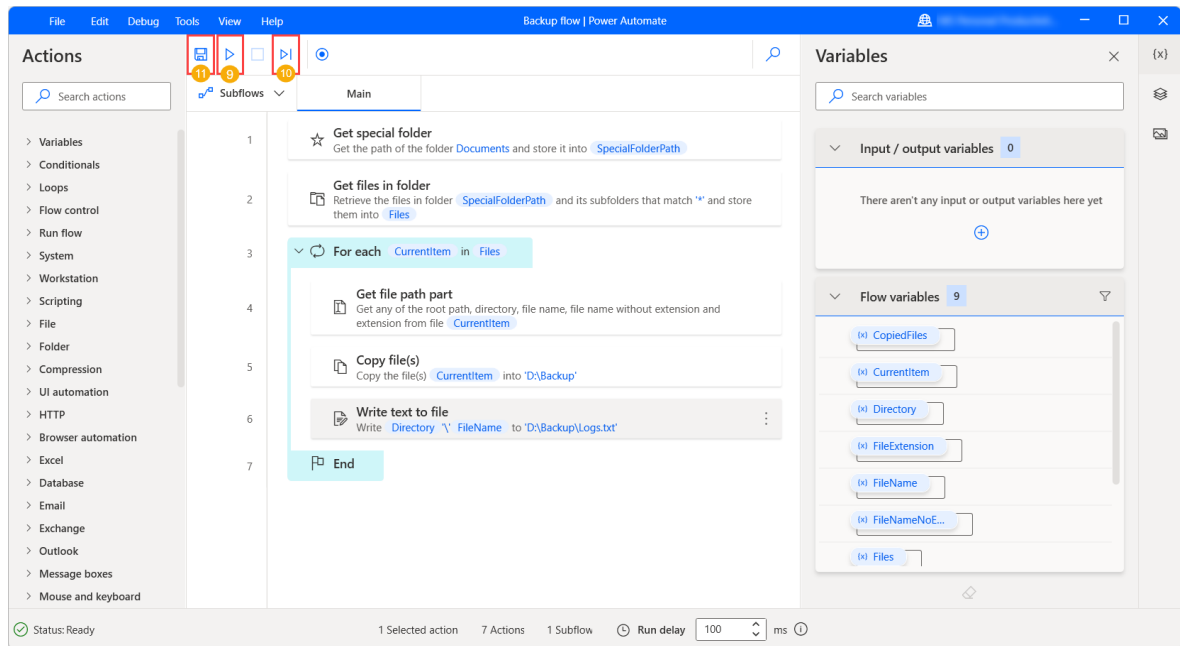
8. Use the **Write text to file** action to append a new registry in the log file. In this example, the file is called **Logs.txt**, and each registry contains the original path of the copied file.



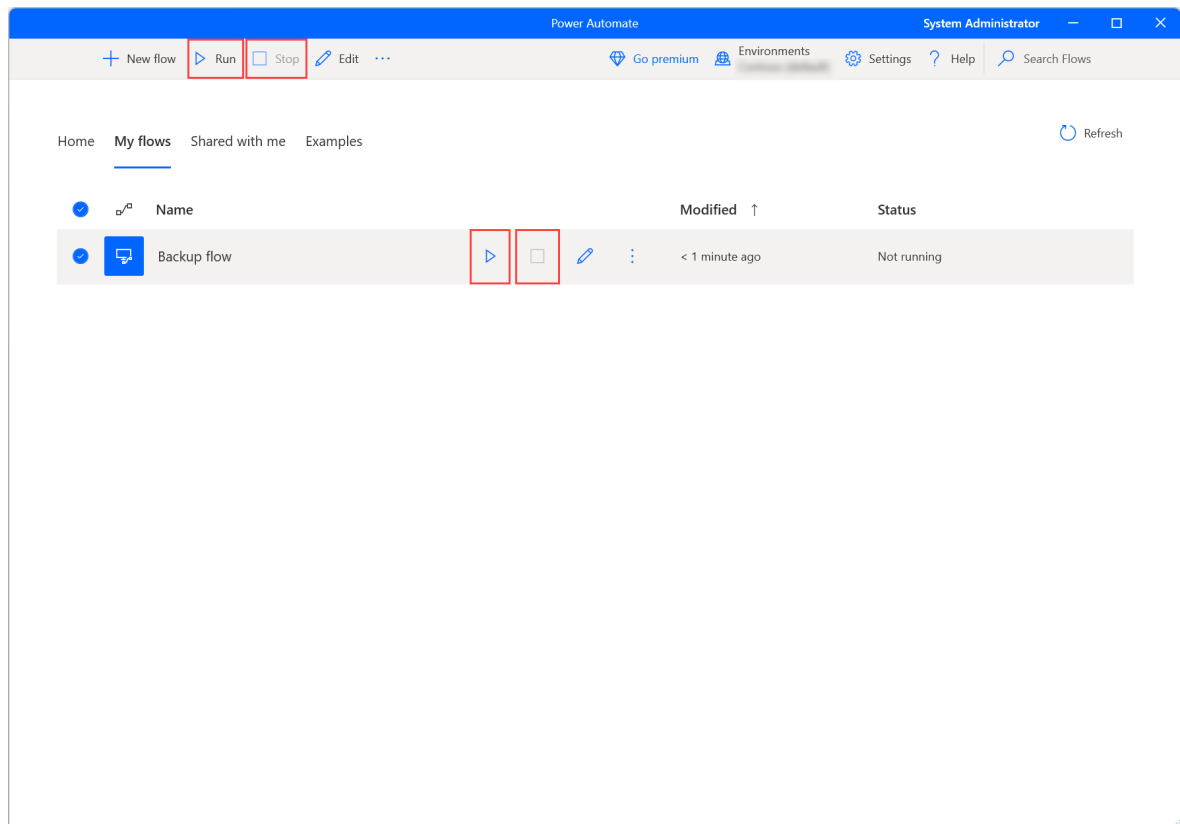
9. To test if the flow runs as expected, select the **Run** button on the upper part of the flow designer.

10. To check how every single action is implemented, run the flow step by step using the **Run next action** button.

11. If the flow runs as expected, select **Save** and close the flow designer window.



12. Now, you can run your flow directly using the **Run** button in the console. To stop the flow before its completion, select **Stop**.



## Next Steps



- Learn how to [set up Power Automate for desktop](#).
- Begin your journey in Power Automate by [creating a Power Automate desktop flow](#).
- Get familiar with the [console](#) and the [flow designer](#).
- Find the list of actions available in the [Actions reference](#).

# Get started with an organization premium account

Article • 03/10/2023

Power Automate enables regular and power users to create flows that automate routine repetitive tasks. For example, build flows from premade actions, or [record windows and web browser activity in real time](#).

Unlock the full spectrum of RPA features such as premium cloud connectors, the ability to [run your flows automatically, detailed monitoring](#), and many more.

Power Automate gives you the option to [share your flows](#) among your colleagues so that you can improve automations and build on top of them.

Access your flows from anywhere, harnessing the power of the cloud to establish a robust and flexible RPA system. Take full advantage of multiple environments to organize and manage users' flows.

If you currently use Power Automate with a work or school account or your license doesn't include attended RPA, you can still use Power Automate for your desktop automation needs. Start a trial to preview all the features by selecting **Go premium** on the Power Automate console.

## Creating a flow

1. Begin by signing in to the [Power Automate portal](#) <sup>↗</sup>. Then, navigate to **Create > Power Automate for desktop**.
2. After you assign a name to the flow, you'll be prompted to launch Power Automate for desktop. Select **Open** to do so.
3. In the flow designer, start building the flow by double-clicking on actions, or dragging them from the actions pane on the left into the central workspace pane.
4. Expand the **Datetime** category, and select the **Get current date and time** action. Configure it to only retrieve the date.

### Get current date and time ✕

Retrieves the current date or the current date and time [More info](#)

**Select parameters**

Retrieve: Current date only ▼ ⓘ

Time zone: System time zone ▼ ⓘ

> Variables produced CurrentDateTime

On error
Save
Cancel

5. Next, expand the **Text** category, and configure the **Convert datetime to text** actions as follows. This step will ensure that the current date is displayed in a filename-friendly format.

### Convert datetime to text ✕

Converts a datetime value to text using a specified custom format [More info](#)

**Select parameters**

Datetime to convert: %CurrentDateTime% {x} ⓘ

Format to use: Custom ▼ ⓘ

Custom Format: yyyy-MM-dd {x} ⓘ

Sample 2020-05-19

> Variables produced FormattedDateTime

Save
Cancel

6. Use the **Get special folder** action to retrieve the path of the documents folder.

**Get special folder** ✕

☆ Retrieve the path of a Windows' special folder (such as Desktop, My Pictures, Internet Cache, etc.)  
[More info](#)

Select parameters

Special folder name:  ⓘ

Special folder path:  ⓘ

> Variables produced SpecialFolderPath

**Save**

7. Add the **If file exists** action from the **Conditionals** category, and configure it to check whether the file **report.xlsx** is present in the documents folder.

**If file exists** ✕

↓ Marks the beginning of a conditional block of actions depending on whether a file exists or not  
[More info](#)

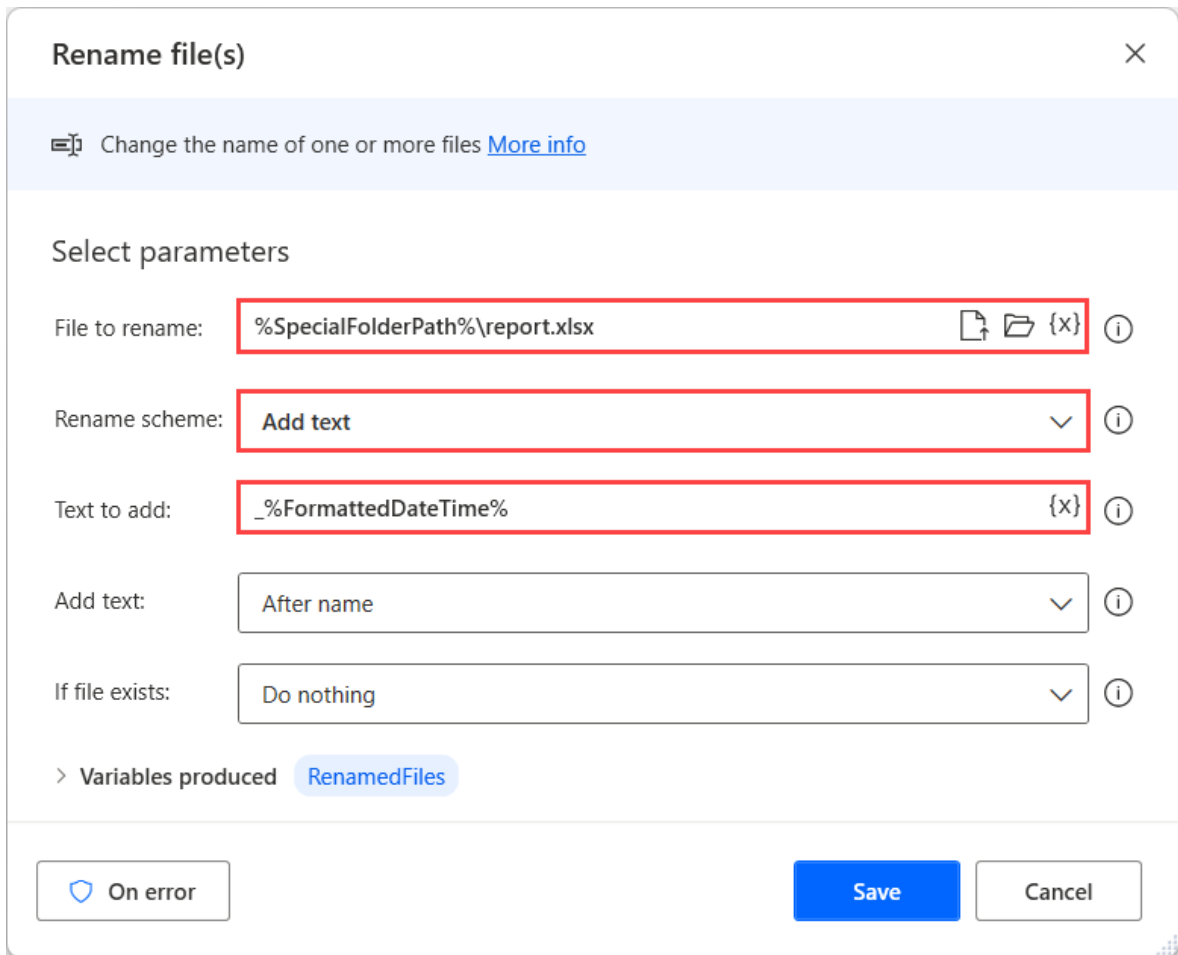
Select parameters

If file:  ⓘ

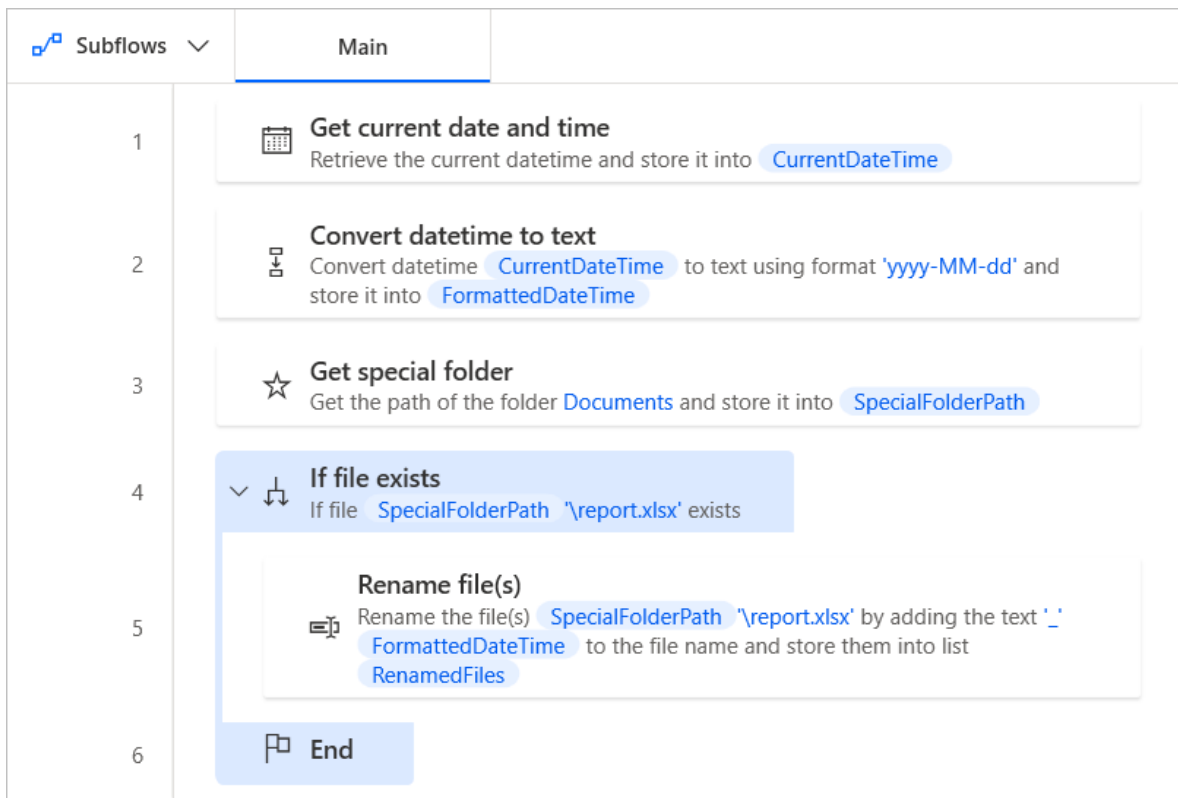
File path:  ⓘ

**Save**

8. Finally, add the current date to the file's name by using the **Rename file(s)** action from the **File** category.



9. The resulting flow should look like the following figure:



Following this example, it's possible to imagine a wide range of scenarios where Power Automate can be used to automate tasks. The abundance of actions, combined with

cloud management capabilities, affords endless possibilities to individual users and organizations.

## Next Steps

- Learn how to [set up Power Automate](#).
- Begin your journey in Power Automate by [creating a Power Automate desktop flow](#).
- Get familiar with the [console](#) and the [flow designer](#).
- Find the list of actions in the [Actions reference](#).
- Learn how to [apply unattended RPA licenses to your flows](#).

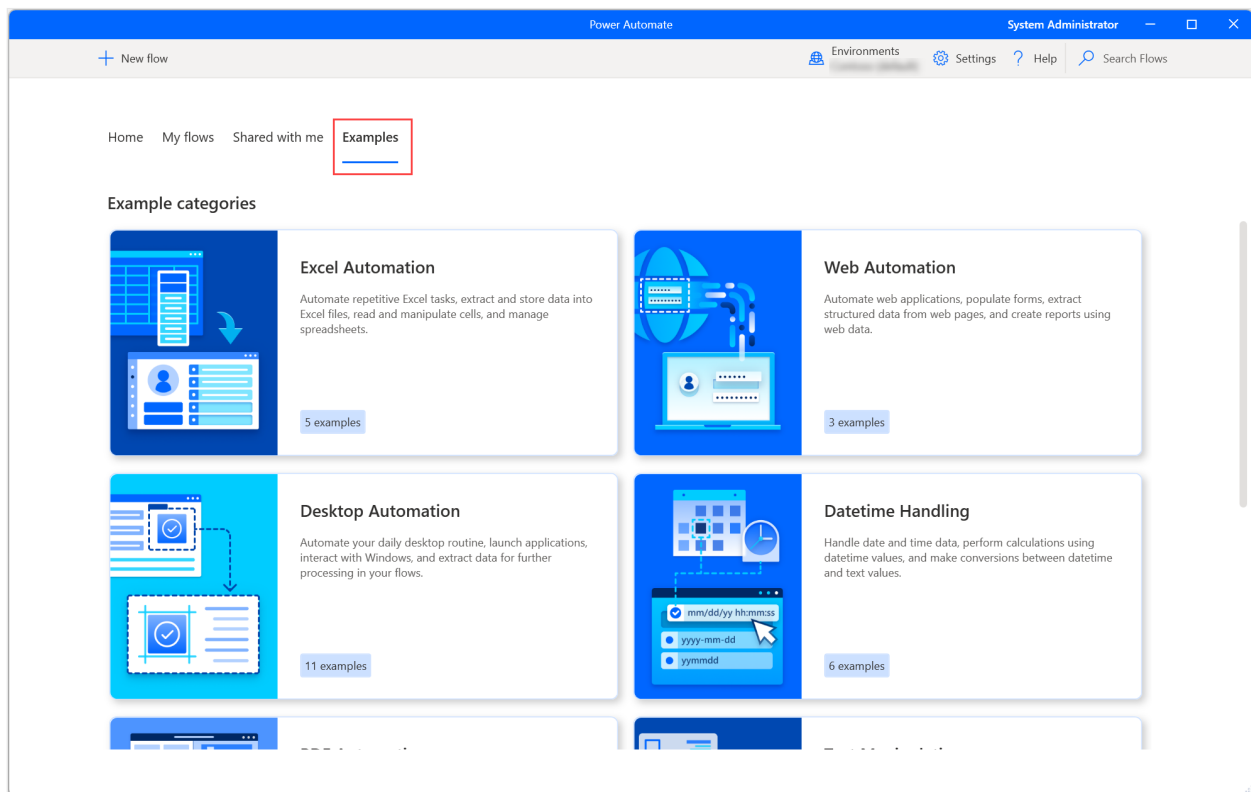
# Create desktop flows

Article • 02/24/2023

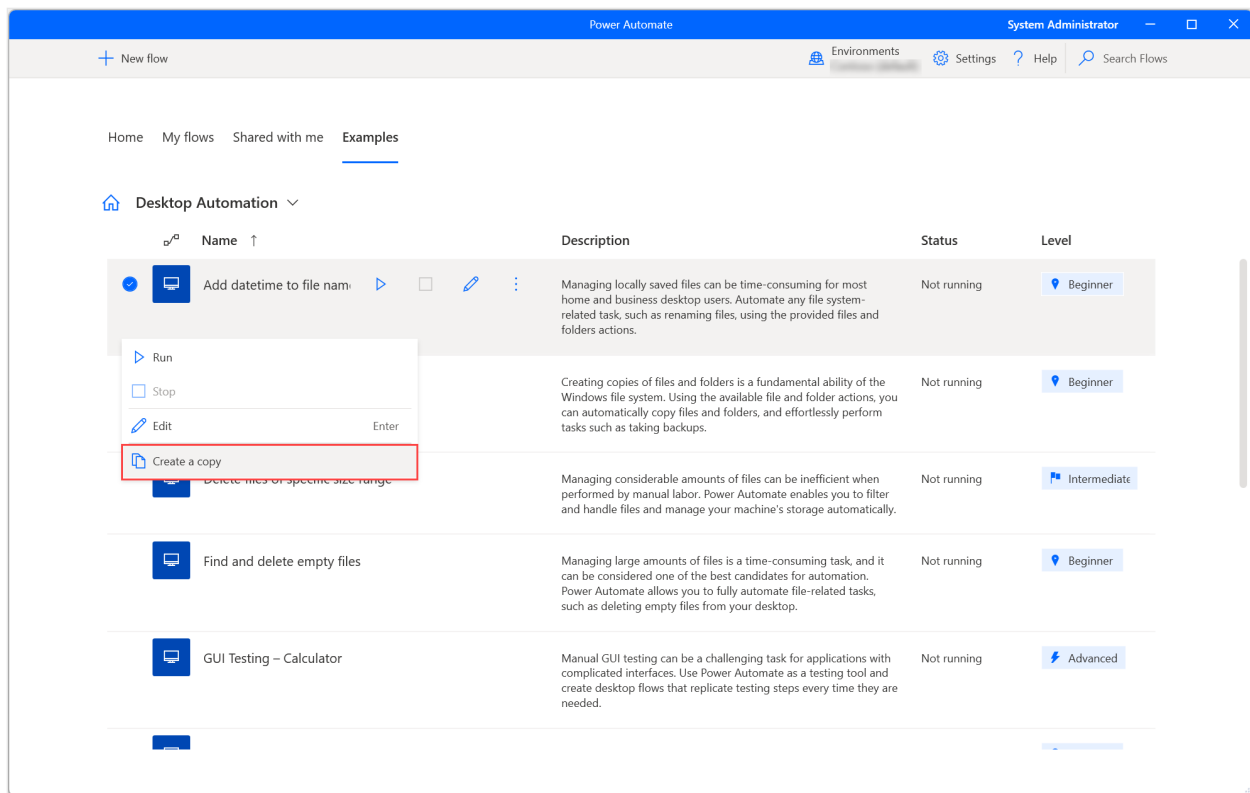
Using Power Automate, you can develop desktop flows that automate tasks on your desktop and the Web. This section presents all the available ways to create desktop flows and start designing your automations.

## Start creating desktop flows using examples

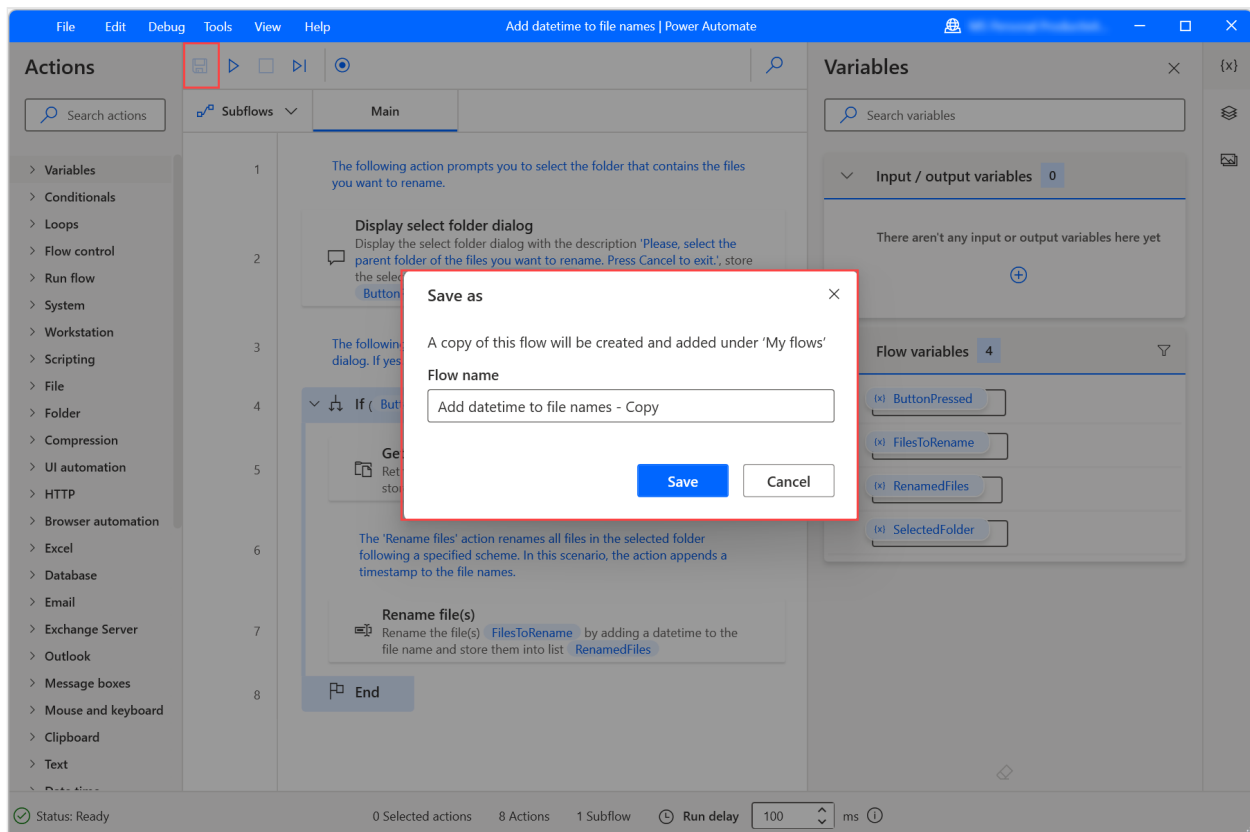
Power Automate provides an extensive collection of examples to introduce users to RPA. You can find all the available examples under the **Examples** tab in the console.



To copy an example to your flows, right-click the example and select **Create a copy**. The copied flow will be stored under the **My flows** tab.



If you've opened and edited an example in the flow designer, select **Save as** to copy the edited example to your flows. The changes can't be saved to the original example flow.

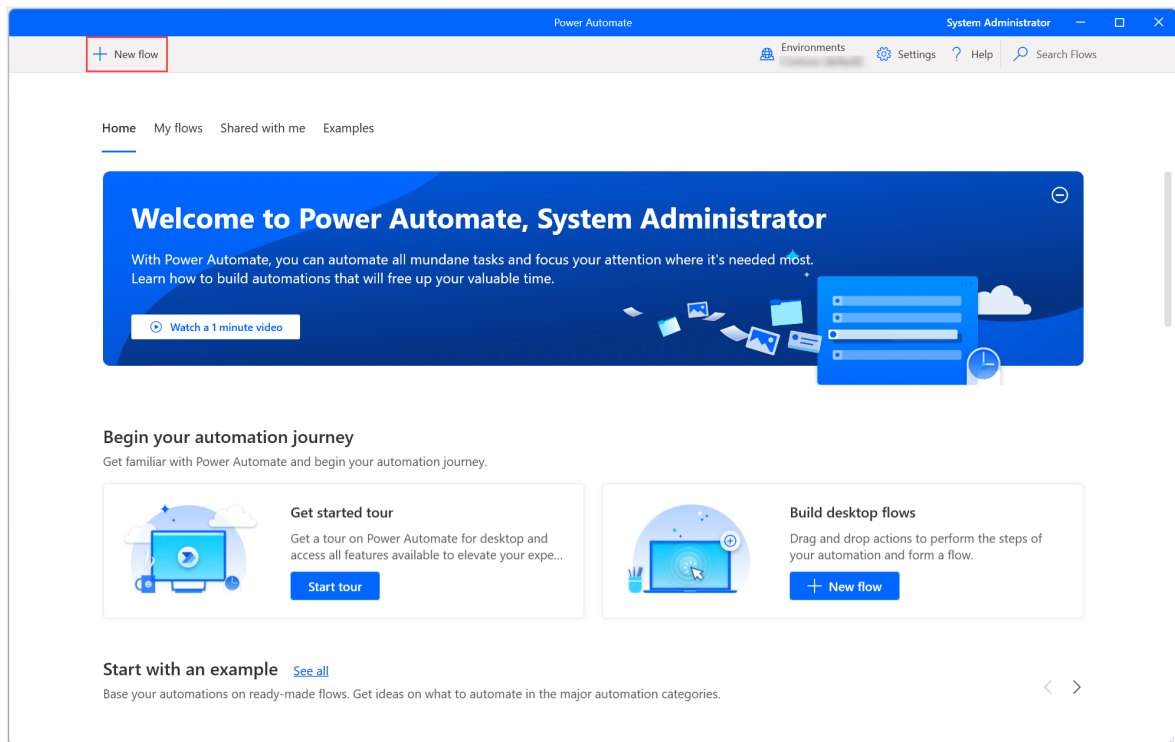


## Create desktop flows through the console

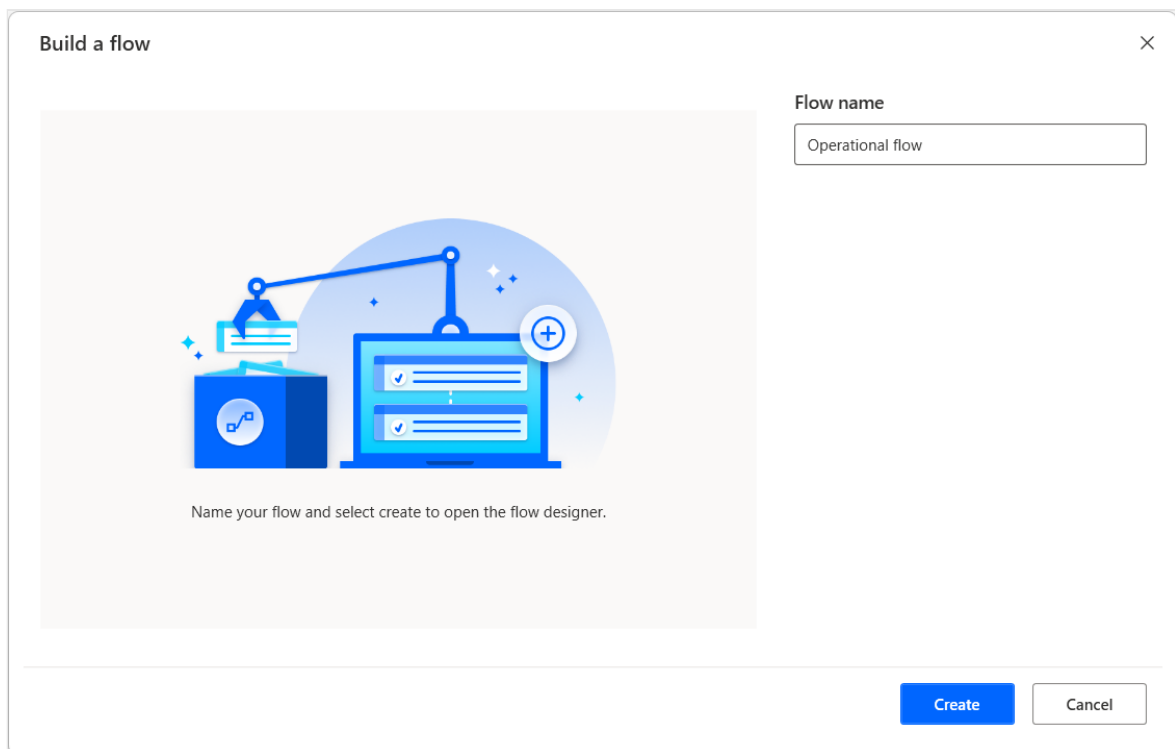
To create a desktop flow using Power Automate for desktop:



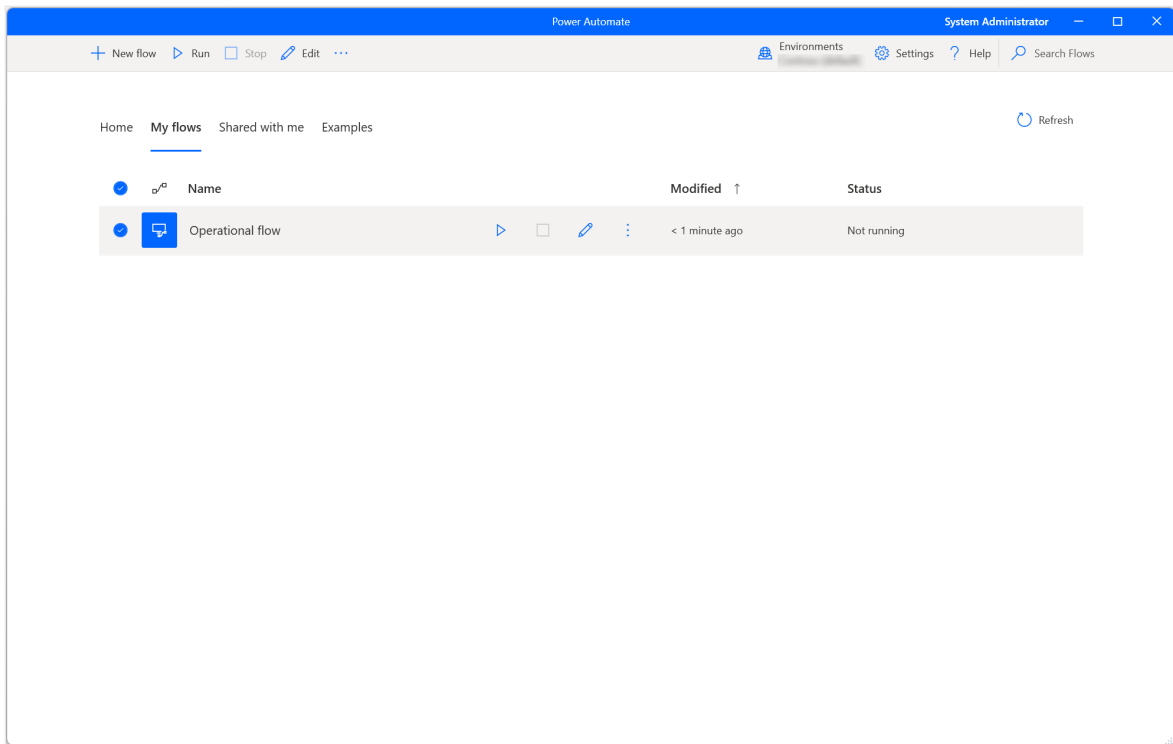
1. Launch the application and select **New flow** in the console.



2. Enter a name for the desktop flow, and select **Create**.



3. Design your flow in the flow designer and select **Save**. Close the flow designer and the flow will appear in the **My flows** tab of the console.



## Create desktop flows through cloud flows

Power Automate enables you to create desktop flows through cloud flows and trigger them remotely. To find more information about this functionality, go to [Trigger desktop flows from cloud flows](#).

# Copilot in Power Automate for desktop (preview)

Article • 11/14/2023

[This topic is prerelease documentation and is subject to change.]

The copilot generative answers capability in Power Automate for desktop provides answers to product-related questions. Type your question or select one from the predefined prompts, and the copilot finds the answer for you. You can access this feature from both the console and the designer.

## Important

- This feature is in preview.
- Copilot is a new technology that is still in development. It's optimized for use with the English language and has limited support with other languages.
- Copilot's generative answers capability is powered by the Azure OpenAI Service and Bing Search.
- To understand the capabilities and limitations of this feature, go to [FAQ for copilot generative answers in Power Automate for desktop](#)

## Prerequisites

### Availability by region

Currently, copilot in Power Automate for desktop is only available in environments located in the United States.

### Availability by account type

Currently, copilot in Power Automate for desktop is only available for users with a work or school account.

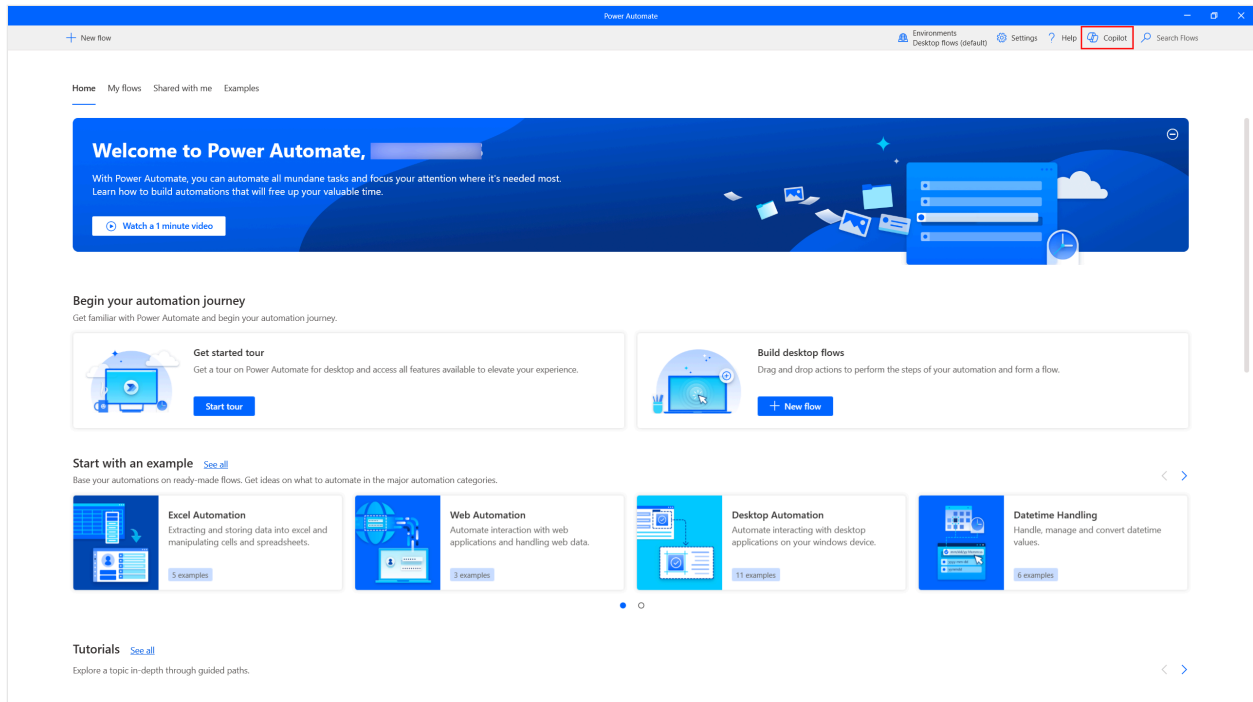
## Note

If your environment is in a supported region, you are signed in with a work or school account, and you still can't see the copilot in Power Automate for desktop

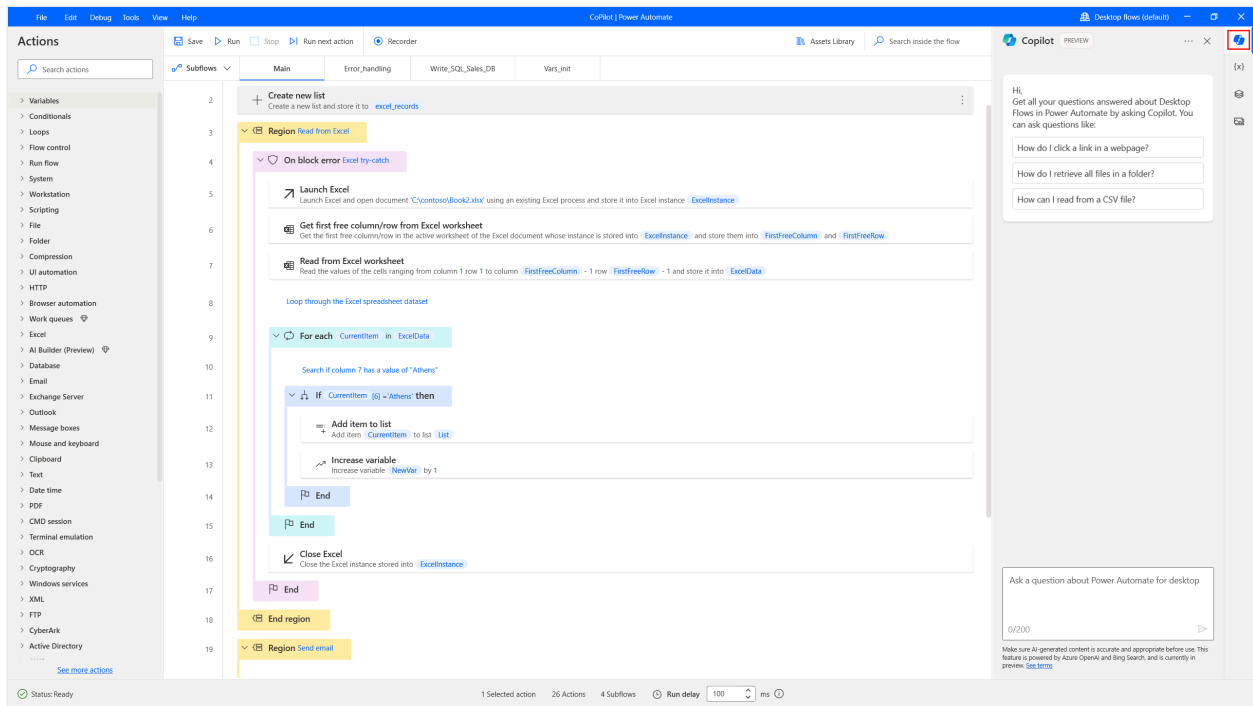
experience, contact your Power Platform administrator. They might have turned off the copilot functionality.

# How to use copilot to get answers to product-related questions

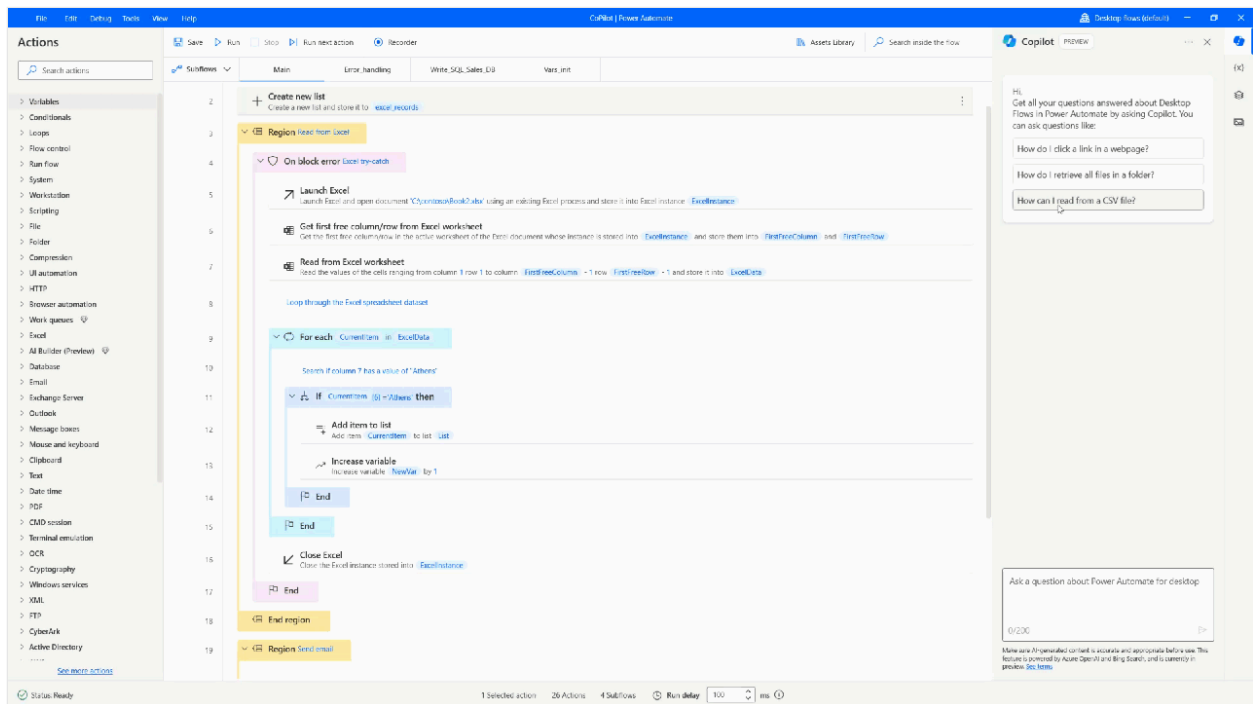
Access the generative answers capability from the console by selecting **Copilot** located on the top right corner of the console window.



Alternatively, you can also access the generative answers capability from the designer's vertical menu on the right.



In the **Copilot** pane, ask any product-related questions or use one of the proposed prompts to get you started.



The answer generated contains a link to the documentation page to refer you to additional information. Make sure that you always review AI-generated content.

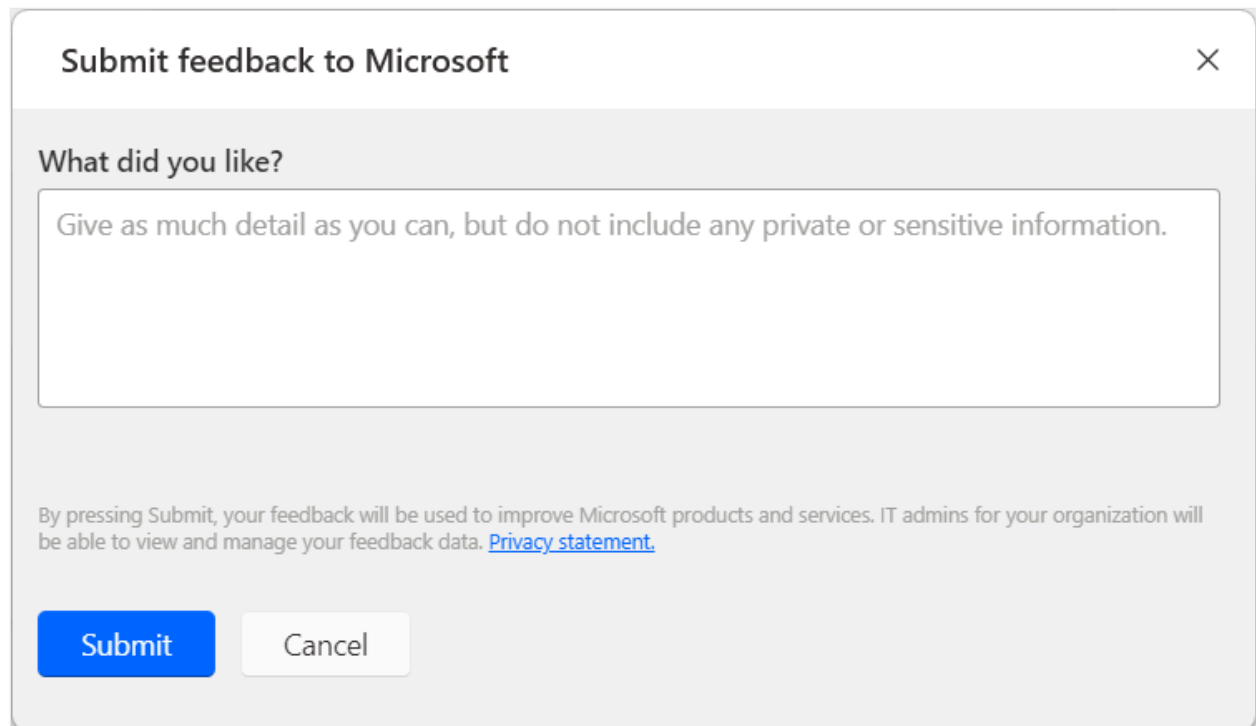
## Prevent your users from using the copilot's generative answers capability

To prevent users from using the copilot's generative answers capability, Power Platform administrators turn off the **Copilot help assistance** in Power Automate via Bing setting

in the Power Platform admin center.

## Help us improve this feature

You can send feedback by selecting the thumb up or thumb down icon underneath the AI-generated content. Once you do, a dialog box appears, which you can use to submit feedback to Microsoft.



The screenshot shows a dialog box titled "Submit feedback to Microsoft" with a close button (X) in the top right corner. Below the title is the question "What did you like?". Underneath is a text input field with the placeholder text "Give as much detail as you can, but do not include any private or sensitive information." At the bottom of the dialog, there is a blue "Submit" button and a white "Cancel" button. A small disclaimer at the bottom of the dialog reads: "By pressing Submit, your feedback will be used to improve Microsoft products and services. IT admins for your organization will be able to view and manage your feedback data. [Privacy statement](#)."

### ⓘ Note

If you can't see the dialog box, your Power Platform admin might have turned it off. More information: [Disabling the user feedback functionality](#).

## Disabling the user feedback functionality

As a Power Platform admin you can prevent users from sending feedback to Microsoft by disabling the `disableSurveyFeedback` tenant setting. More information:

- [List tenant settings \(preview\)](#)
- [Set TenantSettings](#)

## Data subject rights requests on user feedback

Tenant administrators can view, export, and delete the feedback from users by signing in to the [Microsoft 365 admin center](#), and then selecting **Health** > **Product feedback**.

## Related information

- [FAQ for Generative Answers in Power Automate for desktop](#)
- [Responsible AI FAQs for Power Automate](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#)

# Trigger desktop flows from cloud flows

Article • 06/25/2024

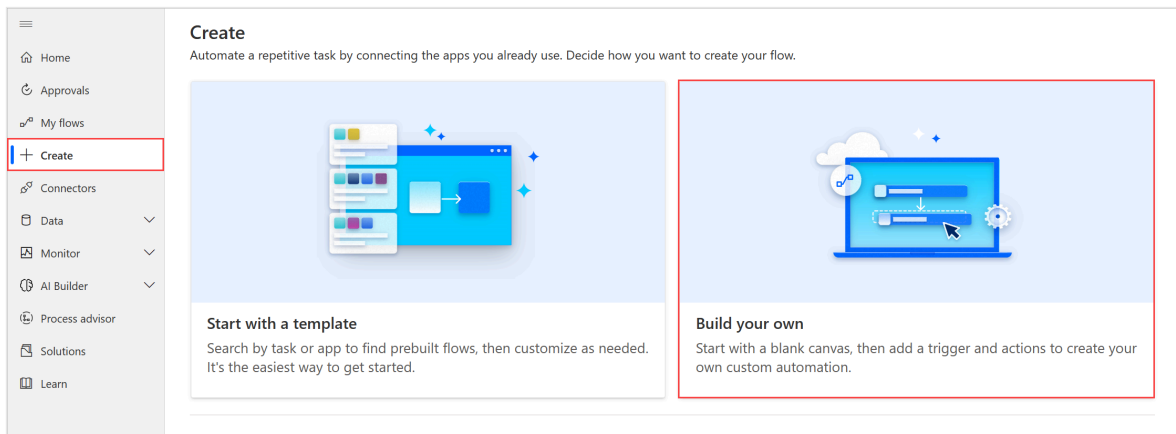
## Prerequisites

- A registered [machine](#) or [machine group](#) that will run the triggered desktop flows. Machines are the physical or virtual devices you use to automate desktop processes. Machine groups allow you to handle multiple machines as one entity and distribute your automation workload.
- A work or school account.
- A configured [desktop flow connection](#).
- To run the triggered desktop flows, you need to have the appropriate license (for attended runs) or an unattended add-on (for unattended runs). The user who needs to have the appropriate license is the creator of the connection.

## Trigger a desktop flow from a cloud flow

To trigger a desktop flow from a cloud flow:

1. Go to [Power Automate](#) and sign in with your credentials.
2. Create a new cloud flow that you'll later use to trigger your desktop flow. This flow can be an instant or an automated cloud flow.



3. The following example displays the creation of a manually triggered cloud flow. This step may differ depending on the type of cloud flow you want to create.



Step 1

## Choose a trigger

A trigger is an event that kicks off your flow. They can be started manually, on a set schedule, or be based on a predetermined event (like an email mention or when a new document is added to SharePoint).

### The building blocks of automation

Trigger + Actions = Flow

Event that starts your flow + Tasks that are accomplished = Busywork you don't need to do anymore!

### Choose a connector

All Built-in Standard Premium Custom

Manual trigger Scheduled PowerApps Power Virtual Agents Microsoft Forms  
 SharePoint OneDrive for Business Planner Microsoft Dataverse RSS

[See more connectors](#)

### Manually trigger a flow

This type of flow only runs when someone manually tells it to run, like pushing a button. Manually triggered flows are also sometimes called instant flows. You can manually trigger a flow from either the web portal or mobile.

Examples:

- When the flow is manually triggered, create a new task.
- When the flow is manually triggered, send an out-of-office email to your coworkers.

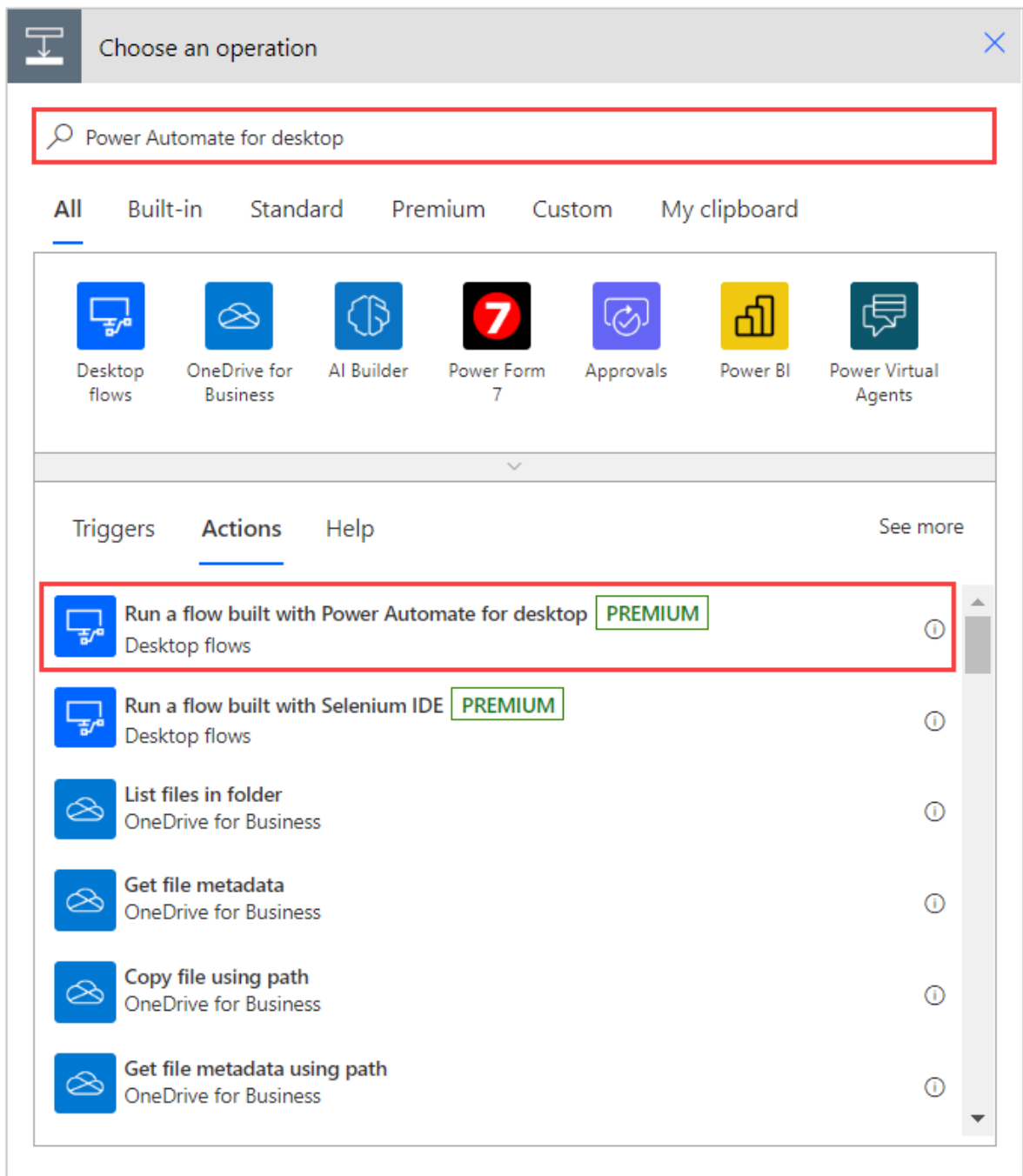
[Next](#) Skip to building your own flow [Cancel](#)

4. In the cloud flow designer, select **+ New step**.

Manually trigger a flow

[+ New step](#) [Save](#)

5. In the **Choose an action** dialog, search for **Power Automate for desktop**. Under **Actions**, select **Run a flow built with Power Automate for desktop**.



6. If you haven't already created a desktop flow connection, the action will prompt you to create one. You can find more information regarding desktop flow connections in [Create desktop flow connections](#).

Desktop flows

\* Connect

\* Machine or machine group

\* Domain and username

\* Password

**Create** **Cancel**

- Set the desired run mode (attended or [unattended](#)) for your desktop flow and select **Create a new desktop flow** in **Desktop flow**. If you want to trigger an existing desktop flow, select its name instead.

Run a flow built with Power Automate for desktop

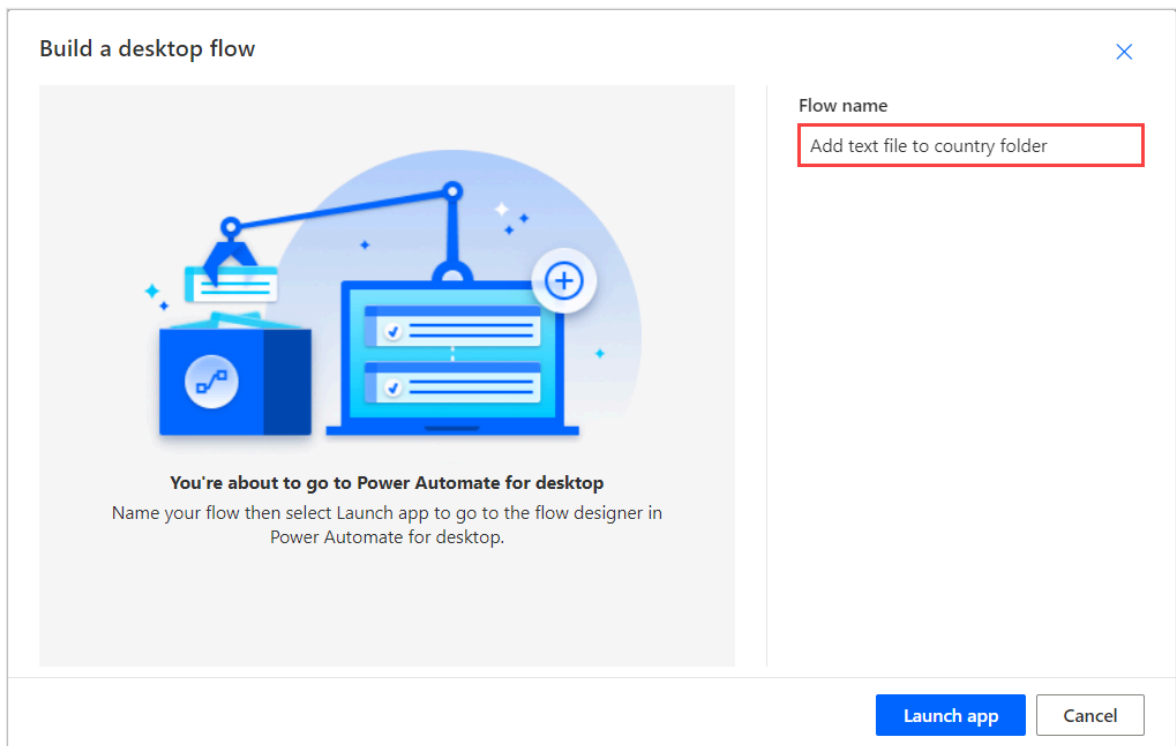
\* Desktop flow  **Edit**

\* Run Mode  **Background**

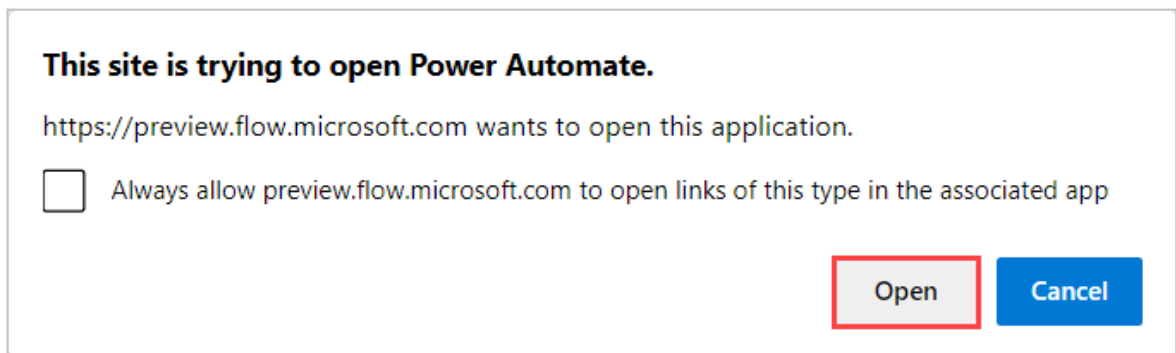
Show advanced options

**You don't have any items**  
No items found

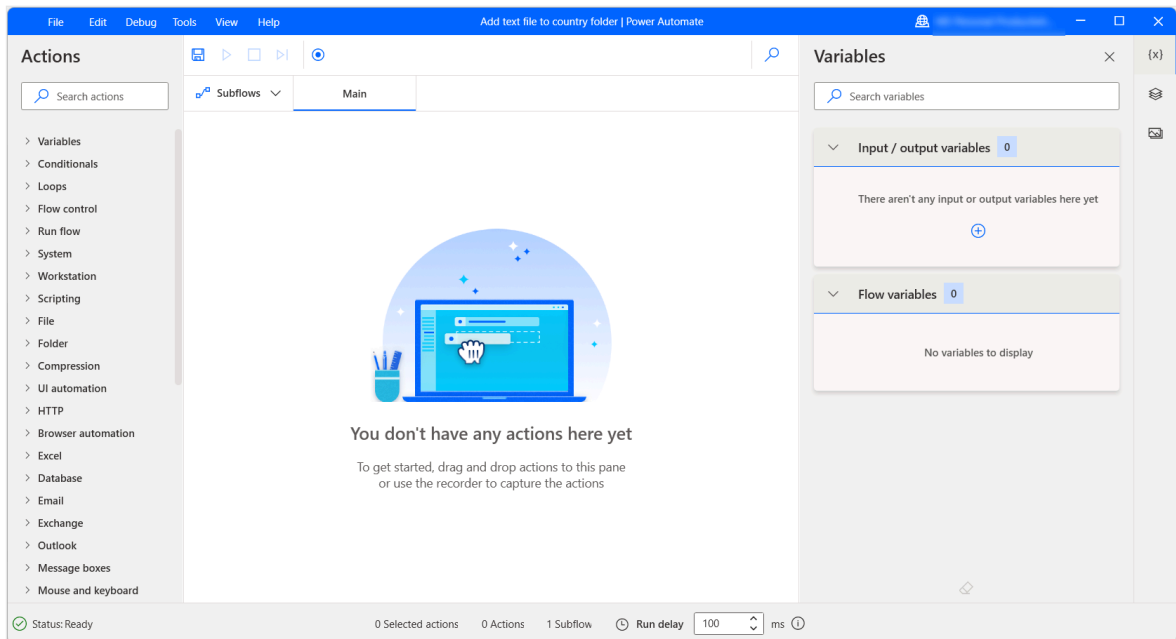
- Enter a name for the new desktop flow and select **Launch app**.



9. A message from the browser may appear, asking whether to allow the page to open Power Automate. Select **Open**.



10. At this step, Power Automate should have created a new desktop flow and opened it in the flow designer.



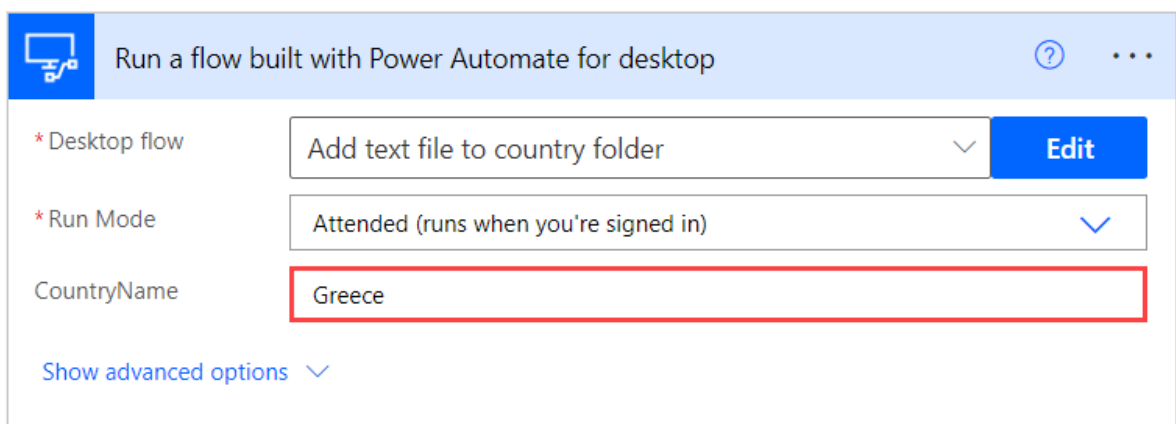
11. Desktop flows can contain input and output variables to pass data between desktop and cloud flows.

Input variables enable you to pass data from cloud to desktop flow, while output variables allow you to pass data from desktop to cloud flows. To see more information about input and output variables, go to [Input and output variables](#).

12. Back in the Power Automate portal, any input variables appear as fields in the **Run a flow built with Power Automate for desktop** action.

**Note**

- If an input variable contains sensitive data, you may want to obfuscate or omit it from the logs. To find more information regarding sensitive text inputs, go to [Manage sensitive input like passwords](#).
- The limit of the input size for a desktop flow is 2 MB (1 MB for China regions).



# Known limitations

- We currently support up to 70 desktop flows runs per minute for every connection.
  - Cancelling a parent cloud flow doesn't stop its child desktop flows if the **Asynchronous Pattern** is disabled under the 'Run a flow built with Power Automate for desktop' action settings.
- 

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Run unattended desktop flows

Article • 03/04/2024

[Triggering desktop flows from cloud flows](#) enables you to run desktop flows in unattended mode. Unattended desktop flows are ideal for automating tasks that don't need human supervision.

## Tip

For unattended desktop automation, you need the [Power Automate Process](#) plan. More information: [Allocate and assign the Process license](#)

Power Automate uses the selected [desktop flow connection](#) to automatically sign in to your machine and run the unattended desktop flow. When the flow is complete, it signs out from the device and reports its activity.

When running desktop flows in unattended mode, keep in mind that:

- Power Automate creates a remote desktop (RDP) session on the machine to run unattended desktop flows. Connecting to the machine's console session isn't available for unattended runs.
- Power Automate creates, manages, and then releases the Windows user session on the target devices.
- Unattended desktop flows keep the screen of the target machine locked so no one can see them running.
- Windows 10 and Windows 11 devices can't run unattended desktop flows if any active Windows user sessions are present (even a locked one).
- On Windows Server, if you have a locked Windows user session open with the same user as the desktop flow connection, you receive an error.
- The user specified in the connection must have permissions to create a remote desktop session on the machine. In most cases this means the user must be a member of the **Remote Desktop Users** group on the machine. On some Citrix configurations, the user must be in the **Direct Access Users** group.
- The default screen resolution of the remote desktop session might be different than the one used during flow authoring. This might create different conditions, such as smaller screen size, less visible elements in target app, and so on, for the

flows that run in unattended mode. This can result in errors if a target element isn't found, or even in interacting with the wrong element if keyboard or mouse actions are used. To prevent this behavior, [set the proper screen resolution on unattended mode](#).

### 📘 Important

- Unattended desktop flows require an available machine with all users signed out.
- Locked Windows user sessions will prevent unattended desktop flows from running.
- Unattended desktop flows can't run with elevated privileges.

## Reuse a Windows session in unattended mode

Desktop flows can run on a Windows session as long as it exists and is unlocked for unattended runs.

Power Automate creates a new session for each unattended run on the machine using the credentials provided in the connection. The flow runs on this session, and then Power Automate signs it off.

The **reuse Windows session** functionality allows desktop flows to run on an existing session. After a desktop flow run, the session gets locked, and Power Automate can reuse it for another run.

To allow reusing Windows session:

1. Sign in to Power Automate.
2. Select **Monitor**, and then select **Machines**.
3. Select the target machine or machine group.
4. Select **Settings** in the Command bar.
5. Enable **Reuse sessions for unattended runs**.

### ⚠️ Note

When you add machines to machine groups, they inherit the settings of the group. When you remove machines from machine groups, they keep the settings defined



at the group level.

## Known issues and limitations

- Reusing sessions isn't supported on machines that allow users to have multiple sessions (users aren't restricted to a single session).

# Run desktop flows sequentially

Article • 04/09/2024

Power Automate enables you to schedule multiple desktop flows to run on one or more devices. If you trigger more than one desktop flow on the same device:

1. The first desktop flow runs on the target machine based on priority and time requested.
2. The other desktop flows are added to a queue and get marked as **Queued**.
3. When a desktop flow run completes, the next desktop flow starts running based on priority and time requested. This desktop flow is marked as **Next to run**.

You can [view the state of the queues in real time](#) and manually [change the order](#) of the desktop flows in them at runtime, either by changing the priority or moving them to the top of the queue.

## Important

- A time-out occurs when desktop flows don't run within six hours after being requested.
- The presented orchestration rules apply to desktop flow runs scheduled by any user on the same device.

# Run desktop flows concurrently

Article • 10/09/2023

## 📘 Important

Gateways for desktop flows are now deprecated except for the China region. Switch to our machine-management capabilities. [Learn more about the switch from gateways to direct connectivity.](#)

Windows Server (2016, 2019, and 2022) allows multiple users to sign in simultaneously on the same machine. Power Automate uses this OS capability to run multiple desktop flows simultaneously, allowing organizations to reduce infrastructure costs.

## 📌 Note

Running multiple concurrent desktop flows by the same user isn't supported. You need to have different users running desktop flows simultaneously to benefit from this feature.

Replicate the following steps to run multiple desktop flows concurrently on a single machine:

1. Set up a Windows Server 2016, 2019, or 2022 device with the latest version of Power Automate installed.
2. Use two or more user accounts to create desktop flow connections targeting this device. To find more information about desktop flow connections, go to [Create desktop flow connections](#).

Power Automate automatically scales the number of concurrent desktop flow runs to the supported maximum. The machine run queue follows a first-in, first-out approach, which means the first run received is the next one executed. If all available machines have reached their maximum concurrent sessions and can't execute the next run in the queue, the queue is blocked until a machine becomes available to run the next run in the queue. If the machine's capacity is exceeded, the remaining runs wait as described in [Run desktop flows sequentially](#).

## 📘 Important

If you want to use more than two parallel user sessions on Windows Server, you must turn on Remote Desktop Services (RDS). To learn more about RDS, go to [License your RDS deployment with client access licenses](#).

# Best practices

Article • 02/24/2023

This article presents the best practices for running Power Automate desktop flows and distributing the workload.

## Avoid time-outs and distribute load across machines

Running multiple desktop flows at the same time may cause time-outs. Adopt one of the recommended strategies to distribute the workload and ensure that all desktop flows run successfully without overloading the target machines.

- Spread the load over time by planning your desktop flows to run at different times. This practice works best if you have a limited set of machines and can control the triggers that start your desktop flows.
- Create machine groups that run desktop flows with identical configurations in parallel. To find more information about machine groups, go to [Manage machine groups](#).
- Create multiple flows that use separate connections to target different machines. To find more information about desktop flow connections, go to [Create desktop flow connections](#).

All the presented strategies prevent desktop flows from competing to run on the same device and failing due to time-outs.

### ⓘ Note

- To run desktop flows in unattended mode, you need to anticipate the number of desktop flows your organization plans to run in parallel and then purchase an adequate amount of Unattended Add-ons.
- If a target device or gateway becomes offline due to a restart or connectivity issues, desktop flows will wait up to three hours before failing. This wait time allows for transient machine states and enables you to run automation successfully even if the devices go through restart or update cycles.

# Support long-running desktop flows

Some desktop flows may run for long durations—for example, more than 24 hours. To ensure that those flows run successfully and don't fail due to the default time-out values, perform the following steps:

1. Select the ellipsis (...) on the top of the **Run a flow built with Power Automate for desktop** cloud action, and then select **Settings**.
2. Select **Timeout** and update the duration to handle your desktop flow runs appropriately.

Settings for 'Run a flow built with Power Automate for desktop'

**Secure Inputs**  
Secure inputs of the operation.  
Secure Inputs  Off

**Secure Outputs**  
Secure outputs of the operation and references of output properties.  
Secure Outputs  Off

**Asynchronous Pattern**  
With the asynchronous pattern, if the remote server indicates that the request is accepted for processing with a 202 (Accepted) response, the Logic Apps engine will keep polling the URL specified in the response's location header until reaching a terminal state.  
Asynchronous Pattern  On

**Automatic decompression**  
Automatically decompress gzip response.  
Automatic decompression  On

**Timeout**  
Limit the maximum duration an asynchronous pattern may take. Note: this does not alter the request timeout of a single request.  
Duration ⓘ

**Retry Policy**  
A retry policy applies to intermittent failures, characterized as HTTP status codes 408, 429, and 5xx, in addition to any connectivity exceptions. The default is an exponential interval policy set to retry 4 times.  
Type

**Tracked Properties**

Key	Value
-----	-------

3. Select **Done**.

# Distribute load evenly across gateways in a cluster

## Important

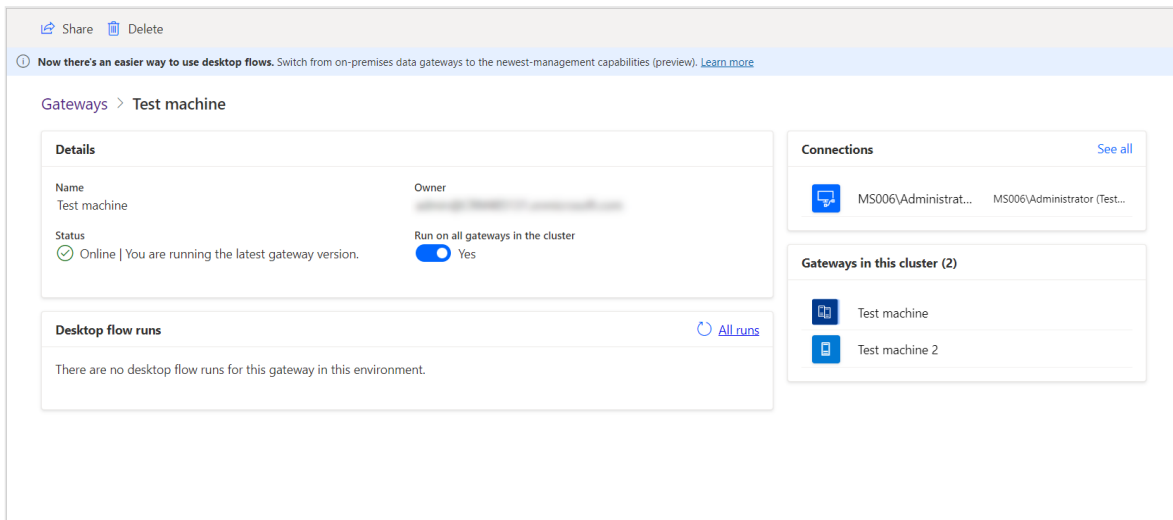
Gateways for desktop flows are now deprecated except for the China region. Switch to our machine-management capabilities. [Learn more about the switch from gateways to direct connectivity.](#)

Power Automate enables you to distribute desktop flow runs evenly across gateways in a cluster. By default, the selection of a gateway during load balancing is random.

To provide load balancing:

1. Open the Power Automate portal, navigate to **Data > Gateways**, and select your gateway cluster.
2. In the gateway details page, enable **Run on all gateways in the cluster**. This option allows you to distribute the desktop flow runs on all the gateways within the cluster.

In rare cases, it can take up to 10 minutes for this setting to be effective and for load balancing runs to begin across cluster members.



The screenshot displays the 'Test machine' gateway details page in the Power Automate portal. At the top, there are 'Share' and 'Delete' icons. A notification banner states: 'Now there's an easier way to use desktop flows. Switch from on-premises data gateways to the newest-management capabilities (preview). [Learn more](#)'. The page title is 'Gateways > Test machine'. The 'Details' section shows the name 'Test machine' and the owner. The 'Status' is 'Online | You are running the latest gateway version.' The 'Run on all gateways in the cluster' toggle is turned 'Yes'. The 'Desktop flow runs' section shows 'All runs' and a message: 'There are no desktop flow runs for this gateway in this environment.' The 'Connections' section shows a connection to 'MS006\Administrat...'. The 'Gateways in this cluster (2)' section lists 'Test machine' and 'Test machine 2'.

## Important

- Offline gateway members within a cluster will negatively impact performance. Disable or remove these members.

- If you are using local Windows accounts, all machines in the cluster must have the same local account with the same password. Use these credentials when you create the **desktop flow connection**.
- If you are using Active Directory or Azure AD-joined machines, confirm that the user account in the **desktop flow connection** can access all the gateways in the cluster.



# Run desktop flows via URL or desktop shortcuts

Article • 03/15/2024

Power Automate, apart from triggering flows through the console, flow designer, and cloud flows, enables you to run desktop flows using run URLs and desktop shortcuts.

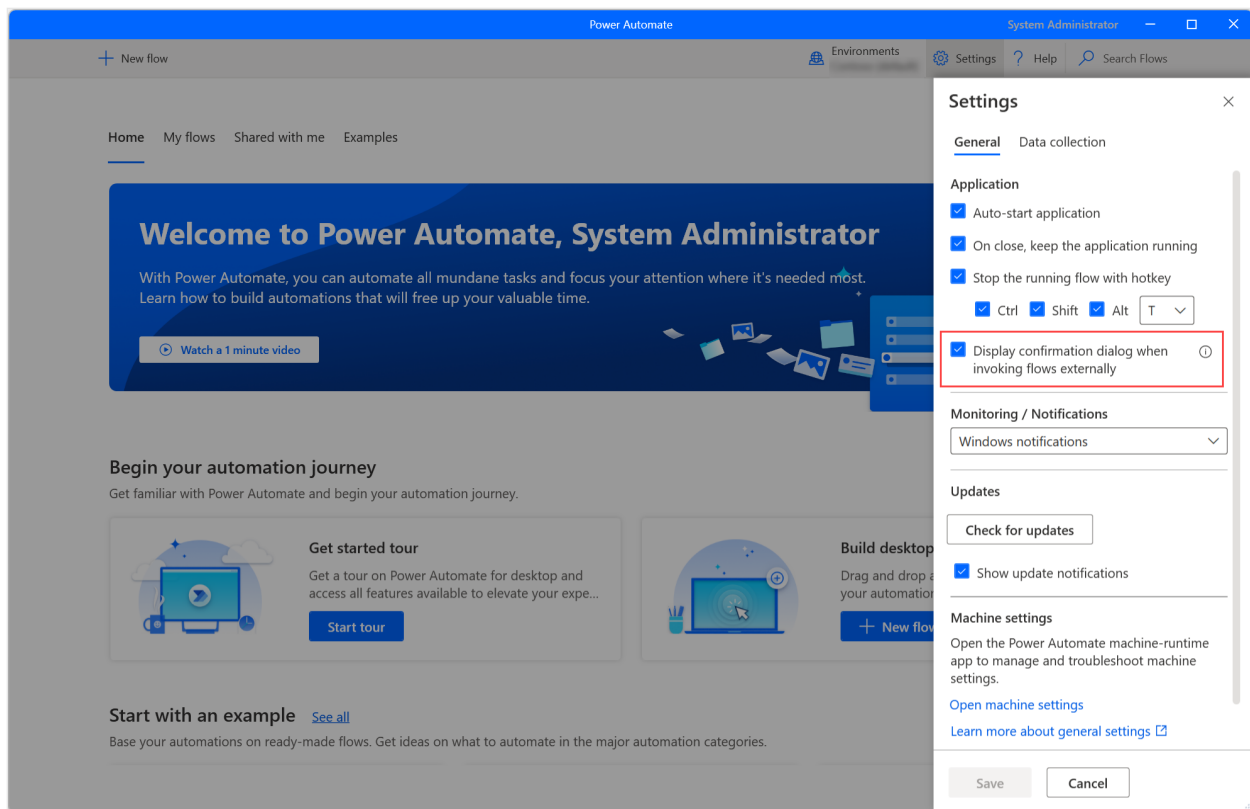
You can use URLs to trigger desktop flows through many different sources, such as browsers, the Windows Run application, the [command prompt](#), and the [Windows Task Scheduler](#). Alternatively, you can [create desktop shortcuts](#) and run your desktop flows directly through them.

If a triggered flow requires input variables, the console will ask you to enter the appropriate values.

By default, Power Automate always prompts you to confirm the triggering of a desktop flow via URL or desktop shortcut. To disable this functionality, navigate to the console settings and disable **Display confirmation dialog when invoking flows externally** or modify the [appropriate Windows registry entry](#).

## **Warning**

Disabling the confirmation dialog poses security threats because you could run without notice a questionable flow shared by a malicious actor.

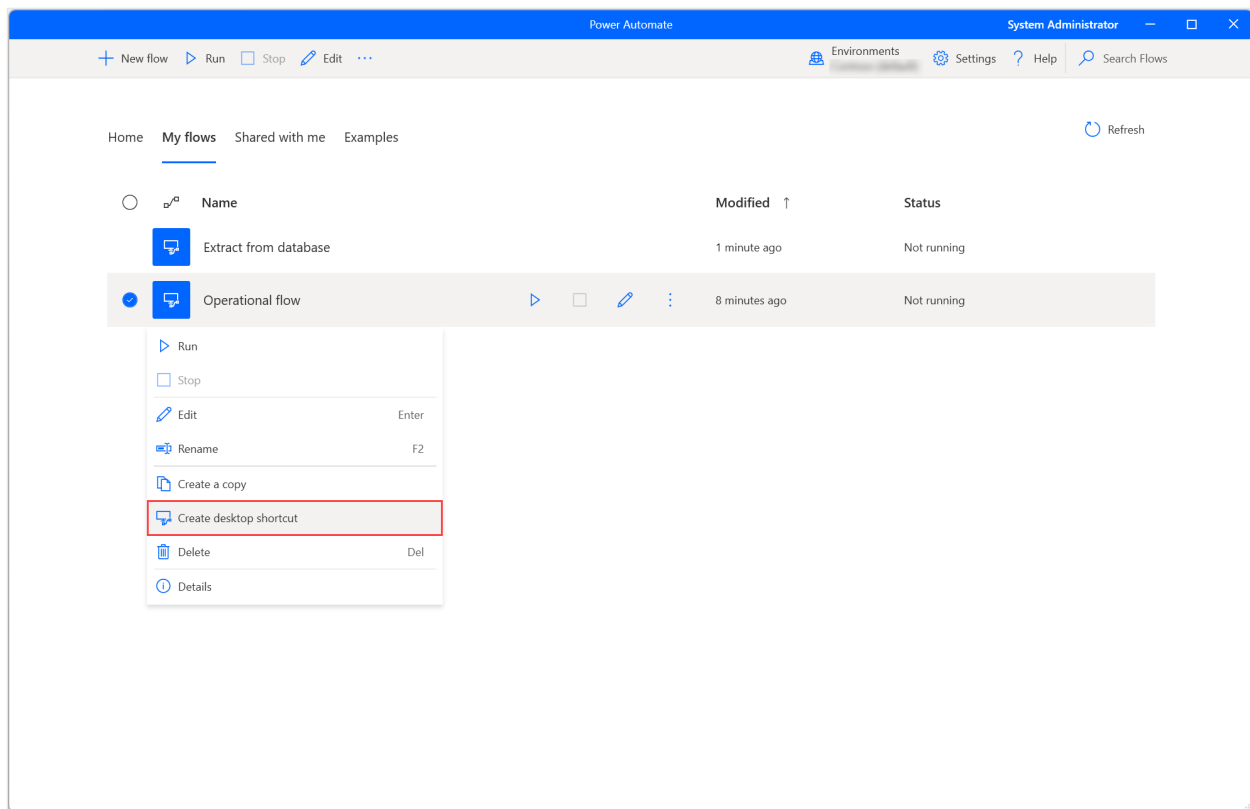


## Prerequisites

- Power Automate for desktop needs to be installed on the machine.
- The user must be signed in.
- The user needs a Power Automate Premium plan or access to a pay-as-you-go environment.

## Create a desktop shortcut

To create a shortcut for a desktop flow, right-click its name in the console and select **Create desktop shortcut**. All shortcuts are automatically created in your desktop folder, but you can move them to any folder of your machine.



## Create a run URL

### **Important**

If a flow is already running, it won't run again when the URL is invoked.

To generate a URL that triggers a desktop flow, use one of the following formats:

```
"ms-powerautomate:/console/flow/run?workflowName=[workflowName]"
```

```
"ms-powerautomate:/console/flow/run?workflowId=[workflowId]"
```

```
"ms-powerautomate:/console/flow/run?environmentId=[environmentId]&workflowId=[workflowId]"
```

```
"ms-powershell:/console/flow/run?environmentId=[environmentId]&workflowName=[workflowName]"
```

### ⓘ Note

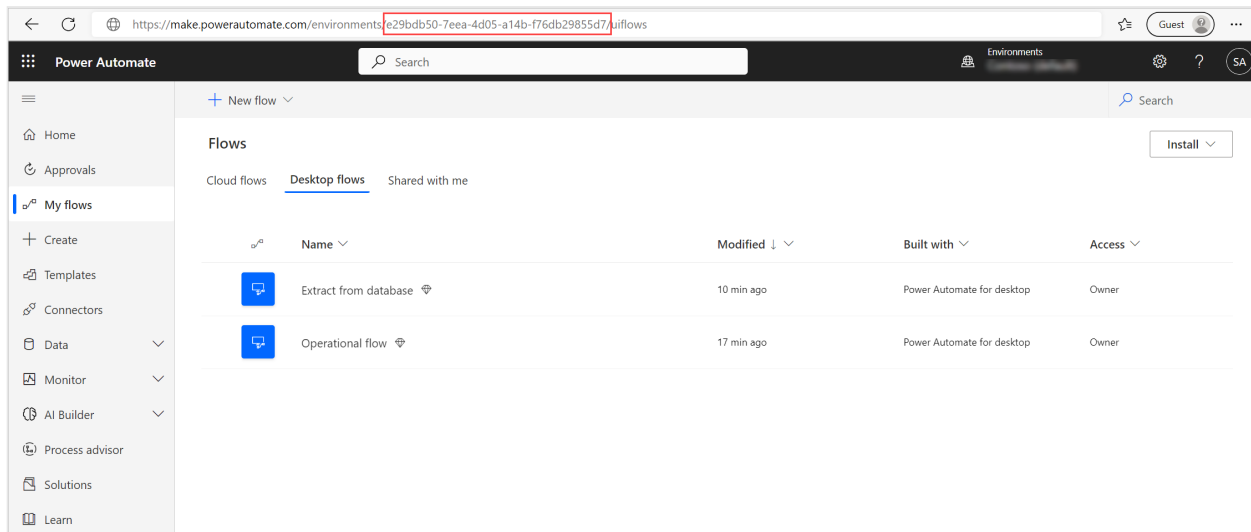
You can find an automatically created run URL consisting of the environment and flow IDs on the properties section of the desktop flow. You can find more information about flow properties in [Desktop flow properties](#).

The first two formats don't define a specific environment, so Power Automate automatically uses the currently selected console environment. The command will be neglected if either flow ID or flow name isn't specified.

If the console is set to another environment than the one specified in the URL, the console environment will automatically change.

## Find environment and desktop flow IDs

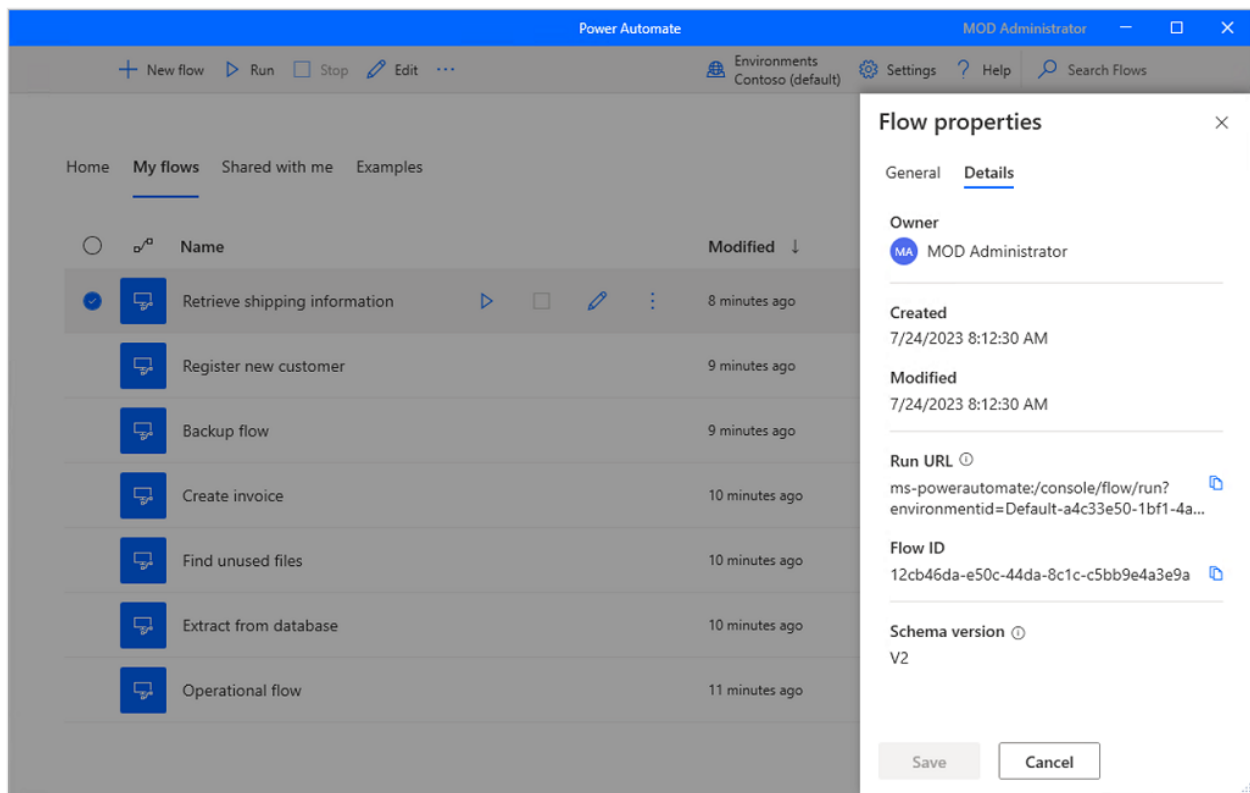
To find the ID of an environment, navigate to the [Power Automate portal](#) and select the desired environment. Then, navigate to the **My flows** tab and copy the environment ID from the address line.



The screenshot shows the Power Automate console interface. The browser address bar displays the URL: `https://make.powerautomate.com/environments/e29bdb50-7eea-4d05-a14b-f76db29855d7/flows`. The environment ID `e29bdb50-7eea-4d05-a14b-f76db29855d7` is highlighted in red. The main content area shows the 'Flows' section with a table of desktop flows.

Name	Modified	Built with	Access
Extract from database	10 min ago	Power Automate for desktop	Owner
Operational flow	17 min ago	Power Automate for desktop	Owner

To find the ID of a desktop flow, launch the Power Automate console, select or right-click the appropriate flow, and select **Properties**.



## Add optional parameters to a run URL

Apart from the mandatory input parameters, you can add optional parameters to a run URL.

## Add flow input variables to a run URL

Add the `inputArguments` parameter to a run URL to configure the flow's inputs.

If the `inputArguments` parameter contains all the input variables of the flow, then Power Automate console doesn't ask for user input during the flow run.

A URL containing the `inputArguments` parameter should have the following structure. The parameter can be added to any of the previously mentioned URLs.

### **Important**

All special characters in the JSON string must be escaped. For example, all double quotes must be backslash-escaped.

```
"ms-powerautomate:/console/flow/run?workflowId=[workflowId]&inputArguments={\"[External name 1]\": [Value 1],\"[External name 2]\": [Value 2]}"
```

For example, the below run URL invokes a desktop flow with text, numeric and boolean inputs:

```
"ms-powerautomate:/console/flow/run?&workflowid=dfd0c814-2c30-4cd8-849d-a4b2d2f4f33b&inputArguments={\"NewInput\": \"Hello\", \"NewInput2\": 123, \"NewInput3\": true}"
```

#### ⓘ Note

- Only Text, Numeric and Boolean data types are supported.
- The Boolean values are case sensitive, and the value can be either **true** or **false**.
- If there are additional flow inputs that aren't included in the `inputArguments` parameter, then during the flow run the Power Automate console asks for user input.
- The source that invokes the run URL may have a limit of maximum allowed characters, which will cause the flow to fail if that limit is exceeded.

#### ⓘ Important

- To trigger the run URL through a web browser, unescape the `inputArguments` parameter's JSON string value and use **URL encoding** to convert the characters into a valid ASCII format.
- To unescape the double quote characters, remove the backslashes. For example, `inputArguments={"NewInput": "Hello", "NewInput2": 123, "NewInput3": true}`

## Sign in silently with the current Windows account

Add the `autoLogin` parameter to a run URL to sign in to Power Automate without any user interaction, with the current Windows logged in user.

As prerequisites, the user must be signed out and Power Automate must not be running on the machine.

#### ⓘ Important

If the user has explicitly signed out of Power Automate through the UI, then Power Automate respects user's preferences and does not perform auto-login.

A URL containing the `autologin` parameter should have the following structure. The parameter can be added to any of the previously mentioned URLs.

```
"ms-powerautomate:/console/flow/run?workflowId=[workflowId]&autologin=true"
```

## Save logs for desktop flows run via URL

Add the `runId` parameter to a run URL to define a unique GUID for the desktop flow logs.

Power Automate uses this GUID to create a folder and store the logs inside it. The logs are stored in: `C:\Users\[Username]\AppData\Local\Microsoft\Power Automate Desktop\Console\Scripts\[Flow ID]\Runs\[Run ID]`

### ⓘ Note

A GUID is a 128-bit value consisting of one group of 8 hexadecimal digits, three groups of 4 digits each, and one group of 12 digits, for example: `e6f82a20-47f7-4dd8-a97f-63df36797d0f`.

A URL containing the `runId` input parameter should have the following structure. The parameter can be added to any of the previously mentioned URLs.

```
"ms-powerautomate:/console/flow/run?workflowId=[workflowId]&runId=[GUID]"
```

## Use a run URL in the command prompt

To trigger a flow using the command prompt, use a command with the following syntax (applies to MSI installations):

```
"C:\Program Files (x86)\Power Automate Desktop\PAD.Console.Host.exe" "ms-
```

```
powerautomate:/console/flow/run?workflowName=[workflowName]"
```

### ⓘ Note

You can replace the second part of the command with any of the previously presented URL formats.

## Trigger flows automatically with Task Scheduler

To trigger a flow using the Task Scheduler application of Windows:

1. Create a new task, navigate to the **Actions** tab of the **Create Task** dialog, and add a new action.
2. Populate the following value in the **Program/script** field.

- For MSI installations:

```
C:\Program Files (x86)\Power Automate Desktop\PAD.Console.Host.exe
```

- For Microsoft Store installations:

```
C:\WINDOWS\system32\WindowsPowerShell\v1.0\powershell.exe
```

3. Populate the following value in the **Add arguments** field.

- For MSI installations:

```
ms-powerautomate:/console/flow/run?workflowName=[workflowName]
```

- For Microsoft Store installations:

```
-Command "Start-Process \"ms-powerautomate:/console/flow/run?workflowName=[workflowName]\""
```



ⓘ **Note**

You can replace the given argument with any of the previously presented URL formats.

# Run desktop flows via keyboard shortcuts

Article • 04/20/2023

Power Automate enables you to control desktop flow runs using keyboard shortcuts. You can press key or key combinations to trigger desktop flows and pause/resume or stop the running flow.

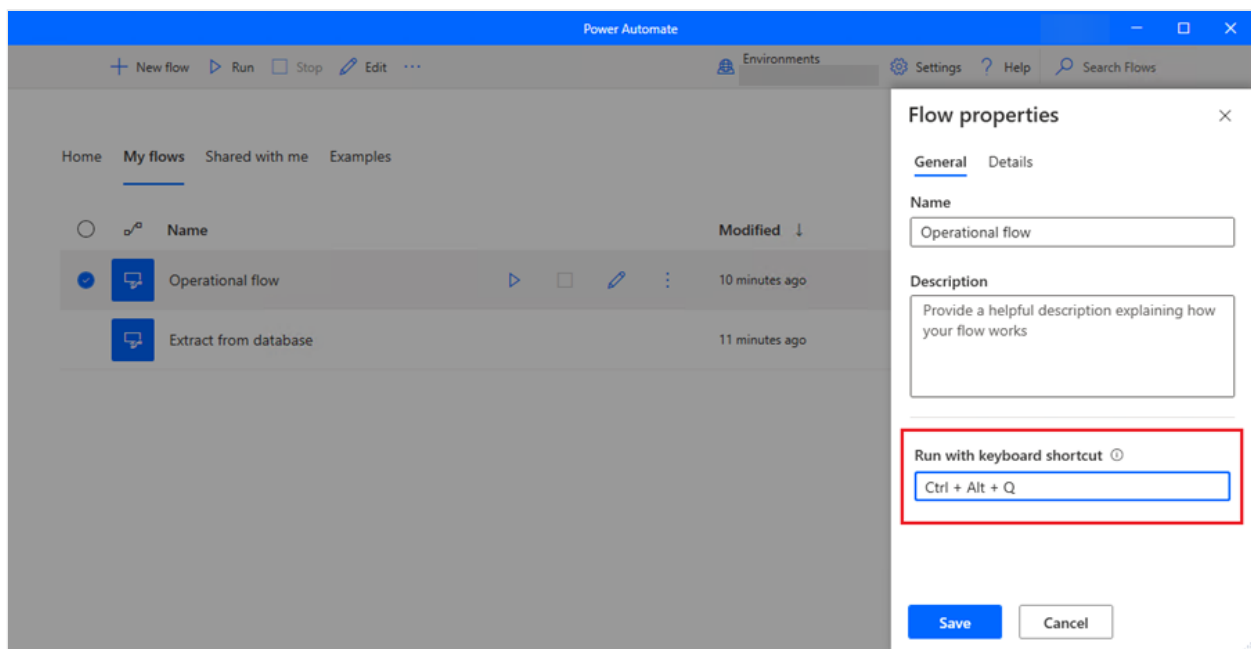
If a triggered flow requires input variables, the console will ask you to enter the appropriate values.

## Prerequisites

- Power Automate for desktop needs to be installed on the machine.
- The user must be signed in.

## Set a keyboard shortcut

To create a keyboard shortcut that triggers a desktop flow, right-click its name in the console and select **Properties**. Then enter the key or key combination that will trigger the flow.



To create a keyboard shortcut that pauses/resumes or stops the running flow go to [Console Settings](#).

### ⓘ Note

A list of all keyboard shortcuts can be found at `%localappdata%\Microsoft\Power Automate Desktop\Console\console.config` for each user that has signed into Power Automate on the current machine and under the current user in the past.

## Limitations

- Supported keys and key combinations include either a single Functional key or a combination of at least one modifier key along with any other key.
- Keyboard shortcuts are saved per user and per machine. Each user with access to a desktop flow can set their own shortcuts for each machine.

# Runtime notifications

Article • 02/24/2023

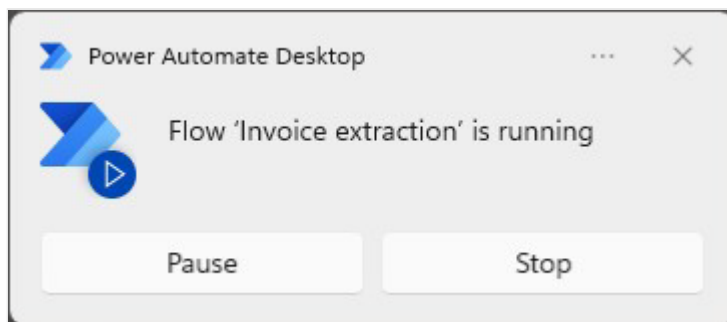
## ⓘ Note

Runtime notifications are displayed when a flow is run directly from the console. When a flow is run from the portal, Power Automate doesn't display notifications.

Power Automate provides two different types of notifications while running desktop flows, depending on the user's preferences.

Through the **Monitoring/Notifications** option of the console settings, you can choose between the integrated Windows notifications, the flow monitoring window, or disabling the notifications.

The **Windows notifications** option displays a Windows notification pop-up when a desktop flow is running, paused, stopped, finished running successfully, or encountered an error. Additionally, the notification pop-up enables users to pause or stop the flow through the respective buttons.



The **Flow monitoring window** option provides the same functionality as the Windows notifications, while it offers some extra functionality.

Instead of displaying separate notifications for each desktop flow, the monitoring window displays the state of all running flows in a single window. Further, it shows which subflow and action are running at any given time for each desktop flow. If an error occurs, you can copy the error details directly through the monitoring window for easier debugging.


## ⓘ Note

When Power Automate pop-up dialogs appear, like input variable dialogs or update notifications, users can't interact with the flow monitoring window until they

close the displayed dialog.


### Power Automate - Flow Monitoring

---


 **Invoice extraction**

---

**Failed with error:** Image doesn't exist  
Action: #2 Extract text with OCR  
Subflow: main  
Duration: 00:00:11

 Copy error details

---

 **Add customer to Excel**

---

**Running**  
Action: #1 Display input dialog  
Subflow: main  
Duration: 00:00:14

Pause Stop

# Run desktop flows in picture-in-picture (preview)

Article • 05/04/2024

[This topic is prerelease documentation and is subject to change.]

Power Automate enables you to run attended desktop flows within a virtual window that replicates your desktop, so that you can continue working on your machine while the automation is running in parallel.

This attended run mode is called *picture-in-picture* and uses the [Child Sessions](#) technology.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality.
- These features are available before an official release so that customers can get early access and provide feedback.
- Triggering desktop flows from cloud flows in picture-in-picture requires Power Automate for desktop version 2.43 or later.

## Prerequisites

- Power Automate for desktop needs to be installed on the machine.
- The user must be signed in to use Power Automate.
- The user needs a Power Automate Premium plan or access to a pay-as-you-go environment.
- The user running flows in picture-in-picture should be part of the following Windows policies:
  - `Computer Configuration\Windows Settings\Security Settings\Local Policies\User Rights Assignment\Allow Log On Locally`
  - `Computer Configuration\Windows Settings\Security Settings\Local Policies\User Rights Assignment\Access this computer from the network`

- A device that runs Windows 10 (Pro or Enterprise), Windows 11 (Pro or Enterprise), Windows Server 2016, Windows Server 2019, or Windows Server 2022.

## Enable picture-in-picture on the machine

To enable the picture-in-picture run mode on the machine, follow one of the methods described here.

### Important

Administrator rights on the local machine are required for all methods. For [Microsoft Store](#) installations, only the manual method is available.

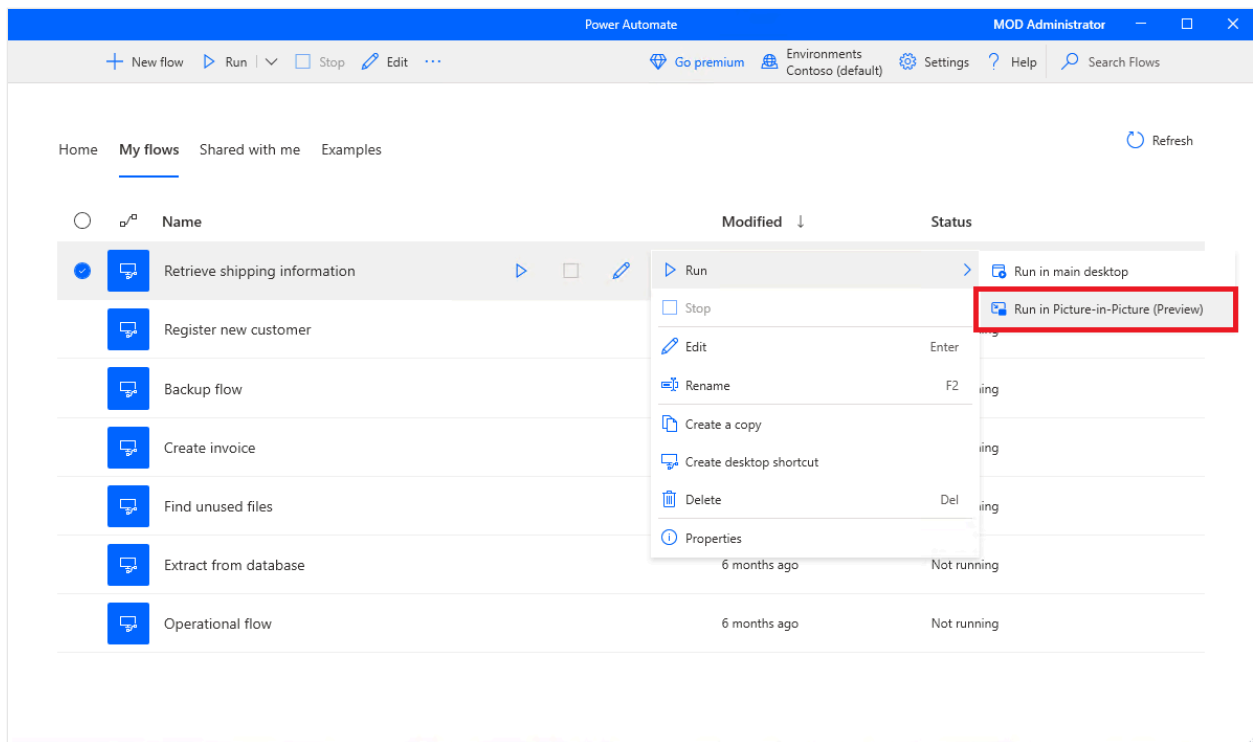
 Expand table

Method	Description
Manually	Run a desktop flow in picture-in-picture mode on the machine. You're asked to enable the feature.
MSI installer	Install Power Automate with the <a href="#">MSI installer</a> and select the <b>Enable Picture-in-Picture mode</b> option during the installation process.
Silent installation	Install Power Automate with <a href="#">silent installation</a> . During silent installation, picture-in-picture is enabled by default on the machine. To skip the enablement, add the <b>-SKIPENABLEPIPMODE</b> argument. More information: <a href="#">Command line arguments</a>
Command	Update an existing installation and enable or disable the picture-in-picture run mode on the machine with a command. Open the <b>Start</b> menu, search for <b>Command Prompt</b> , right-click it, and then select <b>Run as administrator</b> . Go to the installation directory of Power Automate, by default <code>cd C:\Program Files (x86)\Power Automate Desktop</code> and run the command <code>PAD.ChildSession.Installer.Host.exe</code> to enable picture-in-picture or <code>PAD.ChildSession.Installer.Host.exe -d</code> to disable it.

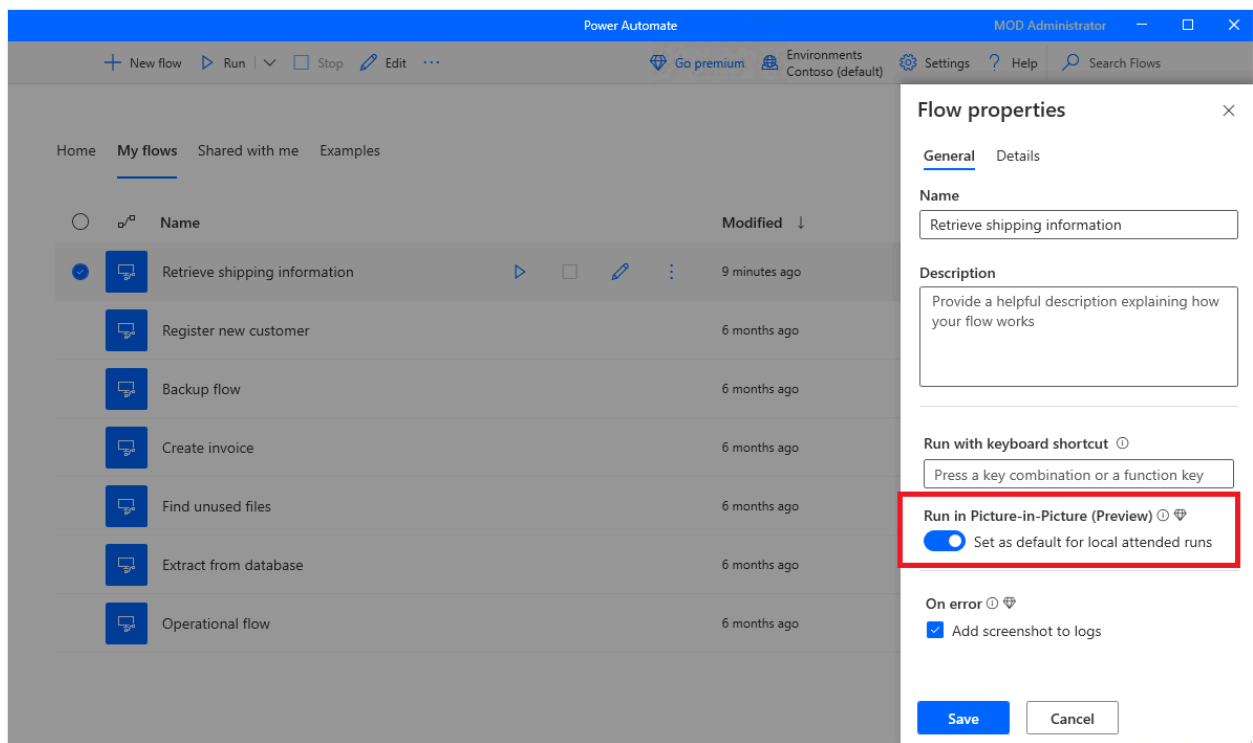
## Trigger a desktop flow from Power Automate console in picture-in-picture

You can trigger a desktop flow in picture-in-picture mode through the **Power Automate console**.

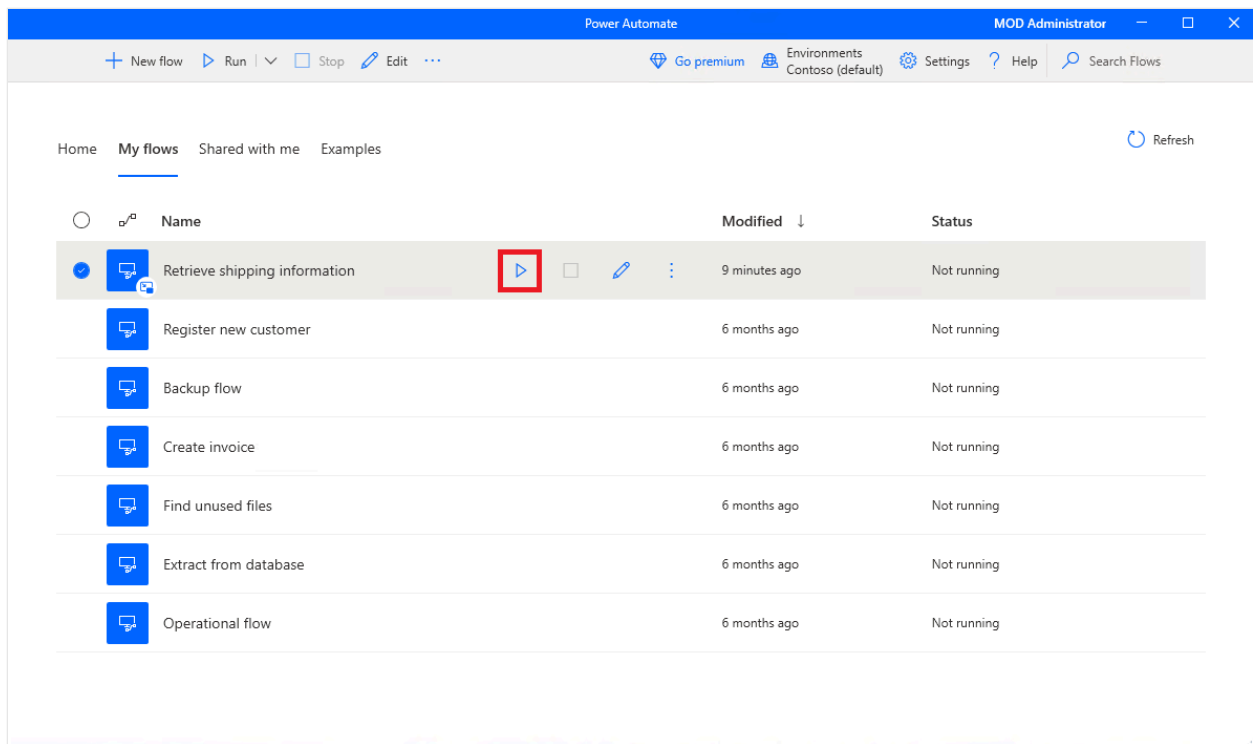
Select the target flow, open the **More actions** menu, and then select **Run in Picture-in-Picture**.



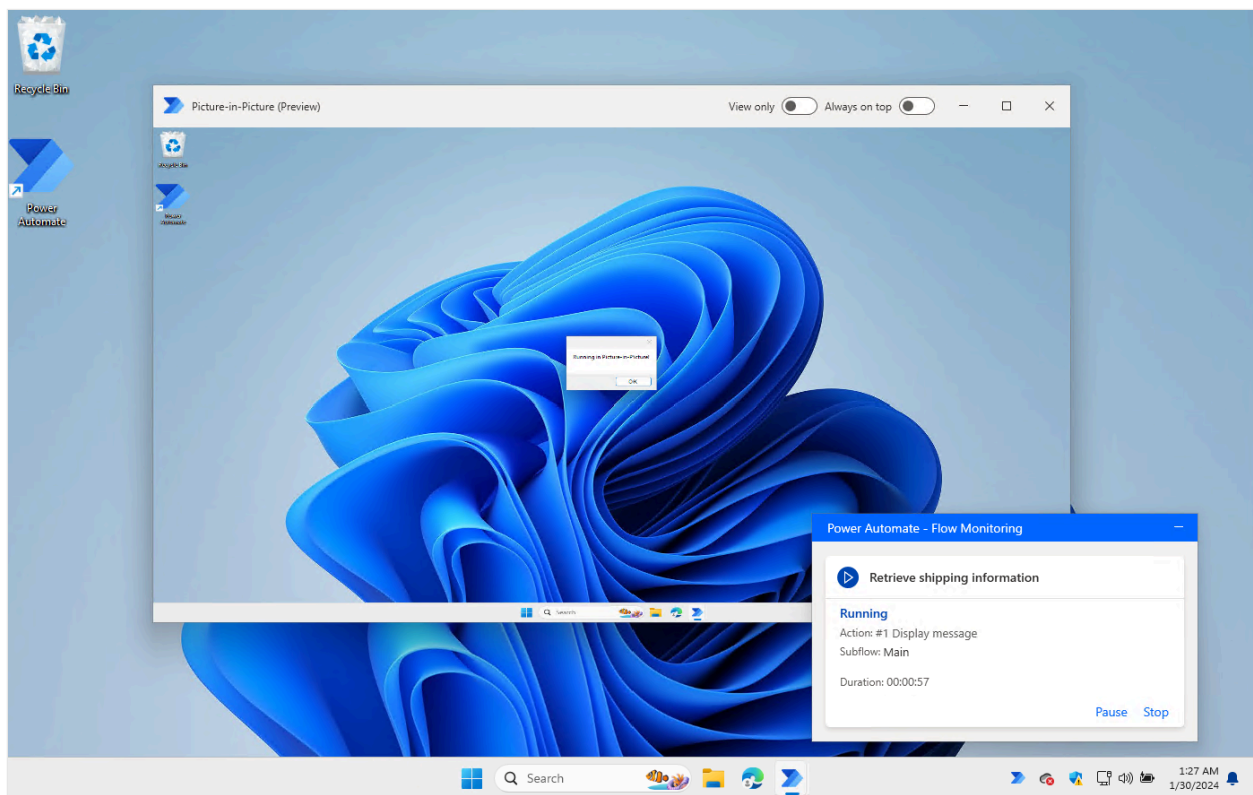
Alternatively, enable the **Run in Picture-in-Picture** flow property so that the flow always runs in picture-in-picture mode when triggered locally.







When you authenticate on the picture-in-picture session, the flow starts running within the picture-in-picture window.



Enable options **View only** to block user input, and **Always on top** to always keep the window on the foreground.

## Trigger a desktop flow from a cloud flow in Picture-in-Picture

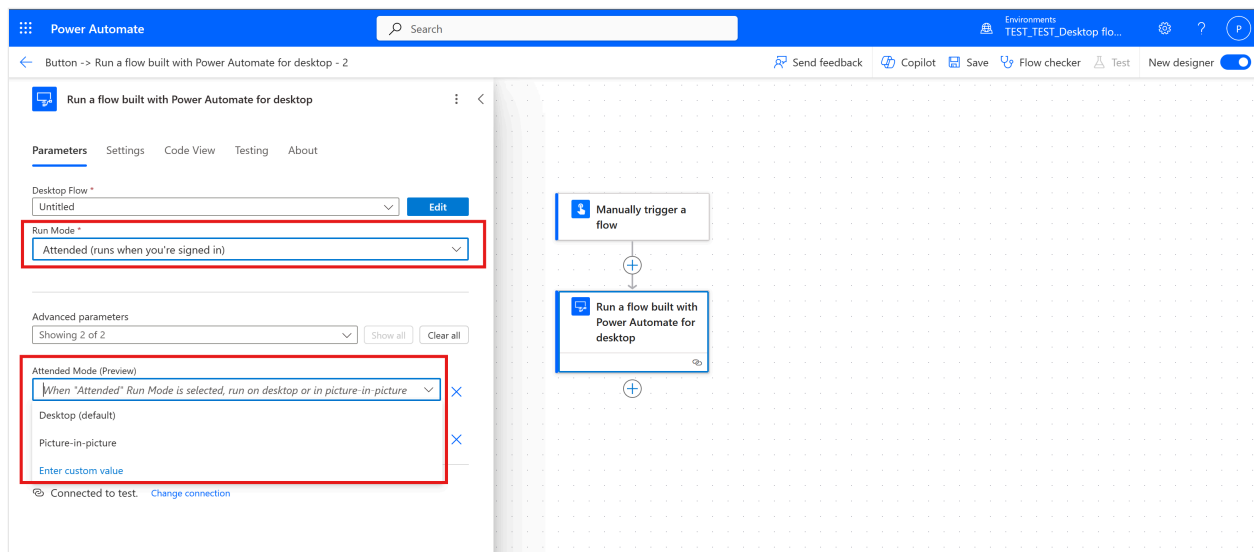
You can trigger a desktop flow in picture-in-picture mode from a cloud flow.

[Triggering desktop flows from cloud flows](#) enables you to run desktop flows in attended or unattended mode.

### **i** Important

- Running flows in picture-in-picture is available only for attended runs.

To trigger a desktop flow in Picture-in-Picture, open the action configuration pane of the **Run a flow built with Power Automate for desktop** cloud action. Set the **Run Mode** field to **Attended**, and in the Advanced parameters section, set the **Attended Mode** field to **Picture-in-picture**.

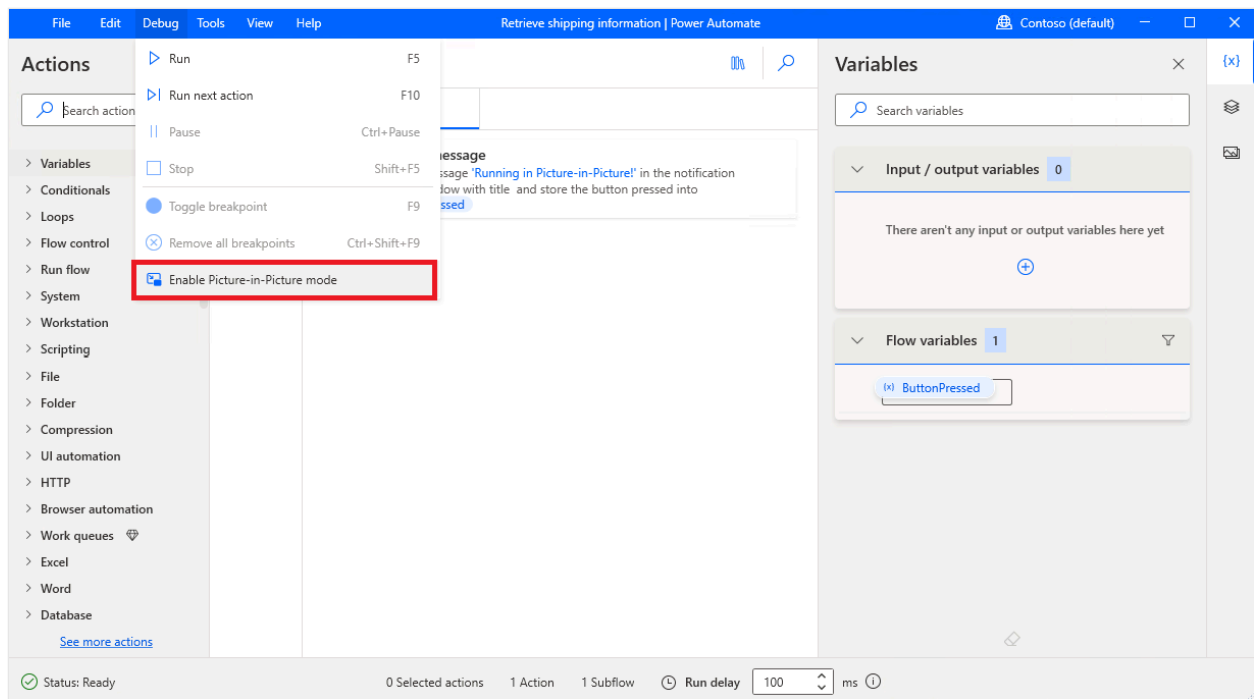


Upon triggering the desktop flow, the **Picture-in-Picture** window pops up prompting for authentication, and then the flow starts running like when you [trigger a desktop flow from Power Automate console in picture-in-picture](#).

## Debug a desktop flow in Picture-in-Picture

You can debug a desktop flow in a picture-in-picture session directly through the **Power Automate flow designer**.

To enable the picture-in-picture run mode in the designer, select **Debug > Enable Picture-in-Picture mode**.



## Limitations of Browser automation in Picture-in-Picture

Two instances of a web browser (Chrome, Firefox, or Microsoft Edge) can't open concurrently with the same user data folder in both main and picture-in-picture sessions.

If a web browser is already open on the desktop with a user data folder, then it opens in picture-in-picture with another user data folder, and vice versa.

This limitation is handled automatically with the **User data folder** parameter in the launch browser actions in the Power Automate designer. For more information, see [Launch new Microsoft Edge](#).

The **User data folder** parameter has the following options:

- Picture-in-Picture default (default option)
- Browser default
- Custom

When set to **Picture-in-Picture default**, Power Automate creates a new user data folder for the browser to use when the flow runs in picture-in-picture mode.

### Important

For browser automation to work successfully, use a launch browser action to open your web browser within the Picture-in-Picture window and enable the **Power**

Automate browser extension on the Picture-in-Picture user data folder.

If it's set to **Browser default**, the browser within the picture-in-picture session uses the default user data folder, which is the same as the one used when the flow runs in the main session.

### 📘 Important

- When **User data folder** is set to **Browser default**, the web browser can only open in one session at a time.
- When it's set to **Custom**, you can enter a custom user data folder to be used by the browser in picture-in-picture flow runs.

## Known issues and limitations

- If you're using a PIN to sign in to Windows, PIN authentication only works the first time the picture-in-picture session is opened. After that, it can only be authenticated with username and password.
- Applications that start on Windows startup are automatically opened within the picture-in-picture session as well. This might cause a conflict between the two sessions, as two instances of an application are running concurrently. To avoid this, don't set the applications to start automatically on Windows startup. To resolve this, it might be required to sign out and sign in again or restart the machine.
- Windows Home editions aren't supported.
- The machine can't be restarted or shut down while the picture-in-picture session is open.
- The clipboard is shared between the picture-in-picture session and the main session.
- With Windows Server, if multiple users are connected concurrently to the server, only one picture-in-picture session can be opened at a time.
- The default timeout to start a process in a picture-in-picture is 120 seconds. If the sign in takes longer than that, a timeout error is thrown.
- Picture-in-picture asks for credentials every time it starts in case the following Windows policy is set to *Disabled*:
  - `Local Group Policy\Computer Configuration\Administrative Templates\System\Credential Delegation\Allow delegating default credentials`
- If smartcard is used to sign in to Windows, the following policy should be set to *Not Configured* or *Disabled*:

- Computer Configuration\Administrative Templates\Windows Components\Remote Desktop Services\Remote Desktop Session Host\Device and Resource Redirection\Do not allow smart card device redirection
- 

## Feedback

Was this page helpful?



[Provide product feedback](#) 

# Manage machines

Article • 03/20/2024

Machines are the physical or virtual devices you use to automate desktop processes. When you connect your machine to Power Automate, you can instantly start your desktop automation using any of the [available triggers](#), such as predefined schedules.

Connecting your machine directly to Power Automate and the cloud allows you to harness the full power of robotic process automation (RPA).

Our direct connectivity is the easiest way to connect your machine to the cloud. Sign in to the latest version of Power Automate for desktop, and your machine will be registered automatically. Once registered, you can immediately [create a connection in your cloud flows](#).

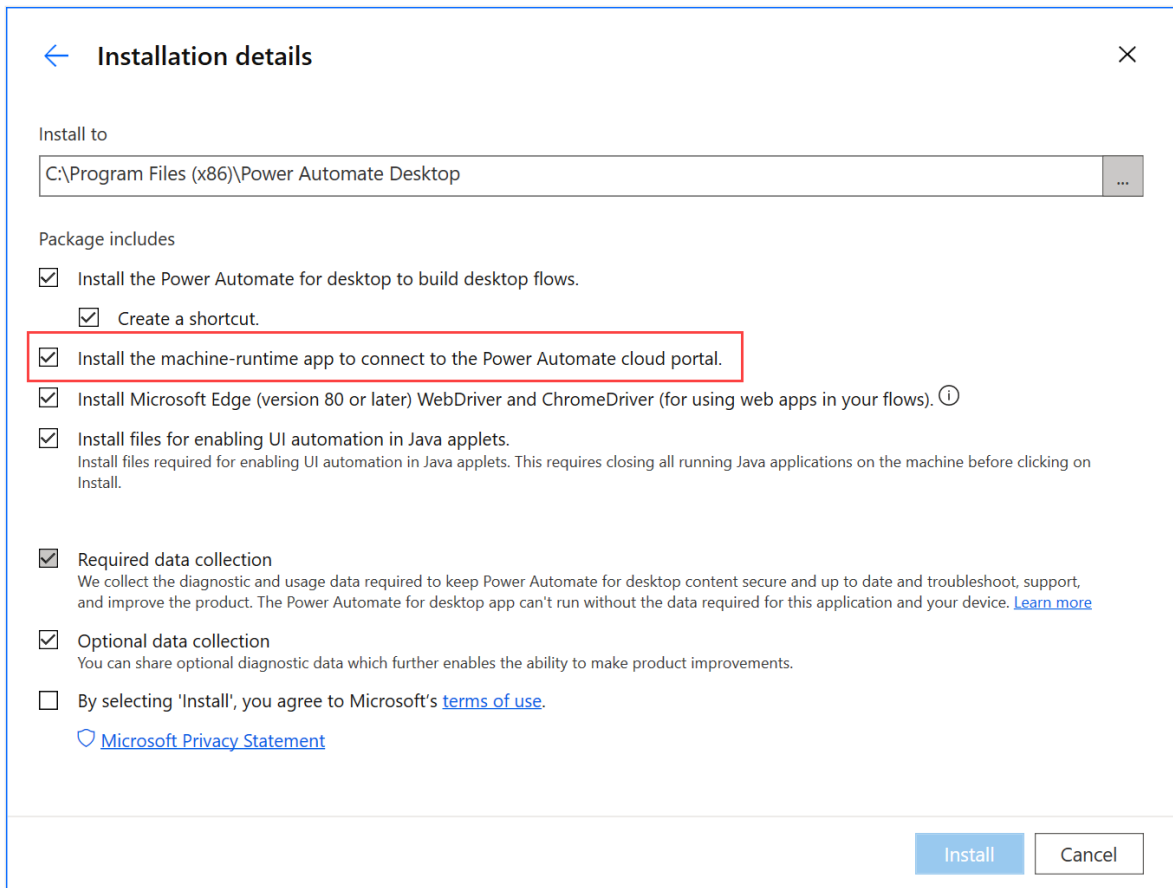
## Important

- Direct connectivity is only available for Power Automate 2.8.73.21119 or later. If you currently use an earlier version, [update to the latest](#).
- Direct connectivity isn't available for machines running Windows 10 Home or Windows 11 Home.
- To register your machine and use the machine management features, your Power Platform environment must have a version of the **MicrosoftFlowExtensionsCore** solution that is greater than or equal to 1.2.4.1.
- Before registering a machine to [run desktop flows from cloud flows](#), ensure the machine is secured and the machine's admins are trusted.

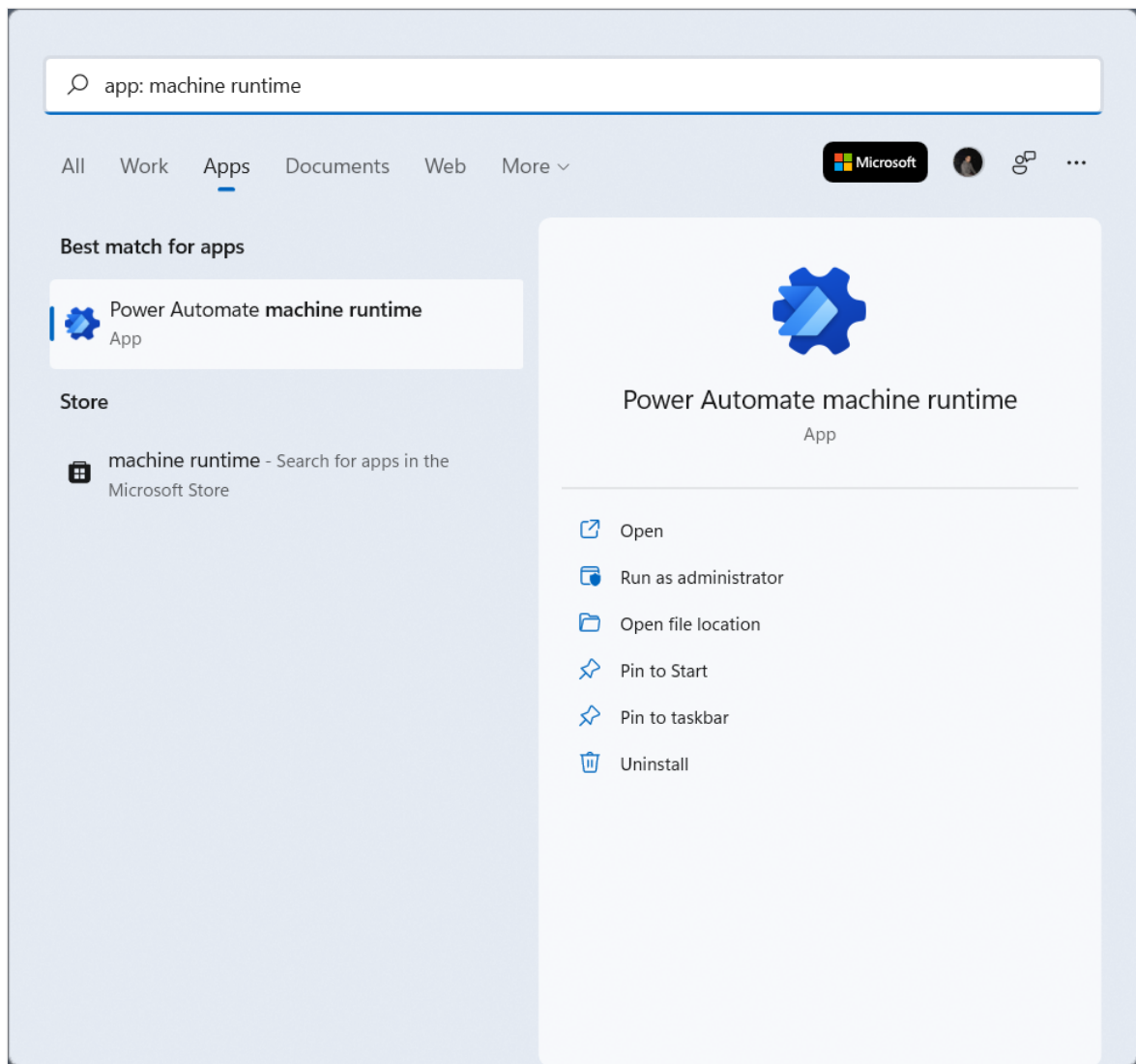
## Register a new machine

Your machine is automatically registered on the currently selected environment in Power Automate for desktop. If you don't have permission to register machines in that environment or want to use another environment, update the environment manually.

1. [Install the latest version](#) of Power Automate on your device. If you already have the latest version, skip this step. During installation, make sure you've checked the **Install the machine-runtime app to connect to the Power Automate cloud portal** option.

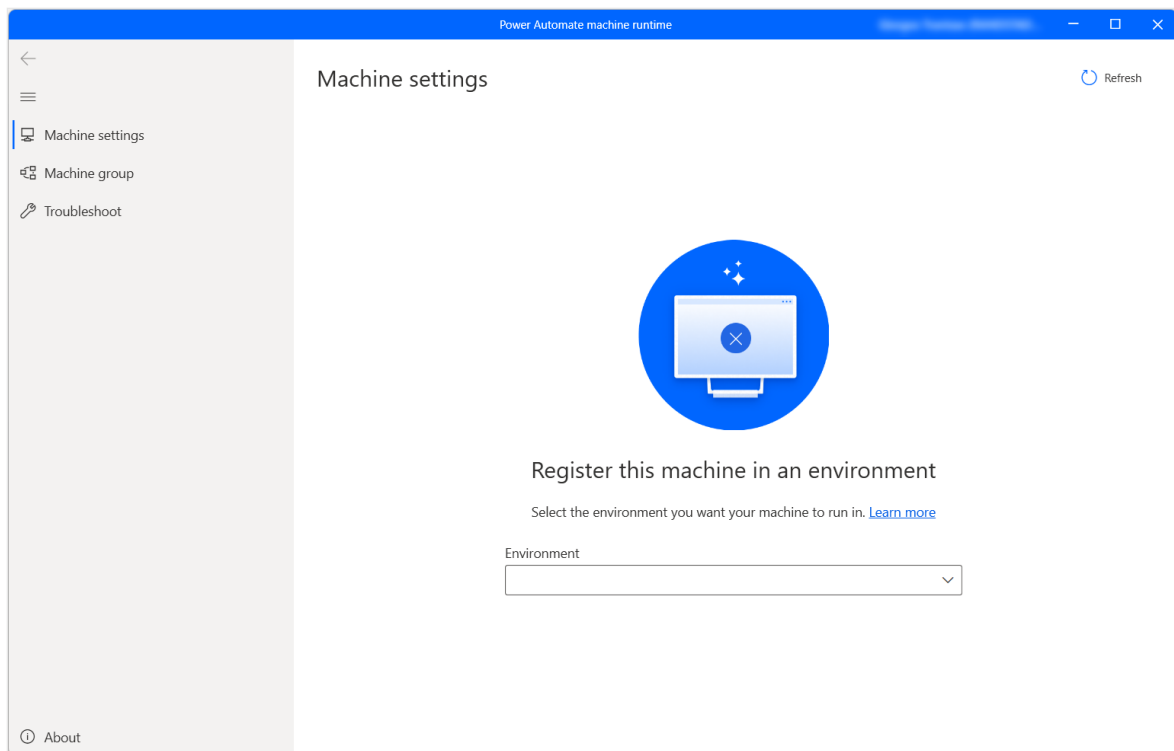


2. Launch Power Automate machine runtime.



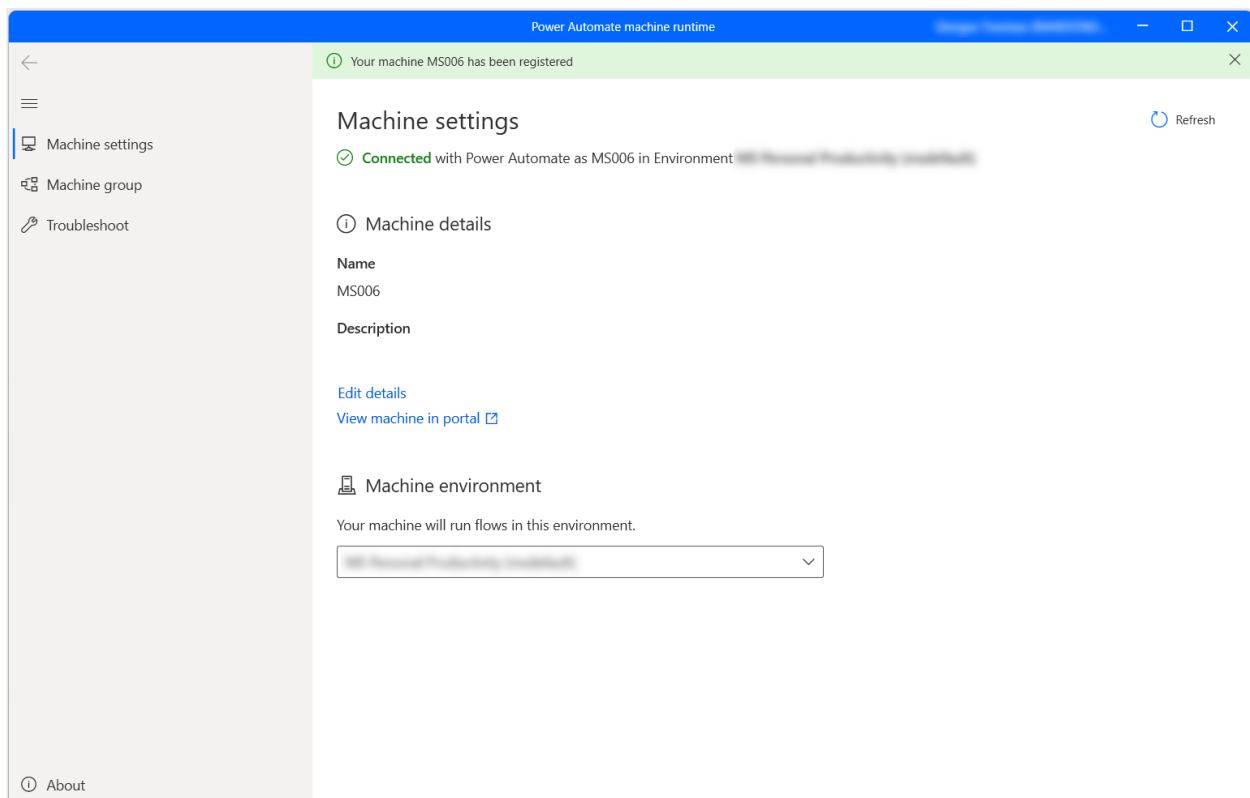
3. Sign in to Power Automate machine runtime. Your machine should be automatically registered in the currently selected environment.
4. If the machine hasn't been registered yet, a message will prompt you to select a machine-running environment. Power Automate will use this environment to run all the triggered desktop flows.





5. When the connection is established successfully, the machine settings will display the following fields regarding the machine:

- **Machine name:** A unique name to identify the machine.
- **Machine description:** An optional description of the machine.
- **Machine environment:** The running environment of the machine.



! Note

- To successfully register a machine, ensure the services specified in [IP address configuration](#) are accessible.
- You need an **Environment Maker** or **Desktop Flow Machine Owner** role to register machines. Before registering a machine, ensure you have the required permissions and an available environment to register the new machine.
- In the case of a virtual machine, don't clone the virtual machine after installing Power Automate machine runtime.
- Machines aren't affected by changes in the Power Automate for desktop organization.
- Although you can create and debug desktop flows in Teams environments, you can't register machines in them.
- If you reset your PC, your machine registration will be lost.

## Update running environment for your machine

Each machine can only run desktop flows from the cloud in one environment at a time. To update the running environment in which a machine can run desktop flows:

1. Launch Power Automate machine runtime and select **Machine settings**.
2. Under **Machine environment**, select an environment in the dropdown list.

### ⓘ Note

Changing the running environment of a machine removes all its current connections.

## Trigger a desktop flow to run on your machine

Power Automate enables you to trigger desktop flows from cloud flows using events, schedules, and buttons.

1. Edit an existing cloud flow or [create a new cloud flow](#).
2. Create a desktop flow connection using the instructions in [Create desktop flow connections](#).
3. Follow the instructions in [Trigger desktop flows from cloud flows](#) to trigger a desktop flow from your cloud flow.

### 📘 Important

- To apply this functionality, you need a [premium per-user plan with attended RPA](#) <sup>↗</sup>.
- When you create a desktop flow connection, you allow Power Automate to create a Windows session on your machine to run your desktop flows. Make sure you trust co-owners of your flows before using your connection in a flow.
- If you consistently encounter issues when creating a connection on a new machine, first try to remove it, and then [register it](#) again.

## Enable your machine for unattended mode

To trigger desktop flows in unattended mode on your machine, you need some unattended bots on the machine. Each unattended bot on a machine can carry one unattended desktop flow run at a time. So if a machine needs to execute multiple unattended runs simultaneously, it needs as many unattended bots as it has simultaneous unattended runs to perform.

To create unattended bots, allocate process capacity or unattended RPA capacity to your machine. Learn how to [allocate process capacity as an unattended bot](#) on a machine.

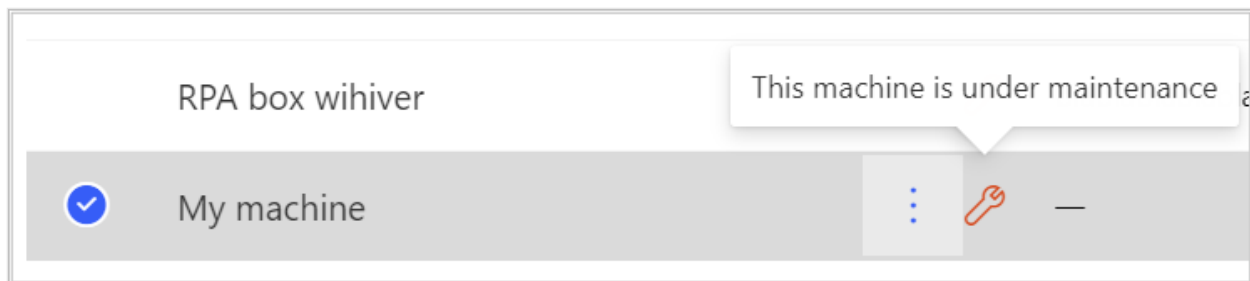
## Maintenance mode for machines

The maintenance mode enables you to stop all the desktop flow runs on machines or machine groups. This feature is useful when you need to do installations or deployments on machines and avoid run failures.

To use the maintenance mode:

1. Sign in to the [Power Automate portal](#) <sup>↗</sup>.
2. Go to **Monitor > Machines**.
3. Select a machine, go to its details page, and select **Settings**.
4. Turn on the toggle for **Enable maintenance mode**.
5. Select **Activate** in the dialog.

All the machines that are in maintenance mode are indicated with a red pictogram in the list of machines.




### ⓘ Note

- If a machine group is in maintenance mode, all the machines of the group are in maintenance mode and you can't change them individually.
- When machines require some specific actions (such as key rotation), maintenance mode is disabled.
- If a desktop flow is currently running on your machine when the maintenance mode is enabled, the run doesn't get canceled.
- When a machine is in maintenance mode, no new run is assigned to it. If the machine is standalone, the desktop flow run is put in the run queue. If the machine is part of a machine group, the desktop flow is assigned to an active machine. Timeout remains the same by default.

## View list of machines

Once you've registered a machine to an environment, you can view its details at any time in the Power Automate portal. You can also view all other machines that you have access to.

1. Sign in to the [Power Automate portal](#) .
2. Go to **Monitor > Machines**.
3. Select the desired machine. For each machine you can view:
  - Machine name.
  - Machine description.
  - Machine version.
  - Group that the machine is a part of, if applicable.
  - Machine status.
  - Number of flows running on the machine.
  - Number of flows queued on the machine, if applicable.
  - Type of access you have to the machine.

- Machine owner.

### ⓘ Note

The version of the machine gets updated with the first registration and after each desktop flow run.

## Share a machine

You can share a machine with other users in your organization and give those users specific permissions to access it.

1. Sign in to the [Power Automate portal](#).
2. Go to **Monitor > Machines**.
3. Select your machine from the list, and then select **Manage access**.
4. Select **Add people**, and enter the name of the person in your organization with whom you'd like to share the machine.
5. Select the name of the person to choose which permissions they can access the machine with.

There are two levels of permissions that you can assign when managing access to your machine:

- **Co-owner**. This access level gives full permissions to that machine. Co-owners can run desktop flows on the machine, share it with others, edit its details, and delete it.
- **User**. This access level only gives permission to run desktop flows on the machine. No edit, share, or delete permissions are possible with this access.

 Expand table

Actions	Co-owner	User
Run a desktop flow on the machine	X	X
Share the machine	X	
Add machine to group	X	
Edit details	X	

Actions	Co-owner	User
Delete machine	X	

## 6. Select Save.

The screenshot shows the 'Manage access' dialog box. On the left, a list of machines is visible, with 'MS006' selected. The main area of the dialog is titled 'Manage access' and contains the following elements:

- Add people:** A search bar and a list of users. 'ML' (User) is selected with a checkmark.
- Shared with:** A dropdown menu set to 'Sort by Name' and a list of users. 'GT' (Owner) is listed.
- Permissions:** Two radio button options:
  - User:** Selected. Description: 'Can run desktop flows on this machine.'
  - Co-owner:** Unselected. Description: 'Can run desktop flows on this machine, share it with others, edit its details, and delete it.'
- Buttons:** 'Save' (highlighted in blue) and 'Cancel'.

### ⓘ Note

When a user isn't part of an environment anymore, you'll continue seeing the user as deactivated. You'll be notified in the **Manage access** section of the machine if it's shared with deactivated users. In this situation, remove access to them.

## Delete a machine

Although you can't delete a machine from the Power Automate machine runtime, you can do it from the Power Automate portal:

1. Sign in to the [Power Automate portal](#).
2. Go to **Monitor > Machines**.
3. From the list, select the machine you want to delete.
4. Select **Delete machine** in the command bar.

## Switch from gateways to direct connectivity

### 📘 Important

Gateways for desktop flows are no longer supported. Switch to our machine-management capabilities.

### 📌 Note

To determine which desktop flow connections that are still using a gateway:

1. Sign in to [Power Automate](#) ↗.
2. Go to **Data > Gateways**.
3. Select a gateway, go to its details page, and then select the **Connections** tab.  
Any desktop flow connections listed should be switched to direct connectivity.
4. Repeat step 3 for each gateway in the list.

You can easily switch to direct connectivity by changing the desktop flow connection and using one with the **directly to machine** option.

You can edit the connection or create a new one for each desktop flow action in your cloud flow:

1. If you haven't done it yet, [update Power Automate for desktop](#) to version 2.8.73.21119 or later.
2. If you've already created a desktop flow connection, select the three dots on the top right of the action, and select **+Add new connection** under **My connections**.
3. In the **Connect** field, select **Directly to machine**.
4. Select the name of your machine.
5. Enter the credentials you would use to sign in to your machine.
6. Select **Create**.

You can also change the connections used by a cloud flow in its details page when you select **Run**.

## Update permissions based on security role

By default, all users with an **Environment Maker** role can register their machines in an environment. You can restrict actions on machines and machine groups by modifying

the **Flow Machine** and **Flow Machine Group** permissions for a particular security role.

Security Role: Environment Maker									
Details	Core Records	Sales	Service	Business Management	Service Management	Customization	Missing Entities	Business Process Flows	Custom Entities
Component Layer Data Source									
Connection Reference									
Connector									
Conversation Transcript									
Custom API									
Data Lake Folder									
Data Lake Workspace									
Dataflow									
Device Price									
Entity Image Configuration									
Environment Variable Definition									
ExportSolutionUpload									
Flow Machine									
Flow Machine Group									
Flow Session									
Help Page									
Image Attribute Configuration									
Internal Catalog Assignment									
KeyVaultReference									
Knowledge Federated Article									
Knowledge FederatedArticle Incident									
ManagedIdentity									
Model-Driven App Component Node									
Model-Driven App Component Node's Edge									
Model-Driven App User Setting									
NonRelational Data Source									
Notification									
OData v4 Data Source									
Organization Setting									

Environment admins can also restrict machine registration to a specific set of users using the three security roles that come with machine management.

[Expand table](#)

Actions	Desktop Flows Machine Owner	Desktop Flows Machine User	Desktop Flows Machine User Can Share
Register a machine	X		
Run a desktop flow	X	X	X
Share a machine	X		X
Share a machine group	X		X
Add machine to group	X		
Edit machine details	X		
Edit machine group details	X		
Delete machine	X		



<b>Actions</b>	<b>Desktop Flows Machine Owner</b>	<b>Desktop Flows Machine User</b>	<b>Desktop Flows Machine User Can Share</b>
Delete machine group	X		

## Machine and machine group limitations

 Expand table

<b>Name</b>	<b>Limit</b>
Maximum number of machines in a group	50
Maximum amount of time a desktop flow can run	24 hours
Maximum amount of time a desktop flow can be queued	Three hours

# Silent registration for machines

Article • 10/30/2023

This article describes how to use our mass deployment tool that allows you to easily install Power Automate on multiple machines. You can both register your machines to Power Automate and add them to machine groups.

## Prerequisites

To silently register your machines, you need to download and install Power Automate for desktop on the targeted devices. Visit this page to understand how to [install Power Automate silently](#).

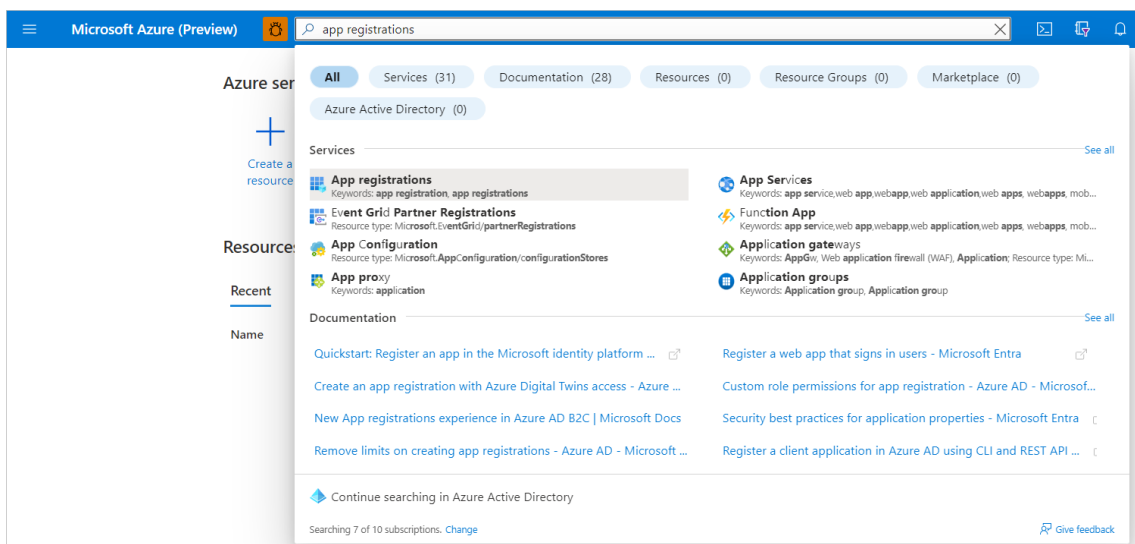
To silently register your machine and join a group, we recommend that you use a service principal account. You can also use your Microsoft Entra account.

## Using a service principal account

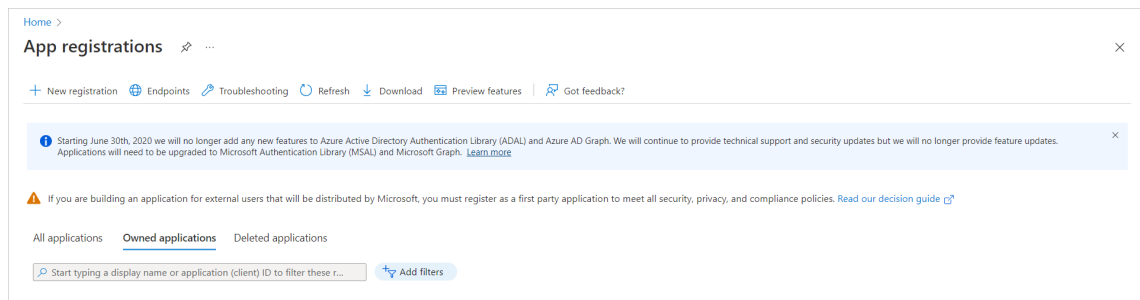
### ! Note

To create the application user, you need to have admin rights on the Dataverse environment of your tenant.

1. Create an Azure app:
  - a. Go to the Azure portal: <https://portal.azure.com/>
  - b. Search App registrations.



### c. Select **New registration**.



### d. Define a name and select **Single tenant** (or multitenant) and then select **Register**.

#### 2. Give your app the following permissions:

- Select **Add a permission**.
- Select **Flow Service**.
- Select **Flow.Read.All**.

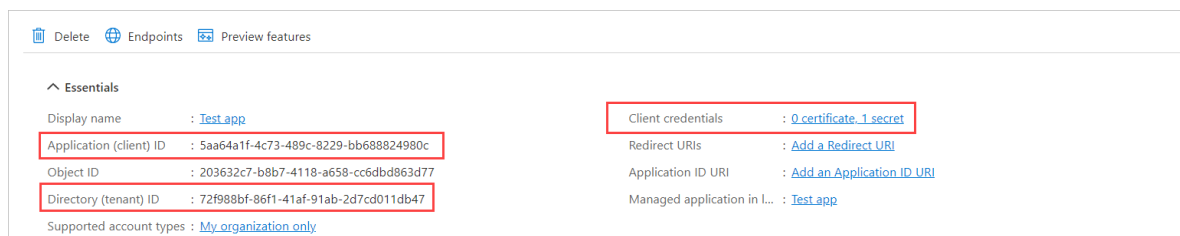
#### 3. [Create an application user](#).

#### ⓘ Note

Administrators must set users at least as Environment Makers (or Desktop Flows Machine Owners) to allow them to register machines and join groups.

#### 4. Get the following information that will be used in the Machine Registration app:

- Application ID
- Directory (tenant) ID
- Client credentials (certificate or thumbprint)



## Use the machine registration app

#### 1. Open the **Start** menu.

#### 2. Search for "command prompt" (or "PowerShell"), and then run it.

3. Change the directory to the Power Automate installation folder (by default: C:\Program Files (x86)\Power Automate Desktop).

CMD

```
cd C:\Program Files (x86)\Power Automate Desktop
```

4. You can use the help menu to have an overview of what you can do with the silent app.

CMD

```
.\PAD.MachineRegistration.Silent.exe -help
```

```
PS C:\Program Files (x86)\Power Automate Desktop> .\PAD.MachineRegistration.Silent.exe -help
Power Automate Desktop - Machine Registration Silent allow you to deploy PAD easily on multiple machines (Preview).
Scenarios:
  Register machine with username: $ <exe> -register -machinename mymachine -username account@ms.com
  Register machine with application id: $ <exe> -register -force -applicationid 654b31ae-d941-4e22-8798-7add8fd049f -clientsecret -tenantid bc301e21-fe79-4572-9768-ded9fc364da3
  Join machine group: $ <exe> -joinmachinegroup -groupid 524acc79-c2ae-43f0-a68a-47319e62a1eb -grouppassword

Options:
  -help                Display the usage guide.
  -username <string>  The username to use.
  -applicationid <string> [-clientsecret][-certificatethumbprint <string>] The application to use.
  -environmentid <string> The environment identifier to use.
  -tenantid <string> The tenant identifier to use. This parameter is required when using an application.
  -authenticationfallback <string> The registration authentication to use e.g. interactive or devicecode.
  -register [-machinename <string>][-machinedescription <string>][-force] Perform the registration with the given parameter.
  -joinmachinegroup -groupid <string> -grouppassword Perform joining the current machine to the given group.

Secure element as grouppassword and clientsecret will required to be typed and will be kept confidential.
Current version doesn't allow to perform register and join machine group on the same command.

Learn more about machine registration: https://go.microsoft.com/fwlink/?linkid=2165141
PS C:\Program Files (x86)\Power Automate Desktop>
```

## Silently register a new machine

To silently register your machine in Power Automate with the service principal account, use the register operation `-register` with the following arguments:

Connection arguments (for service principal account):

1. `Applicationid`: The application to use.
2. `Clientsecret`: The secret of the `applicationid` (you can also use the `certificateThumbprint`). You shouldn't use this input as an input to the command line. See the "Secure input" section to see options you can choose to provide it.
3. `Tenantid`: The tenant identifier to use.

Machine registration arguments:

1. `Environmentid` (optional): The environment where the machine will be registered. If not provided, the machine is registered in the default environment. You can retrieve it in the URL of Power Automate.
2. Machine name (optional): The name of the registered machine.

3. Machine description (optional): The description of the registered machine.
4. `force` (optional): The force flag used to override an existing registration. Overriding a registration will break existing connections to the machine.

#### ⓘ Note

"force" argument can be really useful in case your existing machine is in a bad state with no other available environment to unregister/re-register your machine.

#### CMD

```
.\PAD.MachineRegistration.Silent.exe -register -applicationid appid -  
clientsecret (or -certificatethumbprint thumbprint) -tenantid tenantid  
-environmentid envid
```

#### ⓘ Note

If you decide to use an Microsoft Entra account, you can specify the username: `-username [UPN]` instead of service principal account arguments

## Silently join a machine group

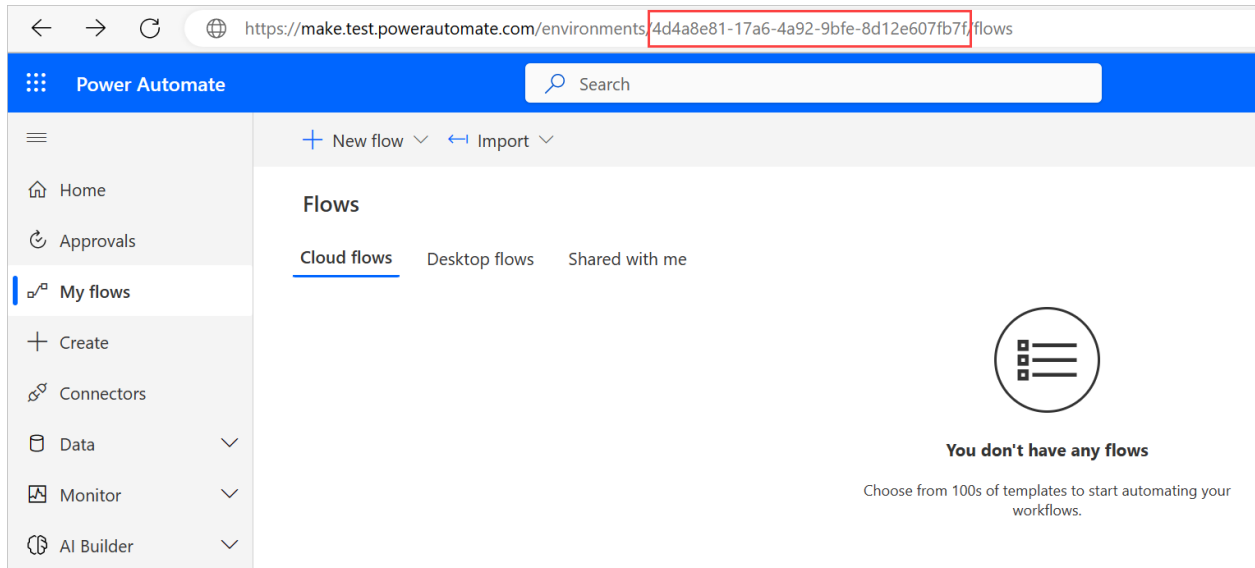
#### ⓘ Note

You can't create a machine group silently. You'll need to create it from the portal (and share it with your application user if you're using a service principal) before adding machines silently.

To join a group silently with the service principal account, use the join group operation - `joinmachinegroup` with the following arguments:

1. `Environmentid`: The environment where the machine group is registered. You can retrieve it in the URL of Power Automate.
2. `Groupid`: The ID of the machine group you want to join. You can retrieve it in the URL of Power Automate when you are in the machine group details page.
3. `Grouppassword`: The password of your machine. If this machine is the first machine of the group, you need to define it. If not, you need to provide the defined

password of the group. You shouldn't use this input as an input to the command line. Go to the "Secure input" section to see options you can choose to provide it.



#### CMD

```
.\PAD.MachineRegistration.Silent.exe -joinmachinegroup -groupid groupid -grouppassword -applicationid appid -clientsecret (or -certificatethumbprint thumbprint) -tenantid tenantid -environmentid envid
```

#### ⓘ Note

To use an Microsoft Entra account, specify the username: `-username [UPN]` instead of service principal account arguments.

## Secure input

In the machine registration tool, you'll have to provide secure inputs for registration and joining the group.

You have two options to provide a secure input:

1. Type when asked: You'll be prompted to enter this data when needed. This option is an interactive action that isn't adapted if you need to do mass deployment.
2. Redirect string/file to the silent registration application:
  - Redirect string (if you need to input multiple strings, you can do it easily in PowerShell):

PowerShell

```
echo clientsecret mypassword |  
.\PAD.MachineRegistration.Silent.exe -joinmachinegroup -  
applicationid appid -clientsecret -groupid groupid -grouppassword  
-tenantid tenantid
```

- Redirect file:
  - a. Create a TXT file that contains your password and save it in a Power Automate folder (you'll need admin privileges).
  - b. Use the following command:

For cmd prompt:

CMD

```
grouppassword < pwd.txt
```

For PowerShell:

CMD

```
Get-Content password.txt | .\PAD.MachineRegistration.Silent.exe  
-joinmachinegroup -groupid groupid -grouppassword
```

# Manage machine groups

Article • 02/27/2024

Machine groups allow you to group multiple machines together to help distribute your automation workload and optimize productivity.

You can assign desktop flows to a machine group, and they'll be automatically queued to it when triggered to run. Then, when a machine in the group is available, Power Automate will assign the next available desktop flow to it. To find more information about queues, go to [Monitor desktop flow queues](#).

## Create a machine group

You can create machine groups through the Power Automate machine runtime application or the Power Automate portal.

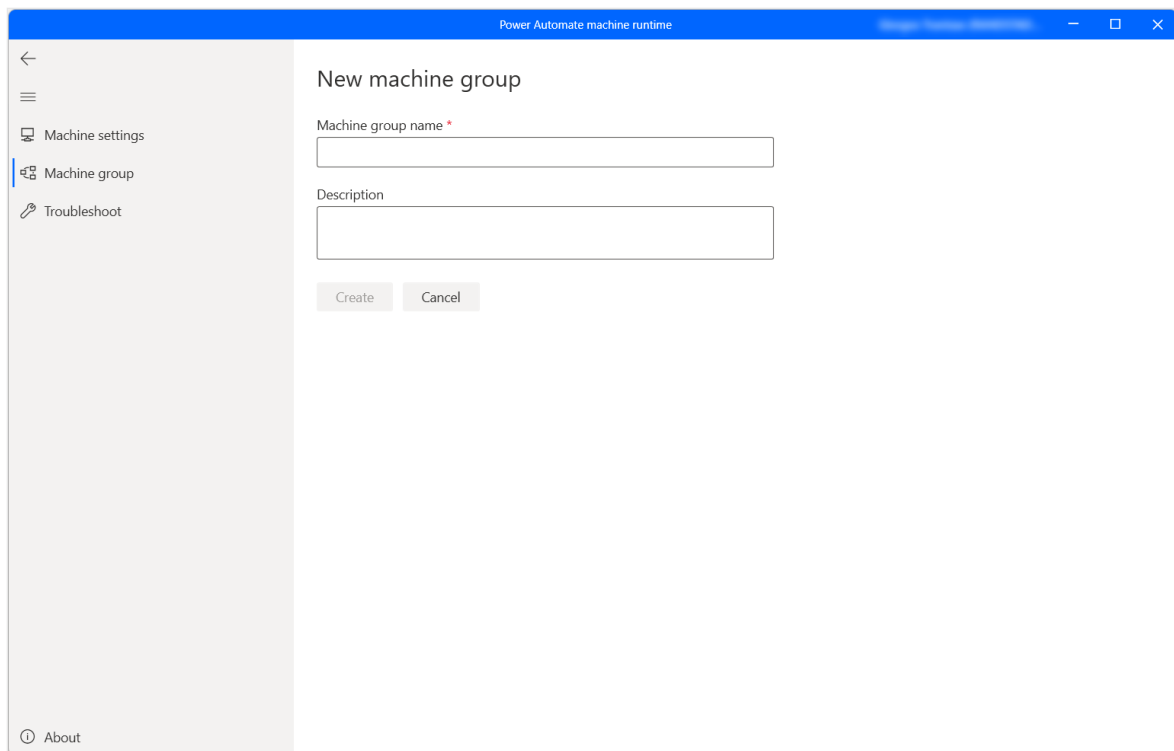
### ⓘ Note

To launch Power Automate machine runtime, launch Power Automate for desktop and go to **Settings > Open machine settings**.

From the Power Automate machine runtime application:

1. Sign in to the **Power Automate machine runtime** application.
2. Select **Machine group** and then select **New machine group**.
3. Enter a name for your machine group, and optionally add a description.
4. Select **Create**.





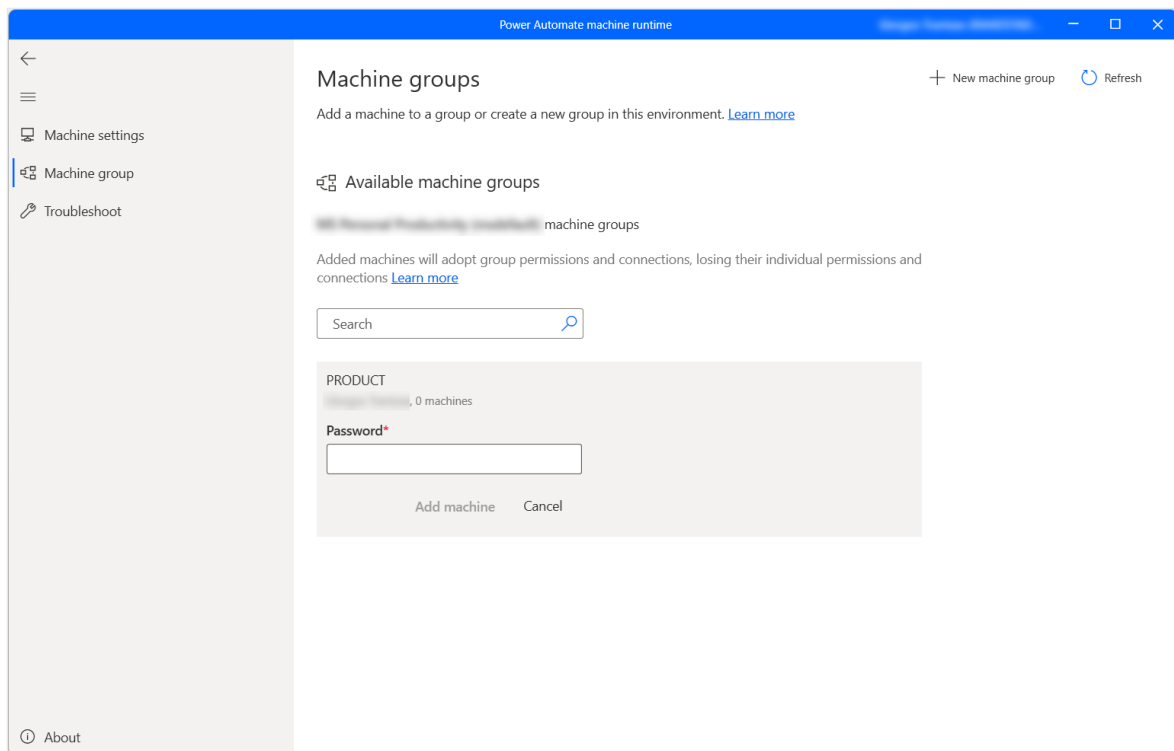
From the Power Automate portal:

1. Sign in to the [Power Automate portal](#).
2. Go to **Monitor > Machines**.
3. Select **New machine** and then select **Group**.
4. Enter a name for your machine group, and optionally add a description.
5. Select **Create**.

## Add your machine to a group

You need at least one machine in a group to run desktop flows. To add a machine to a machine group:

1. Launch Power Automate machine runtime and select **Machine group**.
2. In the displayed list, you can find all the available machine groups. Select the desired group and fill in the required credentials.



3. If it's the first time adding a machine to this group, you need to create a password for your group. This password limits access for users who can add machines to the group. Make sure you keep the password, as you'll be unable to recover it. If you've added a machine before, enter the password for the group.

4. Select **Add machine**.

When you add your machine to a machine group, any connections currently targeting your machine will break. Update these connections to target the machine group.

#### ⓘ Note

- To register a machine, you need to have an Organization premium account.
- In the case of a virtual machine, don't clone the virtual machine after installing the Power Automate machine runtime application.
- Machines aren't affected by changes in the Power Automate for desktop organization.

## Trigger a desktop flow to run on your machine group

Power Automate enables you to trigger desktop flows from cloud flows using events, schedules, and buttons.

1. Edit an existing cloud flow or [create a new cloud flow](#).
2. Create a desktop flow connection using the instructions in [Create desktop flow connections](#).
3. Follow the instructions in [Trigger desktop flows from cloud flows](#) to trigger a desktop flow from your cloud flow.


#### Important

- If you use local Windows accounts, all machines in the group must have the same local account with the same password. Use these credentials when you create the desktop flows connection.
- If you use Active Directory or Microsoft Entra joined machines, confirm that the user account in the desktop flow connection can access all the machines in the cluster.

## Maintenance mode for machine groups

The maintenance mode allows you to stop all the desktop flow runs on machines or machine groups. This feature can be useful when you need to do installations or deployments on machines and avoid run failures.

To use the maintenance mode:

1. Sign in to the [Power Automate portal](#) .
2. Go to **Monitor > Machines**.
3. Select a machine group, go to its details page, and select **Settings**.
4. Turn on the toggle for **Enable maintenance mode**.
5. Select **Activate** in the dialog box.

#### Note

- If a machine group is in maintenance mode, all the machines of the group are in maintenance mode and you can't change them individually.
- If a desktop flow is currently running on your machine when the maintenance mode is enabled, the run doesn't get canceled.

- When a machine group is in maintenance mode, the desktop flow run is put in the run queue. Timeout remains the same by default.
- When a machine group is back to active mode, all the machines of the group are activated again (except if there is an action required on the machine).

## View list of machine groups

Once you've created a machine group in an environment, you can view its details at any time in the Power Automate portal. You can also view all other machines groups that you have access to.

1. Sign in to the [Power Automate portal](#).
2. Go to **Monitor > Machines**.
3. Select **Machine groups**.
4. Select the desired machine group. For each machine group you can view:
  - The name of the machine group.
  - The description of the machine group.
  - The number of the machines in the group.
  - The number of flows running in the machine group.
  - The number of flows queued in the machine group.
  - The type of access you have to the machine group.
  - The owner of the machine group.

## Share a machine group

You can share a machine group with other users in your organization and give those users specific permissions to access it.

1. Sign in to the [Power Automate portal](#).
2. Go to **Monitor > Machines**.
3. Select **Machine groups** and then select the desired machine group from the list.
4. Select **Manage access**.
5. Select **Add people** and enter the name of the person in your organization with whom you'd like to share the machine group.

6. Select the name of the person to choose which permissions they can access the machine group with.

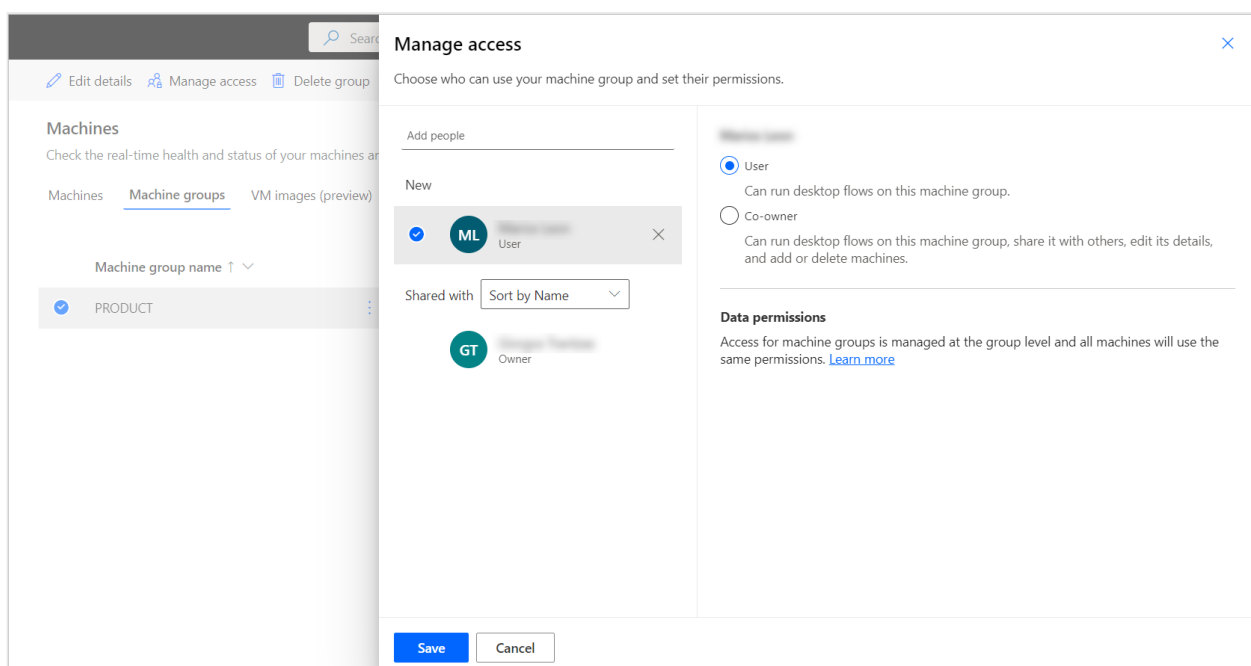
There are two levels of permissions that you can use when managing access to your machine groups:

- **Co-owner.** This access level gives full permissions to the machine group. Co-owners can run desktop flows on the machine group, share it with others, edit its details, and add or delete machines.
- **User.** This access level only gives permission to run desktop flows on the machine group. No edit, share, or delete permissions are possible with this access.

 Expand table

Actions	Co-owner	User
Run a desktop flow on the group	X	X
Share the machine group	X	
Add machines to group	X	
Remove machines from group	X	
Edit details	X	
Delete machine group	X	

7. Select **Save**.



The screenshot shows the 'Manage access' dialog box. On the left, there's a sidebar with 'Machines' and 'Machine groups' tabs. The 'Machine groups' tab is active, showing a list with 'PRODUCT' selected. The main dialog area has a search bar and 'Add people' section. Under 'New', 'ML User' is selected with a checkmark. Under 'Shared with', 'GT Owner' is listed. The 'Permissions' section has 'User' selected with a radio button. The 'Data permissions' section is at the bottom, with a 'Save' button highlighted in blue and a 'Cancel' button next to it.

## ⓘ Note

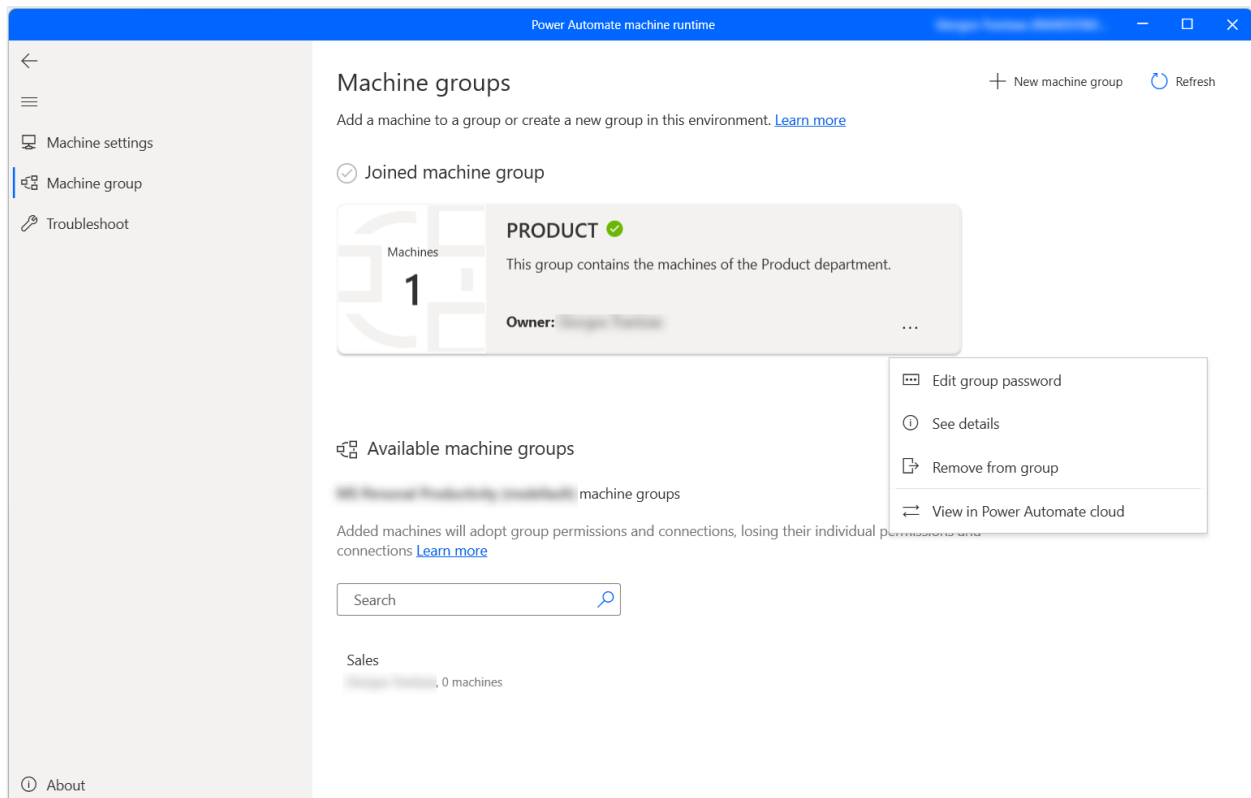
When a user isn't part of an environment anymore, you can continue to see the user as deactivated. You'll be notified in the **Manage access** section of the machine group if it's shared with deactivated users. In this situation, remove access to them.

Access for machine groups is managed at the group level. All machines in the group will use the same permissions and connections.

If the permissions of a machine and its group fall out of sync, certain actions for that machine might no longer be available, and your machine and machine group might not behave as expected. For example, this issue might appear if you modify the permissions of the group directly in Microsoft Dataverse. Ensure the permissions between the machine and machine group are consistent to avoid any such issues.

## Change the machine group of a machine

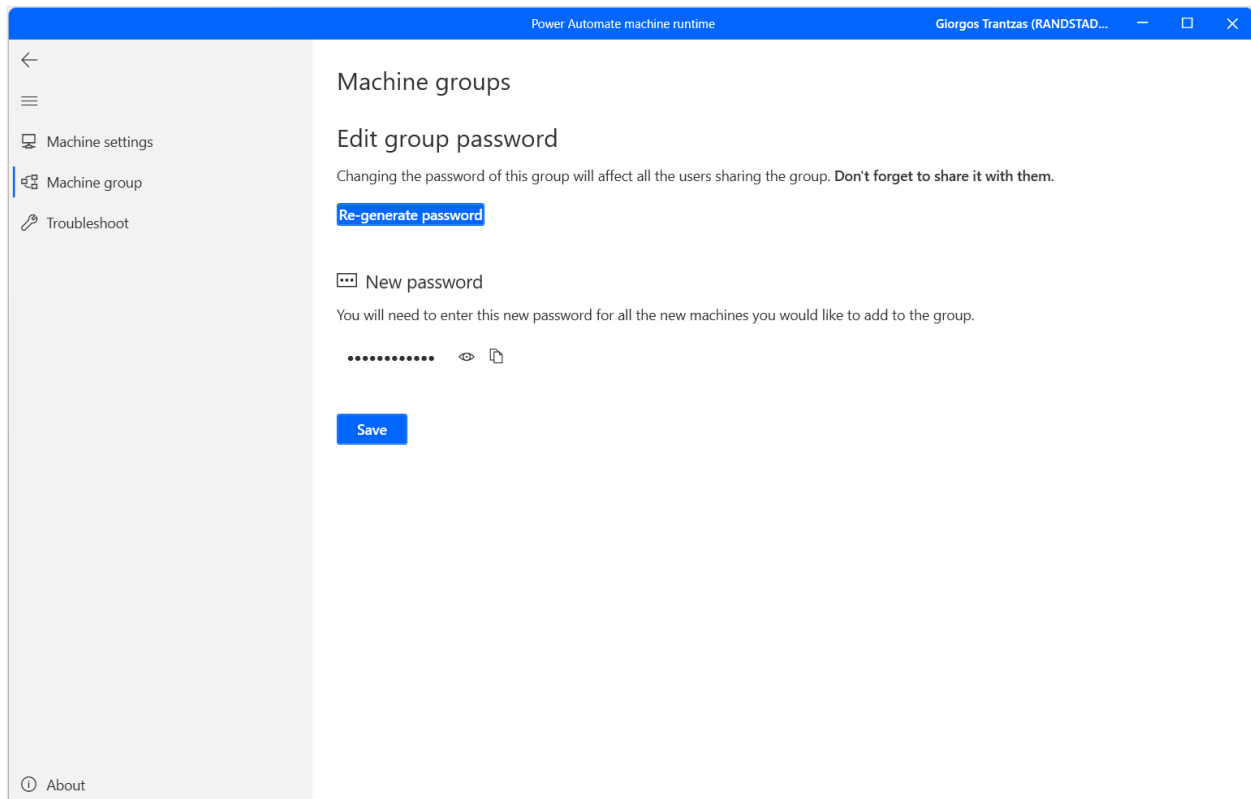
To change the machine group that contains your machine, select another group in the list of the available machine groups and fill in the required credentials. If you want to remove the machine from a group without adding it to a new one, select **Remove from group**.



## Change machine group's password

To change the password of the currently used machine group:

1. Select the dots on the machine group card and then select **Edit group password**.
2. Select **Re-generate password**, copy the automatically generated password, and save the changes.



## Update permissions based on security role

By default, all users with an **Environment Maker** role can register their machines in an environment. You can restrict actions on machines and machine groups by modifying the **Flow Machine** and **Flow Machine Group** permissions for a particular security role.

Security Role: Environment Maker									
Details	Core Records	Sales	Service	Business Management	Service Management	Customization	Missing Entities	Business Process Flows	Custom Entities
Component Layer Data Source									
Connection Reference									
Connector									
ConversationTranscript									
Custom API									
Data Lake Folder									
Data Lake Workspace									
Dataflow									
Device Price									
Entity Image Configuration									
Environment Variable Definition									
ExportSolutionUpload									
Flow Machine									
Flow Machine Group									
Flow Session									
Help Page									
Image Attribute Configuration									
Internal Catalog Assignment									
KeyVaultReference									
Knowledge Federated Article									
Knowledge FederatedArticle Incident									
ManagedIdentity									
Model-Driven App Component Node									
Model-Driven App Component Node's Edge									
Model-Driven App User Setting									
NonRelational Data Source									
Notification									
OData v4 Data Source									
Organization Setting									

Environment admins can also restrict machine registration to a specific set of users using the three security roles that come with machine management.

[Expand table](#)

Actions	Desktop Flows Machine Owner	Desktop Flows Machine User	Desktop Flows Machine User Can Share
Register a machine	X		
Run a desktop flow	X	X	X
Share a machine	X		X
Share a machine group	X		X
Add machine to group	X		
Edit machine details	X		
Edit machine group details	X		
Delete machine	X		



Actions	Desktop Flows Machine Owner	Desktop Flows Machine User	Desktop Flows Machine User Can Share
Delete machine group	X		

## Machine and machine group limitations

 Expand table

Name	Limit
Maximum number of machines in a group	50
Maximum amount of time a desktop flow can run	24 hours
Maximum amount of time a desktop flow can be queued	Six hours

## Other known limitations

- Machine groups aren't available in the Government Community Cloud (GCC), Government Community Cloud - High (GCC High), Department of Defense (DoD), or China regions. You can still run desktop flows using machine-management capabilities. Learn more about [switching from gateways to direct connectivity](#).
- When you trigger multiple desktop flows in parallel on a machine group, machine selection might take up to 50 seconds before assigning the desktop flow to an available machine. In these rare cases, desktop flow runs might seem to be running sequentially, if they have short run durations.

# Machine group certificate renewal

Article • 02/24/2023

## ⓘ Note

This feature is currently under rollout until March 31, 2023.

Machine group certificates secure credentials in desktop flow connections and identify machines with Power Automate. Security best practices require certificates to be renewed regularly. Power Automate automatically performs this renewal that doesn't affect your runs.

While using Power Automate, you may notice a key icon next to your machine in the Power Automate portal, and the following message: **Machine group security has been updated. Re-generate a machine group password before adding a new machine.**

These messages indicate that if you need to [add another machine to the group](#), you must sign in to one of its existing machines and [regenerate the password](#). These messages appear after a certificate renewal has started on that machine group.

## Prerequisites

- Machines with Power Automate for desktop version 2.23 or above.
- Machines need to be online at least once in the last six months before the certificate expires (once every five years). The mentioned values are the default, but can be changed.

## Recommendation

- During the renewal period of a machine group, use Desktop flow connections targeting this group once. This step will prevent the need to fix your Desktop flow connections when the renewal period has ended. For more information about desktop flow connections, go to [Create desktop flow connections](#) .

## ⓘ Important

The certificate renewal duration is long enough for machines and Desktop flow connections to be updated without needing specific user action.

# Information for admins

To find information for admins about machine group certificate renewal, go to [Machine group certificate renewal for admins](#).

## Corner cases

- **Case:** I can't add my machine to an empty machine group. The Power Automate machine runtime app says the password is incorrect.

**Description:** Machine groups need at least one machine connected to have their certificates renewed. If a machine group is empty or inactive during the renewal, its certificate will expire. You can't use these machine groups and you should delete them.

- **Case:** Following a certificate renewal, my machines on Power Automate for desktop version 2.21 or earlier can't be connected anymore.

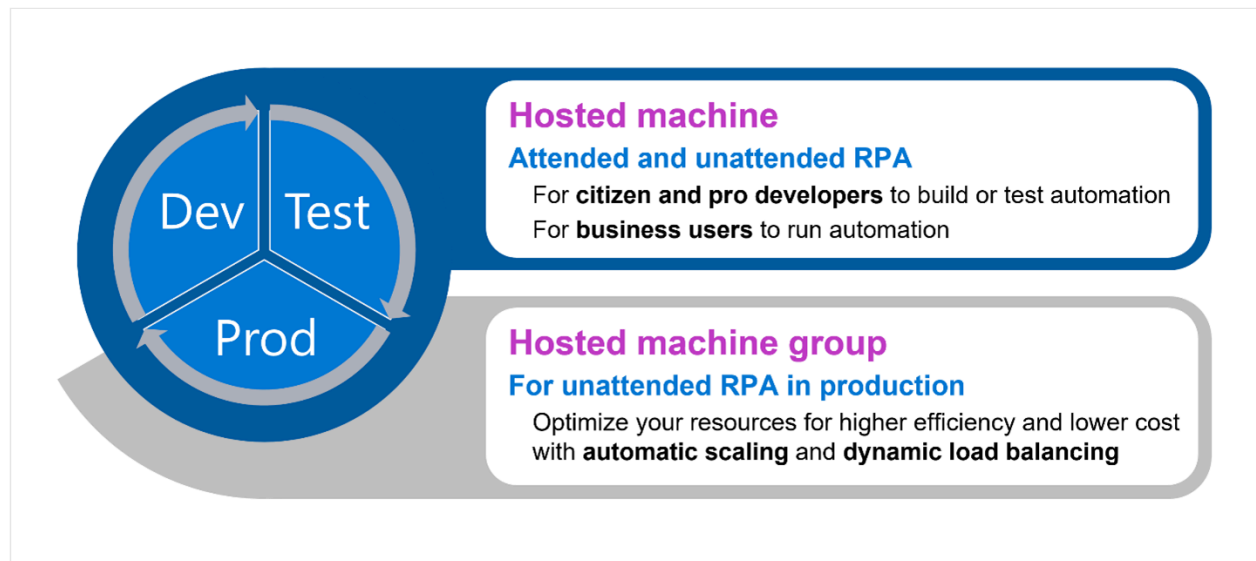
**Description:** These versions are outdated and can't renew their certificate. You must update Power Automate for desktop and rejoin them to their group.

# Introduction to the Power Automate hosted RPA

Article • 05/01/2024

Microsoft Power Automate supports two hosted robotic process automation (RPA) scenarios that provide developers and Center of Excellence admins a simple way to set up and scale automations:

1. **Hosted machines** enabling developers to build or test automation and business users to run automation.
2. **Hosted machine groups** can automatically scale workloads to optimize unattended automation in production, delivering improved business process continuity and governance at scale.



Using Microsoft hosted infrastructure running in Azure, Power Automate hosted RPA empowers you to run RPA quickly and at scale while freeing up resources and reducing costs.

Setting up RPA infrastructure manually is time consuming. It can take days to get machines for automation—from the initial machine request and creation to installation and assignment. Power Automate delivers a consistent setup experience and license for both individual hosted machines and hosted machine groups, making it faster and easier to set up and manage RPA for your organization. Instead of doing all the heavy lifting yourself, anyone with just a few basic parameters can build, test, and run a large-scale automation in minutes. Just give it a name, select the base image and account to be used, and you're all set!

If you need more advanced automation for specific desktop applications, you can bring your own virtual machine (VM) image through our integration with Azure Compute Gallery. For common scenarios, a Windows image sufficient for web automation is provided by default.

## Hosted machines for attended and unattended automation

[Hosted machines](#) give developers a quick and simple way to build, test, and run desktop flows without providing or setting up any physical machines.

When testing is complete, the desktop flow can be deployed on a single machine to support individual business users running in both attended and unattended mode. For unattended scenarios that are more robust, you start by building the desktop flow on a hosted machine. Then, it can be assigned to a machine group that distributes and scales the automation workload based on demand.

## Hosted machine groups for unattended automation at scale

### Automatically react to spikes in demand with scalable infrastructure

Planning for variability in RPA utilization is challenging and time-consuming, making it difficult to guarantee response times when speed is necessary. When additional capacity is needed, critical processes are slowed or put on hold waiting for support teams to set up and allocate more machines. In some cases, large pools of machines are allocated to support peak-load processes, resulting in low average machine utilization and higher costs.

[Hosted machine groups](#) solve this problem by automatically provisioning hosted bots when needed. Bots are virtual machines running in Azure that run your automation flows unattended and can scale to run simultaneously on multiple Windows VMs. When a desktop flow waits in the queue and no bot is available, a new bot is created automatically up to the maximum number of bots determined by the admin. There's no need to set up or register those machines and they can be easily reassigned to different workloads whenever you need them.

You don't have to worry about whether you have enough machines to run your automations when demand spikes, or whether you underutilized machines adding cost without delivering value to your organization.

## Improve efficiency with dynamic load balancing

Hosted machine groups let you share resources among different automation scenarios. Multiple RPA processes with varying load levels are automatically scaled in and out based on real-time load. The number of bots allocated to the group are automatically assigned across different RPA processes, ensuring available machines are efficiently utilized.

For example, you can have 10 bot capacity shared between two groups—let's say one for sales and one for finance. If finance requires additional processing capacity while sales workloads are light, the majority of the 10 bot capacity will be assigned to finance. When finance's processing is complete or returns to normal levels, the bot machines assigned to finance are available again for sales or other hosted machine groups to run their workloads.

## Get started with hosted machines and groups

Learn more about [Hosted machines](#) and [Hosted machine groups](#) and see [pricing for hosted process licenses](#) [↗](#).

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) [↗](#)

# Hosted machines

Article • 07/16/2024

Hosted machines allow you to build, test, and run attended and unattended desktop flows without providing or setting up any physical machines.

You can create hosted machines directly through the Power Automate portal. Power Automate automatically provisions a Windows machine based on your configuration and registers it to your environment. Access your hosted machines in the Power Automate portal and start building your desktop flows within minutes. Hosted machines use [Windows 365](#) for provisioning and access.

Here are some of the highlights of what you can do with hosted machines:

- Build and test desktop flows using Power Automate for desktop.
- Run attended and unattended desktop flows.
- To distribute your automation workload, assign your hosted machines to [machine groups](#).

Key capabilities:

- **Work or school account integration:** Enables access to resources that are part of the business plan linked to your organization, such as Office, SharePoint, and Azure.
- **Vanilla or custom VM images for your hosted machine:** Use a vanilla virtual machine (VM) image provided by Microsoft or personalize your hosted machines by providing your own Windows image directly from your Azure Compute Gallery. Providing your own Windows image allows you to have all your applications installed on the provisioned hosted machines.
- **Connect to your own virtual network:** Securely communicate with each other, the Internet, and your on-premises networks.

## ⓘ Note

- Sign-in access is only available to the creator of the hosted machine.
- You can run unattended desktop flows using a work or school account that is different from the creator of the hosted machine, provided that you add the account on the hosted machine.

# Licensing requirements

To use hosted machines, you need the **Power Automate Hosted Process** license (previously Power Automate hosted RPA add-on). Assign to your environment as much capacity as the number of hosted machines you want to run in your environment.

You also need the following prerequisite licenses: Windows, Intune, Microsoft Entra ID.

## ⓘ Note

The Hosted Process licenses the machines and not the user. The Premium user plan is required to run attended RPA, and for RPA developers to build and manage desktop flows on the Power Automate portal. To learn more about the Premium RPA features that come with the Premium user plan, go to [Premium RPA features](#).

## Trial licenses for evaluation

To evaluate hosted machines, you need one of the following trial licensing options:

- Use the **Power Automate Hosted Process** license

The Power Automate hosted RPA add-on have trial versions that last 30 days and can be extended once to a total of 60 days. Organization admins can obtain up to 25 user licenses from [Microsoft 365 admin center](#), assign those Power Automate Premium (previously Power Automate per user plan with attended RPA) trials to 25 individual makers, and assign the hosted RPA add-ons to the targeted environment.

- Use the **90-days self-assisted premium trial**.

Trial users are granted the capacity of one hosted machine per tenant. To start a trial, select **Try free** under **Power Automate Premium** in the [Power Automate pricing page](#) or the desktop flow page of the [Power Automate portal](#).

## ⓘ Note

Hosted machine capacity based on the 90-days self-assisted premium trial has been temporarily disabled until further notice.

## Prerequisites



This section presents all the prerequisites to create and use hosted machines.

## Microsoft Entra and Intune requirements

- A valid and working Intune and Microsoft Entra tenant.
- Ensure that Intune device type enrollment restrictions are set to **Allow Windows (MDM) platform for corporate enrollment**.

To find more information about the Microsoft Entra and Intune requirements, go to [Windows 365 requirements](#).

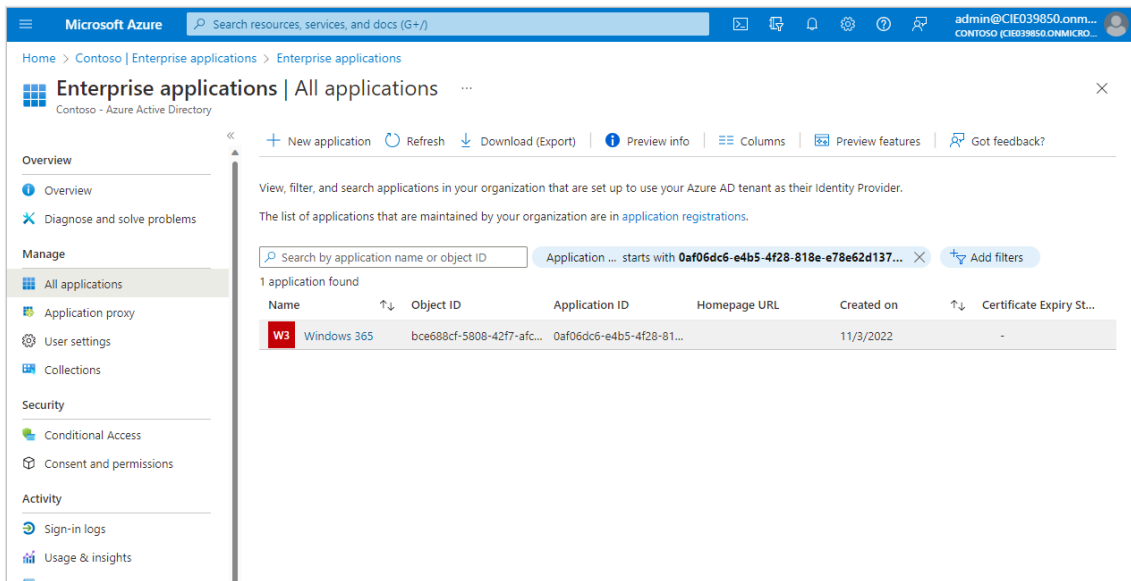
## Windows 365 Cloud PC and Azure Virtual Desktop service principal

### ⓘ Note

The Windows 365 and Azure Virtual Desktop service principals should automatically be created in your tenant. You can skip this step, unless you face an error with service principals not created in your tenant when you provision the hosted machine.

1. Validate if the Windows 365 service principal is already created:
  - a. Sign in to the [Azure portal](#).
  - b. Navigate to **Microsoft Entra > Enterprise applications > All applications**.
  - c. Remove filter **Application type == Enterprise Applications**.
  - d. Fill filter **Application ID starts with** with the Windows 365 application ID **0af06dc6-e4b5-4f28-818e-e78e62d137a5**.

If the service principal is provisioned in your Microsoft Entra, the page should look like the following screenshot:



If the application is like the presented screenshot, you don't need to perform any extra steps. However, you must create the service principal if the application isn't showing up.

## 2. Create the Windows 365 service principal.

You can create an Azure service principal with the `az ad sp create` command from the [Azure Command-Line Interface \(CLI\)](#).

Azure-CLI-command

```
az ad sp create --id 0af06dc6-e4b5-4f28-818e-e78e62d137a5
```

## 3. Create other service principals related to Azure Virtual Desktop.

To create a hosted machine, you must create the following Azure Virtual Desktop services in your tenant.

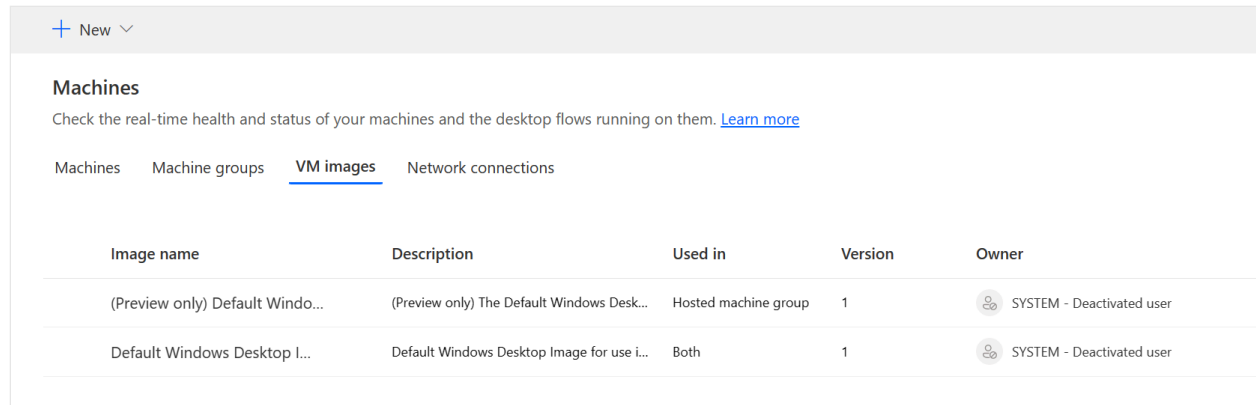
[Expand table](#)

Application name	Application ID
Azure Virtual Desktop	9cdead84-a844-4324-93f2-b2e6bb768d07
Azure Virtual Desktop Client	a85cf173-4192-42f8-81fa-777a763e6e2c
Azure Virtual Desktop ARM Provider	50e95039-b200-4007-bc97-8d5790743a63

Follow the same instruction as for creating the Windows 365 application to check and create the service principals.

# Get access to the default VM image

To create hosted machines, you need access to the default image that is part of your environment. You can view the default image in **Monitors > Machines > VM images**.



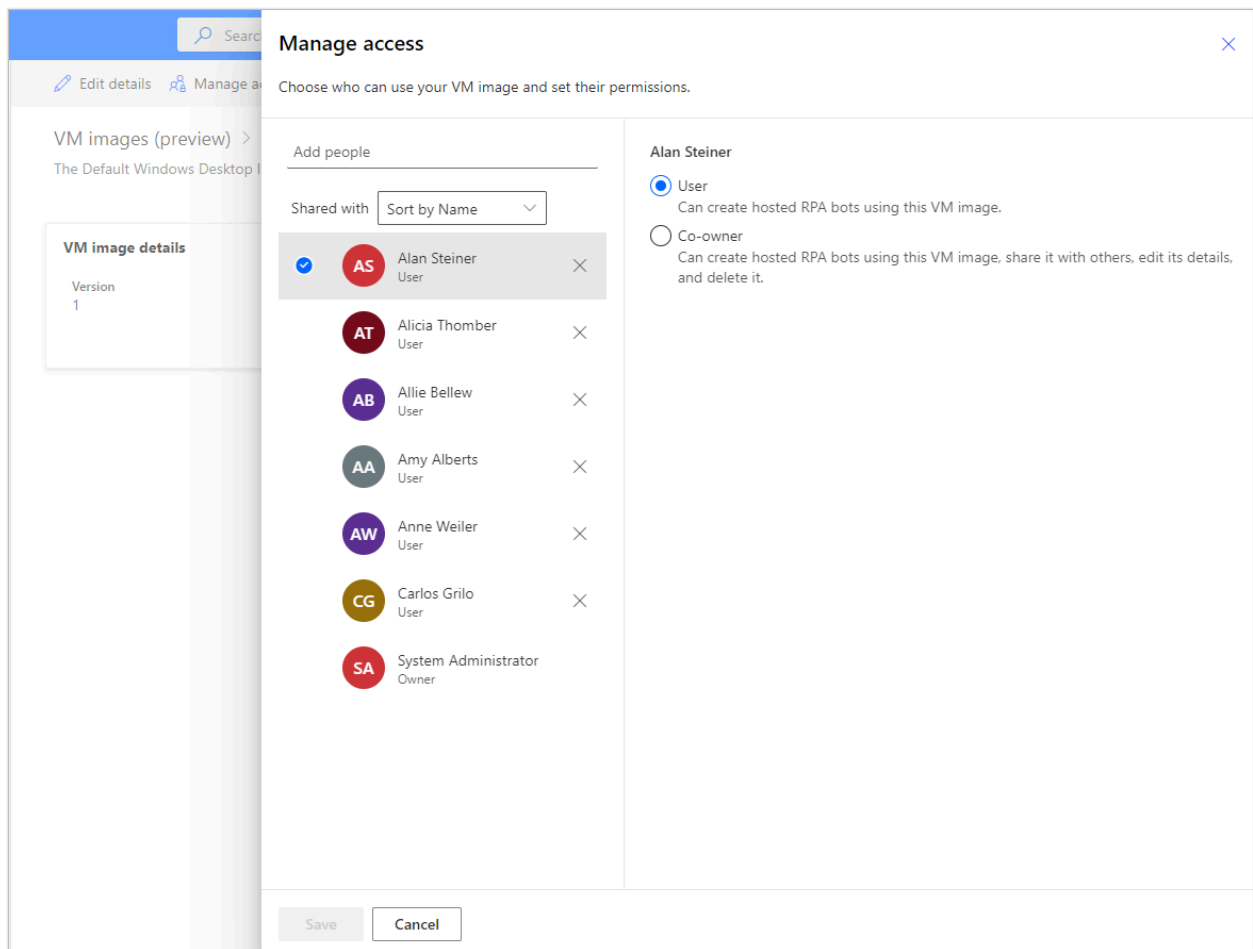
The screenshot shows the 'Machines' section in Power Automate. It includes a '+ New' button and a 'Learn more' link. The 'VM images' tab is selected, displaying a table with the following data:

Image name	Description	Used in	Version	Owner
(Preview only) Default Windo...	(Preview only) The Default Windows Desk...	Hosted machine group	1	SYSTEM - Deactivated user
Default Windows Desktop I...	Default Windows Desktop Image for use i...	Both	1	SYSTEM - Deactivated user

Users need either the **System Administrator** or **Desktop Flow Machine Image Admin** role to see and manage the default image. For other users, the **System Administrator** or **Desktop Flow Machine Image Admin** needs to [share the default image](#) with them before they can use it.

## Share the default image

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines > VM images**.
3. Select the default Windows desktop image from the list.
4. Select **Manage access**.
5. Select **Add people** and enter the name of the person in your organization with whom you'd like to share the image.
6. Select the names of the persons and choose which permissions they can access the machine with.
7. Select **Save**.



## Create a hosted machine

To create a hosted machine:

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines**.
3. Select **New > Hosted machine**.
4. In the hosted machine creation wizard:
  - a. Enter a name for your hosted machine and optionally add a description.
  - b. Select the VM image to use for your hosted machine. A proposed default Windows 11 image called **Default Windows Desktop Image** is available. If you don't see it, make sure you followed the steps described in [Prerequisites](#).  
  
Alternatively, you can select a [custom VM image](#) that is shared with your account.
  - c. Optionally, select the [custom network connection](#) you want your hosted machine to be provisioned with. Otherwise, you automatically connect to the

## Microsoft Hosted Network.

### d. Review and create your hosted machine.

Create new hosted machine

Step 4 of 4

**Ready to go?**

**Review and create**  
Review your new hosted machine details below. If something is missing you can go back to the previous steps. If everything looks good, select Create.

**Hosted machine name**  
Quinn's Dev Machine

**Description**  
Quinn's Dev Machine for Finance Department

**VM image**  
Default Windows Desktop Image

**Network connection**  
Microsoft Hosted Network (Default) ⓘ

#### ⓘ Note

The time needed to provision a hosted machine varies depending on the configuration of the hosted machine. It can take over 30 minutes for the machine to be ready for access.

## Access a hosted machine

1. Sign in to [Power Automate](#) ↗.
2. Go to **Monitor > Machines**.
3. Select the **Machines** tab
4. Select your hosted machine from the list of machines.
5. In the machine details page, you should observe the following details:
  - **Machine type:** Hosted machine
  - **Connectivity status:** Connected
  - **Machine status:** Active

[Edit details](#) [Open in browser](#) [Manage access](#) [+ Add to group](#) [Delete machine](#)

Machines > **Quinn's Dev machine**  
 Quinn's Dev machine for Finance Department

**Overview** [Run queue](#)

**Machine details**

Connectivity status ✔ Connected	Machine status ✔ Active	Flow activity 0 running, 0 queued	Owner RPA Admin
Version 2.26.123.22300	Created Oct 27, 12:12 PM	Machine type Hosted machine	Reuse session No

**Connections** [See all connections](#)

- rpaadmin@poweraut... ✔
- rpaadmin@poweraut... F ✔

**Last runs** [See all runs](#)

Requested	Desktop flow	Status	Run mod
Nov 7, 03:16 PM (2 wk ago)	Invoice Processing	Succeeded	Unattendec
Nov 7, 03:16 PM (2 wk ago)	Invoice Processing	Succeeded	Unattendec
Nov 7, 03:16 PM (2 wk ago)	Invoice Processing	Succeeded	Unattendec

**Shared with** [Manage access](#)

RA RPA Admin

**Run status - Trends (last 7 days)**

6. Select **Open in browser**.

7. A new tab in the browser should open and load the hosted machine access. Sign in with your work or school account.

8. The hosted machine is preregistered into the Power Automate environment.

# Use custom VM images for your hosted machine

You can personalize your hosted machines by providing your own Windows image directly from your Azure Compute Gallery. This feature allows you to have all your applications installed on your hosted machines.

## Create an Azure Compute Gallery in Azure and add an image

1. Go to the [Azure portal](#) <sup>↗</sup>.
2. Create a new Azure Compute Gallery and select **Role based access control (RBAC)** in the **Sharing** tab.
3. Select **Review + create**, and once you validated all the settings, select **Create**.
4. Once you created an Azure Compute Gallery, create an image definition following the steps in [Create an image definition and an image version](#). You should create the image in the exact location where we deploy your hosted machines. You can find the following mapping with your environment Geo:

- Australia: Australia East
- Asia: East Asia
- Brazil: Brazil South
- Canada: Canada Central
- Europe: North Europe
- France: France Central
- Germany: Germany West Central (Restricted, send your request to [hostedrpa@microsoft.com](mailto:hostedrpa@microsoft.com))
- India: Central India
- Japan: Japan East
- Korea: Korea Central
- Norway: Norway East
- Switzerland: Switzerland North
- United Arab Emirates: UAE North
- United Kingdom: UK South
- United States: East US

## Image requirements

Custom VM images must meet the following requirements:

- Windows 10 Enterprise version 20H2 or later
- Windows 11 Enterprise 21H2 or later

- Generation 2 image
- Generalized VM image
- Single Session VM images (multi-session isn't supported)
- No recovery partition. To find more information about how to remove a recovery partition, go to [Windows Server command: delete partition](#)
- Default 64-GB OS disk size. The OS disk size is automatically adjusted to 256 GB
- The image definition must have [trusted launch enabled as the security type](#)

## Share the reader permission on Azure subscription with Windows 365 service principal

To use your VM image for hosted machines, you need to grant Windows 365 service principal with the following permissions:

- Reader permission on the Azure subscription.

When you upload a custom image, you must be signed in with an account that is an owner or admin of the subscription.

## Share the Azure Compute Gallery with Power Automate makers

The last step before using your image in Power Automate is to share the image with the Power Automate makers.

1. In the [Azure portal](#), go to your Azure Compute Gallery.
2. Go to the **Access Control (IAM)** settings.
3. Select **Add > Add role assignment**.
4. Assign at least **Reader** permissions access to the Power Automate makers you want to share the gallery with. Then select **Next**.
5. Select **Select members** and search for the Power Automate makers you want to share with.
6. Once you selected all the members to add, review the permissions and users, and assign them.

## Add a new custom VM image

1. Sign in to [Power Automate](#).



2. Go to **Monitor > Machines**.

3. Select **New > VM image**.

4. Enter a VM image name, a description, and the usage.

- **VM Image name:** A unique name to identify the image.
- **VM Image description:** An optional description for the image.
- **Use with:** Select either **Hosted machine** or **Both**, if you want the image to work with both hosted machines and hosted machine groups.

5. Select one of the images that you have access to from the Azure Compute Gallery.

The screenshot shows the Azure portal interface. On the left, there's a 'Machines' section with a table of VM images. The table has columns: Image name, Description, Used in, Version, and Owner. There are two rows of data. The right side of the screenshot shows a 'New VM image' dialog box. It has a title bar with a close button. Below the title bar, there are four main sections: 'VM image name \*' with a text input field containing 'A new VM image'; 'Description' with a text area containing 'A new VM image with description'; 'Use with \*' with a dropdown menu showing 'Hosted machine'; and 'Image from Azure Compute Gallery \*' with a dropdown menu showing '(H2H\_Gallery|FromPortal|0.0.1)'. At the bottom of the dialog box, there are 'Create' and 'Cancel' buttons. A link 'Learn more about VM images for hosted machine groups' is also visible.

### ⓘ Note

- The image needs to be replicated in the same Azure region as the hosted machine.
- The list of images available may vary depending on the usage you are selecting.

## Share the image

1. Sign in to [Power Automate](#).

2. Go to **Monitor > Machines > VM images**.

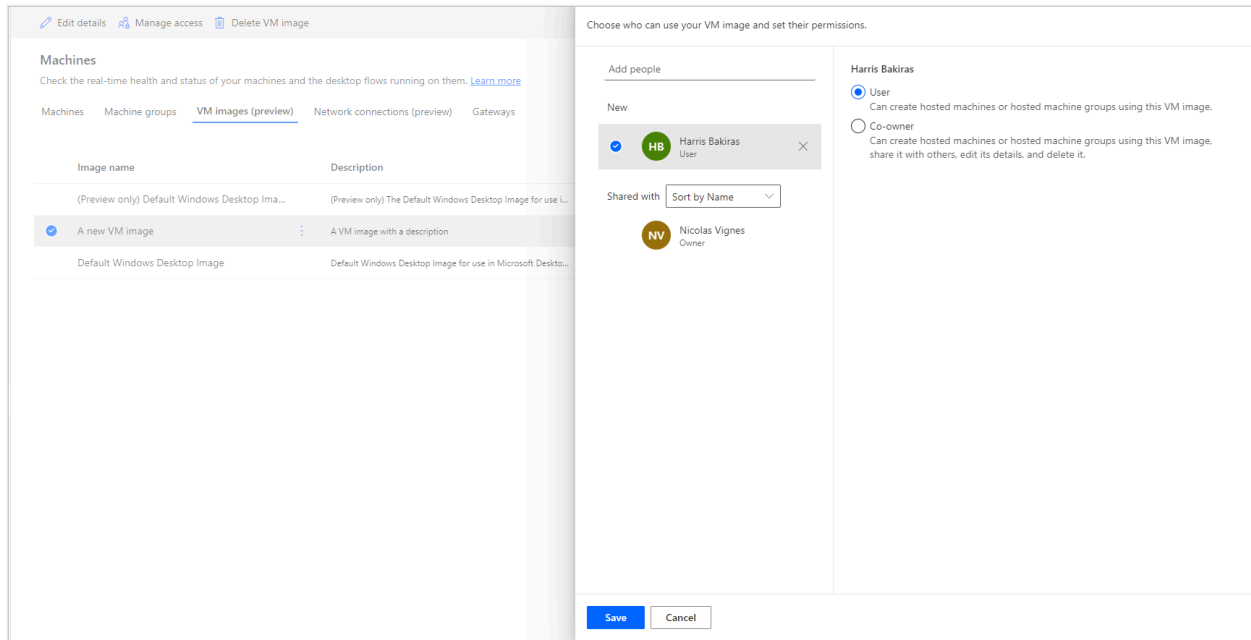
3. Select the image you created.

4. Select **Manage access**.

5. Select **Add people** and enter the names of the persons in your organization with whom you'd like to share the image.

6. Select the names of the persons and choose with which permissions they can access the image.

7. Select **Save**.



### ! Note

When a user isn't part of an environment anymore, you can continue to see the user as deactivated. You are notified in the **Manage access** section of the image if it's shared with deactivated users. In this situation, remove access to them.

## Use a custom virtual network for your hosted machines

You can connect to your own virtual network with your hosted machines to securely communicate with each other, the Internet, and on-premises networks. Providing your own virtual network from your Azure subscription allows your hosted machines to be provisioned with your virtual network automatically.

### ! Note

You can have up to 30 custom virtual networks configured per tenant.

## General network requirement

To use your own network and provision Microsoft Entra joined hosted machines, you must meet the following requirements:

- You must have a virtual network in your Azure subscription in the same region where you created the hosted machines.
- Follow [Azure's Network guidelines](#).
- A subnet within the virtual network and available IP address space.
- [Allow network connectivity](#) to required services.

The virtual network needs to be created in the same location with your hosted machines. You can find the following mapping with your environment Geo:

- Australia: Australia East
- Asia: East Asia
- Brazil: Brazil South
- Canada: Canada Central
- Europe: North Europe
- France: France Central
- Germany: Germany West Central (Restricted, send your request to [hostedrpa@microsoft.com](mailto:hostedrpa@microsoft.com))
- India: Central India
- Japan: Japan East
- Korea: Korea Central
- Norway: Norway East
- Switzerland: Switzerland North
- United Arab Emirates: UAE North
- United Kingdom: UK South
- United States: East US

## Additional requirements for Microsoft Entra hybrid joined hosted machines (preview)

[This topic is prerelease documentation and is subject to change.]

If your organization has an on-premises Active Directory implementation and you want your hosted machines to be joined to it, you can accomplish this task with Microsoft Entra hybrid join.

### **Important**

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

To use your own network and provision Microsoft Entra hybrid joined machines, you must meet the following requirements:

## **Domain requirements**

- You must configure your infrastructure to automatically Microsoft Entra hybrid join any devices that domain joins to the on-premises Active Directory. This [configuration lets them be recognized and managed in the cloud](#).
- Microsoft Entra hybrid joined hosted machines require network line of sight to your on-premises domain controllers periodically. Without this connection, devices become unusable. For more information, see [Plan your Microsoft Entra hybrid join deployment](#).
- If an organizational unit is specified, ensure it exists and is valid.
- An Active Directory user account with sufficient permissions to join the computer into the specified organizational unit within the Active Directory domain. If you don't specify an organizational unit, the user account must have sufficient permissions to join the computer to the Active Directory domain.
- User accounts that are creators of hosted machines must have a synced identity available in both Active Directory and Microsoft Entra ID.

## **Role and identity requirements**

Hosted machines users must be configured with [hybrid identities](#) so that they can authenticate with resources both on-premises and in the cloud.

## **DNS requirements**

As part of the Microsoft Entra hybrid join requirements, your hosted machines must be able to join on-premises Active Directory. That requires that the hosted machines be able to resolve DNS records for your on-premises AD environment. Configure your Azure Virtual Network where the hosted machines are provisioned as follows:

1. Make sure your Azure Virtual Network has network connectivity to DNS servers that can resolve your Active Directory domain.
2. From the Azure Virtual Network's Settings, select DNS Servers and then choose Custom.
3. Enter the IP address of DNS servers that environment that can resolve your AD DS domain.

## Share the virtual network with Windows 365 service principal

To use your virtual network for hosted machines, you need to grant Windows 365 service principal with the following permissions:

- Reader permission on the Azure subscription
- Windows 365 Network Interface Contributor permission on the specified resource group
- Windows 365 Network User permission on the virtual network

### ⓘ Note

For virtual networks created before November 26, 2023, the Network Contributor role is used to apply permissions on both the resource group and virtual network. The new RBAC roles have more specific permissions. To manually remove the existing roles and add the new roles, refer to the following table for the existing roles used on each Azure resource. Before removing the existing roles, make sure that the updated roles are assigned.

[Expand table](#)

Azure resource	Existing role (before November 26, 2023)	Updated role (after November 26, 2023)
Resource group	Network Contributor	Windows 365 Network Interface Contributor
Virtual network	Network Contributor	Windows 365 Network User
Subscription	Reader	Reader

## Share the virtual network with Power Automate makers

The last step before being able to reference your virtual network from Power Automate is to share the virtual network with the Power Automate makers.

1. Go to the [Azure portal](#).
2. In the Azure portal, go to your **Virtual network**.
3. Go to the **Access Control (IAM)** settings.
4. Select **Add > Add role assignment**.
5. Assign at least **Reader** permissions access to the Power Automate makers you want to share the virtual network with. Then select **Next**.
6. Select **Select members** and search for the Power Automate makers you want to share with.
7. Once you selected all the members to add, review the permissions and users, and assign them.

## Add a new network connection

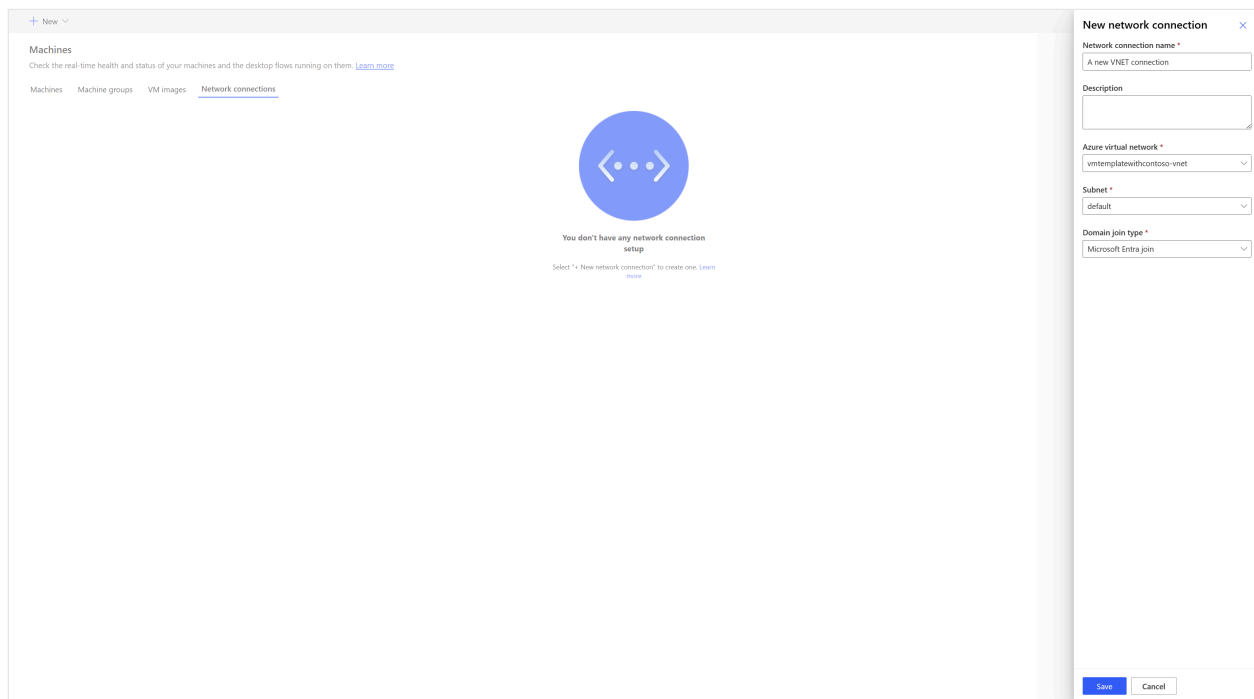
1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines**.
3. Select **New > Network connection**.
4. Enter a network connection name, a description, and the usage.
  - **Network connection name:** A unique name to identify the network connection.
  - **Description:** An optional description for the network connection.
5. Select one of the **Azure virtual network** available in Azure that meets the network requirement.
6. Select the **Subnet** the hosted machine uses.
7. Select the **Domain join type** the machine uses.
8. If the '**Microsoft Entra hybrid join (preview)**' is selected, the following information is required:
  - **DNS domain name :** The DNS name of the Active Directory domain you want to use for connecting and provisioning hosted machines. For example,

corp.contoso.com.

- **Organizational unit (optional)** : An organizational unit (OU) is a container within an Active Directory domain, which can hold users, groups, and computers. Make sure that this OU is enabled to sync with Microsoft Entra Connect. Provisioning fails if this OU isn't syncing.
- **Username UPN** : The username, in user principal name (UPN) format, you want to use for connecting the hosted machines to your Active Directory domain. For example, svcDomainJoin@corp.contoso.com. This service account must have permission to join computers to the domain and, if set, the target OU.
- **Domain password** : The password for the user.

### ⓘ Note

It takes 10-15 minutes to provision a new network connection with Microsoft Entra hybrid join (preview) domain join type.



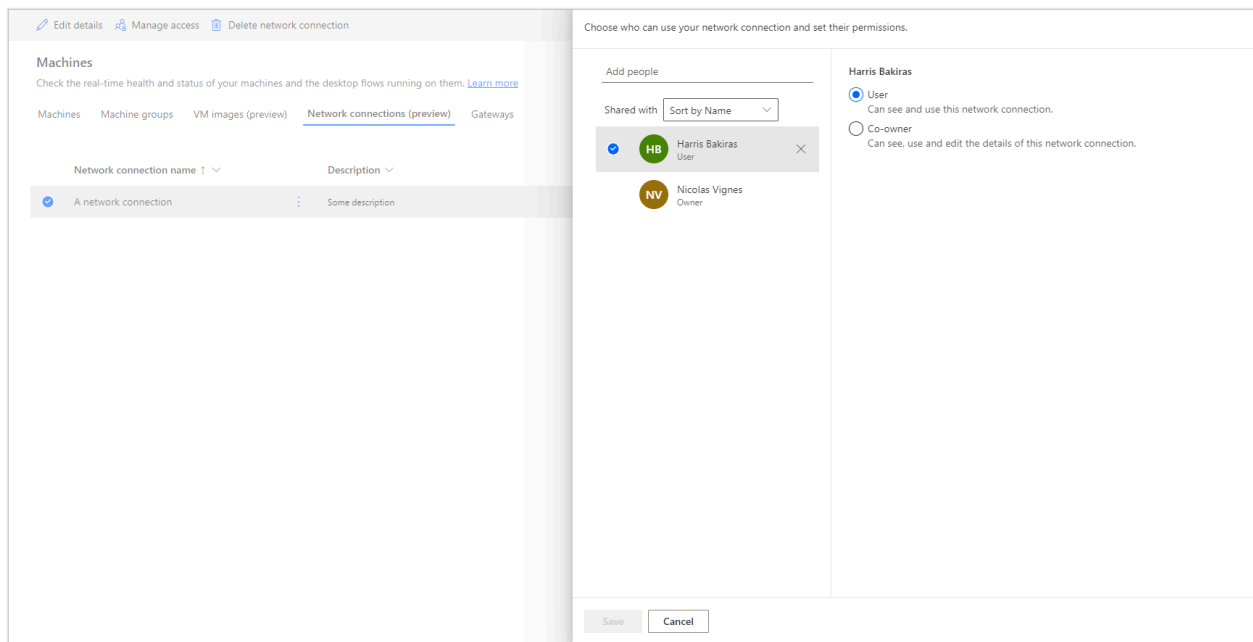
## Share the network connection

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines > Network connection**.
3. Select the network connection you created.
4. Select **Manage access**.

5. Select **Add people** and enter the names of the persons in your organization with whom you'd like to share the network connection.

6. Select the names of the persons and choose which permissions they can access the network connection with.

7. Select **Save**.



### ⓘ Note

When a user isn't part of an environment anymore, you can continue to see the user as deactivated. You are notified in the **Manage access** section of the network connection if it's shared with deactivated users. In this situation, remove access to them.

## View list of hosted machines

Once you created your hosted machine in an environment, you can view its details in the Power Automate portal.

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines**.
3. Select **Machines**.

The list contains both hosted machines and standard machines. For each item in the list, you can view:

- The name of the machine.



- The description of the machine.
- The Power Automate for desktop version of the machine
- The machine group it belongs to, if it's part of a machine group.
- The number of flows running in the machine.
- The number of flows queued in the machine.
- The type of access you have to the machine.
- The owner of the machine.

Machine name ↓	Description ↓	Version	Group ↓	Status	Flows...	Flows...	Ac... ↓	Owner
Quinn's Invoice Processing BOT02	—	—	—	✔ Connect...	0	0	Co-ow...	Jonas ...
Quinn's Invoice Processing BOT02	—	2.26.139.22312	—	✔ Connect...	0	0	Owner	Megan...
Quinn's Dev machine	—	—	—	✔ Connect...	0	0	Co-ow...	Alex W...

Selecting a hosted machine in the list takes you to the hosted machine details page where you can:

- View and edit the details of the machine.
- Access the machine.
- Add the machine to a machine group.
- Monitor the run queue.
- View past runs.
- List existing connections referencing the machine.
- View provisioning errors on the machine, if any.
- Manage access of the machine.
- Delete the machine.

Edit details Open in browser Share Add to group Delete machine

Machines > Quinn's Dev machine  
Quinn's Dev machine for Finance Department

Overview Run queue

**Machine details**

Connectivity status Connected Machine status Active Flow activity 0 running, 0 queued Owner RPA Admin Version 2.26.123.22300 Created Oct 27, 12:12 PM

Machine type Hosted machine Reuse session No

**Connections** [See all connections](#)

rpaadmin@powerautomatesh001.onmicros... RP... 🔄

rpaadmin@powerautomatesh001.onmicros... RPA... 🔄

**Last runs** [See all runs](#)

Requested	Desktop flow	Status	Run mode	Parent flow
Nov 7, 03:16 PM (2 wk ago)	Invoice Processing	Succeeded	Unattended	Invoice Processing Cloud Flow
Nov 7, 03:16 PM (2 wk ago)	Invoice Processing	Succeeded	Unattended	Invoice Processing Cloud Flow
Nov 7, 03:16 PM (2 wk ago)	Invoice Processing	Succeeded	Unattended	Invoice Processing Cloud Flow
Nov 7, 03:16 PM (2 wk ago)	Invoice Processing	Succeeded	Unattended	Invoice Processing Cloud Flow
Nov 7, 03:14 PM (2 wk ago)	Invoice Processing	Succeeded	Unattended	Invoice Processing Cloud Flow
Nov 7, 03:12 PM (2 wk ago)	Invoice Processing	Succeeded	Unattended	Invoice Processing Cloud Flow
Nov 7, 03:02 PM (2 wk ago)	Invoice Processing	Succeeded	Attended	Invoice Processing Cloud Flow
Nov 7, 02:58 PM (2 wk ago)	Invoice Processing	Succeeded	Attended	Deleted flow

**Shared with** [Manage access](#)

RA RPA Admin

**Run status - Trends (last 7 days)**

No data to display yet

## Share hosted machines

You can share your hosted machines with other users so they can run desktop flows with the creator's connection on them. To share a hosted machine:

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines**.
3. Select the **Machines** tab.
4. Select a hosted machine in the list and navigate to the details page of it.
5. Select **Manage access**.
6. Enter the username or email you want to share the hosted machine with, and select the user you want to add.
7. For each user, you can grant different permissions: **User** or **Co-owner**.

**User** permission only allows the targeted user to run desktop flows on the selected hosted machine. A **Co-Owner** can also edit the hosted machine details.

### ⓘ Note

- Sign-in access is only available to the creator of the hosted machine.

- You can run unattended desktop flow using a work or school account that is different from the creator of the hosted machine, provided that you add the account on the hosted machine.
- When a user isn't part of an environment anymore, you may continue to see the user as deactivated. You'll be notified in the **Manage access** section of the hosted machine if it's shared with deactivated users. In this situation, remove access to them.

## Run desktop flows on hosted machines

Power Automate enables you to trigger desktop flows on your hosted machines as you do on standard machines. To implement this functionality, you need a [desktop flow connection](#) to your hosted machine.

To find more information about triggering desktop flows from cloud flows, go to [Trigger desktop flows from cloud flows](#).

### ⓘ Note

If you intend to run unattended desktop flows on your hosted machine using the default virtual machine (VM) image option, you need to [disable Network Level Authentication](#) on your machine.

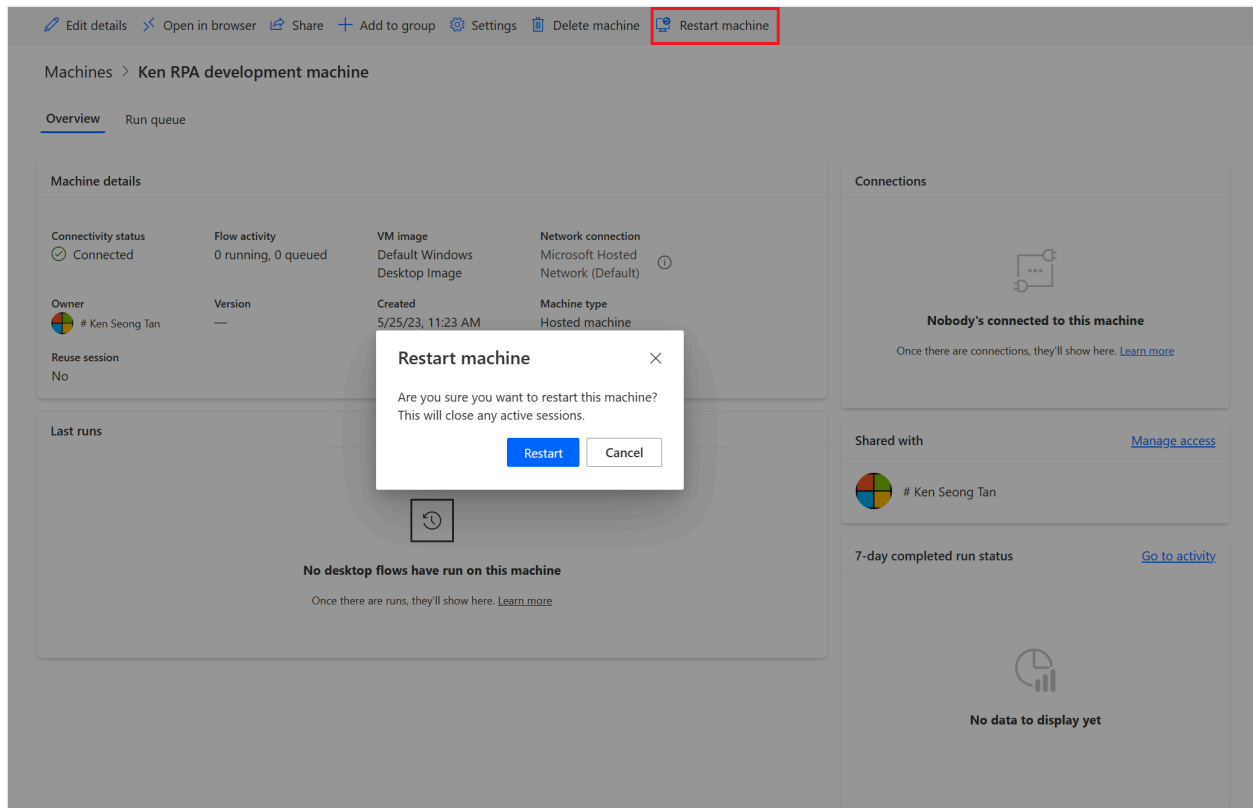
## Restart hosted machines

Power Automate enables you to restart your hosted machines from the Power Automate portal. To restart your hosted machine:

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines**.
3. Select the **Machines** tab.
4. Select a hosted machine in the list and navigate to the details page of it.
5. Select **Restart machine**.

### ⓘ Note

The hosted machine is restart may take a few minutes to complete. Please wait for a few minutes before trying to [access the hosted machine](#).



## Permissions based on security roles

Hosted machine permissions and roles are iterations on top of [Desktop Flows Machine Management permissions and roles](#). A hosted machine group follows the same rules and privileges as a regular group.

## Creation of hosted machine and privileges

This section describes the permissions for hosted machines.

### Environment Maker role

By default, the **Environment Maker** role can create hosted machines in their environment. The entities that require privileges to use hosted machines are:

- Flow Machine
- Flow Machine Group
- Flow Machine Image
- Flow Machine Network (if using custom virtual network for your hosted machine)

The Environment Maker role can [create and share custom VM images](#), as these actions require create and append privileges on the **Flow Machine Image**.

The Environment Maker role can [create and share custom virtual network](#), as these actions require create and append privileges on the **Flow Machine Network**.

Admins can also use the roles provided as part of Desktop Flows. You can find more information about desktop flow security roles in [Manage Machines](#).

**Security Role: Environment Maker** Working on solution: Default Solution

Table	Create	Read	Write	Delete	Append	Append To	Assign	Share
DataflowRefreshHistory	●	●	●	●	●	●	●	●
Desktop Flow Binary	⚠	⚠	⚠	⚠	⚠	⚠	⚠	⚠
Entity Image Configuration	○	○	○	○	○	○	○	○
EntityRefreshHistory	●	●	●	●	●	●	●	●
Environment Variable Definition	⚠	⚠	⚠	⚠	⚠	⚠	⚠	⚠
ExportSolutionUpload	●	●	●	●	●	●	●	●
FeatureControlSetting	○	○	○	○	○	○	○	○
Flow Machine	⚠	⚠	⚠	⚠	⚠	⚠	⚠	⚠
Flow Machine Group	⚠	⚠	⚠	⚠	⚠	⚠	⚠	⚠
Flow Machine Image	⚠	⚠	⚠	⚠	⚠	⚠	⚠	⚠
Flow Machine Network	⚠	⚠	⚠	⚠	⚠	⚠	⚠	⚠
Flow Session	⚠	⚠	⚠	⚠	⚠	⚠	⚠	⚠
Help Page	○	○	○	○	○	○		
Image Attribute Configuration	○	○	○	○	○	○		
Insights Store Data Source	○	○	○	○	○	○	○	○
Integrated search provider	○	○	○	○	○	○		
Internal Catalog Assignment	○	○	○	○	○	○		
Key Vault Reference	○	○	○	○	○	○	○	○
Knowledge article language setting	○	○	○	○	○	○	○	○
Knowledge Federated Article	○	○	○	○	○	○	○	○
Knowledge Federated Article Incident	○	○	○	○	○	○		
Knowledge Management Setting	○	○	○	○	○	○	○	○

**Key**

- None Selected
- ⚠ User
- ⚠ Business Unit
- Parent: Child Business Units
- Organization

## Desktop Flows Machine Owner role

By default, the **Desktop Flows Machine owner** can create hosted machines, but can't create custom VM images or custom virtual network. They can only use previously shared [custom VM images](#) or [custom virtual networks](#) in their own hosted machine.

**Security Role: Desktop Flows Machine Owner** Working on solution: Default Solution

Details | Core Records | Sales | Service | Business Management | Service Management | Customization | Missing Entities | Business Process Flows | Custom Entities

Table	Create	Read	Write	Delete	Append	Append To	Assign	Share
DataflowRefreshHistory	○	○	○	○	○	○	○	○
Desktop Flow Binary	👤	👤	👤	👤	👤	👤	👤	👤
Entity Image Configuration								
Entity link chat configuration	○	○	○	○	○	○	○	○
EntityRefreshHistory	○	○	○	○	○	○	○	○
Environment Variable Definition	○	○	○	○	○	○	○	○
ExportSolutionUpload	○	○	○	○	○	○	○	○
FeatureControlSetting	○	○	○	○	○	○	○	○
Flow Machine	👤	👤	👤	👤	👤	👤	👤	👤
Flow Machine Group	👤	👤	👤	👤	👤	👤	👤	👤
Flow Machine Image	○	👤	○	○	○	👤	○	○
Flow Machine Network	○	👤	○	○	○	👤	○	○
Flow Session	👤	👤	👤	👤	👤	👤	👤	👤
Help Page	○	○	○	○	○	○		
Image Attribute Configuration								
Insights Store Data Source	○	○	○	○	○	○		
Integrated search provider	○	○	○	○	○	○	○	○
Internal Catalog Assignment	○	○	○	○	○	○		
Key Vault Reference	○	○	○	○	○	○	○	○
Knowledge article language setting	○	○	○	○	○	○	○	○
Knowledge Federated Article	○	○	○	○	○	○	○	○
Knowledge Federated Article Incident	○	○	○	○	○	○	○	○
Knowledge Management Setting	○	○	○	○	○	○	○	○

**Key**

- None Selected
- 👤 User
- 👤 Business Unit
- 👤 Parent: Child Business Units
- Organization

## Desktop Flows Machine Configuration Admin role

The **Desktop Flows Machine Configuration Admin** role only brings full privileges on the **Flow Machine Image** and **Flow Machine Network** entities. In particular, it allows users with this role to share/unshare VM images and virtual network to be used for created hosted machines in their environment. You can find more information about sharing pre-provisioned VM images and virtual network in [Create hosted machines](#).

**Security Role: Desktop Flow Machine Configuration Admin** Working on solution: Default Solution

Table	Create	Read	Write	Delete	Append	Append To	Assign	Share
DataflowRefreshHistory	○	○	○	○	○	○	○	○
Desktop Flow Binary	○	○	○	○	○	○	○	○
Entity Image Configuration								
Entity link chat configuration	○	○	○	○	○	○	○	○
EntityRefreshHistory	○	○	○	○	○	○	○	○
Environment Variable Definition	○	○	○	○	○	○	○	○
ExportSolutionUpload	○	○	○	○	○	○	○	○
FeatureControlSetting	○	○	○	○	○	○	○	○
Flow Machine	○	○	○	○	○	○	○	○
Flow Machine Group	○	○	○	○	○	○	○	○
Flow Machine Image	●	●	●	●	●	●	●	●
Flow Machine Network	●	●	●	●	●	●	●	●
Flow Session	○	○	○	○	○	○	○	○
Help Page	○	○	○	○	○	○		
Image Attribute Configuration								
Insights Store Data Source	○	○	○	○	○	○		
Integrated search provider	○	○	○	○	○	○	○	○
Internal Catalog Assignment	○	○	○	○	○	○		
Key Vault Reference	○	○	○	○	○	○	○	○
Knowledge article language setting	○	○	○	○	○	○	○	○
Knowledge Federated Article	○	○	○	○	○	○	○	○
Knowledge Federated Article Incident	○	○	○	○	○	○		
Knowledge Management Setting	○	○	○	○	○	○	○	○

**Key**

- None Selected
- 👤 User
- 🏢 Business Unit
- 👤 Parent: Child Business Units
- Organization

## Hosted machines limitations

This section presents the limitations of hosted machines.

## Geographical availabilities/restrictions

The following list displays all the supported Power Platform geographies in the public cloud:

- Australia
- Asia
- Brazil
- Canada
- Europe
- France
- Germany (Restricted, send your request to [hostedrpa@microsoft.com](mailto:hostedrpa@microsoft.com))
- India
- Japan
- Korea
- Norway
- Switzerland
- United Arab Emirates

- United Kingdom
- United States

### ⓘ Note

Hosted machines aren't yet available in sovereign clouds.

## Azure tenant country/region and supported geographies in the public cloud

A hosted machine stores limited metadata in the geography of your tenant's country/region, which can be different from the region of your Power Automate environment. By default, the cross-geo support for hosted machines is enabled. System admins and environment admins can disable or enable the feature from the Power Platform admin center.

1. Sign in to the [Power Platform admin center](#).
2. Go to **Environments**, and select the appropriate environment.
3. Select **Settings** > **Features**.
4. Under **Hosted RPA**, select the toggle for **Enable cross-geo support for hosted machines** to disable or enable this feature.

### Hosted RPA

Enable hosted machine groups. [Learn more](#)

On

Enable work or school accounts for hosted machine groups. [Learn more](#)

On

Enable hosted machines. [Learn more](#)

On

Enable cross-geo support for hosted machines

On

When on, this allows for hosted machines to be provisioned in a geography different from that of the configured tenant country. Hosted machines store limited metadata in the geography of the configured tenant's county. [Learn more](#)

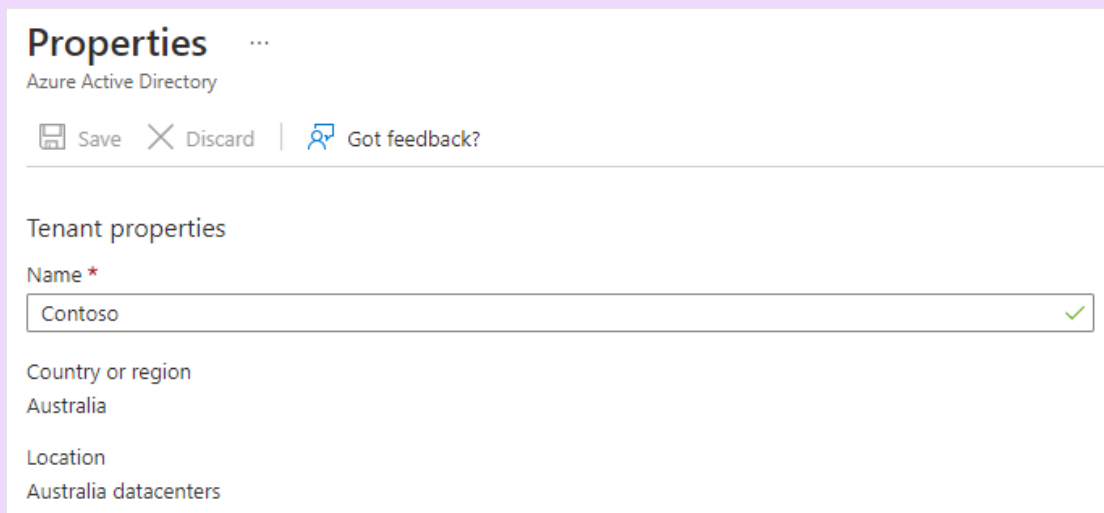


## 5. Select **Save**.

### ⓘ Note

Disabling this feature at the environment level will restrict creation of hosted machines when your tenant's country or region on Azure don't fall within the same scope of the region for your Power Automate environment. To check the tenant country/region on Azure:

1. Go to the [Azure portal](#) <sup>↗</sup>.
2. Open the **Tenant properties** service. The **Country or region** is available as one of the properties.



**Properties** ...  
Azure Active Directory

Save Discard | Got feedback?

Tenant properties

Name \*  
Contoso ✓

Country or region  
Australia

Location  
Australia datacenters

## Deletion of unused resources

For environments without the Power Automate Hosted Process license, we clean unused resources to ensure our service is available for everyone. A hosted machine that is inactive for 14 days is automatically deleted. The deleted hosted machine is still visible but can't be used anymore. An inactive hosted machine is a machine that has no flow runs and no usage of Power Automate for desktop for the last 14 days.

### ⓘ Note

You need to delete the inactive hosted machine and recreate a new one to continue using the hosted machines feature. You need to reconfigure the connections associated with your cloud flows.

# Troubleshoot hosted machines

To find information on how to troubleshoot hosted machines, go to [Troubleshoot hosted machines](#).

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Hosted machine group

Article • 07/16/2024

Hosted machine group allows you to run unattended automation at scale without providing or setting up any machines. You can create hosted machine groups like any other machine group, and Power Automate automatically provisions the machines based on the specified configuration.

Desktop flows assigned to a hosted machine group get queued to it when triggered to run. Then, like for any machine group, the next desktop flow in the queue runs when a bot in the group is available. To find more information about queues, go to [Monitor desktop flow queues](#).

Here are some of the key features of hosted machine group:

- Run unattended desktop flows at scale.
- Autoscale the number of bots in your hosted machine group based on current workloads.
- Load balance bots across all hosted machine groups in an environment.
- Work or school account integration: Enables access to resources that are part of the business plan linked to your organization, such as Office, SharePoint, and Azure.
- Vanilla or Custom VM images: Use a vanilla VM image provided by Microsoft or personalize your hosted machine group by providing your own Windows image directly from your Azure Compute Gallery.

## Licensing requirements

To use hosted machine group, you need the **Power Automate Hosted Process** license (previously Power Automate hosted RPA add-on). Assign to your environment as many capacity as the number of hosted bots you want to run in parallel in your environment.

## Trial licenses for evaluation

To evaluate the hosted machine group, you need one of the following trial licensing options:

- Use the **Power Automate Hosted Process** license

The Power Automate Hosted Process license has trial versions that last 30 days and can be extended once to a total of 60 days. Organization admins can obtain up to

25 seats from [Microsoft 365 admin center](#) and assign Power Automate Hosted Process capacity to the targeted environment.

- Use the 90-days self-assisted premium trial.

Trial users can create up to 10 hosted machine groups and have up to two bots running in parallel in a given environment. To start a trial, select **Try free** under **Power Automate Premium** in the [Power Automate pricing page](#) or the desktop flow page of the [Power Automate portal](#).

## Prerequisites

This section presents all the prerequisites to create and use hosted machine groups.

### Get access to the default VM image

To create a hosted machine group, you need access to the default VM image that is part of your environment. You can view the default image in **Monitor > Machines > VM images**.

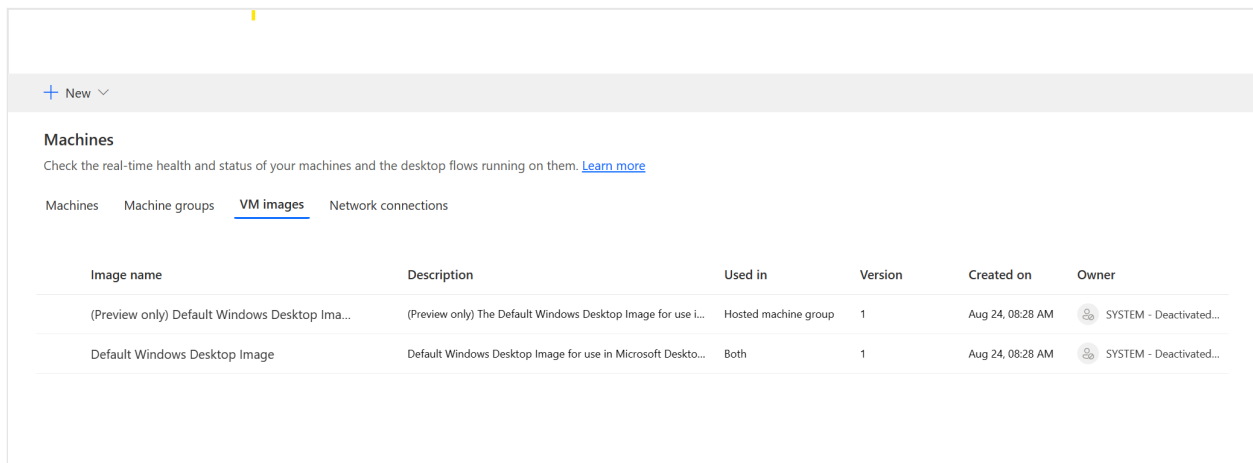


Image name	Description	Used in	Version	Created on	Owner
(Preview only) Default Windows Desktop Ima...	(Preview only) The Default Windows Desktop Image for use I...	Hosted machine group	1	Aug 24, 08:28 AM	SYSTEM - Deactivated...
Default Windows Desktop Image	Default Windows Desktop Image for use in Microsoft Desкто...	Both	1	Aug 24, 08:28 AM	SYSTEM - Deactivated...

#### ⓘ Note

- Users need either the **System Administrator** or **Desktop Flow Machine Image Admin** role to see and manage the default image.
- For other users, the **System Administrator** or **Desktop Flow Machine Image Admin** has to share the default image with them before they can use it.

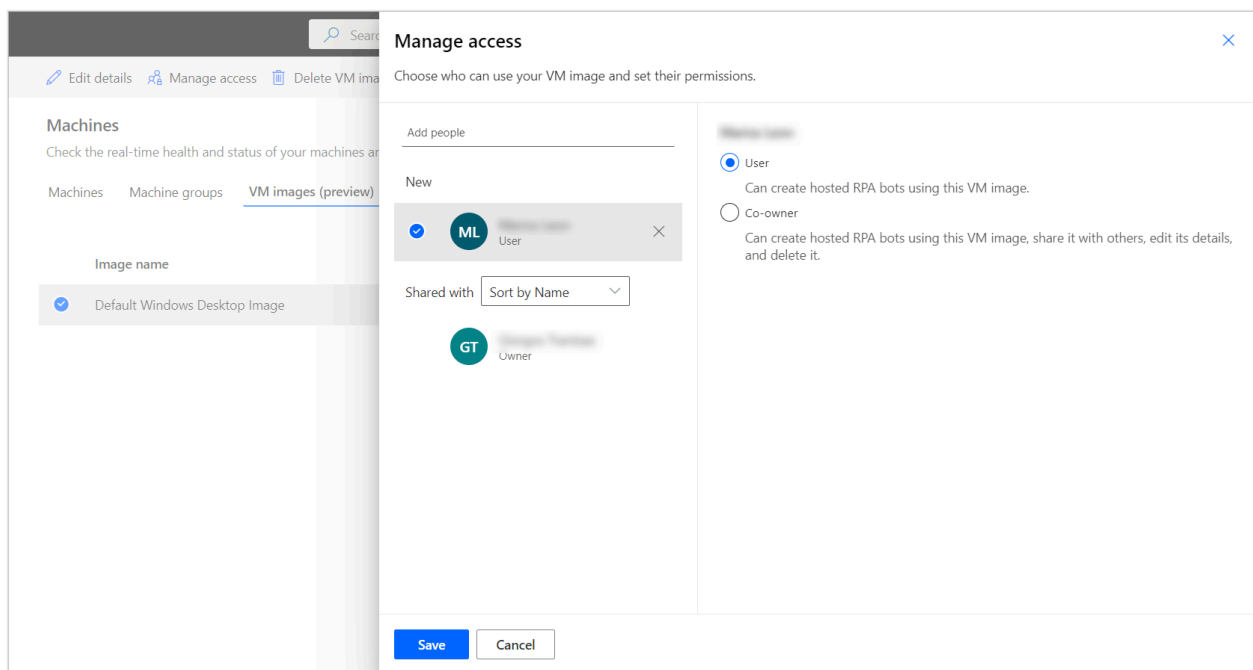
### Share the default image

1. Sign in to [Power Automate](#).

2. Go to **Monitor > Machines > VM images**.
3. Select the default windows desktop image from the list, and then **Manage access**.
4. Select **Add people**, and then enter the names of the persons in your organization with whom you'd like to share the image.
5. Select the names of the persons and which permissions they have to get access to the machine or co-own it as well.
6. Select **Save**.

### ⓘ Note

When users aren't part of an environment anymore, you can continue to see them as deactivated users. You'll be notified in the **Manage access** section of the image if it's shared with deactivated users. In this situation, remove access to them.



## Create hosted machine groups

To create a hosted machine group:

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines**.
3. Select **New > Hosted machine group**.
4. In the hosted machine group creation wizard

- Enter a **name** for your hosted machine group, then optionally add a description.
- Determine if you want to **reuse a Windows session** in unattended mode.
- Define the **maximum number of bots** you want to assign to this group.

ⓘ **Note**

- **Max bots allow** your hosted machine group to automatically scale to the max bots configuration when required and when resources are available.
- If multiple hosted machine groups are used in the same environment, bots are automatically load balanced between the groups.
- You can't exceed the total number of Hosted Process capacity assigned to your environment.
- To find more information about load balancing, go to [Load balance hosted machine groups](#).

- Define the **committed number of bots (optional)** you want to assign to this group.

ⓘ **Note**

- **Committed bots guarantee** your hosted machine group to automatically scale to the committed bots configuration when required.
- The sum of hosted machines and committed bots configured in your environment can't exceed the Hosted Process capacity assigned to the environment. View usage of Hosted Process capacity in your environment in the [Hosted Process capacity utilization dashboard](#).

Create new hosted machine group

Step 3 of 6

### Select bots usage

Bots in a group are created when needed. Whenever a desktop flow waits in the queue and no bot is available, a bot is created automatically.

A bot is created as long as the maximum number of bots for this group isn't reached and you have enough hosted RPA add-ons assigned to your environment.

[Read more information about the licensing requirements](#)

### Select the committed and maximum number of bots

Define the committed and maximum number of bots you want to assign to this group.

**Note**

- **Max Bots** allows your hosted machine group to scale beyond the number of Committed Bots, based on the available capacity in your environment. The Max Bots setting offers flexibility to handle increases in workload or unexpected demand surges.
- **Committed Bots** (preview) guarantees the number of available bots during auto-scaling. This ensures that the necessary resources will always be available for processing your flows, providing consistent performance for your critical flows.
- Go to the **Capacity Utilization** page to view and manage your hosted RPA capacity utilization within your environment.

Maximum number of bots

5 bots

Committed number of bots

2 bots

Back Next Cancel

- Select the **VM image** to use for your hosted machine group. A proposed default Windows 11 image called **Default Windows Desktop Image** is available. If you don't see it, make sure you followed the steps described in [Prerequisites](#).
- Select how you would like to **access** your hosted machine group. You can use your [work or school account](#) or use a local admin account you want created. This account is used to run your automations by the bots.

#### ⓘ Note

If you select work or school account, enter your email address (and not domain\username) when creating a connection to the hosted machine group.

- **Review and create** your hosted machine group.

Create new hosted machine group

Step 6 of 6

Ready to go?

**Review and create**  
Review your new hosted machine group details below. If something is missing you can go back to the previous steps. If everything looks good, select Create.

Hosted machine group name  
Quinn's hosted machine group

Description  
Quinn's hosted machine group for Finance Department

Re-use session  
Yes

Max number of bots  
5 bots

Committed number of bots  
2 bots

VM image  
Default Windows Desktop Image

Credentials details  
Work or school account

Back Create Cancel

## Hosted machine groups availability

Hosted bots in a hosted machine group are created when needed. Whenever a desktop flow waits in the queue and no bot is available, a bot is created automatically. A bot is created as long as the maximum number of bots for this group isn't reached and you have enough unattended add-ons assigned to your environment. You can find more information about licensing requirements in [Licensing requirements](#).

### ⓘ Note

If the hosted machine group has just been created or hasn't been used for more than three hours, hosted bots are created before a run gets addressed from the queue. The creation of a bot can take more than 10 minutes depending on its configuration.

## Use custom VM images for your hosted machine groups

You can personalize your hosted machine groups by providing your own Windows image directly from your Azure Compute Gallery. This feature allows you to have all your applications installed on your hosted machine group.

## Image requirements



Custom VM images must meet the following requirements:

- Generation 2 images
- Generalized VM image
- 127-GB limit on VM image size
- Microsoft Edge version 80 or higher
- The image definition is recommended to have [trusted launch enabled as the security type](#)

Learn how to create a generalized VM image in Azure in [Upload a generalized Windows VHD and use it to create new VMs in Azure](#).

## Create an Azure compute gallery in Azure and add an image

1. Go to the [Azure portal](#).
2. Create a new Azure Compute Gallery and select **Role based access control (RBAC)** in the **Sharing** tab.
3. Select **Review + create**, and once you've validated all the settings, select **Create**.
4. Once you've created an Azure Compute Gallery, create an image definition following the steps in [Create an image definition and an image version](#). You should create the image in the exact location where we deploy your hosted machine group. You can find the following mapping with your environment Geo:

- Asia: East Asia
- Australia: Australia East
- Brazil: Brazil South
- Canada: Canada Central
- Europe: North Europe
- France: France Central
- Germany: Germany West Central
- India: Central India
- Japan: Japan East
- Korea: Korea Central
- Norway: Norway East
- South Africa - South Africa North
- Southeast Asia - Singapore
- Switzerland: Switzerland North
- United Arab Emirates: UAE North

- United Kingdom: UK West (UK South from May 2nd, 2024)
- United States: West US (East US from May 2nd, 2024)

### ⓘ Important

Starting May 2nd, 2024, we will be updating the region mapping for environments in the United States and United Kingdom to ensure our services are deployed in regions with Azure Availability Zones support. For more information, see the [geographic availability and restrictions](#).

## Share the Azure compute gallery with Power Automate Hosted Machine Groups service principal

To use the image in Power Automate, you need to share the image with Power Automate through the Azure portal.

1. In the [Azure portal](#), go to your Azure Compute Gallery.
2. Go to the **Access Control (IAM)** settings.
3. Select **Add > Add role assignment**.
4. Select the role **Reader** and search for the Hosted machine group application: **Power Automate Hosted Machine Groups**. This allows our service to access the image to create the Hosted machine group.

### ⓘ Note

If you can't find the application above, verify that the application exists in your tenant and provision it if necessary. To verify that the application exists, go to [Azure portal](#) > **Microsoft Entra > Enterprise applications > All applications**, and search for application id: **51699864-8078-4c9e-a688-09a1db1b2e09**. If you can't find the application, provision it using the following command:

```
az ad sp create --id 51699864-8078-4c9e-a688-09a1db1b2e09
```

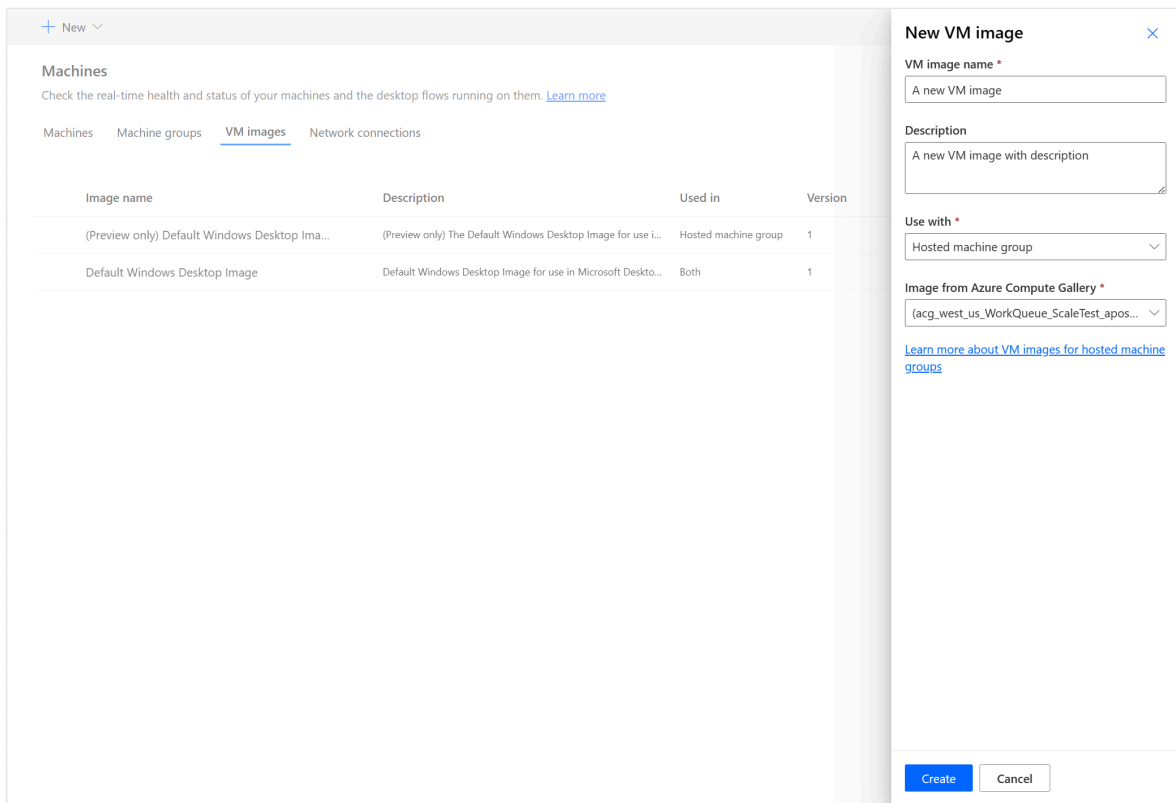
## Share the gallery with Power Automate makers

The last step before using your image in Power Automate is to share the image with the Power Automate makers.

1. In the [Azure portal](#), go to your Azure Compute Gallery.
2. Go to the **Access Control (IAM)** settings.
3. Select **Add > Add role assignment**.
4. Assign at least **Reader** permissions access to the Power Automate makers you want to share the gallery with. Then select **Next**.
5. Select **Select members** and search for the Power Automate makers you want to share with.
6. Once you've selected all the members to add, review the permissions and users, and assign them.

## Add a new custom VM image

1. Sign in to [Power Automate](#).
2. Select **New > VM image**.
3. Enter an image name, a description, and the usage.
  - **Image name:** A unique name to identify the image.
  - **Image description:** An optional description for the image.
  - **Use with:** Select either **Hosted machine group** or **Both**, if you want the image to work with both hosted machines and hosted machine groups.
4. Select one of the images that you have access to from the Azure Compute Gallery.

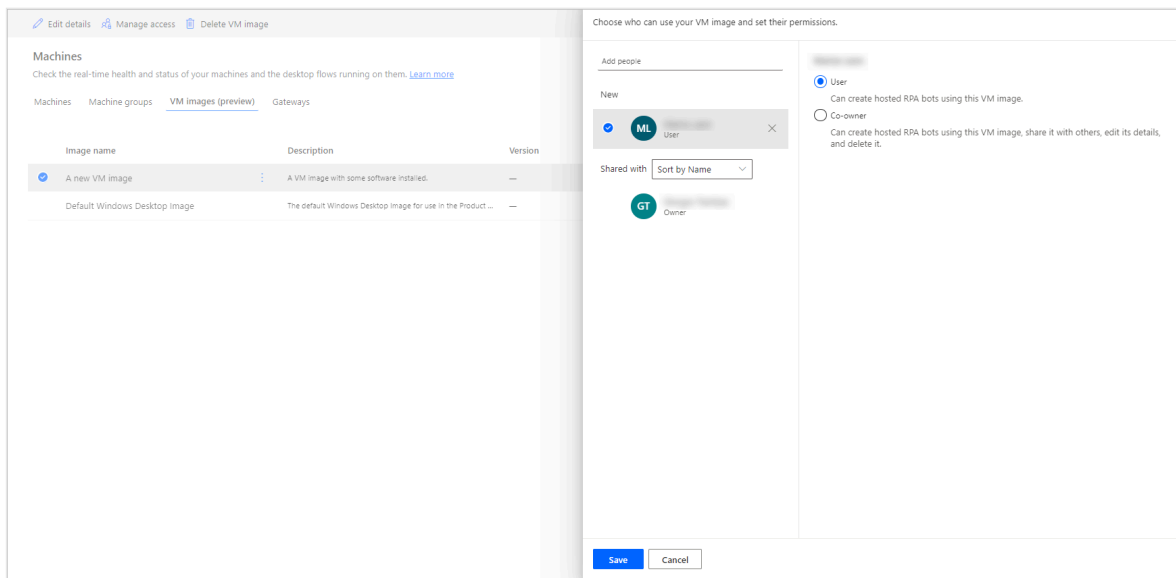


### ! Note

- The image needs to be replicated in the same Azure region as the hosted machine group.
- The list of images available may vary depending on the usage you are selecting.

## Share the image

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines > VM images**.
3. Select the image you've created.
4. Select **Manage access**.
5. Select **Add people** and enter the names of the persons in your organization with whom you'd like to share the image.
6. Select the names of the persons and choose with which permissions they can access the image.



## 7. Select **Save**.

### ⓘ **Note**

When a user isn't part of an environment anymore, you can continue to see it as a deactivated user. You'll be notified in the **Manage access** section of the image if it's shared with deactivated users. In this situation, remove access to them.

## View list of hosted machine groups

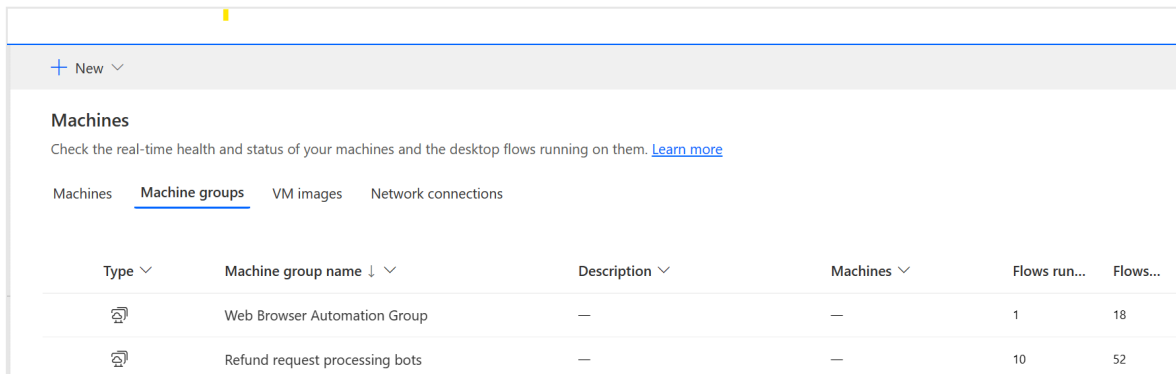
Once you've created your hosted machine group in an environment, you can view its details in the Power Automate portal.

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines**.
3. Select **Machine groups**.



The list contains both hosted machine groups and standard machine groups. For each item in the list, you can see:

- The name of the item.
- The description of the item.
- The number of the machines in the group (only for standard machine groups).
- The number of flows running in the item.
- The number of flows queued in the item.
- The type of access you have to the item.

- The owner of the item.



The screenshot shows the 'Machines' page in Power Automate. At the top, there is a '+ New' button. Below it, the 'Machines' section is titled, with a subtitle: 'Check the real-time health and status of your machines and the desktop flows running on them. [Learn more](#)'. There are four tabs: 'Machines', 'Machine groups' (which is selected), 'VM images', and 'Network connections'. Below the tabs is a table with the following columns: 'Type', 'Machine group name', 'Description', 'Machines', 'Flows run...', and 'Flows...'. The table contains two rows of data:

Type	Machine group name	Description	Machines	Flows run...	Flows...
	Web Browser Automation Group	—	—	1	18
	Refund request processing bots	—	—	10	52

Selecting a hosted machine group in the list takes you to the machine group's details page where you can:

- View and edit the details of the hosted machine group.
- Update the VM image used by the hosted machine group.
- Monitor the machine group's run queue.
- View past runs.
- List existing connections referencing the hosted machine group.
- View provisioning errors on the hosted machine group, if any.
- Manage access by sharing (or not) the hosted machine group.
- Delete the hosted machine group.

## Share hosted machine groups

You can share your hosted machine groups with other users so they can create connections and run desktop flows on them. To share a hosted machine group:

1. Sign in to [Power Automate](#).
2. Select **Monitor** > **Machines**.
3. Select the **Machine groups** tab.
4. Select a hosted machine group in the list, or navigate to the details page of the desired hosted machine group.
5. Select **Manage access**.
6. Populate the username or email you want to share the hosted machine group with, and select the user you want to add.
7. For each user you can grant different permissions: **User** or **Co-owner**.

User permission only allows the targeted user to run desktop flows on the selected hosted machine group. A **Co-Owner** can also edit the hosted machine's group details.

#### ⓘ Note

When a user isn't part of an environment anymore, you may continue to see the user as a deactivated user. You'll be notified in the **Manage access** section of the hosted machine if it's shared with deactivated users. In this situation, remove access to them.

## Run desktop flows on hosted machine groups

Power Automate enables you to trigger desktop flows on your hosted machine groups as you do on standard machine groups. To implement this functionality, you need a [desktop flow connection](#) to your hosted machine group.

To find more information about triggering desktop flows from cloud flows, go to [Trigger desktop flows from cloud flows](#).

#### ⓘ Important

- Only direct connectivity connections are supported for hosted machine groups.
- Only available for [unattended run mode](#).
- Desktop flows targeting hosted machine groups aren't yet compatible with the **Test flow** feature. It's possible that you observe errors when trying to test your flow. This problem is due to the nature of the [machine groups availability](#). The scheduled test run will still be accessible from the flow run history.

## Monitor your hosted machine groups

You can't directly access or sign in to your hosted machine groups. They're not persisted unless they're running desktop flows. Hosted bots in a group are created based on the current size of the queue, the configuration of the group, and the licenses assigned to the current environment.

For instance, if the hosted machine group is newly created or it wasn't used for more than 3 hours, new hosted bots might need to be provisioned before desktop flow runs. The creation of a bot takes at least 10 minutes, depending on the type of VM Image in use. It's expected that the queue would appear stuck for more than 10 minutes before desktop flows start running.

After this process, new hosted bots are provisioned to run desktop flows in the queue as efficiently as possible.

To monitor your hosted bots:

1. Sign in to [Power Automate](#).
2. Go to **Monitor > Machines**.
3. Select **Machine groups**.
4. Select one of your hosted machine groups.

In the following example, two hosted bots are available to pick up the first two desktop flows in the queue, and three other desktop flows are queued. The desktop flow runs are marked as **Running** or **Queued** to indicate their state.

The screenshot displays the 'Invoice Management' machine group details in Power Automate. At the top, there are links for 'Edit details', 'Manage access', and 'Delete group'. Below this, the breadcrumb 'Machine groups > Invoice Management' is shown, along with a description: 'Automatic management of invoices from our top 5 suppliers'. There are two tabs: 'Overview' (selected) and 'Run queue'. The 'Machine group details' section shows: 'Machine group type: Hosted RPA bots (preview)', 'Flow activity: 0 running, 5 queued', 'Owner: Amy Alberts', and 'State: Provisioned'. Below this is a 'Runs' section with a 'See all runs' link. The runs table has the following data:

Requested	Desktop flow	Status	Machine	Parent flow
May 16, 09:58 PM (4 min ago)	Contoso Invoice Management Flow	Queued	—	Automatic Invoice Manage...
May 16, 09:58 PM (4 min ago)	Contoso Invoice Management Flow	Queued	—	Automatic Invoice Manage...
May 16, 09:58 PM (4 min ago)	Contoso Invoice Management Flow	Queued	—	Automatic Invoice Manage...
May 16, 09:58 PM (4 min ago)	Contoso Invoice Management Flow	Running	hostedBotA0V6AZ	Automatic Invoice Manage...
May 16, 09:58 PM (4 min ago)	Contoso Invoice Management Flow	Running	hostedBot7TC7TD	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBotHVJ2HQ	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBotQZ41RF	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBot7TC7TD	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBotA0V6AZ	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBot7TC7TD	Automatic Invoice Manage...

After a few minutes, another bot is provisioned to run a third flow as the queue is large enough.



Edit details Manage access Delete group

Machine groups > Invoice Management  
Automatic management of invoices from our top 5 suppliers

Overview Run queue

**Machine group details**

Machine group type: Hosted RPA bots (preview)      Flow activity: 3 running, 2 queued      Owner: Amy Alberts      State: Provisioned

**Runs** [See all runs](#)

Requested	Desktop flow	Status	Machine	Parent flow
May 16, 09:58 PM (6 min ago)	Contoso Invoice Management Flow	Queued	—	Automatic Invoice Manage...
May 16, 09:58 PM (6 min ago)	Contoso Invoice Management Flow	Queued	—	Automatic Invoice Manage...
May 16, 09:58 PM (6 min ago)	Contoso Invoice Management Flow	Running	hostedBotHVJ2HQ	Automatic Invoice Manage...
May 16, 09:58 PM (6 min ago)	Contoso Invoice Management Flow	Running	hostedBotA0V6AZ	Automatic Invoice Manage...
May 16, 09:58 PM (7 min ago)	Contoso Invoice Management Flow	Running	hostedBot7TC7TD	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBotHVJ2HQ	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBotQZ41RF	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBot7TC7TD	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBotA0V6AZ	Automatic Invoice Manage...
May 16, 06:20 PM (3 h ago)	Contoso Invoice Management Flow	Succeeded	hostedBot7TC7TD	Automatic Invoice Manage...

## Load balance hosted machine group

The key feature of hosted machine groups is the ability to automatically load balance hosted bots between different groups, hence optimizing your automation resources seamlessly between your different workloads.

The number of hosted bots that can run in your environment is equal to the number of Hosted Process capacity you've assigned to your environment excluding the number of hosted machines provisioned in the environment (for example, if you have 10 Hosted Process assigned to your environment, and two hosted machines provisioned, then the number of hosted bots that can run in your environment will be eight). This capacity is then load balanced across all the hosted machine groups you have in your environment. Each hosted machine group has a max bot and committed bot configuration that enables you to control the scaling capabilities of the hosted machine group.

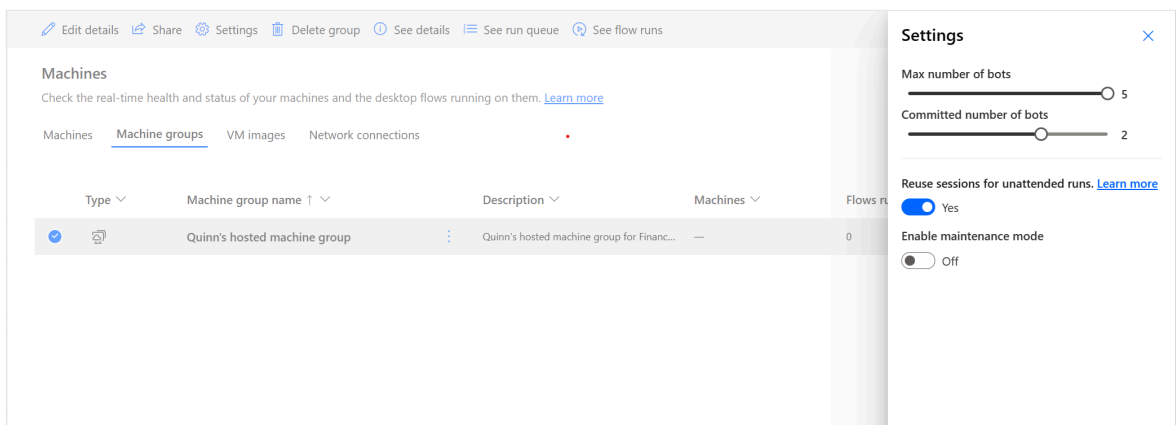
The hosted machine group requests to scale out when there aren't enough hosted bots to run desktop flows. It takes into consideration the max and committed bot configuration in the hosted machine group and the available capacity in the environment. The hosted machine group scale-in when the desktop flow queue is lesser than the number of available hosted bots. This capacity then becomes available to other hosted machine groups in the environment.

## ⓘ Note

- **Max bots allow** your hosted machine group to automatically scale to the max bots configuration when required and when resources are available.
- **Committed bots guarantee** your hosted machine group to automatically scale to the committed bots configuration when required.
- View usage of Hosted Process capacity in your environment in the [Hosted Process capacity utilization dashboard](#).

To update the scaling configuration of your hosted machine group:

1. Sign in to [Power Automate](#).
2. Select **Monitor > Machines**.
3. Select **Machine groups**.
4. Select one of your hosted machine groups.
5. Select **Settings** at the top of the page.



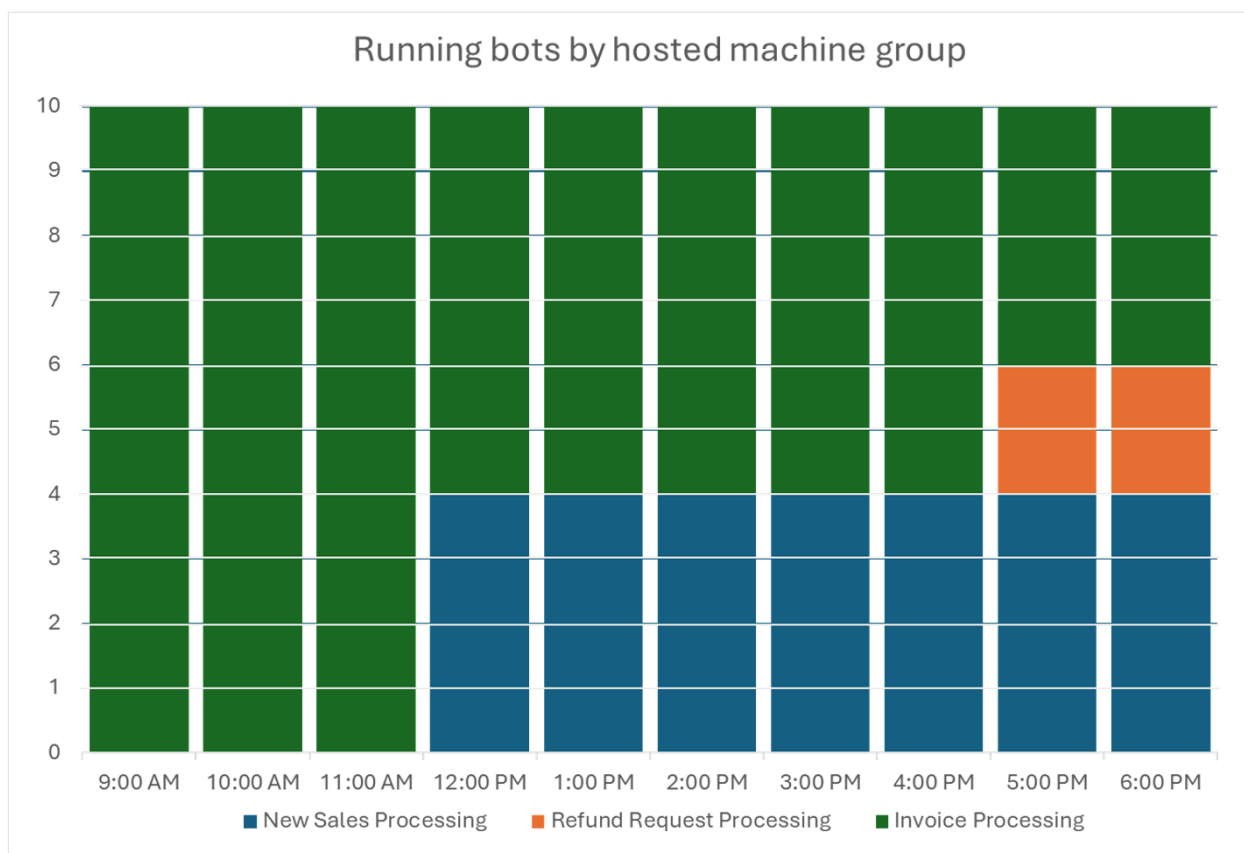
## Hosted machine group scaling & load balancing example

In this example, the customer has 10 Hosted Process capacity assigned to the environment and has configured three hosted machine groups with the following configuration.

[Expand table](#)

Hosted machine group name	Max bots	Committed bots
Invoice Processing	10	4

Hosted machine group name	Max bots	Committed bots
New Sales Processing	10	4
Refund Request Processing	10	2



[Expand table](#)

Time	Event
9AM - 11:59 AM	The Invoice Processing group has a high volume of desktop flow jobs and autoscales to 10 hosted bots (Max bots configuration) as no other groups have desktop flow jobs.
12PM - 4:59 PM	In addition to the high volume of desktop flow jobs for the Invoice Processing group, the New Sales Processing group now also has a high volume of desktop flow jobs queued, and therefore consumes the committed capacity of four hosted bots.
5PM - 6:59 PM	In addition to the high volume of desktop flow jobs for the Invoice Processing and New Sales Processing groups, the Refund Request Processing group now also has a high volume of desktop flow jobs queued, and therefore consumes the committed capacity of two hosted bots.

## Update VM Image used by the hosted machine group

You can update the VM image that is used by your hosted machine group. This is beneficial in situations where a custom VM image requires software updates and additional customization to run desktop flows. This feature allows you to update the VM image to be used when creating new hosted bots in your hosted machine group, eliminating the need to delete and recreate it. To update VM image:

1. Sign in to [Power Automate](#).
2. Select **Monitor > Machines**.
3. Select **Machine groups**.
4. Select one of your hosted machine groups.
5. Select **Update VM image** at the top of the page.
6. From the drop-down list, select the updated VM image to be used by the hosted machine group.

#### ⓘ Note

- Upon updating of VM image, all existing hosted bots complete their ongoing desktop flow runs prior to being reprovisioned with the new VM image.
- The current and updated VM image must have the same security type. For example, you can't update from non-trusted launch enabled to trusted launch enabled, and vice versa.

The screenshot displays the Power Automate interface for a machine group named 'Invoice Processing Bots'. The 'Update VM image' dialog box is open, showing a dropdown menu with the selected VM image 'Invoice Processing Nov.2023 Updates'. The dialog includes 'Update' and 'Cancel' buttons. The background interface shows machine group details, a table of last runs, and a 7-day completed run status indicator showing 88 successful runs.

Requested	Desktop	Flow	Status	Flow
Nov 3, 01:34 PM (5 d ago)	☑			
Nov 3, 01:32 PM (5 d ago)	☑			
Nov 3, 01:30 PM (5 d ago)	☑	Invoice Processing Desktop Flow	Succeeded	Invoice Processing Cloud Flow
Nov 3, 01:28 PM (5 d ago)	☑	Invoice Processing Desktop Flow	Succeeded	Invoice Processing Cloud Flow
Nov 3, 01:26 PM (5 d ago)	☑	Invoice Processing Desktop Flow	Succeeded	Invoice Processing Cloud Flow

# Permissions based on security roles

Hosted machine group permissions and roles are iterations on top of [Desktop Flows Machine Management permissions and roles](#). Hosted machine groups follow the same rules and privileges as regular machine groups.

## Environment Maker role

By default, users with the **Environment Maker** role can create hosted machine groups in their environment. The four tables that require privileges to use hosted machine groups are:

- Flow Capacity Assignment
- Flow Machine
- Flow Machine Group
- Flow Machine Image

**Security Role: Environment Maker** Working on solution: Default Solution

Table	Create	Read	Write	Delete	Append	Append To	Assign	Share
DataflowRefreshHistory	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
Desktop Flow Binary	User	User	User	User	User	User	User	User
Entity Image Configuration	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Entity link chat configuration	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
EntityRefreshHistory	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
Environment Variable Definition	User	User	User	User	User	User	User	User
ExportSolutionUpload	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization
FeatureControlSetting	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Flow Machine	User	User	User	User	User	User	User	User
Flow Machine Group	User	User	User	User	User	User	User	User
Flow Machine Image	User	User	User	User	User	User	User	User
Flow Machine Network	User	User	User	User	User	User	User	User
Flow Session	User	User	User	User	User	User	User	User
Help Page	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Image Attribute Configuration	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Insights Store Data Source	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Integrated search provider	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Internal Catalog Assignment	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Key Vault Reference	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Knowledge article language setting	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Knowledge Federated Article	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Knowledge Federated Article Incident	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected
Knowledge Management Setting	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected	None Selected

**Key**

- None Selected
- 👤 User
- 🏢 Business Unit
- 🌳 Parent: Child Business Units
- 🟢 Organization

Environment Maker role can [create and share custom VM images](#), as this functionality requires create and append privileges on the **Flow Machine Image**.

Admins can also use the roles provided as part of Desktop Flows. You can find more information about desktop flow security roles in [Manage Machines](#).

# Desktop Flows Machine Owner role

By default, **Desktop Flows Machine** owners can create hosted machine groups but can't create custom VM images. They can only use previously shared [custom VM images](#) in their own hosted machine groups.

**Security Role: Desktop Flows Machine Owner** Working on solution: Default Solution

Table	Create	Read	Write	Delete	Append	Append To	Assign	Share
DataflowRefreshHistory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desktop Flow Binary	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Entity Image Configuration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Entity link chat configuration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EntityRefreshHistory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environment Variable Definition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ExportSolutionUpload	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FeatureControlSetting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flow Machine	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Flow Machine Group	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Flow Machine Image	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flow Machine Network	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flow Session	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Help Page	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Image Attribute Configuration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insights Store Data Source	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrated search provider	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internal Catalog Assignment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Key Vault Reference	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge article language setting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge Federated Article	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge Federated Article Incident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge Management Setting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Key**

- None Selected
- User
- Business Unit
- Parent: Child Business Units
- Organization

# Desktop Flows Machine Configuration Admin role

The **Desktop Flows Machine Image Admin** role only brings full privileges on the **Flow Machine Image** entity. In particular, it allows users with this role to share/unshare VM images to be used for created hosted machine group in their environment. You can find more information about sharing pre-provisioned VM Images in [Create hosted machine groups](#).

**Security Role: Desktop Flow Machine Configuration Admin** Working on solution: Default Solution

Table	Create	Read	Write	Delete	Append	Append To	Assign	Share
DataflowRefreshHistory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desktop Flow Binary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Entity Image Configuration								
Entity link chat configuration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EntityRefreshHistory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environment Variable Definition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ExportSolutionUpload	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FeatureControlSetting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flow Machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flow Machine Group	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flow Machine Image	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Flow Machine Network	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Flow Session	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help Page	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
Image Attribute Configuration								
Insights Store Data Source	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
Integrated search provider	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internal Catalog Assignment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
Key Vault Reference	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge article language setting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge Federated Article	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge Federated Article Incident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge Management Setting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Key**

- None Selected
- User
- Business Unit
- Parent: Child Business Units
- Organization

## Use your work or school account

Hosted machine groups support work and school accounts. If you use your work or school account, your hosted machine group will have access to your resources that are part of the business plan linked to your organization, such as Office, SharePoint, Azure, and more.

When you register a hosted machine group with this access option, you won't be prompted for credentials. Instead, the machine will be registered to your Microsoft Entra, and you'll be able to sign in with your Microsoft Entra credentials. To [create a desktop flow connection](#) to target the hosted machine group, enter your work or school account email address and the associated password.

**Create new hosted machine group**

---

Step 5 of 6

### Access your hosted machine group

You can choose to access your hosted machine group using a local admin account or your Work or School account which enables you to access all business plans linked to your organization.

**Select connection credentials**

Choose how you will connect to your bots. [Learn more](#)

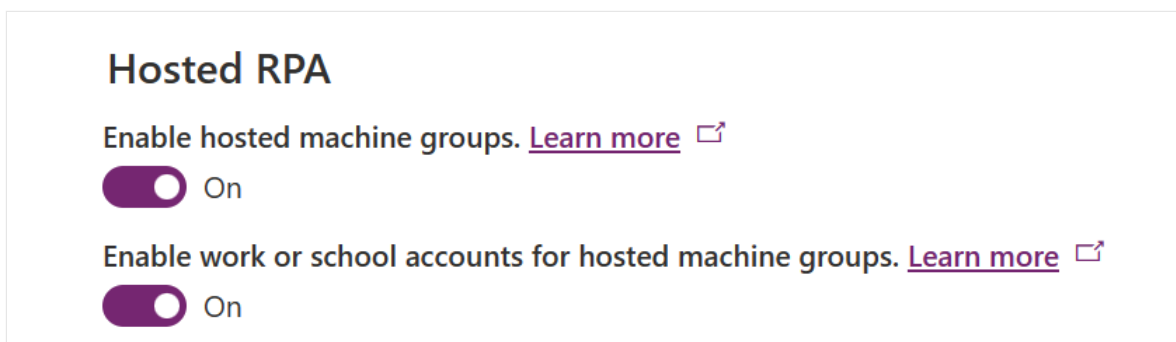
Use your work or school account  
Enables access to your documents and other resources (Eg: Office, Sharepoint, Azure, etc) that are part of your business plan linked to your organization

Create and use a local account  
Access to the hosted machine group using a local account

# Disable/enable work or school accounts in an environment

The work or school accounts feature is enabled by default. System admins and environment admins can disable or enable the feature from the Power Platform admin center.

1. Sign in to the [Power Platform admin center](#).
2. Go to **Environments**, and select the appropriate environment.
3. Select **Settings > Features**.
4. Under **Hosted RPA**, select the toggle for **Enable work or school accounts for hosted machine groups** to disable or enable this feature.



5. Select **Save**.

## ⓘ Note

Disabling this feature at the environment level will remove the **Work or school account** option in the hosted machine group creation wizard. Also, it will prevent any desktop flows from running using hosted machine groups configured with work or school accounts.

## Disable work or school accounts at tenant level

To prevent users from creating hosted machine groups with work or school accounts at the tenant level, send a request to support to disable the feature at the tenant level.

## ⓘ Note

- Disabling this feature at tenant level won't hide the **Work or school account** option in the hosted machine group creation wizard. However, the hosted



machine group creation will fail with an error.

- Desktop flows will continue to run using work or school account connection. You need to manually remove hosted machine groups that have been created with the **Work or school account** option.

## Hosted machine groups limitations

This section presents all the limitation of hosted machine groups.

### Geographic availability and restrictions

#### Important

Starting May 2nd, 2024, we will be updating the region mapping for environments in the United States and United Kingdom to ensure our services are deployed in regions with Azure Availability Zones support. This change will enhance the resiliency and availability of our services. The updated region mapping is as follows:

- United States: West US -> East US
- United Kingdom: UK West -> UK South

After the transition date, all new hosted machine groups will be provisioned in the updated region. If you have an existing hosted machine group that was provisioned before the transition, you will have the option to reprovision your hosted machine group via the Power Automate portal. If you're using a custom VM image, please ensure that the VM image version has been replicated to the updated region before you reprovision your hosted machine group. Please ensure there are no desktop flow runs queued on the hosted machine group before you run the reprovision process.

The following list displays all the supported geographies in the public clouds:

- Asia
- Australia
- Brazil
- Canada
- Europe
- France
- Germany

- India
- Japan
- Korea
- Norway
- South Africa
- Southeast Asia
- Switzerland
- United Arab Emirates
- United Kingdom
- United States

The following list displays all supported sovereign clouds:

- Government Community Cloud (GCC): US Gov Virginia
- Government Community Cloud High (GCC High): US Gov Virginia
- Department of Defense (DoD) : US DoD East

Hosted machine groups aren't yet available in the following sovereign cloud:

- China

## Sovereign clouds limitations for hosted machine groups

The following features aren't supported in sovereign clouds:

[Expand table](#)

Feature not supported	Sovereign cloud(s)
Work or school account	GCC, GCC High, DoD
Custom VM images	GCC, DoD

## Network limitations for hosted machine groups

Hosted machine groups don't have access to on-premises data sources or other on-premises resources. Hosted machine group can't be accessed from the Internet, as the inbound traffic is blocked.

## Remote desktop to hosted machine groups

Remote desktop to hosted machine groups isn't supported. Hosted machine groups are meant to be used for unattended runs only, and remote desktop access from the

Internet isn't required to run Power Automate desktop flows.

## Limit on the number of hosted machine groups per environment

The number of hosted machine groups is limited to 10 for each environment. If you reach this limit, delete an existing hosted machine group to create a new one.

## Limit on the number of bots per hosted machine group

The maximum number of hosted bots per hosted machine group is limited to 50.

## Delete unused resources

We delete unused resources to ensure the service is available for everyone. Therefore, all hosted machine groups that don't have a committed bot configured are automatically deleted if they remain inactive for more than 28 days. Although the deleted groups remain visible, they can't be used. An inactive group is defined as a group that hasn't run any desktop flows in the last 28 days.

### Note

You must delete the hosted machine group and create a new one to continue using its features. You'll need to reconfigure the connection that's associated with your cloud flow.

---

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Create an Azure Key Vault credential

Article • 07/03/2024

The **Credentials** page in Power Automate allows you to create, edit, and share sign in credentials using Azure Key Vault and use them in desktop flow connections.

You can also [create credentials with CyberArk® \(preview\)](#).

## Important

- Currently, this feature isn't available for US Government Clouds.

## Prerequisites

Credentials use secrets stored in Azure Key Vault. To allow you to create credentials, your administrator needs to configure Azure Key Vault first.

In a nutshell, admin needs to ensure:

1. Microsoft Power Platform resource provider is registered in Azure subscription.
2. There's an Azure Key Vault that contains the secrets to be used in the credentials.
3. Dataverse service principal has permissions to use the secrets.
4. Users who create the environment variable have appropriate permissions to the Azure Key Vault resource.
5. The Power Automate environment and the Azure subscription must be on the same tenant.

To configure Azure Key Vault, follow the steps described in [Configure Azure Key Vault](#).

## Create a credential

To create your credentials:

1. Go to the **Credentials** page.
2. Select **more** in the left nav, then select **Discover all**.
3. Under **Data**, select **Credentials**. You can pin the page in the left nav to make it more accessible.

In the credentials page, you can now create your first credential.

**Create a credential** ×

● Define credential name  
○ Select credential store  
○ Select credential values

**Define credential name**

**Credential name \***  
Type a name for your credential

**Description**  
Enter a description

To create your credential, you need to provide the following information:

- **Credential name:** Enter a name for the credential
- **Description** (optional)

After selecting **next**, you need to select **Azure Key Vault** as a credential store.

In the last step of the wizard, you select username and password or create new ones:

- **Username:** To select a username, you can use the dropdown. If you don't have any environment variables, select **new**:
  - **Display name.** Enter a name for the environment variable.
  - **Name.** The unique name is automatically generated from the Display name, but you can change it.
  - **Value.** Populate the name of the user. For local users, provide username. For domain users, provide `<DOMAIN\username>` OR `<username@domain.com>`.

### Create a credential ✕

- ✓ Define credential name
- ✓ Select credential store
- Select credential values

#### Select credential values

Select now the values of your credential to complete the creation.

**Username \*** ⓘ

**Display name \***

**Name \*** ⓘ  
 Enter a unique name

**Value \*** ⓘ

#### ⓘ Note

Credential username is a text environment variable. You can also [create a text variable from the solutions page](#) and select it as username.

- **Password:** To select a password, you can use the dropdown. If you don't have any secret environment variables, select **new**:
  - **Display name.** Enter a name for the environment variable.
  - **Name.** The unique name is automatically generated from the Display name, but you can change it.
  - **Subscription id.** The Azure subscription ID associated with the key vault.
  - **Resource group name.** The Azure resource group where the key vault that contains the secret is located.
  - **Azure key vault name.** The name of the key vault that contains the secret.
  - **Secret name.** The name of the secret located in Azure Key Vault.

### Create a credential ✕

- ✓ Define credential name
- ✓ Select credential store
- Select credential values

#### Select credential values

Select now the values of your credential to complete the creation.

**Username** \* ⓘ

**Password** \* ⓘ

**Display name** \*

**Name** \* ⓘ  
 Enter a unique name

**Subscription id** \* ⓘ

**Resource group name** \* ⓘ

**Azure key vault name** \* ⓘ

**Secret name** \* ⓘ

#### ⓘ Note

The subscription ID, resource group name, and key vault name can be found on the Azure portal Overview page of the key vault. The secret name can be found on the key vault page in the Azure portal by selecting Secrets under Settings. User access validation for the secret is performed in the background. If the user doesn't have at least read permission, this validation error is displayed: "This variable didn't save properly. User is not authorized to read secrets from 'Azure Key Vault path'."

Passwords use **secret environment variables**. You can also [create a secret variable from the solutions page](#) and select it as password.

## Create desktop flow connections using a credential

Note: Credentials are only supported in the desktop flow connections for now.

You can now use your credential in a [desktop flow connections](#)

## View where secrets are used

From Solutions page, you can retrieve all the dependencies of secret environment variables. This helps you to understand where your Azure Key Vault secrets are used before editing them.

- Select one environment variable.
- Select the **advanced** option and select **Show dependencies**.
- You can see:
  - The credentials using this environment variable.
  - The connections using this environment variable.

## Share a credential

You can share the credentials you own with other users in your organization and give those users specific permissions to access it.

1. Sign-in to [Power Automate](#) , and then go to **Credentials**.
2. Select your credential from the list of credentials.
3. On the command bar, select **Share**.
4. Select **Add people**, enter the name of the person in your organization with whom you would like to share the credentials, and then select the role you want to grant to this user:
  - **Co-owner** (can edit). This access level gives full permission to that credential. Co-owners can use the credential, share it with others, edit its details, and delete it.
  - **User** (can view only). This access level only gives permission to use the credential. No edit, share, or delete permissions are possible with this access.
  - **User** (can view and share). This access level is the same as the can view only option, but it gives permission to share.
5. Select **Save**.

### ⓘ Note

By sharing your credential, all the environment variables used in the credential are shared as well. Removing permissions on a credential doesn't remove permissions



on the environment variables.

## Delete a credential

1. Sign in to [Power Automate](#), and then go to **Credentials**.
2. From the list, select the credential you want to delete, and then select **Delete machine** on the command bar.

### ⓘ Note

Deleting a credential doesn't delete the associated environment variables.

## Export a desktop flow connection using credential

### ⓘ Note

You should first read the article about [ALM for desktop flows](#).

You can export a cloud flow with a desktop flow connection using credential. You should import the solution containing the credential and the related environment variables first then import the one containing the cloud flow and the desktop flow.

## Limitations

- Currently, this feature is available only for desktop flow connections.
- Creating credentials in the new designer isn't available yet.
- You can't edit the selected environment variables in an existing credential. If you want to change the value of username and password, you need to either update the environment variables or the Azure Key Vault secret.
- Update of connections using credentials is asynchronous. It can take up to one minute for the desktop flow connection to use the new credentials after the secret is updated.

## Update a secret (password rotation) - Deprecated

### ⓘ Note

This section is now deprecated. All the connections using Credentials are now retrieving secrets during the flow execution. It is not necessary anymore to create this custom flow to update the connections. The connections using Credentials created before April 2024 should be updated to benefit of the automatic update.

## Prerequisites for updating a secret (password rotation)

- Ensure Event Grid is registered as a Resource provider in Azure. [Learn more about resource providers.](#)
- Ensure users who use Event Grid trigger in Power Automate have Event Grid Contributor permissions. [Learn more](#)

### ⓘ Note

This section requires specific permissions such as system admin of the organization otherwise only your own desktop flow connections will be updated.

## Create a cloud flow using Event Grid trigger

When you edit secrets in your Azure Key Vault, you want to ensure that the credentials and connections using these secrets are always up to date to avoid breaking your automations. In Power Automate, you need to create a cloud flow that updates the credentials when secrets are changed in Azure Key Vault.

This cloud flow contains one trigger and one action:

### 1. Trigger: When a resource event occurs (Event Grid)

- Resource type: **Microsoft.KeyVault.vaults**
- Resource name: Provide the name of the key vault.
- Subscription: Provide the name of the subscription.
- Event type: **Microsoft.KeyVault.SecretNewVersionCreated**

### 2. Action: Perform an unbound action (Dataverse)

- Action name: **NotifyEnvironmentVariableSecretChange**
- KeyVaultUrl: **Topic**
- Secret name: **Subject**

Perform an unbound action
... <<

Parameters
Settings
Code View
Testing
About

Action Name \*

NotifyEnvironmentVariableSecretChange
>

---

Advanced parameters

Showing 2 of 2
>
Show all
Clear all

Item/KeyVaultUrl

Topic
×

×

Item/SecretName

Subject
×

×

If you use one Key Vault for all your secrets, you need only one cloud flow. If you have several Key Vaults, you need to duplicate the cloud flow and update the resource name.

To ensure that your cloud flow is working correctly with Azure Key Vault:

1. Go to your Key Vault.
2. Select **Events**.
3. In **Events subscriptions**, check if you can see a LogicApps webhook.

Search to find event subscription by name...					
Name	Endpoint	Prefix Filter	Suffix Filter	Event Types	Provisioning state
LogicApp6d015ae-1bb6-42ac-abd2-d1dd3fe69750	Webhook			Microsoft.KeyVault.SecretNewVersionCreated	Succeeded

## Feedback

Was this page helpful? 👍 Yes 👎 No

[Provide product feedback](#) ↗

# Create a CyberArk credential (preview)

Article • 07/24/2024

[This article is prerelease documentation and is subject to change.]

This feature allows users to create a Power Automate credential that retrieves CCP CyberArk secrets from vault during runtime.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.


## Availability

Currently, this feature isn't available for US Government Clouds.

## Prerequisites

### Set up your CyberArk Central Credential Provider (CCP)

If your CyberArk Central Credential Provider (CCP) isn't set up, complete the following actions:

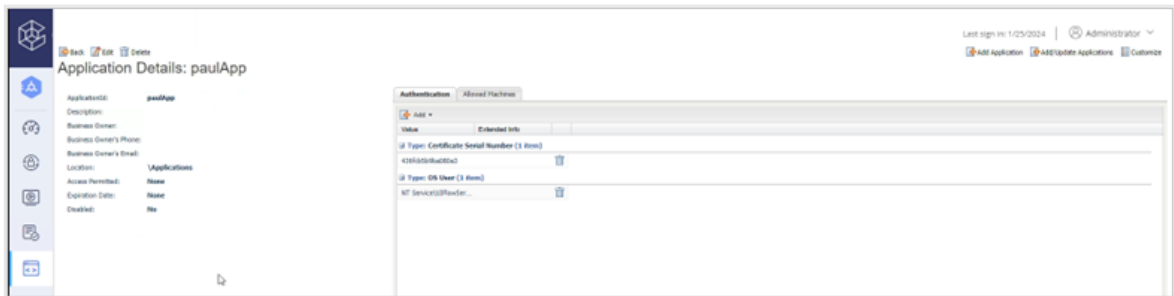
1. Install the Central Credential Provider (CCP). Learn more at <https://docs.cyberark.com/credential-providers/latest/en/Content/CCP/CCP-Installation.htm> .
2. Ensure that your machines can communicate with the CyberArk server.
3. Allow https connections to contact the CCP AIMWebService.

## Create an application with client certification authentication from PVWA

A signed certificate enables the application authentication with a certificate serial number.

To add a signed certificate:

1. Sign-in to CyberArk's Password Vault Web Access (PVWA).
2. From the left navigation, select the **Applications** tab and then select **Add Application**.



3. Provide the information in the Application window (at least a name) and select **Add**.
4. In the details of the application, select **Add** on the **Authentication** tab.
5. Select **Certificate serial number** and enter the value. Learn more in [Application authentication methods](#).

## Set up a CyberArk safe that contains their user accounts

(Optional) If you don't have a safe yet, you can create a Safe from PVWA:

1. From the left navigation, select **Policies** and then select **Safes**.
2. Select **Create Safe**.
3. Enter a safe name and select **PasswordManager**.
4. Enter Safe members and Access then select **Create Safe**.

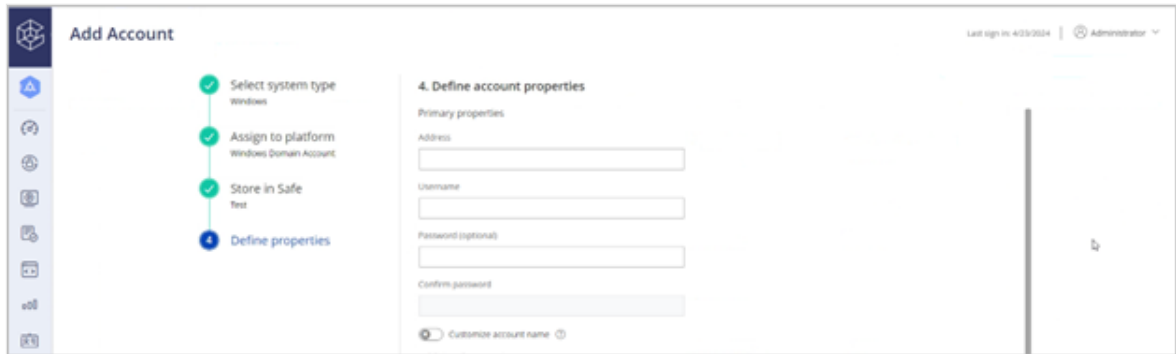
From PVWA, you can then add your machine accounts.

### ⓘ Note

You can also create accounts from PrivateArk client.

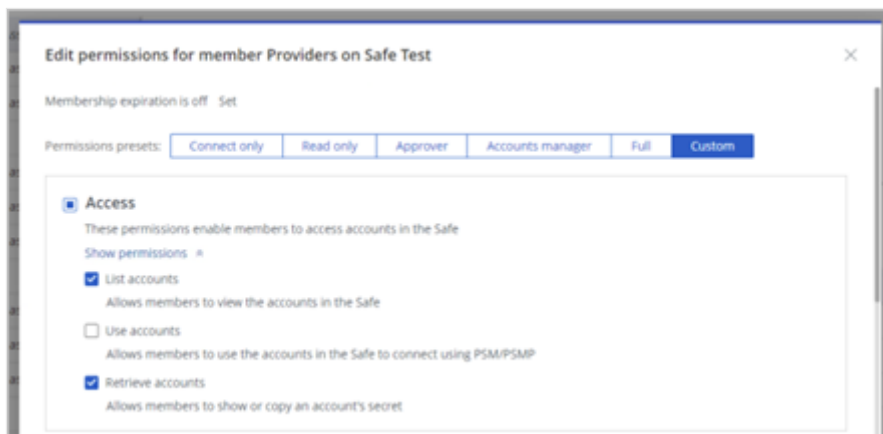
5. From the left navigation, select **Accounts** > **Add Account**.
6. Select **Windows** as system type.

7. Select the safe you created to store your robotic process automation (RPA) machine accounts.
8. Provide information about your account and select **Add**.



## Define application and credential provider as safe member

1. Add the Credential Provider user as a Safe Member with the following authorizations:
  - List accounts
  - Retrieve accounts
  - View Safe Members



2. Add the application as a Safe Member with the following authorizations:
  - Retrieve accounts

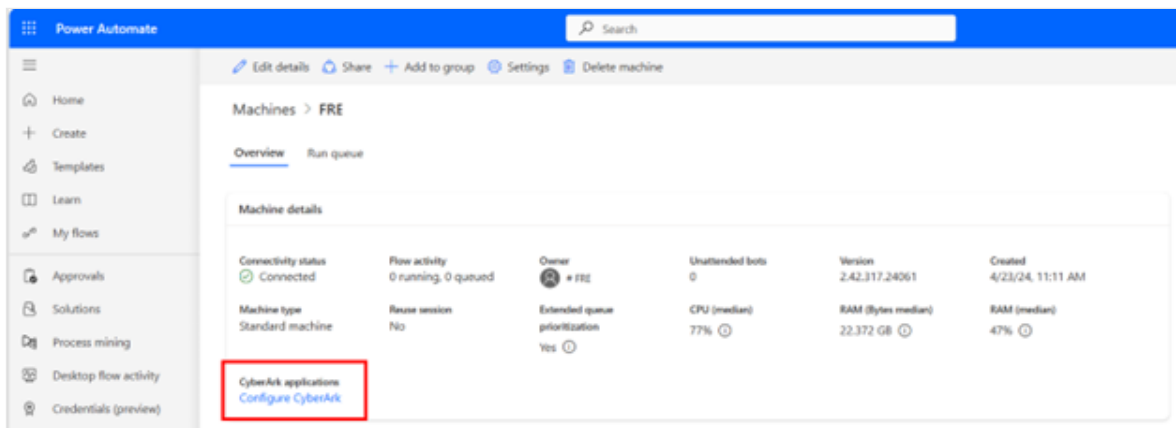
## Add a CyberArk application to machine / group

**Important**

It isn't currently possible for users to associate a CyberArk application with machines or groups that are shared with other users.

If you want to run a desktop flow on a machine or a group using CyberArk credentials, you need to add your CyberArk application information in the Power Automate portal.

1. Sign-in to [Power Automate](#).
2. From the left navigation, select **Machines**, and then select the machine or the group.
3. In the Machine details, select **Configure CyberArk**.

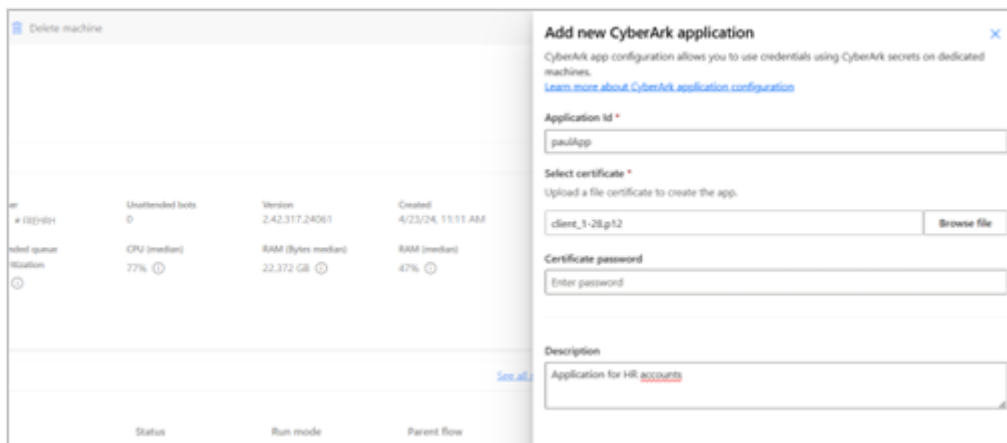


4. Select **New application**.
5. Enter the app ID of the application you created from CyberArk PVWA.
6. Select the certificate, which stores the private and the public key of the certificate.
  - The allowed formats are .pfx or .p12 files.
  - The private key should be marked as exportable.
7. Enter the certificate file password that is used to open the certificate file.

#### ⓘ Note

The password is not stored. The certificate is opened and encrypted with the public key of the machine group so it is only readable from the registered machines.

8. Enter a description (optional) and then select **Save**.



## Create a CyberArk credential

Now that you complete all the prerequisites steps, you can create your CyberArk credentials.

1. From the left navigation, select **Credentials**.
2. Select **New credential**.
3. In the wizard, define a credential name and a small description and then select **Next**.
4. Select CyberArk CCP as the type of credential store.
5. If you already defined a CyberArk store, you can select it from the dropdown. Otherwise, select **Create new**.
  - **Display name:** Provide a name for your CyberArk store.
  - **Server address:** The server address is the Central Credential Provider URL. For example, `https://svc.skytap.com:8992`.

### ⓘ Note

Versions below the August release don't support a server address ending with a "/".

- **Application Id:** To find the Application ID, open CyberArk PVWA (Password Vault Web Access) on a web browser and navigate to the Applications tab.
- **Safe:** Populate the name of the safe displayed in CyberArk PVWA.



- **Folder** (optional): Populate the folder name where your credentials are stored. By default, credentials are stored in the "Root" folder.

Type	Credential store
Login credential	CyberArk
Login credential	CyberArk
Login credential	CyberArk
localUser	Login credential
	Login credential
cyberk creds	Login credential

**Create a credential**

Define credential name

Select credential store

Select credential values

**Select credential store**

Provide information about the credential store you would like to use for your credentials.

Select the type of credential store \*

CyberArk (CCP)

CyberArk store \*

Create new

Display name \*

Enter a name for your store

Server address \*

https://hostname:port\_number/

Application Id \*

Enter the Application Id

Safe \*

Enter the safe name defined in CyberArk

Folder

Root

Create

6. In the last step of the wizard, you need to provide the information about the user account:

- **Username:** Select a username from your text environment variables or create a new one by selecting new.

If you create a CyberArk credential to be used in a desktop flow connection, provide your device account. Populate the name of the user (for example, `<MACHINENAME\User>` or `<local\User>`) or a Microsoft Entra ID account, such as `<DOMAIN\User>` or `<username@domain.com>`.

- **Object name:** The object name corresponds to the CyberArk object name store in the CyberArk safe. This value is also called account name in PVWA.

## Use the credential in a desktop flow connection

Your credential is now created. You can use it in a desktop flow connection to [run desktop flows from cloud flows](#).

## Feedback

Was this page helpful?

[Provide product feedback](#)

# Create desktop flow connections

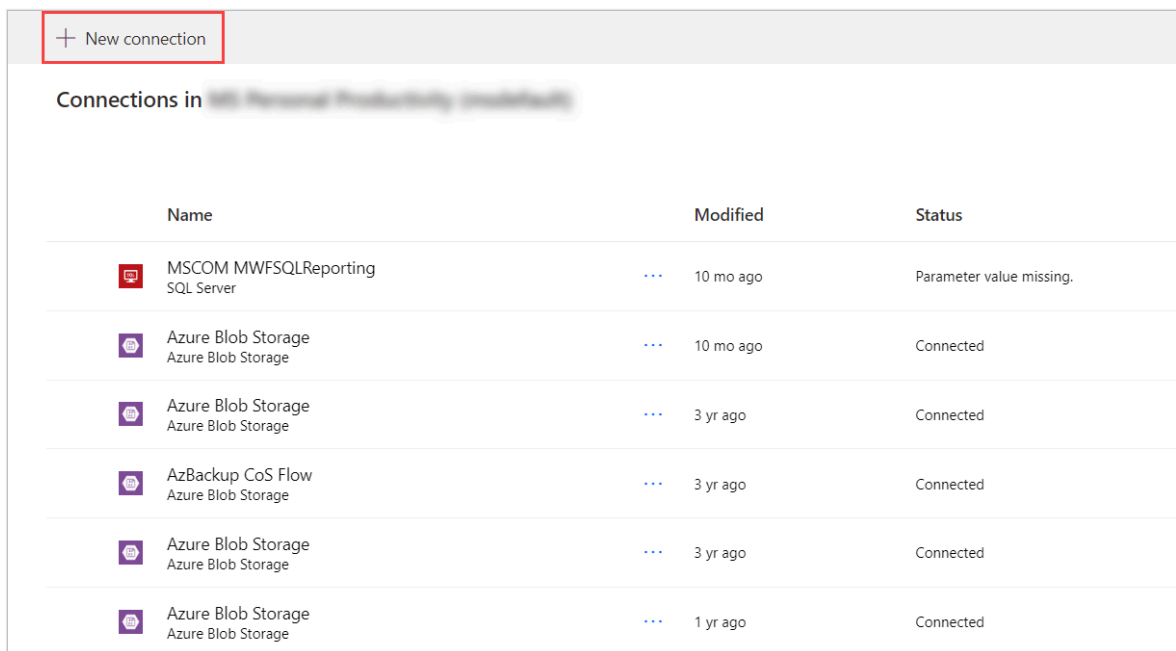
Article • 07/24/2024







## Important

Before using a machine to run desktop flows from the cloud, ensure that the machine is secured and the machine's admins are trusted.

Before using the **Run desktop flow** action in your cloud flow to trigger a desktop flow, you need to create a connection to your machine. To create a connection:

1. Sign in to [Power Automate](#), go to **Data > Connections**, and then select **New connection**.



Name	Modified	Status
 MSCOM MWFSQLReporting SQL Server	... 10 mo ago	Parameter value missing.
 Azure Blob Storage Azure Blob Storage	... 10 mo ago	Connected
 Azure Blob Storage Azure Blob Storage	... 3 yr ago	Connected
 AzBackup CoS Flow Azure Blob Storage	... 3 yr ago	Connected
 Azure Blob Storage Azure Blob Storage	... 3 yr ago	Connected
 Azure Blob Storage Azure Blob Storage	... 1 yr ago	Connected

2. Search for **Desktop flows**, and then select the appropriate result.

## Note

Desktop flows connection cannot be shared with other users.

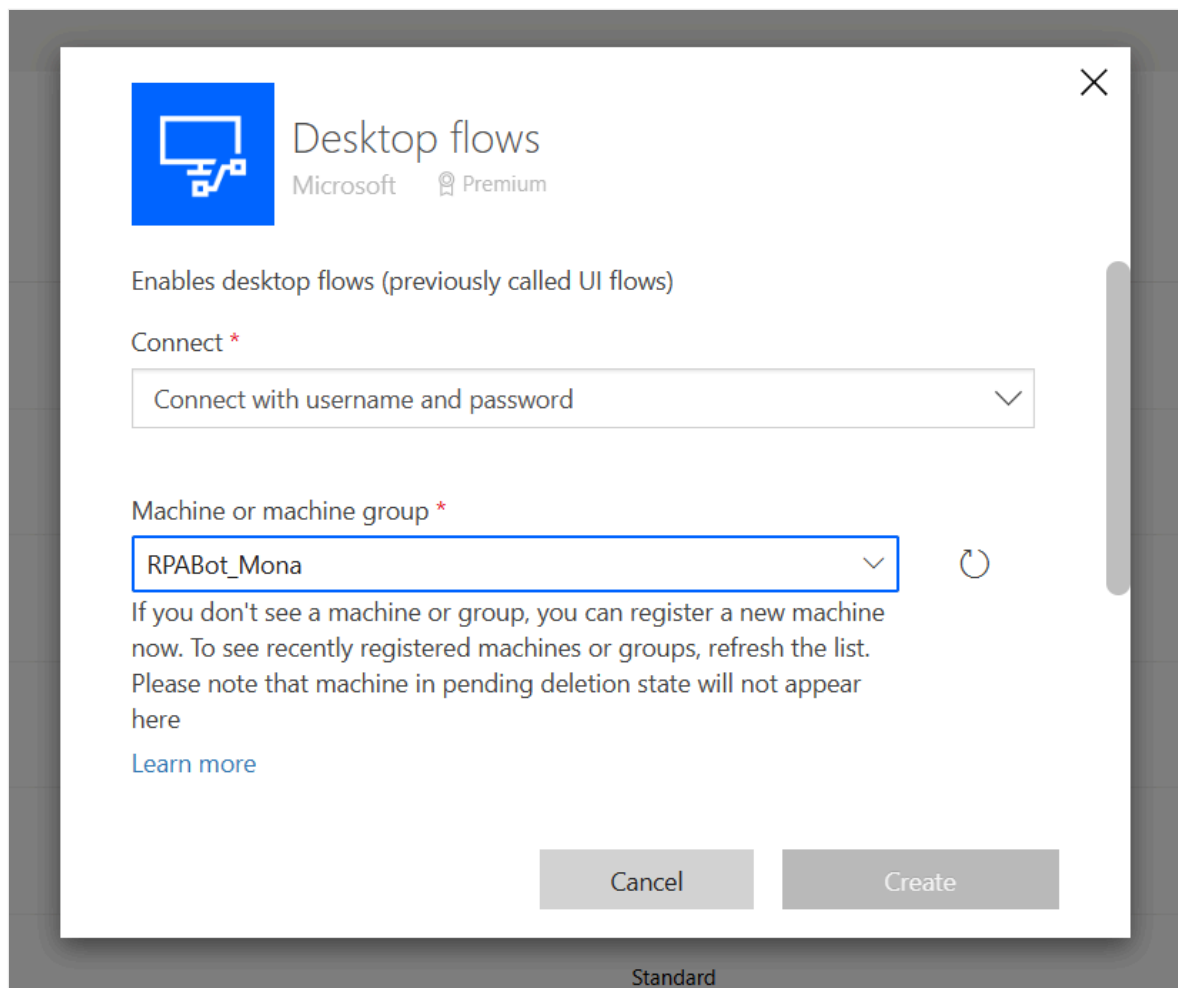
There are two different methods to connect Power Automate with your machines (or groups).

## Connect with username and password

With this option, you need to provide the machine information and device credentials:

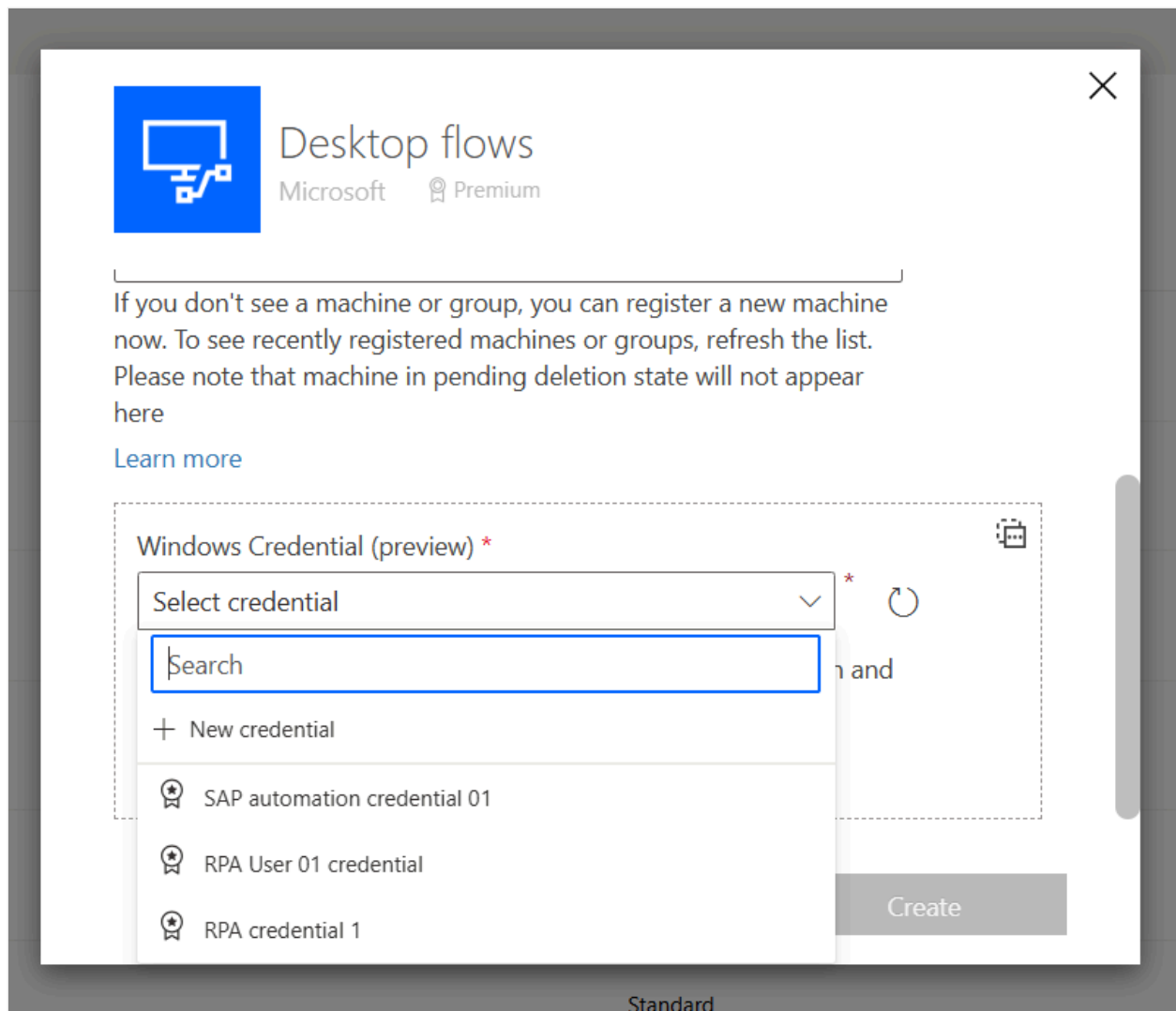
- **Connect:** Select if you want to connect to a machine or a machine group.

To connect to a machine or a machine group, select **Connect with username and password**, and choose the appropriate machine or machine group in **Machine or machine group**.



## Option 1: Select credential

1. Select **Switch to credentials**.
2. You can now select the credential you want to use on the selected machine and select **Create**. If you don't have any credential yet, select **New credential**. You can create credentials with secrets stored in [Azure Key Vault](#) or [CyberArk®](#) (preview).



## Option 2: Enter username and password

- **Domain and username:** Provide your device account. To use a local account, populate the name of the user (for example, <MACHINENAME\User> or <local\User>) or a Microsoft Entra ID account, such as <DOMAIN\User> or <username@domain.com>.
- **Password:** Your account's password.

**Desktop flows**  
Microsoft Premium

Machine or machine group \*

Invoice processing bots

If you don't see a machine or a machine group, you can register a new machine now. To see recently registered machines or machine groups, refresh this list.

[Learn more](#)

Domain and username \*

Format as domain\username or username@domain.com

Password \*

Password credential

Cancel Create

## Connect with sign-in for attended runs

With this option, you don't need to provide session credentials. This option might be helpful when your organization doesn't allow username and password for user sessions.

### Prerequisites

To use connection with sign-in, you need to meet the following prerequisites:

- Microsoft Entra users must be in the same tenant as the selected environment in the Power Automate portal.
- The target (machine / group) should be Microsoft Entra ID or AD joined. If there's a Microsoft Entra ID joined target, the machine or group must be synchronized with Microsoft Entra ID.
- The Microsoft Entra user account must be granted permission to open a Windows session on the target machines (interactive sign in). At runtime, there should a Windows interaction session matching the connection user in order to process the run (as it's today for existing connections).
- The tenant of the target Microsoft Entra account is configured to use modern [Authentication with Microsoft Entra ID](#).

### ⓘ Note

For GCCH, DOD, and China regions, the December version of the Power Automate for desktop app is required. For GCC, the July version of the Power Automate for desktop app is required.

## Set up the connection with sign-in

To set up a connection with sign-in:

1. Select **Connect with Sign-in** in the **Connect** dropdown.
2. Select the target (machine or machine group).
3. Select **Sign in**.
4. Pick or provide an **Microsoft Entra account** in the sign in pop-up.

The desktop flow connect is automatically created.

## How it works

- An access / refresh token is created during the Microsoft Entra authentication.
- The token scope is limited to executing a desktop flow.
- The Power Platform services manage the refresh of those tokens.

## Limitations

- Connect with sign-in (preview) works only for attended runs. Running unattended with this connection fails.
- Queue time duration is limited to one hour.

### ⓘ Important

If you consistently encounter issues when creating a connection on a new machine, first try to remove it, and then [register it](#) again.

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) ↗

# Manage desktop flows

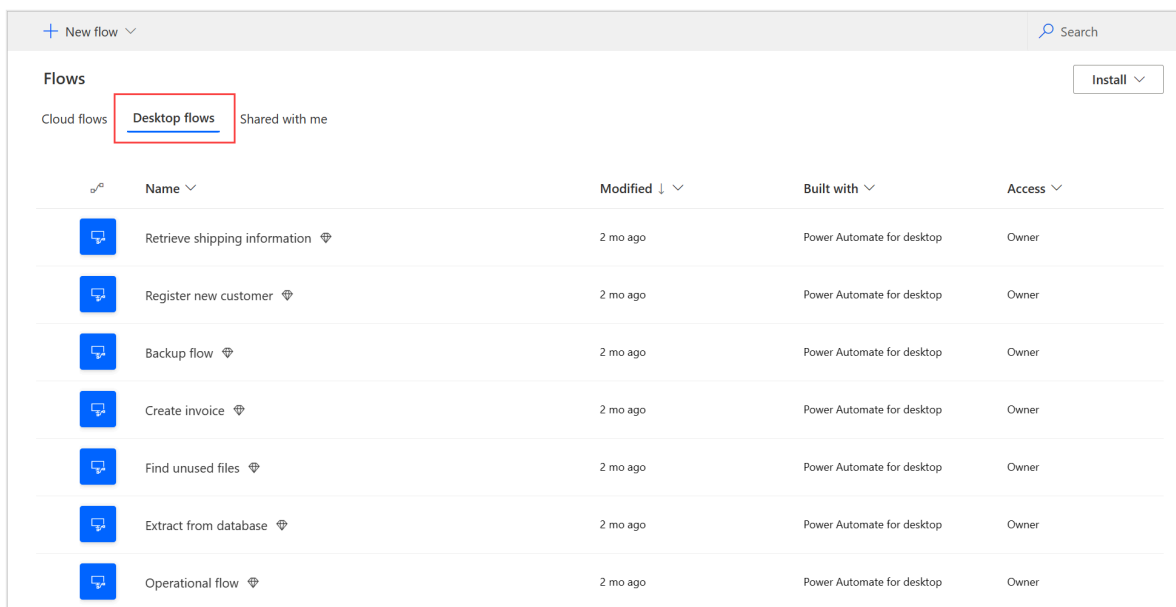
Article • 04/11/2024

After creating desktop flows, you might need to view, edit, or check their status. To achieve all these tasks, go to **My flows > Desktop flows** in the Power Automate portal.

## See a list with desktop flows

1. Sign in to the [Power Automate portal](#).
2. Go to **My flows > Desktop flows**.

Using the available options in this tab, you can create new desktop flows and edit or delete existing desktop flows.



The screenshot shows the 'Flows' section in the Power Automate portal. The 'Desktop flows' tab is selected and highlighted with a red box. Below the tabs, there is a table listing several desktop flows. Each row includes a flow icon, the flow name, the modification date (all listed as '2 mo ago'), the built-with application (all 'Power Automate for desktop'), and the access level (all 'Owner').

Name	Modified	Built with	Access
Retrieve shipping information	2 mo ago	Power Automate for desktop	Owner
Register new customer	2 mo ago	Power Automate for desktop	Owner
Backup flow	2 mo ago	Power Automate for desktop	Owner
Create invoice	2 mo ago	Power Automate for desktop	Owner
Find unused files	2 mo ago	Power Automate for desktop	Owner
Extract from database	2 mo ago	Power Automate for desktop	Owner
Operational flow	2 mo ago	Power Automate for desktop	Owner

### ⓘ Note

If you delete or rename a desktop flow, select the refresh button to reflect the changes in the desktop flows list.

## See details of desktop flows

For each of your desktop flows, you can see its details by selecting its name from the list of desktop flows. You can see various details including:

- The run history with details of each run.
- The applications or websites used in the desktop flow.



Follow these steps to see the details for a desktop flow:

1. Sign in to the [Power Automate portal](#).
2. Go to **My flows** > **Desktop flows**.
3. Select any of your desktop flows.

The screenshot shows the Power Automate console interface for a desktop flow. At the top, there are navigation icons for Edit, Save As, Share, and Delete. The breadcrumb path is 'Desktop flows > Retrieve shipping information'. The main content is divided into three sections:

- Details:** Shows the flow name 'Retrieve shipping information', owner 'System Administrator', and creation/modification dates of 'Nov 4, 10:45 AM'. It also notes it was built with 'Power Automate for desktop'.
- Shared with:** Shows the flow is shared with 'System Administrator'.
- Last runs:** A table showing one run that was 'Canceled' on 'Nov 4, 10:47 AM (2 mo ago)' with a duration of '00:01:25'.

On the right side, there is a '7-day completed run status (preview)' section with a 'Go to activity' link and a message 'No data to display yet'.

## Generate flow description using Copilot (preview)

[This topic is prerelease documentation and is subject to change.]

Generate a flow description for flows by the press of a button. Copilot then analyzes the flow and generates a description for it. This feature is also available from the flow properties in the Power Automate for desktop console. More information: [Power Automate for desktop console](#)

### **i** Important

- This is a preview feature.
- Preview features aren't meant for production use and might have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.
- To understand the capabilities and limitations of this feature, go to [FAQ for generating a flow description using Copilot](#).

## Prerequisites

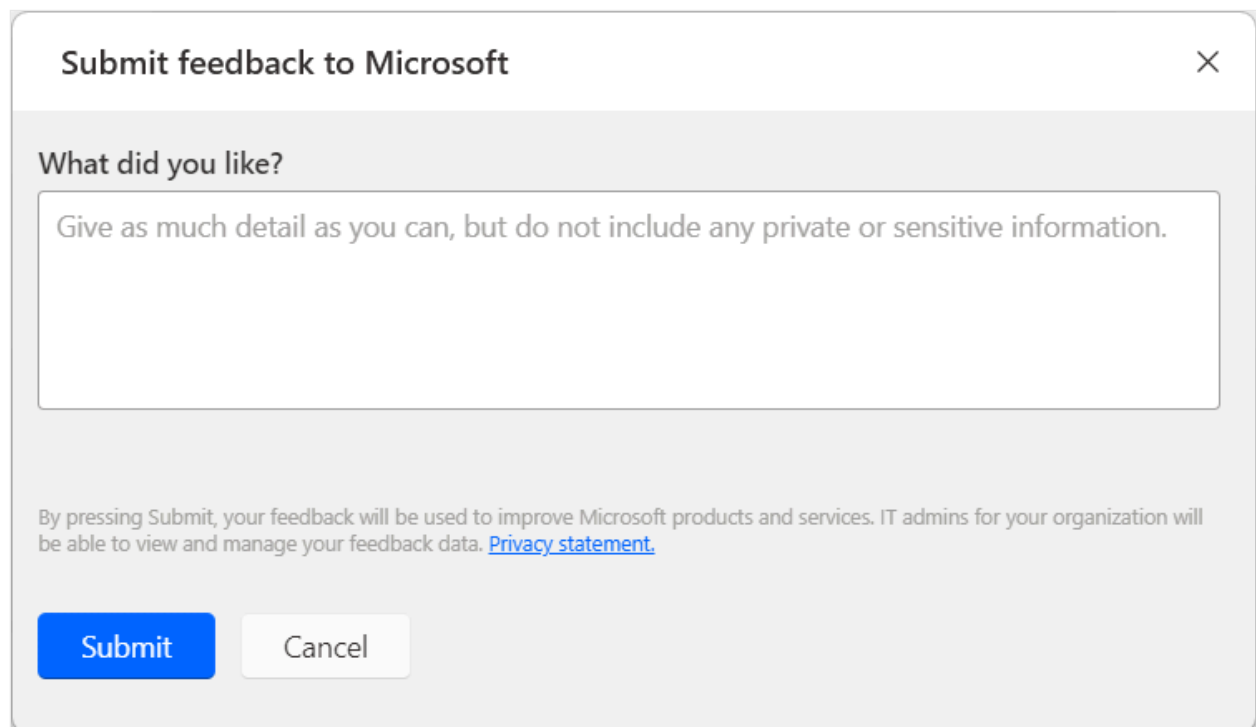
- Currently, the generate flow description using Copilot functionality is only available in environments located in the United States.
- Currently, the generate flow description using Copilot functionality is only available for users with a work or school account.

## Use Copilot to generate the description

To generate a flow description, go to the details of the flow where you want to generate the description, and then select **Edit**. Under the **Description** text area, select **Let Copilot create a description**. Copilot analyzes your flow and populates the description with a summary of your flow.

## Help us improve this feature

Send feedback by selecting the thumb up or thumb down icon underneath the AI-generated content. Once you do, a dialog box appears, which you can use to submit feedback to Microsoft.



The image shows a dialog box titled "Submit feedback to Microsoft" with a close button (X) in the top right corner. Below the title is the question "What did you like?". Underneath is a text input field with the placeholder text "Give as much detail as you can, but do not include any private or sensitive information." At the bottom of the dialog box, there is a blue "Submit" button and a white "Cancel" button. A small disclaimer at the bottom of the dialog box reads: "By pressing Submit, your feedback will be used to improve Microsoft products and services. IT admins for your organization will be able to view and manage your feedback data. [Privacy statement](#)."

### ⓘ Note

If you can't see the dialog box, your Power Platform admin might have turned it off. More information: [Disabling the user feedback functionality](#).

# Disabling the generate flow description using Copilot functionality

To disable the generate flow description using Copilot functionality, Power Platform admins can contact Microsoft support. More information: [Get Help + Support](#)

## Disabling the user feedback functionality

As a Power Platform admin you can prevent users from sending feedback to Microsoft by disabling the `disableSurveyFeedback` tenant setting using PowerShell. More information:

- [List tenant settings \(preview\)](#)
- [Set TenantSettings](#)

## Data subject rights requests on user feedback

Tenant administrators can view, export, and delete the feedback from users by signing in to the [Microsoft 365 admin center](#), and then select **Health** > **Product feedback**.

## See also


- [FAQ for generating a flow description using Copilot](#)

## Share desktop flows

You can share a desktop flow with other users in your organization, giving those users specific permissions to access your flows.

Follow these steps to share a desktop flow:

1. Sign in to the [Power Automate portal](#).
2. Go to **My flows** > **Desktop flows**.
3. Select the desktop flow you want to share, and then **Share**.
4. Select **Add people**, and then enter the name of the person in your organization with whom you'd like to share the desktop flow.

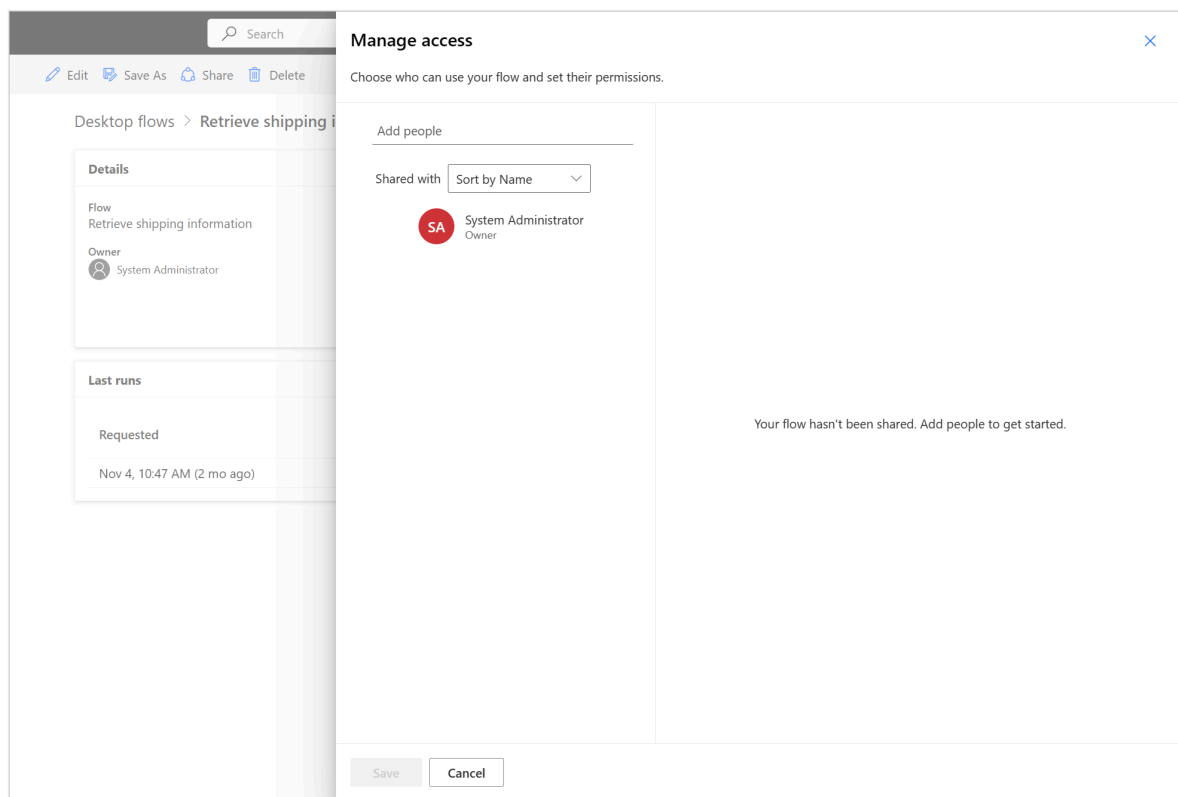
 **Note**

You can also enter a Microsoft Dataverse team name instead of the name of the person. If you want to share with a Microsoft Entra group, you first need to create a Microsoft Entra Group team in Dataverse based on the Microsoft Entra Group. More information: [Microsoft Dataverse teams management](#)

5. Select the user and then select either **User** or **Co-owner** as the permission for the person with whom you share the flow.

- **Co-owner:** This access level gives the co-owner full permissions to the desktop flow. They can edit, share, and delete the desktop flow.
  - **User:** This access level gives permission to only use that desktop flow in a cloud flow and run it locally with Power Automate for desktop. No edit, rename, delete, or share permissions are possible with this access.
- Alternatively, those users can create a copy of the desktop flow using the **Save as** option, and work independently.

6. Select **Save**.



### ⓘ Note

Once a desktop flow has been shared, owners and co-owners can change the access of each user by selecting **Manage access** on the desktop flow details page. If someone shares a desktop flow with you, select the refresh button to see it in the **Shared with me** flows list. After you share a desktop flow with new co-owners, the

co-owners see all the desktop runs that happen in the future. However those co-owners don't see the desktop flows already completed before sharing.

## Reassign desktop flows

To reassign a desktop flow to another user:

1. Sign in to the [Power Automate portal](#).
2. Go to **Data > Tables**.
3. Go to the **All** tab, and then search for the **Process** table.

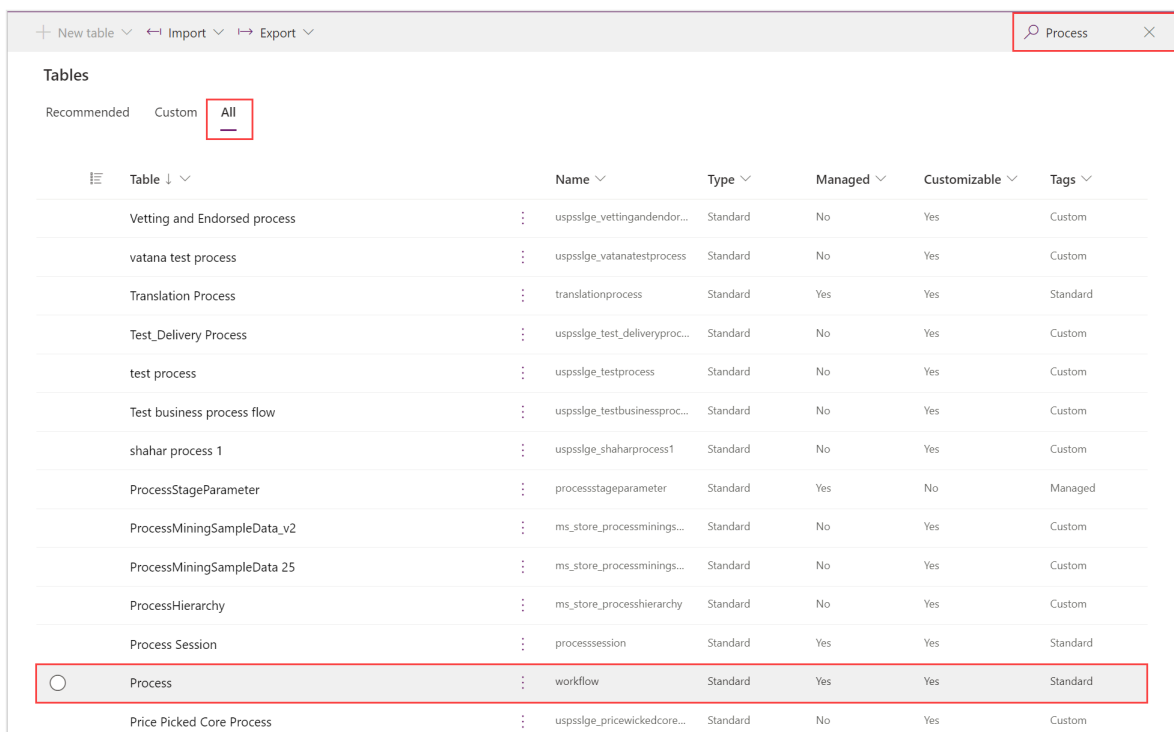
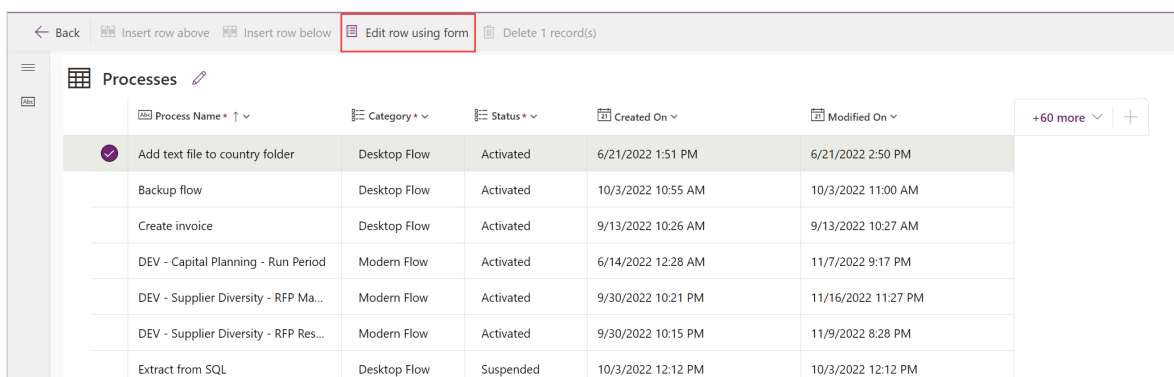


Table	Name	Type	Managed	Customizable	Tags
Vetting and Endorsed process	uspssige_vettingandendor...	Standard	No	Yes	Custom
vatana test process	uspssige_vatanatestprocess	Standard	No	Yes	Custom
Translation Process	translationprocess	Standard	Yes	Yes	Standard
Test_Delivery Process	uspssige_test_deliveryproc...	Standard	No	Yes	Custom
test process	uspssige_testprocess	Standard	No	Yes	Custom
Test business process flow	uspssige_testbusinessproc...	Standard	No	Yes	Custom
shahar process 1	uspssige_shaharprocess1	Standard	No	Yes	Custom
ProcessStageParameter	processstageparameter	Standard	Yes	No	Managed
ProcessMiningSampleData_v2	ms_store_processminings...	Standard	No	Yes	Custom
ProcessMiningSampleData 25	ms_store_processminings...	Standard	No	Yes	Custom
ProcessHierarchy	ms_store_processhierarchy	Standard	No	Yes	Custom
Process Session	processsession	Standard	Yes	Yes	Standard
Process	workflow	Standard	Yes	Yes	Standard
Price Picked Core Process	uspssige_pricewickedcore...	Standard	No	Yes	Custom

4. Select **Edit**.

5. Select your desktop flow in the list, and then select **Edit row using form**.



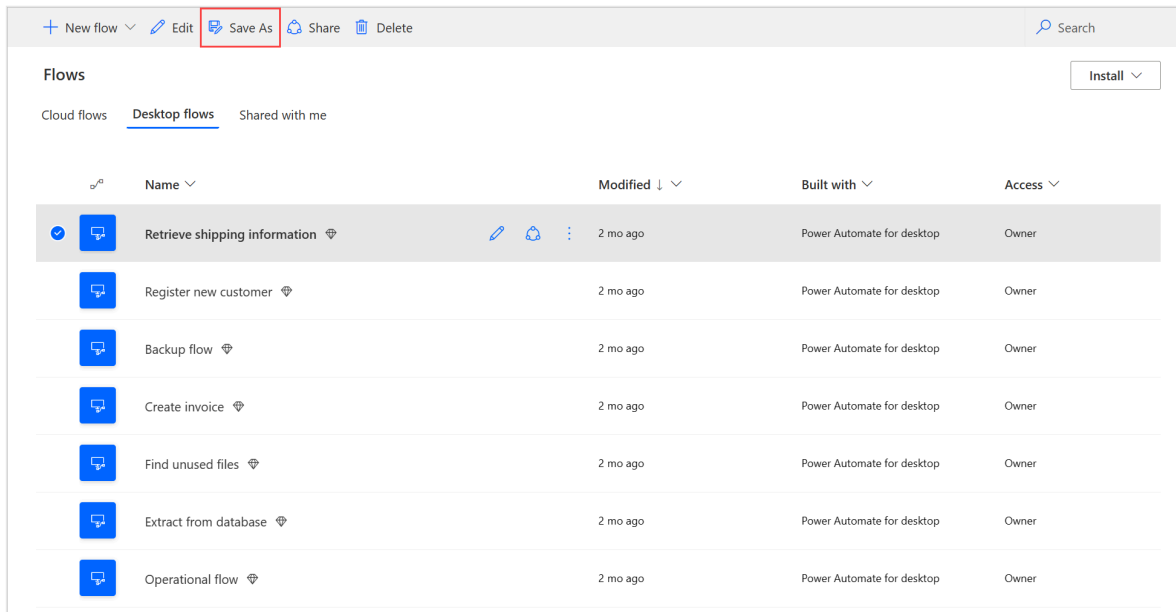
Process Name	Category	Status	Created On	Modified On
Add text file to country folder	Desktop Flow	Activated	6/21/2022 1:51 PM	6/21/2022 2:50 PM
Backup flow	Desktop Flow	Activated	10/3/2022 10:55 AM	10/3/2022 11:00 AM
Create invoice	Desktop Flow	Activated	9/13/2022 10:26 AM	9/13/2022 10:27 AM
DEV - Capital Planning - Run Period	Modern Flow	Activated	6/14/2022 12:28 AM	11/7/2022 9:17 PM
DEV - Supplier Diversity - RFP Ma...	Modern Flow	Activated	9/30/2022 10:21 PM	11/16/2022 11:27 PM
DEV - Supplier Diversity - RFP Res...	Modern Flow	Activated	9/30/2022 10:15 PM	11/9/2022 8:28 PM
Extract from SQL	Desktop Flow	Suspended	10/3/2022 12:12 PM	10/3/2022 12:12 PM

6. Select **Assign**, and then confirm the changes.

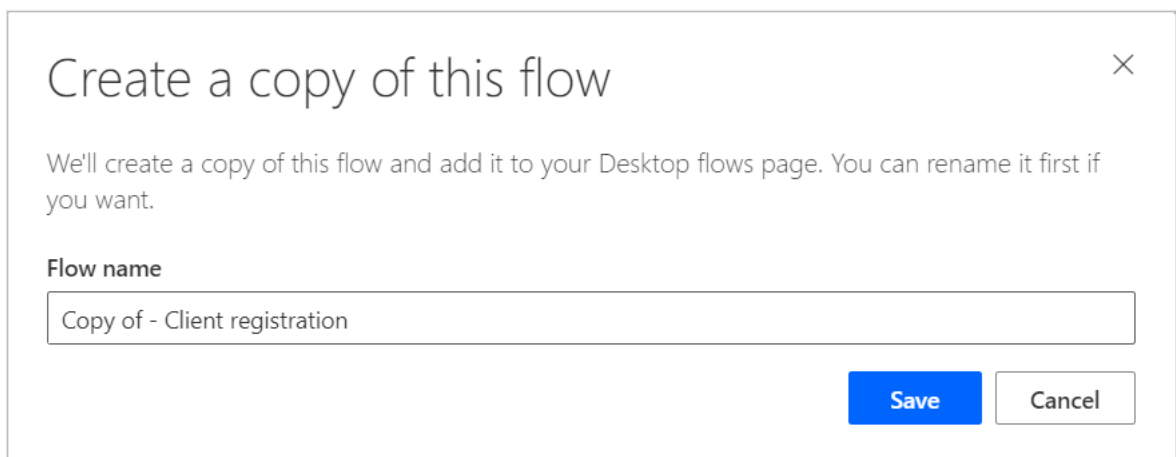
# Copy desktop flows

To duplicate an existing desktop flow:

1. Sign in to the [Power Automate portal](#).
2. Go to **My flows > Desktop flows**.
3. Select the flow you want to copy.
4. Select **Save As**.



5. Enter a name for the new desktop flow.
6. Select **Save**.



## Manage desktop flows access

For each of your desktop flows, you can manage its access by selecting **Manage access** in the desktop flows details page.

Desktop flows > Retrieve shipping information

**Details** [Edit](#)

Flow: Retrieve shipping information  
Created: Nov 4, 10:45 AM

Owner: System Administrator  
Modified: Nov 4, 10:45 AM

Built with: Power Automate for desktop

**Shared with** [Manage access](#)

SA System Administrator

**7-day completed run status (preview)** [Go to activity](#)

No data to display yet

**Last runs** [All runs](#)

Requested	Duration	Status
Nov 4, 10:47 AM (2 mo ago)	00:01:25	Canceled

In this page, you can:

- Share the desktop flow with another user.
- Edit users' permissions.
- Remove users' permissions for this desktop flow.

#### ! Note

- Users of an environment with a Dataverse security role that grants them **Read** access to **all records** in the **Process** table (where different types of flows are stored), will be listed as **Co-owners** of **any desktop flows** created in that environment. They can't be removed as co-owners unless you change privileges and access level in the underlying security role. An example of a security role with environment wide **Read** privileges for desktop flows is the **System Customizer** role, which has **Process** table **Read** permission set to **Organization**, which essentially allows users with this role to view all desktop flows in the environment and be marked as co-owner. We therefore highly recommended reviewing each security role before assigning them to users to ensure that the privilege set and access level is appropriate for the intended use case.
- When a user isn't part of an environment anymore, you can continue to see it as a deactivated user. You're notified in the **Manage access** section of the desktop flow if this flow is shared with deactivated users. In this situation, remove access to them.

**Learn more**

- Create desktop flows.
- Trigger desktop flows from cloud flows.
- Monitor desktop flow runs.
- Desktop flow activity.



# Work queues overview

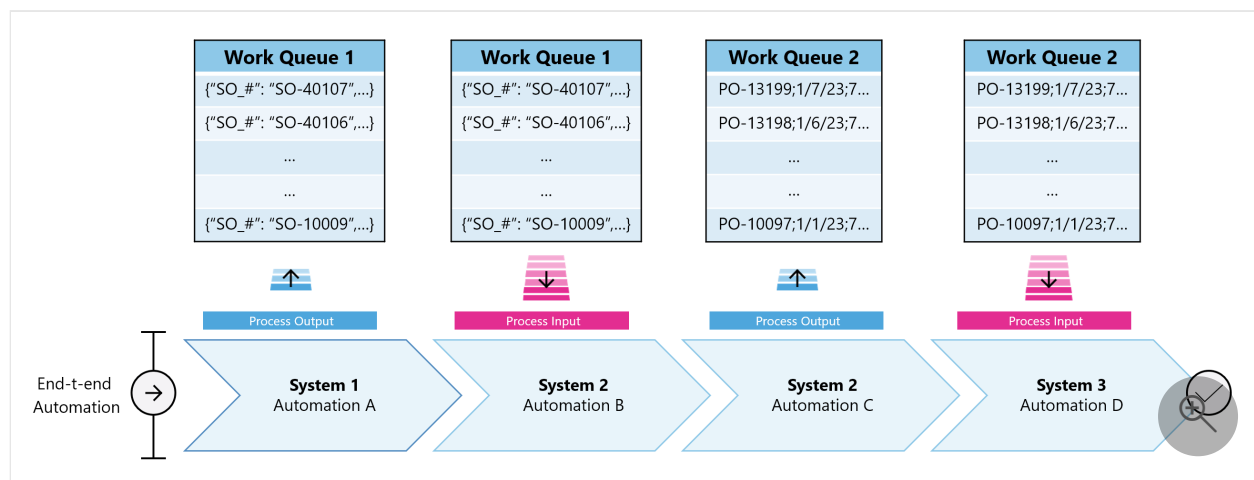
Article • 10/26/2023

Work queues in Power Automate can be used to store process-relevant data and provide a way to decouple complex processes and automations, allowing them to communicate asynchronously.

They can play a crucial role in improving the efficiency, scalability and resiliency of automations and help prioritize work, with the highest-priority items being completed first, regardless of whether they've been processed by digital workers, human workers, or through integrations.

Just as manufacturing assembly lines are designed to decouple different complex stages of production, work queues can help decouple different areas of a process allowing each part to operate independently and exchange prioritized inputs and outputs asynchronously.

The following illustration shows an end-to-end process that uses work queues to communicate prioritized work between process steps and automations.



## Prerequisites

To use work queues in Power Automate the following are required:

- Premium Power Automate license
- Environment maker role (or other roles that include access to work queue tables)

## Work queue benefits

The following table lists some of the benefits of using work queues.

Benefit	Description
<b>Increased efficiency and scalability</b>	Work queues can increase the efficiency and throughput of an automation process by helping to ensure timely and resilient completion of work. They can also help decouple parts of your automation so that you can scale them independently.
<b>Better resource utilization</b>	By using work queues, you could improve robot utilization, and optimize the number of robots needed to complete work.
<b>Consistent prioritization</b>	Work queues can help you prioritize work items, with the highest-priority items being completed first, regardless of whether they've been processed by digital workers, human workers, or through integrations.
<b>Centralized monitoring</b>	Work queues provide human-in-the-loop monitoring experiences that allow fusion teams of business users and IT professionals to work hand-in-hand to remediate work queue processing exceptions.

By using work queues in combination with other digital workforce management tools, such as [hosted machine groups](#), advanced analytics with Power BI, and [process mining](#), organizations can gain deeper insights into the performance of their automation to improve the efficiency, scalability and resiliency while also reducing costs and improving the quality of services.

## When to use work queues

Work queues are a highly versatile tool for managing workloads more effectively and ensuring that important work is completed on time, regardless of the complexity of the process or the size of the automation they're being used for.

## Example of a typical work queue use case

As part of a **supply chain** process, **thousands** of transactions have to be processed **every day**.

Process completion is based on a strict **SLA** and has to be complete by **11PM** since the outcome is used as input to another process.

To conform with the SLA, automations need to be built that:

1. Push transactions to a **centrally managed and monitored work queue**.
2. Process transactions **concurrently** across a dedicated machine group of **20** machines.

In cases where the automation is unable to process a particular transaction within the SLA, users are notified to have the transaction processed manually instead.

## How to get started

[Create your first work queue](#)

## Learn more

- [Manage work queues](#)
- [Bulk-import work queue data](#)
- [Trigger work queues](#)
- [Process work queues](#)
- [Known issues and limitations](#)
- [Work queues actions](#)

# Manage work queues

Article • 07/08/2024

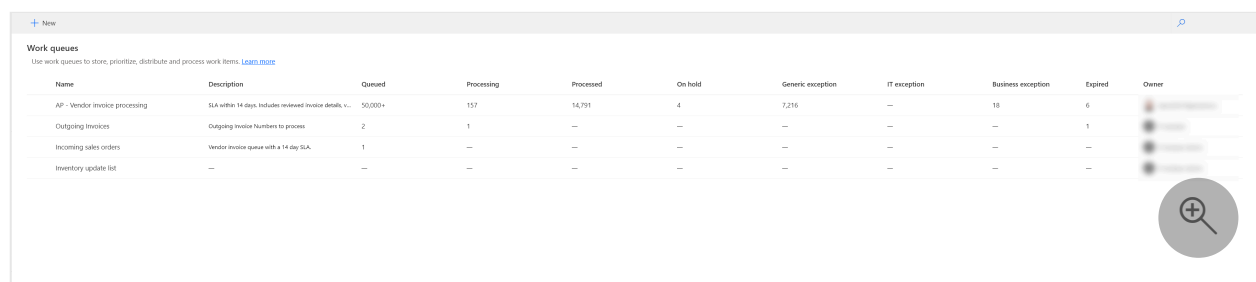
Power Automate provides rich user experiences and features that allow you to efficiently and centrally manage work queues within your environments.

## View work queues

To view the list of work queues:

1. Go to [Power Automate](#) and sign in with your credentials.
2. On the left menu, select the **Monitor** section.
3. Select **Work queue**.

If you have already created work queues or if any work queue has been shared with you, you see a list similar to the below.



Name	Description	Queued	Processing	Processed	On hold	Generic exception	IT exception	Business exception	Expired	Owner
AP - Vendor invoice processing	SLA within 14 days. Includes reviewed invoice details, ...	50,000+	157	14,791	4	7,216	—	18	6	
Outgoing Invoices	Outgoing Invoice Numbers to process	2	1	—	—	—	—	—	1	
Incoming sales orders	Vendor invoice queue with a 14 day SLA	1	—	—	—	—	—	—	—	
Inventory update list	—	—	—	—	—	—	—	—	—	

## Create a work queue

To create a work queue:

1. Go to [Power Automate](#) and sign in with your credentials.
2. On the left menu, select the **Monitor** section.
3. Select **Work queue** and then select **+ New work queue**.
4. In the **New work queue** side panel, enter a **work queue name** for the queue.
5. (Optional) Enter a **description** for the work queue.
6. (Optional) Enter a **work queue key** for the work queue. When provided, the value must be unique within this queue. If left empty, a unique value is automatically provided by the system.
7. (Optional) Activate this section and select a default lifespan value for work queue items in the **Items expire after** fields.

! Note

If you set an *Items expire after* value for a work queue, any item added without an explicit expiration date will expire after the entered *Items expire value* has elapsed. So if you set the *Items expire after* to 30 minutes, an item added at 2:00 PM will expire at 2:30 PM.

8. (Optional) Select either JSON or XSD as the schema type for work queue item input validation to ensure that input data conforms to the defined schema. Next, select **Add schema** to enter or paste the desired schema.

#### ⓘ Note

- Once a schema is added to a work queue, it can't be changed to avoid data inconsistencies and processing failures.
- Currently supported JSON schema version is draft 3.

## Edit a work queue

To edit a work queue:

1. Go to [Power Automate](#) and sign in with your credentials.
2. On the left menu, select the **Monitor** section.
3. Select **Work queues**.
4. In the work queue list, select the work queue you would like to edit.
5. Select **Edit work queue** on the toolbar and update the values in the update pane.
6. (Optional) Enter a **Description** for the work queue.
7. (Optional) Enter a **Work queue key** for the work queue. When provided, the value must be unique within this queue. If left empty, a unique value is automatically provided by the system.
8. (Optional) Activate **Set default item expiration** and select a default lifespan value for work queue items in the **Items expire after** fields.
9. Select **Save**.

## Share a work queue

To share a work queue:

1. Go to [Power Automate](#) and sign in with your credentials.
2. On the left menu, select the **Monitor** section.
3. Select **Work queue**.
4. In the work queue list, select the work queue you would like to share.

5. Select **Manage access** on the toolbar.
6. In the **Share** pane, enter the email or name of the person you want to share with.
7. Add the user to the list and select the user under the **New** section to confirm the access level.

## View advanced fields of a work queue

If you're ingesting or programmatically interacting with work queue data through the Dataverse connector or APIs, it's helpful to quickly identify internal field values that might be required for your use-case.

To view advanced work queue details:

1. Go to [Power Automate](#) and sign in with your credentials.
2. On the left menu, select the **Monitor** section.
3. Select **Work queue**.
4. In the work queue list, select the work queue you would like to share.
5. Select **Advanced details** on the work queue details card.
6. In the **Advanced details** pane, you can use the 'Copy' icons to copy each of its values.

## Delete a work queue

To delete a work queue:

1. In the work queue list, select the work queue you would like to delete.
2. Select **Delete work queue** on the toolbar.
3. In the delete confirmation dialog, select **Delete**.

### ⊗ Caution

When you delete a work queue, all related records, including work queue items and their processing history, are permanently deleted.

## Create work queue items

To create a new work queue item through the Power Automate portal:

1. Go to [Power Automate](#) and sign in with your credentials.
2. On the left menu, select the **Monitor** section.

3. Select the work queue you would like to create items for and then select **See details**.
4. Select + **New work queue item** on the toolbar.
5. In the **New work queue item** side panel, enter a **Name** for the work queue item.

ⓘ **Note**

If you don't provide a value for the work queue item name, the internal work queue ID is displayed instead in the work queue item list pages.

6. (Optional) Set the **Status** to **On hold** if the created item requires review or other preprocessing work before they can be queued.
7. (Optional) Select a different **Priority** for the work queue item if you wish to influence processing priority.
8. (Optional) Enter a **Unique Id or reference** if you wish to provide a custom unique value within this queue. If left empty, a unique value in the format of `system-  
<GUID>` is automatically provided. |
9. (Optional) Activate the **Expiration date** section and select a custom **Expiration date** value for the work queue item.
10. Enter the actual alphanumeric **Input** value of the work queue item.
11. (Optional) Enter **Processing notes** relevant to this work queue item.

Looking for more ways to create work queue data?

[Learn how to bulk-import work queue data](#)

## Edit a work queue item

ⓘ **Important**

To help protect data integrity during processing, work queue item names or values aren't allowed to be changed for items that are in the **Processing** state.

To edit a work queue item:

1. Select the work queue item you would like to edit and then select **Edit work queue item**.
2. In the **Edi work queue item** side-panel, you can update all values as long as the item isn't in the **Processing** state.

### ⓘ Note

If you don't provide a value for the work queue item name, the internal work queue id is displayed instead in the work queue item list pages.

## Allowed status transitions

Status transitions rules have been established in order to optimize the lifecycle management of work queue items. As a result, certain work queue item statuses might be unavailable for selection either interactively or during runtime processing if they don't fall under the allowed transition path. More information about these paths is in the following table.

[Expand table](#)

Status	Details	Allowed transitions
Queued	This is the default state when items enter the work queue, and the only state under which work queue item dequeuing is allowed.	Processing
Processing	Indicating that the item is currently being processed.	Processed, Exception
Processed	Indicating that the item is currently processing.	Queued, On hold
Exception	An exception has been raised during work item processing. Depending on your exception scenarios, you have the option to choose between <b>Generic</b> , <b>**IT</b> , and <b>Business exceptions</b> .	Queued, On hold
On hold	A business or IT user has picked an item to review, assess, and potentially remediate issues.	Queued

## Next steps

[Learn how to process work queues](#)



# Related information

- [Work queue overview](#)
  - [Manage work queues](#)
  - [Trigger work queues](#)
  - [Process work queues](#)
  - [Known issues and limitations](#)
- 

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Bulk-import work queue data

Article • 06/23/2023

With Power Automate and work queues being an integral part of the Power Platform, you can easily streamline your data management processes. The suite of tools available is comprehensive, ranging from highly end-user optimized wizards to powerful cloud-based ETL services and even pro-code options. Whether you're a business user, an IT professional or a developer, you can find the right tool to create or bulk upload data with ease and efficiency.

## Comprehensive bulk-import options

Here's a comprehensive list of data management and bulk-import options you can choose from.

- ✓ Using a cloud flow with the Dataverse connector action - [Add a row new action](#) to add one or more rows to the **Work Queues** and **Work Queue Items** tables.
- ✓ Using Microsoft Dataverse bulk-import options
  - [Import using a connector](#) - Supporting data transformation with Power Query and connecting to many different sources, such as Excel, Azure, SQL Server, CSV, JSON, XML, Text, OData, and more.
  - [Import from Excel or CSV](#) - Supporting Excel and CSV files with data validation and a visual mapping experience.
- ✓ Using Power Platform Dataflows with its powerful cloud-based ETL services.

## Adding work queue items with cloud flow and Dataverse connector

1. Go to [Power Automate](#) and sign in with your credentials.
2. On the left menu, select **My flows**.
3. In the toolbar, select + **New flow** and select **Instant cloud flow**.
4. Provide a **Flow name** and then select **Manually trigger a flow** option.
5. Select **Create**.

6. Once the flow designer opened, select + **New step** and select the Microsoft Dataverse connector.
7. In the list of actions, select **Add a new row**.
8. The following highlighted fields, represent the minimum fields required to add items to a work queue.

Manually trigger a flow

Add a new row

* Table name	Work Queue Items
* Name	My new work queue item name
Is Customizable	For internal use only.
Work Queue Id (Work Queues)	/workqueues(44e44ea8-1af2-ed11-8848-000d3ae86f97)
Completed on	The date and time when the work queue item was completed.
Execution Context	The execution context contains a system-managed list of processing attempts, i
Expiry Date	The expiry date indicates the deadline when the work queue items has to be pr
Import Sequence Number	Sequence number of the import that created this record.
Input	This could be any alphanumeric value that fits into the column
Owner (Owners)	Owner Id
Priority	The priority value determines the pick and processing order for work queue iter
Processing Result	
Record Created On	Date and time that the record was migrated.
Status Reason	Queued
Time Zone Rule Version Number	For internal use only.
UTC Conversion Time Zone Code	Time zone code that was in use when the record was created.
Work Queue Item	Unique identifier for entity instances.

[Hide advanced options](#) ^

When using the Dataverse connector **Add a row** action, it expects a certain pattern to be followed when referencing a parent record. An example of this pattern can be seen in the 'Work Queue ID (work Queues)' field, which uses the work queue ID (Guid) to reference the parent work queue, for example,

```
/workqueues(44e44ea8-1af2-ed11-8848-000d3ae86f97).
```

9. Select **Save** and **Test** the flow.

10. Navigate to the work queue details page of the work queue you have specific in the action, and confirm that the newly created work queue item has been added.

## Tutorial: Import a work queue and items from CSV

This tutorial showcases both mentioned [Dataverse bulk-import options](#) for importing a work queue along with its associated work queue items, which in this example is vendor invoices.

### ⓘ Note

While the easiest and most straight forward way to create work queues is through the [Power Automate portal](#) as described in [Create a work queue](#), we've included work queue import steps as well to demonstrate the [import from Excel or CSV](#) approach.

### ⓘ Important

The CSV sample data for this tutorial includes three special columns: **workqueuekey**, **componentstate**, and **overwritetime**, along with their values. The **componentstate** and **overwritetime** fields typically have default values of **0** and **01/01/1900 00:00**, respectively. The default value of the **workqueuekey** field is a Guid and is auto-generated when you create a work queue through the Power Automate portal. However, if you create a work queue through an import file (like in this example) or through the Dataverse connector in cloud flows, you can supply a more descriptive work queue key, such as **Vendor Invoices**. These fields are part of the work queue record and must be included in any import. To view their values, go to [Power Apps](#) and under **Tables**, search for *Work Queue*.

## Prerequisites

- Power Automate or Power Apps premium license
- Some parts of this tutorial require OneDrive for Business access

## Phase 1/3: Create sample files

1. Create a local file called **vendor-invoice-queue.csv** and paste the following text into it:

JSON

```
defaultitemtimetoliveinminutes,description,name,prioritytype,overwritetime,componentstate,workqueuekey,workqueuetype
1440,Vendor invoice queue with a 14 day SLA.,Vendor invoice processing,Fifo,01/01/1900 00:00,0,Vendor Invoices,Work Queue
```

2. Save the file.

3. Create another file called **vendor-invoice-items.csv** and paste the following rows into it:

JSON

```
WorkQueueItemId,InvoiceId,InvoiceDate,AccountName,ContactEmail,Amount,Status,WorkQueueKey,ComponentState,OverwriteTime
653d9256-a217-4742-8cfc-f7d0a4a0f902,I-1001,01/04/2023,Fabrikam,invoicing@fabrikam.com,4232.16,Paid,Vendor Invoices,0,01/01/1900 00:00
01634ba7-93bf-4aa6-85f7-15a4d6cb3b20,I-1002,02/04/2023,Litware Inc.,adixon@litware.com,2455.00,Paid,Vendor Invoices,0,01/01/1900 00:00
6fa8c944-5400-4db6-af6d-2f18d8b74bed,I-1003,03/04/2023,Proseware Inc.,lrobbins@proseware.com,7458.98,Paid,Vendor Invoices,0,01/01/1900 00:00
683be530-017f-48a7-899b-c7390836fc37,I-1004,04/04/2023,Tailspin Toys,p.gupta@tailspintoys.com,5237.26,Paid,Vendor Invoices,0,01/01/1900 00:00
daedf721-40e8-40a0-b6f9-e332e90c1187,I-1005,05/04/2023,WingTip Toys,b.friday@wingtiptoys.com,2230.99,Invoiced,Vendor Invoices,0,01/01/1900 00:00
64d6dbbb-52a8-47b1-8587-b791ae7e612a,I-1006,06/04/2023,Fabrikam,invoicing@fabrikam.com,1253.78,Paid,Vendor Invoices,0,01/01/1900 00:00
688e12f2-6528-43b1-ae36-d31214fad7dd,I-1007,07/04/2023,Proseware Inc.,lrobbins@proseware.com,3345.87,Paid,Vendor Invoices,0,01/01/1900 00:00
36ecf154-9cc4-43aa-aaa6-2b3e6807d6d2,I-1008,08/04/2023,Tailspin Toys,p.gupta@tailspintoys.com,967.45,Paid,Vendor Invoices,0,01/01/1900 00:00
7404787b-e9c1-49fc-90cf-c1f3372d2577,I-1009,09/04/2023,WingTip Toys,b.friday@wingtiptoys.com,1437.75,Paid,Vendor Invoices,0,01/01/1900 00:00
```

53970b80-b23e-46e5-afb4-9f6f6f46c365, I-1010, 10/04/2023, Fabrikam, invoicing@fabrikam.com, 1687.43, Paid, Vendor Invoices, 0, 01/01/1900 00:00

41cf9fd8-c98f-4dea-be0a-ff70bc9c74b9, I-1011, 11/04/2023, WingTip Toys, b.friday@wingtiptoys.com, 2854.67, Paid, Vendor Invoices, 0, 01/01/1900 00:00

95ea6270-6efe-476f-a86c-892483242532, I-1012, 12/04/2023, Litware Inc., adixon@litware.com, 6743.12, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

c639cd8c-b603-4a30-9659-30de6e333c2f, I-1013, 13/04/2023, Fabrikam, invoicing@fabrikam.com, 2997.12, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

9dcefd8a-f4cf-4592-b179-1e1bdfa808b4, I-1014, 14/04/2023, Proseware Inc., lrobbins@proseware.com, 843.76, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

4775f771-4168-46ca-9e10-5957c15e4145, I-1015, 15/04/2023, Fabrikam, invoicing@fabrikam.com, 1349.24, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

5450ea15-1a69-4692-b083-ba1ac0e8cb6e, I-1016, 16/04/2023, Tailspin Toys, p.gupta@tailspintoys.com, 367.13, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

c7718c58-8b9c-4915-b9d7-f067ceac726b, I-1017, 17/04/2023, Litware Inc., adixon@litware.com, 3984.54, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

ab1c46f8-6de2-4583-b0ba-0959a962e8f1, I-1018, 18/04/2023, Fabrikam, invoicing@fabrikam.com, 1943.89, Uninvoiced, Vendor Invoices, 0, 01/01/1900 00:00

9d5b0ab6-1cb0-40b8-af91-326417843eee, I-1019, 19/04/2023, Proseware Inc., lrobbins@proseware.com, 2853.39, Paid, Vendor Invoices, 0, 01/01/1900 00:00

154d6965-1a4c-49c3-96e2-ce94f5bc92f1, I-1020, 20/04/2023, Fabrikam, invoicing@fabrikam.com, 8764.14, Paid, Vendor Invoices, 0, 01/01/1900 00:00

b5ff78f0-c3d7-4da0-b233-9cdbc0798f7c, I-1021, 21/04/2023, Litware Inc., adixon@litware.com, 643.68, Paid, Vendor Invoices, 0, 01/01/1900 00:00

816463ca-4ecd-4433-b56c-7d16df6a9fe0, I-1022, 22/04/2023, Proseware Inc., lrobbins@proseware.com, 4232.16, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

2d1e88b7-f4f7-4885-98f0-f56e33218291, I-1023, 23/04/2023, Tailspin Toys, p.gupta@tailspintoys.com, 3345.87, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

338d57d0-f869-4707-b817-f9d1bbd9ed92, I-1024, 24/04/2023, WingTip Toys, b.friday@wingtiptoys.com, 3345.87, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

67b2184d-8a3a-40e8-8647-298852529070, I-1025, 25/04/2023, Fabrikam, invoicing@fabrikam.com, 3345.87, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

475b5afa-5c21-427e-af32-d4af33a018c2, I-1026, 26/04/2023, Proseware Inc., lrobbins@proseware.com, 6743.12, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

23b08df8-49de-475d-96c6-894880d6d2ad, I-1027, 27/04/2023, Tailspin Toys, p.gupta@tailspintoys.com, 4232.16, Invoiced, Vendor Invoices, 0, 01/01/1900 00:00

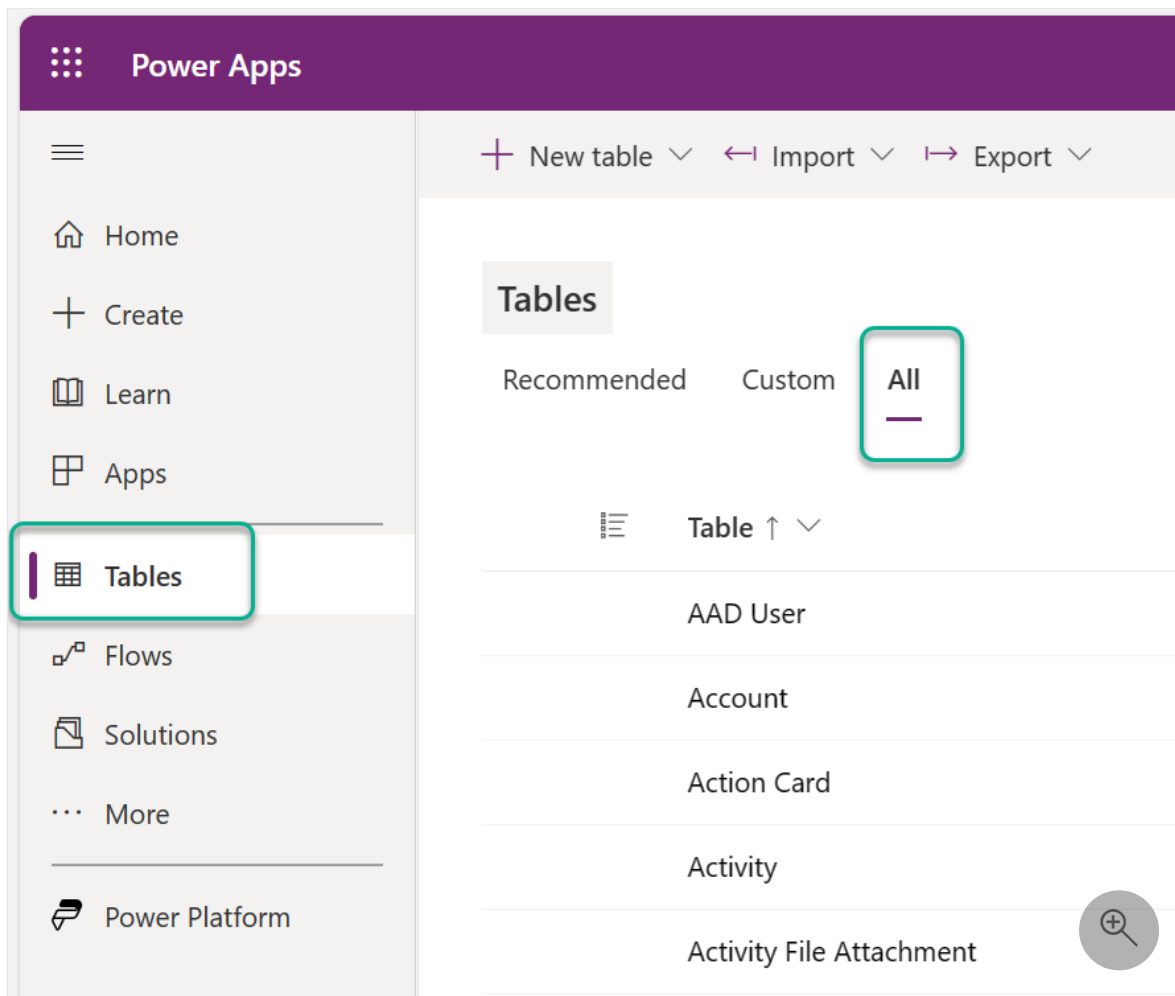
2a3425b7-3e84-4560-a2eb-b20d5c666c25, I-1028, 28/04/2023, WingTip

Toys,b.friday@wingtiptoys.com,6743.12,Invoiced,Vendor  
Invoices,0,01/01/1900 00:00  
58b40e26-a34a-493d-865f-d6dbe32edb96,I-  
1029,29/04/2023,Fabrikam,invoicing@fabrikam.com,4232.16,Invoiced,Vendor  
Invoices,0,01/01/1900 00:00  
989ae0b3-a4d4-491c-be3a-5f32791c465a,I-1030,30/04/2023,WingTip  
Toys,b.friday@wingtiptoys.com,3345.87,Invoiced,Vendor  
Invoices,0,01/01/1900 00:00

4. Save the file.

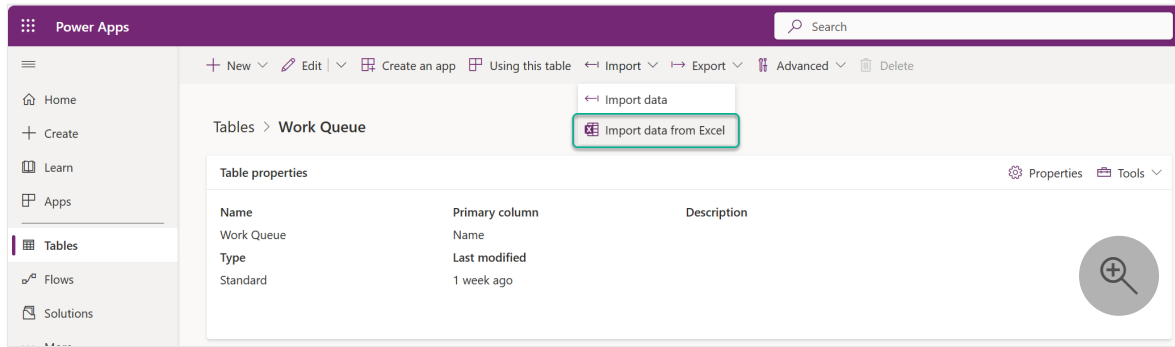
## Phase 2/3: Import work queue

1. Next, go to <https://make.powerapps.com> and sign-in with your credentials.
2. Confirm that you're in the correct environment and select **Tables** in the side-menu.
3. Select the **All** tab.

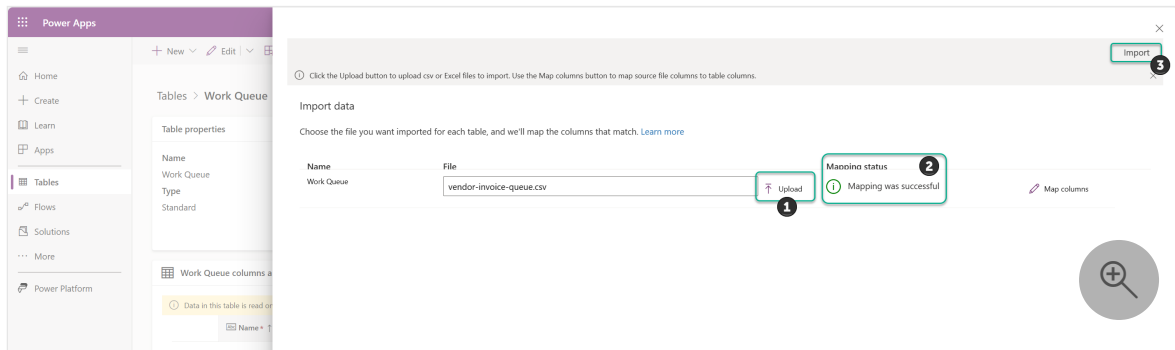


4. Search for **Work Queue** table and open its details page.

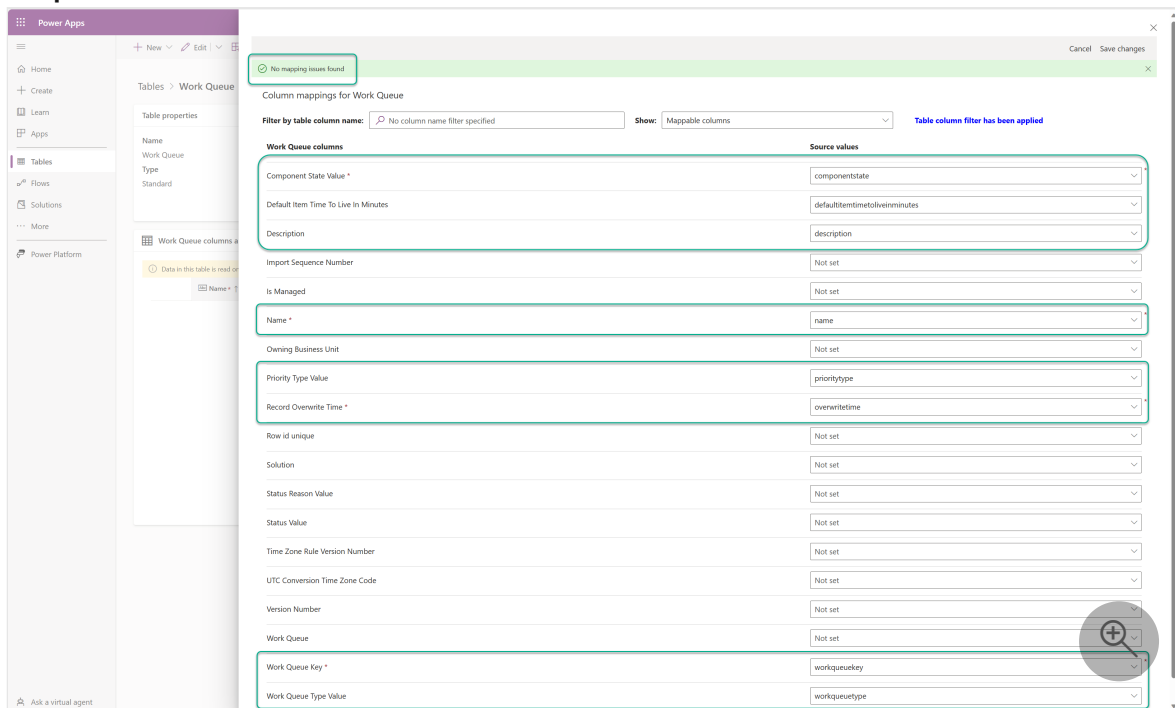
5. In the toolbar, select **Import** and then select **Import data from Excel**.



6. Select **Upload** and choose the **vendor-invoice-queue.csv** file.



7. Confirm that the automapping was successful, or if needed adjust it by selecting **Map columns**.

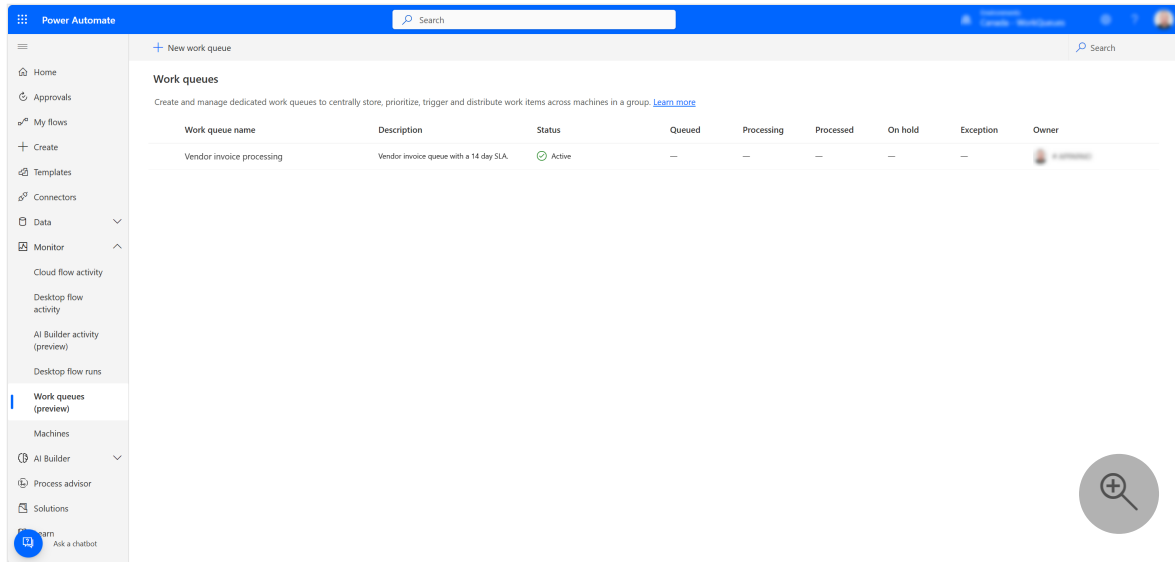


8. Select **Import**.

9. Depending on your data volume, this might take some time to complete. Once complete, navigate to the work queue list page and confirm that vendor invoice

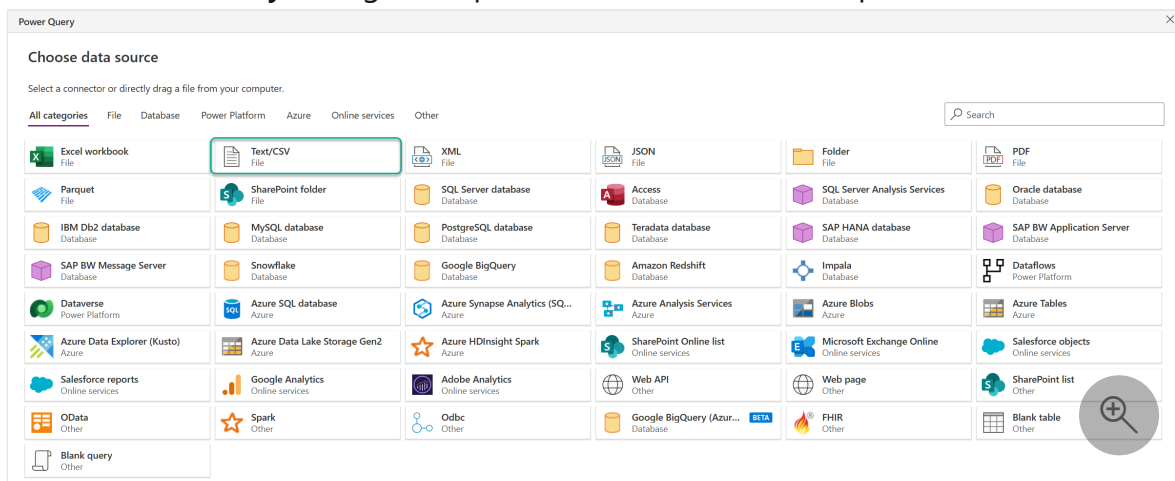


queue has been added.

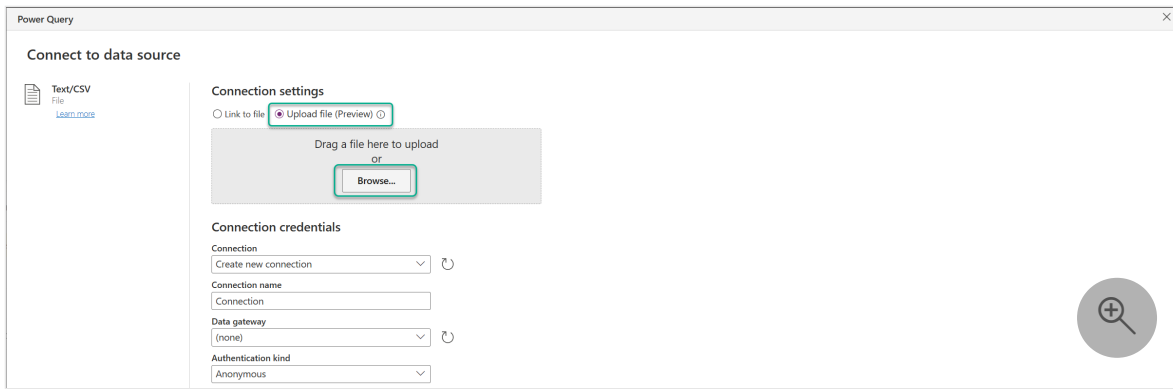


## Phase 3/3: Import work queue items

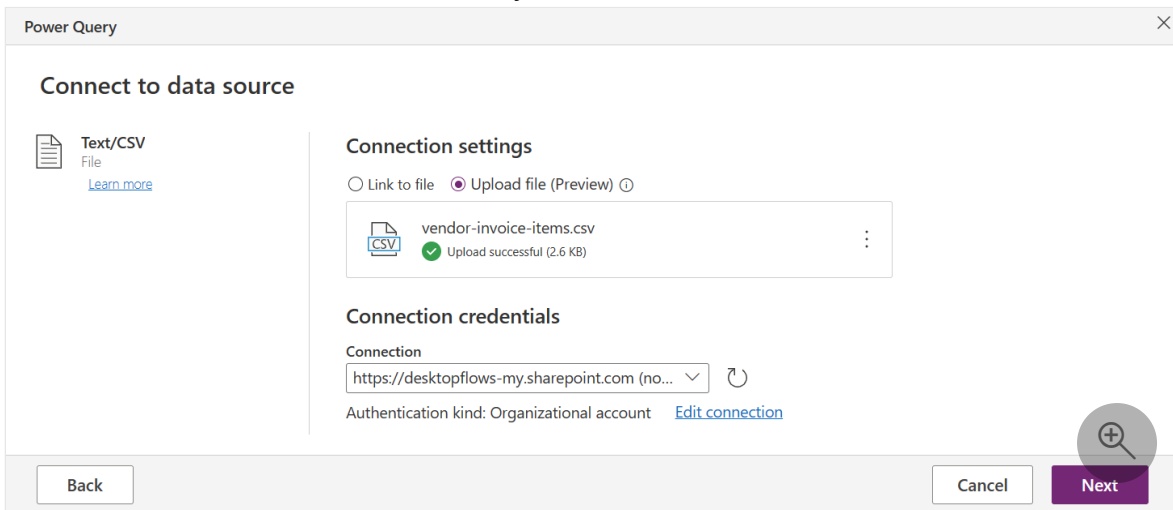
1. Next, go to <https://make.powerapps.com> and sign-in with your credentials.
2. Confirm that you're still in the correct environment and select **Tables** in the side-menu.
3. Select the **All** tab.
4. Search for **Work Queue Item** table and open its details page.
5. In the toolbar, select **Import** and then **Import data**.
6. In the **Power Query** dialog that opens, select the **Text/CSV** option.



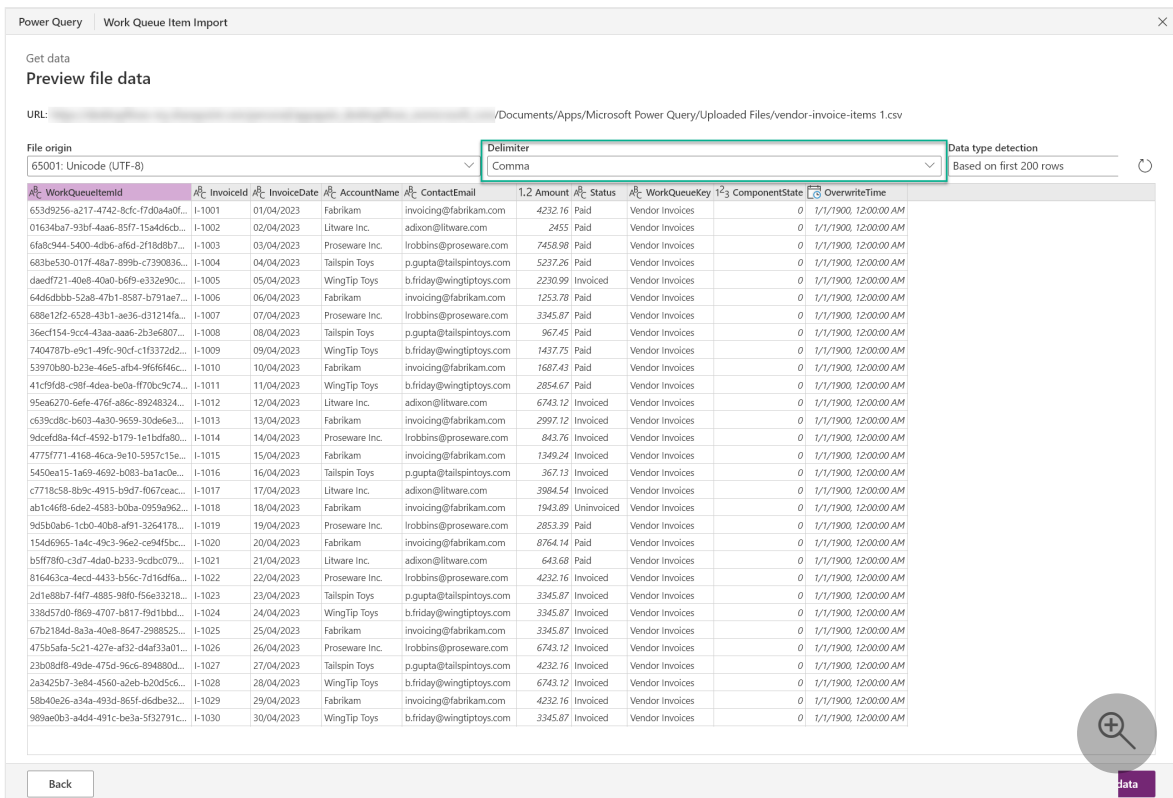
7. Next, select **Upload file (Preview)** and then **Browse...** for the **vendor-invoice-items.csv** file.



8. If needed, establish a connection to your OneDrive for Business folder.



9. Select **Next** and confirm that you see the work queue item records and that **Comma** is selected as delimiter.

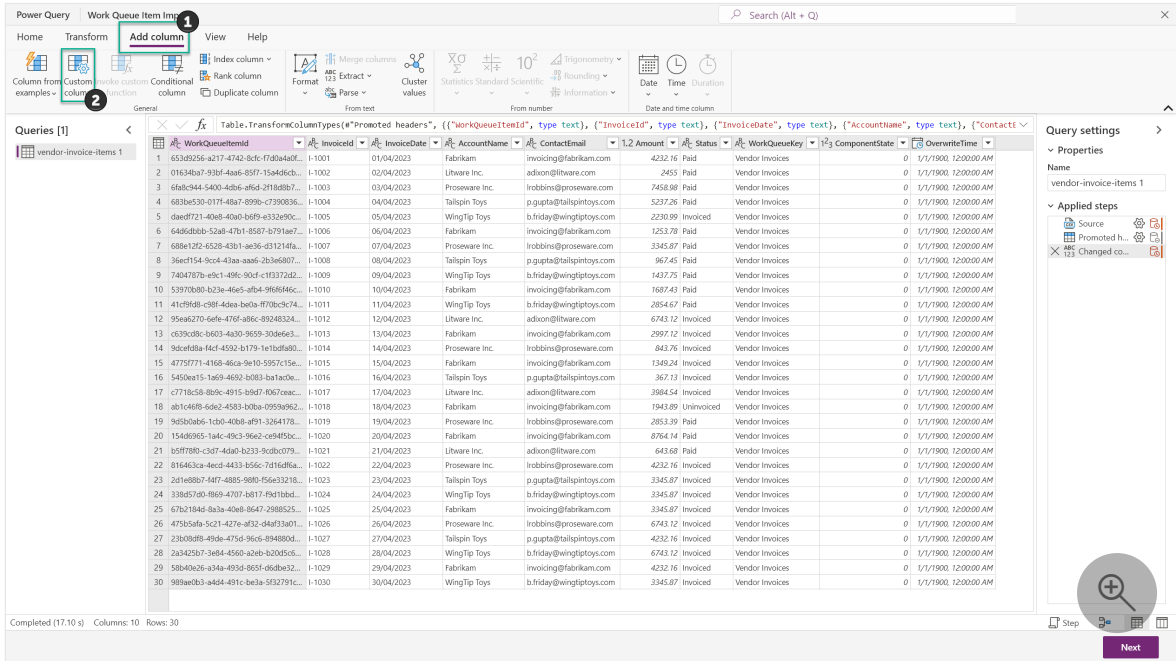


10. Select **Next**.

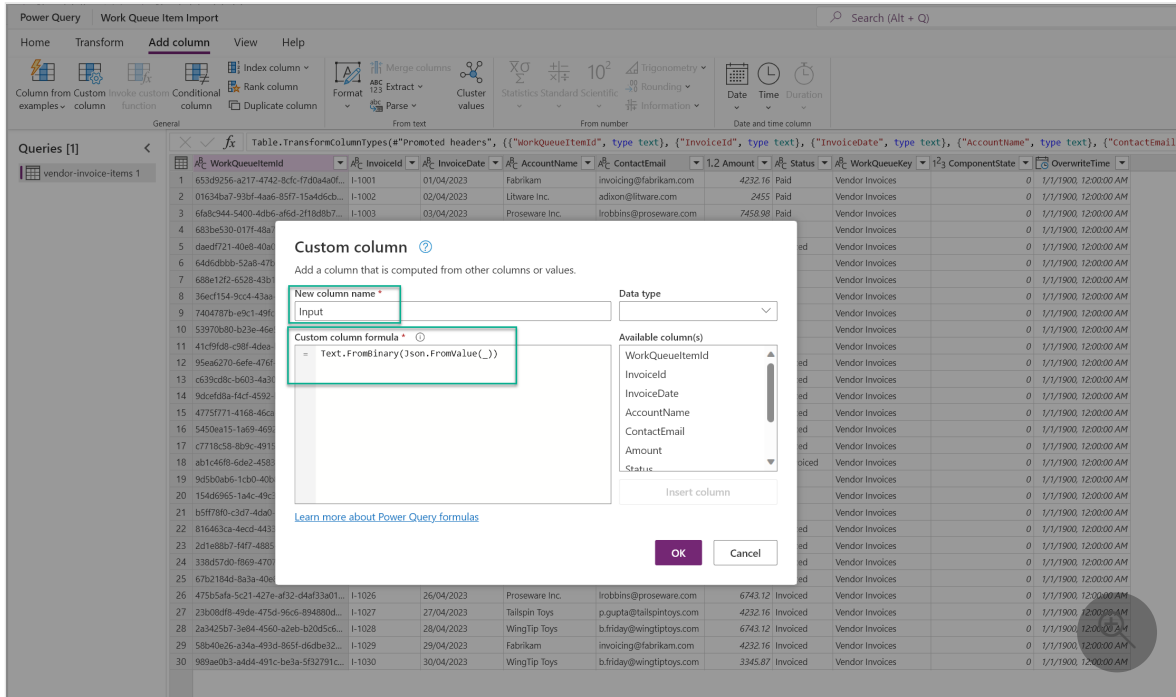
**Note**

The next few steps are not required if all you want to do is import basic, already formatted values into the work queue items table. However, if you're looking to reshape the source data before you import it, then the following Power Query transformations might come in handy for your future use-cases.

11. In the Power Query transformation window, select the **Add column** tab on the ribbon toolbar and then select **Custom column**.



12. In the Custom column dialog box, enter **Input** as the new column name and **Text.FromBinary(Json.FromValue(\_))** in the custom column formula field.



Here's what the formula does:

- **Json.FromValue(\_)**: This part of the expression takes the input value (that is, a row of the table) and converts it into a JSON-formatted text.
- **Text.FromBinary()**: This part of the expression takes the JSON-formatted text and converts it into binary format. This step is primarily used for optimizing data storage or transmission.

By using both of these functions together, the expression can turn each row of the table into a JSON object and store the resulting JSON object in a new column called **Input**. This process is repeated for each row of the table.

13. Select **Ok**.

14. Select **Next**.

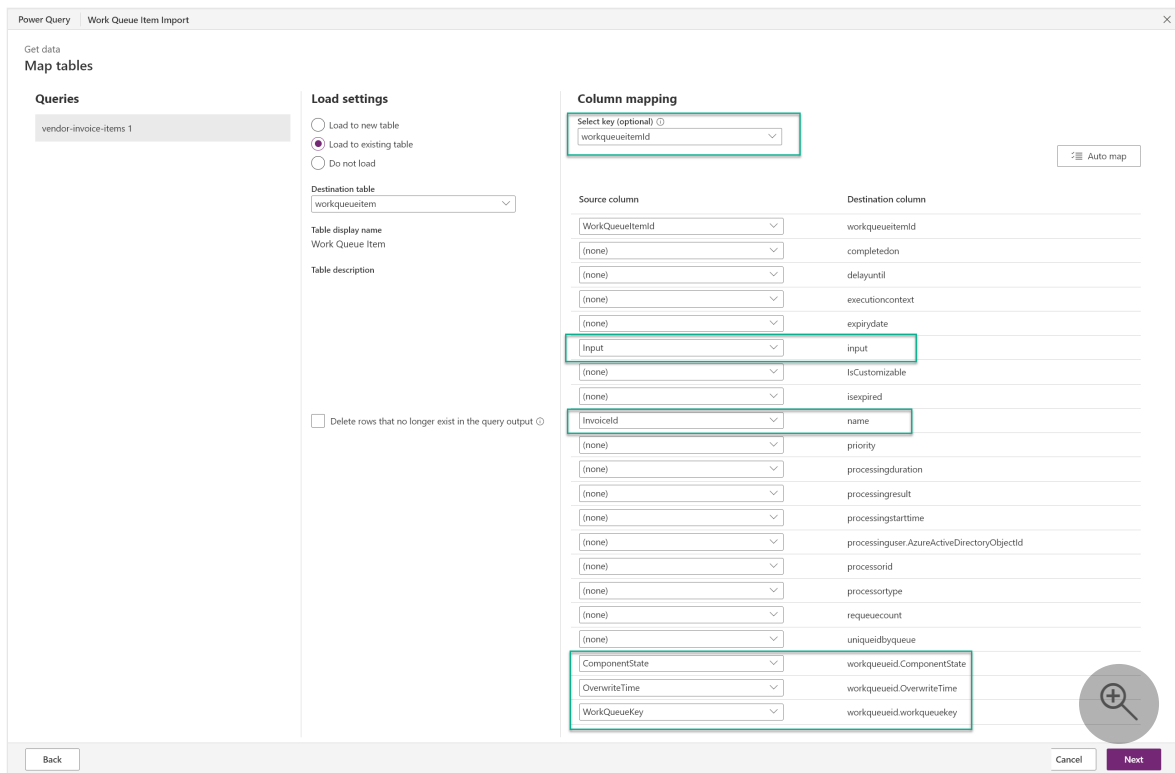
15. On the mapping under the **Load settings** section, select **Load to existing table**.

16. Under **Destination table**, select **workqueueitem**.

17. Under **Select key (optional)** select **workqueueitemid**.

18. In the **Column mapping** section set the following mapping:

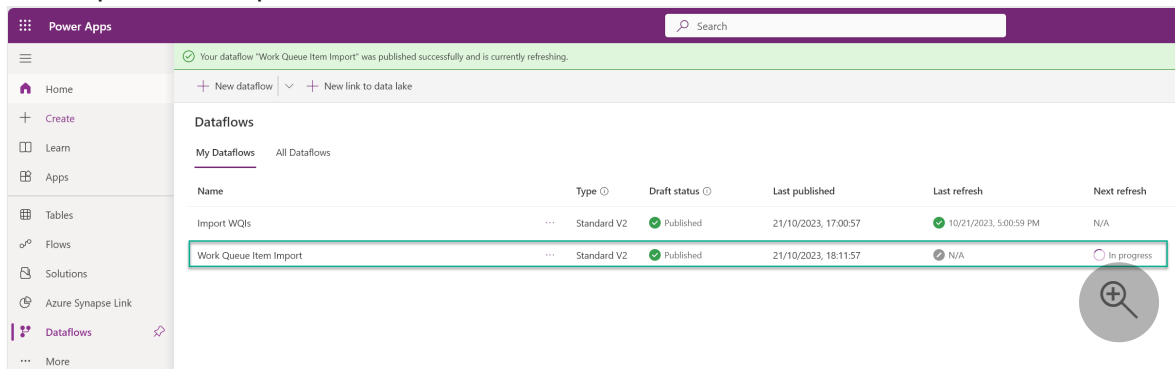
<b>Source column</b>	<b>Destination column</b>
Input	input
Invoiceld	name
ComponentState	workqueueid.ComponentState
OverwriteTime	workqueueid.OverwriteTime
WorkQueueKey	workqueueid.workqueuekey



19. Select **Next** and then select **Publish**.

20. Go to the [Power Apps maker portal](#) and select **Dataflows** from the left-menu (you might have to select **More** first to get to the Dataflows menu).

21. Confirm that you see a new dataflow entry and that both icons show success once the import is complete.



22. Once complete, navigate to the work queue details page of the vendor invoice queue and confirm that the work queue items have been added.

Power Automate

Vendor invoice processing

Vendor invoice queue with a 14 day SLA

Work queue details

Process status: Active  
Created on: May 14, 07:46 AM  
Owner: [User]  
Modified on: May 14, 07:46 AM  
Modified by: [User]  
Default item Time to Live: 1d 00:00:00

Work queue items

Name	Enqueued time	Status	Expiration date	Value	Processing notes
I-1028	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1028", "InvoiceDate": "28/04/2023", "AccountName": "Wingtip Toys", "ContactEmail": "b.friday@wingtip toys.com", "Amount": 6743.12, "Status": "Invoiced", "WorkQueueKey": "Vendor Invoices", "ComponentState": 0, "OverwriteTime": "1900-01-01T00:00:00"]	—
I-1027	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1027", "InvoiceDate": "...	—
I-1011	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1011", "InvoiceDate": "...	—
I-1026	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1026", "InvoiceDate": "...	—
I-1025	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1025", "InvoiceDate": "...	—
I-1029	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1029", "InvoiceDate": "...	—
I-1030	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1030", "InvoiceDate": "...	—
I-1017	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1017", "InvoiceDate": "...	—
I-1004	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1004", "InvoiceDate": "...	—
I-1006	May 14, 08:21 AM	Queued	May 15, 08:21 AM	["InvoiceId": "I-1006", "InvoiceDate": "...	—

I-1028

```
Value
{
  "InvoiceId": "I-1028",
  "InvoiceDate": "28/04/2023",
  "AccountName": "Wingtip Toys",
  "ContactEmail": "b.friday@wingtip toys.com",
  "Amount": 6743.12,
  "Status": "Invoiced",
  "WorkQueueKey": "Vendor Invoices",
  "ComponentState": 0,
  "OverwriteTime": "1900-01-01T00:00:00"
}
```

## Next steps

Learn how to process work queues

## Learn more

- [Work queue overview](#)
- [Manage work queues](#)
- [Trigger work queues](#)
- [Process work queues](#)
- [Known issues and limitations](#)

# Process work queues

Article • 10/26/2023

Work queue processing refers to the management of a list of work items that need to be completed in a particular order. This list contains information about each item, such as its name, priority, expiration date, status, and the actual value to be processed.

Ways to process work queues:

- ✓ [Desktop flow-based processing in Power Automate desktop \(PAD\).](#)
- ✓ [Cloud flow and connector-based processing.](#)
- ✓ [Cloud flow-based processing with desktop flow support.](#)
- ✓ Using Dataverse pro-developer features (for advanced integration scenarios only):
  - [Dataverse Web API](#)
  - [Dataverse SDK for .NET](#)

Learn more about Dataverse's pro-code tooling: [Dataverse developer documentation](#).

## Processing walkthroughs

To showcase some of the available processing options, here are three different processing scenarios.

### Desktop flow-based work queue processing in Power Automate desktop (PAD)

#### Process work queue items & Update examples

The first step to using work queue actions in Power Automate desktop is to create a work queue in the environment that you're working in and load some queue items with data to be consumed downstream. Queue items can be loaded into a work queue through a desktop flow, cloud flow or in bulk as outlined [here](#), which populates queue items. In this example, some queue items have been added manually into a work queue to explain how actions in Power Automate desktop can be used.

The work queue items have been created and the value field includes text in JSON format that will be used downstream in the desktop flow.

Name	Enqueue time	Status	Expires	Value	Processing notes
004	Jul 24, 04:47 PM	Queued	Jul 29, 04:47 PM	{"InvoiceId": "1-1009", "InvoiceDate": "06/04/2023", "Ac..."	—
003	Jul 24, 04:24 PM	Queued	Jul 29, 04:24 PM	{"InvoiceId": "1-1008", "InvoiceDate": "06/04/2023", "Ac..."	—
002	Jul 24, 04:24 PM	Queued	Jul 29, 04:24 PM	{"InvoiceId": "1-1007", "InvoiceDate": "06/04/2023", "Ac..."	—
001	Jul 24, 04:23 PM	Queued	Jul 29, 04:23 PM	{"InvoiceId": "1-1006", "InvoiceDate": "06/04/2023", "Ac..."	—

The example flow we'll be using to demonstrate work queue action usage mimics a process that would consume a work queue item from the cloud, process the data included in the value field and convert it to a custom object to be processed downstream. Note that it isn't mandatory to use JSON or custom objects as values for your work queue items, but it can be a useful method for organizing values that have multiple properties and follow a specific schema.

The screenshot shows the Power Automate interface with a flow titled 'Queues | Power Automate'. The flow is designed to process work queue items from a 'Demo PAD Queue' and store them into a 'WorkQueueItem'. The flow consists of the following steps:


- Process work queue items (Preview)**: Process work queue items from work queue 'Demo PAD Queue' and store into 'WorkQueueItem'.
- Convert JSON to custom object**: Convert JSON 'WorkQueueItem.Value' to custom object 'JsonAsCustomObject'.
- Run subflow Fabrikam Data Entry**: Execute a subflow named 'Fabrikam Data Entry'.
- If Scenario = 1 then**: Conditional logic block.
  - Update work queue item (Preview)**: Update work queue item status of 'WorkQueueItem' to 'Processed' with processing result 'Processed successfully'.
- Else if Scenario = 2 then**: Conditional logic block.
  - Update work queue item (Preview)**: Update work queue item status of 'WorkQueueItem' to 'Generic exception' with processing result 'Generic exception occurred'.
- Else if Scenario = 3 then**: Conditional logic block.
  - Update work queue item (Preview)**: Update work queue item status of 'WorkQueueItem' to 'IT exception' with processing result 'IT exception occurred'.
- Else if Scenario = 4 then**: Conditional logic block.
  - Update work queue item (Preview)**: Update work queue item status of 'WorkQueueItem' to 'Business exception' with processing result 'Business exception occurred'.
- End**: Flow termination step.
- End**: Final flow termination step.

The interface also shows a 'Variables' pane on the right with three flow variables: 'JsonAsCust...', 'Scenario', and 'WorkQueu...'. The status bar at the bottom indicates 'Status: Ready' and '1 Selected action 13 Actions 2 Subflows'.

1. The **Process work queue items** action is used to designate which work queue to consume items from and process in your desktop flow. The action can be configured to select a work queue from a list using the dropdown arrow, pass a variable including the queue name. When run, this action works by bringing in the first (oldest) item from the work queue into your flow that contains a status of **queued**. Once the queue item begins processing in your flow, its status automatically changes to **processing**.




## Process work queue items ✕


 Indicates to the orchestrator that the machine is ready to process one or more work queue items, if available [More info](#)

### Select parameters






Work queue  {x} ▾ ⓘ

> Variables produced WorkQueueItem

 On error
Save

Cancel


Work queue items [See all](#)

Name	Enqueue time	Status	Expires	Value	Processing notes
005	Jul 24, 04:47 PM	 Queued	Jul 29, 04:47 PM	{ "InvoiceId": "I-1010", "InvoiceDate"...	—
004	Jul 24, 04:47 PM	 Queued	Jul 29, 04:47 PM	{ "InvoiceId": "I-1009", "InvoiceDate"...	—
003	Jul 24, 04:24 PM	 Queued	Jul 29, 04:24 PM	{ "InvoiceId": "I-1008", "InvoiceDate"...	—
002	Jul 24, 04:24 PM	 Queued	Jul 29, 04:24 PM	{ "InvoiceId": "I-1007", "InvoiceDate"...	—
001	Jul 24, 04:23 PM	 Processing	Jul 29, 04:23 PM	{ "InvoiceId": "I-1006", "InvoiceDate"...	—

- A **breakpoint** (red dot) was set by clicking next to action 3 in the flow and then run through the PAD console. When the process pauses at the breakpoint, the **WorkQueueItem** variable can be opened by double clicking the populated value under **Flow variables** and this shows all the properties associated with the work queue item being processed.

### Variable value ✕

WorkQueueItem (Work queue item)

Property	Value
.Id	7f2ab9ff-5f2a-ee11-bdf4-000d3ae86f97
.WorkQueueId	c1f6d6d5-5f2a-ee11-bdf4-000d3ae86f97
.Priority	Normal
.Name	001
.ProcessingNotes	
.Value	{ "InvoiceId": "I-1006", "InvoiceDate": "06/04/2023", "AccountName": "Fabrikam", "ContactEmail": "invoicing@fa... <a href="#">More</a>

Close

3. In action 2 of the flow, I converted the returned JSON value, which in this case is accessed via %WorkQueueItem.Value% into a custom object. The reason for this is because it helps parse the JSON and use the JSON properties downstream in your flow. In this hypothetical case, the info would be used to make entries into Farbrikam's finance portal.


```
JSON

{
  "InvoiceId": "I-1006",
  "InvoiceDate": "06/04/2023",
  "AccountName": "Fabrikam",
  "ContactEmail": "invoicing@fabrikam.com",
  "Amount": 1253.78,
  "Status": "Paid",
  "WorkQueueKey": "Vendor Invoices",
  "ComponentState": 0,
  "OverwriteTime": "1900-01-01T00:00:00"
}
```

**Variable value** ✕

**JsonAsCustomObject** (Custom object)

Name	Value
InvoiceId	I-1006
InvoiceDate	06/04/2023
AccountName	Fabrikam
ContactEmail	invoicing@fabrikam.com
Amount	1253.78
Status	Paid
WorkQueueKey	Vendor Invoices
ComponentState	0
OverwriteTime	1/1/1900 12:00:00 AM

**Close** 

For instance, let's say there was a requirement to enter the invoice ID into a field of a finance system as part of a process where you're automating the UI of a web or desktop app – you can call that value using %JsonAsCustomObject.InvoiceId% to populate a text field and push a button.

4. Moving along, this example contains some conditional statements once it completes processing the steps and uses the data from the custom object within the subflow Fabrikam Data Entry. If the process runs end-to-end without encountering any input system related exceptions the **Update work queue item** action is used to change the status of the work queue item to **Processed** and the **processing result** field can be used to input some optional notes. If the **expires** field is left blank, the new queue item retains the *Items expire after* value defined in the work queue properties.

**Update work queue item** X

Updates the status and processing result of a specific work queue item [More info](#)

Select parameters

Work queue item: %WorkQueueItem% ⓘ

Status: Processed ⓘ

Processing result: Processed successfully {x} ⓘ

On error Save Cancel

Exception handling options can be configured by clicking **on error** in the **update work queue item** action configuration window. Three options are available for customization under the advanced tab. **Work queue item not found** might occur if the work queue item is removed from the queue, either manually or through another systematic process, before it finishes processing in PAD. **Work queue item on hold** might occur if an automated process, or somebody changes the status of the work queue item being processed to **on hold** in the flow portal while the queue item is being processed. **Failed to update work queue item** might occur if the queue item no longer exists in the queue, or has been placed into the status **on hold**. All the above are edge cases, which might occur - [learn more about handling errors in desktop flows here](#).

### Update work queue item ✕

🛡️ The following rules will apply if the action fails [More info](#)

> **Retry policy** None ⓘ

> **🛡️ All errors** ⊕ New rule ✕ Clear all

∨ **🛡️ Advanced**

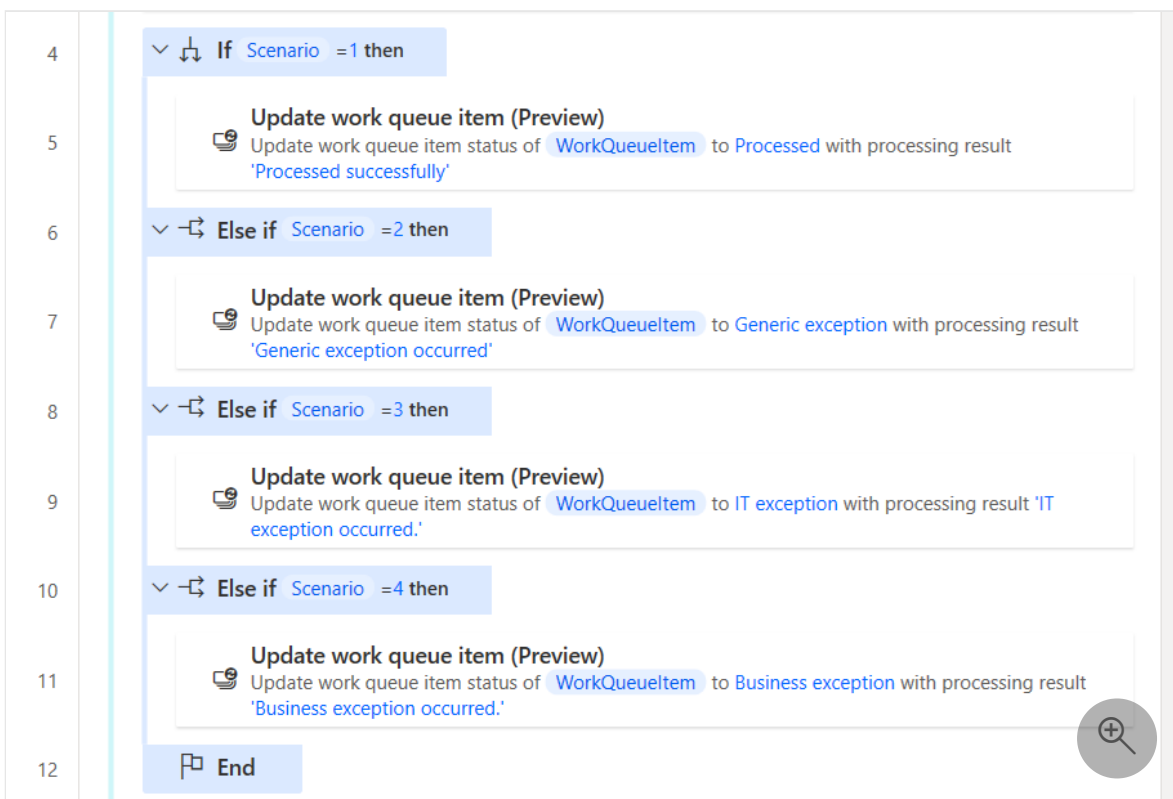
Work queue item not found ⊕ New rule ✕ Clear all

Work queue item on hold ⊕ New rule ✕ Clear all

Failed to update work queue item ⊕ New rule ✕ Clear all

← Return to parameters
Save
✕ Cancel

5. If some issue was determined during processing the data of the work queue item into the data entry system, the item could alternatively be assigned a status of **generic exception, IT exception, or business exception**. These exceptions statuses are available to be used when, or if, your automated use case meets criteria, which might apply.



Let's say that while processing a queue item, scenario 2 was met. In this case, the queue item is marked as generic exception in the originating queue. Depending on the scenario, you might decide to change the status of queue items, which couldn't be processed successfully as one of the alternative status options. From there, you can decide whether human intervention is required, or build a subsequent process with the logic required to manage each exception status.

Name	Enqueue time	Status	Expires	Value	Processing notes
004	Jul 24, 04:47 PM	Business exception	Jul 29, 04:47 PM	{"InvoiceId": "1-1009", "InvoiceDate": "06/04/2023", "Ac..."}	Business exception occurred.
003	Jul 24, 04:24 PM	IT exception	Jul 29, 04:24 PM	{"InvoiceId": "1-1008", "InvoiceDate": "06/04/2023", "Ac..."}	IT exception occurred.
002	Jul 24, 04:24 PM	Generic exception	Jul 29, 04:24 PM	{"InvoiceId": "1-1007", "InvoiceDate": "06/04/2023", "Ac..."}	Generic exception occurred.
001	Jul 24, 04:23 PM	Processed	Jul 29, 04:23 PM	{"InvoiceId": "1-1006", "InvoiceDate": "06/04/2023", "Ac..."}	Processed successfully.

## Adding & Requeuing work queue items examples from PAD

The **Add work queue item** enables desktop flow users to populate work queue items into a work queue, which has been set up in the flow portal.

In this example, an Excel file in .csv is dropped into a directory on a daily basis and each row needs to be added to a work queue.

The screenshot displays the Power Automate desktop flow editor interface. The main workspace shows a sequence of actions:

- Read from CSV file**: Load CSV table from file 'C:\Users\dbekirop\Downloads\Contoso Invoices.csv' into **CSVTable**.
- Get current date and time**: Retrieve the current datetime and store it into **CurrentDateTime**.
- Add to datetime**: Add 7 Days(s) to **CurrentDateTime** and store the result into **ExpiryDateTime**.
- For each**: Loop through **CurrentItem** in **CSVTable**.
- Add work queue item (Preview)**: Add work item to queue **Demo PAD Queue** and store into **NewWorkQueueItem**.
- End**: Terminate the loop.

The **Variables** pane on the right shows the following flow variables:

- CSVTable
- CurrentDat...
- CurrentItem
- ExpiryDate...
- NewWork...

The status bar at the bottom indicates: Status: Ready, 1 Selected action, 6 Actions, 1 Subflow, Run delay: 100 ms.

The first couple of actions in this sample process map a folder where the daily Contoso Invoices.csv file is dropped - when the process runs it begins by reading the data table from the CSV file. The **CSVTable** variable contains the data, which has been imported and will be processed to new queue items.

Variable value ✕


CSVTable (Datatable)

#	ID	Date	Vendor	Contact	Address	Amount	Status
0	1001	8/3/2022	Fabrikam	invoicing@fabrikam.com	123 Main St, Redmond WA 11105	\$4,232.16	Paid
1	1002	8/3/2022	Litware Inc.	adixon@litware.com	345 1st St, Astoria NY 98052	\$2,455.00	Paid
2	1003	8/3/2022	Proseware Inc.	lrobbins@proseware.com	567 2nd Ave, Azusa CA 10462	\$7,458.98	Paid
3	1004	8/3/2022	Tailspin Toys	p.gupta@tailspintoys.com	8910 3rd Pl, Boca Raton FL 33428	\$5,237.26	Paid
4	1005	8/3/2022	WingTip Toys	b.friday@wingtiptoys.com	234 4th Ct, Bronx NY 91702	\$2,230.99	Invoiced
5	1006	9/3/2022	Fabrikam	invoicing@fabrikam.com	456 5th Circle, Bronx NY 91911	\$1,253.78	Paid
6	1007	9/3/2022	Proseware Inc.	lrobbins@proseware.com	5678 6th Boulevard, Brooklyn NY 95014	\$3,345.87	Paid
7	1008	9/3/2022	Tailspin Toys	p.gupta@tailspintoys.com	1234 Main Ave, Brooklyn NY 94533	\$967.45	Paid

+  
Close

Actions 3 and 4 generate the time at which we choose the new queue items to expire after being added into a work queue. Action 3 captures the current system data and time, then for this example 7 days are added onto it by using the **%Add to datetime%** action. The output is stored into a variable called **ExpiryDatetime** which will be used in the **Add work queue item** action.

**Add to datetime** ✕

 Adds (or subtracts) a specific number of seconds, minutes, hours or days to a datetime value [More info](#)


Select parameters

Datetime:  {X} ⓘ

Add:  {X} ⓘ

Time unit:  ▾ ⓘ

> Variables produced **ExpiryDatetime**

**Save** **Cancel** 

Action 5 introduces the **For each** loop, which is used to iterate through each row of data in the imported **CSVTable** - this action renders a data row for the current item being processed.

**Variable value** ✕

**CurrentItem** (Datarow)

ID	Date	Vendor	Contact	Address	Amount	Status
1001	8/3/2022	Fabrikam	invoicing@fabrikam.com	123 Main St, Redmond WA 11105	\$4,232.16	Paid

**Close**

All of the preceding actions in this example desktop flow are now incorporated into setting the values for the **Add work queue item** action.

**Add work queue item** ✕

Add a work queue item into a work queue [More info](#)

**Select parameters**

Work queue:  {x}

Priority:

Name:  {x}

Input:  {x}

Expires:  {x}

Processing notes:  {x}

> Variables produced **NewWorkQueueItem**

The **work queue** parameter is set to the queue that we want to add new work queue items into - in this case **Demo PAD queue** was selected by choosing it from the dropdown menu.

The **Priority** parameter is left at the default, **Normal**, but options for **Low** and **High** are also optional. Higher priority work queue items are processed first, then normal and last when mixed into the same work queue.

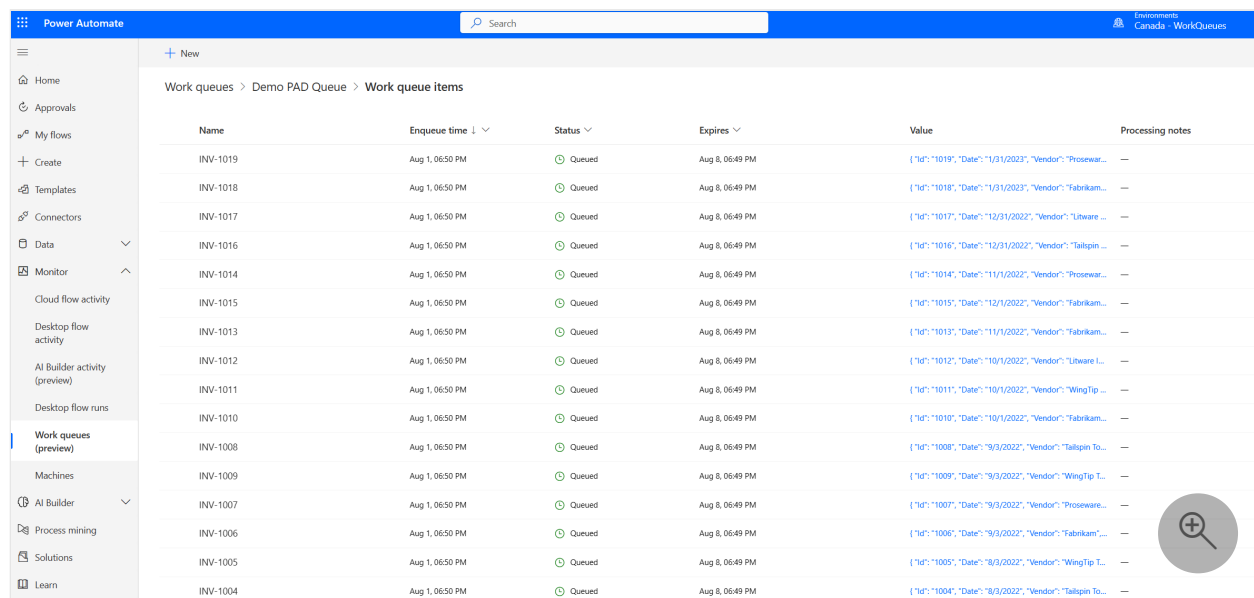
The **Name** parameter has been set with a static prefix along with the variable value **CurrentItem['ID']** - which contains the value from the ID cell of the data row being processed. This is optional but can be useful depending on your use case.

Using the values from the data row in the variable **CurrentItem** the **Input** parameter was entered in JSON format. Note each header name was appended to the **currentitem** variable using the notation **['name of header']**

The **Expires** field is populated with the datetime variable we added 7 days onto in the previous steps. When left blank, the work queue item being added will contain the *Items expire after* value set for the work queue.

**Processing notes** are optional - use as deemed necessary.

When the process is run, each data row in the imported CSV creates a work queue item containing a **Queued** status, which means it's available for processing.



Name	Enqueue time	Status	Expires	Value	Processing notes
INV-1019	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1019", "Date": "1/31/2023", "Vendor": "Prosewar..."	—
INV-1018	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1018", "Date": "1/31/2023", "Vendor": "Fabrikam..."	—
INV-1017	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1017", "Date": "12/31/2022", "Vendor": "Litware..."	—
INV-1016	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1016", "Date": "12/31/2022", "Vendor": "Tailspin..."	—
INV-1014	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1014", "Date": "11/1/2022", "Vendor": "Prosewar..."	—
INV-1015	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1015", "Date": "12/1/2022", "Vendor": "Fabrikam..."	—
INV-1013	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1013", "Date": "11/1/2022", "Vendor": "Fabrikam..."	—
INV-1012	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1012", "Date": "10/1/2022", "Vendor": "Litware L..."	—
INV-1011	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1011", "Date": "10/1/2022", "Vendor": "WingTip..."	—
INV-1010	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1010", "Date": "10/1/2022", "Vendor": "Fabrikam..."	—
INV-1008	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1008", "Date": "9/3/2022", "Vendor": "Tailspin To..."	—
INV-1009	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1009", "Date": "9/3/2022", "Vendor": "WingTip T..."	—
INV-1007	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1007", "Date": "9/3/2022", "Vendor": "Proseware..."	—
INV-1006	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1006", "Date": "9/3/2022", "Vendor": "Fabrikam..."	—
INV-1005	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1005", "Date": "8/3/2022", "Vendor": "WingTip T..."	—
INV-1004	Aug 1, 06:50 PM	Queued	Aug 8, 06:49 PM	{ "Id": "1004", "Date": "8/3/2022", "Vendor": "Tailspin To..."	—

These are just some of many ways that work queue actions can be used in PAD. Take some time to explore and find creative uses to incorporate work queues into your Power Automate flows!

## Requeue item with delay example



The **Requeue item with delay** action enables desktop flow users to requeue items and set a delay period at which time the item it can be released again for processing.

In this example, there's a work queue loaded with items, which are set to expire in 24 hours, but they can't be processed in time because there's some ongoing routine system maintenance being performed by IT and the items need to be requeued. The maintenance will be completed overnight, so we'll proceed to delay each queue item by 24 hours and then set them to expire 24 hours after the release period.


The screenshot displays a workflow editor interface. At the top, there are control buttons: 'Save', 'Run', 'Stop', 'Run next a...', and 'Recorder'. On the right, there is an 'Assets Library' search bar. Below the controls, a 'Subflows' dropdown is set to 'Main'. The workflow steps are numbered 1 through 6:


- 1** **Get current date and time**  
Retrieve the current datetime and store it into `CurrentDateTime`
- 2** **Add to datetime**  
Add 1 Days(s) to `CurrentDateTime` and store the result into `Delay`
- 3** **Add to datetime**  
Add 2 Days(s) to `CurrentDateTime` and store the result into `Expire`
- 4** **Process work queue items**  
Process work queue items from work queue `Demo PAD Queue` and store into `WorkQueueItem`
- 5** **Requeue item with delay**  
Requeue `WorkQueueItem` and add a delay
- 6** **End**

The first three actions of this example process are date time actions. The 'Get current date and time' action captures the system datetime at the moment the action is run. Next we used the 'Add to datetime' action to cover two requirements, first we need to define the delay time by adding 24 hours to the current datetime - then we need to add 48 hours to the current datetime as an expiry.

## Get current date and time



 The option 'Specific time zone' in the 'Time zone' property will be deprecated and become unavailable for use in the 'Get current date and time' action. If this action is deleted, it can't be used again and you will need to update your flows using one of the other available options provided for this property.


 Retrieves the current date or the current date and time [More info](#)

### Select parameters

Retrieve:  

Time zone:  

> Variables produced **CurrentDateTime**


 On error

Save

Cancel 

## Add to datetime



 Adds (or subtracts) a specific number of seconds, minutes, hours or days to a datetime value [More info](#)

### Select parameters

Datetime:  

Add:  


Time unit:  

> Variables produced **Delay**

Save

Cancel 

## Add to datetime ✕

 Adds (or subtracts) a specific number of seconds, minutes, hours or days to a datetime value [More info](#)


### Select parameters

Datetime:  {X} ⓘ

Add:  {X} ⓘ


Time unit:  ▾ ⓘ

> Variables produced Expire

Save
Cancel 

Next in the example, the 'Process work queue items' action is configured to point to the loaded work queue and the 'Requeue item with delay' is placed within the loop.

## Requeue item with delay ✕

 Requeue a work queue item and delay it until a specified date and time [More info](#)



### Select parameters

Work queue item:  ▾ ⓘ

Delay until:  {X} ⓘ

Expires:  {X} ⓘ

Processing result:  {X} ⓘ

 On error
Save
Cancel 

The values generated for the delay and the expiry can now be passed into the 'Requeue item with delay' action. The 'work queue item' field is populated by the variable produced by the loop - this instructs which queue item to requeue. Next we plugged in the values created using the datetime actions for the 'delay until' and 'expires' fields. The 'delay until' is mandatory, but you can use 'expires' and 'processing result' at your discretion.

With this simple process, you can requeue all available items in a queue, delay them for a certain time, with options to also set an expiration date and processing result.

## Cloud flow and connector-based processing

The simplest way to dequeue a work queue item and process it is as follows:

1. Go to [Power Automate](#) and sign in with your credentials.
2. On the left menu, select **My flows**.
3. On the toolbar, select + **New flow** and then select **Instant cloud flow**.
4. Provide a **Flow name**, such as *My first work queue flow*, and then select **Manually trigger a flow**.
5. Select **Create**.
6. Once the flow designer opens, select + **New step**, and then select the Microsoft Dataverse connector.
7. In the list of actions, select **Perform a bound action**.

Parameter	Value	Description
<b>Table name</b>	Work Queues	The name of the work queue table.
<b>Action name</b>	Dequeue	The action, which gets the next available item from the queue.
<b>Row ID</b>	[Work Queue ID]	The work queue ID (GUID) of the queue you'd like to dequeue from. You can get to this value by navigating to the work queue details page of your queue and opening the <b>Advanced details</b> panel.

Work queues > Vendor invoice processing  
SIA within 14 days. Includes reviewed invoice details, verified purchase orders and receipts.

Work queue details

Process status	Created on	Owner	Modified on	Modified by	Items expire after
Active	Feb 26, 03:59 PM		Oct 22, 06:52 AM		90d 00:00:00

Work queue items

Name	Status	Enqueue time	Priority	Input
INV-01012021-587211	Processed	May 1, 02:06 PM	Normal	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587211	Processed	Apr 15, 05:53 PM	Normal	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587212	On hold	Apr 16, 05:40 PM	Normal	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587213	Queued	Apr 15, 12:47 PM	Normal	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587214	Processed	Apr 16, 11:59 AM	Normal	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587277	On hold	Mar 1, 11:48 AM	High	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587279	Queued	Mar 1, 11:48 AM	High	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587226	Generic exception	Mar 1, 11:48 AM	High	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587227	On hold	Mar 1, 11:48 AM	High	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }
INV-01012021-587228	On hold	Mar 1, 11:48 AM	High	{ "InvoiceDateFormatted": "2022-01-01T20:49:48", "Type": "Monthly recurring..." }

Advanced details

Work queue id  
d12e6923-e585-ed11-8595-000d3a360370

Work queue key  
Vendor invoice processing key

Component state  
0

Record overwrite time  
1900-01-01T00:00:00Z

## ! Note

A bound action is a Dataverse action that is defined on a specific table (work queues in our example) and can only be executed on records of that table. Bound actions are used by the platform to perform custom business logic or operations on a specific record.

1. Your flow should look similar to this now.

Power Automate

My first work queue flow

Manually trigger a flow

Perform a bound action

\* Table name: Work Queues

\* Action Name: Dequeue

\* Row ID: 44e44ea8-1af2-ed11-8848-000d3ae86f97

+ New step Save

1. Select **Save** and then **Test** your flow.

2. In the testing side-pane select **Manually, Test, Run flow** and then **Done**.

3. If the flow ran successfully, you should get a similar result (but with different IDs).

Power Automate

Search

My first work queue flow

Your flow ran successfully.

Manually trigger a flow 0s

Perform a bound action 1s

INPUTS Show raw inputs >

Table name  
Work Queues

Action Name  
Dequeue

Row ID  
44e44ea8-1af2-ed11-8848-000d3ae86f97

OUTPUTS Show raw outputs >

body

```
{"_owningbusinessunit_value": "a7da3f57-8bd6-ed11-a7c7-000d3af341f",  
"input": {"InvoiceId": "I-1020", "InvoiceDate": "20\\04\\20"},  
"owninguser_value": "8f503fc1-48d9-ed11-a7c5-000d3ae86f97",  
"workqueueitemid": "4978e989-1ff2-ed11-8848-000d3ae86f97",  
"iscustomizable": {  
  "Value": true,  
  "CanBeChanged": true,  
}}
```

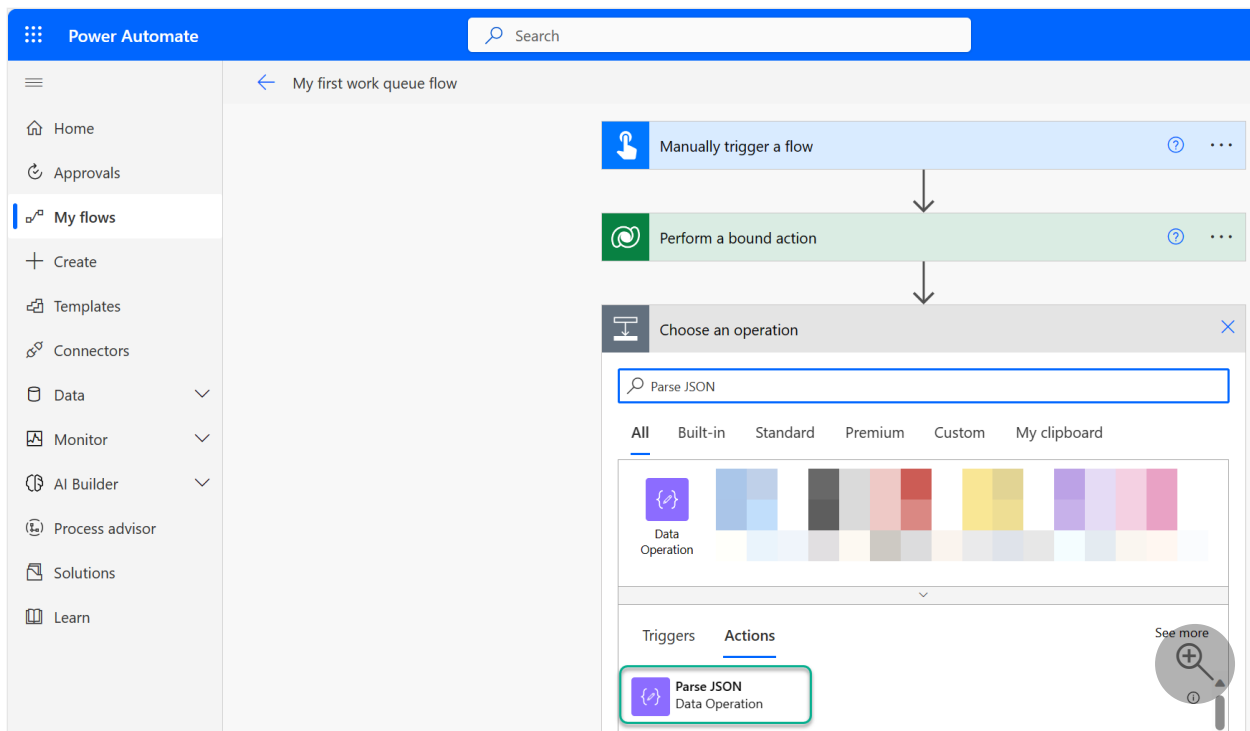
Connection: APPAPAI@desktopflows.onmicrosoft.com

1. Next, copy the whole JSON content from the **body** field and then select **Edit** in the upper right corner of the flow.

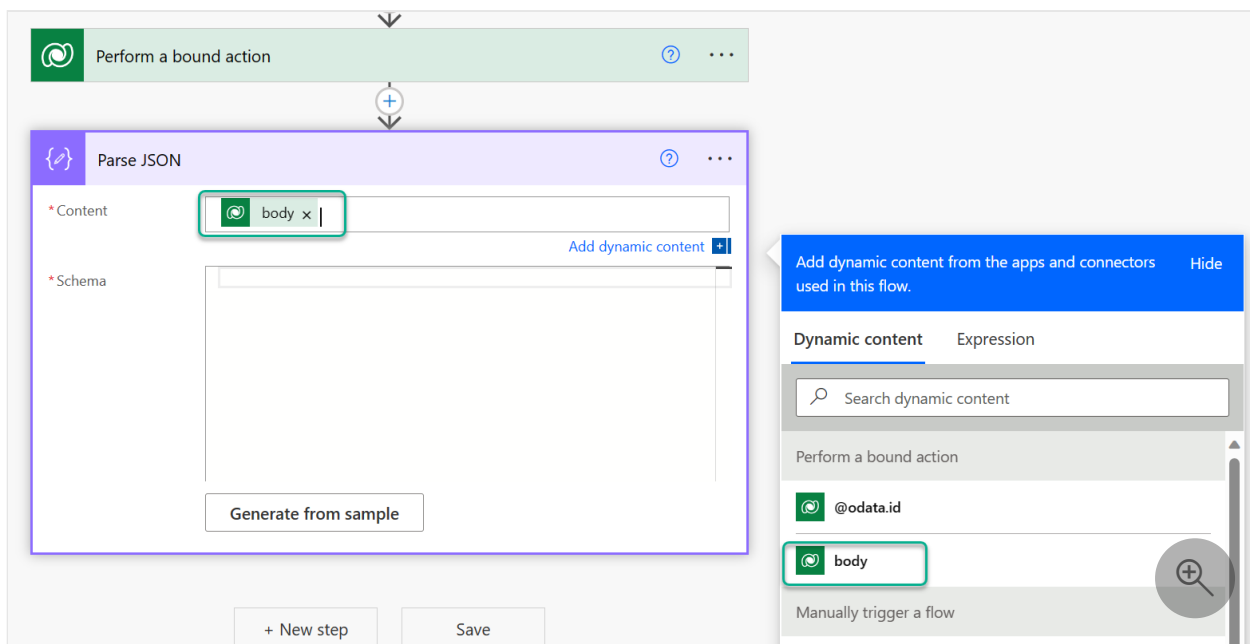
### 💡 Tip

After dequeuing a work queue item, use the JSON content of the item as a schema example for parsing the item's JSON properties. This allows you to easily access any property of the item returned by the work queue orchestrator in subsequent flow actions.

1. Add a new step by selecting + **New step** and search for an action called **Parse JSON** and select it.



1. Position your mouse in the **Content** field and select the **body** property from the previous action.



1. Next, select **Generate from sample** and paste the previously copied JSON string into the dialog and select **Done**.
2. Select **+ New step** and then select the **Microsoft Dataverse** connector.
3. From the list of actions, select **Update a row**.
4. In the **Table name** field, select the **Work Queue Items** table and position your cursor in the **Row ID** field.

5. In the **Dynamic content** list, you'll now have all fields that are available in the work queue item table.

6. Select **Show advanced options** and then set the **RowID**, **Processing Result**, **Status**, and **Status Reason** fields to the following values.

Field	Value	Details
Row ID	workqueueitemid	This value can be selected in the dynamic content list dialog.
Processing Result	The item has been successfully processed.	
Status	Processed	
Status Reason	Processed	

The screenshot displays a Power Automate flow with three actions: 'Perform a bound action', 'Parse JSON', and 'Update a row'. The 'Update a row' action is expanded, showing the following configuration:

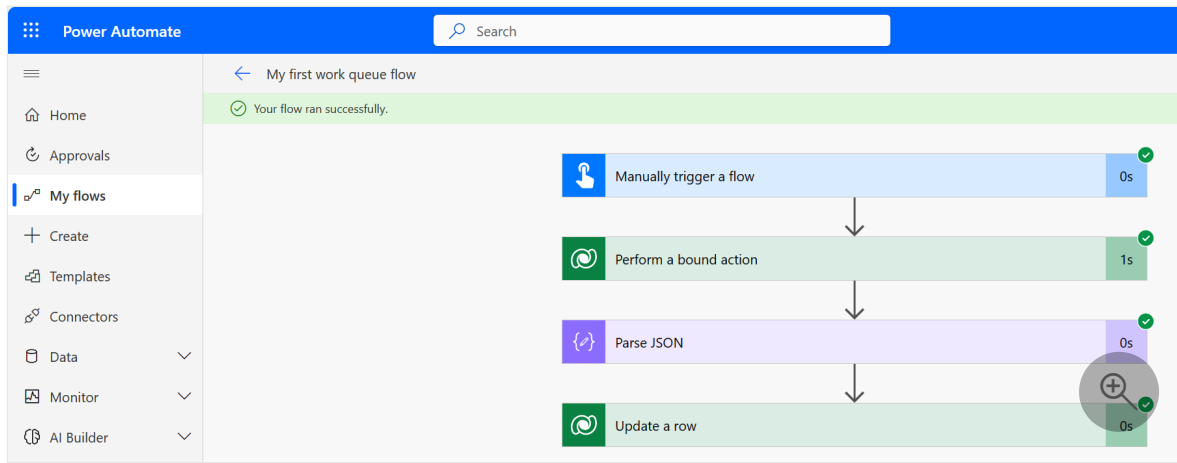
- Table name:** Work Queue Items
- Row ID:** workqueueitemid (with a dynamic content icon)
- Is Customizable:** For internal use only.
- Name:** The name of the work queue item which is by default set to an auto number (e.
- Work Queue Id (Work Queues):** The work queue id of the parent work queue record.
- Completed on:** The date and time when the work queue item was completed.
- Execution Context:** The execution context contains a system-managed list of processing attempts.
- Expiry Date:** The expiry date indicates the deadline when the work queue items has to be pr
- Input:** The input field contains the actual work item data used for processing by bots,
- Owner (Owners):** Owner Id
- Priority:** The priority value determines the pick and processing order for work queue ite:
- Processing Result:** The item has been successfully processed
- Status:** Processed
- Status Reason:** Processed
- Time Zone Rule Version Number:** For internal use only.
- UTC Conversion Time Zone Code:** Time zone code that was in use when the record was created.

The 'Show advanced options' link is visible at the bottom of the configuration pane. On the right, the 'Dynamic content' panel is open, showing a list of fields from the 'Work Queue Items' table. The 'workqueueitemid' field is highlighted with a green box, indicating it is the selected dynamic content for the 'Row ID' field.

1. Select **Save** and **Test** the flow once more.

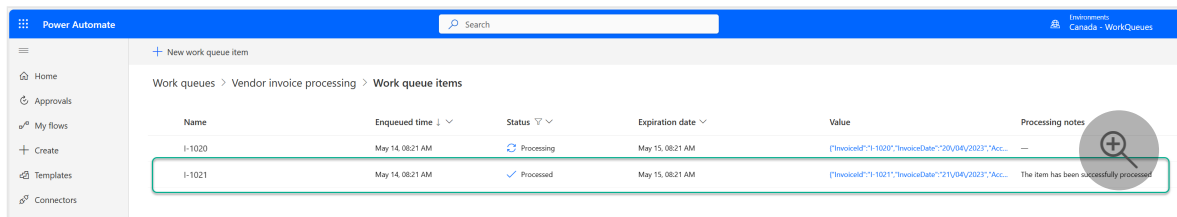
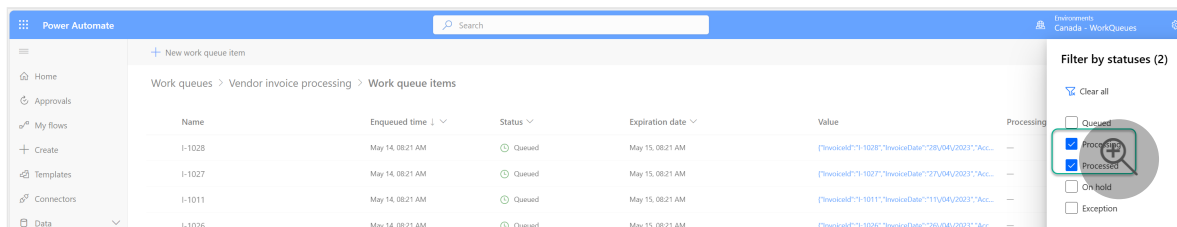
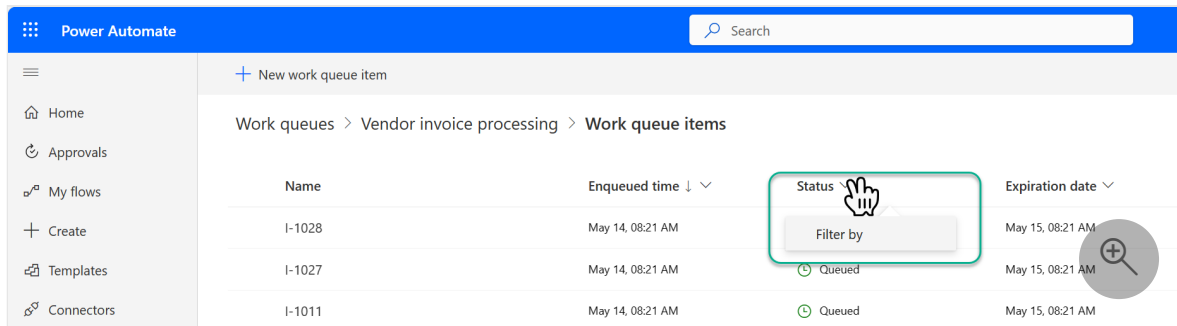
2. If the flow ran successfully, you should get a similar result as the following.





3. Now, navigate to the work queue details page and in the work queue item list section select **See all**.

4. Filter the **Status** field to only show **Processing** and **Processed** items to confirm that our dequeue and update actions worked as expected.



Congratulations, you just completed your first work queue processing scenario!

## Cloud flow-based processing with desktop flow support

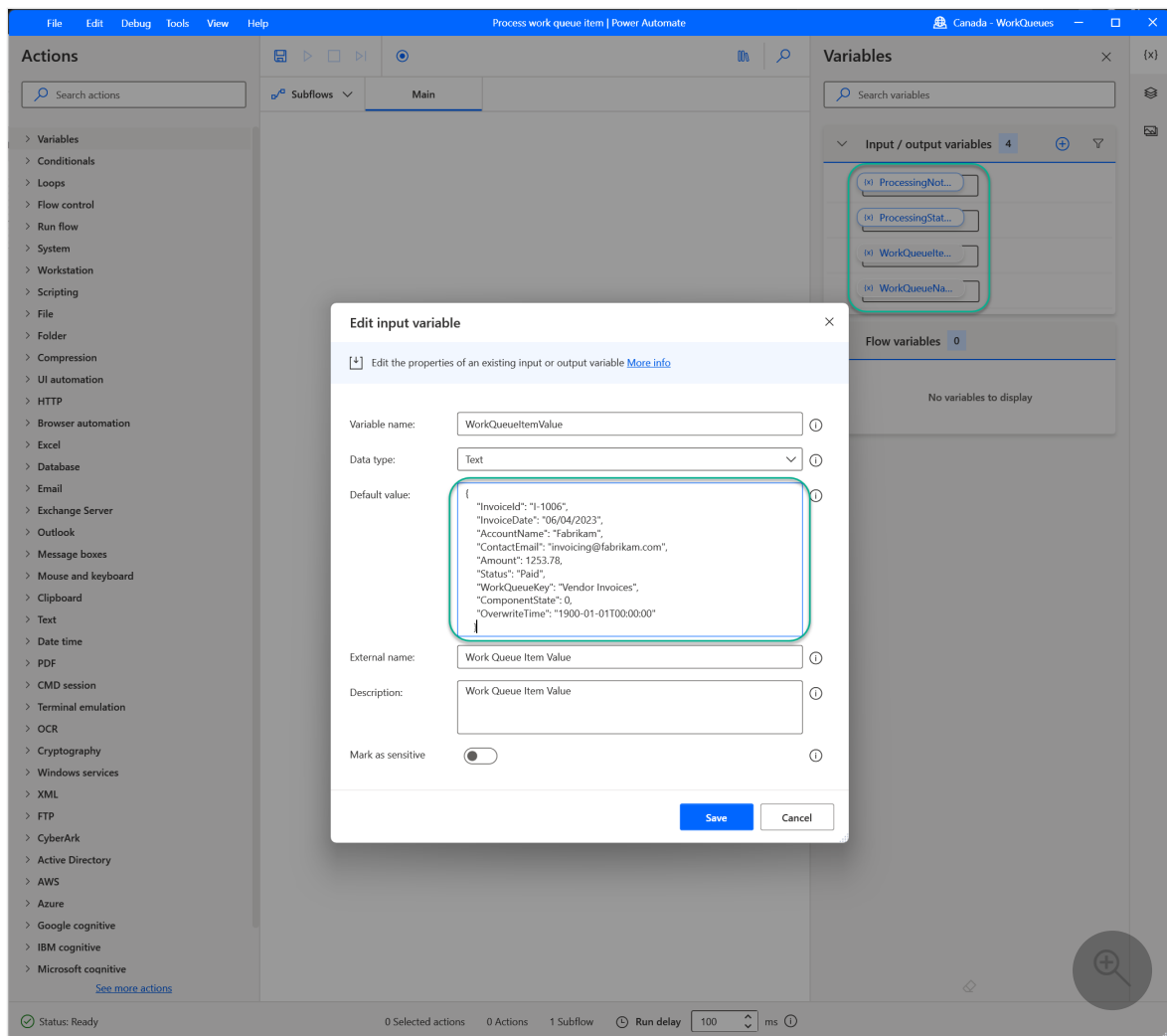
For this scenario, we extend the previous one by adding a desktop flow processing step as well.

1. Go back and edit the *My first work queue flow*.

2. Add a new action right after the **Parse JSON** action and search for **Desktop flows** connector and the **Run a flow built with Power Automate for desktop**.
3. In the desktop flow dropdown, either choose and edit an existing desktop flow or select + **Create a new desktop flow** and follow the instruction on screen to create the desktop flow and launch Power Automate for desktop. If you're new to desktop flows, you can learn more [here](#).
4. Once the Power Automate for desktop designer opens, create two **input** variables called **WorkQueueItemValue** and **WorkQueueItemName** and then add two **output** variables called **ProcessingNotes** and **ProcessingStatus** respectively, all of which should have **Text** as their data type.
5. Provide a default value for the **WorkQueueItem** variable so that you can later test the script locally. In case you've followed the [bulk-import tutorial](#) you should have work queue items in the **Vendor** invoice queue that have their values in JSON format. Here's an example of one of the values used.

JSON

```
{
  "InvoiceId": "I-1006",
  "InvoiceDate": "06/04/2023",
  "AccountName": "Fabrikam",
  "ContactEmail": "invoicing@fabrikam.com",
  "Amount": 1253.78,
  "Status": "Paid",
  "WorkQueueKey": "Vendor Invoices",
  "ComponentState": 0,
  "OverwriteTime": "1900-01-01T00:00:00"
}
```



6. Now, **Save** the flow.

7. In the action panel, open the **Variables** action group and double-click the **Convert JSON to custom object** action to add it to the design canvas, which opens its property window.

8. Select the variable icon in the JSON field and choose the **WorkQueueItemValue** variable.

9. Rename the produced output variable from **JsonAsCustomObject** to **VendorInvoice** and select **Save**.

10. Next, add an **If** action from the **Conditionals** group and configure its properties as follows:

First operand	Operator	Second operand
%VendorInvoice['Amount']%	Less than (<)	5000

11. Select **Save**.

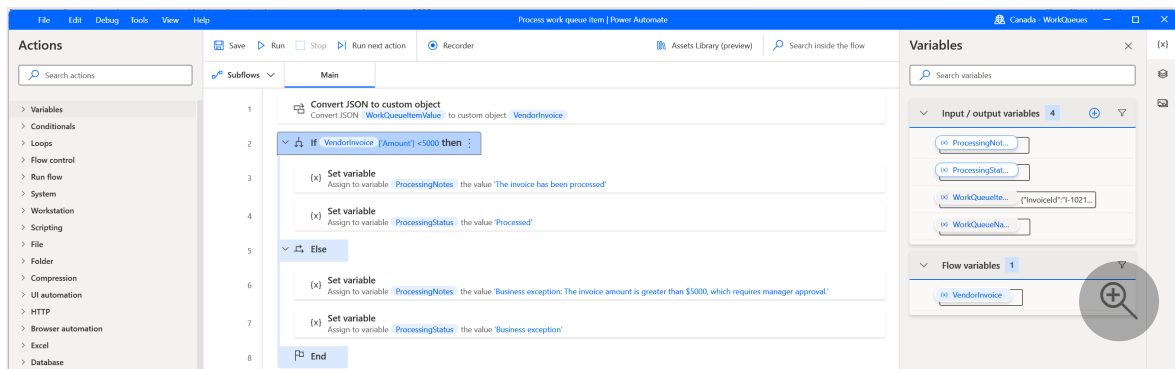
- Add another action from the **Conditionals** group called **Else** and add it between the **If** and **End** action.
- Now, add another two actions from the **Variables** group called **Set variable** and add them within the **If** and **Else** actions and set the **ProcessingNotes** and **ProcessingStatus** variables to the following values:

Variable	Value
%ProcessingNotes%	The invoice has been processed
%ProcessingStatus%	Processed

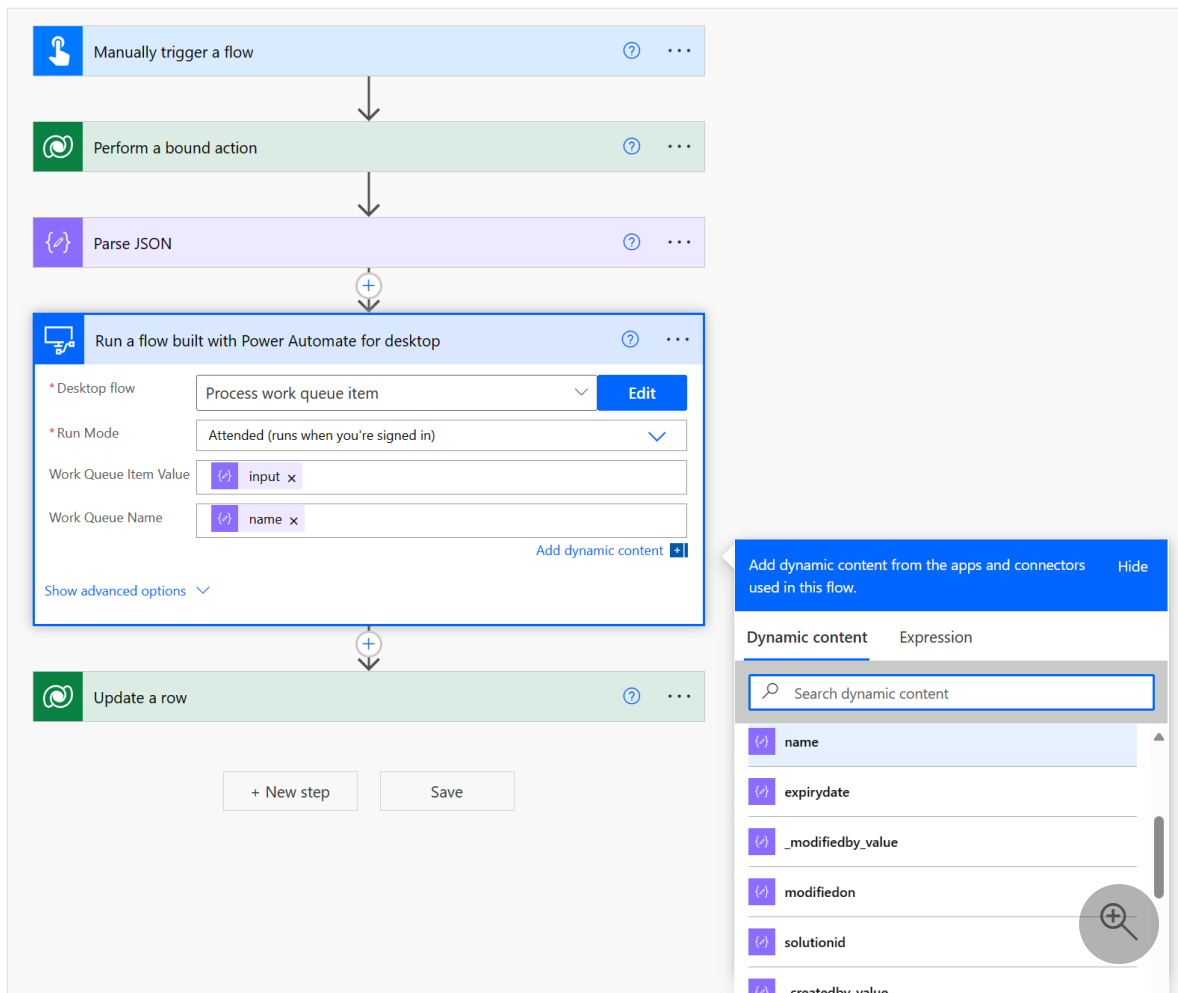
- Copy the two **Set variable** action and paste them between the **Else** and the **End** action and change their values to match these:

Variable	Value
%ProcessingNotes%	Business exception: The invoice amount is greater than \$5000, which requires manager approval.
%ProcessingStatus%	Exception

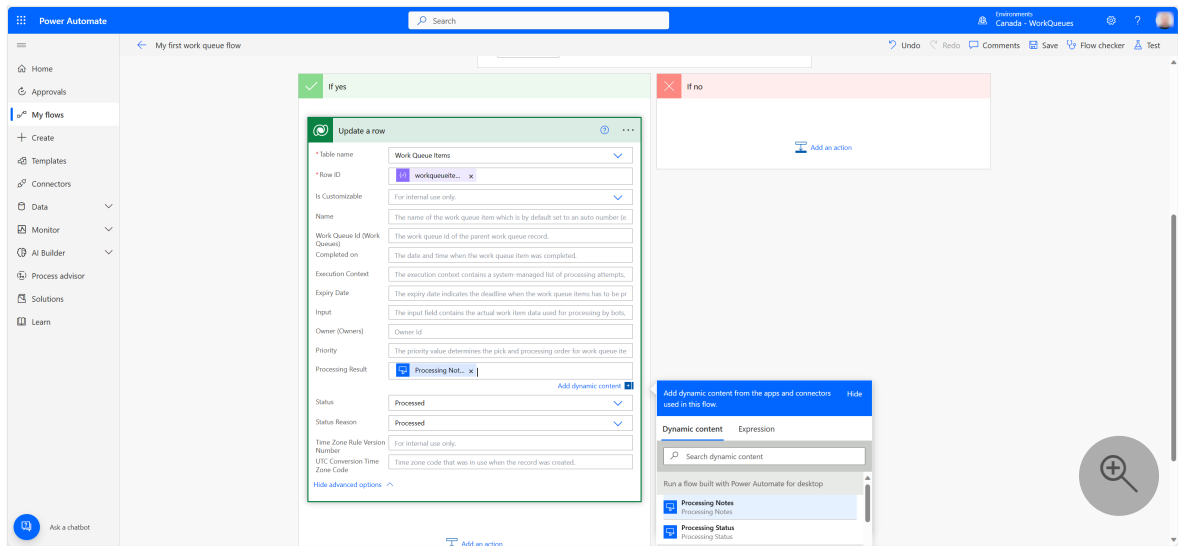
- Your flow should look similar to this now.



- Save the flow and run it to confirm that the flow logic works as expected.
- Go back to edit the *My first work queue flow*.
- Select the newly created (or edited) desktop flow from the list and then select **Attended** as its Run Mode.
- Fill in the **Work Queue Item Value** and **Work Queue Item Name** parameters as shown here:



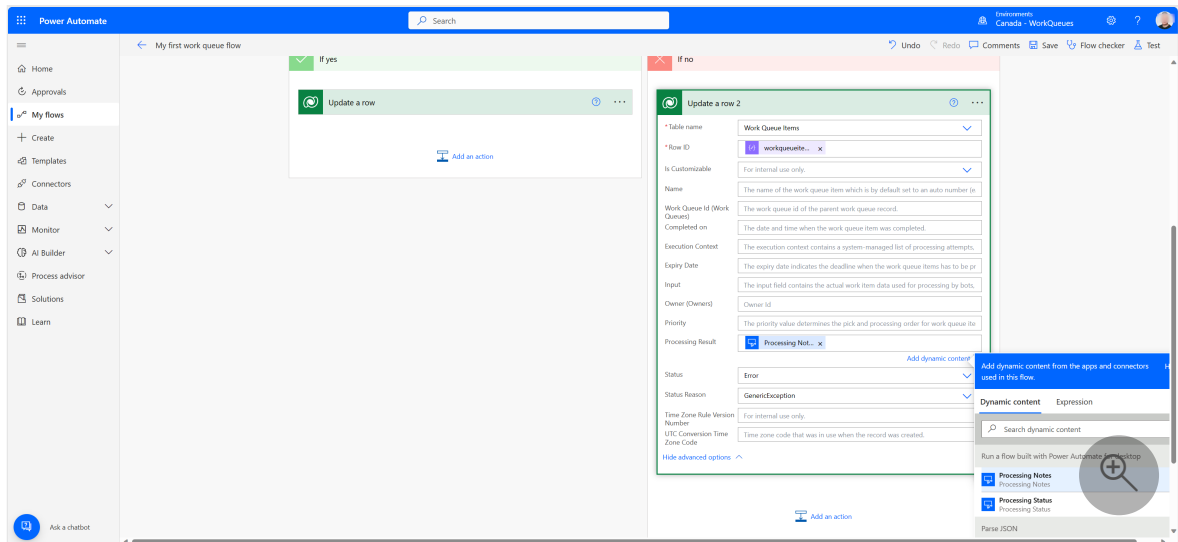
20. Add a **Condition** action before the **Update a row** action.
21. Position your mouse in the **Choose a value** field and select **Processing Status** from the dynamic content list dialog.
22. Position your mouse in the other **Choose a value** field and enter **Processed** as the text value.
23. Drag and drop the **Update a row** action into the **If yes** section of the condition action.
24. Open the **Update a row** action details and replace the values to match the following:



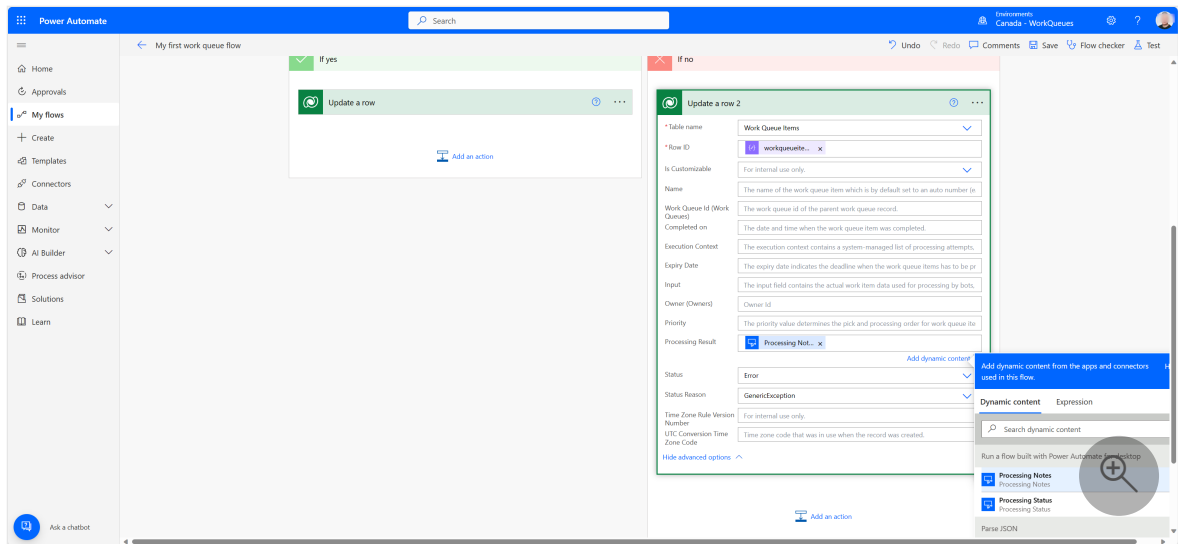
25. In the red **If no** box, add another **Update a row** action and select **Work Queue Items** as the **Table name**.

26. Next, select **workqueueitemid** as **Row ID** and open **Show advanced options** section select **Processing Notes** as the **Processing Results** value.

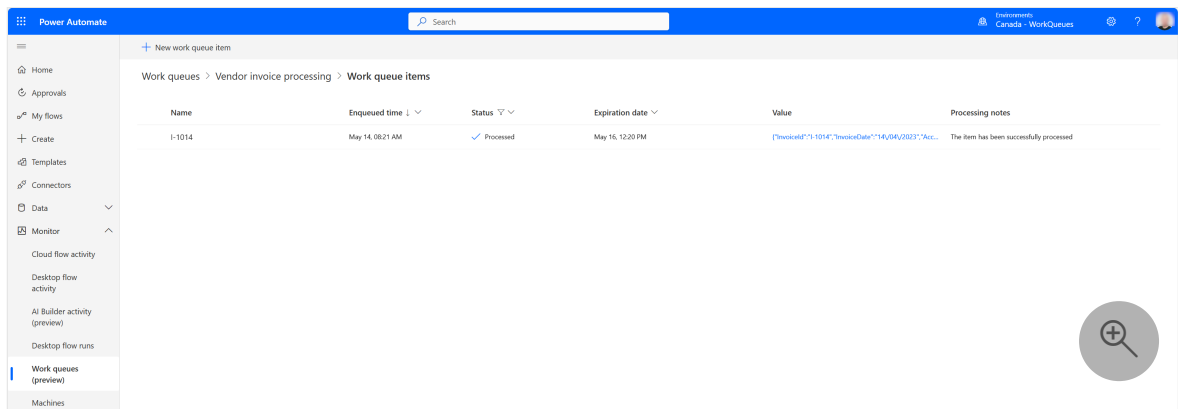
27. Select **Error** as **Status** and **GenericException** for **Status Reason**.



28. Select **Save** and **Test** to test the overall automation and observe the output from the desktop flow action.



29. To confirm that the work queue item has been processed you can go to the work queue details page, select **See all** in the work queue items section and filter the items by **Processed** status.



Well done, you just completed a more advanced scenario that included hybrid work queue processing!

## Next steps

[Learn how to trigger work queues](#)

## Learn more

- [Work queue overview](#)
- [Manage work queues](#)
- [Bulk-import work queue data](#)
- [Trigger work queues](#)
- [Known issues and limitations](#)

# Trigger work queues processing

Article • 10/26/2023

Power Automate provides a [variety of triggers](#) that can be used to initiate work queue processing. These triggers can be categorized into different types based on their functionality.

- **Manual Triggers:** These triggers are initiated manually by the user. They're useful when you want to start a flow on-demand, such as when you need to perform a specific task.
- **Automated Triggers:** These triggers are initiated automatically based on a specific event or condition. For example, you can use the "When a new email arrives" trigger to initiate a flow whenever a new email is received.
- **Scheduled Triggers:** These triggers are initiated based on a specific schedule. You can use them to perform tasks at specific times or intervals, such as sending a daily report.
- **Instant Triggers:** These triggers are initiated immediately when a specific event occurs. For example, you can use the "When a file is created or modified" trigger to initiate a flow whenever a file is created or modified in a specific folder.
- **UI-based Triggers:** These triggers are initiated based on user interactions with a user interface. For example, you can use the "When a button is clicked" trigger to initiate a flow when a user select a button on a form.

## Learn more

- [Work queue overview](#)
- [Manage work queues](#)
- [Bulk-import work queue data](#)
- [Trigger work queues](#)
- [Process work queues](#)



# Known limitations for work queues

Article • 07/26/2024

The following table lists known limitations for work queues in Power Automate for desktop.

 Expand table

Limitation	Details	Potential workaround
Dequeuing concurrency	Keep work queue dequeuing concurrency within moderate levels. Five parallel dequeue operations per work queue are currently supported.	When applying concurrency patterns in cloud flows, it's recommended to align the concurrency level to available machine capacity to ensure that the number of work items being processed in parallel matches the number of machines available to process them.
Dataverse limits	Work queues are based on Dataverse technologies, hence the same service protection and API limits apply. Learn more: <a href="#">Service protection API limits</a> .	
Work queue connector disabled in GCC High and DoD environments	The work queue connector that is applicable to Power Automate for desktop only, is disabled by default for customers operating in GCC High and DoD environments.	You can enable the work queue connector and its actions. More information: <a href="#">Disable new connectors by default in GCC High and DoD</a> .
Work queue DLP policy configuration support	<p>There may be a delay before new work queue connector actions added to Power Automate desktop are visible and configurable through DLP policies in Power Platform Admin Center.</p> <p>Additionally, if you want to limit the use of work queues in cloud flow and API-based scenarios, you should use Dataverse RBAC to control access to the underlying tables. This is because work queues are built on the Dataverse platform, and their actions (such as adding, updating, deleting and dequeuing) are accessible by-design through the native Dataverse connector,</p>	

Limitation	Details	Potential workaround
	which cannot be completely blocked by DLP policies.	
Throughput and scaling	Work queues aren't suited for high throughput (subsecond processing time) scenarios, where hundreds or thousands of items need to be processed in seconds. If you do have such throughput requirements, consider using other queuing solutions such as Azure Service Bus Queues.	

## Related information

- [Work queue overview](#)
- [Manage work queues](#)
- [Bulk-import work queue data](#)
- [Trigger work queues](#)
- [Process work queues](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# Desktop flow activity

Article • 08/29/2023

As you scale the automation of your business processes, you may need access to aggregated data to monitor your desktop flows effectively. The **Desktop flow activity** section of the Power Automate portal (**Monitor** > **Desktop flow activity**) provides dashboards, tables, and graphs to monitor desktop flows, measure effectiveness, and quickly identify issues.

You can filter the presented data by date, desktop flow, cloud flow, machine, run mode, run status, and error. Filtering enables you to focus on a specific range of data and handle it more efficiently.

## ⓘ Note

- Some filters may not be available for some pivots because of the nature of the presented data.
- When you move between pivots, the tab keeps the active filtering selection. Select **Clear filters** to reset the applied filters.

## Available data for admins and makers

The **Desktop flow activity** section is helpful for Center of Excellence (CoE) users who want to monitor all activity in an environment and makers who want to get an aggregated view of their automation. Learn more about the CoE in [Microsoft Power Platform Center of Excellence Starter Kit](#).

If you're the admin of the current environment, you can see all the desktop flows, machines, and machine groups that exist in Dataverse for the environment. If you're a maker, you can see all your desktop flows and machines, including the flows that others share with you.

## ⓘ Note

If a cloud flow appears as **private flow**, it means that it isn't shared with you. Cloud flows aren't saved in Dataverse, and environment admins need to **get access to the flows** to read details about them.

# Last runs: Monitor desktop flow runs

The **Last runs** section provides graphs and tables to get meaningful insights about your desktop flow runs, such as the number of runs, the percentage of errors, and the run modes.

You can find information regarding each table in the following list:

- **Completed desktop flows:** This card provides the number of desktop flow runs in a selected period of time.
- **Desktop flows runs and error rate:** This chart shows the number of desktop flow runs and the error percentage by date. If no desktop flows run for one or several days, the corresponding data aren't available in the table.
- **Desktop flows completion status:** This donut chart displays the proportion of desktop flows that succeeded, failed, or got canceled.
- **Run status – Trends:** This stacked area chart helps you understand how your flows work across time. Use this chart to quickly identify if there was a particular issue during a dedicated time period, such as too many failures and low number of runs.
- **Top desktop flows runs status:** This card presents the desktop flows that ran the most during a dedicated time period. For each presented desktop flow, the card gives details about the run mode (attended, unattended or local) and the run status (successful, skipped, failed, canceled). If you want to review specific desktop flows, select them in the appropriate filter.
- **Last desktop flows runs:** This card displays the latest completed desktop flows runs.



## Errors: Monitor desktop flow errors

You can use the **Errors** section to identify the most common errors that occur while your flows run. These pivot tables provide information about desktop flows, cloud flows, and machines in which errors occurred, allowing you to view details to identify the source of errors.

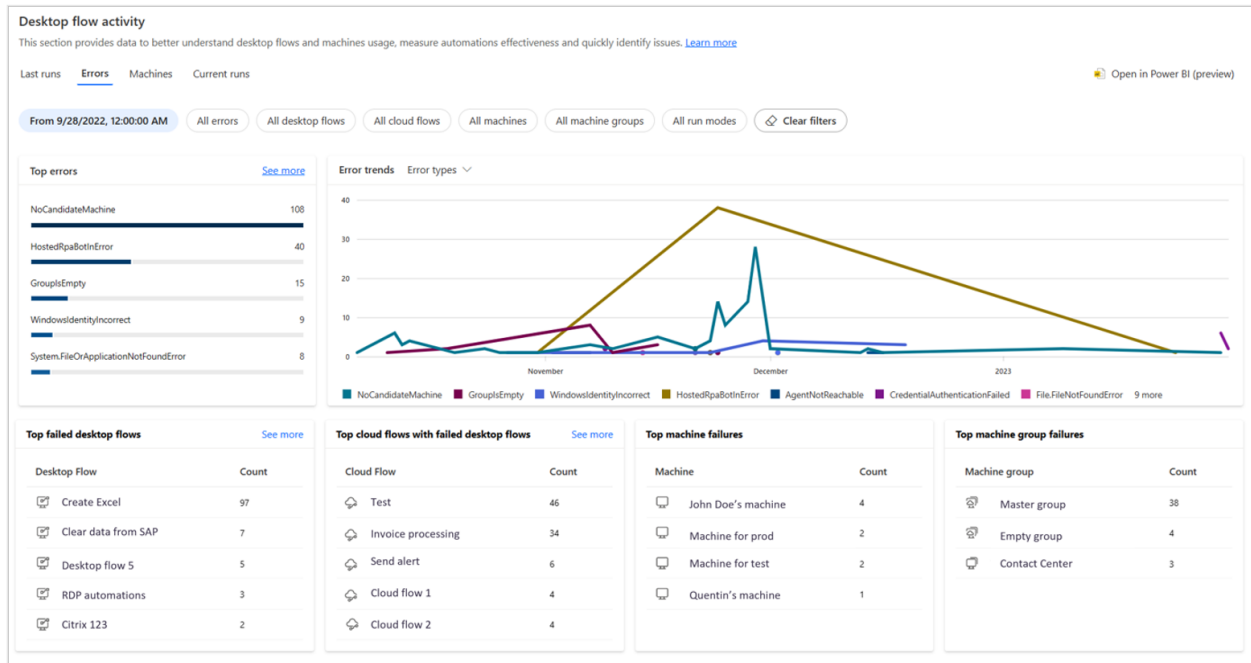
By default, this section displays the desktop flow run errors for the last seven days. Optionally, you can select another time period and filter on specific errors.

You can find information regarding each table in the following list:

- **Top errors:** This card displays the errors that occur most frequently during your desktop flow runs. If you can't see a specific error in the card, select the **All errors** filter, and then choose the error that you want to see.
- **Top failed desktop flows:** This card displays the desktop flows that failed the most in your environment. You can select each desktop flow to display its details page.
- **Top cloud flows with failed desktop flows:** This card provides a list of cloud flows that are the most impacted by failures in desktop flows. For example, if a cloud flow contains two desktop flows and these desktop flows failed two times each, you'll see this cloud flows with a count of four errors.
- **Top machine failures:** This card displays information about the machines on which desktop flow runs failed most frequently. You can select each machine name to

display its details page.

- **Error trends:** This chart displays daily trends for errors in desktop flow runs. These trends can help you to identify if an error started to appear recently or several days ago. In addition to trends per error, the chart can display trends per desktop flow and machine. Select the dropdown menu of the table to display the type of pivot you prefer.



## Machines: Monitor your machines and machine groups

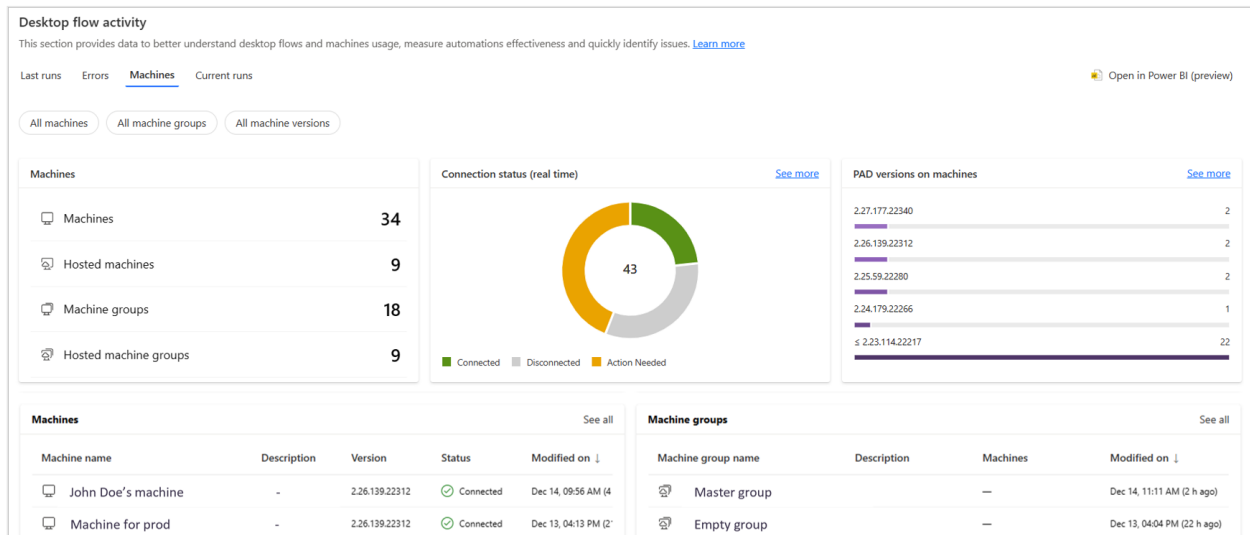
You can use the **Machines** section to monitor your machines and machine groups. These pivot tables provide information about the number of machines, groups, connection status, Power Automate for desktop versions installed on machines, and lists of machines and machine groups.

- **Connection status:** This card displays the connection status of your machines (connected, disconnected, action needed). If you want to see machines that are disconnected, select **See more**. In the pane, you can see all the machines per connection status. You can select the machine name to reach its details page.

### ! Note

There is a limit of 40 connection statuses displayed at one time. If you have more machines in your environment, use the filters to reduce the current selection.

- **Versions on machines:** This card displays for each version of Power Automate for desktop, the number of machines that use this version. This feature is useful to understand which machines require updates (you should update your application regularly). From filters, you can select a dedicated version and see machines that are using this version.
- **Machines and Machine groups:** These cards display the 10 last modified machines and machine groups (name, description, version, status). Select **See all** to view the full list of items, if you have more than 10 machines or groups.



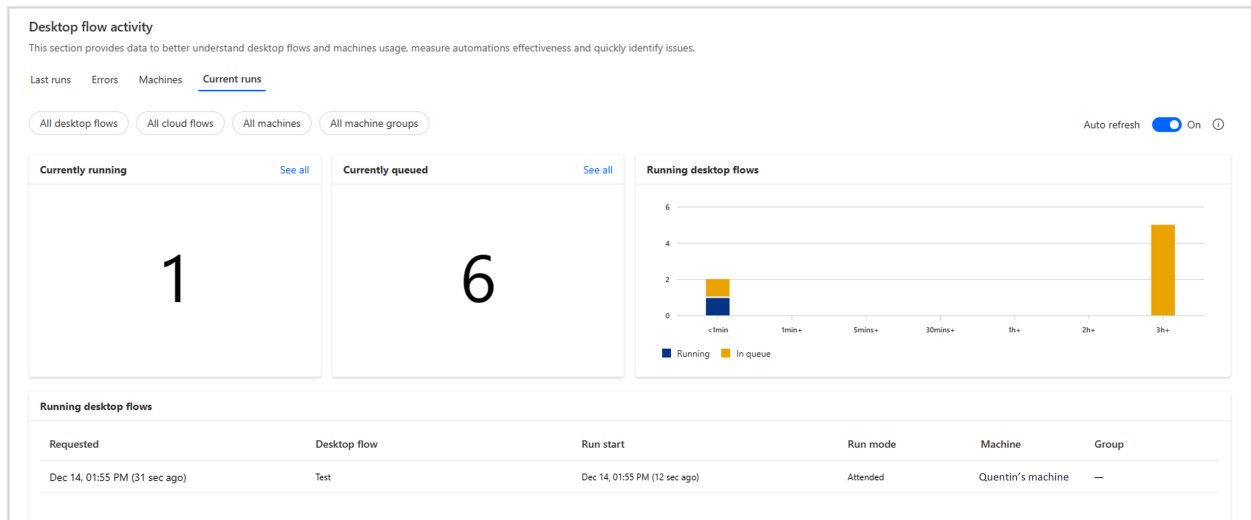
## Current runs: Monitor your queued and running desktop flows

You can use the **Current runs** section to monitor active desktop flow runs. These pivot tables provide information about the number of running and queued desktop flows, and lists with the running and queued desktop flows.

By selecting **Auto refresh**, all the cards will be refreshed automatically.

- **Currently running and Currently queued:** These cards display the total number of desktop flows that are currently running or are in queue.
- **Running desktop flows:** This card displays the number of running flows per period of time. It allows you to see if some of your desktop flows are stacked during their execution or if there's throttling on specific machines.
- **Running desktop flows and desktop flow in run queue:** These cards display the list of flows that are running or are currently in queue. You can select **Requested** items to reach the run details page, **Desktop flow** items to reach the desktop flow

details page, and **Target** items to reach the machine or machine group details page.



### ! Note

Limitations: **Target** for run queue table doesn't display information for standalone machines.

## Monitor desktop flow activity with Power BI desktop (preview)

[This topic is pre-release documentation and is subject to change.]

Power Automate enables you to download a Power BI template to monitor desktop flow activity from the Power BI desktop application. [Learn more about Power BI desktop.](#)

You can use this template to retrieve the data and charts displayed on the desktop flow activity page, such as last runs, main errors, and machine information.

Additionally, you can:

- Customize filters and graphs from the existing data in the **Desktop flow activity** page.
- Add your own data to build your own business dashboards.
- Publish the template to share it with your organization.

## Prerequisites

- Install the latest version of the [Power BI desktop application](#).

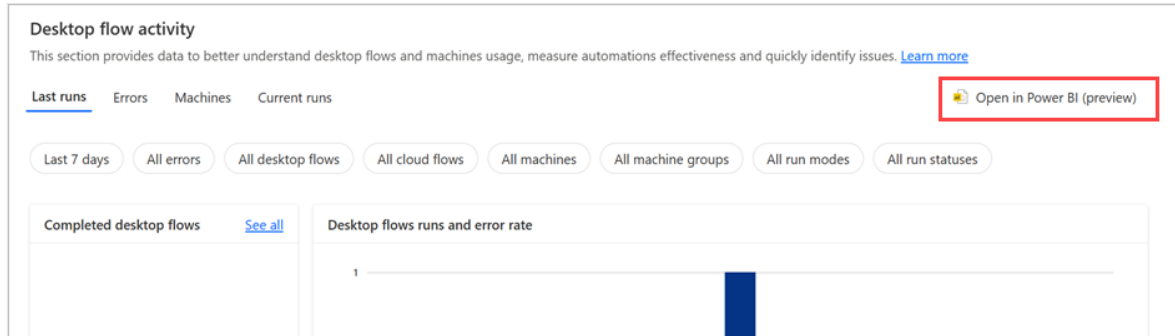


- Ensure the TDS endpoint is enabled in the selected environment.

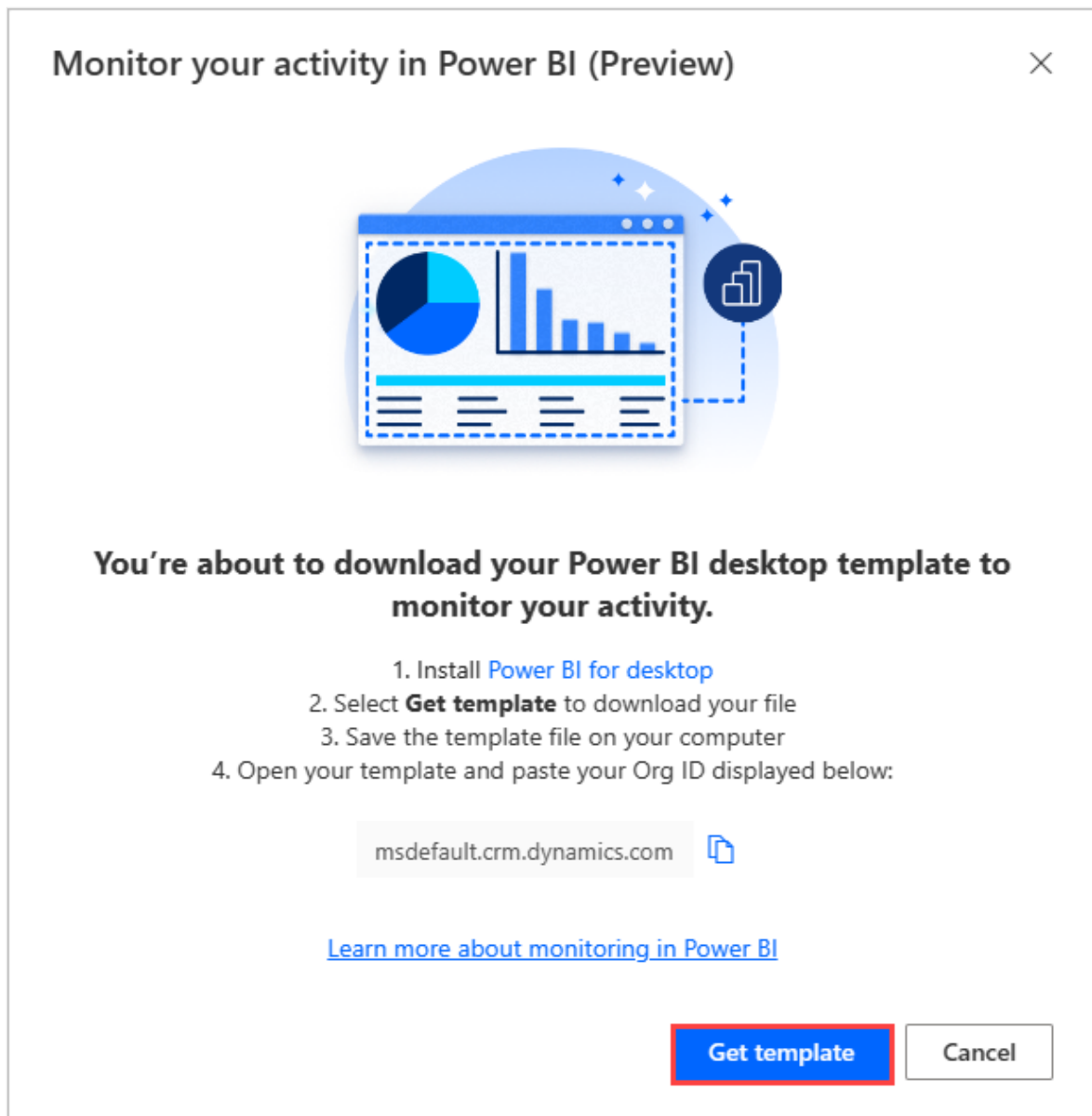
## Download the Power BI template

To download the template:

1. Navigate to the **Desktop flow activity** page, and select **Open in Power BI (preview)**.



2. Select **Get template** on the pop-up window and save the template locally on your machine.



3. Once the template has been downloaded, open it in the Power BI desktop application.
4. On the first screen, provide your orgId and select **Load**. You must sign in with your organization account the first time you open the template.

**Note**

You can copy the orgId from the pop-up window in Power Automate.

5. Once the template is open, you can save it as a standard PBIX file to avoid re-entering the orgId.

## Limitations

- Some data aren't available in the Power BI desktop template: current runs, machine statuses, top failed cloud flows, and the **see more** option.
- Power BI desktop is only available in English.
- Microsoft can regularly provide updates for this template. You need to redownload the Power BI template if you want to get the latest version of it.
- There's no migration of your changes between template versions.
- The Power BI model doesn't adjust the timezone based on a user's location or locale. Time is displayed in UTC timezone.

# Monitor desktop flow runs

Article • 04/09/2024

As you scale the automations in your business, you may need an easy way to ensure all your desktop flows are running as expected. Monitor all your desktop flow runs in just one location to keep your automations running smoothly.

Requested	Desktop flow	Status	Run start	Run mode	Machine	Group	Parent flow
7 min ago	Processing invoice2	Running	3 min ago	Attended	IBMKT-HHTB2	IBM machines group	Extend project access
20 min ago	Export file to OneDrive	Running	5 min ago	Attended	My other machine	—	Automate registration
32 min ago	Extracting AI builder invoice proce...	Running	16 min ago	Unattended	IBMKT-HHTB24	IBM machines group	Demo win from app
46 min ago	Extracting AI builder invoice proce...	Queued	30 min ago	Unattended	IBM machines group	IBM machines group	Automate data sync
8:15 AM, 8/25/20	Demo win from app	Succeeded	8:15 AM, 8/25/2020	Attended	MININT-4HCC	SAP machines group	Demo win from app
8:15 AM, 8/25/20	Record maintenance	Succeeded	8:15 AM, 8/25/2020	Unattended	My other machine	—	Demo win from app
8:15 AM, 8/25/20	Extracting AI builder invoice proce...	Failed	10:00 AM, 8/25/2020	Attended	MININT-4HCB	SAP machines group	Demo win from app
8:12 AM, 8/25/20	Demo win from app	Succeeded	10:00 AM, 8/25/2020	Unattended	IBMKT-HHTB2	IBM machines group	Demo win from app
8:10 AM, 8/25/20	Access data base input automation	Queued	9:50 AM, 8/25/2020	Unattended	MININT-4HCS	—	Demo win from app
8:00 AM, 8/25/20	Processing invoice2	Succeeded	12:11 AM, 8/25/2020	Unattended	IBMKT-HHTB24	IBM machines group	Demo win from app
12:10 AM, 8/24/20	Save total values	Succeeded	10:00 AM, 8/25/2020	Unattended	IBMKT-HHTB2	IBM machines group	Demo win from app
10:30 PM, 8/24/20	Processing invoice2	Canceled	12:11 AM, 8/25/2020	Attended	My other machine	—	Demo win from app
10:28 PM, 8/24/20	Save total values	Failed	9:50 AM, 8/25/2020	Attended	Private machine	—	Demo win from app
10:10 PM, 8/24/20	Save total values	Canceled	10:00 AM, 8/25/2020	Unattended	Private machine	—	Demo win from app
8:13 PM, 8/24/20	Processing invoice2	Succeeded	12:11 AM, 8/25/2020	Unattended	MININT-4HCC	SAP machines group	Demo win from app
6:45 PM, 8/24/20	Export file to OneDrive	Failed	8:15 AM, 8/25/2020	Attended	My network machine	—	Demo win from app
6:22 PM, 8/24/20	Export file to OneDrive	Succeeded	12:11 AM, 8/25/2020	Unattended	MININT-4HCA	SAP machines group	Demo win from app

## View list of all desktop flow runs

1. Sign into Power Automate
2. Select **Monitor** > **Desktop flow runs**

From this page you can view all your desktop flow runs for the current environment to which you have access.

## Prerequisites

In order to see runs in this list, one of the following must be true:

- You have [run an attended or unattended desktop flow](#) in the current environment
- Another user has [shared their desktop flow](#) with you, which has run in the current environment
- You have [permission](#) to view all data in the environment



Tip

To enable a user to view all the desktop flow runs in the current environment, ensure they have been assigned at least a System Administrator or Environment Admin security role for that environment. Learn more about configuring user security to resources.

### Important

- For each desktop flow run initiated by a cloud flow, there's a maximum action log capacity of 32 MB. This capacity translates to roughly 50,000 to 80,000 action log entries. However, if you start a local attended desktop flow from the Power Automate desktop console, it will only store the first 10,000 log entries. Once this limit is reached, any subsequent actions aren't recorded in the log. If you encounter this limitation, you can split your flow into smaller, separate flows.
- For desktop flows that are launched within the Power Automate desktop designer itself, no action logs are collected.

## Desktop flow run information

The following information is available on your runs:

 Expand table

Property	Description
Requested	The time in which the desktop flow was requested by the parent flow. This may not be the same as the time when the desktop flow started running on the machine.
Desktop flow	The name of the desktop flow which was run.
Status	The status of the desktop flow run.
Run mode	The mode in which the desktop flow was run.
Duration	How long the desktop flow took to run on the machine, excluding any time spent in the run queue.
Parent flow	The cloud flow that triggered the desktop flow to run.

## Customize your view

You can make changes to your view to narrow the list of runs to only those you are interested in seeing. Click the column name to change the order of items or filter them to specific values.

## View all runs from the parent flow run

You may have several desktop flow runs that were triggered by one flow run. Click the three dots next to the desktop flow name, then select See all desktop flow runs in the parent flow.

Requested ↓	Desktop flow ↓	Status ▾	Run start ↓	Run mode ↓	Machine ↓	Group ↓	Parent flow ↓
Jun 28, 11:52 AM (4 sec a...)	Send physical click on web e...	Succeeded	Jun 28, 11:52 AM (9 sec ago)	—	—	—	—
Jun 28, 11:51 AM (1 min a...)	Ticket confirmation	Succeeded	Jun 28, 11:51 AM (1 min ago)	—	—	—	—
Jun 28, 11:50 AM (2 min a...)	Client registration	Succeeded	Jun 28, 11:49 AM (2 min ago)	—	—	—	—
Jun 22, 11:12 AM (6 d ago)	Clipboard flow	Succeeded	Jun 22, 11:13 AM (6 d ago)	Attended	—	—	Deleted flow

## View the run queue for a queued run

### Important

Gateways for desktop flows are now deprecated. This feature is no longer supported from June 30th, 2023, and for China regions from September 30th, 2023.

[Learn more](#)

Machines and gateways can be used to run multiple desktop flows. To see the placement of a desktop flow in the run queue, click the three dots next to the name of the desktop flow and select **See desktop flow in run queue**.

**Desktop flow runs**

Here's a quick overview of the desktop flows you have running. [Learn more](#)

Requested ↓	Desktop flow ↓	Status ▾	Run start ↓	Run mode ↓	Machine ↓	Group ↓	Parent flow ↓
Jun 28, 11:44 AM (17 min ...)	Currency conversion	Queued	—	Attended	—	—	Currency conversion
Jun 28, 11:44 A...	Client registration	Running	Jun 28, 11:44 AM (17 min ag...	Attended	PRODUCTGR-18	—	Client Registration

- ☰ See desktop flow in run queue
- 🔍 See parent flow run
- ▶▶ See all desktop flow runs in the parent flow run
- ✕ Cancel parent flow run

## Live updates

To keep your desktop flow run information always up to date, you can activate the **Live updates** toggle switch at the top of the page.

Live updates are only supported for up to fifty desktop flow runs. Loading more runs will deactivate live updates and activating live updates with more than fifty runs will trim the list to the supported amount.

# Monitor run details

Article • 07/24/2023

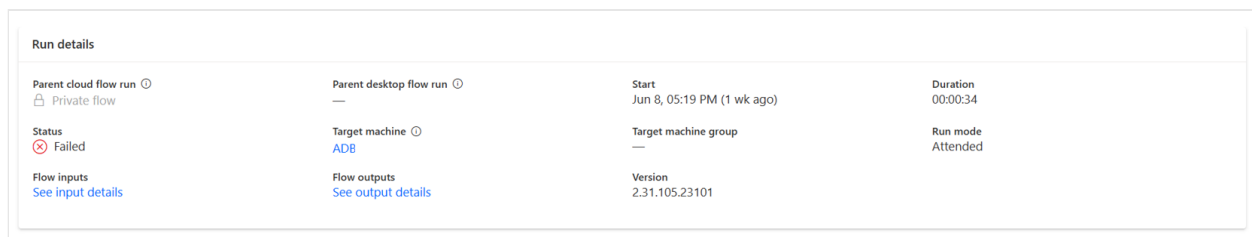
From this page you can view all the details of one of your desktop flow runs for the current environment. The information provided in this page can help you to understand better how your flows are running, what went good or bad, and all the useful related metadata (owner, inputs, and others).






You can access this page:

- from the monitor section in the left nav of Power Automate
- from Desktop flow activity: in last runs pivot by selecting one run from the desktop flows runs card.
- from Desktop flow runs

## Run details

The run details card displays all the parameters related to your run.



Run details			
Parent cloud flow run  Private flow 	Parent desktop flow run  —	Start Jun 8, 05:19 PM (1 wk ago)	Duration 00:00:34
Status  Failed	Target machine  ADB	Target machine group —	Run mode Attended
Flow inputs <a href="#">See input details</a>	Flow outputs <a href="#">See output details</a>	Version 2.31.105.23101	

- **Parent cloud flow run:** the name of the cloud flow that contains the executed desktop flow. The link redirects to the run details page of the parent cloud flow (for attended and unattended runs). If the run mode is local attended (flow triggered from Power Automate for desktop), the field remains empty.
- **Parent desktop flow run:** if there's no parent desktop flow, the field remains empty. The link redirects to the run details page of the parent desktop flow.
- **Start:** when the desktop flow action is requested.
- **Duration:** the duration of the desktop flow runs includes steps where Power Automate is trying to find the machine to target (it also includes the period in queue when all the machines are already busy)
- **Status:** will display the result of the desktop flow runs. Result can be succeeded, failed, canceled, skipped.
- **Target machine:** this provides you with the information about the registered machine that is selected to run the desktop flow in attended or unattended mode. If you're running with local attended mode, you won't see machine information.



- **Target machine group:** when a machine is part of a group or the flow is run on a hosted group, you'll see the name of group displayed in this section. Link redirects you to the details page of the group.
- **Run mode:** can be attended or unattended when the flow is triggered from the cloud, local attended when the flow is triggered manually from Power Automate for desktop.
- **Flow inputs and outputs:** when a desktop flow is using inputs or provides outputs, you can see the details of both inputs and outputs by clicking on See {inputs/outputs} details.

### ⓘ Note

When inputs / outputs are secure inputs / outputs, you won't see the value in the details but only {}. o When inputs or outputs contain sensitive variables, the details value will always be null. Inputs and outputs are also viewable from the Dataverse flow session entity.

- **Version:** the version of Power Automate for desktop agent used to execute the flow.

## Run status

The run status is a timeline that allows to understand how works a desktop flow run from request to finalization. Running a desktop flow from a cloud flow (attended or unattended) has previous steps before being executed on your machine, the timeline describes these different steps.

It might be critical for your orchestration to identify if a step took too much time or if a desktop flow always fails during the same step.



## Actions details

This card allows you to see information and status for each action of your desktop flow:

- **Start:** timestamp when the action has started.

- **Subflow:** your flow can be composed of one or several subflows. By default, your actions are in the main subflow. This information helps you to quickly identify in which subflows the action is to fix potential errors.
- **Action index:** in the desktop flow script, each action is linked to an action index (this corresponds to the number of the line).
- **Action name**
- **Duration**
- **Log level:** indicates the severity level (Info/Warning/Error) of the logged action. The only action that is associated with a log level is the **Log message** action. For any other logged action, the column remains empty.
- **Status:** this column gives you for each action the result of its run.

By default, the actions are sorted from the latest to the earliest. If you don't see all the action in the card, select see all to view the full list of action details.

# Monitor desktop flow queues

Article • 01/29/2024

## 📘 Important

Gateways for desktop flows are no longer supported. Switch to our machine-management capabilities. Learn more about [switching from gateways to direct connectivity](#).

As you scale the automations in your business, you might need an easy way to ensure that competing desktop flows are running according to their business priority. Monitor, manage and visualize all your queued desktop flow runs in just one location. Desktop flow queues can be used whether your target device is a machine, machine group, or a gateway.

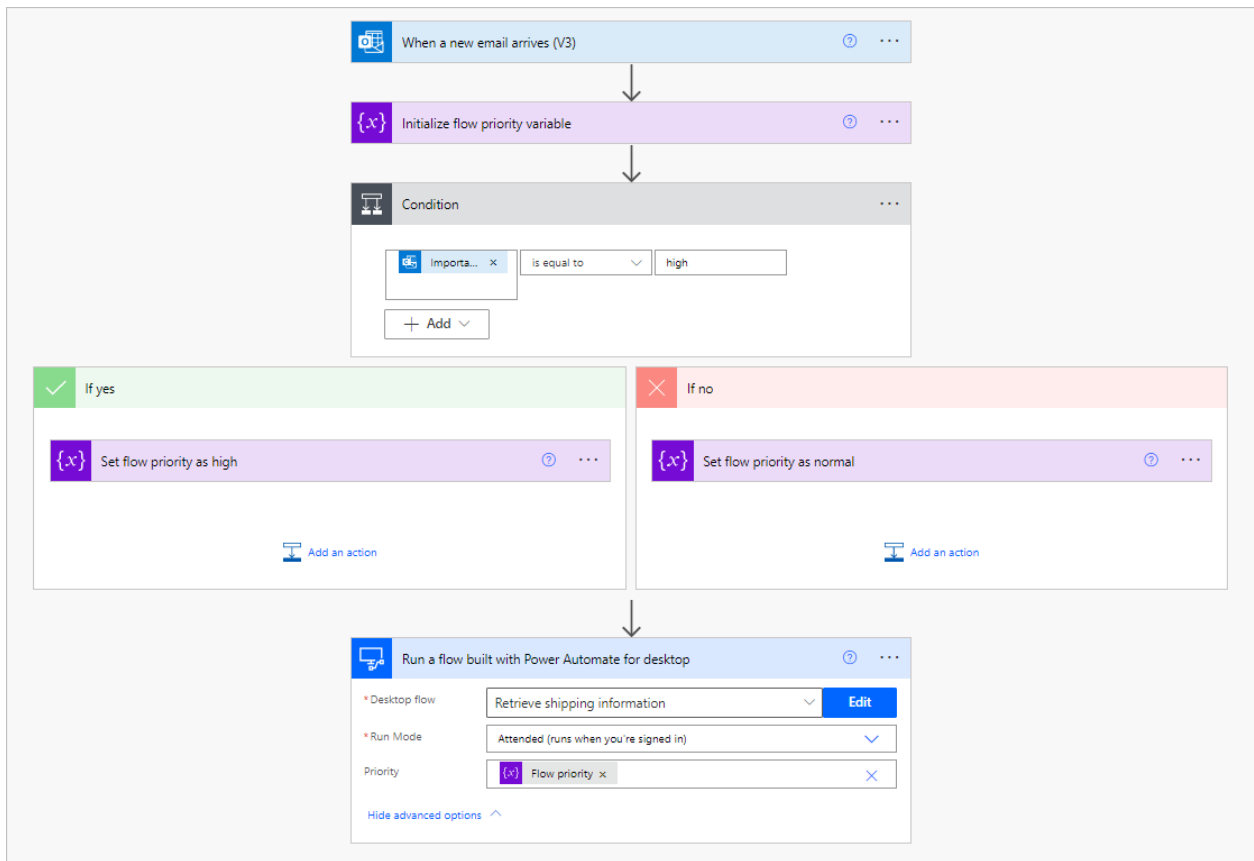
## 📌 Note

Everyone accessing the run queues for their gateways from the **Desktop flow queues** page should now navigate to the **Gateways** pivot in the **Machines** page to access them.

## Setting a priority

The desktop flows connector actions contains a new priority parameter under the Advanced options section.

Available priorities are High and Normal (the default value). This value can also be passed dynamically using the custom value parameter. Every time the desktop flow is triggered, it's executed with the priority that has been set.



When multiple runs are queued, the execution ordering is based on the run priority and enqueued time. Runs with a high priority that's been enqueued first will be executed first.

## View run queue for a machine or machine group

Visit the details page for your machine or machine group, then select on the **Run queue** tab to see the list of queued desktop flow runs.

Edit details Manage access Add to group Delete machine Refresh

Machines > MS006

Overview Run queue

Queue	Desktop flow	Requested	Priority	Status	Run start	Parent flow
	Retrieve shipping information	4 min ago	Normal	Running	3 min ago	Retrieve shipping information
1	Register new customer	3 min ago	Normal	Next to run	—	New order
2	Create invoice	19 sec ago	Normal	Queued	—	Send invoice

## Prerequisites

In order to see runs in this list, one of the following situations must be true:

- You're [running an attended or unattended desktop flow](#) in the current environment
- Another user has [shared their desktop flow](#) with you, which has run in the current environment
- You have [permission](#) to see view all data in the environment

### Tip

To enable a user to view all the desktop flow runs in the current environment, ensure they have been assigned at least a System Administrator or Environment Admin security role for that environment. Learn more about configuring user security to resources in [Configure user security to resources in an environment](#).

## Queue Status

A run in a queue can have the following status:

- Running
- Queued
- Next to run

## Actions on a run

Four actions are available when clicking on the three dots next to the desktop flow name:

- Change priority
- Move to top
- See parent flow run
- Cancel parent flow run

## Change priority

You can change the priority of a specific run by clicking on the three dots then **Change priority**. You can only change the priority of a run of which you're an owner, or if you're a co-owner on the machine/machine group or admin on the gateway.

Changing the priority only impacts the current run and not any subsequent ones. If you wish to [change the priority of all the upcoming runs](#), you need to change the priority in the connector action.

## Move to top

The owner of the device or a user with administrator privileges for the machine, machine group, or gateway can override the queue priority by moving an item to the top of the queue. That item is put at the top of the queue regardless of its original priority and queued time. If multiple runs are moved to top, the last one added will be executed first.

You can cancel moving a run to top. It reverts the run back to its original priority and queued time.

## See parent flow run

If you have permission to access the parent flow, you can use this action to view its run details.


## Cancel parent flow run

If you're the owner of the flow, or have the role System Administrator or Environment Admin, you can cancel the parent flow run instance. This cancels the current desktop flow and all the other actions that were used in the parent flow.

## Extended queue prioritization

The extended queue prioritization is a machine and machine group setting, which optimizes the machine-assignment logic of a run queue.

Enabling this feature means that extended queue prioritization is applied on machines with multi-session support, such as Windows Server operating systems with RDS enabled. This optimizes the default run queue prioritization by extending the current first-in-first-out (FIFO) logic with user prioritization. This feature is enabled automatically when multi-session support is detected, but you can opt out at any time by disabling it.

 **Note**

This feature is currently being gradually rolled-out and might not yet be available in your region.

## With disabled extended queue prioritization

Principle. The machine-assignment algorithm always waits for the first run in queue **Next to run** status to be assigned to a machine before considering the next one.

Step-by-step logic for an attended run. The first run in queue is an attended run, its connection user is user **Y**:

1. *Filter*: The algorithm selects all machines, which are connected and ready to process runs (not in maintenance, and so on).
2. *Filter*: The algorithm selects all machines, which have an opened session of user **Y**.
3. *Allocation*: The algorithm assigns the run to one of the remaining machines (randomly). If no machine is remaining after the last filter, the run is failed.

Step-by-step logic for an unattended run. The first run in queue is an unattended run, its connection user is user **Y**:

1. *Filter*: The algorithm selects all machines, which are connected and ready to process runs (not in maintenance, and so on).
2. *Filter*: The algorithm selects all available machines (that is, machines that have at least one session available).
3. *Filter*: The algorithm discards the machines, which already have a session opened by user **Y**.
4. *Allocation*: The algorithm assigns the run to one of the remaining machines (randomly). If no machine is remaining after the last filter, the run is failed.

### ⓘ Note

- An unattended run can only be processed by a machine if the user session targeted, which is recorded on the desktop flow connection, isn't already in-use on the same machine.
- In both attended and unattended run scenarios, if no machines are left after the final filter, but there are some eligible machines currently offline (that were discarded in step 1), the run waits for the offline machines to come back online before marking the run as failed.

### 💡 Tip

- With disabled **Extended queue prioritization**, if no machine is available to execute the first run in queue, it is either failed or it waits for an offline machine to get back online, blocking the run queue in the meantime.
- Enabling **Extended queue prioritization** allows the algorithm to reprioritize the queue when the first run in queue can't be processed.

## With enabled extended queue prioritization

Principle. The machine-assignment algorithm is able to consider the other runs in the queue if the first run in the queue can't be processed for the following reasons:

- Its targeted user session is currently not active on any machine (for attended runs).
- Its targeted user session being already in use on all available machines (for an unattended run).

Step-by-step logic for an attended run: The first run in queue is an attended run, its connection user is user **Y**:

1. *Filter*: The algorithm selects all machines, which are connected and ready to process runs (not in maintenance, and so on).
2. *Filter*: The algorithm selects all machines, which have an opened session of user **Y**:
  - If some machines remain, the algorithm moves to step 4 (allocation).
  - If no machine remains, the algorithm moves to step 3 (reprioritization).
3. *Reprioritization*: The algorithm reprioritizes the queue by considering the next run in queue until a run is assignable to a machine.
4. *Allocation*: The algorithm assigns the run to one of the remaining machines (randomly).

Step-by-step logic for an unattended run. The first run in queue is an unattended run, its connection user is user **Y**:

1. *Filter*: The algorithm selects all machines, which are connected and ready to process runs (not in maintenance, and so on).
2. *Filter*: The algorithm selects all available machines (= machines, which have at least one session available).
3. *Filter*: The algorithm discards the machines, which already have a session opened by user **Y**:



- If some machines remain, the algorithm moves to step 5 (allocation).
  - If no machine remains, the algorithm moves to step 4 (reprioritization).
4. *Reprioritization*: The algorithm reprioritizes the queue by considering the next run in queue (until a run is assignable to a machine).
  5. *Allocation*: The algorithm assigns the run to one of the remaining machines (randomly)

## View list of run queues for gateways

Users can view the desktop flow queues for their gateways under the **Machines page > Gateways pivot**. The gateways pivot is only available if you own or have access to a gateway.

The screenshot shows the 'Machines' page with the 'Gateways' pivot selected. A yellow warning banner states: 'Gateways for desktop flows will be deprecated soon. Start to switch to our machine-management capabilities. [Learn more](#)'. Below the banner is a table with the following data:

Gateway cluster name	Gateways	Desktop flows running	Desktop flows queued	Owner
Product2	1	0	0	[User Icon]
Product	1	0	2	[User Icon]
v-anpoly2	1	0	0	[User Icon]

From this page you can view all the gateways to which you have access. Each gateway has its own run queue when used to run desktop flows.

## Using gateways with multiple environments

We recommend using a gateway for desktop flows only by one environment. However, gateways can still be used across multiple environments if needed.

With multiple environments, in some cases no flows might appear to be running even with a full list of queued runs, as the gateway might be running flows in another environment. Run queues are per environment and can't be prioritized one over the other. A message is shown to indicate if the gateway is being used in another environment.

## Known issues

- Microsoft recommends that you limit the number of short (~under 1 min) desktop flows that you queue in large machine groups.
- Machines and machine groups aren't available in China regions. You can still view the desktop flow queue for your gateways by visiting **Desktop flow queues** under the **Monitor** section in the left navigation.
- Desktop flow queues are designed using a best-effort FIFO (first-in, first-out) approach to process runs in the order in which they were received, with the oldest execution running first. However, due to the way runs are prepared and processed internally, it's possible that runs added to the queue a few seconds later will be started before the previous one already in the queue, to optimize the use of machines.

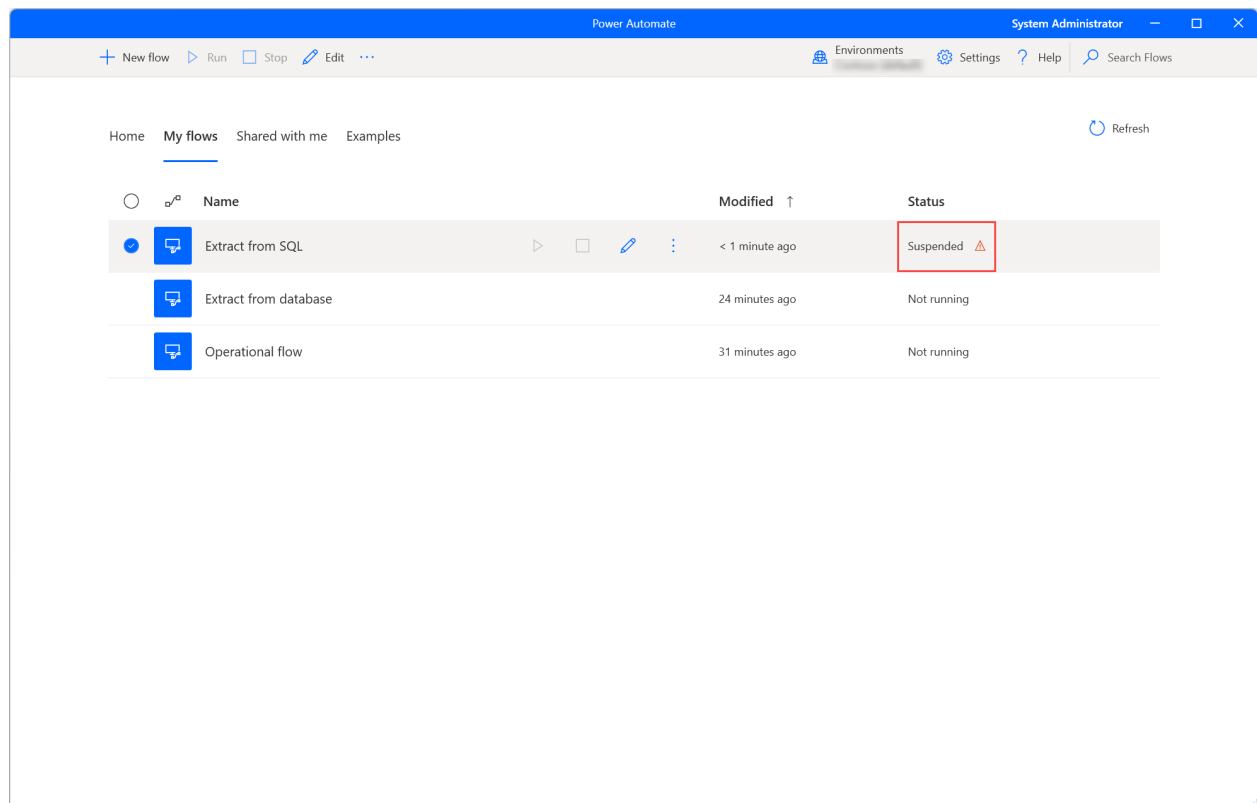
# Data loss prevention (DLP) policies

Article • 06/30/2023

Power Automate offers to administrators the option to create and enforce policies that classify desktop flows action groups as business or non-business and mark actions or action groups as blocked. That way a non-business action can't be combined with an action that has been marked as business so that to avoid data exposure outside the organization. For more details on how to form a data loss prevention (DLP) policy, visit the [respective topic](#) under the Administer Power Platform documentation.

## Troubleshoot data loss prevention (DLP) policies violations

While saving a desktop flow you will be notified about the data loss prevention violations the flow includes. The same will occur while attempting to run the flow from the designer and the console. A desktop flow that violates a data loss prevention (DLP) policy will be marked as suspended and the run option will be disabled.



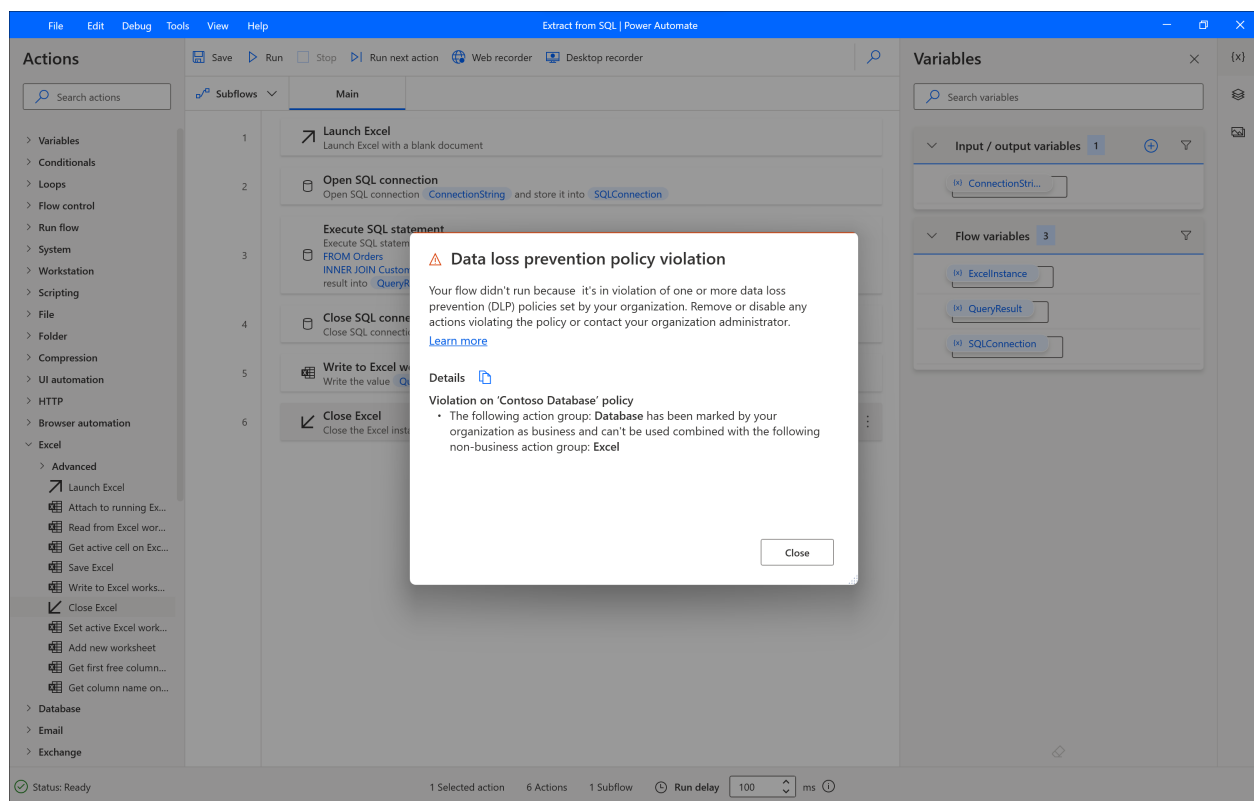
To resolve a violation navigate to the designer and delete or disable the actions causing this error.

# Business vs non-business data loss prevention policy

The business vs non-business data loss prevention policy, prevents users to use actions from the two categories on the same flow.

For example, the flow that appears below contains the **Open SQL connection**, **Execute SQL statement** and **Close SQL connection** actions which belong to the Database actions group and the **Launch Excel**, **Write to Excel** and **Close Excel** actions that belongs to the Excel actions group. Thus it receives an error as the Database group of actions are marked as business while the Excel group is marked as non-business.

To resolve this data loss prevention policy (DLP) violation, delete or disable actions from one of the two groups.

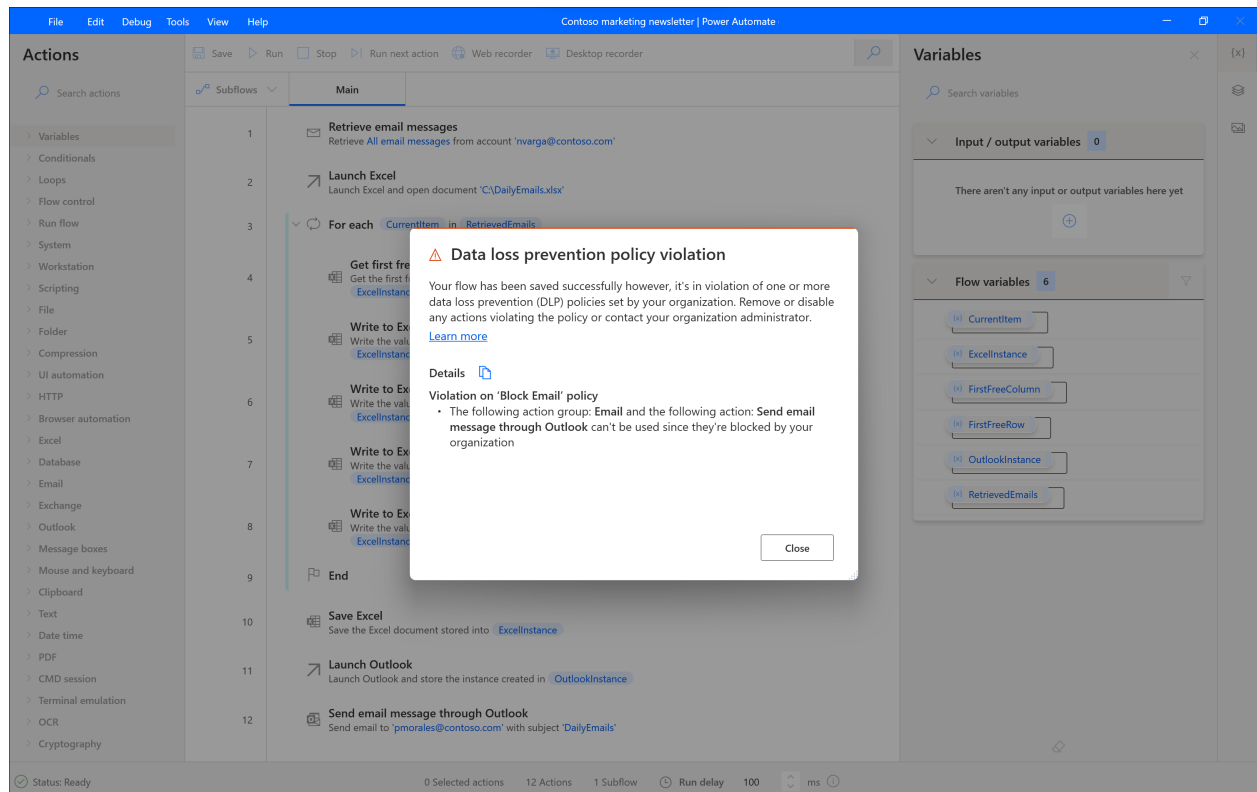


# Blocked actions and action groups data loss prevention policy

Apart from marking action groups as business and non-business, the administrator can mark action groups or particular actions as blocked. In this case these actions can't be used at all in the flow.

In the example shown below the Email group of actions and the Send email through Outlook actions are marked as blocked.

To resolve this data loss prevention policy (DLP) violation, delete or disable all actions that are marked as blocked.



### ! Note

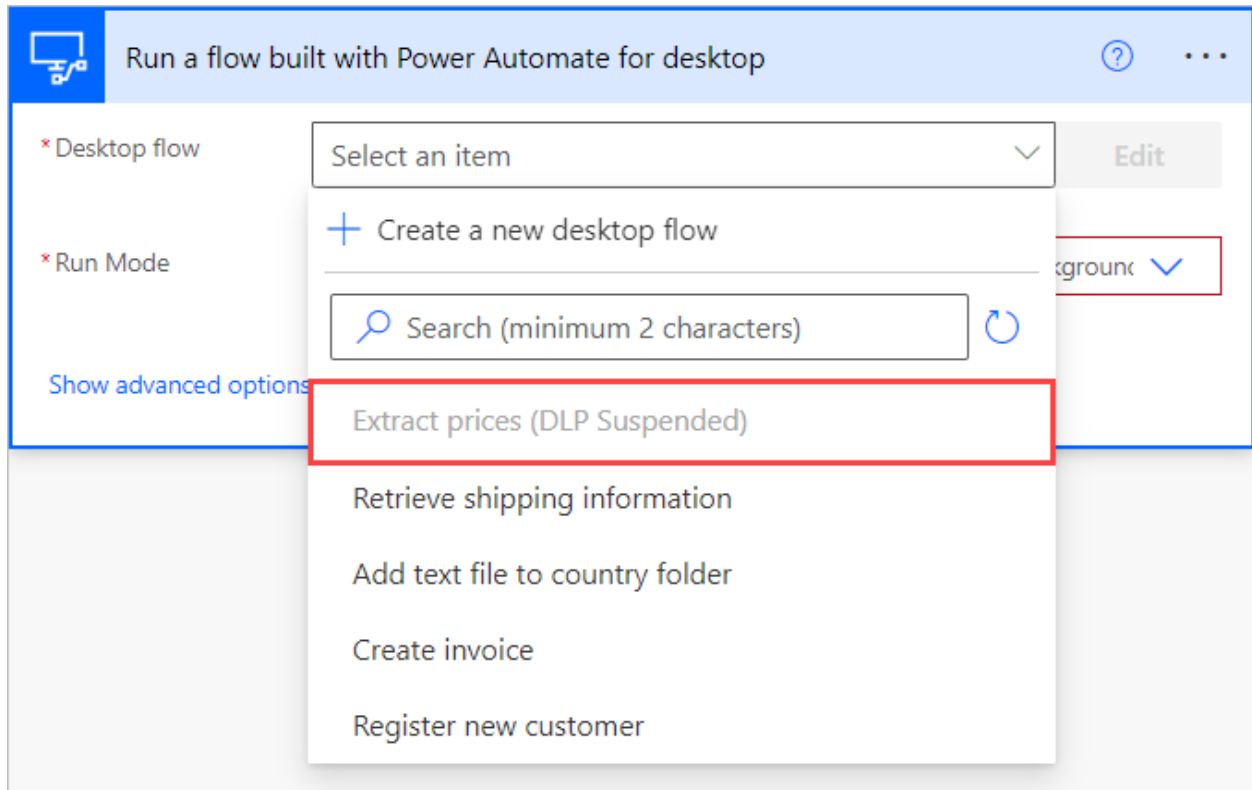
- In case a flow calls other flows using the **Run desktop flow** action, the dependent flows are not being evaluated for data loss prevention (DLP) violations.
- If the suspended desktop flow was used in a cloud flow, this cloud flow will be also marked as suspended. Once you have fixed the violations on your desktop flow, make sure that all your cloud flows appear on again.

### i Important

For cases that a desktop flow is suspended, it won't be able to run it. Similarly, a cloud flow using a suspend desktop flow won't be able to run either.

## Making use of suspended desktop flows in cloud flows

A suspended desktop flows due to data loss prevention (DLP) prevention policies violations won't be available to be selected.



To be able to launch the desktop flow from a cloud flow, edit the desktop flow in the desktop designer and resolve the DLP violations. You will then be able to select again the desktop flow to run.

### **Important**

In case a data loss prevention (DLP) policy rule is set to a desktop flow after it has been used in a cloud flow, there won't be any notification and the cloud flow will error out at that step. In case a desktop flow violates any rules and you correct it you will need to go back to the cloud flow and reselect it from the list.

## **More info**

- [Learn more about Power Automate DLP](#)
- [Learn more about DLP policies](#)

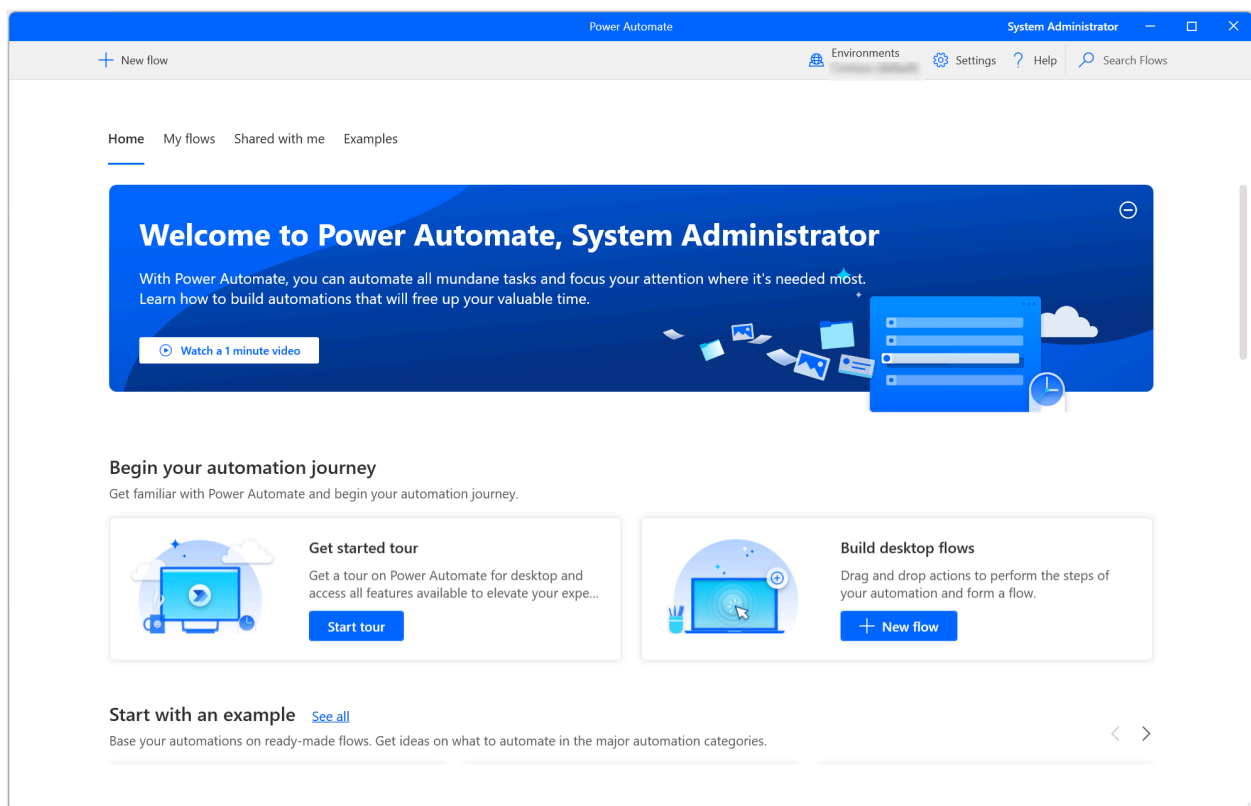
# Power Automate console

Article • 07/17/2024

The console is the central interface of Power Automate for desktop.

The main area of the console contains four tabs that display different kind of information: a home screen, your desktop flows, [shared desktop flows](#), and [built-in examples](#).

On the top of the window, you can see the current user, while on the command bar, you can see all the available actions, a dropdown list to switch environments, the **Settings** and **Help** buttons, and a search bar.

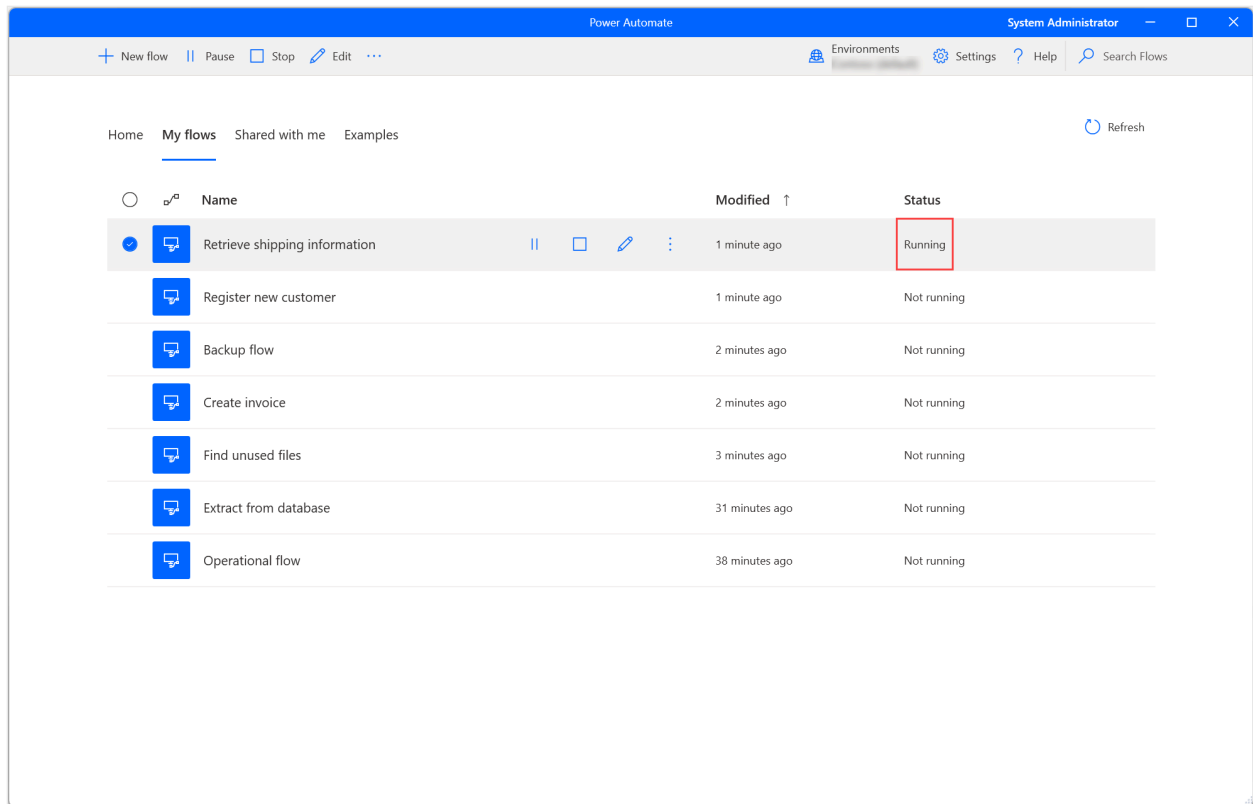


## ! Note

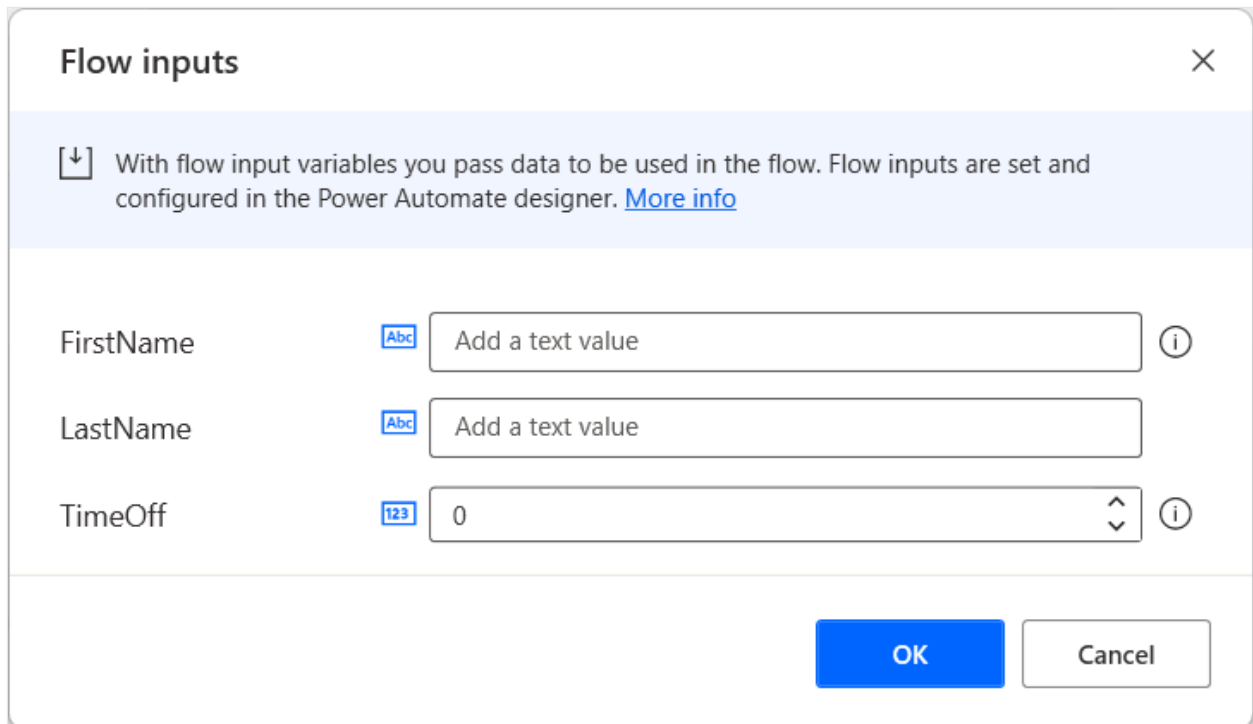
Some options in the console may be disabled due to insufficient permissions in the current environment. Contact your administrator to grant you access or switch to another environment. To find more information about security roles, go to [Configure user security](#).

## Starting a desktop flow

To run a desktop flow as local attended, use the **Start** button next to the selected flow or on the command bar. The **Status** column allows you to review the current status of each flow.



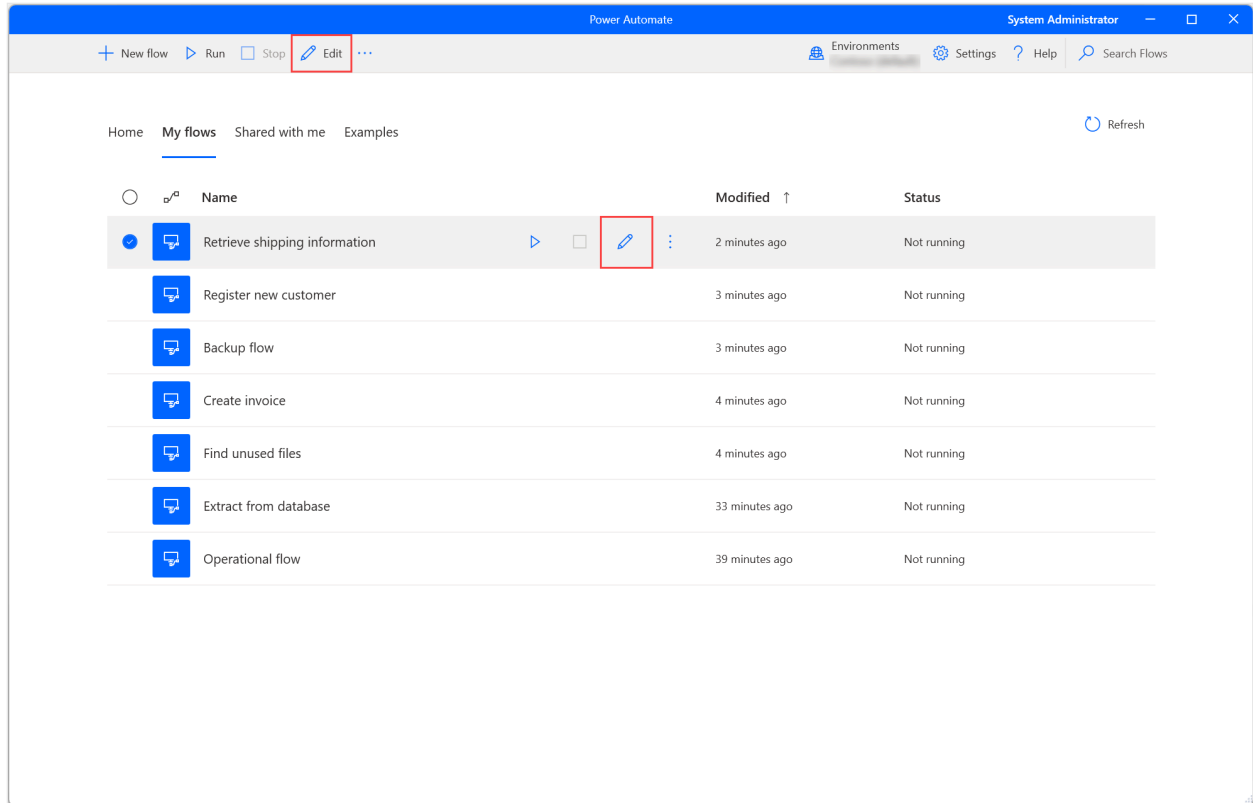
If a running flow contains **input variables**, a dialog box prompts you to provide the appropriate values.



## Editing a desktop flow



Apart from [creating new desktop flows](#), you can edit existing flows using the **Edit** button next to the selected flow or on the command bar.



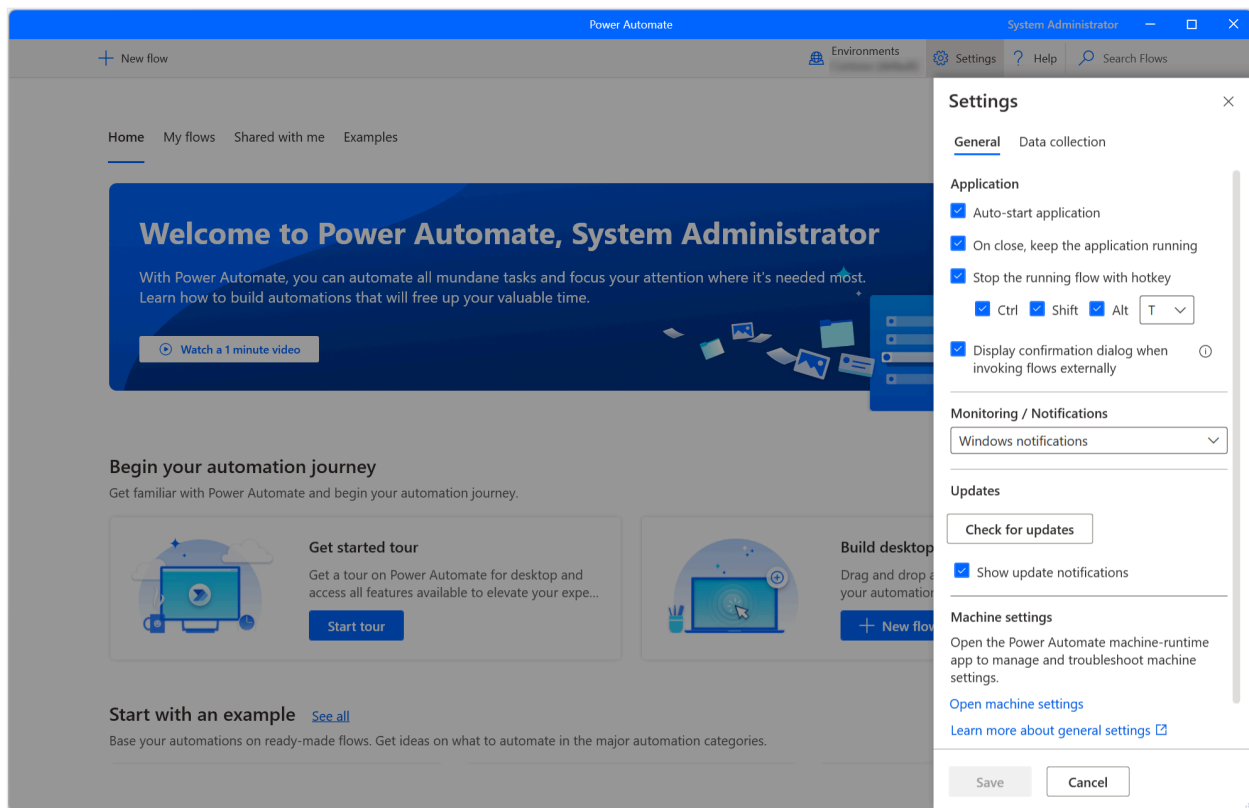
The development of new flows and the editing of existing flows occur in the flow designer. To find more information regarding the flow designer and how to develop desktop flows, refer to [Desktop flow designer](#).

### **Important**

When more than one person changes a shared desktop flow, the last person who saves the flow overrides all previous actions.

## Console Settings

To configure Power Automate for desktop to your liking, select the **Settings** button.



Under the **Application** category, select whether Power Automate should launch automatically and whether closing the console also closes the application. You can also set a hotkey combination to stop running flows instantly.

Using the **Monitoring/Notifications** dropdown list, you can choose whether Power Automate displays integrated Windows notifications, a custom monitoring window, or no notifications at all. To find more information regarding Power Automate notifications, go to [Runtime notifications](#).

By default, Power Automate always prompts you to confirm the triggering of a desktop flow via URL or desktop shortcut. The **Display confirmation dialog when invoking flows externally** option allows you to disable this functionality. You can find more information about external links in [Run desktop flows via URL or desktop shortcuts](#).

To decide whether Microsoft should collect diagnostic data to improve user experience, navigate to the **Data collection** settings tab.

### Important

Only admins can change data collection settings.

## Desktop flow properties

To review the properties of a desktop flow, right-click on it and select **Properties**, or select the same option from the corresponding shortcut. In the **General** tab, you can edit the name and description of the flow, set up a keyboard shortcut to trigger the flow locally, define the **On error** behavior of the flow run, and determine whether the desktop flow should **time out** after a set period of time.

If the **Add screenshot to logs** option is enabled, a screenshot is captured upon flow run failure and is uploaded to the [flow run action details](#).

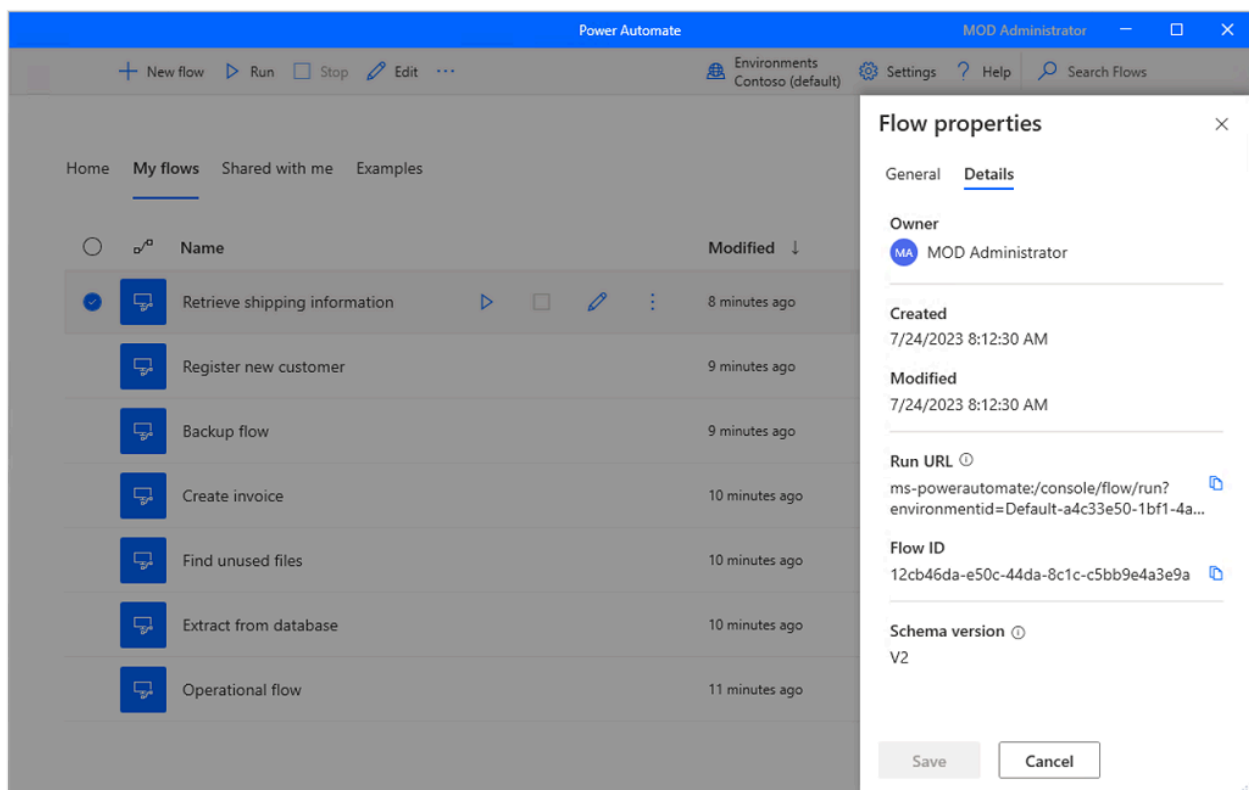
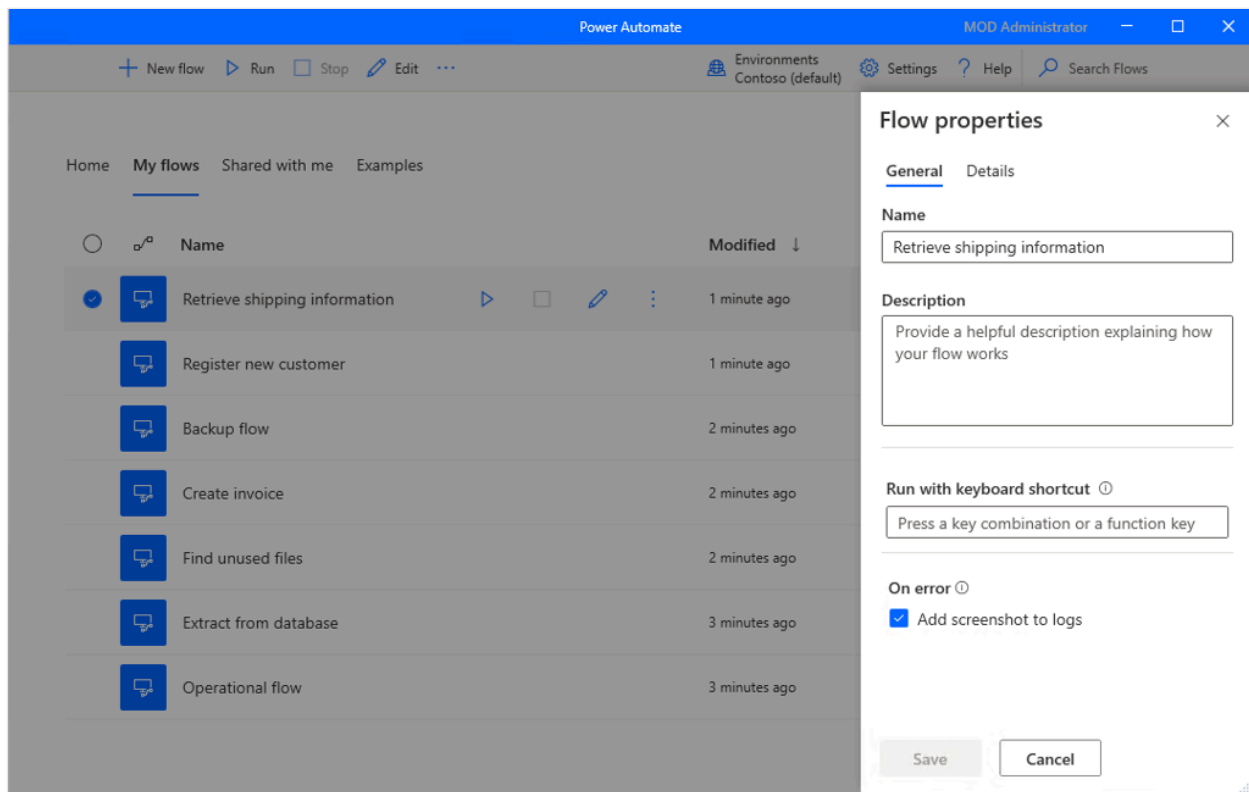
The **Flow timeout** property is disabled by default. If it becomes enabled, you can specify the maximum allowed time that the flow is allowed to run. If that maximum duration limit is reached during (console or cloud initiated) runtime, the desktop flow is forced to stop and time out. You can use the proposed timeout value, or provide your own using a combination of an integer value with the preferred time unit (seconds, minutes, or hours).

#### **Important**

- Access to the flow run logs is a premium feature, which requires a [Power Automate subscription](#).
- The **Flow timeout** property is also a premium feature requiring the above license.
- The **Add screenshot to logs** and **Flow timeout** properties apply only to flows stored in [Power Automate v2 schema](#).

In the **Details** tab, you can see the owner, the creation and last modification dates, the flow ID and the flow's storage schema version in Dataverse. For more information on the enhanced desktop flows schema, go to [Power Automate v2 schema](#).

Additionally, there's the **Run URL** that you can use to run the flow through many different sources, such as browsers, the Windows Run application, and the Command Prompt. You can find more information regarding this functionality in [Run desktop flows via URL or desktop shortcuts](#).



## Generate flow description using Copilot (preview)

[This topic is prerelease documentation and is subject to change.]

Generate a flow description for flows that you own or are a co-owner by the press of a button. Copilot then analyzes the flow and generates a description for it. This feature is

also available from the flow details in [make.powerautomate.com](https://make.powerautomate.com). More information:  
[Manage desktop flows](#)

### Important

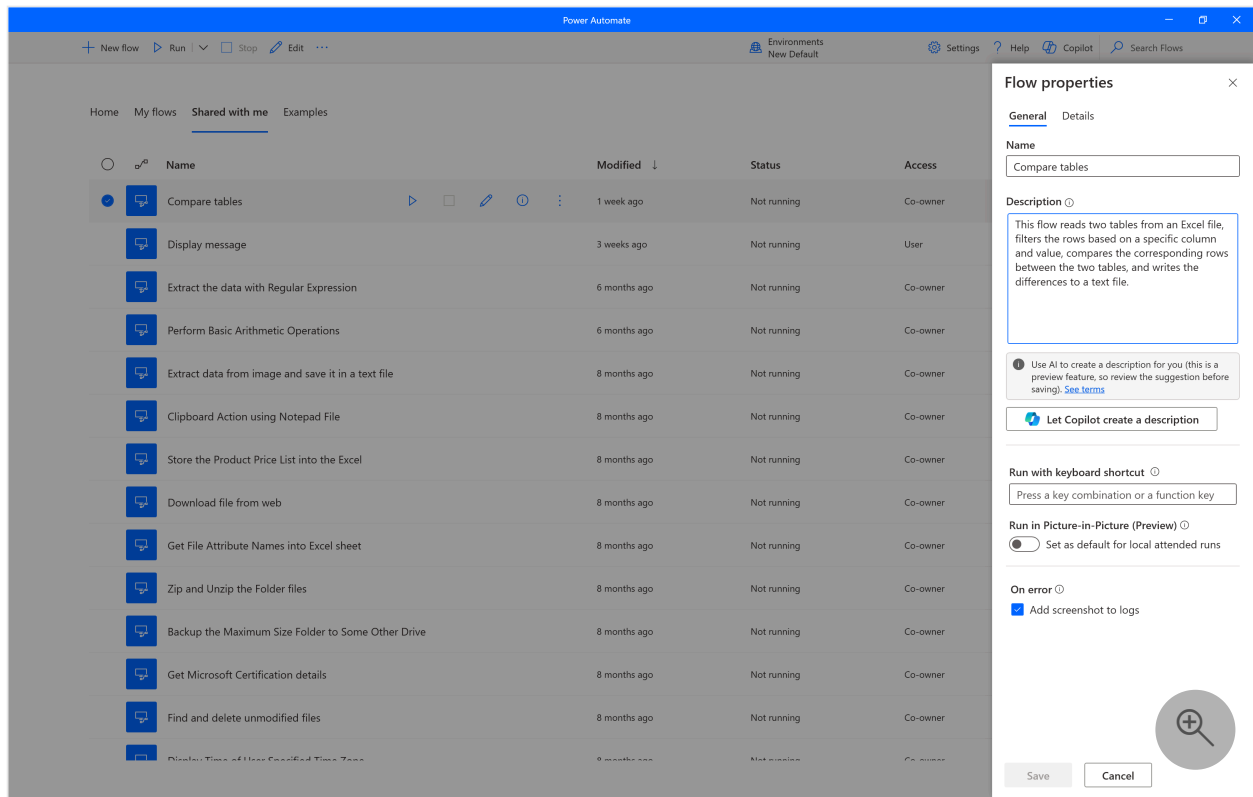
- This is a preview feature.
- Preview features aren't meant for production use and might have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.
- To understand the capabilities and limitations of this feature, go to [FAQ for generating a flow description using Copilot](#).

## Prerequisites

- Currently, the generate flow description using Copilot functionality is only available in environments located in the United States.
- Currently, the generate flow description using Copilot functionality is only available for users with a work or school account.

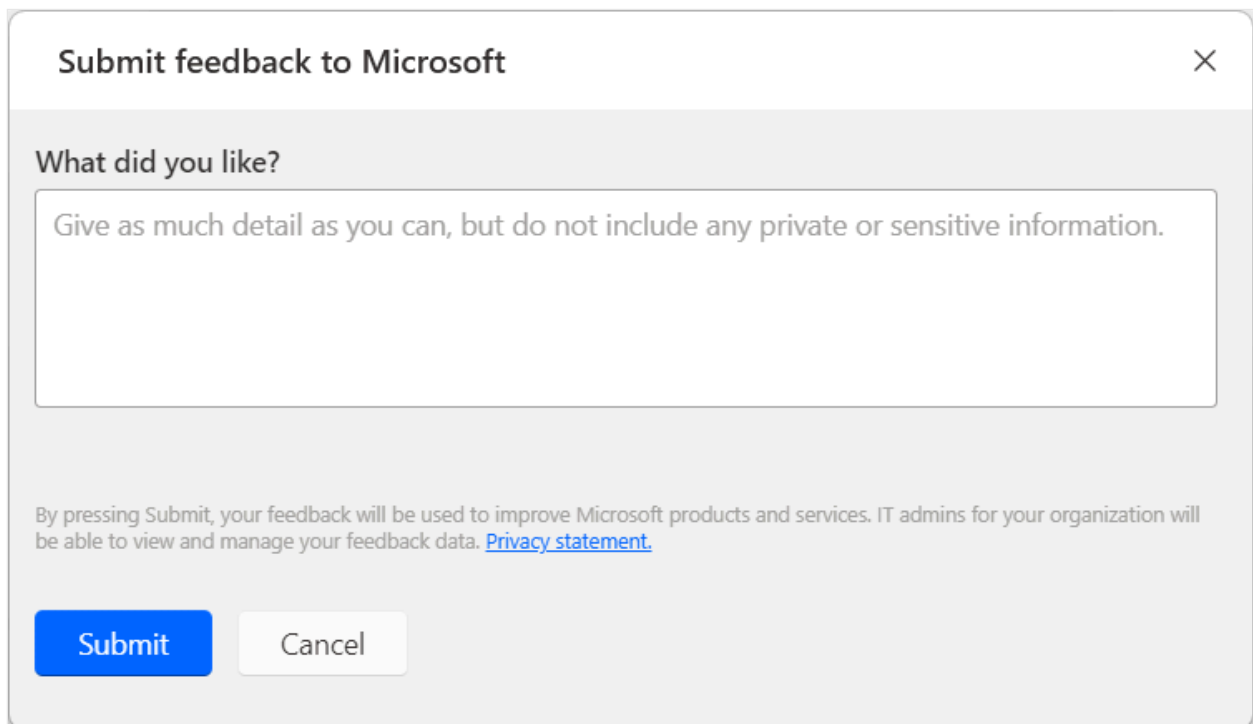
## Use Copilot to generate the description

To generate a flow description, navigate to the properties of the flow where you want to generate the description. Under the **Description** text area, select **Let Copilot create a description**. Copilot analyzes your flow and populates the description with a summary of your flow.



## Help us improve this feature

Send feedback by selecting the thumb up or thumb down icon underneath the AI-generated content. Once you do, a dialog box appears, which you can use to submit feedback to Microsoft.



ⓘ Note

If you can't see the dialog box, your Power Platform admin might have turned it off. More information: [Disabling the user feedback functionality](#).

## Disabling the generate flow description using Copilot functionality

To disable the generate flow description using Copilot functionality, Power Platform admins can contact Microsoft support. More information: [Get Help + Support](#)

## Disabling the user feedback functionality

As a Power Platform admin you can prevent users from sending feedback to Microsoft by disabling the `disableSurveyFeedback` tenant setting using PowerShell. More information:

- [List tenant settings \(preview\)](#)
- [Set TenantSettings](#)

## Data subject rights requests on user feedback

Tenant administrators can view, export, and delete the feedback from users by signing in to the [Microsoft 365 admin center](#) <sup>↗</sup>, and then select **Health** > **Product feedback**.

## See also

[FAQ for generating a flow description using Copilot](#)

## Update Power Automate for desktop

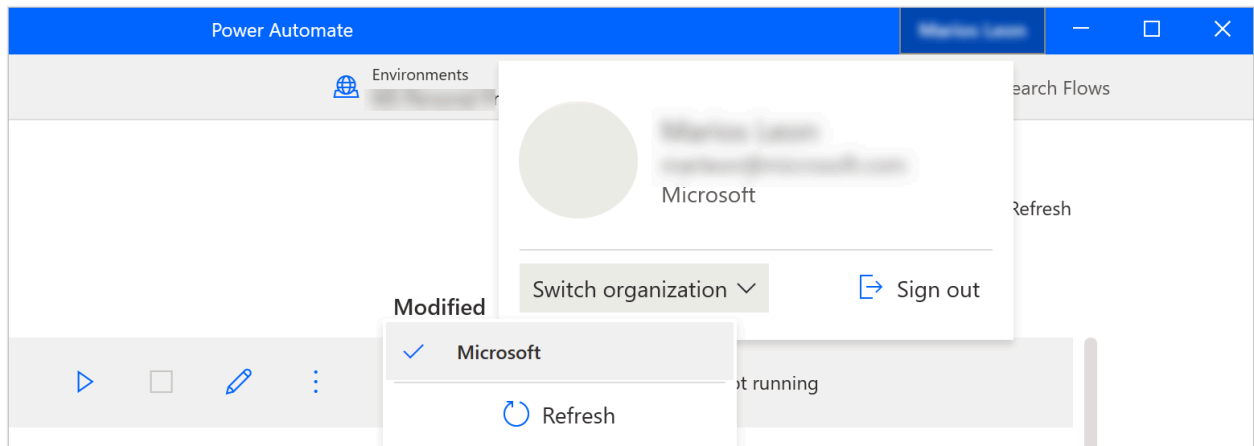
Power Automate frequently checks for updates and displays appropriate notifications.

Update notifications offer you the option to delay the update and proceed with it at a later time. If you don't wish to receive any update notifications, clear the **Show update notifications** option in the general settings.

To manually update Power Automate for desktop, select **Check for updates** in the general settings.

## Switch organization

If you're a member of more than one tenant, you can switch organizations by selecting the organization name at the top right corner of the console and then select **Switch organization**.



## Feedback

Was this page helpful?

Yes

No

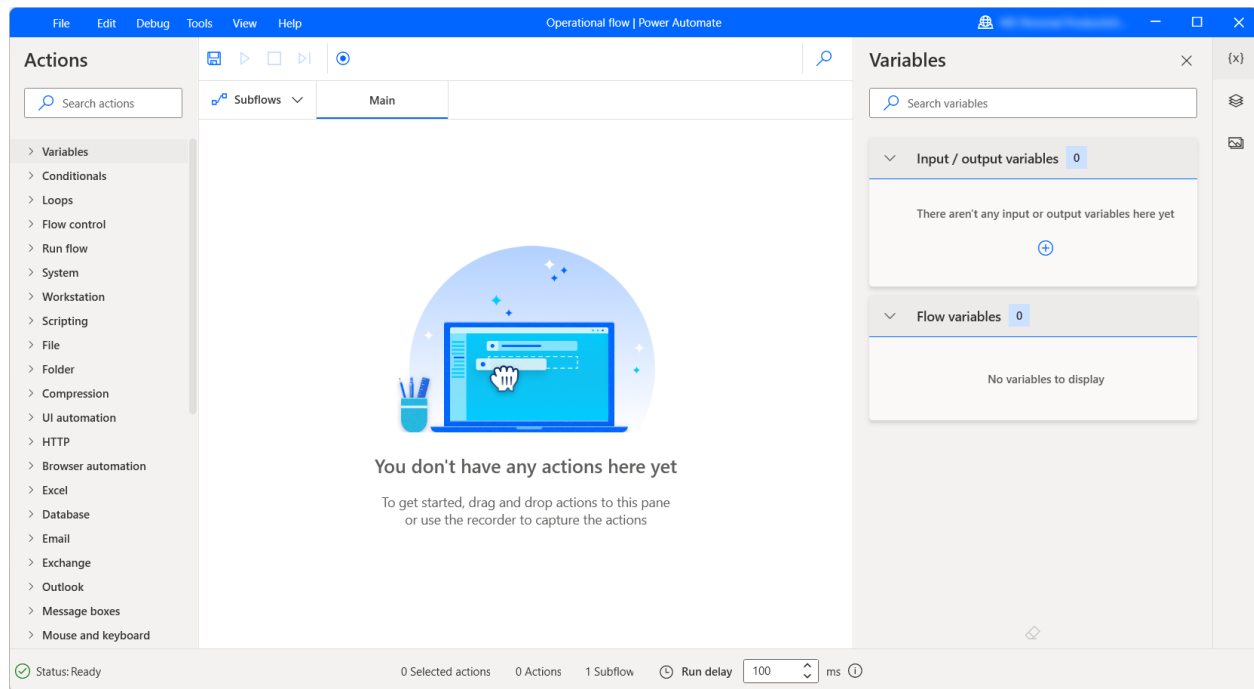
[Provide product feedback](#)



# Power Automate flow designer

Article • 02/24/2023

The flow designer contains all the tools required to design and debug a Power Automate flow. Additionally, any images, UI elements, or variables of a desktop flow can be accessed and managed here.

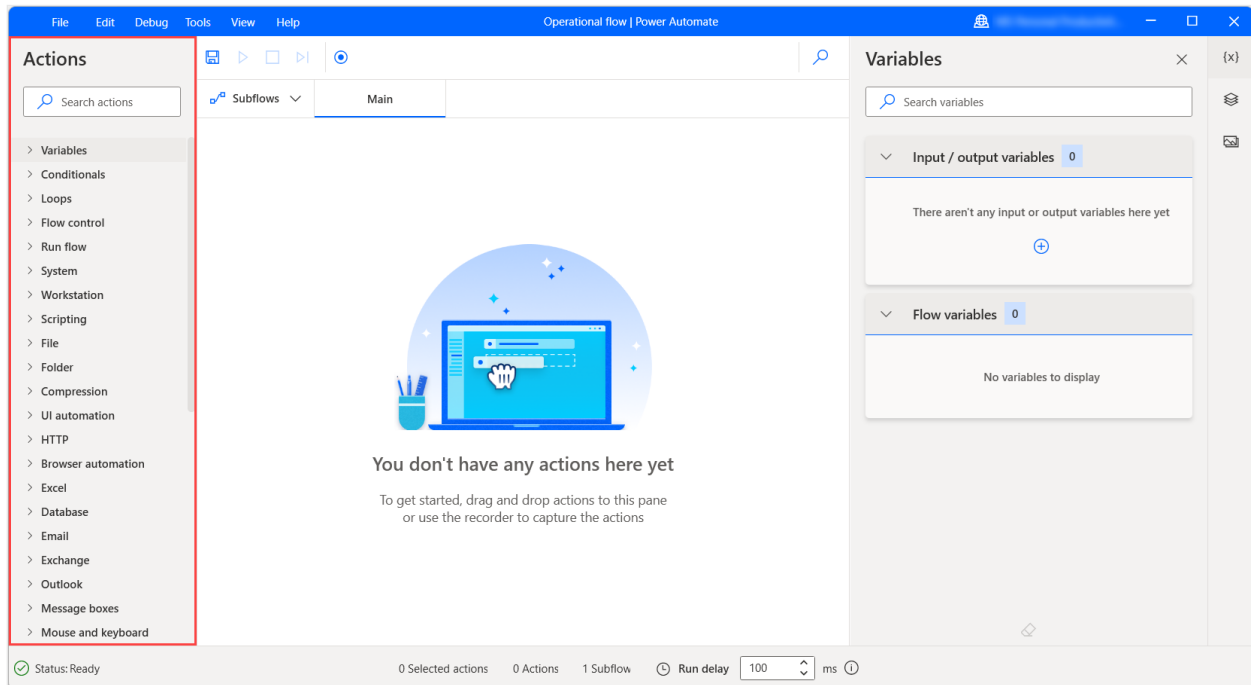


The flow designer consists of multiple elements. The actions pane, the variables pane, and the workspace display information about the status of the flow, and all the data it contains. Subflows are separated into tabs to help design large, complex flows. Tools for debugging flows, such as breakpoints and the option to run a desktop flow step by step, are also available in flow designer. Any error information is displayed, and the erroneous actions are immediately highlighted.

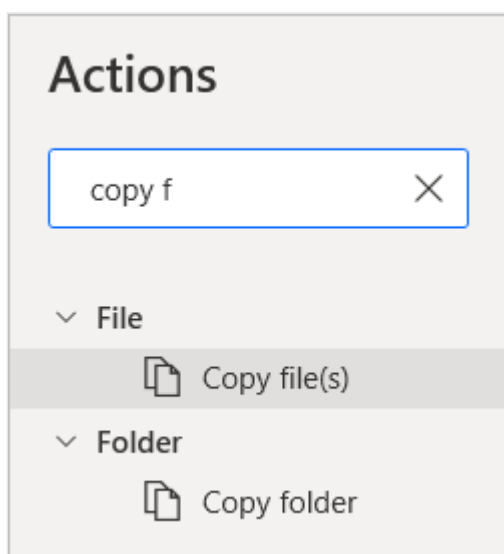
# Configure actions and the actions pane

Article • 01/19/2024

The actions pane occupies the left side of the flow designer and displays all the available desktop flow actions.

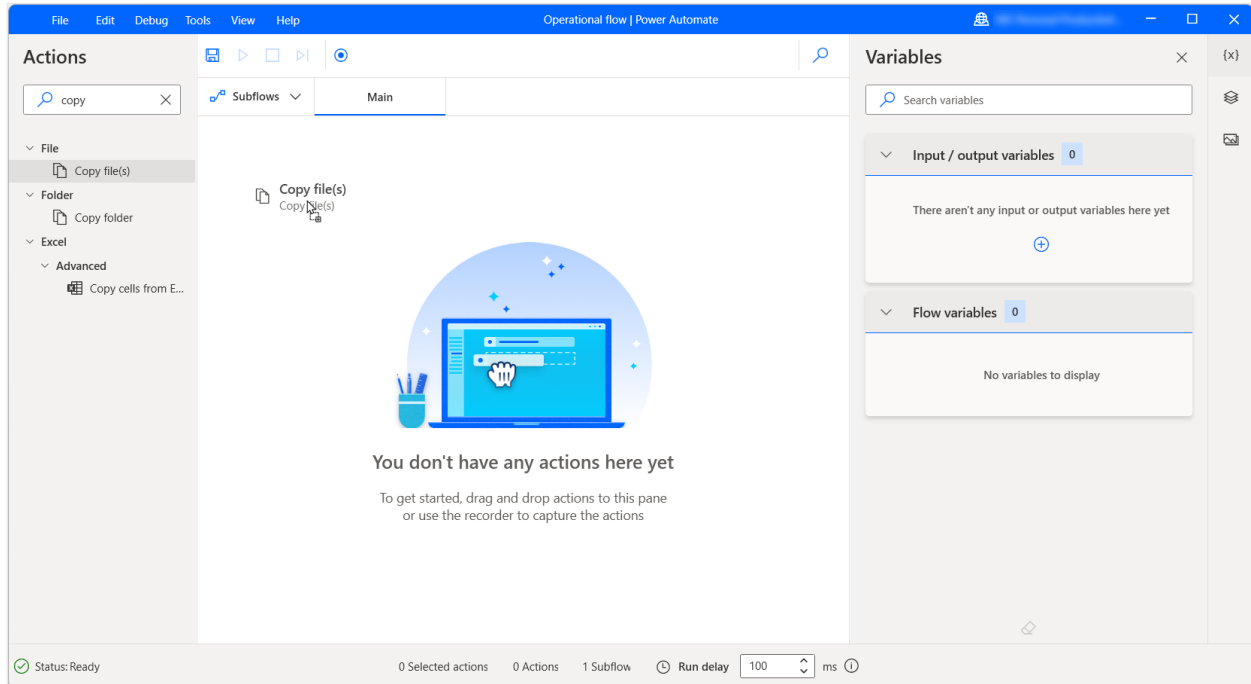


To find a specific action, populate its name in the search bar at the top of the pane. Searching also returns partial matches but requires at least two provided characters. When the search term matches a module name, the results display the module expanded with all its actions available.

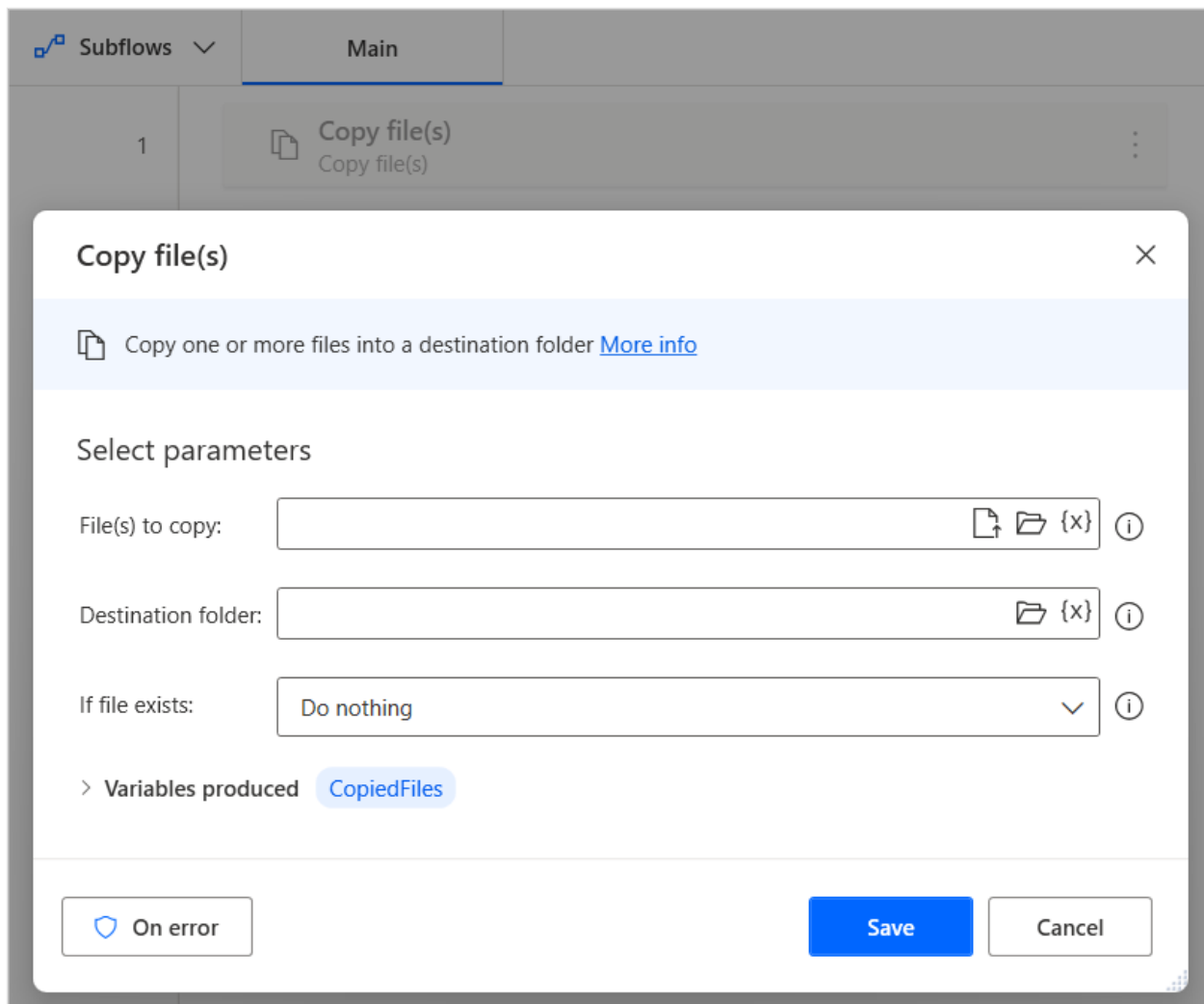


## Add actions to the workspace

To develop a desktop flow, find the action you want to deploy, and double-click on it or drag it into the workspace.



After the deployment, the modal of the action opens and displays the available parameters of the action. Some actions might have default values for some parameters, while others require user input. When the configuration is ready, select **Save**.



## Adding actions from the suggested actions panel (preview)

In addition to adding actions from the actions panel, you can also use the suggested actions panel.

### **i** Important

- This feature is in preview. Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.
- To understand the capabilities and limitations of this feature, go to [FAQ for Power Automate for desktop suggested actions](#).

## Availability by region

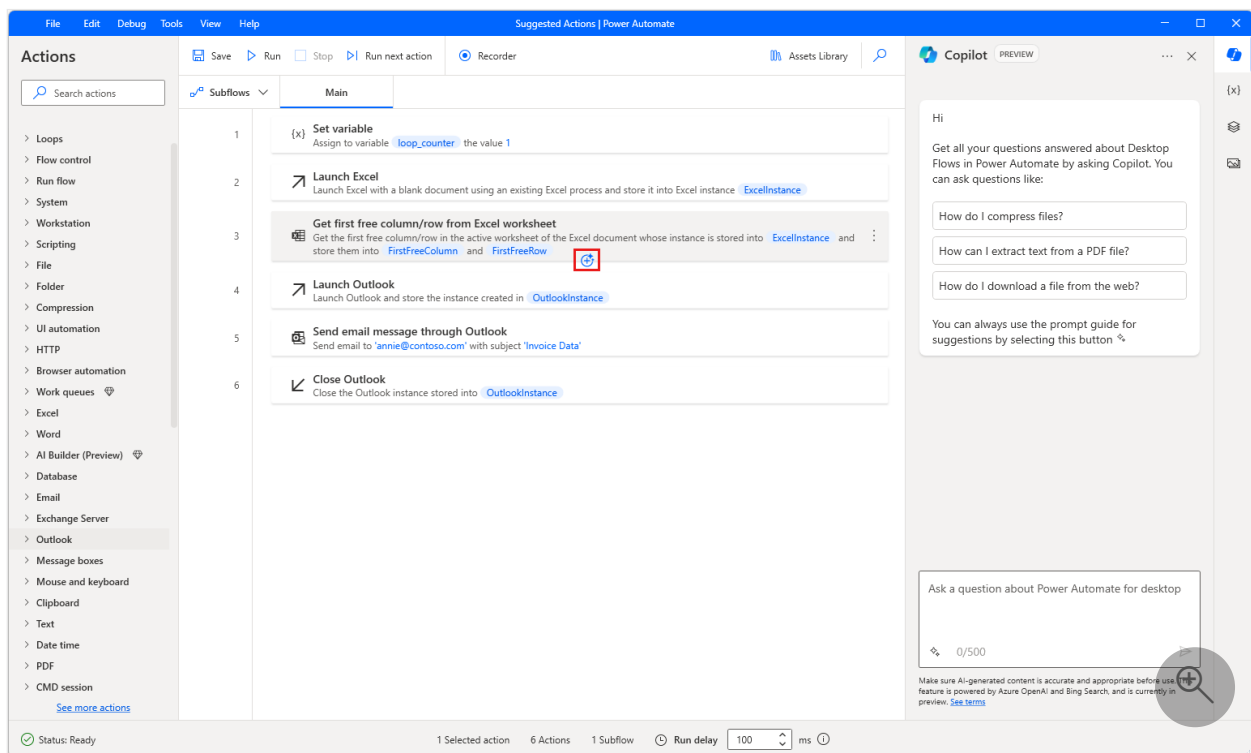
Currently, the suggested actions functionality in Power Automate for desktop is only available in environments located in the United States.

## Availability by account type

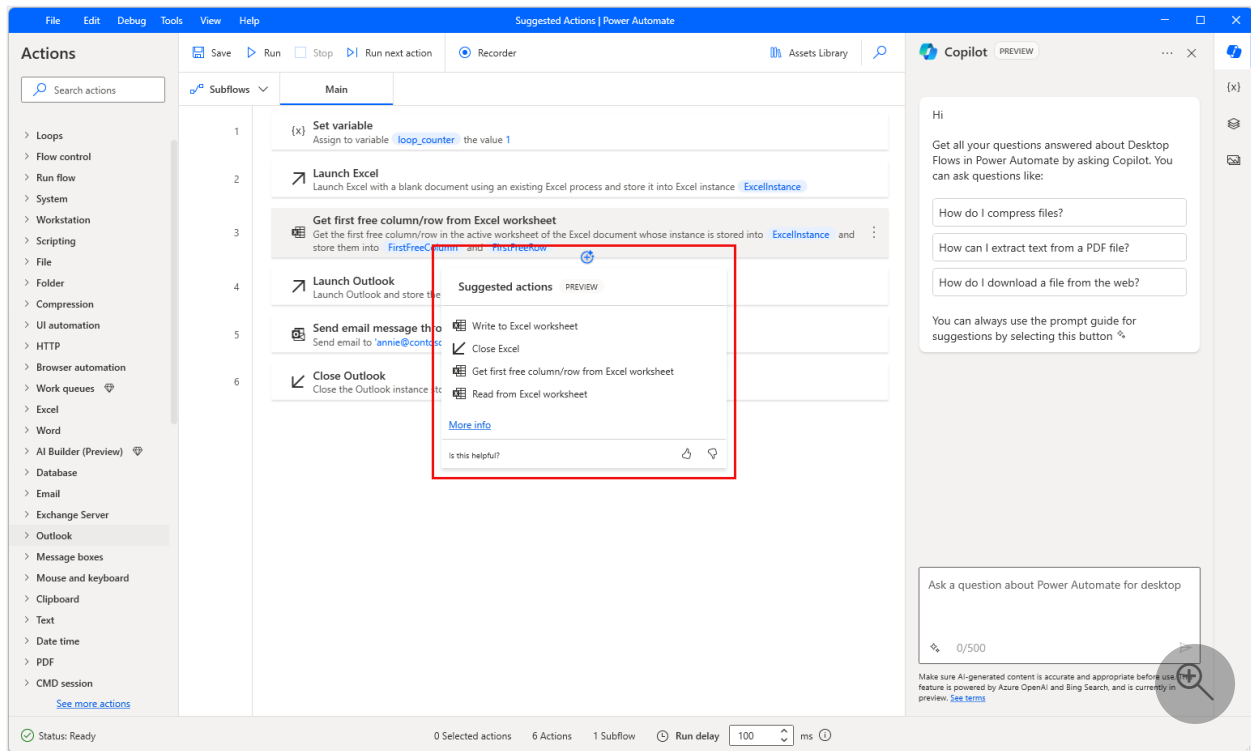
Currently, the suggested actions functionality in Power Automate for desktop is only available for users with a work or school account.

## Using suggested actions in your flows

The suggested actions functionality leverages AI to generate a list of actions that you could use as the next steps in your flow. To do so, select the add button that appears on mouse hover or when an action is selected.



Once the **Suggested actions** panel appears, double-click the action that you want to add to your flow.



## Disabling the suggested actions functionality

To disable the suggested actions functionality, Power Platform admins contact Microsoft support. More information: [Get Help + Support](#)

## Help us improve this feature

You can send feedback by selecting the thumb up or thumb down icon underneath the AI-generated action suggestions. Once you do, a dialog box appears, which you can use to submit feedback to Microsoft.

### Submit feedback to Microsoft ✕

What did you like?

Give as much detail as you can, but do not include any private or sensitive information.

By pressing Submit, your feedback will be used to improve Microsoft products and services. IT admins for your organization will be able to view and manage your feedback data. [Privacy statement](#).

#### ⓘ Note

If you can't see the dialog box, your Power Platform admin might have turned it off. More information: [Disabling the user feedback functionality](#)

## Disabling the user feedback functionality

As a Power Platform admin you can prevent users from sending feedback to Microsoft by disabling the `disableSurveyFeedback` tenant setting. More information:

- [List tenant settings \(preview\)](#)
- [Set TenantSettings](#)

## Data subject rights requests on user feedback

Tenant administrators can view, export, and delete the feedback from users by signing in to the [Microsoft 365 admin center](#), and then selecting **Health** > **Product feedback**.

## Configure actions

Power Automate actions contain three main elements:

- **Input parameters** have the form of text fields, drop-down menus, and checkboxes and determine the way the action functions and the data it gets as input. The data can be hardcoded values or variables.


To use a variable as a parameter, select the appropriate icon on the right side of the field and pick the desired variable.


Each field can accept specific data types, such as numeric values, text, or lists. If you use values or variables of wrong data types as inputs, the action results in an error. To find more information about data types, refer to [Variable datatypes](#).

**Copy file(s)** ×

Copy one or more files into a destination folder [More info](#)

Select parameters

File(s) to copy:   {x} ⓘ

Destination folder:   {x} ⓘ

If file exists:  ⌵ ⓘ

> Variables produced **CopiedFiles**

- **Produced variables** are automatically generated variables that hold the outcomes of the actions for later use. All the produced variables of an action are available on the bottom part of its modal.


Like any other variable, produced variables have data types defined by their content. To find more information about data types, refer to [Variable datatypes](#).

If a produced variable isn't useful for later use, unselect the checkbox next to its name to disable it.


The name of a produced variable can't contain special characters, white spaces, and non-Latin characters. Additionally, it can't start with arithmetic characters.





**Copy file(s)** ✕

 Copy one or more files into a destination folder [More info](#)

Select parameters

File(s) to copy:   {x} ⓘ


Destination folder:   {x} ⓘ

If file exists:   ⓘ

▾ Variables produced


**CopiedFiles** {x}

The copied file(s) as a list of files


 **Save** **Cancel**


- **Error-handling configuration** allows you to set a custom functionality for the cases when an action fails. To configure error-handling for an action, select **On error** in its modal. To find more information regarding error-handling, refer to [Handle errors in desktop flows](#).


**Copy file(s)** ✕

 Copy one or more files into a destination folder [More info](#)


Select parameters

File(s) to copy:   {x} ⓘ

Destination folder:   {x} ⓘ

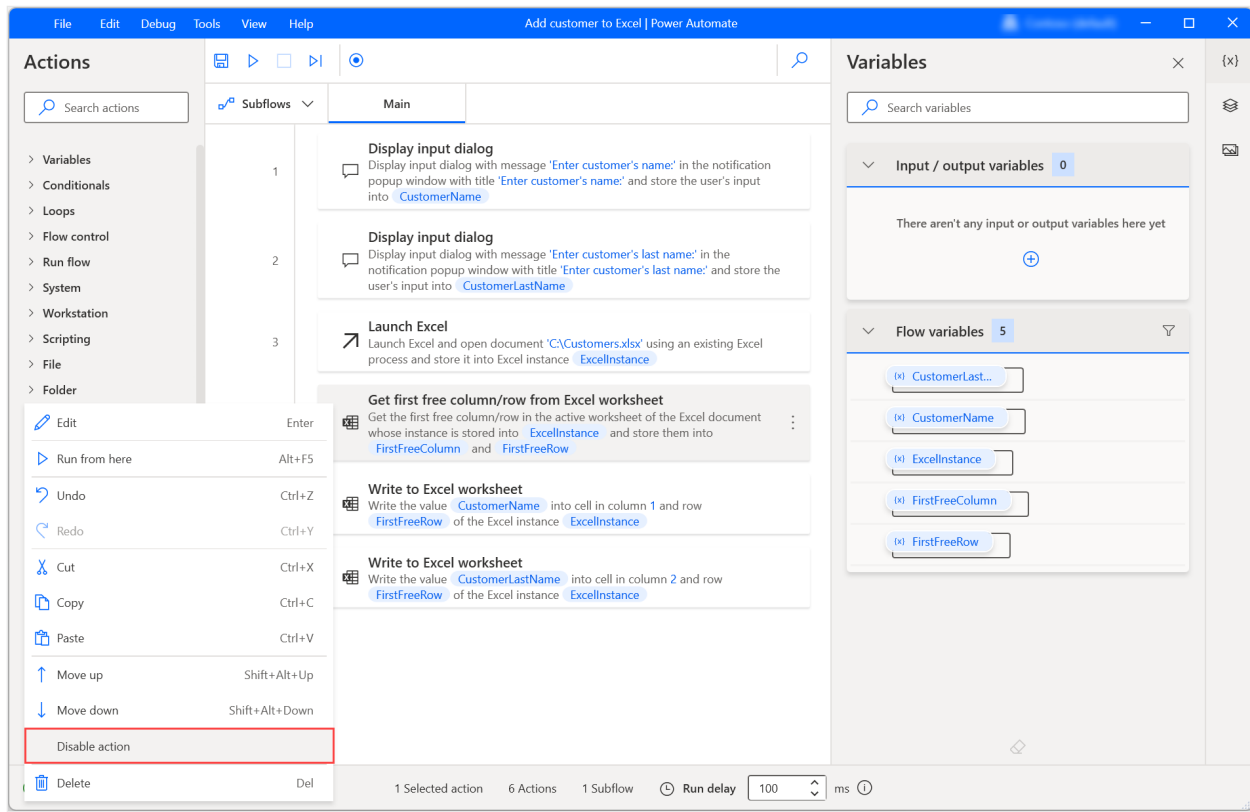
If file exists:   ⓘ

> Variables produced **CopiedFiles**

 **Save** **Cancel**

# Enable and disable actions

To disable or enable an action, right-click on it and select **Disable action** or **Enable action**, respectively.



Disabling an action allows you to remove it from the flow without erasing it. This feature is commonly applied for testing, as it enables you to try different versions of your desktop flow efficiently.

When an action is disabled, all variables initialized in its modal get hidden from the variables pane. The flow might display an error if you use the hidden variables in other actions.

In the example below, two actions throw an error because they contain variables defined in a disabled action. To find information on how to handle errors, go to [Handle errors in desktop flows](#).

File Edit Debug Tools View Help Add customer to Excel | Power Automate

### Actions

Search actions

- > Variables
- > Conditionals
- > Loops
- > Flow control
- > Run flow
- > System
- > Workstation
- > Scripting
- > File
- > Folder
- > Compression
- > UI automation
- > HTTP
- > Browser automation
- > Excel
- > Database
- > Email

Subflows Main

- 1 **Display input dialog**  
Display input dialog with message 'Enter customer's name:' in the notification popup window with title 'Enter customer's name:' and store the user's input into `CustomerName`
- 2 **Display input dialog**  
Display input dialog with message 'Enter customer's last name:' in the notification popup window with title 'Enter customer's last name:' and store the user's input into `CustomerLastName`
- 3 **Launch Excel**  
Launch Excel and open document 'C:\Customers.xlsx' using an existing Excel process and store it into Excel instance `ExcelInstance`
- 4 **Get first free column/row from Excel worksheet**  
Get the first free column/row in the active worksheet of the Excel document whose instance is stored into `ExcelInstance` and store them into `FirstFreeColumn` and `FirstFreeRow`
- 5 **Write to Excel worksheet**  
Write the value `CustomerName` into cell in column 1 and row `FirstFreeRow` of the Excel instance `ExcelInstance`
- 6 **Write to Excel worksheet**  
Write the value `CustomerLastName` into cell in column 2 and row

### Variables

Search variables

Input / output variables 0

There aren't any input or output variables here yet

Flow variables 3

- `CustomerLast...`
- `CustomerName`
- `ExcelInstance`

---

### Errors list

Subflows (1) Errors (2) Warnings (0) Clear all filters Search errors list

Type	Description	Subflow	Line
❗	Parameter 'Row': Variable 'FirstFreeRow' doesn't exist.	Main	5
❗	Parameter 'Row': Variable 'FirstFreeRow' doesn't exist.	Main	6

Status: Errors found 1 Selected action 6 Actions 1 Subflow Run delay 100 ms Errors list (2)

# Assets library

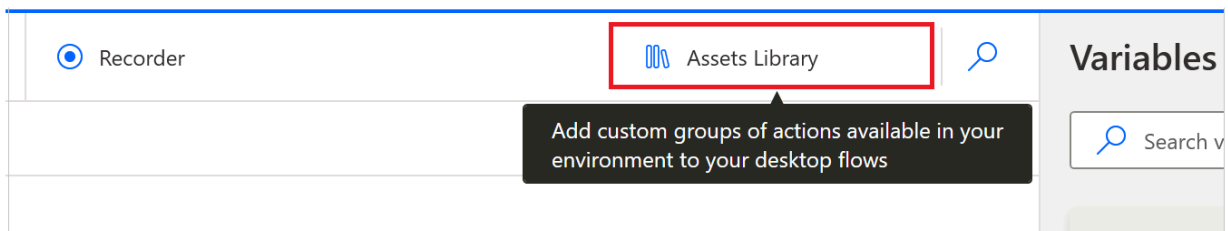
Article • 07/26/2024

## Important

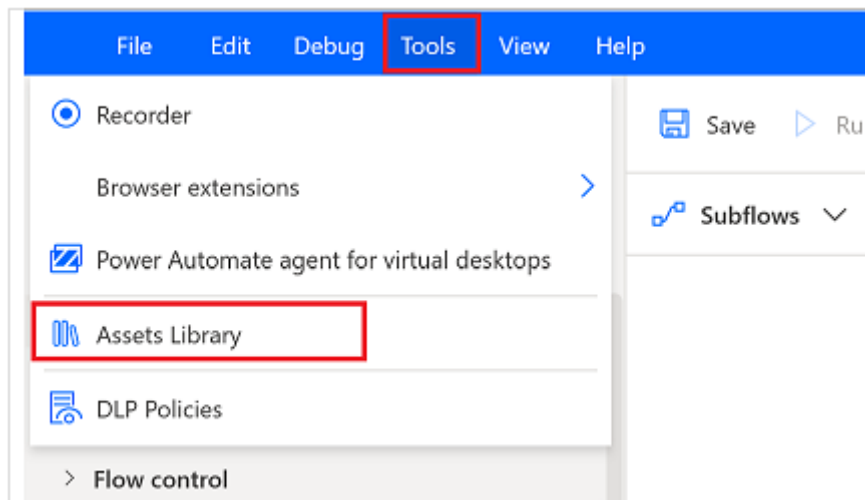
- This feature requires Power Automate for desktop v2.32 or later.

Assets library allows you to include more functionality in desktop flows. For example, you can upload custom actions to the assets library when required, or you can search for available UI elements collections.

To access the assets library, select the Assets library button at the top-right of the designer.



Alternatively, use the **Tools** bar.



## Custom actions tab

[Custom actions](#) tab shows you the custom actions uploaded in the environment you've selected.

## Note

You can only see custom actions shared with you.

The screenshot shows the 'Assets library' interface. On the left, there is a list of 'Custom actions (18)'. Five items are visible, each with a blue icon and the text 'Custom actions group name 1' through '5', followed by 'Uploaded: Jan 8 2023, by Author name' and an 'Add' button. On the right, a detailed view for 'Custom actions group name 1' is shown. It includes a 'Description' section with a paragraph of Lorem Ipsum text and a 'Documentation' link. Below this is a table with three columns: 'Author', 'Updated on', and 'Size'. The table contains the following data:

Author	Updated on	Size
Name of author	Apr 14, 03:32 PM	132 MB

## UI elements collections (preview) tab

The UI elements collections (preview) tab shows you the UI elements collections that are published in the environment you've selected.

### Note

You can only see UI elements collections that you have created or are shared with you.

The screenshot shows the 'Assets Library' interface with the 'UI elements collections (preview)' tab selected and highlighted with a red box. The left sidebar shows a list of collections: 'Woodgrove Bank app collection', 'CRM logon screen', 'SAP GUI elements', and 'Contoso collection', each with an 'Add' button. The right pane shows the details for 'Woodgrove Bank app collection'. It includes a 'Description' section and a table with the following data:

Author	Updated on
Yiannis	4/25/2024 1:02:18 PM

Below the table, the 'Size' is listed as 2.38 KB.

## Related information

- [Custom actions](#)
  - [Create custom actions](#)
  - [Upload custom actions](#)
  - [Use custom actions](#)
  - [UI elements collections](#)
  - [Create and publish UI elements collections](#)
  - [Manage UI elements collections](#)
  - [Use and update UI elements collections](#)
- 

## Feedback

Was this page helpful?

 Yes

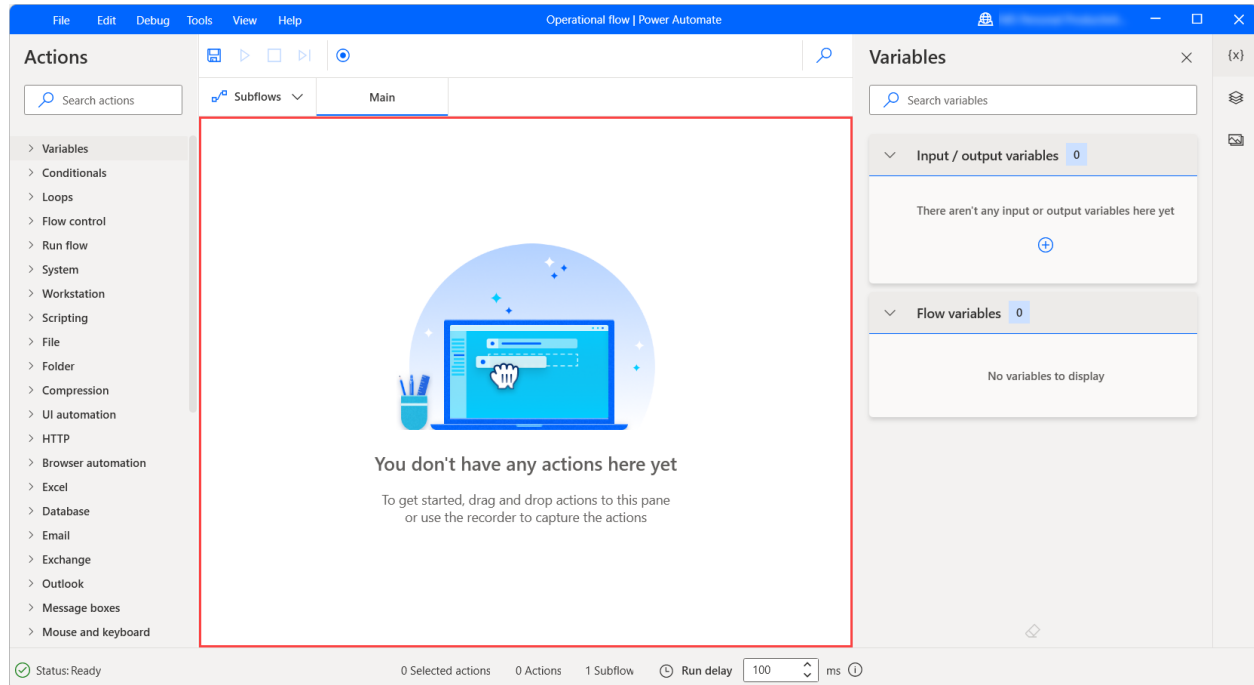
 No

[Provide product feedback](#) 

# Manage the flow designer workspace

Article • 02/24/2023

The central pane of the flow designer is called the workspace. Workspace is the component where the series of actions that make up the flow is assembled:



During development, users may add, edit, and delete actions in the workspace.

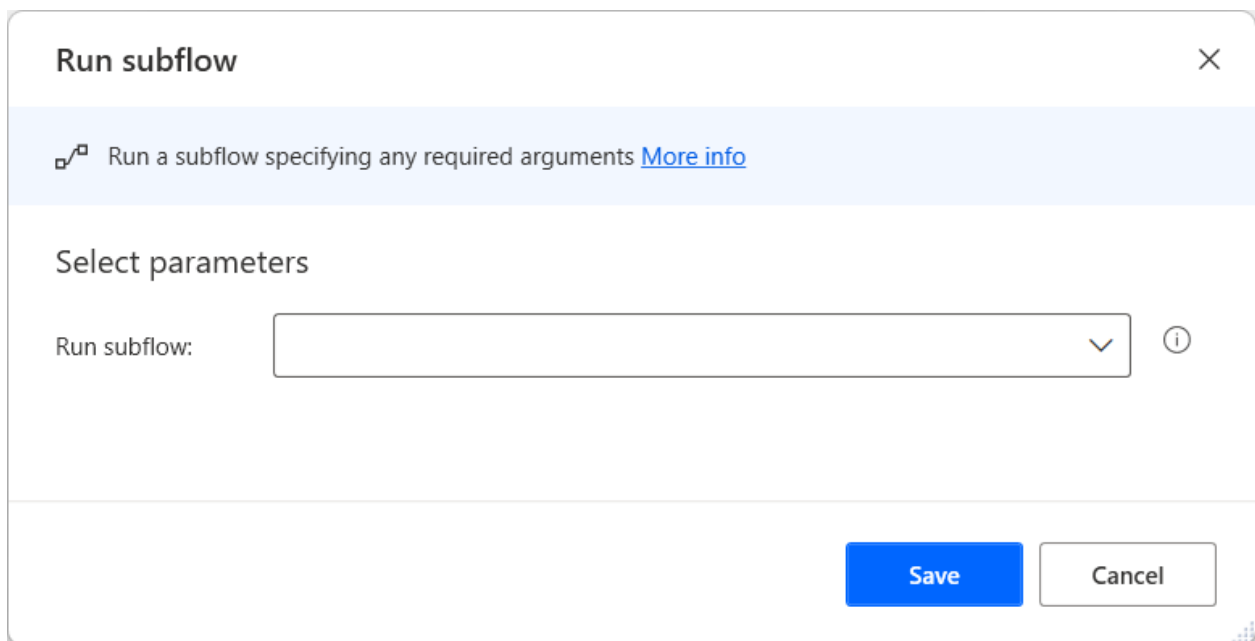
Drag actions to rearrange them and change the order in which they run. Right-click an action and select **Enable action** or **Disable action** to enable or disable an action respectively; while running, the flow skips any disabled actions.

Copy and paste any selected actions in the workspace. You can copy and paste actions within the same subflow, among different subflows, or other open instances of flow designer.

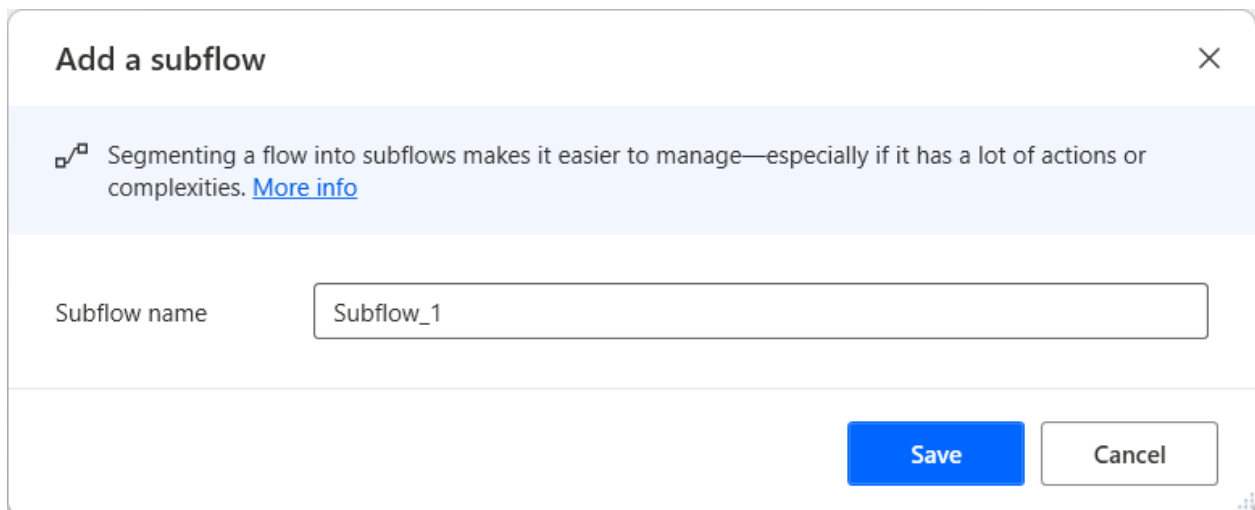
## Setting up subflows

Subflows are groups of actions, which may be referenced as a group within a desktop flow.

Every flow contains the **Main** subflow that runs when a desktop flow starts. Any other subflows may be invoked through the **Run subflow** action:



Subflows are shown in tabs, directly over the main workspace. To add a new subflow, select the subflows tab, select +, and enter the subflow name.

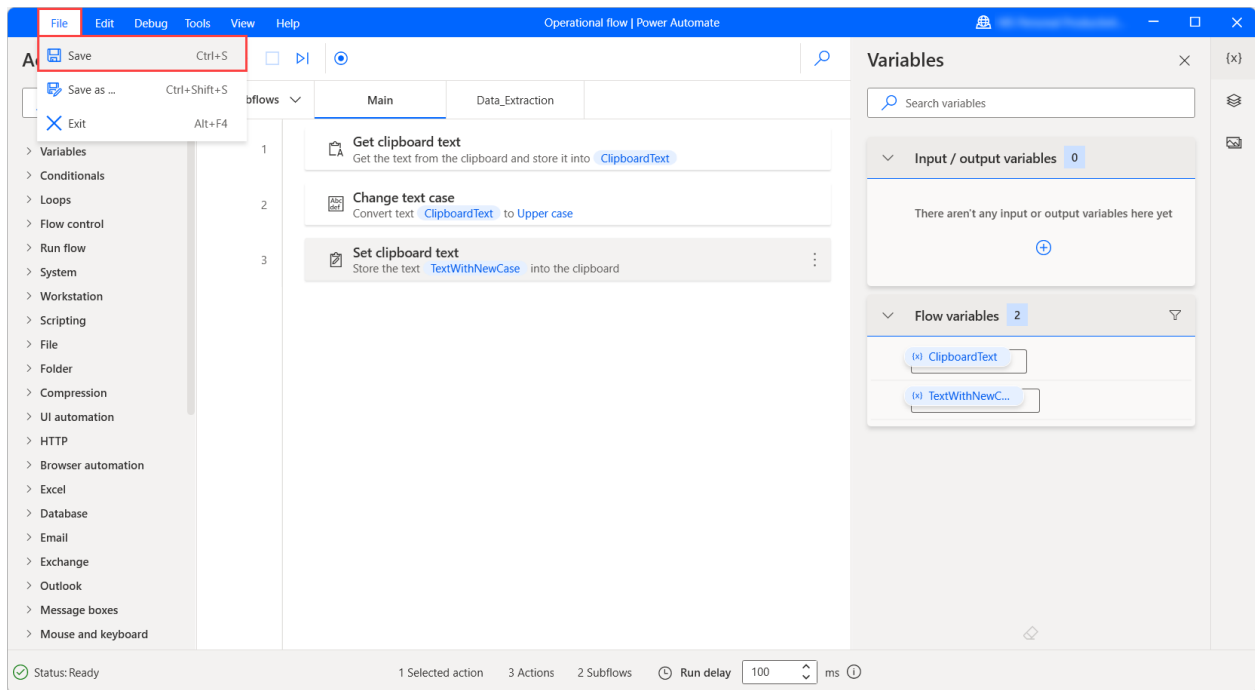


Select a subflow tab to edit the respective subflow.

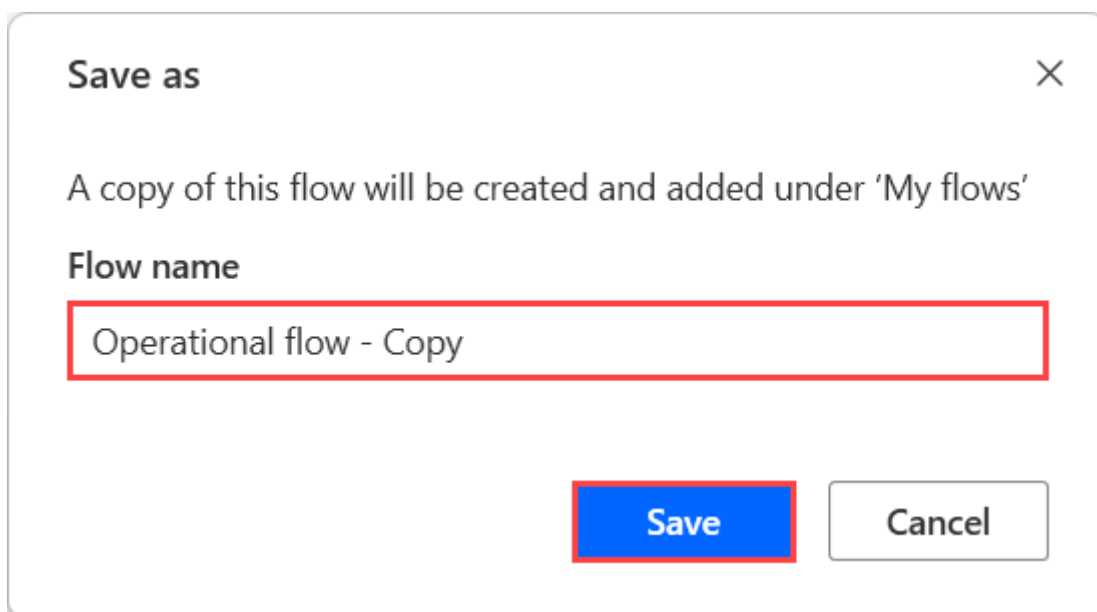
## Saving flows

To save a flow, select **File** in the flow designer's menu bar and then pick **Save**. Alternatively, you can press the keyboard shortcut **Ctrl +S**.





To save the flow's current state as a new flow, select **Save as** in the **File** menu and populate a name for the new flow in the displayed dialog.



## Managing the workspace toolbar

Drag actions to rearrange them and change the order in which they run. Right-click an action and select **Enable action** or **Disable action** to enable or disable an action respectively. While running, the flow skips any disabled actions.

Hold down **Ctrl** to select multiple actions. Hold down **Shift** and select the first and last actions to select a range of actions. Copy and paste any selected actions in the workspace.

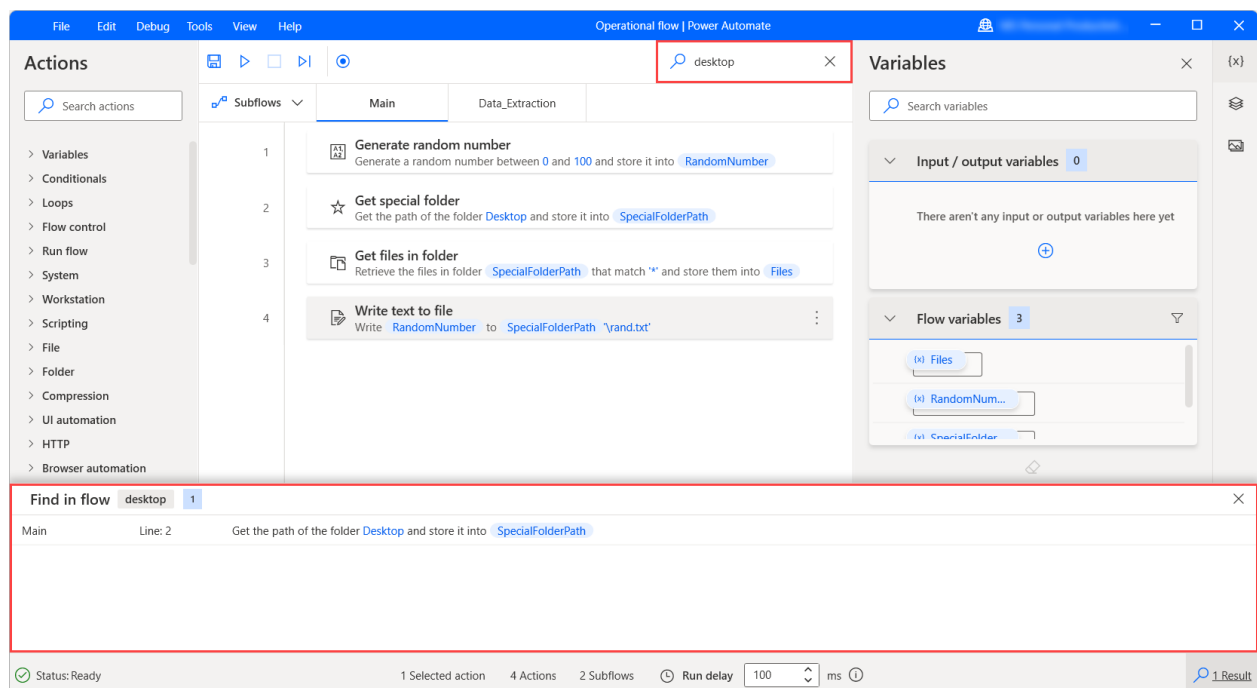
When copying actions, all their parameters, images, and UI elements are copied as well. You can copy and paste actions within the same subflow, among different subflows, or other flow designer instances. Apart from flows, you can paste actions in other applications in a text format, such as a text editor, to share flows' sections with others.

### ! Note

As the underlying schema of an action or the UI elements or images repository might change from one version of Power Automate for desktop to another, make sure when copying flows's sections that the source and target flow designers are on the same version. If the schema is updated on a new version and a different version's flow contents are pasted, the action or the associated UI elements or images might not be recognized.

## Searching in the flow

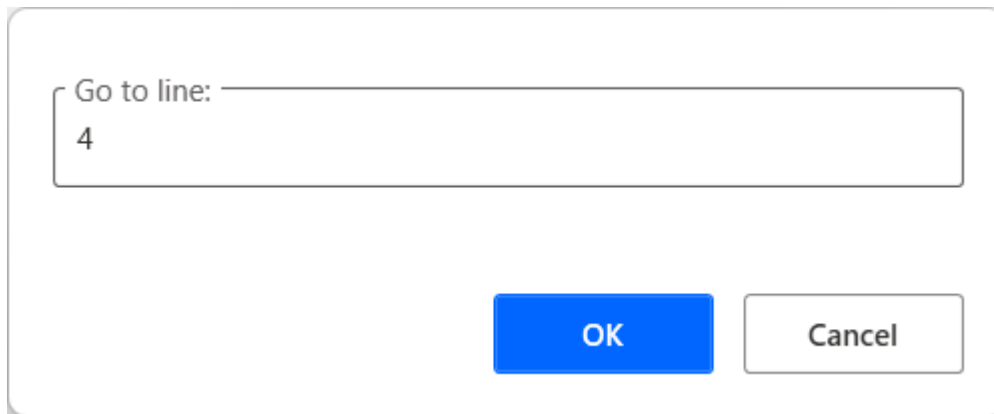
To search for a text string, an action or variable within the flow, use the search field at the top right of the flow designer window. The results pane will show all occurrences of text string by action and subflow. Double-click on a result to highlight the action that contains it.



## Using the Go to line option

The **Go to line** function navigates to a specific line within the current subflow. It can be helpful in subflows that contain a large number of actions.

Select **Edit**, then **Go to line** and enter a line. The corresponding action will be highlighted.

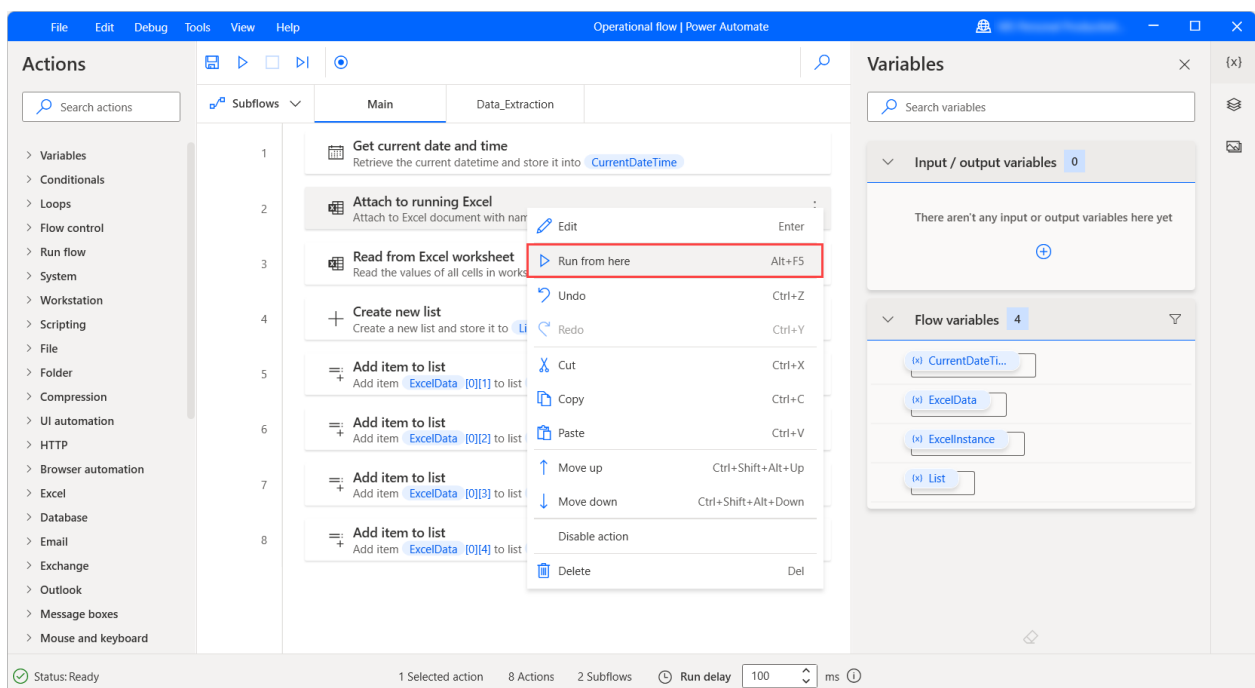


## Using the Run from here option

To run the flow starting from a specific action, right-click the action and select **Run from here**. Power Automate will ignore all the previous actions and run the flow from the selected action onwards.

### ! Note

The **Run from here** option isn't available for actions located in loops, conditionals, or the **On block error** action.



## Record desktop flows

Power Automate enables you to record desktop flows in real time through the built-in recorder. The recorder keeps track of mouse and keyboard activity in relation to UI elements, and records each action separately. The recorder can be used to automate desktop and web applications.

To record a flow, select **Recorder** in the toolbar of the flow designer. When the recorder dialog is launched, select **Record** to start recording. To suspend the recording, select **Pause**. To add a comment to the recorded actions, select **Add a comment**.

Select the bin icon to remove individual actions, or select **Reset** to delete all the actions recorded so far. When the recording is completed, select **Done** to convert the recorded steps to desktop flow actions.

You can find more information regarding the built-in recorder in [Record desktop flows](#).

 Record  Reset 

## Recorded actions

Launch web browser 

Attach Microsoft Edge with url:

<https://www.msn.com/en-us/money/watchlist?cvid=f42542e...>

Click element in web page 

Left click on Span 'suggestedText-DS-EntryPoint1-1' on  
Web Page 'h ... uration=1D'

Click element in web page 

Left click on Span 'displ ... ryPoint1-1' on  
Web Page 'h ... uration=1D'

Extract data 

Extract record(s) in the form of a 2-column table and store  
value in `OutputData_2 {x}`

 Add a comment

[Help](#)

Done

Cancel

# Debug a desktop flow

Article • 02/24/2023

It is common to have to debug flows in case there are any changes in the system or if a desktop flow cannot run because it contains errors.

Debug a desktop flow using the following tools:

- [Errors Pane](#)
- [Breakpoints](#)
- [Run flow action by action](#)
- [Set the Run delay](#)

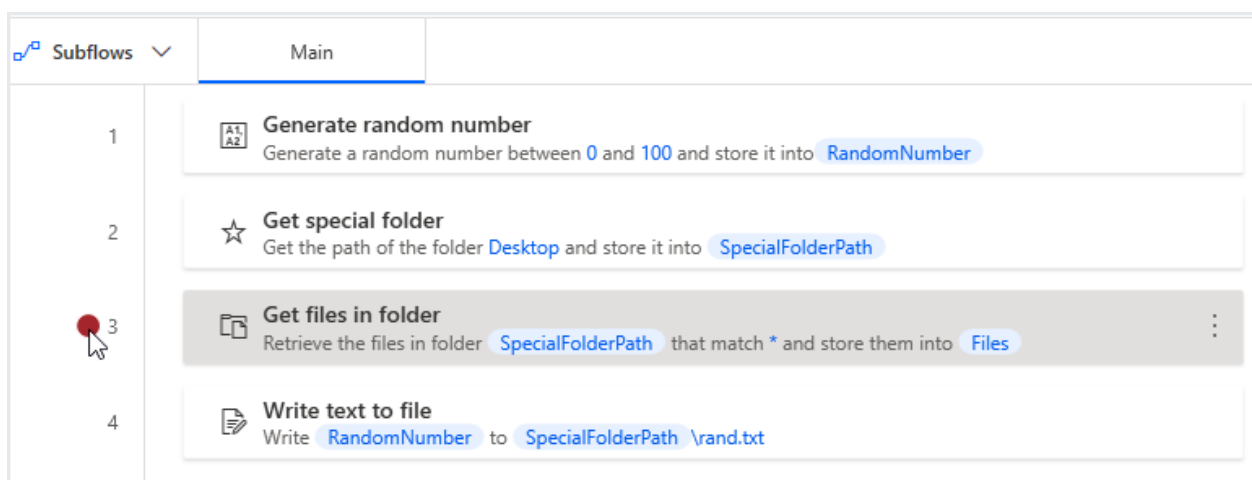
## Run, stop, and pause in flow designer

Select **Run** or press **F5** to run the flow. When the flow runs, **Run** becomes **Pause**. Select **Pause** or press **Ctrl + Pause** while the flow is running to pause and inspect any changes up to that point. Select **Run** while the flow is paused to resume it. The **Run next action** button and the **F10** shortcut run the flow action by action and pause it after each action completes. The **Stop** button and the **Shift + F5** shortcut stop the flow completely.



## Adding breakpoints

Click to the left of the running order number in the workspace to place a breakpoint in the flow, which appears as a red dot. Add a breakpoint to specify at which action to pause the flow. Resume running the flow by selecting **Run** or **Run next action**. Select the breakpoint to remove it.



# Run a desktop flow by action

The **Run next action** button runs the flow action by action. After each action is completed, the flow is paused. Open the variables pane to check the value of any variable at the point where it's paused. This feature is useful for debugging.

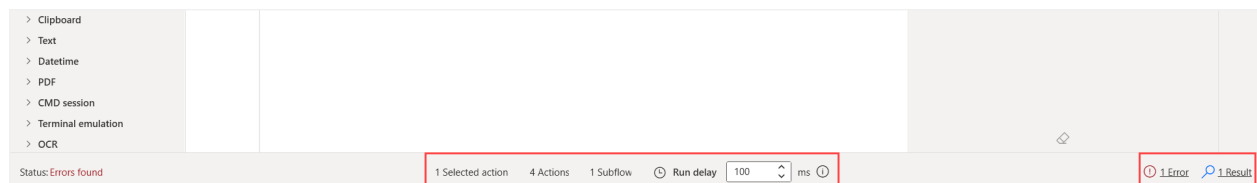
## The status bar

The status bar on the bottom of the window shows the status of the flow and the number of the selected actions. Additionally, it shows the total number of actions and subflows in the current flow.

The **Run delay** field defines the time that the flow waits after running each action in the flow designer. You can modify the default value to increase or decrease the milliseconds that the flow waits.

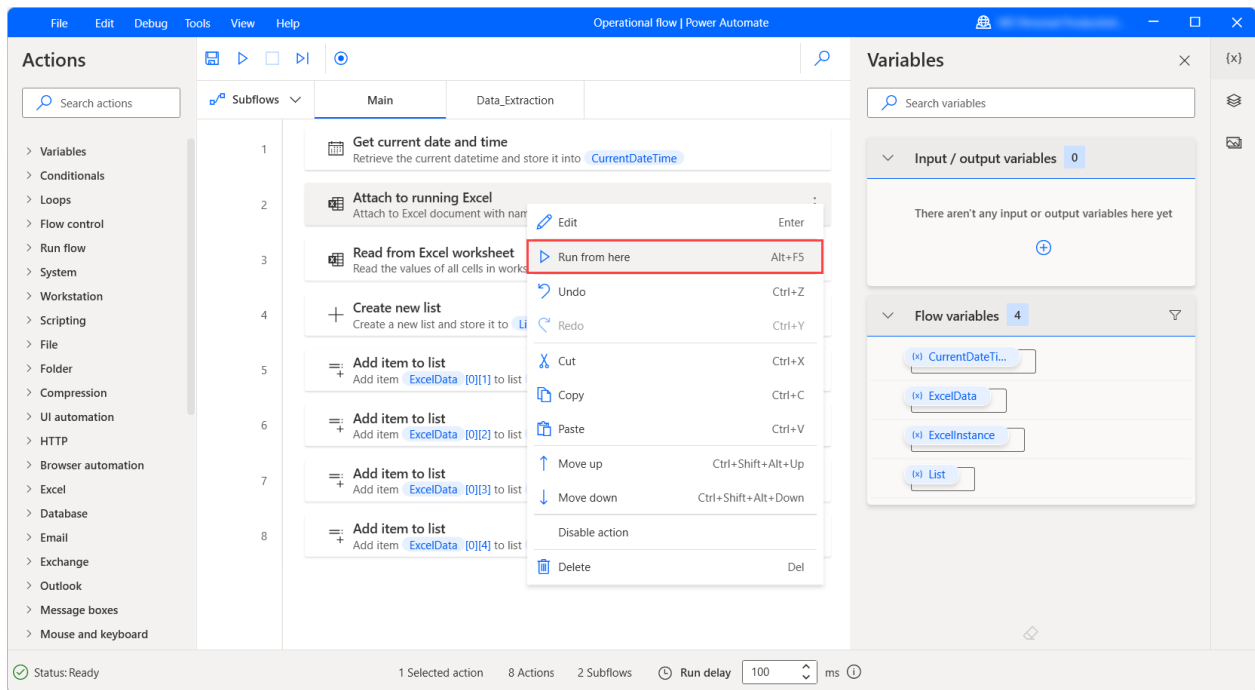
The status bar also displays the number of errors, if any are present. Select the **Errors** option to pop up the **Errors pane**.

If you search inside the flow, the status bar shows an additional field containing the number of the results. Select this field to pop up the **Find in code** pane.



## Run from here

To run the flow starting from a specific action, right-click the action and select **Run from here**. This ignores all previous actions and runs the flow from the selected action onwards.



## Power Automate reserved keywords

A certain amount of words are being used in the core of Power Automate and can't be used during development in the variable, subflow, label or error block names. The list of these words is displayed below.

<b>A - E</b>	<b>F - J</b>	<b>K - R</b>	<b>S - Z</b>
action	FALSE	label	set
and	for	loop	step
block	foreach	main	switch
call	from	mod	then
case	function	next	throw
default	global	no	times
disable	goto	not	to
else	if	on	TRUE
end	in	or	wait
error	input	output	while
exit		repeat	xor
			yes

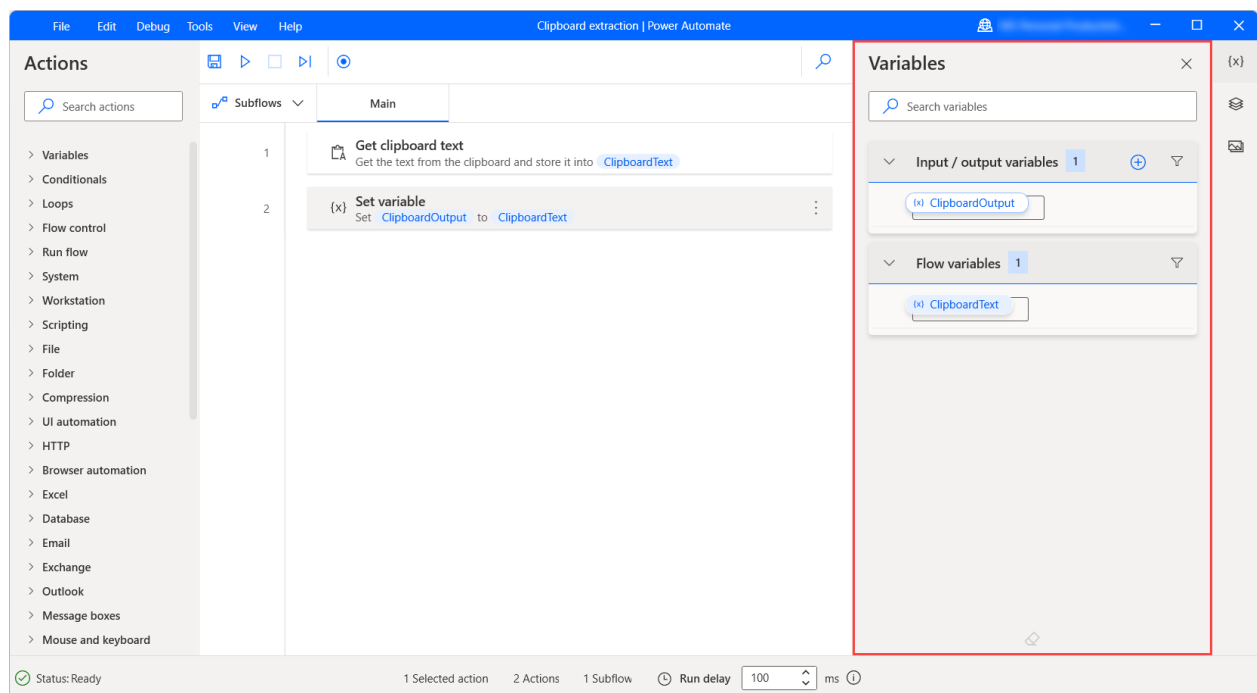


# Manage variables and the variables pane

Article • 01/18/2024

The variables pane shows the input and output variables passed to and from Power Automate desktop flows. It also displays all the variables used in the current desktop flow under **Flow variables**.

Through this pane, you can search for variables, rename them, find their usages, marking them as sensitive, pin them, and filter them by type. Filtering allows you to select whether to apply it to the pinned variables or not.



## The variable value viewer

When a flow runs, the current value of each variable is visible next to its name. Select the eraser icon at the bottom of the variables pane to clear all the current values.

### ! Note

Power Automate automatically omits the variables of disabled actions. Enable a disabled action to make its variables available in the variables pane.

**Variables** [Close]

Search variables

Input / output variables 1

- (x) ClipboardOutput

Flow variables 3

- (x) CurrentDateTime 10/1/2021 10:16:55...
- (x) ExcelData 3 Rows, 3 columns
- (x) ExcelInstance Excel instance

[Variable Value Viewer Icon]

To examine the value of a variable in more detail, double-click on it. The variable value viewer displays the datatype of the selected variable and expands any [datarows](#) or [datatables](#) to show their contents.

**Variable value** ×

**ExcelData** (Datatable)

#	#	First name	Last name	Full name	Language	Gender
0	1	Boryana	Boyanova	Boryana Boyanova	Bulgarian	Female
1	2	Kanok	Kanakorn	Kanok Kanakorn	Thai	Gender neutral
2	3	Plamen	Grigorov	Plamen Grigorov	Bulgarian	Male
3	4	Bieito	Lorme	Bieito Lorme	Galician	Male
4	5	Amporn	Boonluang	Amporn Boonluang	Thai	Female
5	6	Pisha	Leelapun	Pisha Leelapun	Thai	Gender neutral
6	7	Iago	Peirallo	Iago Peirallo	Galician	Male
7	8	Stanislava	Chervenkova	Stanislava Chervenkova	Bulgarian	Female
8	9	Kittikorn	Pornpipatpong	Kittikorn Pornpipatpong	Thai	Male

[Close](#)

Certain data types might contain nested elements. For example, a [custom object](#) might contain another custom object in its properties. To view the properties of the nested element, select **More**.

**Variable value** ×

**NewVar** (Custom object)

Name	Value
First Name	Alexandre
Last Name	Azevedo
Full Name	Alexandre Azevedo
Company	{ 'Name': Adatum, 'URL': http://www.adatum.com, '... <a href="#">More</a>
Nationality	Portuguese
Gender	Male

[Close](#)

Select the arrow icon on the top of the dialog to return to the parent element.

← Variable value ×

NewVar ['Company'] (Custom object)

Name	Value
Name	Adatum
URL	http://www.adatum.com
Location	Lisbon, Portugal

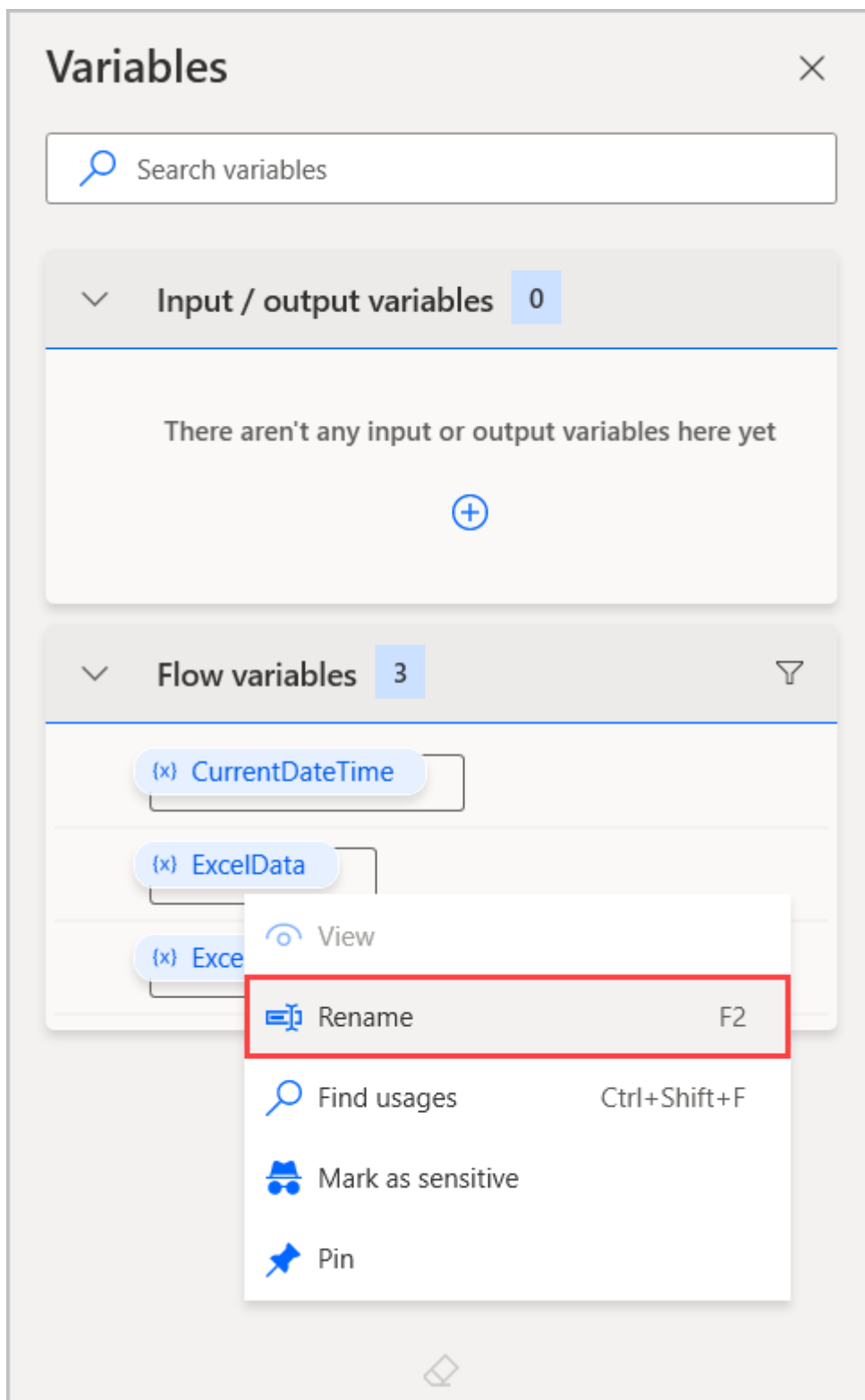
Close

## Renaming a desktop variable

To rename a desktop flow variable, right-click on its name and select **Rename**. Power Automate automatically updates the name of the variable in all its occurrences.

### 📘 Important

If you try to rename a variable to an existing name, Power Automate will prompt you to confirm the merging of the two variables. Unintentional merging may affect the functionality of your flow and cause errors, so ensure that the merging is desirable.



## Input and output variables

Power Automate enables data exchange between cloud and desktop flows through the input and output variables, allowing you to expand automation capabilities

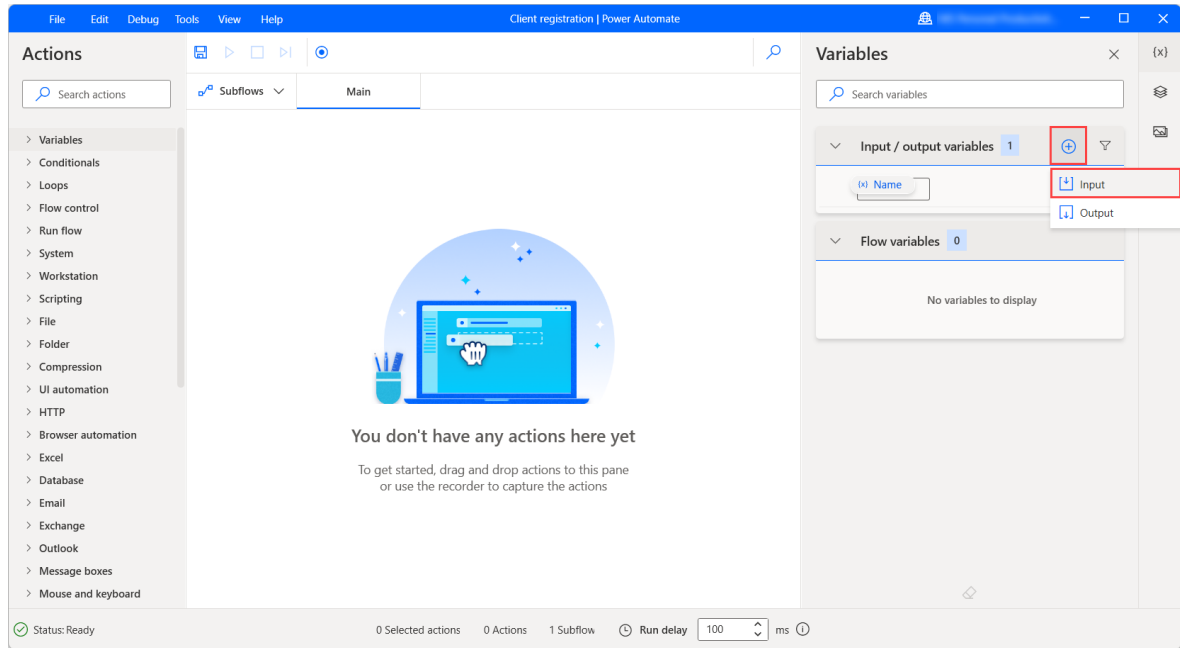
Additionally, you can use input variables to set values manually when the flows are triggered through the console.

To find more information regarding passing data between cloud and desktop flows, refer to [Trigger desktop flows from cloud flows](#).

## Create an input variable

To create an input variable:

1. Select the plus button (+) in the variables pane and then **Input**.



2. When the **New input variable** dialog appears, populate the following fields:

- **Variable name:** The name of the variable in the desktop flow.
- **Data type:** The type of the variable: [text](#), [number](#), [boolean](#), [custom object](#), [list](#) or [datatable](#).
- **Default value:** The default value when the flow runs through the flow designer or console. When you create a custom object, list, or datatable input variable, Power Automate allows you to construct the default value through a

visual or JSON editor.

Name	Value
ProductName	Smart TV
ProductCode	CDE3552
ProductPrice	400

- **External name:** The external name is the name that appears in the cloud flow designer and the flow inputs dialog when calling the flow from the console.
- **Description:** The description of the variable that appears in the cloud and desktop flow designer while calling the flow.
- **Mark as sensitive:** Defines whether to mark the variable as sensitive or not. You can find information regarding sensitive variables in [Sensitive variables](#).
- **Mark as optional:** Defines whether populating this input variable is mandatory or not. By marking an input variable as optional, you allow it to receive **Blank** values and omit passing an actual value, which doesn't result in an error. You can find information regarding optional input variables in [Optional input variables](#).

#### ⚠ Note

The **Variable name**, **Data type**, and **External name** fields are required to create an input variable.

#### 📌 Important

If you choose an existing flow variable name for a new input variable, Power Automate will prompt you to confirm the merging of the two variables. Unintentional merging may affect the functionality of your flow and cause errors. Also, you can't use the name of an existing input or output variable.

### New input variable ✕

↓ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:  ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

Mark as optional  ⓘ

When you trigger desktop flows directly through the console, not a cloud flow, the **Flow inputs** dialog prompts you to set values for the input variables manually. For custom objects, lists, and datatables, the dialog allows you to populate values using a visual or JSON editor.

### Flow inputs ✕

↓ With flow input variables you pass data to be used in the flow. Flow inputs are set and configured in the Power Automate designer. [More info](#)

Name  ⓘ

LastName  ⓘ

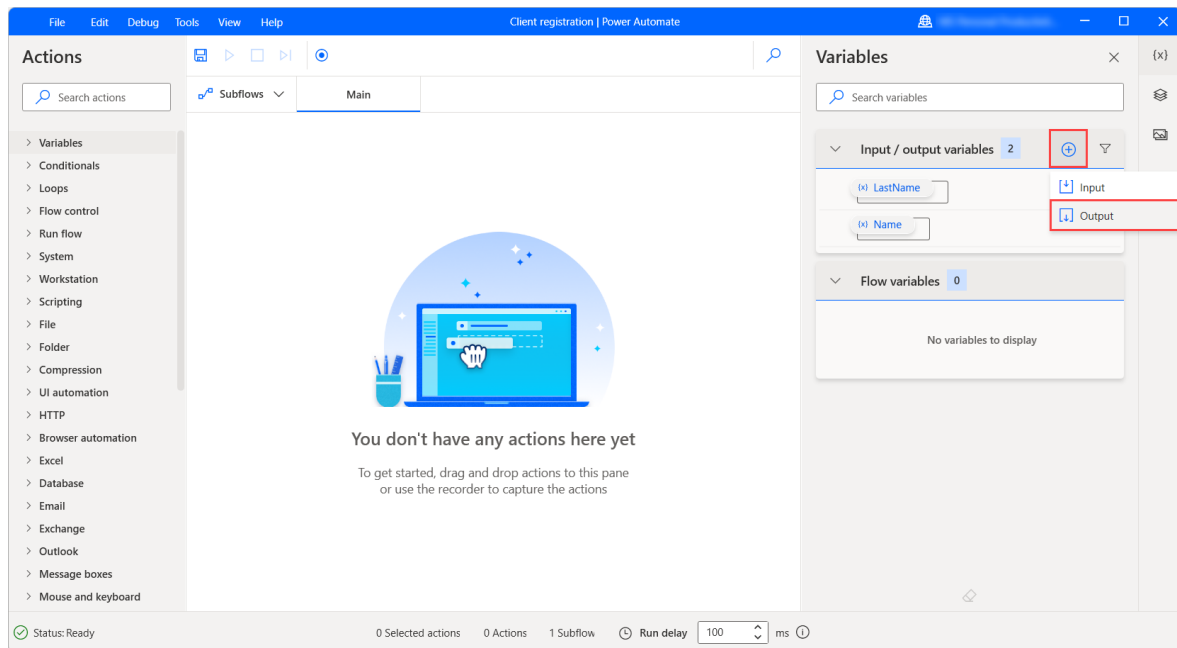
Tasks   ⓘ



# Create an output variable

To create an output variable:

1. Select the plus button (+) in the variables pane and then **Output**.



2. When the **New output variable** dialog appears, populate the following fields:

- **Variable name:** The name of the variable in the desktop flow.
- **Data type:** The type of the variable: [text](#), [number](#), [boolean](#), [custom object](#), [list](#) or [datatable](#).
- **External name:** The external name is the name that appears in the cloud flow designer.
- **Description:** The description of the variable that appears in the cloud or desktop flow designer while calling the flow.
- **Mark as sensitive:** Defines whether to mark the variable as sensitive or not. You can find information regarding sensitive variables in [Sensitive variables](#).

## ⚠ Note

The **Variable name**, **Data type**, and **External name** fields are required to create an output variable.

## 📌 Important

If you choose an existing flow variable name for a new output variable, Power Automate will prompt you to confirm the merging of the two variables.

Unintentional merging may affect the functionality of your flow and cause errors. Also, you can't use the name of an existing input or output variable.

### New output variable ×

⌵ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ▼ ⓘ

External name:  ⓘ

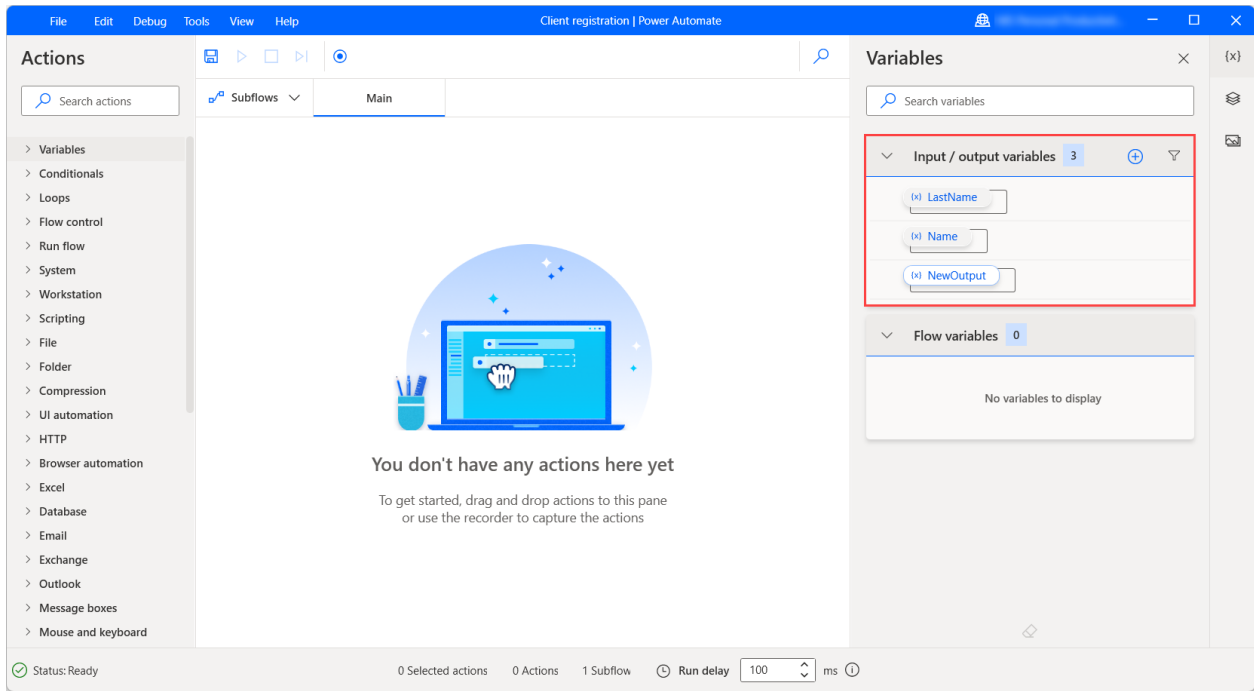
Description:  ⓘ

Mark as sensitive  ⓘ

## Manage input and output variables

All created input and output variables are available in the appropriate section of the variables pane.

You can use this pane to rename, update, delete, find the usages, pin and filter each input/output variable. Filtering allows you to select whether to apply it to the pinned variables or not.

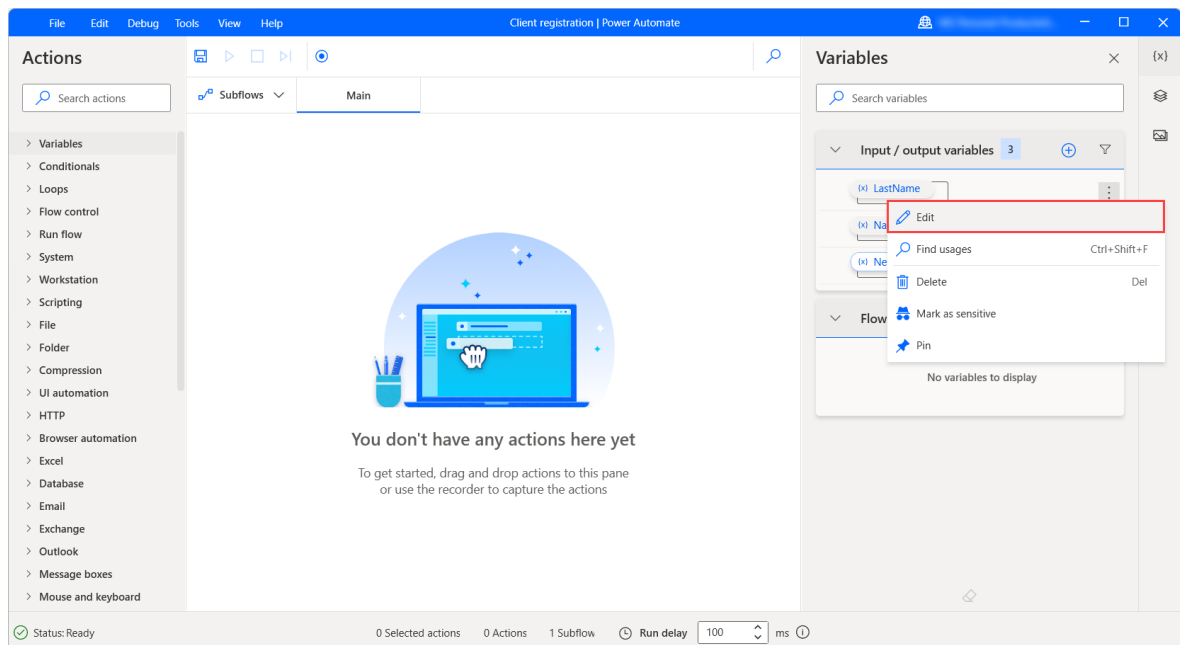


To update an input/output variable:

1. Right-click on its name in the variables pane and select **Edit**.

### **i** Important

If you try to rename an input or output variable to an existing flow variable name, Power Automate will prompt you to confirm the merging of the two variables. Unintentional merging may affect the functionality of your flow and cause errors. Also, you can't use the name of an existing input or output variable.



2. In the **Edit input/output variable** dialog, update the desired fields and select **Save** to apply the changes.

**Edit input variable** [X]

↓ Edit the properties of an existing input or output variable [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:  ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

Mark as optional  ⓘ

**Save** Cancel

## Sensitive variables

### ⓘ Important

Flows developed in older versions of Power Automate for desktop (v.2.13 or older) remain unaffected by the sensitive variables functionality as long as you don't edit them. If you run existing desktop flows through the console or portal without editing them, they'll keep the old behavior and work like before.

To apply the new functionality, edit and save the flows with Power Automate for desktop v.2.14 or above. Power Automate will convert past encrypted input variables and encrypted variables produced by the **Get password from CyberArk** action to text variables marked as sensitive.

Some automation scenarios handle confidential information and require special handling of variables that store and use sensitive data during runtime. Desktop flows

support the creation of sensitive variables, whose values are masked during debugging in the variables pane of the flow designer.

Additionally, if you've logged in with an organization premium account, the values of sensitive variables aren't stored in the Run history in the portal, when the desktop flows run through the console or cloud flows.

Any variable can become sensitive, independently of its type. Sensitivity applies at the variable level, so lists, datarows, datatables, and custom objects, get sensitive as a whole. There's no way to mark a list item, a datatable column, or a variable property as sensitive in an otherwise nonsensitive variable.

You can use, manipulate and process sensitive variables in every action without any limitation, like every other variable. Additionally, you can combine them with other variables and include them in expressions. In this case, logs handle the whole expression as sensitive.

The flow designer handles sensitivity as a mask that you can set on and off. Thus, you can unmask sensitive variables to see their values and mask them again to hide their values.

### Important

Sensitive variables aren't meant to provide protection over hardcoded data. You shouldn't hardcode critical data in plain text, like passwords and PINs, in the properties of actions like **Set variable**, even if the said variables are marked as sensitive. The desktop flow logs will be protected, but the hardcoded values are visible in the modal and the flow definition in Microsoft Dataverse.

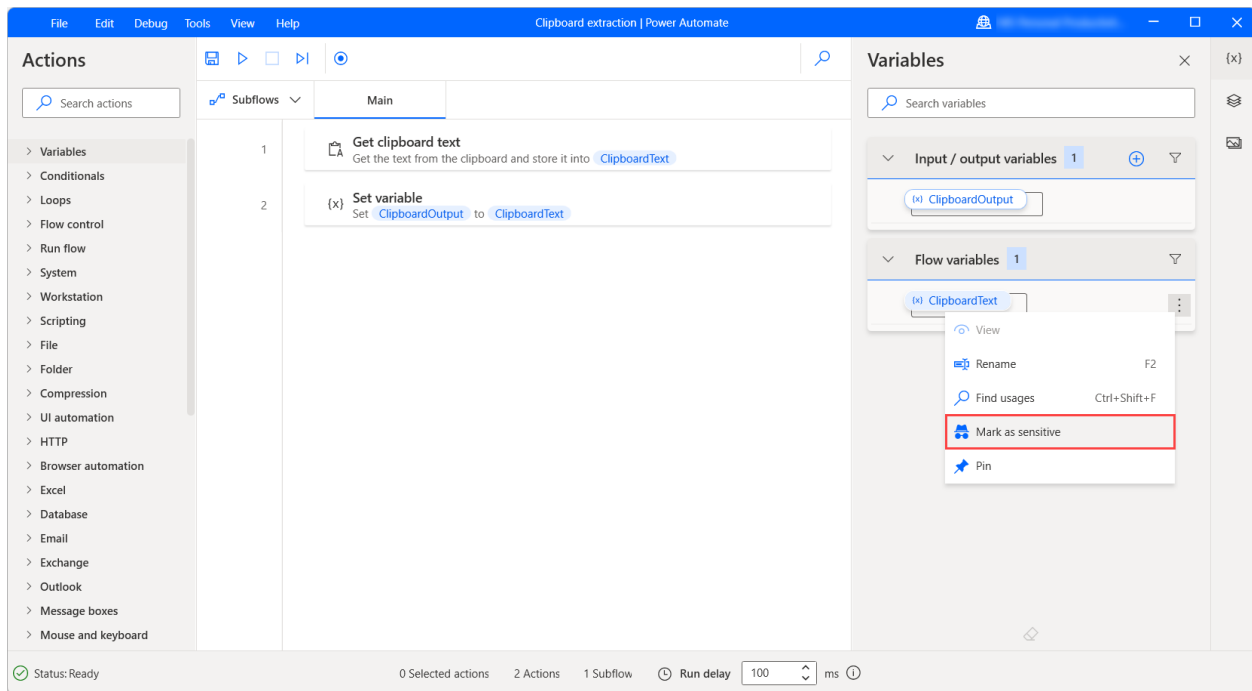
To find more information regarding sensitive inputs in cloud flows, see [Manage sensitive input like passwords](#).

### Note

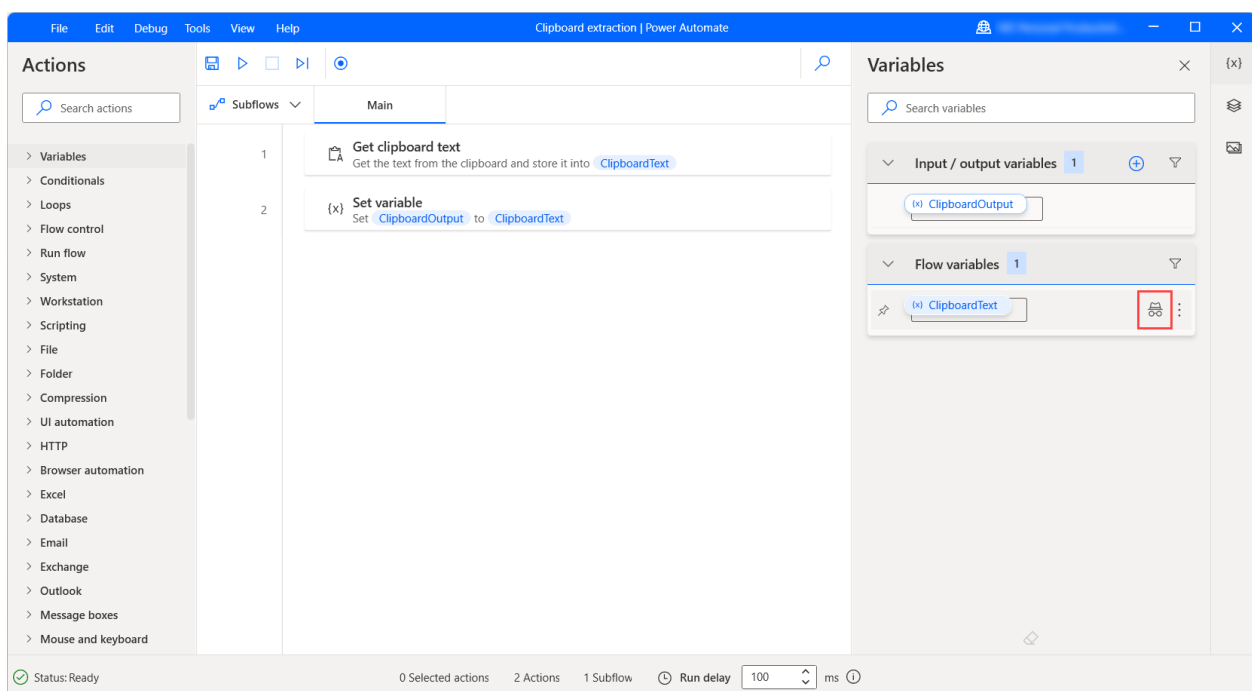
- The value of a sensitive variable is visible when you send it outside desktop flows or displayed through the **Display message** action.
- Sensitivity isn't inheritable in variables. If you add or assign a sensitive variable to another variable, the resulting variable won't be sensitive by default.
- Marking a variable as sensitive hides its values from the summary of the **Set variable** action.

- The input details of the **Set variable** action aren't visible in the desktop flow logs when the contained variables have been marked as sensitive.
- Masking sensitive variables during debugging provides only a basic form of protection to developers from third parties looking at their screens.

To mark a variable as sensitive, right-click on it in the variables pane and select **Mark as sensitive**. To stop a variable from being sensitive, right-click on it and select **Mark as not sensitive**.



Apart from the context menus, you can use the dedicated icon next to each variable to mark it as sensitive or not sensitive.



# Sensitive input and output variables

When you create or edit an input or output variable, you can select **Mark as sensitive** in the respective dialog to make it sensitive.

**New input variable** ×

⌵ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:  ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

Mark as optional  ⓘ

**Save** Cancel

The default value of an input variable is visible in the creating or editing dialog when sensitivity is enabled. This value exists only for testing and debugging purposes, as you have to initialize each input in production runs through the portal or the console. The default values aren't protected in the action modals and the flow definition in Dataverse.

On the other hand, the default value isn't visible in the variables pane and the **Flow input** dialog, which appears when you run a desktop flow with input variables through the console.

The eye icon to reveal the value isn't available unless you delete the default text value and provide a new one. New values are visible when populating other datatypes besides text.

### Flow inputs ✕

With flow input variables you pass data to be used in the flow. Flow inputs are set and configured in the Power Automate designer. [More info](#)

Name  ⓘ

IDNumber  ⓘ

## Optional input variables

When you create or edit an input or output variable, you can select **Mark as optional** in the respective dialog to make it optional.

### New input variable ✕

Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:  ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

**Mark as optional**  ⓘ



By default, input variables are mandatory meaning that you must provide:

- A default value when creating it so that it can be used during debugging (console initiated) runs in case you don't pass another value.
- A value of the respective type to ensure proper execution.

If an input variable is marked as optional both of the above can be omitted because it can receive **Blank** values.

## Setting optional inputs' default value to Blank

### Text variables

To set a text variable's default value to **Blank**:

- Set the **Data type** property to **Text**.
- Enable the **Mark as optional** control.
- Make sure the **Default value** property is empty.

### New input variable ×

⌵ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:  ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

Mark as optional  ⓘ

## Blank numeric input

To set a numeric variable's default value to **Blank**:

- Set the **Data type** property to **Number**.
- Enable the **Mark as optional** control.
- Make sure the **Default value** property is empty.

### New input variable ×

↓ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:  ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

**Mark as optional**  ⓘ

## Blank boolean input

To set a boolean variable's default value to **Blank**:

- Set the **Data type** property to **Boolean**.
- Enable the **Mark as optional** control.
- Make sure the **Default value** property is set to **<Blank>**.

### New input variable ✕

↓ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:  ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive

Mark as optional

## Blank custom object input

To set a custom object's default value to **Blank**:

- Set the **Data type** property to **Custom object**.
- Enable the **Mark as optional** control.
- Make sure the **Default value** property is set to **<Blank>**. To achieve this, select **Edit** next to the property and in the **Edit custom object** window, enable the **JSON editor** control. Delete all the contents, and then select **Save**.

### New input variable ✕

↓ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:   ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

Mark as optional  ⓘ

## Blank list input

To set a list's default value to **Blank**:

- Set the **Data type** property to **List**.
- Enable the **Mark as optional** control.
- Make sure the **Default value** property is set to **<Blank>**. To achieve this, select **Edit** next to the property and in the **Edit list** window, enable the **JSON editor** control. Delete all the contents, and then select **Save**.

## New input variable



↓ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:   ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

Mark as optional  ⓘ

Save

Cancel

## Blank data table input

To set a data table's default value to **Blank**:

- Set the **Data type** property to **Datatable**.
- Enable the **Mark as optional** control.
- Make sure the **Default value** property is set to **<Blank>**. To achieve this, select **Edit** next to the property and in the **Edit datatable** window, enable the **JSON editor** control. Delete all the contents, and then select **Save**.

### New input variable ✕

⌵ Add a new variable to be used as input or output [More info](#)

Variable name:  ⓘ

Data type:  ⓘ

Default value:   ⓘ

External name:  ⓘ

Description:  ⓘ

Mark as sensitive  ⓘ

Mark as optional  ⓘ

## Edit variables while debugging a desktop flow

In the design console, Power Automate desktop supports editing common variable types while running the flow in the debugger. Currently, supported data types include, text, numeric, datetime, and boolean values.

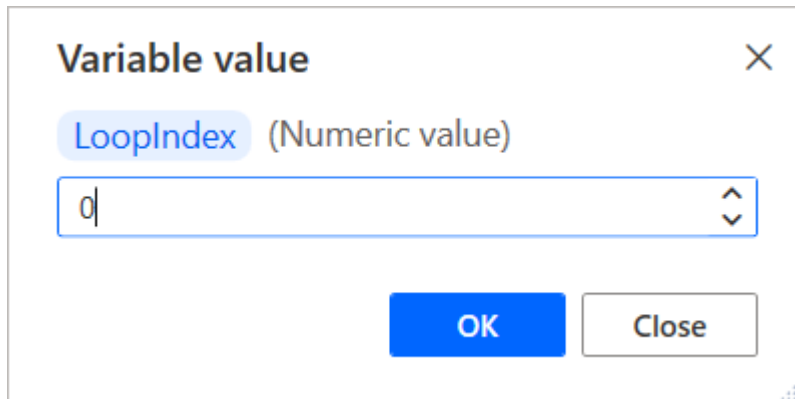
### How to edit variables while running a flow in the debugger

There are two methods you can employ to begin manually modifying flow variable values in the design console.

Place a breakpoint at some point before you want to change the value of flow variable. Run the flow and then wait until the flow pauses at the selected breakpoint. The flow variables pane is in the bottom right corner of the console – find the variable name in the list and double-click next to it to open the variable viewer.

Modify a numeric value:

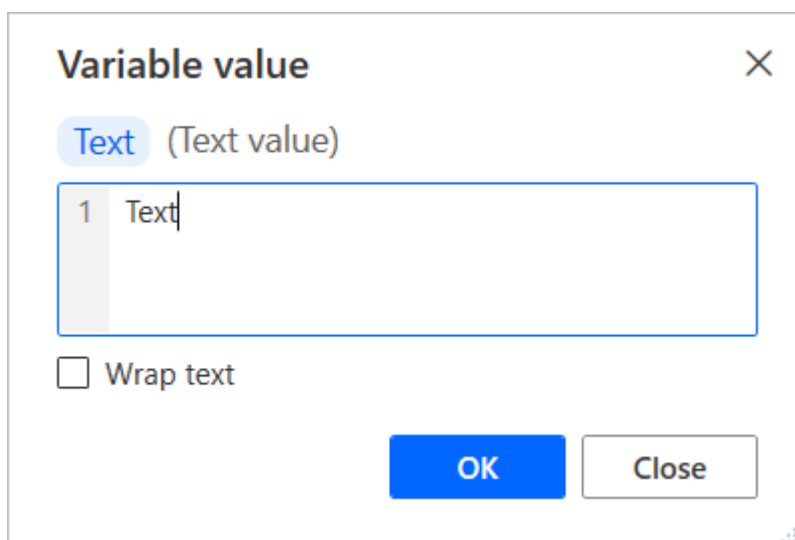
Open the variable that requires editing, place the cursor on the input field and manually edit the numeric value. Alternatively, there are buttons to count up, or down from the current value on the right side of the input in the variable viewer. Note, you can't change the value to something other than numeric.



The screenshot shows a dialog box titled "Variable value" with a close button (X) in the top right corner. Below the title, the variable name "LoopIndex" is displayed in a blue pill, followed by "(Numeric value)". A text input field contains the number "0" and has a small up/down arrow icon on its right side. At the bottom of the dialog, there are two buttons: a blue "OK" button and a white "Close" button with a grey border.

Modify a text value:

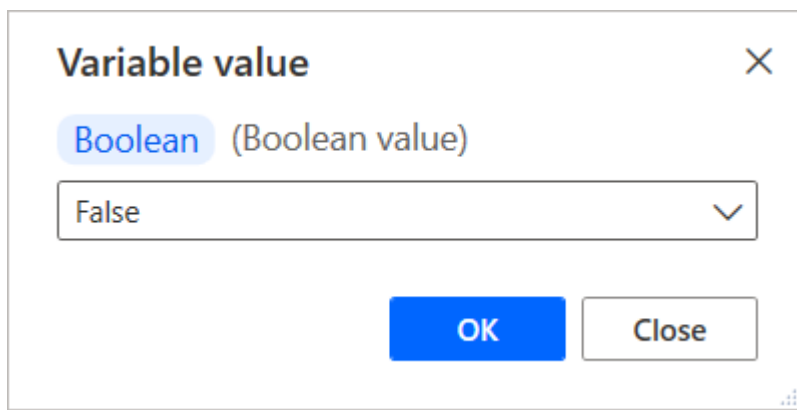
Open the variable that requires editing, place the cursor on the input field and manually edit the text value. There's a checkbox to wrap text within the input field, which makes it easier for you to view in the editor. Text value variables accept numbers as inputs, but keep in mind that if you modify this value and try to pass it to an action with an input parameter that only accepts numeric value, the flow throws an exception error when it reaches that point.



The screenshot shows a dialog box titled "Variable value" with a close button (X) in the top right corner. Below the title, the variable name "Text" is displayed in a blue pill, followed by "(Text value)". A text input field contains the text "1 Text" and has a vertical scrollbar on its left side. Below the input field, there is a checkbox labeled "Wrap text" which is currently unchecked. At the bottom of the dialog, there are two buttons: a blue "OK" button and a white "Close" button with a grey border.

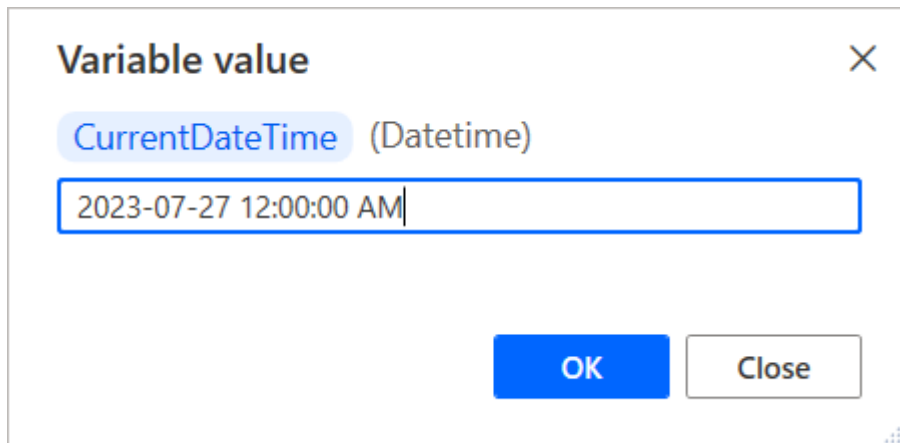
Modify a boolean value:

Open the variable that requires editing, place the cursor on the input field, and then manually edit the boolean value. Use the drop-down list to select true or false.



Modify a datetime value:

Open the variable that requires editing, place the cursor on the input field and manually edit the datetime value. There's a warning message that appears in the variable viewer if you enter a value that isn't acceptable.



## Known issues and limitations

- **Issue:** Flows built or edited with Power Automate for desktop version 2.14 or above are incompatible with older versions of Power Automate for desktop. You can't use older versions of Power Automate for desktop to open or run these flows.

**Workarounds:** None.



# Variable data types

Article • 12/15/2023

When you create variables in your flows, Power Automate converts them to a specific type based on their content.

Some of these data types are widely used throughout the application, such as **numbers**, while others, such as **browser instances**, require explicit actions or groups of actions.

## Simple data types

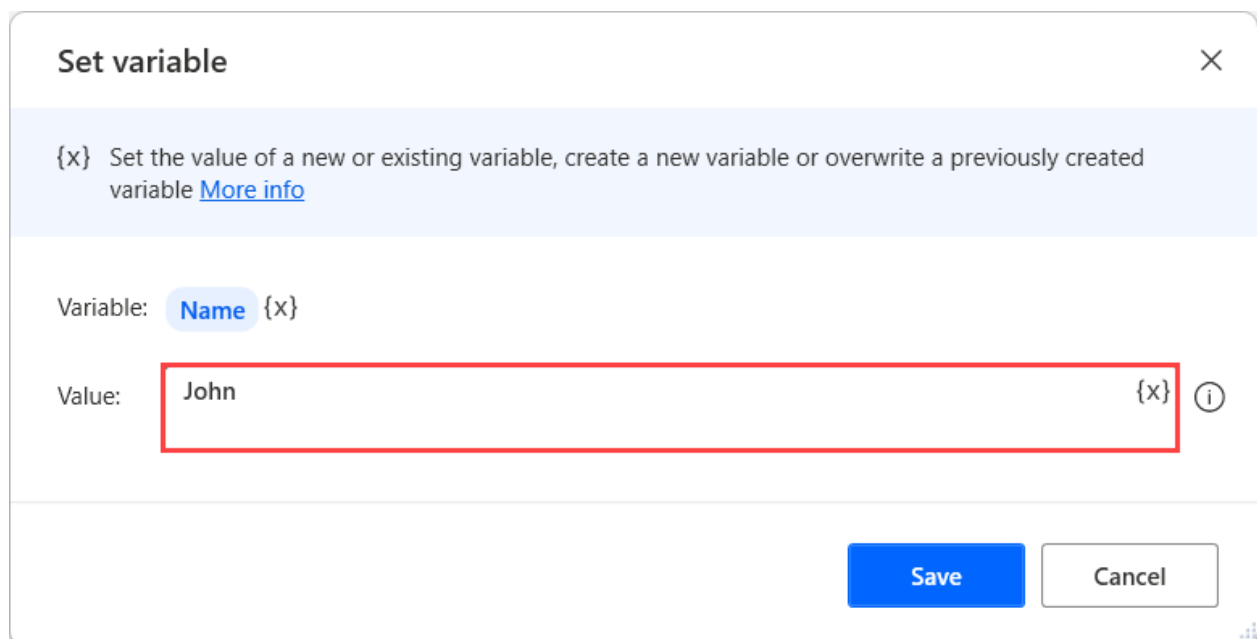
Simple data types represent single values, such as texts and numbers. You can use these data types independently or use them to create more complex data structures, such as lists and datatables.

### Text value

This is any kind of text, from email addresses to the text contents of a .txt file.

[Text data type properties](#)

To create a **Text value** variable, use the **Set variable** action and populate the input parameter with the desired text without any notation.



**Set variable** ×

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **Name** {x}

Value:  {x} ⓘ

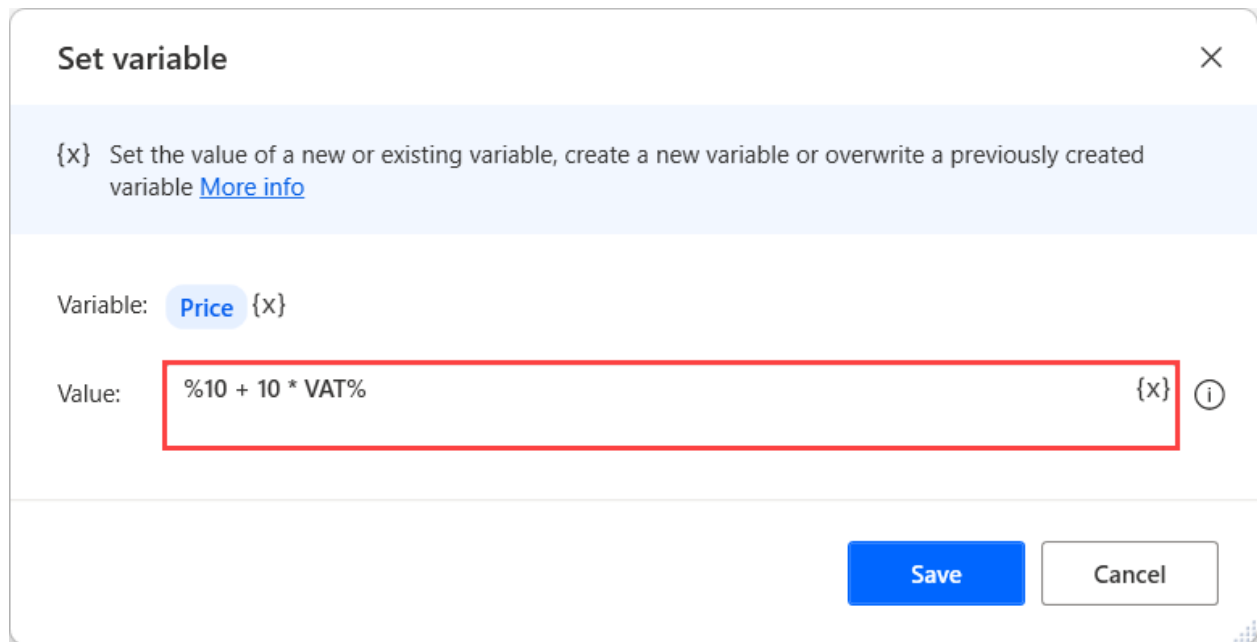
**Save**

### Numeric value

Numeric is the type applied to numbers. Only this data type can be used in mathematical operations.

To create a **Numeric value** variable, use the **Set variable** action and populate the input parameter with a number without any notation.

Except for hardcoded numeric values, you can use mathematical expressions with variables within percentage signs. For more information about mathematical expressions, go to [Use variables and the % notation](#).



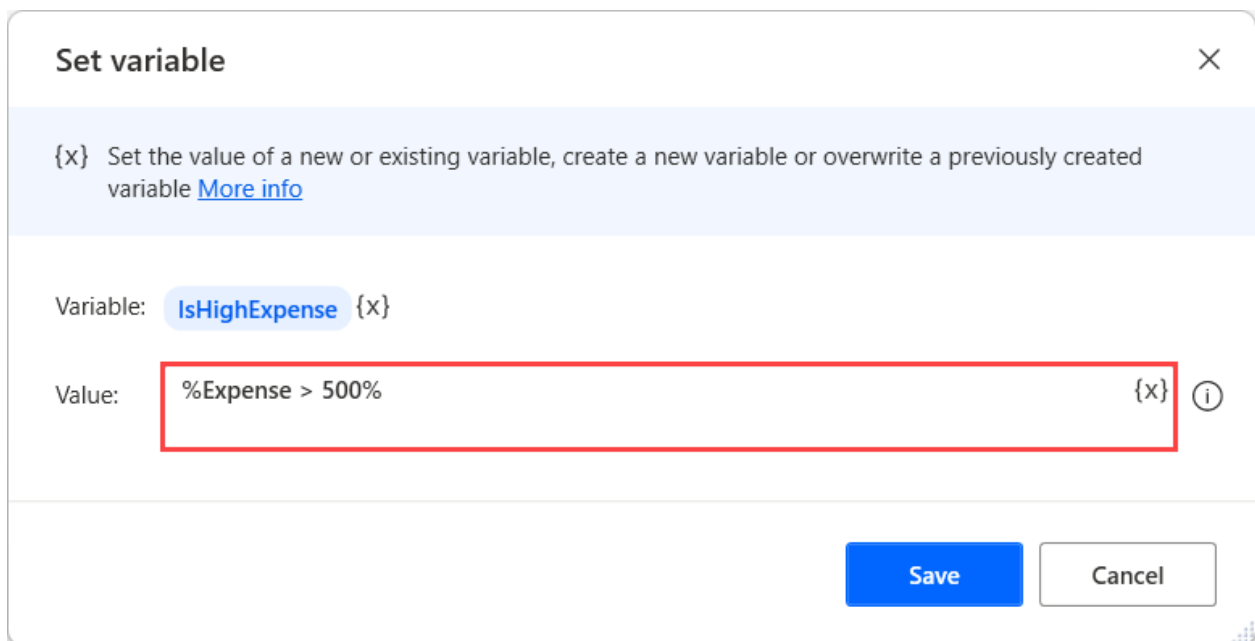
The screenshot shows a 'Set variable' dialog box with a close button (X) in the top right corner. Below the title bar, there is a light blue header area containing the text: '{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)'. The main area of the dialog has two fields: 'Variable:' with a dropdown menu showing 'Price' and a placeholder '{x}', and 'Value:' with a text input field containing the expression '%10 + 10 \* VAT%'. The text input field is highlighted with a red rectangular border. To the right of the input field is a placeholder '{x}' and an information icon (i). At the bottom right of the dialog, there are two buttons: a blue 'Save' button and a white 'Cancel' button with a grey border.

## Boolean value

The value can be either **True** or **False**.

To create a **Boolean value** variable, use the **Set variable** action and populate the input parameter with the expressions **%True%** or **%False%**.

Additionally, you can create complex expressions using logical operators, variables, and the percentage notation. For more information about logical expressions, go to [Use variables and the % notation](#).



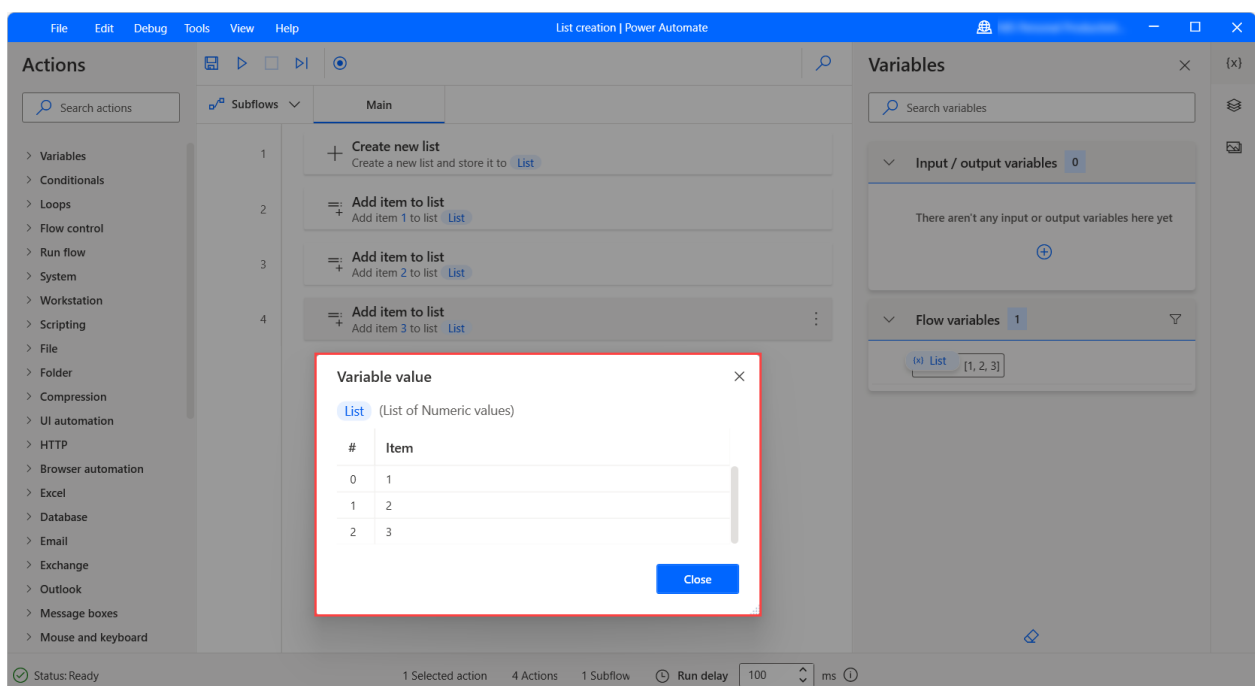
## Advanced data types

Advanced data types represent complex data structures. They function as collections of other data types that you can access as one entity.

### List

Lists are collections of items. Depending on the types of the individual list items, there can be lists of text values, lists of numerical values, and so on. The list data type is the equivalent of a single-dimension array in programming terms.

You can create a list through the **Create new list** action and add an item to that list through the **Add item to list** action.

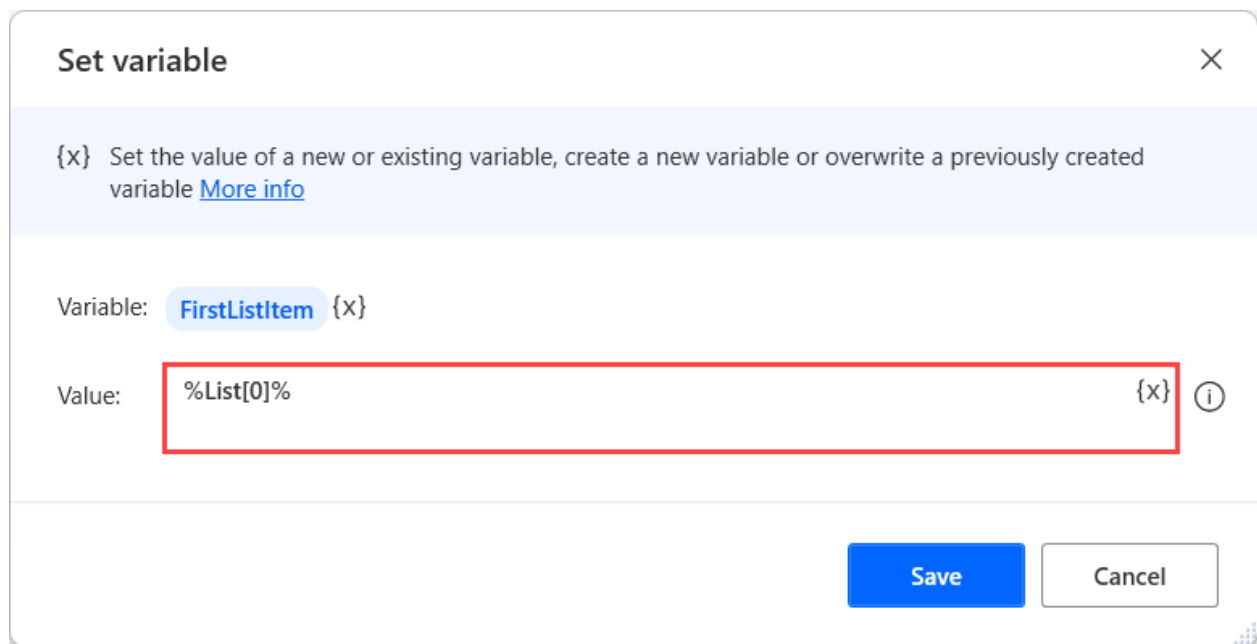


You can also create a list through actions that generate lists as output. For example, the **Read text from file** action can return a list of text values and the **Get files in folder** action returns a list of files.

To retrieve a specific item in a list, use the following notation:

**%VariableName[ItemNumber]%**

In the example below, the flow stores the first number of the previously displayed list to a new variable. Keep in mind that the index should be 0 for the first item of the list.



**Set variable** [X]

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **FirstListItem** {x}

Value: **%List[0]%** {x} ⓘ

**Save** **Cancel**

A common practice is to use a **For each** action to iterate through the items of a list.

If you need to access only a specific part of a list, use the **%VariableName[StartIndex:StopIndex]%** notation. For example, the expression **%List[2:4]%** retrieves the third and fourth items of the list. The item in the **StopIndex** position is the boundary of the slicing and doesn't get retrieved.

To slice a list from the start to a specific item, don't set a **StartIndex** value, for example, **%List[:4]%**. To slice a list from a specific index to the end, don't set a **StopIndex** value, for example, **%List[2:]%**.

[List data type properties](#)

## Datatable

Datatables contain data in a tabular form and are the equivalent of two-dimensional arrays in programming terms.

A datatable contains rows and columns that describe the position of each item uniquely. Datatables can be considered as lists that contain datarows as items.

**Variable value** ✕

**ExcelData** (Datatable)

#	Product Name	Product Code	Price	Availability	Description
0	Product1	2384	\$40	True	This is Product 1
1	Product2	4635	\$20	True	This is Product 2
2	Product3	9584	\$60	False	This is Product 3
3	Product4	8635	\$25	True	This is Product 4
4	Product5	7464	\$70	False	This is Product 5
5	Product6	1836	\$10	True	This is Product 6

**Close**

Power Automate provides the **Create new data table** action to generate new datatables. After deploying the action, you can use the visual builder to populate values and rename the column headers.

**Edit datatable** ⓘ ↶ ✕

	Column1	Column2	
0			

**Save**

Apart from the **Create new data table** action, three more actions produce datatables to store extracted data: the **Read from Excel worksheet**, **Execute SQL statement**, and **Extract data from web page** actions.

Additionally, you can create a datatable using the **Set variable** action and the programming array notation. This notation consists of multiple single-dimension arrays separated by commas and enclosed in curly brackets. The final expression must have the following form: `%[['Product1', '10 USD'], ['Product2', '20 USD']]%`.

### Set variable ✕

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: Products {x}

Value: %{['Product1', '10 USD'], ['Product2', '20 USD']}% {x} ⓘ

Save
Cancel

If you want to add column headers while creating a new datatable using the array notation, use the `^[ 'ColumnName1', 'ColumnName2']` expression for the first row.

### Set variable ✕

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: Products {x}

Value: %{ ^['Product Name', 'Price'], ['Product1', '10 USD'], ['Product2', '20 USD'] }% {x} ⓘ

Save
Cancel

To add a new row to an existing table, use the **Insert row into data table** action. Alternatively, create an expression containing the variable name of the datatable, a plus character (+), and the values you want to add in brackets.

### Set variable ✕

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **Products** {x}

Value:  {x} ⓘ

**Save**

Besides inserting rows into datatables, desktop flows offer various actions that manipulate datatables. You can find a full list with these actions in the [variable actions reference](#).

To retrieve a specific item of a datatable, use the following notation:

**%VariableName[RowNumber][ColumnNumber]%**. Keep in mind that the **RowNumber** and the **ColumnNumber** should be 0 for the first item (row or column).

For example, suppose that a flow retrieves the content of an Excel worksheet and stores it in the **ExcelData** variable. To access the first cell on the second row of the retrieved table, use the expression displayed below.

### Set variable ✕

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **SecondProductName** {x}

Value:  {x} ⓘ

**Save**

ⓘ **Note**

The **ExcelData** variable contains a table of values extracted from an Excel worksheet using the **Read from Excel worksheet** action. It contains some values of a specific worksheet and not the whole Excel file.

If you want to access a specific column in a datable that contains column headers, use the **%ExcelData[rowNumber]['ColumnName']%** notation.

If you loop through a datable with a **For Each** action, the variable that contains the current iteration's data is considered to be a datarow.

Similarly to lists, you use the **%VariableName[StartRow:StopRow]%** notation to access a specific part of a datable. The expression retrieves only the rows defined by the two indexes, while the **StopRow** position is the boundary of the slicing and doesn't get retrieved.

To slice a datable from the first row to a specific row, don't use a **StartRow** value, for example, **%Datable[:4]%**. Likewise, to slice a datable from a specific row to the end, don't use a **StopRow** value, for example, **%Datable[2:]%**.

### Datable data type properties

## Datarow

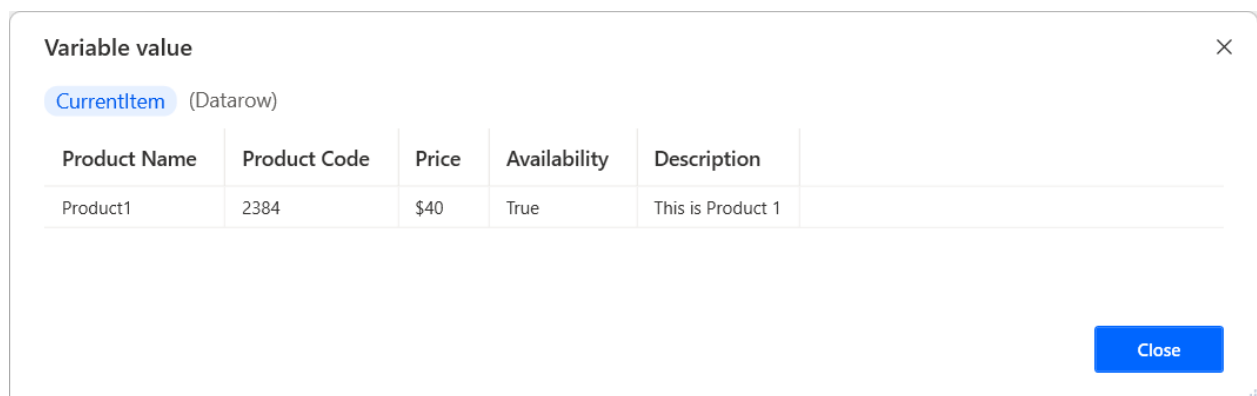
A datarow contains the values of a single row of a datable. When you loop through a datable with a **For Each** action, the variable that contains the current iteration's data is a datarow.

To retrieve a specific item of a datarow, use the following notation:

**%VariableName[ItemNumber]%**

Alternatively, you can use the **%VariableName['ColumnName']%** notation. The name of each column is defined by the datable from which you retrieved the datarow.

### Datarow data type properties



The screenshot shows a dialog box titled "Variable value" with a close button (X) in the top right corner. Below the title, the variable name "CurrentItem" is displayed in a blue box, followed by "(Datarow)". Below this, a table is shown with the following data:

Product Name	Product Code	Price	Availability	Description
Product1	2384	\$40	True	This is Product 1

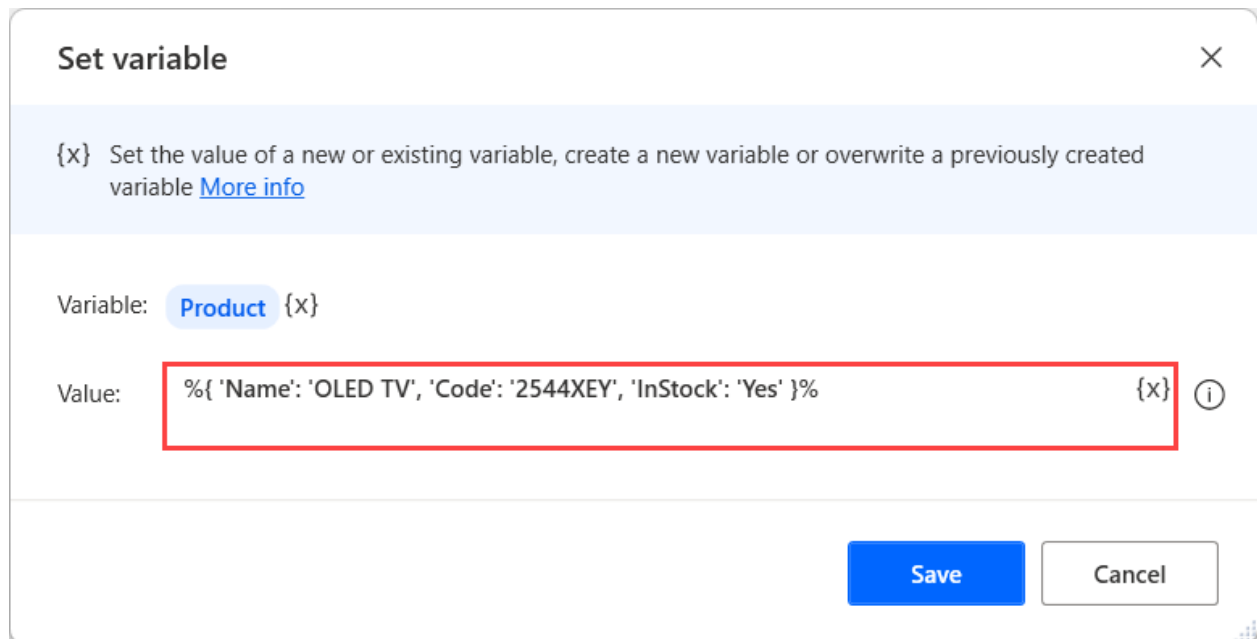
A blue "Close" button is located in the bottom right corner of the dialog box.



## Custom object

Contains pairs of properties and values, which can be easily converted to JSON format.

To create a new empty **Custom object**, use the **Set variable** action and populate the following expression `%{ }`. To create a new **Custom object** and initialize it with properties and values, use an expression of the following structure: `%{ 'Property1': 'Value1', 'Property2': 'Value2', 'Property3': 'Value2' }`.



**Set variable** [X]

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **Product** {x}

Value: `%{ 'Name': 'OLED TV', 'Code': '2544XEY', 'InStock': 'Yes' }` {x} ⓘ

**Save** **Cancel**

### ⓘ Important

Reserved keywords can't be used as custom object properties. For the full list of reserved keywords go to [Reserved keywords in desktop flows](#).

To update the value of an existing property or add a new one, deploy a **Set variable** action, populate the property's name in the **Set** field, and enter its value in the **To** field.

**Set variable**
✕

**{x}** Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: Product['InStock'] {x}

Value: No {x} ⓘ

Save
Cancel

Apart from literal values, you can use variables to dynamically set the properties and values of custom objects. For example, the following flow uses two variables to add a new property to a new empty custom object.

▣
Subflows
▾

	Main
1	<div style="display: flex; justify-content: space-between; align-items: center;"> <span><b>{x}</b> Set variable</span> <span>⋮</span> </div> <p>Set <span style="background-color: #e6f2ff;">PropertyValue</span> to 12</p>
2	<div style="display: flex; justify-content: space-between; align-items: center;"> <span><b>{x}</b> Set variable</span> </div> <p>Set <span style="background-color: #e6f2ff;">PropertyName</span> to 'number'</p>
3	<div style="display: flex; justify-content: space-between; align-items: center;"> <span><b>{x}</b> Set variable</span> </div> <p>Set <span style="background-color: #e6f2ff;">NewCustomObject</span> to {{ }}</p>
4	<div style="display: flex; justify-content: space-between; align-items: center;"> <span><b>{x}</b> Set variable</span> </div> <p>Set <span style="background-color: #e6f2ff;">NewCustomObject</span> [ <span style="background-color: #e6f2ff;">PropertyName</span> ] to <span style="background-color: #e6f2ff;">PropertyValue</span></p>

## Connector object

Connector objects store information from cloud connectors and work similarly to custom objects. Their properties usually contain lists of other connector objects. Accessing values works as in custom objects, although accessing nested values might require more complicated expressions.

**Variable value** ×

**GetTablesResponse** (Connector object)

Property	Value
.value	[[{'Name': '7763d3e4-bd6b-400a-9f85-dfd604802f87', 'DisplayName': 'BAP ERGs and Communities', 'Type': 100 }, { ... }, ...] <a href="#">More</a>

[Close](#)

## List of PDF table info

A variable of this data type can be produced only through the **Extract tables from PDF** action.

Each item on the list describes an extracted table and provides all the essential information about it. To access a specific datatable info item, use the **%VariableName[ItemNumber]%** notation.

**Variable value** ×

**ExtractedPDFTables** (List of PDF table info)

#	Item
0	PDF table #1 in page 1 with 5 rows and 6 columns <a href="#">More</a>

[Close](#)

Every list item provides four properties that allow you to get a specific detail independently. The available properties are the following:

- **DataTable** – Returns the extracted table.
- **TableStartingPage** – Returns the index of the file page that contains the start of the table.
- **TableEndingPage** – Returns the index of the file page that contains the end of the table.
- **TableOrderInPage** – Returns the order of the table on the page.

You can find more information regarding the properties of this data type in [Variables datatype properties](#).

The screenshot shows a 'Variable value' dialog box with a back arrow and a close 'X' button. The variable name 'ExtractedPDFTables' is highlighted in blue, followed by '[0] (PDF table info)'. Below this is a table with two columns: 'Property' and 'Value'. The table contains the following data:

Property	Value
.DataTable	5 Rows, 6 columns <a href="#">More</a>
.TableStartingPage	1
.TableEndingPage	1
.TableOrderInPage	1

A blue 'Close' button is located at the bottom right of the dialog box.

To access the value of a specific property, use the `%VariableName[ItemNumber].PropertyName%` notation. For example, the following expression returns the datatable value of the first item of the **ExtractedPDFTables** variable.

### Set variable ✕

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **ExtractedDataTable** {x}

Value:  {x} ⓘ

**Save**

## Known issues and limitations

- **Issue:** When a datatable or datarow cell contains a multiline entry, the variable viewer displays only the first line of it.
- **Workarounds:** None.

## Instances

- **Web browser instance** – Contains a browser instance created through the **Launch new Internet Explorer** or other browser launching actions.

[Web browser instance data type properties](#)

- **Window instance** – Contains a window instance created through the **Get window** action.

[Window instance data type properties](#)

- **Excel instance** – Contains an Excel instance created through the **Launch Excel** action.

[Excel instance data type properties](#)

- **Outlook instance** – Contains an Outlook instance created through the **Launch Outlook** action.

## Connections

- **SQL connection** – Contains a connection to an SQL database established through the **Open SQL connection** action.

[SQL connection data type properties](#)

- **Exchange connection** – Contains a connection to an Exchange server established through the **Connect to Exchange server** action.

[Exchange connection data type properties](#)

- **FTP connection** – Contains an FTP connection created through the **Open FTP connection** and **Open secure FTP connection** actions.

[FTP connection data type properties](#)

## Others

This section presents all the available data types that don't belong to any of the previous categories.

### General value

- **General value** – This data type is used during design time when Power Automate can't define the data type of a variable or an input parameter. General values get converted to other data types during runtime based on their data.

### Active Directory

- **Active Directory entry** – Contains a connection to an Active Directory server established through the **Connect to server** action.
- **Group info** – Contains the name, the display name, a description, and the members of a specified Active Directory group.
- **Group member** – Represents a member of a specified Active Directory group.
- **User info** – Contains information about a specified Active Directory user, such as first and last name, initials and a distinguished name, work details (company, department, and title), contact information (telephone number, extension, and email), and location (country/region, city, state, street address, and postal code).

[Active Directory data type properties](#)

### Amazon Web Services (AWS)

- **EC2 client** – Contains an EC2 session created through the **Create EC2 session** action.
- **EC2 instance** – Represents a retrieved EC2 instance.
- **EC2 instances info** – Contains information about an EC2 instance.
- **Instance state change** – Contains information about an EC2 instance that was started or stopped.
- **EBS snapshot** – Represents an EBS snapshot.
- **EBS volume** – Represents an EBS volume.

### [AWS data type properties](#)

## Azure

- **Azure client** – Contains an Azure session created through the **Create session** action.
- **Azure resource group** – Represents a retrieved Azure resource group.
- **Azure managed disk** – Represents a retrieved Azure disk.
- **Azure snapshot** – Represents an Azure snapshot.
- **Azure virtual machine** – Represents a retrieved Azure virtual machine.
- **Azure virtual machine info** – Contains information about an Azure virtual machine.
- **Azure subscription** – Represents a retrieved Azure subscription.

### [Azure data type properties](#)

## CMD

- **CMD session** – Contains a CMD session created through the **Open CMD session** action.

### [CMD data type properties](#)

## Dates and time

- **Datetime** – Contains date and time information. To create a datetime variable through the **Set Variable** action, populate the input parameter with the expressions `%d"yyyy-MM-dd HH:mm:ss.ff+zzz"%`, where:

[Expand table](#)

Notation	Description
yyyy	Year

Notation	Description
MM	Month
dd	Day
HH	Hour
mm	Minutes
ss	Seconds
ff	Milliseconds
zzz	UTC Offset

For example, %d"2022-03-25"% assigns the 25th of March 2022 date to the target variable.

### [Dates and time data type properties](#)

## Email

- **Mail message** – Represents an email message. The **Retrieve emails** action populates these variables.

### [Email data type properties](#)

## Exchange

- **Exchange mail message** – Represents an email message retrieved from an Exchange server. The **Retrieve Exchange email messages** action populates these variables.

### [Exchange data type properties](#)

## Files and folders

- **File** – Represents a file.
- **Folder** – Represents a folder.
- **FileSystemObject** – Represents either a folder or a file. This data type is used in input parameters that accept folders and files.

### [Files and folders data type properties](#)



## FTP

- **FTP file** – Represents an FTP file.
- **FTP directory** – Represents an FTP directory

[FTP data type properties](#)

## OCR

- **OCR Engine** – Contains an OCR engine created through the **Create OCR engine** action.

## Outlook

- **Outlook mail message** – Represents an email Outlook message. The **Retrieve email messages from Outlook** action populates these variables.

[Outlook data type properties](#)

## Terminal

- **Terminal session** – Contains a terminal session created through the **Open terminal session** action.

[Terminal data type properties](#)

## XML

- **XML node** – Contains the content of an XML document. The **Read XML from file** action populates these variables.

[XML data type properties](#)

## Error

- **Error** – Contains information about the last occurred error in the desktop flow. The **Get last error** action creates this type of variable.

[Error properties](#)

# Variable data type properties

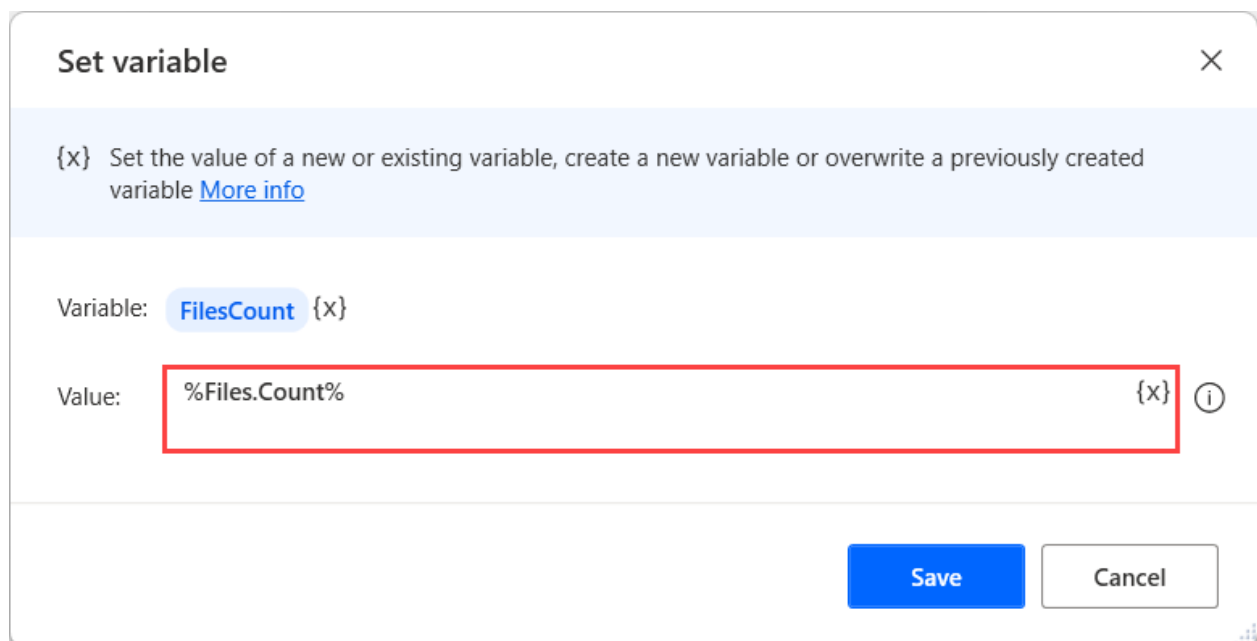
Article • 02/24/2023

Some of the built-in data types have properties that are associated with the value stored in the variable.

A property may contain a part of the information stored in the variable, like the day of a date, or an extra attribute describing the variable, like the size of a list.

The value of these properties can be accessed directly through the following notation: **%VariableName.PropertyName%**.

For example, if you have a list of files called **Files**, you can get the number of the stored files using the expression: **%Files.Count%**



The screenshot shows a 'Set variable' dialog box with a close button (X) in the top right corner. Below the title bar, there is a light blue informational banner that reads: '{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)'. The main area of the dialog has two fields: 'Variable:' followed by a blue pill containing 'FilesCount' and '{x}', and 'Value:' followed by a text input field containing '%Files.Count%'. The text input field is highlighted with a red border. To the right of the input field is a small circle containing '{x}' and an information icon (i). At the bottom right of the dialog are two buttons: a blue 'Save' button and a white 'Cancel' button with a grey border.

The data types that have properties are displayed in the following lists.

## Texts

Property	Description
Length	The length of the stored text in characters.
isEmpty	This property is true if the variable is empty or false if it contains some characters.
ToUpper	The text of the variable written in upper case characters.
ToLower	The text of the variable written in lower case characters.

<b>Property</b>	<b>Description</b>
Trimmed	The text of the variable written without white characters in the beginning and the end.

## Dates

<b>Property</b>	<b>Description</b>
Year	The year part of the datetime value.
Month	The month part of the datetime value.
Day	The day part of the datetime value.
DayOfWeek	The name of the day (Sunday, Monday etc).
DayOfYear	The day of the year part of the datetime value (1-365/6).
Hour	The hour part of the datetime value.
Minute	The minute part of the datetime value.
Second	The seconds part of the datetime value.

## Lists

<b>Property</b>	<b>Description</b>
Count	The number of items stored into the list.

## Files

<b>Property</b>	<b>Description</b>
FullName	The full path to the file.
RootPath	The root path of the file, for example C:\.
Directory	The directory where the file is stored.
Name	The name of the file, including the extension.
NameWithoutExtension	The name of the file without its extension.
Extension	The extension of the file.

<b>Property</b>	<b>Description</b>
Size	The size of the file in bytes.
CreationTime	The date when the file was created.
LastAccessed	The date when the file was last accessed.
LastModified	The date when the file was last modified.
IsHidden	This property is true if the file is hidden or false if the file is visible.
IsSystem	This property is true if the file is a system file or false if it isn't.
IsReadOnly	This property is true if the file is read only or false if it isn't.
IsArchive	This property is true if the file is an archive or false if it isn't.
Exists	This property is true if the file exists or false if the file doesn't exist.
isEmpty	This property is true if the file is empty or false if the file isn't empty.

## Folders

<b>Property</b>	<b>Description</b>
FullName	The full path to the folder.
RootPath	The root path of the folder, for example, C:\.
Parent	The parent directory of the folder.
Name	The name of the folder.
CreationTime	The date when the folder was created.
LastModified	The date when the folder was last modified.
IsHidden	This property is true if the folder is hidden or false if the folder is visible.
Exists	This property is true if the folder exists or false if the folder doesn't exist.
isEmpty	This property is true if the folder is empty or false if the folder isn't empty.
FilesCount	The number of files in the folder.
FoldersCount	The number of folders in the folder.

## Mail messages

---

<b>Property</b>	<b>Description</b>
MailFolder	The name folder the email message is retrieved from.
Uid	The unique identifier of the message.
From	The sender of the email message.
To	A list of values containing the recipients of the message.
Cc	A list of values containing additional recipients for the message (carbon copy).
Date	The date and time in which the message was sent.
Subject	The subject of the message.
Body	The body of the message. The body can be in plain text or in HTML form.
BodyText	If the previous property contains HTML, this property contains the body of the message in plain text form.
Attachments	A list of files that represent the saved attachments of the email message (if any).

## Exchange connection

<b>Property</b>	<b>Description</b>
ServerAddress	The address of the Exchange server.

## Exchange mail messages

<b>Property</b>	<b>Description</b>
MailFolder	The name folder the email message is retrieved from.
ItemId	The unique identifier of the message.
From	The sender of the email message.
To	A list of values containing the recipients of the message.
Cc	A list of values containing additional recipients for the message (carbon copy).
Date	The date and time in which the message was sent.
Subject	The subject of the message.
Body	The body of the message. The body can be in plain text or in HTML form.

<b>Property</b>	<b>Description</b>
BodyText	If the previous property contains HTML, this property contains the body of the message in plain text form.
Attachments	A list of files that represent the saved attachments of the email message (if any).

## Outlook mail messages

<b>Property</b>	<b>Description</b>
MailFolder	The name folder the email message is retrieved from.
EntryId	The unique identifier of the message.
From	The sender of the email message.
To	A list of values containing the recipients of the message.
Cc	A list of values containing additional recipients for the message (carbon copy).
Bcc	A list of values containing additional recipients for the message (blind carbon copy).
Date	The date and time in which the message was sent.
Subject	The subject of the message.
Body	The body of the message. The body can be in plain text or in HTML form.
BodyText	If the previous property contains HTML, this property contains the body of the message in plain text form.
Attachments	A list of files that represent the saved attachments of the email message (if any).

## FTP files

<b>Property</b>	<b>Description</b>
FullName	The full path to the file.
Directory	The directory where the file is stored on the FTP Server.
Name	The name of the file, including the extension.
NameWithoutExtension	The name of the file without its extension.message.
Extension	The extension of the file.

Property	Description
Size	The size of the file in bytes.
LastModified	The date when the file was last modified.

## FTP folders

Property	Description
FullName	The full path to the folder.
Parent	The parent directory of the folder.
Name	The name of the folder.
LastModified	The date when the folder was last modified.

## FTP connection

Property	Description
Host	The host of the FTP connection.
SecurityProtocol	The security protocol used in the connection.

## Datatables

Property	Description
RowCount	The number of rows of the data table.
Columns	A list that contains the names of the columns of the data table.
IsEmpty	This property is true if the datatable is empty or false if it is contains elements.
ColumnHeadersRow	A datarow that contains the table headers.

## Datarows

Property	Description
----------	-------------

Property	Description
ColumnsCount	The number of columns that the data row holds.
ColumnsNames	A list that contains the headers of the datarow.

## Web browser instance

Property	Description
DisplayRectangleX	The position of the top-left corner of the window in the x axel.
DisplayRectangleY	The position of the top-left corner of the window in the y axel.
Handle	The handle of the browser instance.
HtmlDialogs	Contains the dialogs of the current page, if they exist.
IsAlive	This property is true if the browser window is alive or false if it isn't.

## Window instance

Property	Description
Handle	The handle of the window instance.

## Excel instance

Property	Description
Handle	The handle of the Excel instance.

## SQL connection

Property	Description
ConnectionString	The connection string used for the database connection.
IsClosed	This property is true if the browser window is closed or false if it is open.

## PDF table info

---



<b>Property</b>	<b>Description</b>
DataTable	The extracted data table of the specified item.
TableStartingPage	The index of the file page that contains the start of the table.
TableEndingPage	the index of the file page that contains the end of the table.
TableOrderInPage	The order of the table on the page.

## CMD session

<b>Property</b>	<b>Description</b>
IsAlive	This property is true if the CMD session is alive or false if it isn't.
ProcessId	The unique identifier of the process.

## Terminal session

<b>Property</b>	<b>Description</b>
IsTerminated	This property is true if the terminal session is terminated or false if it isn't.

## XML node

<b>Property</b>	<b>Description</b>
Children	The children of the XML node.
InnerText	The inner text of the XML node.
InnerXML	The inner XML of the XML node .
Name	The name of the XML document.
OuterXML	The outer XML of the XML node.
Parent	The parent of the XML node.
Value	The value of the XML node.

## Active Directory entry

---

<b>Property</b>	<b>Description</b>
LdapPath	The LDAP path of the Active Directory connection.

## Group info

<b>Property</b>	<b>Description</b>
Description	The description of the group.
DisplayName	The display name of the group.
Members	A list containing the members of the group.
Name	The name of the group.

## User info

<b>Property</b>	<b>Description</b>
City	The city of the user.
Company	The company of the user.
Country	The country of the user.
Department	The department of the user.
Email	The email of the user.
Extension	The extension of the user.
FirstName	The first name of the user.
Initials	The initials of the user.
LastName	The last name of the user.
PostalCode	The postal code of the user.
State	The state of the user.
StreetAddress	The address of the user.
TelephoneNumber	The phone number of the user.
Title	The title of the user.

# EBS snapshot

<b>Property</b>	<b>Description</b>
DataEncryptionKeyId	The id of the data encryption key.
Description	The description of the snapshot.
Encrypted	This property is true if the snapshot is encrypted.
KmsKeyId	The identifier of the AWS Key Management Service customer master key to use for encryption.
OwnerAlias	The alias of the owner.
OwnerId	The id of the owner.
Progress	The progress of the snapshot.
SnapshotId	The id of the snapshot.
StartTime	The start time of the snapshot.
State	The state of the snapshot.
StateMessage	The state message of the snapshot.
Tags	The tags of the snapshot.
VolumeId	The volume id.
VolumeSize	The size of the volume.

# EBS volume

<b>Property</b>	<b>Description</b>
Attachments	The attachments of the volume.
AvailabilityZone	The availability zone of the volume.
CreateTime	This creation time of the volume.
Encrypted	This property is true if the volume is encrypted.
FastRestored	This property is true if the fast restore is enabled.
Iops	The max IOPS of the volume.

<b>Property</b>	<b>Description</b>
KmsKeyId	The identifier of the AWS Key Management Service customer master key to use for encryption.
MultiAttachEnabled	This property is true if the multi-attach is enabled.
OutpostArn	The Amazon Resource Name (ARN) of the outpost.
Size	The size of the volume.
SnapshotId	The id of the snapshot.
State	The state of the volume.
Tags	The tags of the volume.
Volumeld	The id of the volume.
VolumeType	The type of the volume.

## Azure managed disk

<b>Property</b>	<b>Description</b>
AvailabilityZones	The availability zones of the disk.
Configuration	The configuration of the disk.
Encrypted	This property is true if the disk is encrypted.
IopsSLimit	The max IOPS of the disk.
IsAttachedToVirtualMachine	This property is true if the disk is attached to a virtual machine.
OperationSystem	The operation system installed on the disk.
SizeInGB	The size of the disk in GB.
State	This state of the disk.
ThroughputLimit	The throughput limit of the disk.
TimeCreated	The creation time of the disk.
Type	The type of the disk.
VirtualMachine	The virtual machine that the disk is attached to.
ResourceGroup	The resource group of the disk.

<b>Property</b>	<b>Description</b>
Id	The id of the disk.
Location	The location of the disk.
Name	The name s of the disk.
SubscriptionId	The subscription id of the disk.
Tags	The tags of the disk.

## Azure resource group

<b>Property</b>	<b>Description</b>
ProvisioningState	The provisioning state of the resource group.
Id	The id of the resource group.
Location	This location of the resource group.
Name	The name of the resource group.
SubscriptionId	The subscription id of the resource group.
Tags	The tags of the resource group.

## Azure snapshot

<b>Property</b>	<b>Description</b>
CreationSourceId	The creation source id of the snapshot.
CreationSourceType	The creation source type of the snapshot.
OperationSystem	This operation system on the the snapshot.
SizeInGB	The size of the snapshot in GB.
StorageAccountType	This storage account type of the snapshot.
TimeCreated	The creation time of the snapshot.
ResourceGroup	The resource group of the snapshot.
id	This id of the snapshot.
Location	The location of the snapshot.

<b>Property</b>	<b>Description</b>
Name	The name of the snapshot.
SubscriptionId	The subscription id of the snapshot.
Tags	The tags of the snapshot.

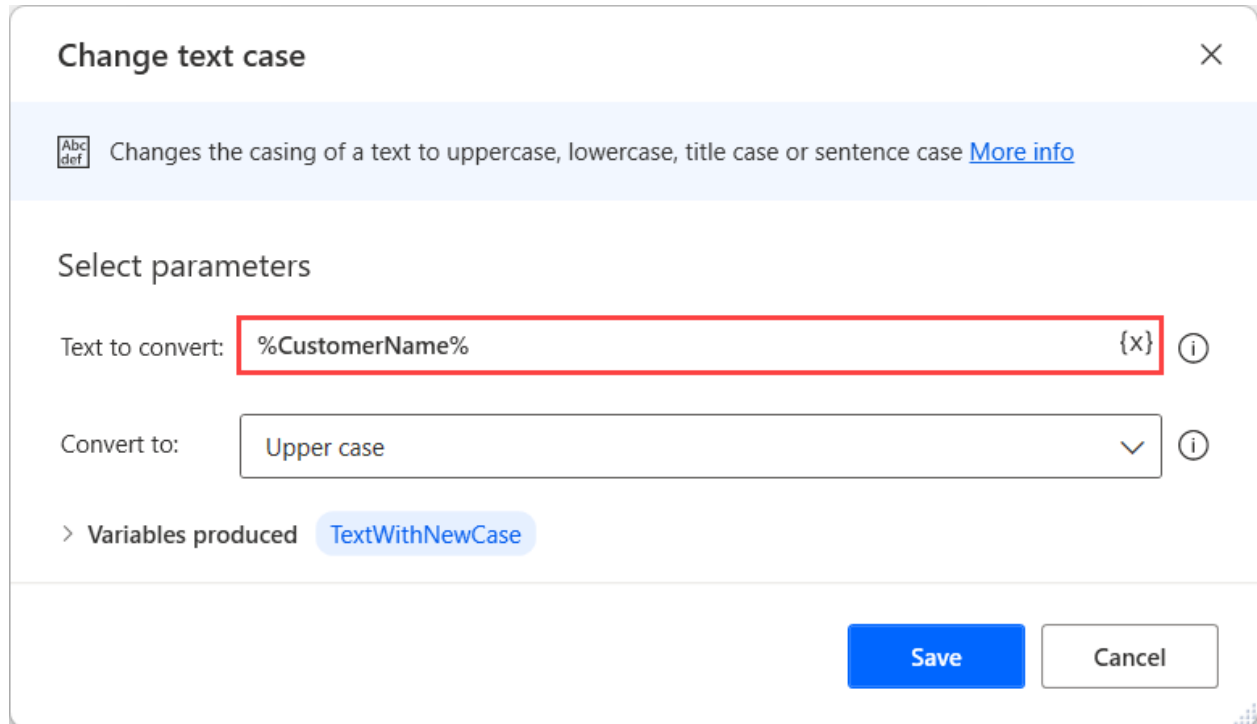
## Error

<b>Property</b>	<b>Description</b>
ActionIndex	The index of the action that caused the error.
ActionName	The name of the action that caused the error.
ErrorDetails	The details of the occurred error.
Location	The name and index information of the action and subflow that caused the error.
Message	The message of the occurred error.
SubflowName	The name of the subflow that contains the action caused the error.


# Use variables and the % notation

Article • 01/18/2024

Variables are used within flows to store data for further processing. Every variable name must be enclosed by percentage signs (%). The percentage sign is used as a special character to denote variables. Any expression between percentage signs should be evaluated.



**Change text case** ✕

 Changes the casing of a text to uppercase, lowercase, title case or sentence case [More info](#)

Select parameters

Text to convert:  {x} ⓘ

Convert to:  ∨ ⓘ

> Variables produced TextWithNewCase

**Save** Cancel

Occasionally, the percentage sign should be used as a simple character, instead of denoting a calculation. In those cases, it should be escaped using another percentage character (%%).

Power Automate enables you to create complex expressions containing hardcoded values, variable names, arithmetic and logical operations, comparisons and parentheses.

### Set variable ✕

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: NewVar {x}

Value:  {x} ⓘ

Save Cancel

## Hardcoded values

To include a hardcoded text value inside a variable, use quotes. Every value between the quote characters will be treated as a text value and not as a variable name.

### Set variable ✕

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: NewVar {x}

Value:  {x} ⓘ

Save Cancel

## Using blank values

Variables can receive null (empty) values. Any variable, dynamic or not, including nested properties, can be populated with a **Blank** value. To check whether a variable holds a blank value use the **Is blank** or **Is not blank** options when configuring the respective [conditional actions](#).

ⓘ **Note**



Some action parameters can be assigned a blank value if the input argument is nullable. If the parameter can't receive a blank value, an error occurs.

## Variable names

Variables can be used by adding their name to the expression without any further notation.

**Set variable** ×

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **NewVar** {x}

Value:  {x} ⓘ

**Save** **Cancel**

## Basic arithmetic

To make mathematical operations, use all the essential, arithmetic operators, such as addition (+), subtraction (-), multiplication (\*), and division (/).

Arithmetic operations are predominantly used with numerical values and variables. However, you can also use the addition operator to concatenate strings. Adding numbers and text strings in the same expression will convert the numbers into text, and concatenate them with the other text strings.

[Expand table](#)

Expression	Result	Result variable type
%5 * 3%	15	Number
%4 / Var%	4 divided by the value of the Variable named "Var"	Number

Expression	Result	Result variable type
%'this is ' + 'text'%	this is text	Text
%'This is the number ' + 5%	This is the number 5	Text

## Comparisons

Besides arithmetic operators, make comparisons using the following operators

[Expand table](#)

Operator	Description
=, <>	Equal/not equal
<, <=	Less than/less than or equal
>, >=	Greater than/greater than or equal

Keep in mind that comparisons, when evaluated, produce either **True** or **False** as a value. Naturally, comparisons can only be done between values of the same type.

## Logical operators

Logical operators can also be used to check multiple conditions simultaneously, allowing you to implement more complex logic in a single expression. The supported operators are: AND, OR, and NOT.

[Expand table](#)

Expression	Result
%Index = 1 OR Index = 2%	True if the value of the <b>Index</b> variable is 1 OR 2, otherwise False.
%Index = 4 AND Text = "Four"%	True if the value of the <b>Index</b> variable is 4 AND the value of the <b>Text</b> variable is Four, otherwise False.
%NOT(4 <> 4)%	Reverses the logical value in the parentheses. In this examples, it returns True.

Additionally, you can use the following logical expressions to check the value of a string or variable.

 Expand table

Expression	Arguments	Description
<code>%StartsWith(arg1,arg2,arg3)%</code>	<b>arg1:</b> Text to search into <b>arg2:</b> Text to search for <b>arg3:</b> Ignore case (True / False)	True if the provided string starts with the specified value, otherwise False.
<code>%NotStartsWith(arg1,arg2,arg3)%</code>	<b>arg1:</b> Text to search into <b>arg2:</b> Text to search for <b>arg3:</b> Ignore case (True / False)	True if the provided string doesn't start with the specified value, otherwise False.
<code>%EndsWith(arg1,arg2,arg3)%</code>	<b>arg1:</b> Text to search into <b>arg2:</b> Text to search for <b>arg3:</b> Ignore case (True / False)	True if the provided string ends with the specified value, otherwise False.
<code>%NotEndsWith(arg1,arg2,arg3)%</code>	<b>arg1:</b> Text to search into <b>arg2:</b> Text to search for <b>arg3:</b> Ignore case (True / False)	True if the provided string doesn't end with the specified value, otherwise False.
<code>%Contains(arg1,arg2,arg3)%</code>	<b>arg1:</b> Text to search into <b>arg2:</b> Text to search for <b>arg3:</b> Ignore case (True / False)	True if the provided string contains the specified value, otherwise False.
<code>%NotContains(arg1,arg2,arg3)%</code>	<b>arg1:</b> Text to search into <b>arg2:</b> Text to search for <b>arg3:</b> Ignore case (True / False)	True if the provided string doesn't contain the specified value, otherwise False.

Expression	Arguments	Description
%IsEmpty(arg1)%	arg1: Text to check	True if the provided string doesn't contain any characters, otherwise False.
%IsNotEmpty(arg1)%	arg1: Text to check	True if the provided string contain one or more characters, otherwise False.

## Parentheses

To change the operators' priority, use parentheses. Parentheses are handled the same way as in algebra and programming languages.

### Set variable ×

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable:  {x}

Value:  {x} ⓘ

# Automate using UI elements

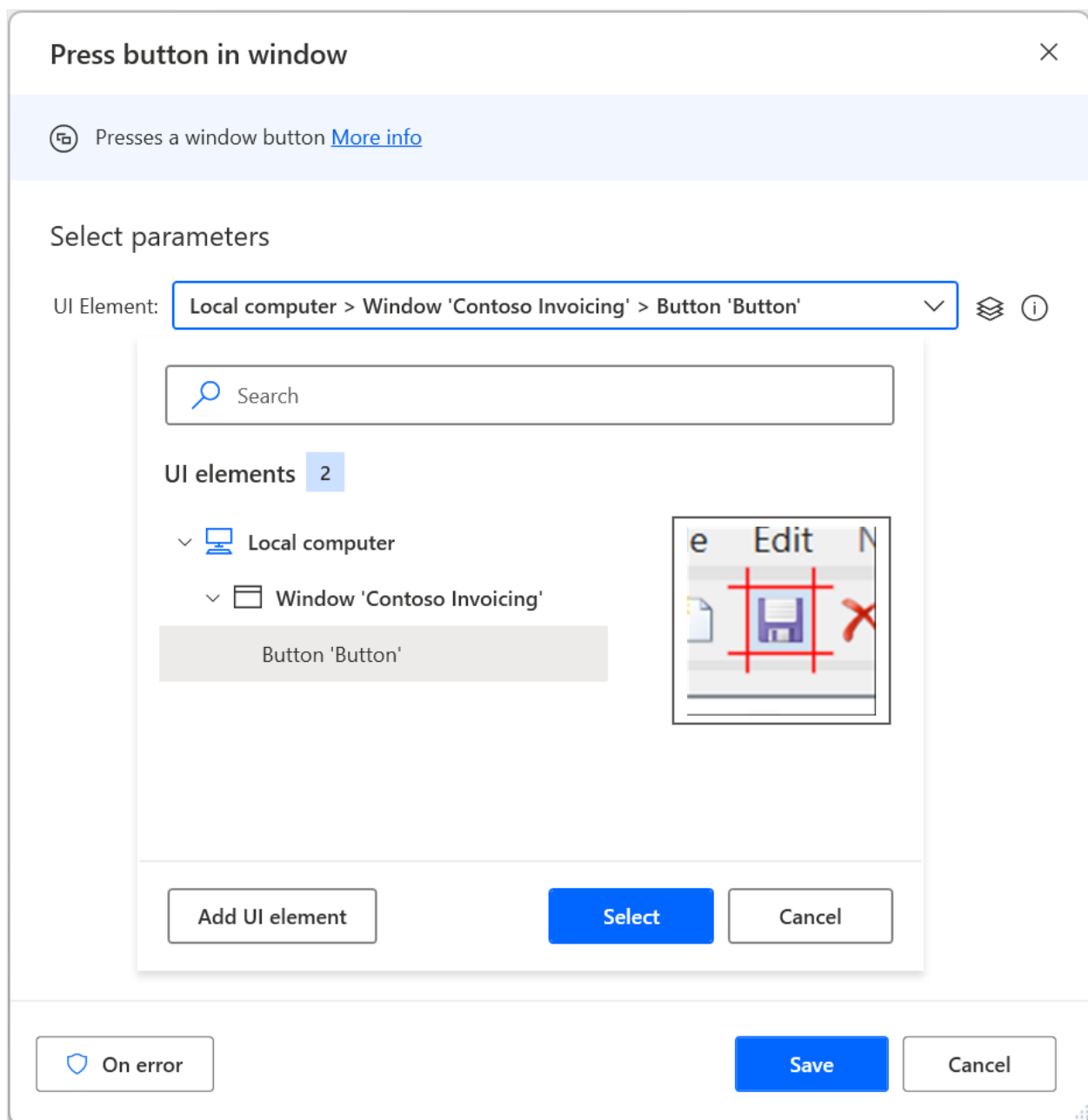
Article • 12/22/2023

Desktop flows utilize UI elements to interact with applications and webpages without resorting to image recognition and absolute coordinates. UI elements are used as input in most UI automation and browser automation actions and identify specific elements on windows and webpages.

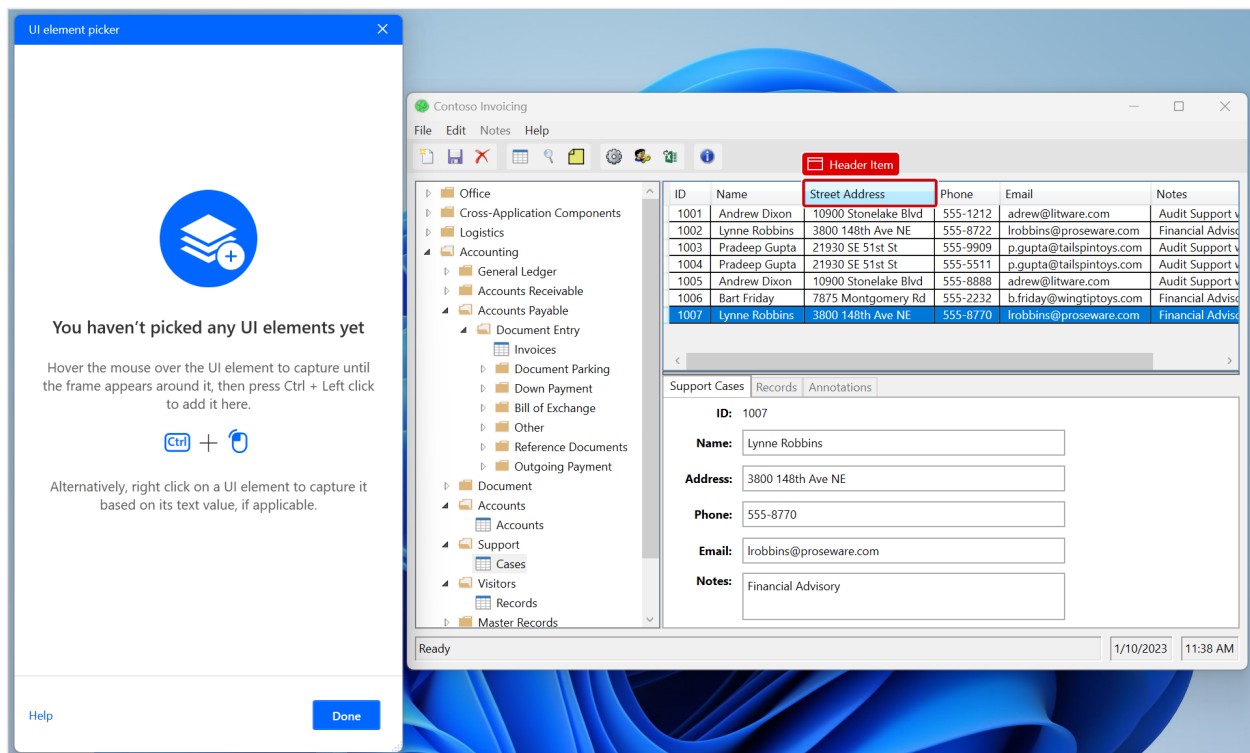
## UI elements

When deploying a UI automation or browser automation action, you might be required to provide a UI element as input. To add a new UI element, you can do it directly from the action properties or through the UI elements pane of the flow designer.

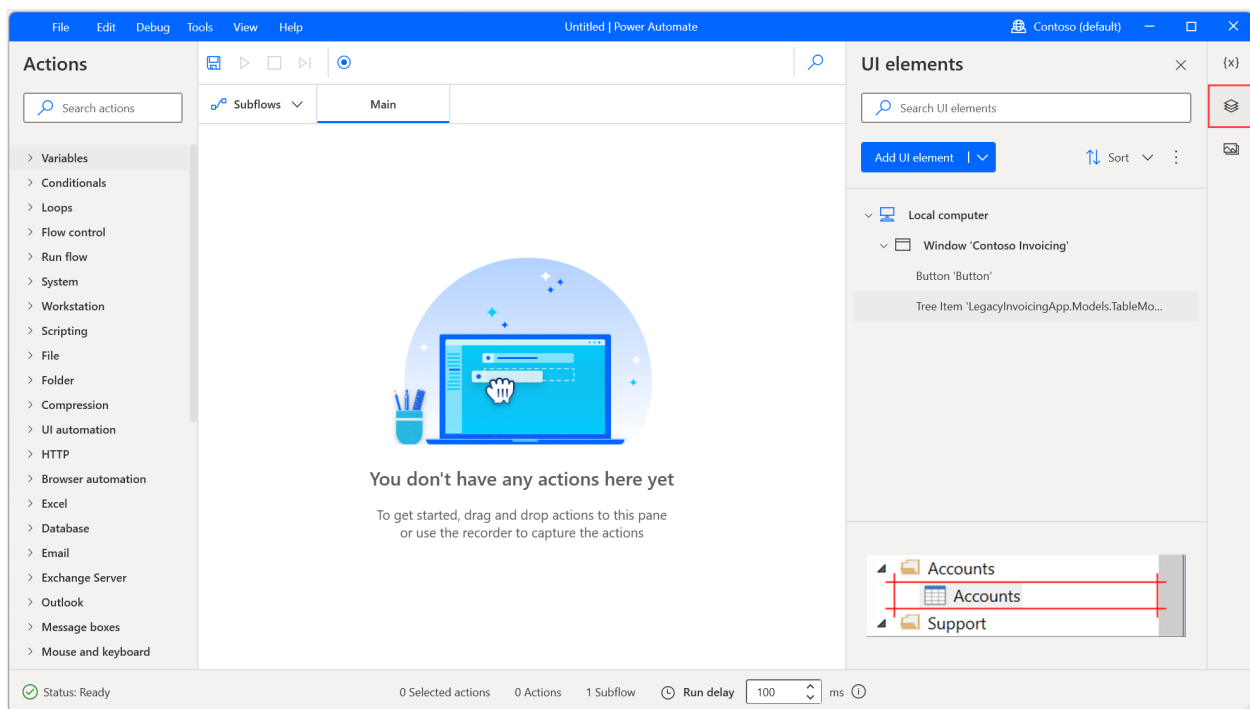
Each one of these action groups accepts a different type of UI elements. UI automation actions accept desktop UI elements, while browser automation actions accept web UI elements.



To add a new UI element to your flow, add a new UI element through an action or the UI elements pane, highlight the respective element, and press **Ctrl + Left click**. When the selection is finished, select **Done**.



Any captured UI elements will be added to the UI elements pane. To access the UI elements pane, select the UI elements tab on the right-hand side of the flow designer.



Elements can be sorted alphabetically through the **Sort** option of the UI elements tab. To remove all the UI elements that aren't used in any action, select the dots icon next to the **Sort** option and then **Remove unused UI elements**.

To rename or delete a UI element, right-click on the respective item and select the appropriate function.


To find where a specific UI element is being used in the flow, right-click on it and select **Find usages**. The results will display all the actions that use this UI element. Double-click on a result to highlight the action on the workspace.






# UI elements





 Search UI elements

Add UI element | 




 Sort  

  Local computer


  Window 'Contoso Invoicing'

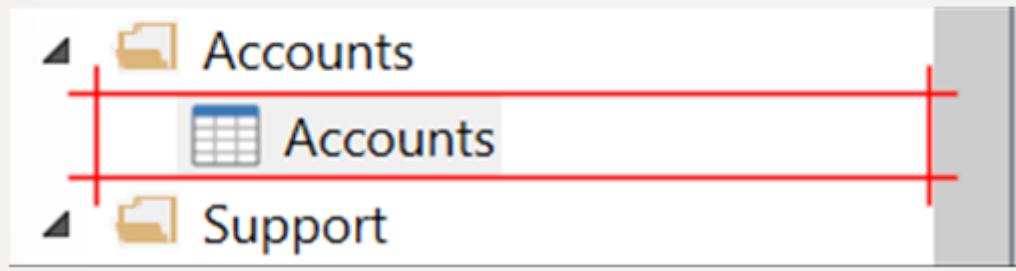
Button 'Button'

Tree Item 'LegacyInvoicingApp.Models.TableMo...'

-  Edit Enter
-  Rename F2
-  Find usages Ctrl+Shift+F

---

-  Delete Del



# UI elements types

Desktop flows support two types of UI elements based on their source: desktop UI elements and web UI elements.

Desktop UI elements can be captured from any Windows application, including the nonwebpage part of browsers, such as the address bar.

You can use these UI elements as input in UI automation actions to indicate the component you want to interact with. The UI element picker of UI automation actions displays and allows you to capture only desktop UI elements.

## Important

Users can capture elements from webpages through the UI element picker of UI automation actions. However, their selectors will represent desktop elements, not web elements.

Web UI elements can be captured from webpages and used only in browser automation actions.

Browser automation actions accept exclusively UI elements captured from webpages. Therefore, existing UI elements captured from desktop applications aren't displayed in the UI elements picker of these actions.

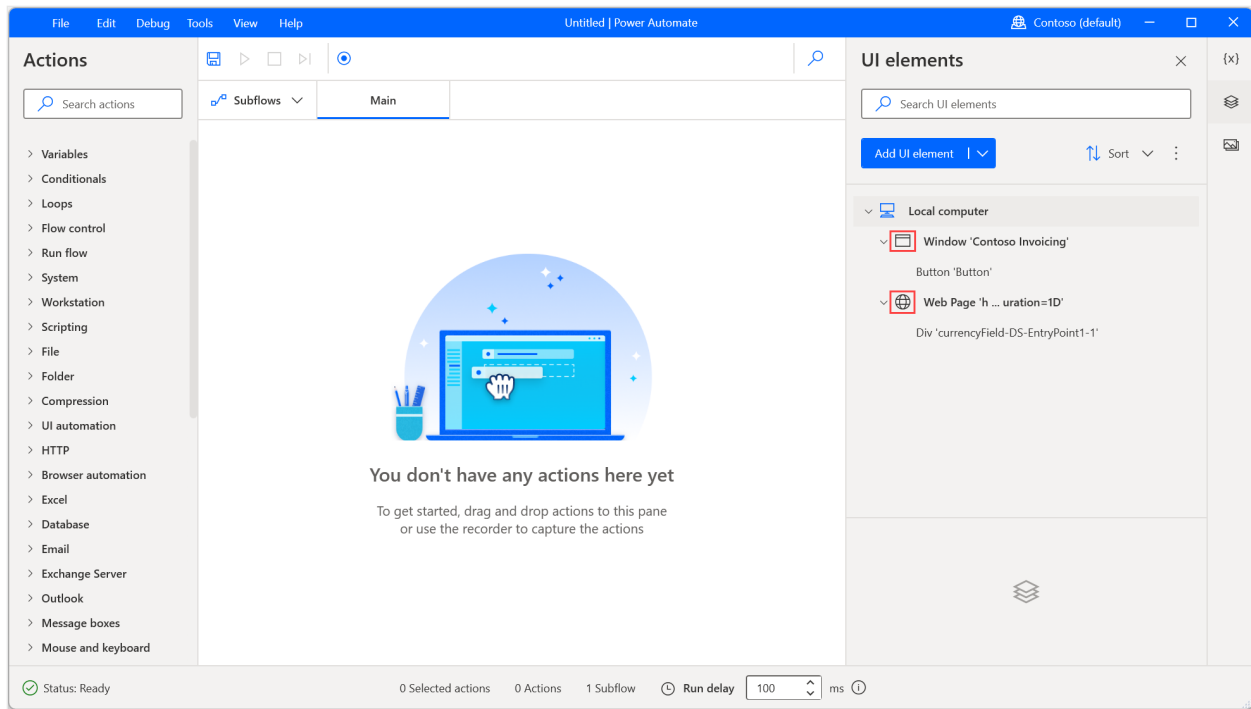
To find more information regarding desktop and web automation, refer to [Automate desktop flows](#) and [Automate web flows](#).

## UI elements for webpages

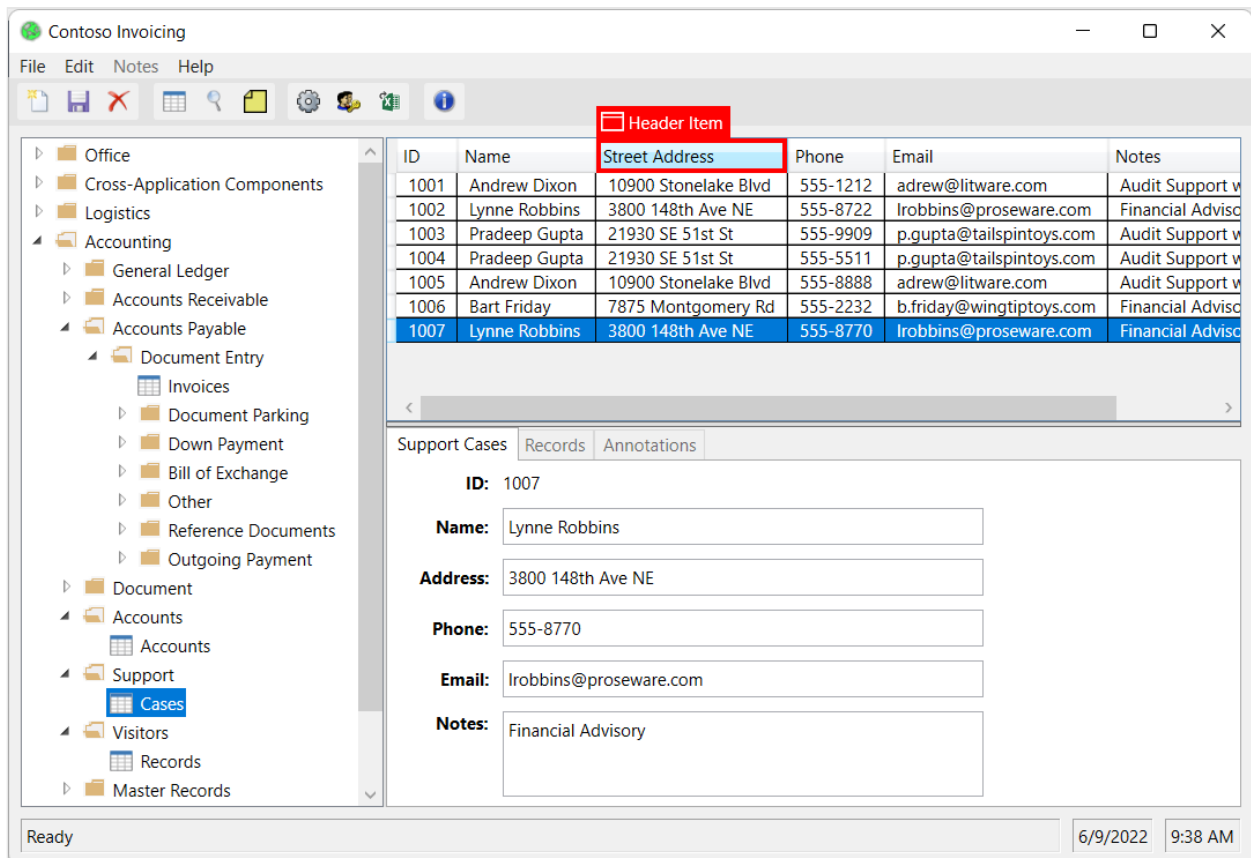
To capture a UI element from a webpage, you need to install the appropriate browser extension. You can find more information about the supported browsers and the required extension in [Use browsers and manage extensions](#).

## Distinguish desktop from web UI elements

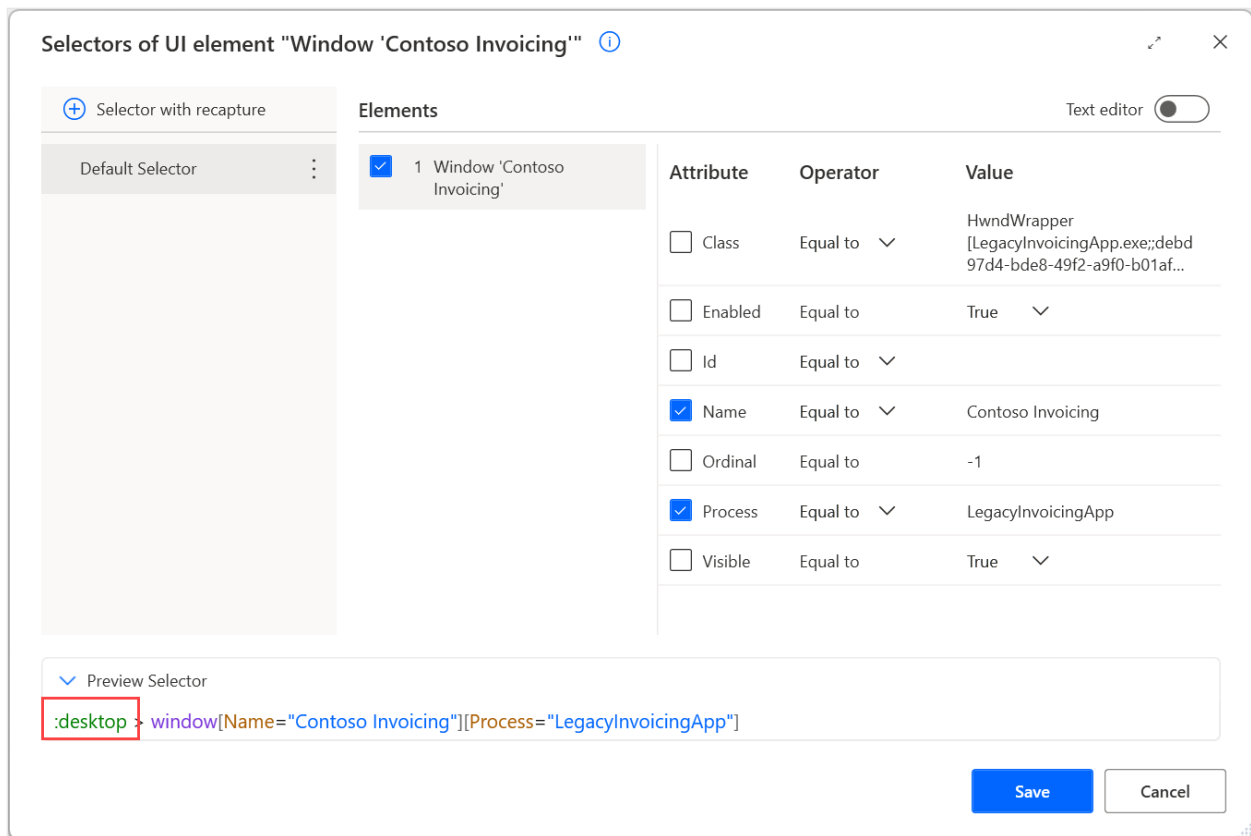
The UI elements pane displays distinctive visual indications to help users quickly recognize desktop and web UI elements.



The same icons are also displayed during capturing, so you can confirm the type of an element before even saving it.



Another method to check the type of a UI element is to review its selectors. Desktop UI elements usually have the desktop as their parent element, while web UI elements have a webpage as their root element.

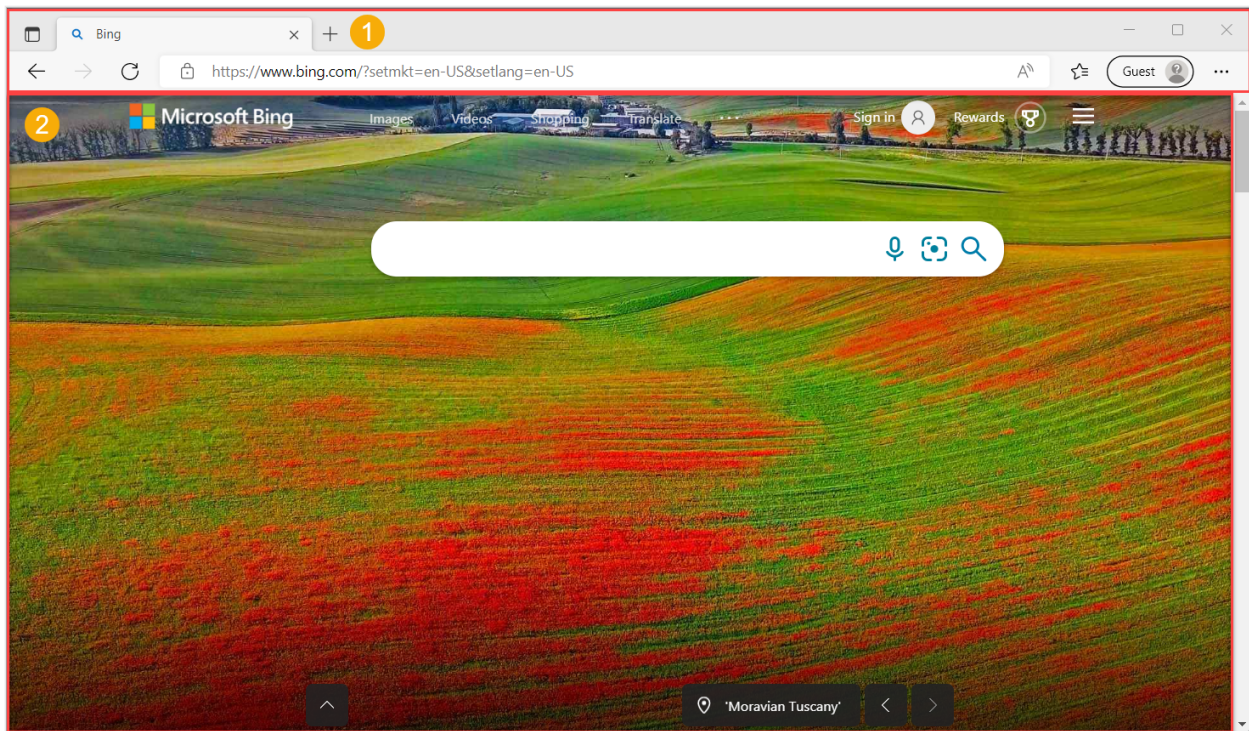


## UI elements in browser windows

The application part of a browser (1) should be automated using desktop UI elements. For example, you can use UI automation actions to interact with the address bar or the tabs.

On the other hand, the loaded webpages inside the browser (2) should be automated using web UI elements and browser automation actions.

During recording, the recorder will automatically distinguish the browser application area from the webpages and generate the appropriate UI elements and actions.



Interactions with drag and drop web UI elements might not function as expected due to their inherent limitations. As a workaround, capture desktop UI elements in a web page by opening the UI element picker through an action of the UI automation group by selecting **Add UI element** within the `UI element` parameter. The captured UI element is of desktop type and can be used in the `Drag and drop UI element in window` action. Keep in mind that desktop UI elements can be used only in actions of the UI automation action group of Power Automate for desktop. It's important to note that desktop UI elements in web pages aren't as reliable as their web counterparts and are subject to browser application details, such as the browser's version.

## UI elements properties

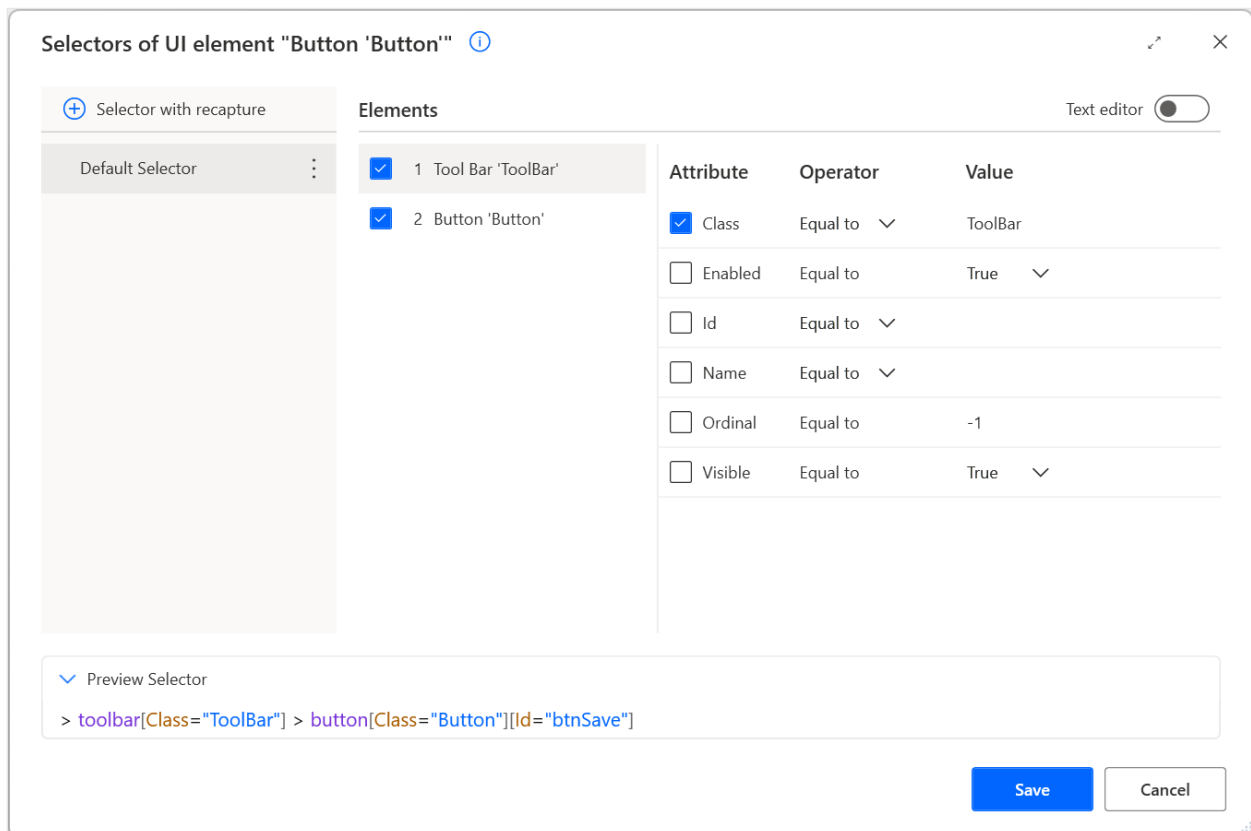
All UI elements consist of one or more selectors that pinpoint the UI or web component that Power Automate interacts with.

### ⓘ Note

Users can create multiple selectors for a UI element. Whenever a selector fails, Power Automate uses the following selector in the defined order.

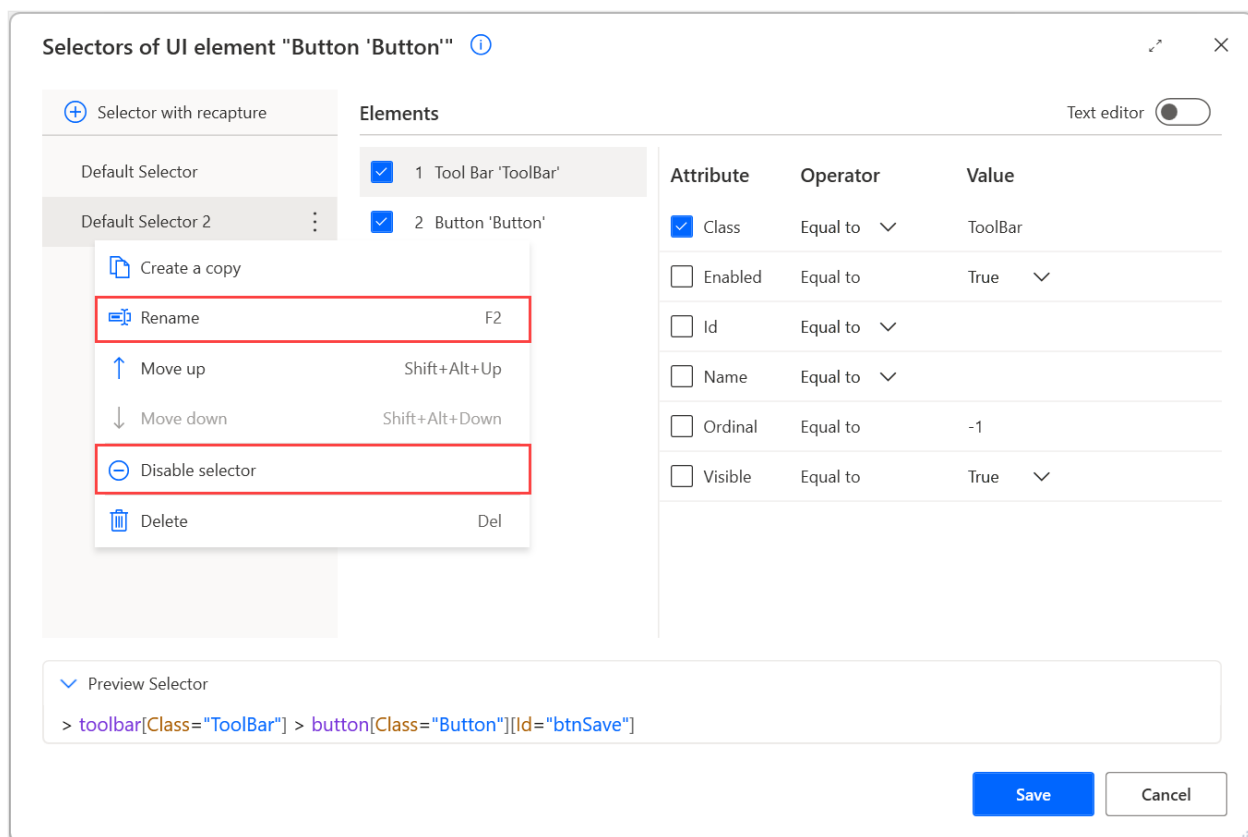
To manage the selectors of a UI element, right-click on it and select **Edit**. This option brings up the selector builder, where you can edit the selectors with a visual or a text editor.

Each selector consists of multiple elements representing the hierarchical structure of the UI element in the application or webpage. The attributes describe each element uniquely and distinguish it from other elements.



All selectors are displayed with a default friendly name that makes them easily accessible. To rename a selector, right-click on its name and select **Rename**.

When you edit a UI element with multiple selectors, you're able to disable a selector by right-clicking on it and selecting **Disable**. This functionality can be helpful during testing.



After editing the selectors, press **Save** to apply the implemented changes. Saving applies the changes in all the selectors in a single step.

You can find more information regarding selectors and how to build them manually in [Build a custom selector](#).

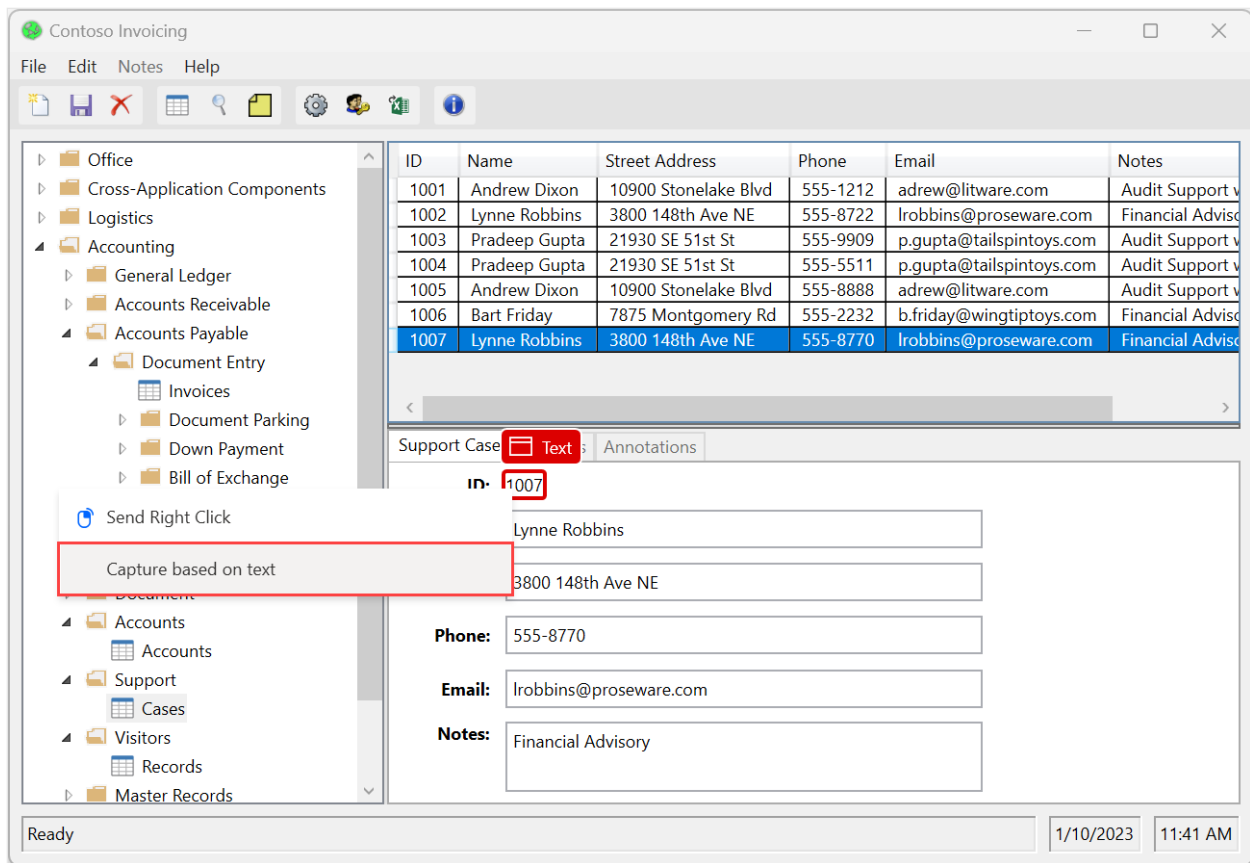
## UI elements with text-based selectors

Apart from the default way to generate selectors of UI elements, Power Automate supports the creation of selectors based on an element's text value.

This feature is helpful for automation scenarios that handle elements in desktop applications or webpages that always come with specific texts. Selectors based on these texts are more reliable and resilient to possible future changes in the application or webpage structure.

Generating text-based selectors is available only when capturing UI elements using the UI element picker (UI elements pane or browser/UI automation actions). It's not available during [recording](#).

To capture a UI element with a text-based selector, open the UI element picker, right-click on the desired element, and select **Capture based on text**.

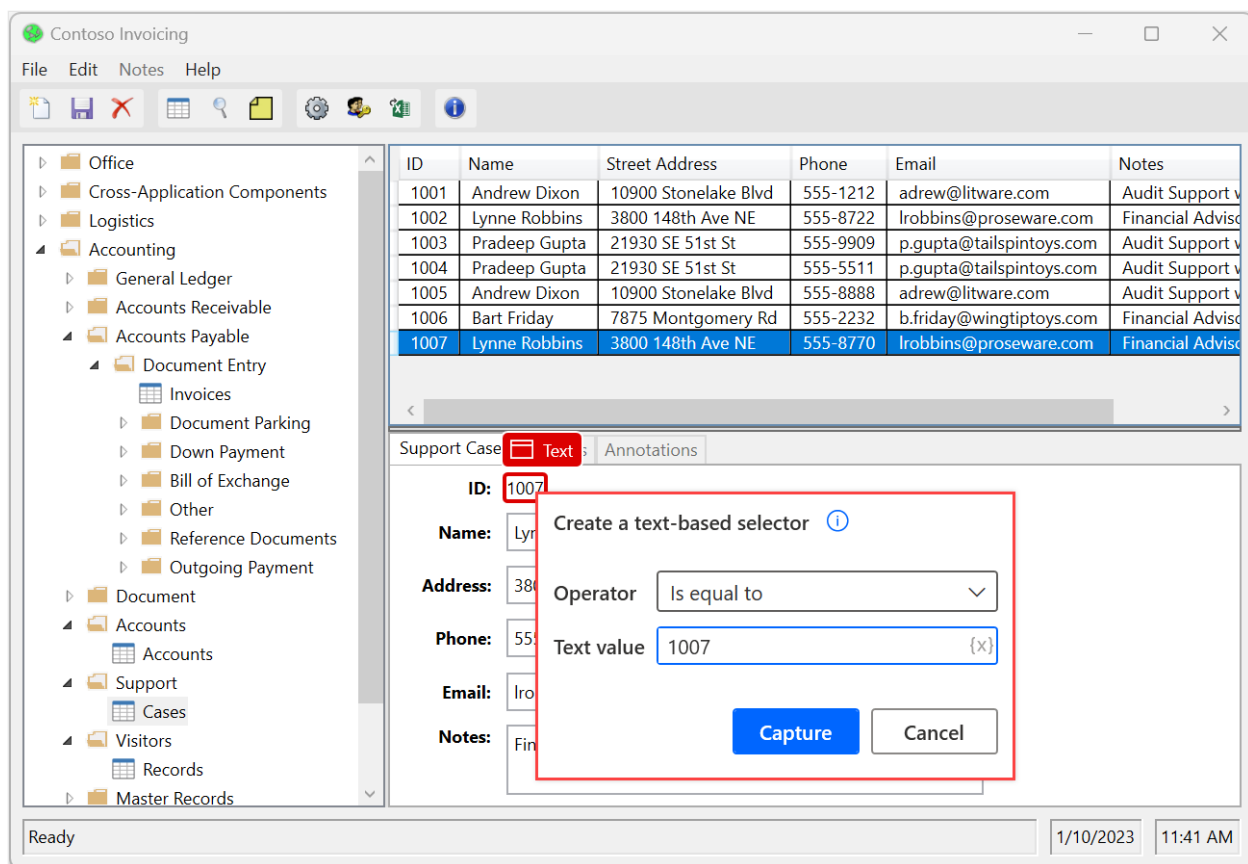


Then, a new window with two fields will appear on your screen:

- The **Text value** field holds the element's text as a proposed value. You can change this value to a hardcoded value or a variable.
- You can set the **Operator** field to various operators to adjust the functionality of the selector.

Selecting **Capture** will add the UI element with the proper text-based selector in the UI elements repository.





Text-based selectors use the **Name** attribute of the captured element for desktop automation and the **Text** attribute for browser automation. They're available only for UI elements that contain a text value themselves.

In other words, they're available for UI elements with a **Name** or **Text** attribute that includes a value. They aren't available for elements that don't hold such a text value, even if they have child element(s) with text in their structure.

### ⓘ Note

For the SAP application, text-based selectors use the **Text** attribute instead of the **Name** attribute that they generally use on desktop automation. SAP automation works more efficiently with default selectors based on the **ID** attribute.

## Known issues and limitations

- If you select **Add UI element**, hover the mouse over a whole window, and choose to capture a UI element based on text, a default selector will get generated. This selector includes the **Process** attribute apart from **Name**.
- The combination of a variable and an operator other than **Equal to** generates a selector displayed in the custom text editor instead of the visual builder. This

functionality avoids an existing limitation that makes the above combination nonfunctional in the visual builder.

# Inspect a UI element

Article • 10/19/2023

The inspect UI element tool is a powerful feature in Power Automate for desktop that allows you to explore the hierarchy tree of all UI elements on your screen, check their attributes and values, and capture them for use in your desktop flow through the UI and browser automation actions.

## Open the inspect UI elements tool

To open the inspect UI element tool, there are three approaches:

- Locate the designer component of Power Automate for desktop, and then go to the UI element repository. Select the **Add UI element** from the dropdown list and launch the UI element picker. Then, in the UI element picker window, select the **Inspect UI elements** arrow.
- Locate the designer component of Power Automate for desktop, and then go to the UI element repository. Select the dropdown list and then select the **Inspect UI elements** option.
- In the designer window, navigate to the **Tools** option in the menu bar and select the **Inspect UI elements** option.

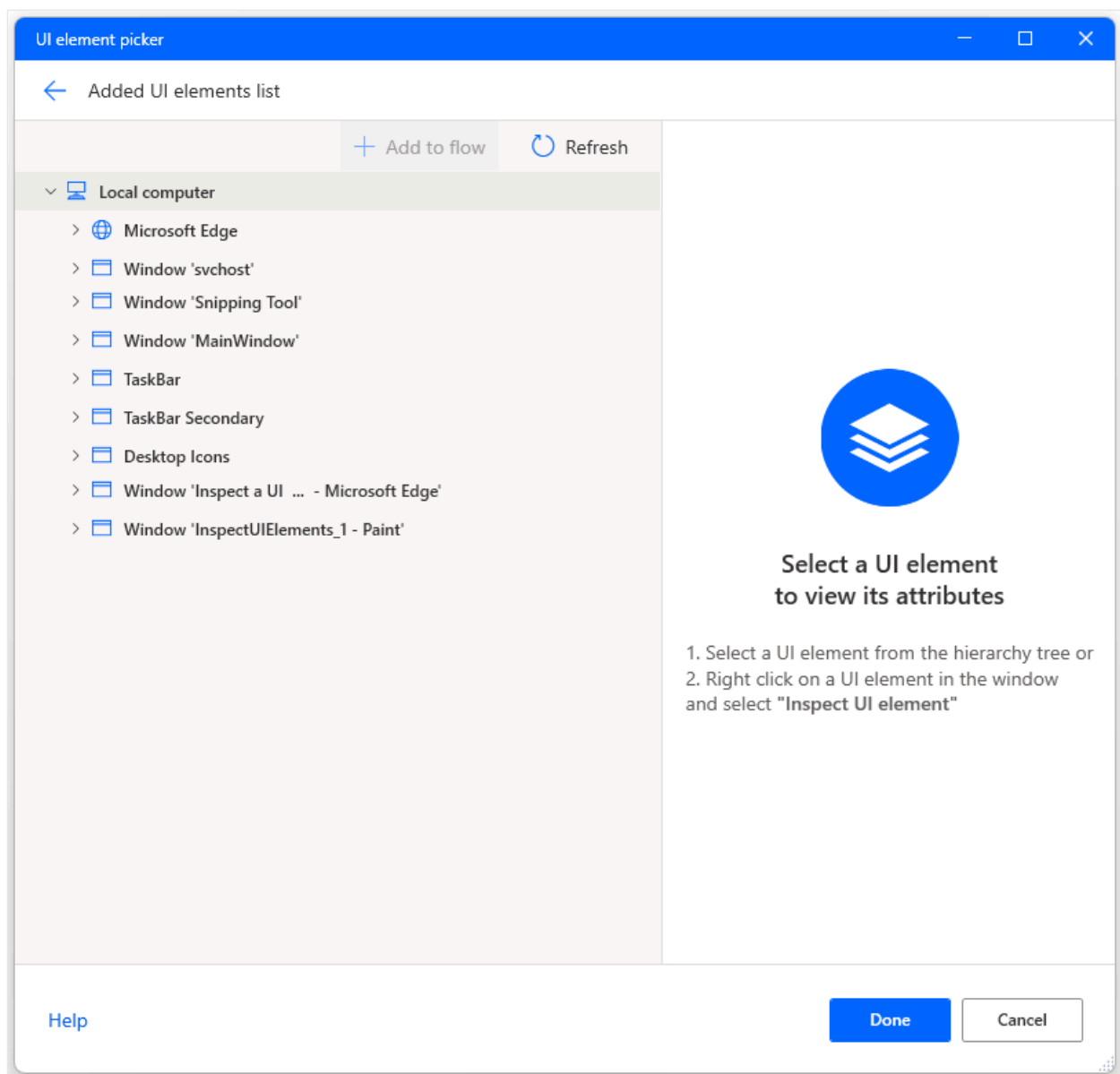
## Description of inspect UI elements tool

When you open the inspect UI elements tool, a hierarchy tree with all available UI elements on your machine is displayed. This includes both web and desktop UI elements, which are separated by their respective icons. Moreover, the web UI elements are split into each browser for easier navigation, displaying each tab that is opened in your browser as a parent UI element. Note that the tabs aren't actual UI elements. You can expand the tree by selecting the expand icon next to a UI element, which loads and displays all of its children UI elements.

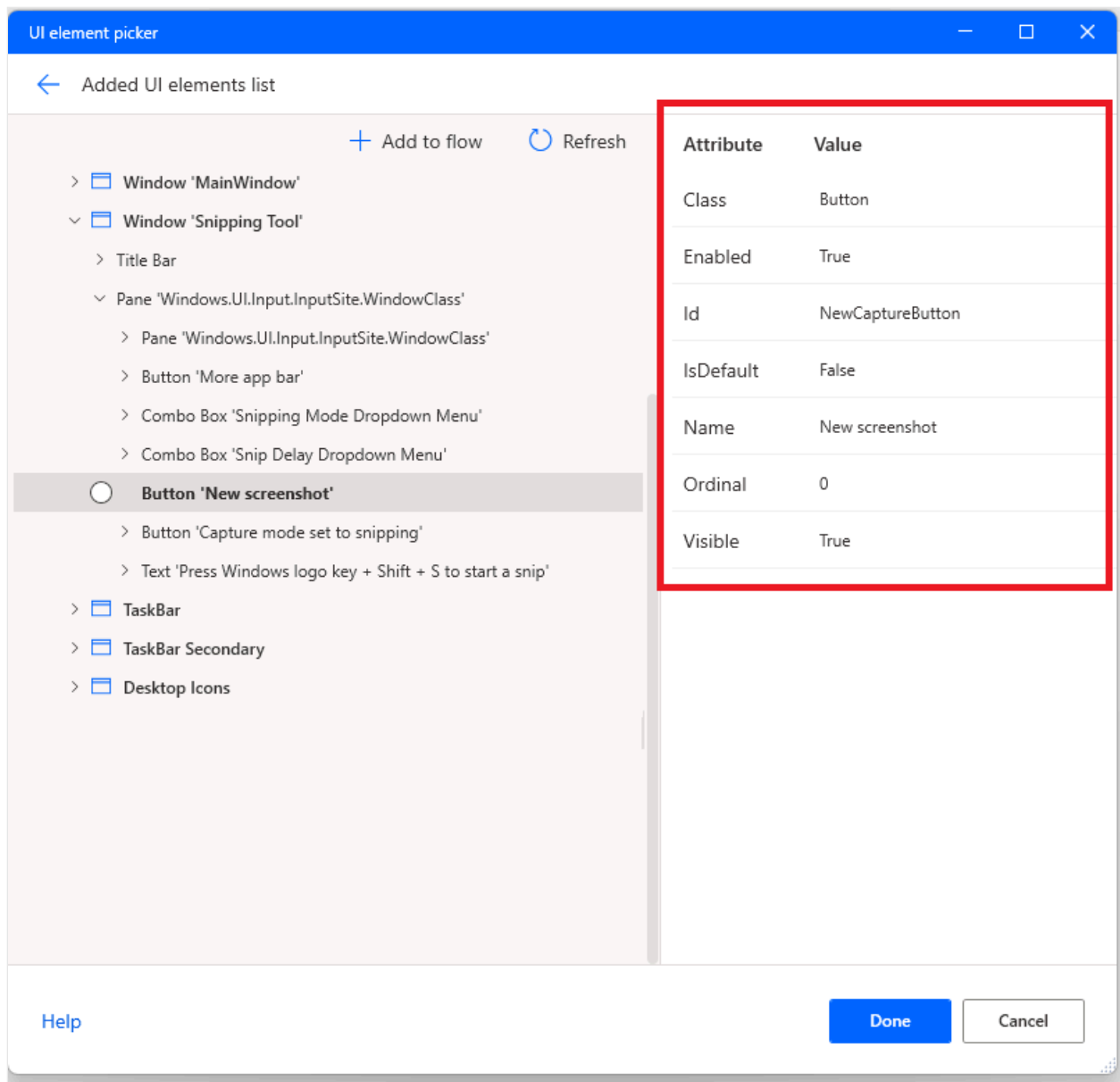
### ⓘ Note

You see the desktop UI elements of a virtual desktop when a connection is opened between your machine and the Citrix virtual desktop or the virtual machine through Remote Desktop Services (RDS) and Power Automate agent for virtual desktops is installed and running in the virtual desktop or machine. More information:

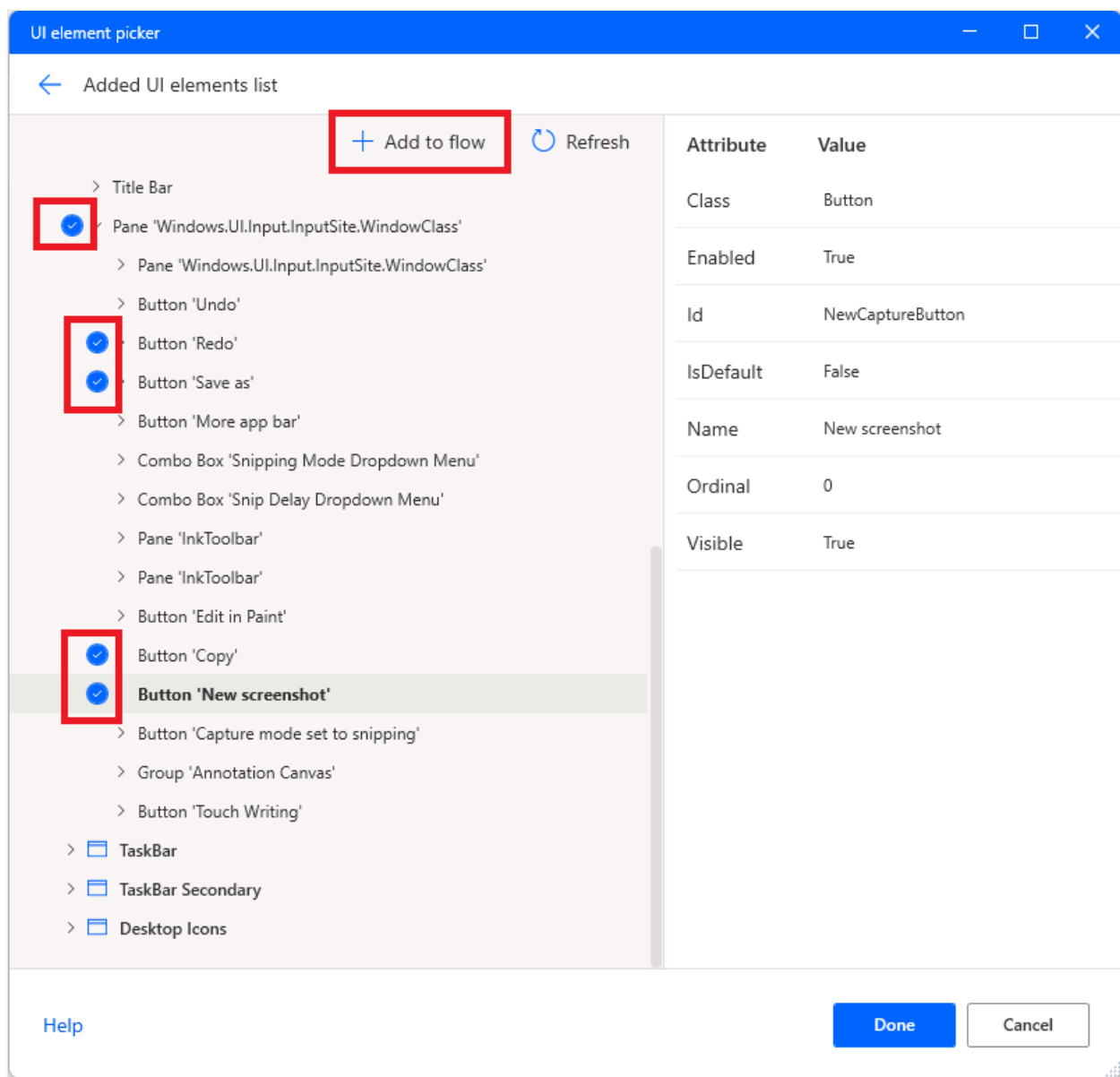
[Automate on virtual desktops](#)



Selecting a UI element in the hierarchy tree displays its attributes and values on the right pane of the tool. These attributes and values can be used to create a custom selector in the UI element builder of the designer for the specific UI element. In order to edit the selector of a UI element, you have to capture it and open it in the UI element selector builder window.



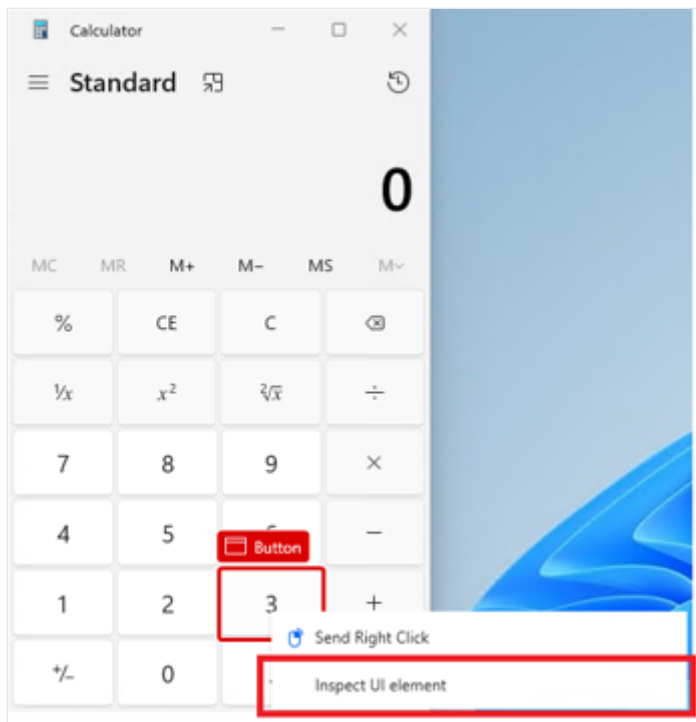
You can capture one or more UI elements and store them in the UI element repository of the desktop flow by hovering to the left of a UI element in the hierarchy tree and checking those you desire. Then, you can select the **Add UI element** on the top of the tool. The captured UI elements can then be used in a UI automation or browser automation action respectively, depending on its type (desktop or web UI element).



The hierarchy tree is refreshed every time you expand a UI element. You can refresh the whole tree by selecting **Refresh** on the top of the tool.

## Navigate in hierarchy tree to a specific UI element in the screen

While the inspect UI elements tool is opened, the Power Automate for desktop highlighter is visible. Go directly to a specific UI element by hovering with your mouse over the desired UI element and then right-click. This opens the context menu. Select the **Inspect UI element** option that takes you to the specific UI element in the hierarchy tree of the tool. Select the UI element to display the attributes and the respective values.



## Known issues and limitations

- **Issue:** Hierarchy tree of specific web browser pages can't be displayed in the tool when the browser window containing them is minimized.

**Workaround:** Ensure the web browser window that you want to inspect isn't minimized on your machine.

- **Issue:** Specific web browser's tree of UI elements can't be displayed in the tool if the Microsoft Power Automate web extension isn't installed and enabled.

**Workaround:** Ensure that the Microsoft Power Automate web extension is installed and enabled in the respective web browser.

- **Issue:** A specific desktop application isn't displayed in the hierarchy tree in the tool.

**Workaround:** Check whether the desktop app is running with elevated rights. If yes, restart Power Automate for desktop and run it with elevated rights. And then try again.

- **Issue:** A virtual desktop connected through Citrix or RDS, or as a Citrix virtual app or as a remote app isn't displayed in the tool.

**Workaround:** Ensure that Power Automate agent for virtual desktops component is installed, up and running in the respective virtual machine.

## Related information

[Automate using UI elements](#)

[Automate desktop applications](#)

[Automate webpages](#)

[Build a custom selector](#)

[Automate on virtual desktops](#)

---

## Feedback

Was this page helpful?

Yes

No

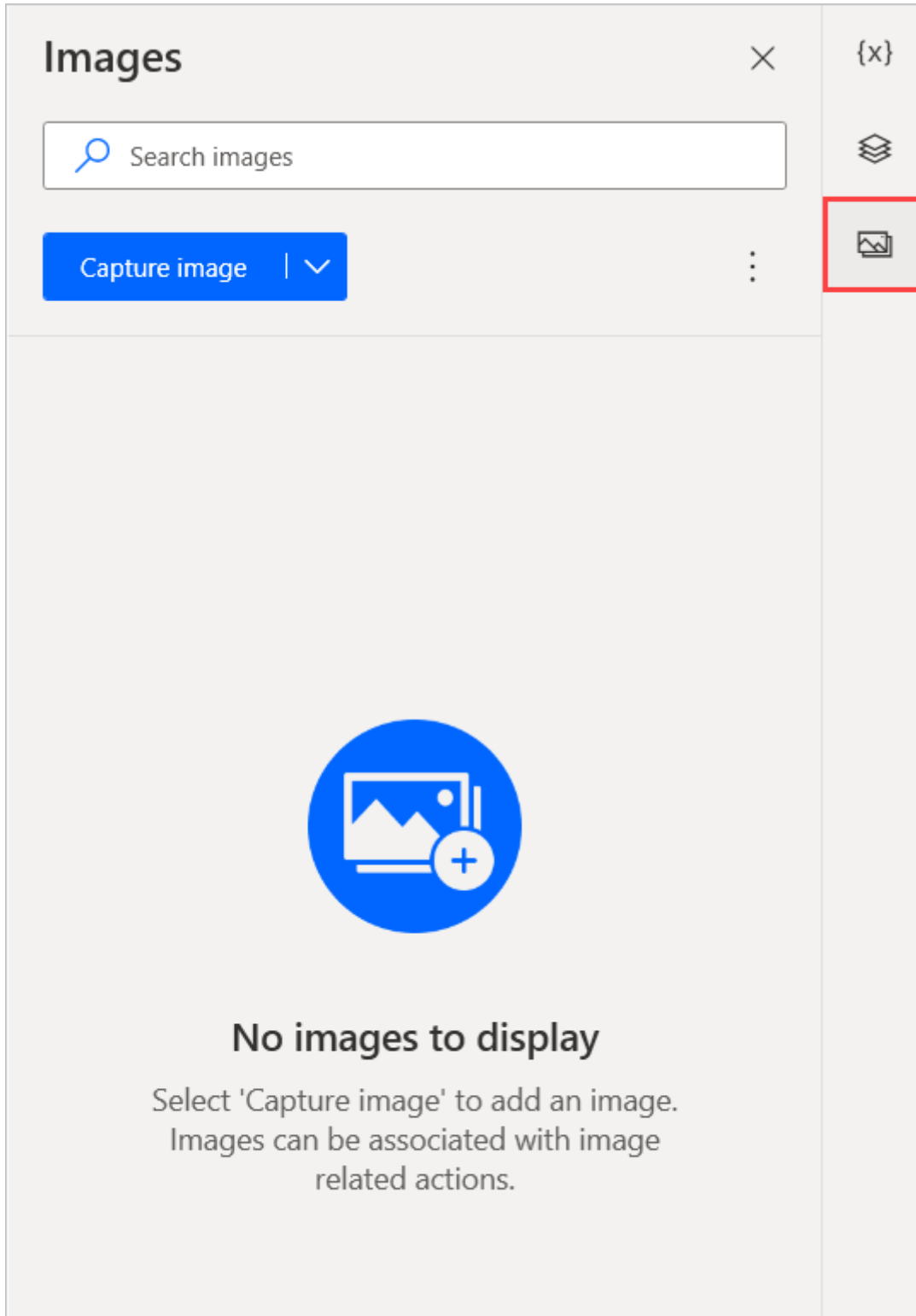
[Provide product feedback](#) [↗](#)



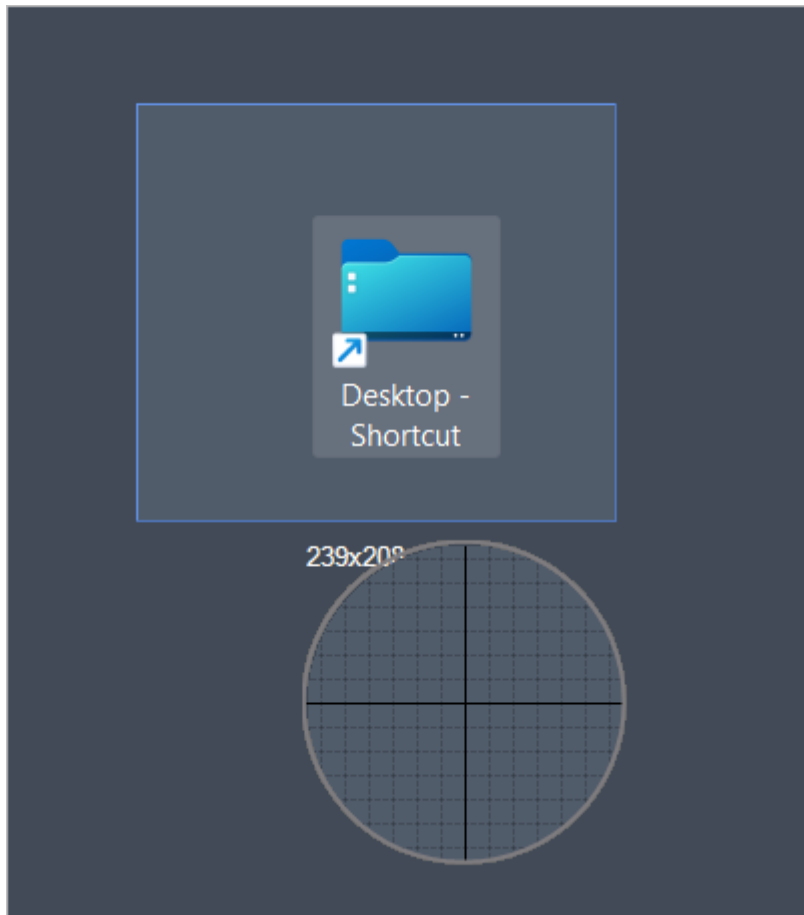
# Automate using images

Article • 02/24/2023

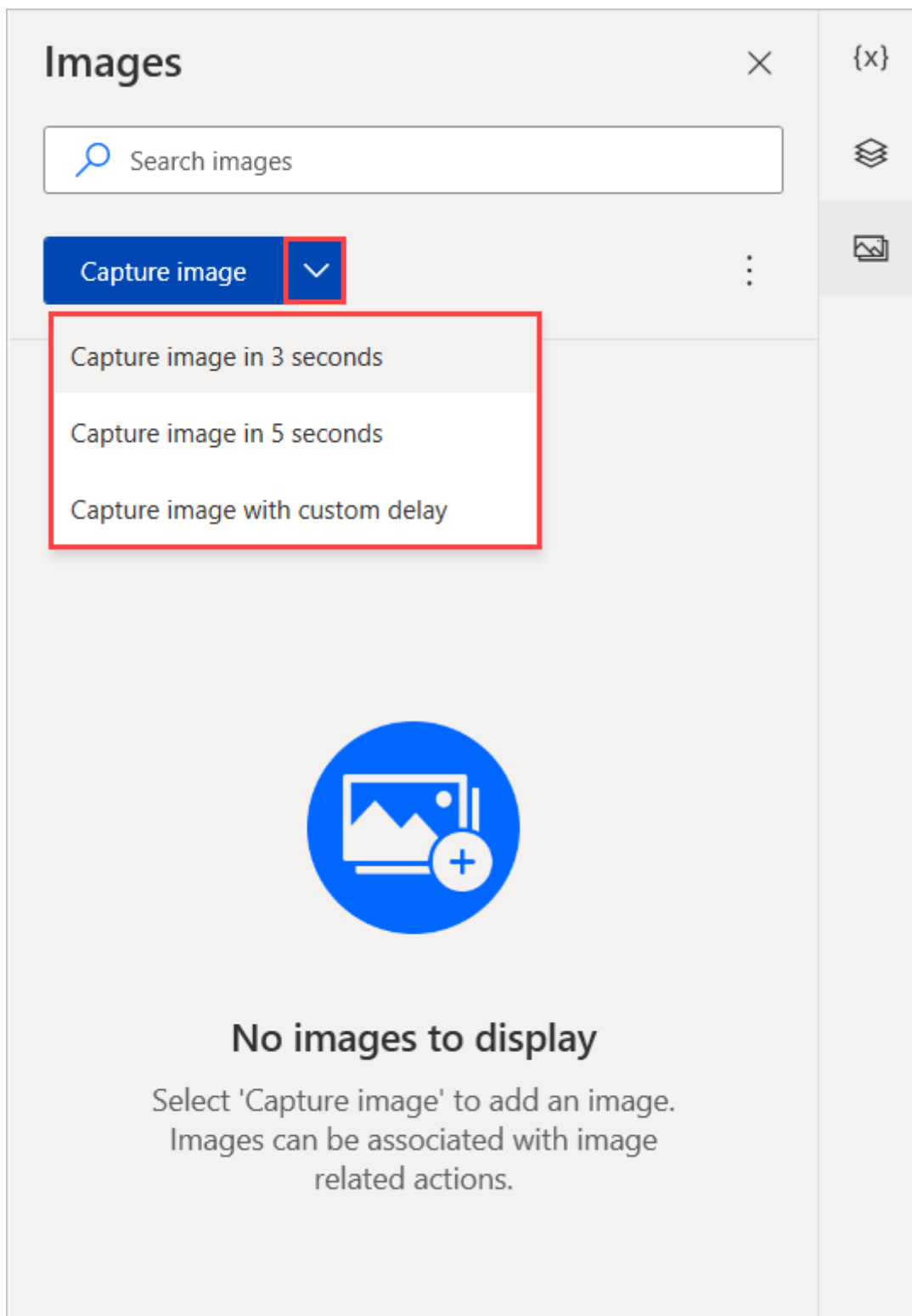
To capture a new image in Power Automate, navigate to the **Images** tab on the right pane of the flow designer.



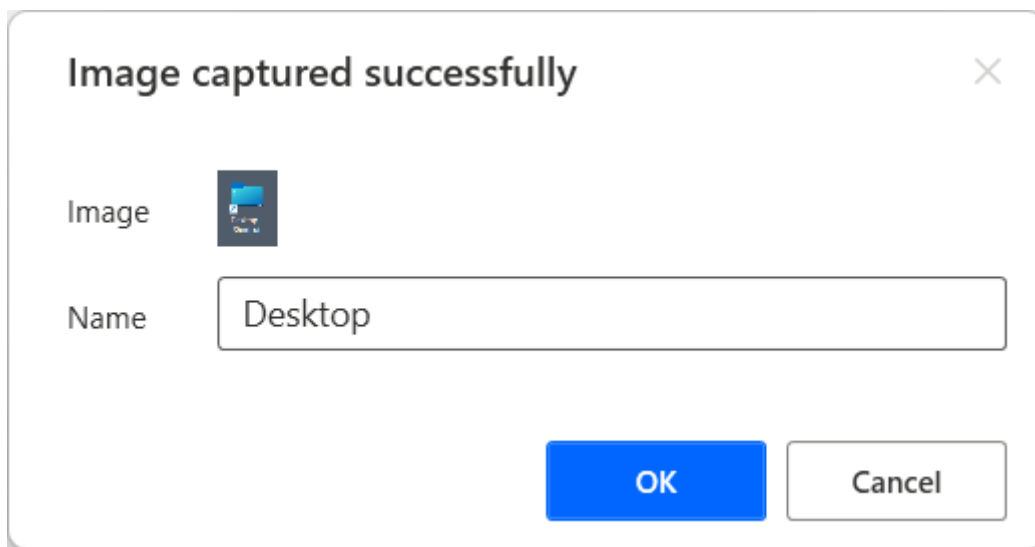
Select **Capture image**, and click and drag the cursor on the area you want to capture. A magnifying glass will help you to capture the image with high precision.



Alternatively, select the arrow on the **Capture image** button to capture images on a timer. Then, choose one of the suggested time options or **Capture image with custom delay** to set a custom delay time.



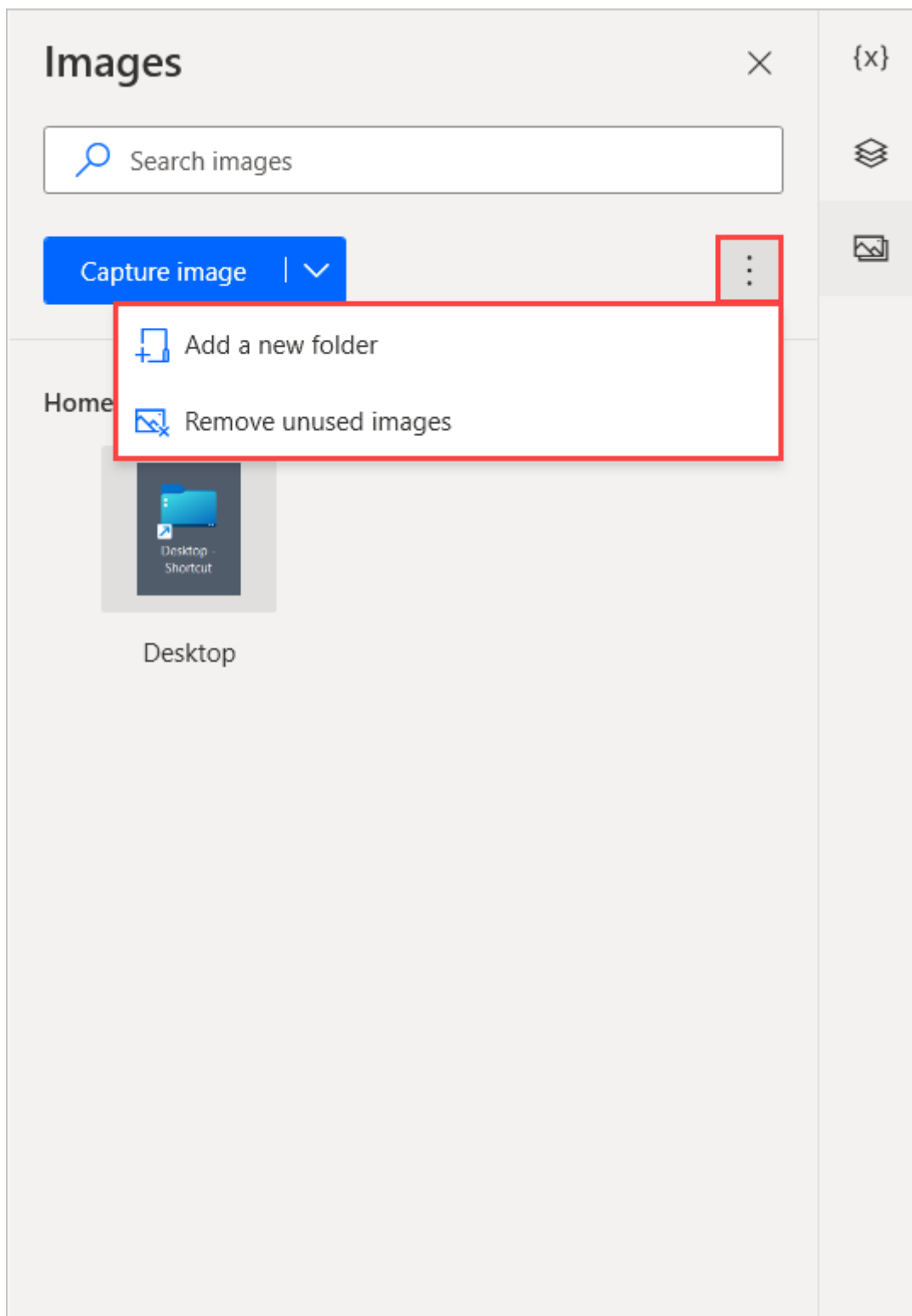
After capturing the image, populate a name for it in the dialog box and select **OK** to add it to the flow.



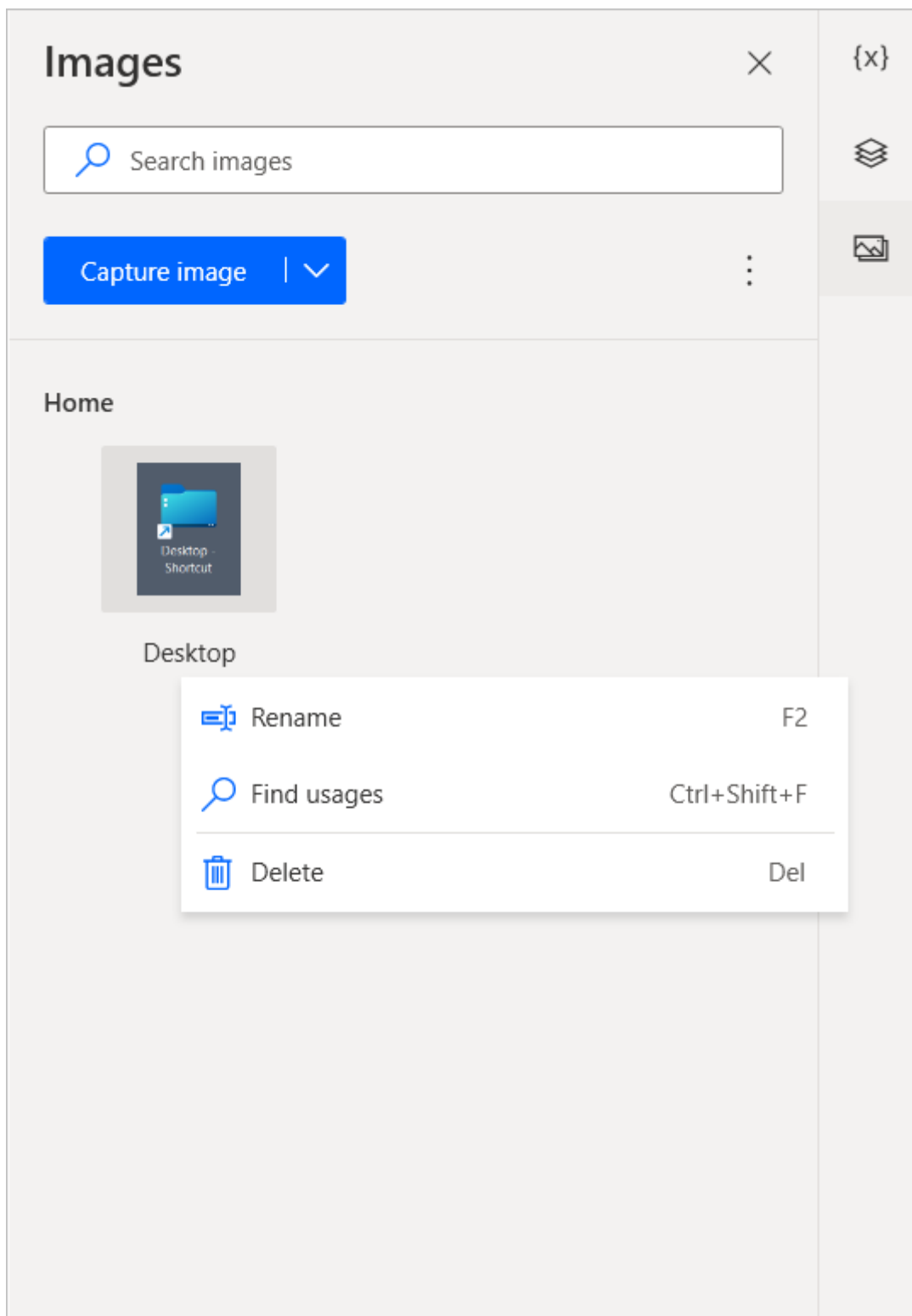
## Manage captured images

To remove all the images that aren't used in any action, select the dots icon next to the **Capture image** option, and then select **Remove unused images**. If you navigate inside a specific folder, the **Remove unused images** option will remove only the unused images located in this folder.

To create a new folder, select **Add a new folder** and specify a name for the created folder. You can store images into a specific folder by capturing them while the folder is open.



To rename or delete images and folders, right-click on the respective item and select the appropriate function. Select the image thumbnail to open and view it.



To find where an image is being used in the flow, right-click on it and select **Find usages**. The results will present the actions that use the specific image. Double-clicking on a result will highlight the action in the workspace.

Find usages of image		
	Desktop	1
Main	Line: 1	Move the mouse pointer on the <a href="#">center</a> of the image found on the <a href="#">Entire screen</a>

## Use images in actions

After capturing images, you can use them as input in actions that require them, such as the **Move mouse to image** action.

### Move mouse to image

✕

🖱️ Moves the mouse over an image found on screen or on the foreground window [More info](#)

#### Select parameters

Image to move mouse to

🖼️ Desktop

🖼️ Select image(s)

Mouse movement style:

Instant

ⓘ

Occurrence:

1

ⓘ

Send a click after moving mouse:

ⓘ

> **Advanced**

> **Variables produced** X Y

🛡️ On error

Save


Cancel

In the advanced settings of these actions, you can select which image matching algorithm you want to use. The **Basic** algorithm achieves better results with images less

than 200x200 pixels, while the **Advanced** algorithm is more effective with bigger images and more robust to color changes.

The **Tolerance field** defines the acceptable amount of differences between the provided image and the image is compared with. High tolerance values may affect the precision of image recognition.

### Move mouse to image ✕

 Moves the mouse over an image found on screen or on the foreground window [More info](#)

▼ **Advanced**

Wait for image to appear:  ⓘ

Fail timeout:  ⓘ

Image matching algorithm:  ⓘ

Mouse position relative to image:  ⓘ

Offset Y:  {x} ⓘ

Tolerance:  ⓘ

Search for image on:  ⓘ

Search mode:  ⓘ

> **Variables produced** X Y



# Handle errors in desktop flows

Article • 04/19/2023

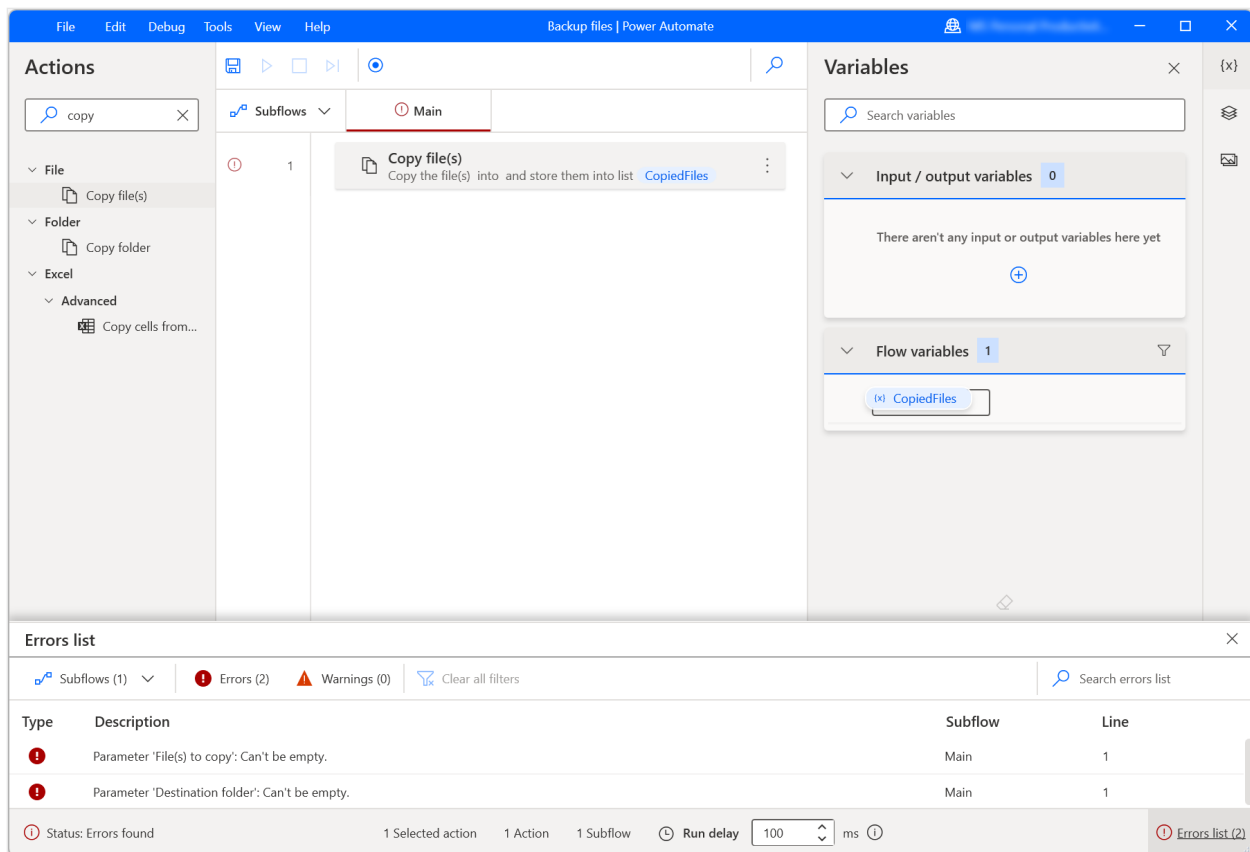
During developing and running, you may encounter errors and warnings in your desktop flows. This article presents the different error and warning types, the **Errors** pane, and the available error handling functionality.

## Desktop flows error types

Desktop flows can cause two kinds of errors:

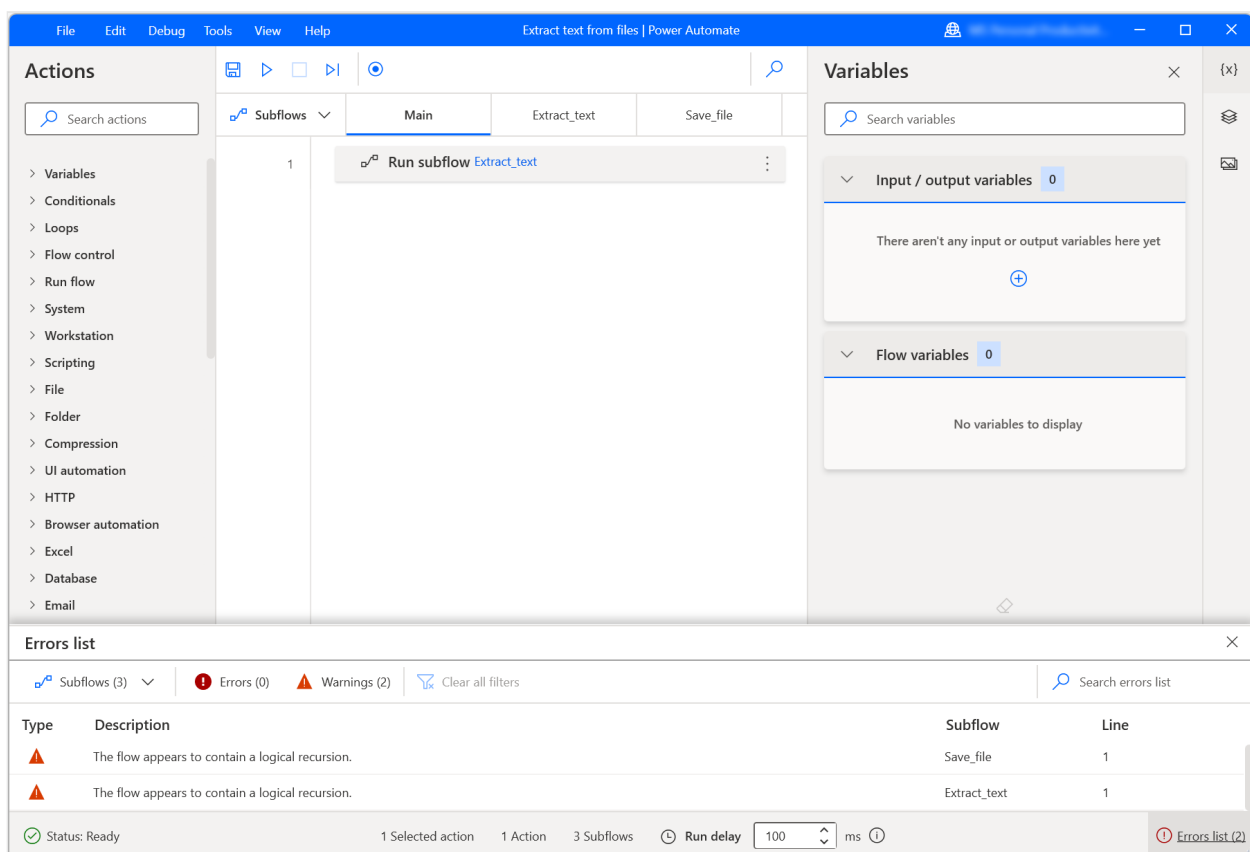
- **Design-time errors** are associated with the configuration of the deployed actions. These errors appear during development and prevent desktop flows from running. For example, an empty mandatory field or an undefined variable can cause this type of error.
- **Run-time errors**, also known as exceptions, occur during execution and make desktop flows fail. For example, an invalid file path can cause this kind of error. Use any of the [available error-handling options](#) to prevent your desktop flows from failing.

When an action throws an error, the flow designer displays an icon next to it and a pop-up pane with relevant information. If the error occurred is a design-time error, the flow designer also displays an error description in the action's modal.



## Desktop flows warnings

Apart from errors, the flow designer displays warnings that indicate non-critical issues in your desktop flows. Warnings don't prevent desktop flows from running but indicate possible unwanted functionality, such as infinite recursions of subflows.



# Review errors and warnings using the errors pane

The errors pane is the flow designer's component responsible for displaying information regarding occurred errors and warnings.

It consists of four columns:

- **Type:** Indicates if the displayed item is an error or warning.
- **Description:** A description of the occurred error or warning.
- **Subflow:** The name of the subflow that contains the erroneous action or the action that causes the warning.
- **Line:** The line number of the erroneous action or the action that causes the warning.

The pane also provides filters to display errors, warnings, and/or items related to specific subflows.

The screenshot shows the Power Automate interface with the Errors list pane open. The pane displays two items:

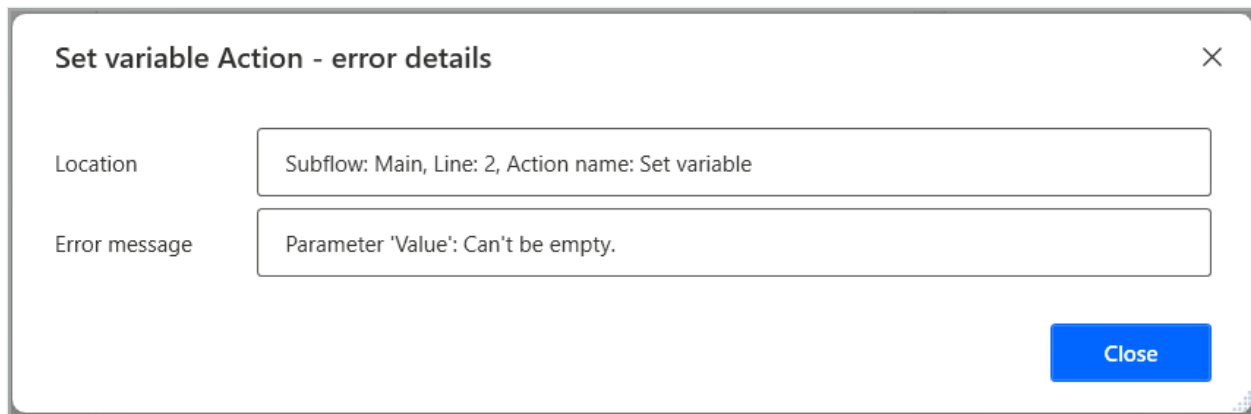
Type	Description	Subflow	Line
Error	Parameter 'OCR engine variable': Can't be empty.	Main	1
Warning	The 'OCR engine variable' as an engine type is going to be deprecated. Make sure you update your flows using alternative OCR engine types.	Main	1

The pane also shows filters for 'Errors (1)' and 'Warnings (1)' and a search bar for the errors list. The status bar at the bottom indicates 'Status: Errors found' and '1 Selected action'.

To see additional information regarding a design-time error or warning, double-click the respective item in the errors pane. Once you do so, a dialog will display information about:

- **Location:** The subflow, line and action that caused the design-time error or warning.

- **Error message:** The message of the occurred design-time error or warning.



To see additional information regarding a runtime error, double-click the respective item in the errors pane. Once you do so, a dialog will display information about:

- The message of the occurred error or warning.
- **Location:** The subflow, line and action that caused the error or warning.
- Possible remediation steps to resolve the issue that occurred (currently only applicable to Excel actions' errors).
- **Error details:** The error's correlation ID, as well as a long, technical description of the occurred runtime error.

## Error details

Failed to open Excel document 'wrong\_Excel\_file\_path' (File related error).

**Location:** Subflow: Main, Line: 1, Action name: Launch Excel

### Please try the following:


Make sure that:

- The Excel file exists and its name or path has been spelled correctly.
- The file name does not contain more than 207 characters.
- The file path does not contain more than 255 characters in total.
- If required, the provided passwords for read and/or write protection are correct.
- The file has not been corrupted and the file extension matches the format of the file.

### ▼ Error details

Correlation Id: b7386159-fa1b-4862-a00c-b311f9236db3

documentPathSafe: Microsoft.Flow.RPA.Desktop.Modules.SDK.ActionException:  
Failed to open Excel document 'wrong\_Excel\_file\_path' (File related error). --->

 Copy details

Close


## Configure error-handling functionality

Power Automate enables you to configure error-handling functionality for single actions and blocks of actions in your desktop flows.



### Handle errors of single actions


By default, desktop flows stop their execution when an error occurs. To configure a custom error-handling functionality for a specific action, select On error in its modal.

### Copy file(s) ✕

 Copy one or more files into a destination folder [More info](#)


Select parameters

File(s) to copy:    {x} ⓘ

Destination folder:   {x} ⓘ

If file exists:  ⌵ ⓘ

> Variables produced CopiedFiles


 On error

Save

Cancel


The first available option is the **Retry action if an error occurs** checkbox. This option makes the flow run the action a set number of times after a set number of seconds. The default value is one retrying with an interval of two seconds.



### Copy file(s) ✕

 The following rules will apply if the action fails [More info](#)

Retry action if an error occurs

Times  ⌵ ⓘ    Interval  ⌵ sec ⓘ


⌵  All errors

 New rule     Clear all

No rules added

Continue flow run

Throw error

>  Advanced

← Return to parameters

Save

Cancel

To keep your desktop flow running even if the retry option fails, select **Continue flow run**. Through the displayed drop-down list, you can:

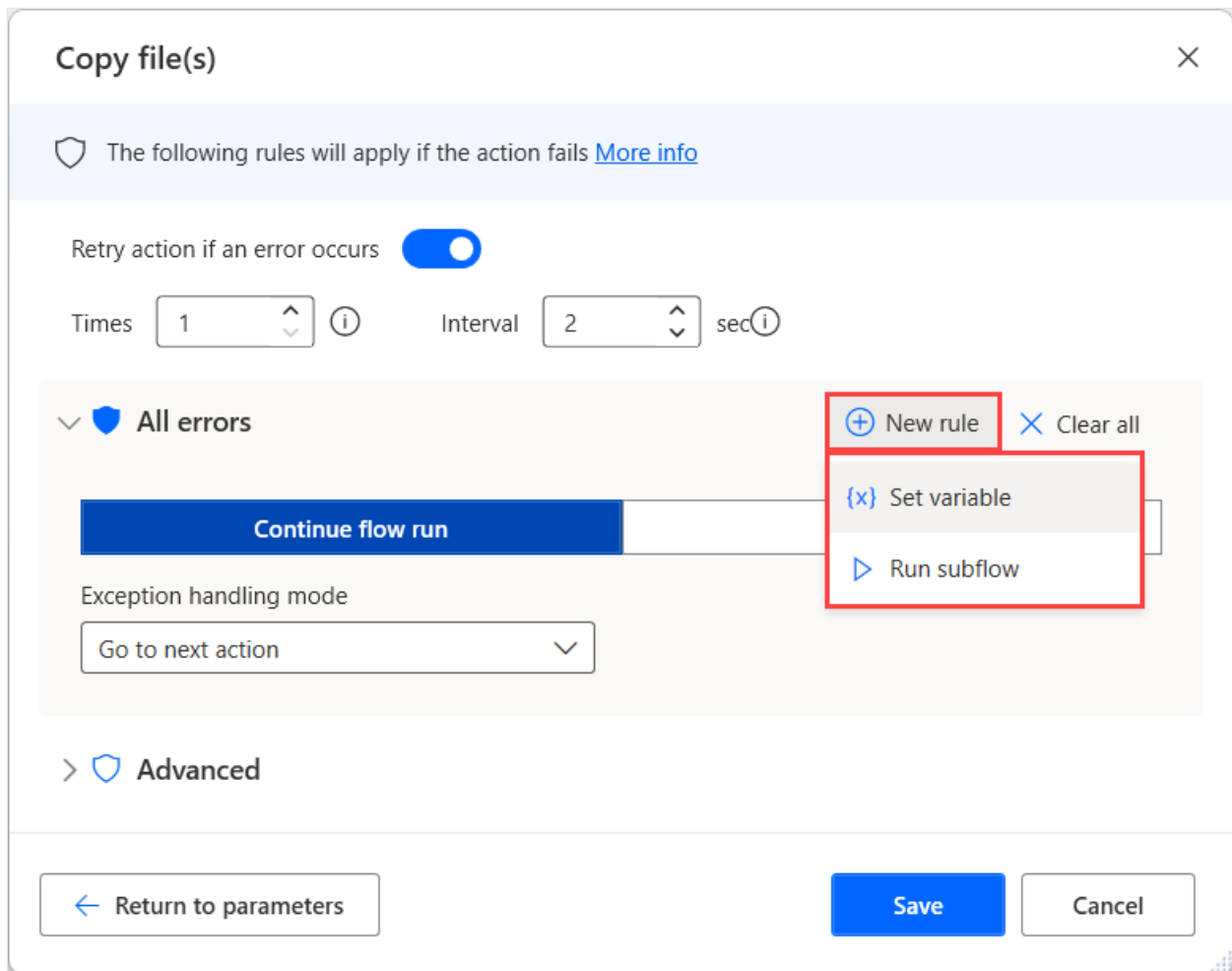
- **Go to next action:** Runs the following action in order.
- **Repeat action:** Repeats the action until it runs successfully.
- **Go to label:** Run the desktop flow from a point defined by a **Label** action.

The screenshot shows the 'Copy file(s)' dialog box with the following settings:

- Retry action if an error occurs:** Enabled (toggle switch).
- Times:** 1
- Interval:** 2 sec
- Exception handling mode:** A dropdown menu is open, showing options: 'Go to next action' (selected), 'Repeat action', and 'Go to label'. The 'Continue flow run' button is highlighted in blue.
- Buttons:** 'Return to parameters', 'Save', and 'Cancel'.

Desktop flows offer two more error handling options. Select **New rule** to:

- **Set variable:** Sets the specified value to a selected variable.
- **Run subflow:** Runs a specified subflow.



If different errors require different error handling functionality, select **Advanced** and configure each possible error separately.

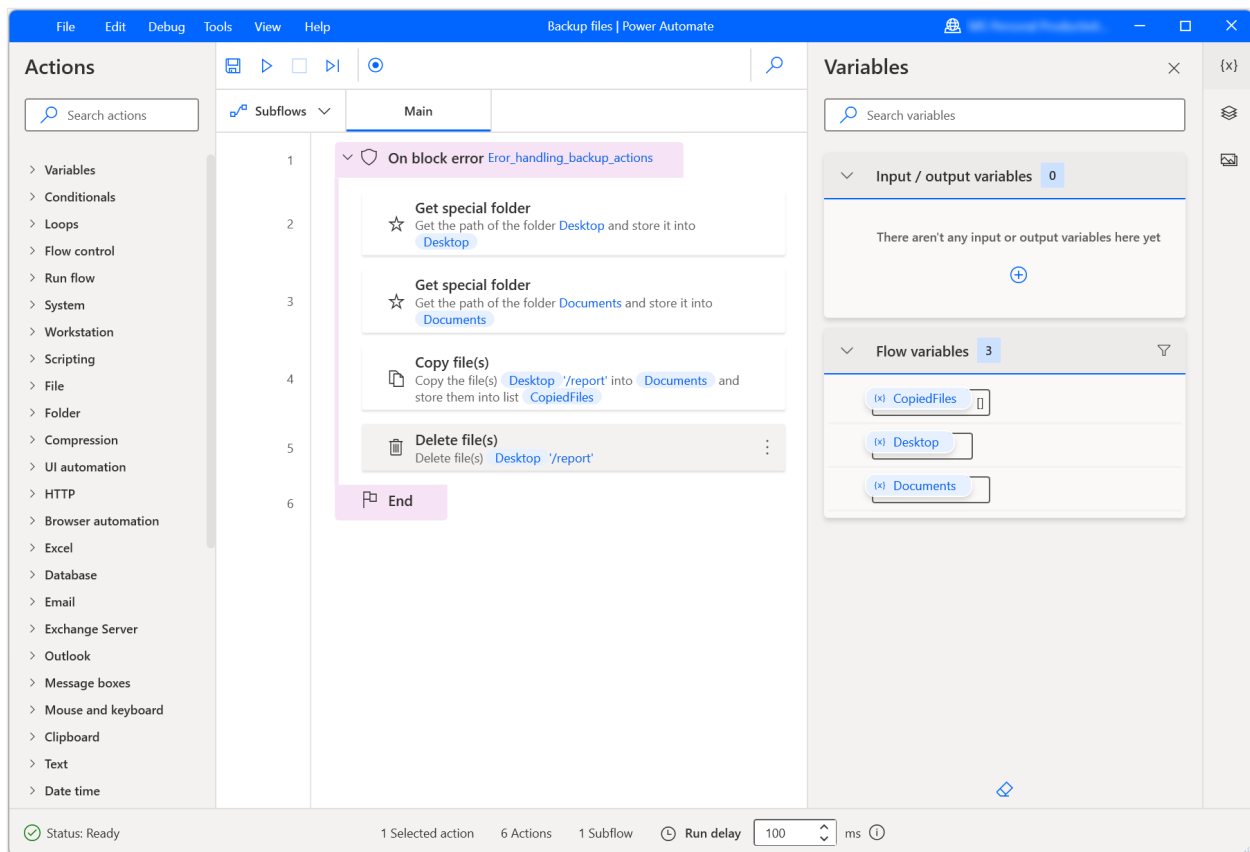
## Handle errors of group of actions

Some scenarios may require you to implement the same error-handling functionality for several actions in your desktop flows.

Instead of configuring each action separately, you can deploy the **On block error** action and configure error-handling for all the actions inside the block.

This action offers almost the same options as the **On error** settings of single actions but also allows you to capture unexpected logic errors, such as trying to access a list item from an out-of-bounds position.





## Retrieve occurred errors in desktop flows

To retrieve the latest occurred error in a desktop flow and use it in later actions, use the **Get last error** action.

This action returns an error type variable that provides six different properties: the name, the location and the index of the action that failed, the subflow that contains this action, and the details and the message of the action.

To avoid retrieving the same error value later in your desktop flow, enable the **Clear error** option that clears the last error after storing it in the variable.

## Get last error



{x} Retrieves the last error that occurred in the flow [More info](#)

### Select parameters

Store into:  {x}

Clear error:   ⓘ

Save

Cancel

# Record desktop flows

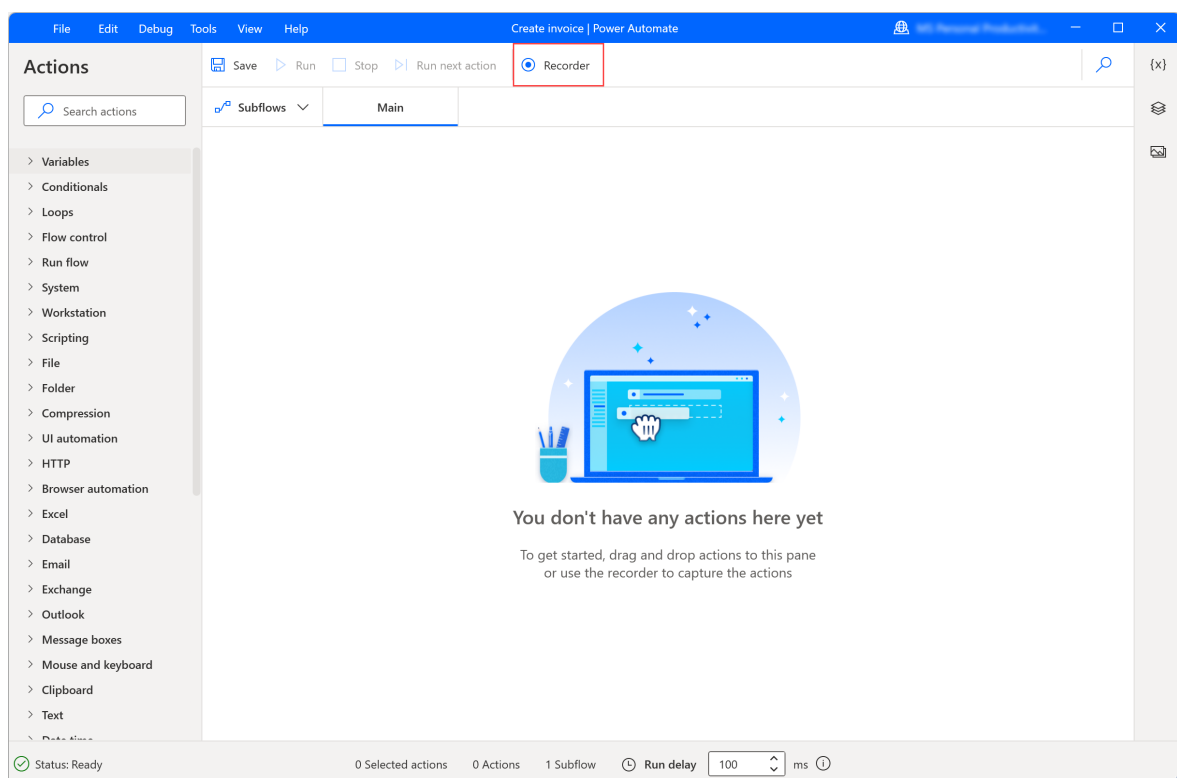
Article • 02/24/2023

Power Automate enables you to design desktop flows automatically by replicating the tasks you wish to automate.

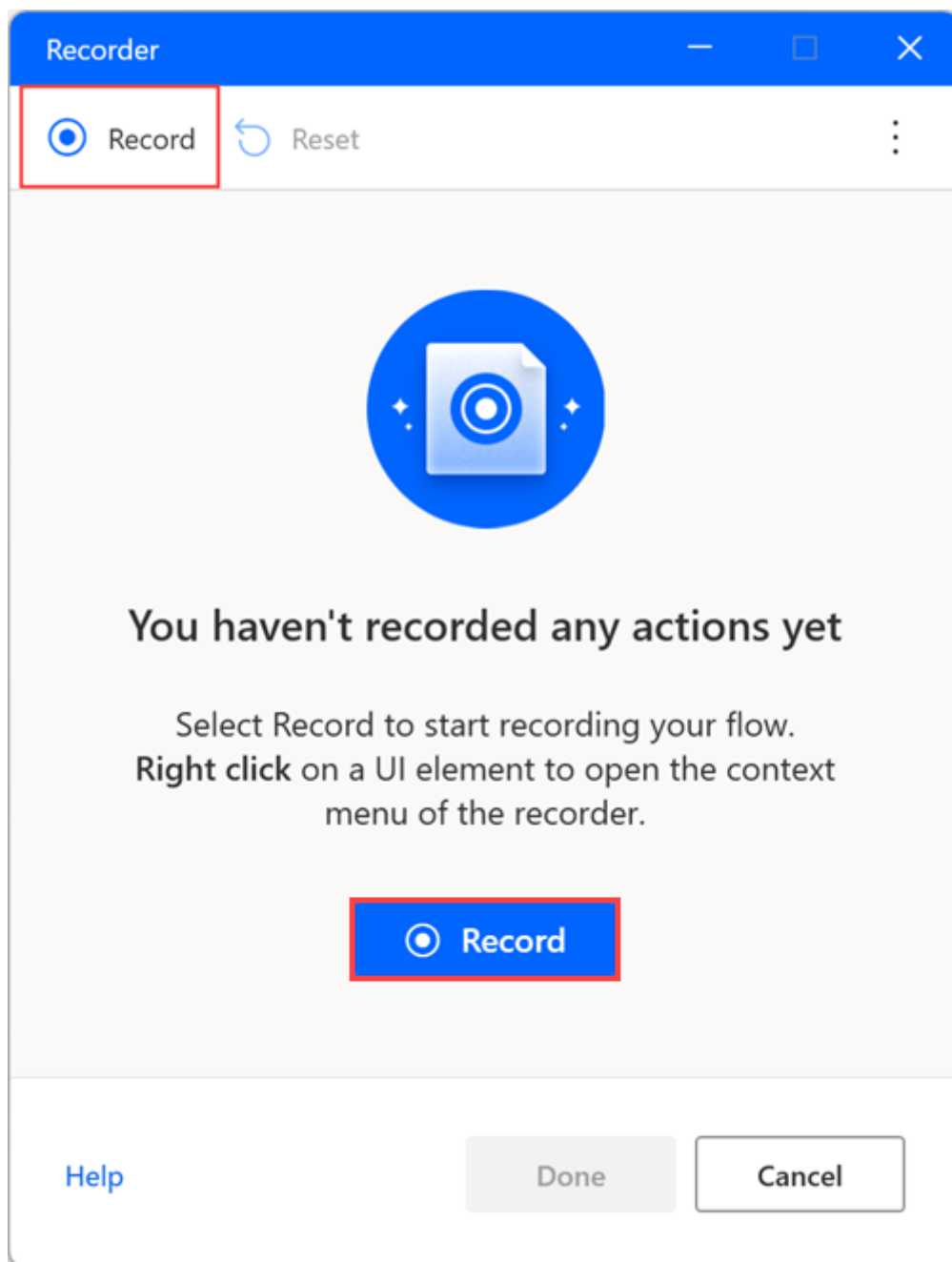
## Record desktop and web flows

To record a flow that automates desktop and/or web applications:

1. Create a new desktop flow, and select **Recorder** in the toolbar of the flow designer.



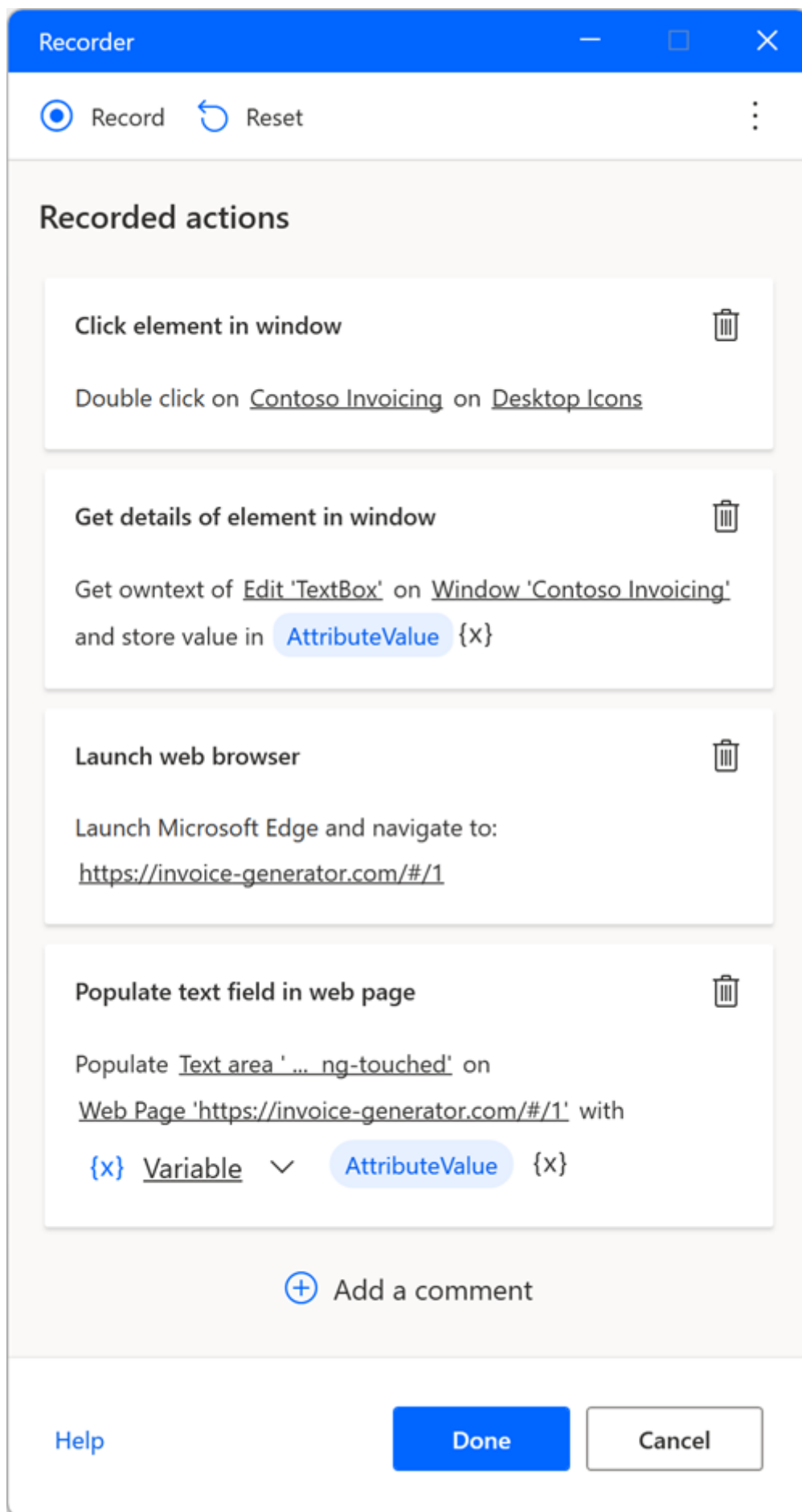
2. Select **Record** in the recorder window, and start performing the desired actions in the appropriate application or web page.



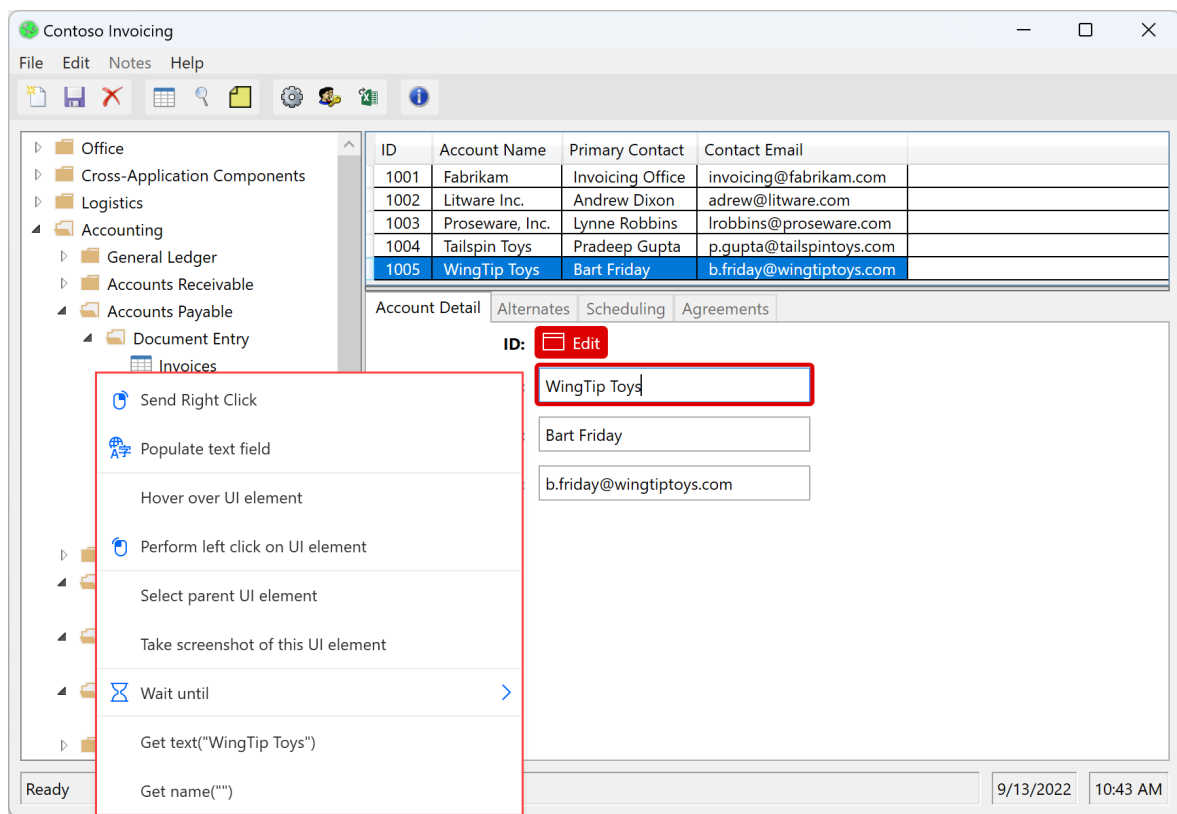
The recorder keeps track of mouse and keyboard activity in relation to UI elements, and it records each action separately. During each recording session, the recorder can generate both UI and browser automation actions.

ⓘ **Note**

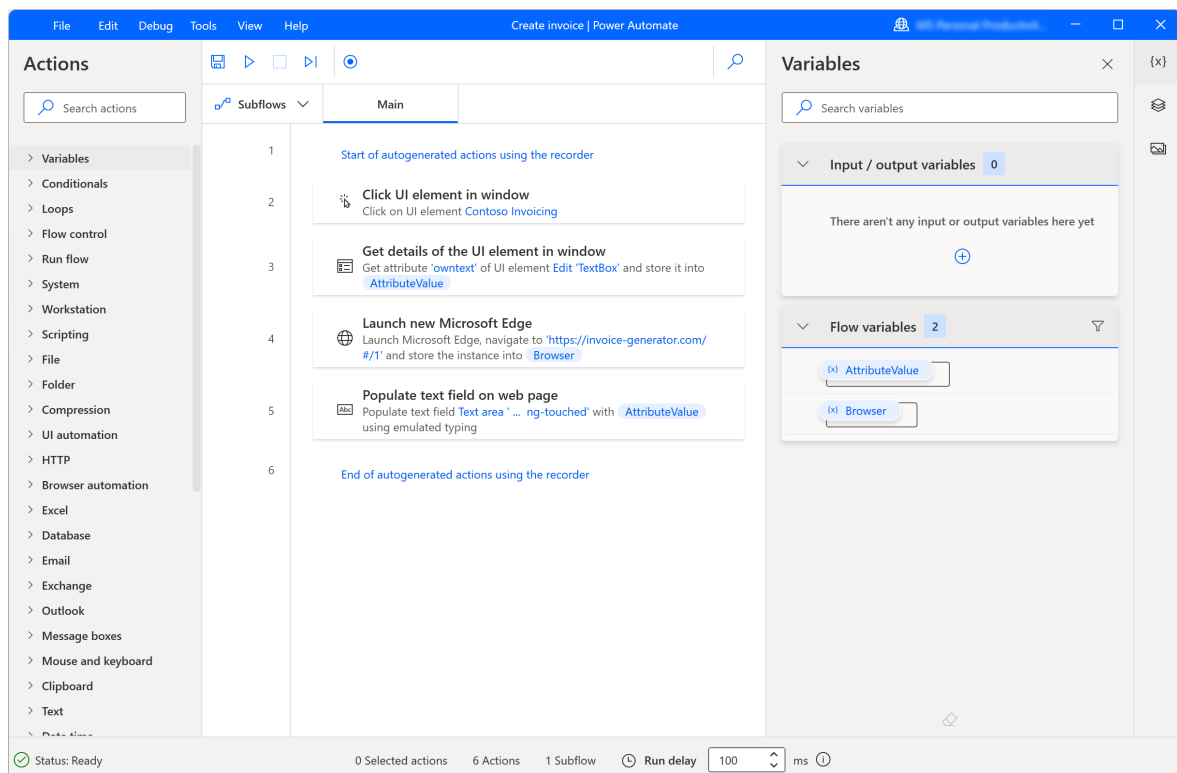
When you perform a left or right click on a UI element during the recording, the highlighter displays a **Wait for action** message, instructing you to wait for the recorder to record and insert the action.



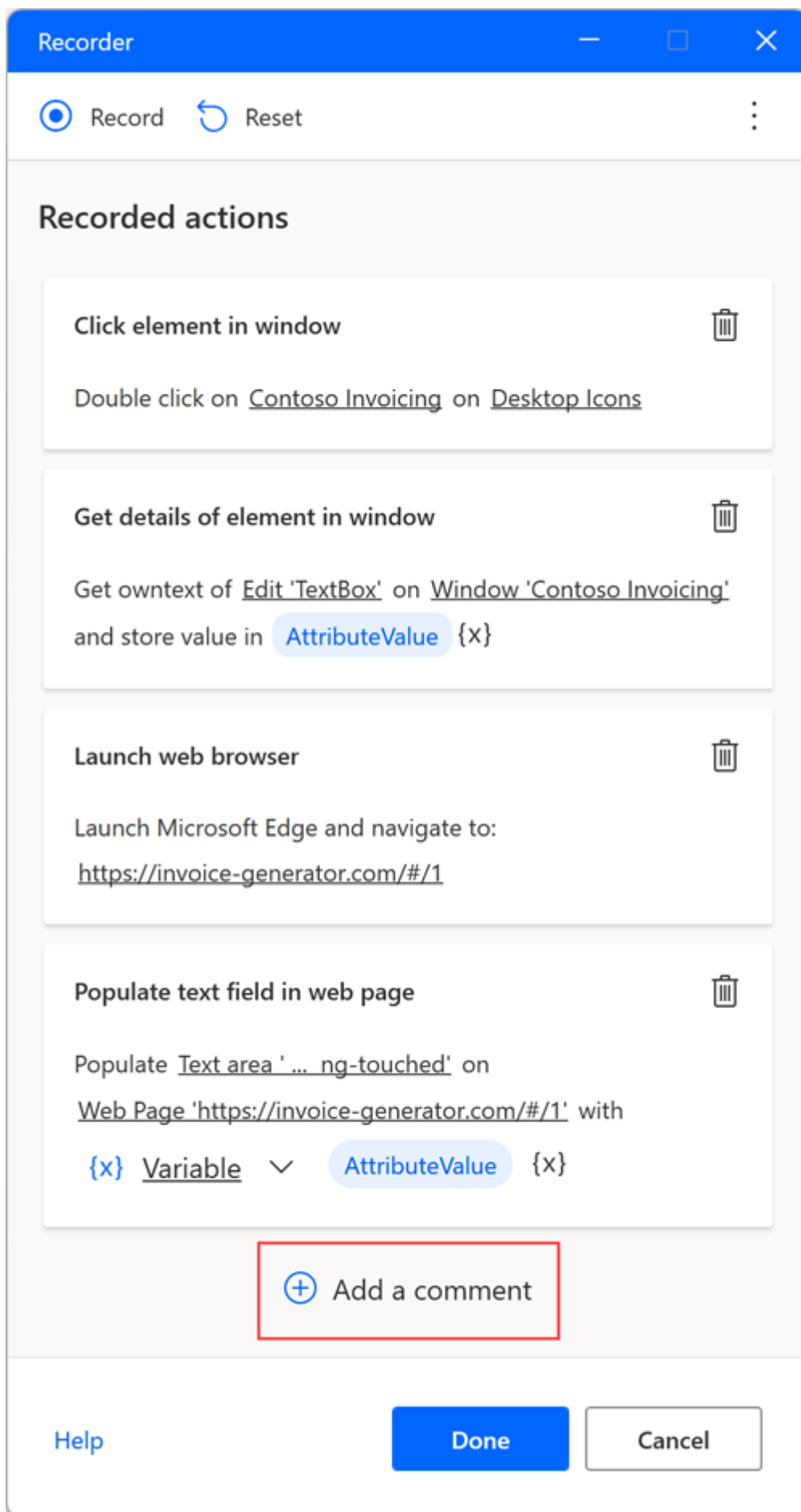
To see the available actions for a specific element, right-click on it to open its context menu. The available options depend on the nature of the selected element.



- When the recording process is completed, select **Done** to convert the recorded steps to desktop flow actions. All the UI elements used in the generated UI and web automation actions are added automatically to the UI elements pane. You can find more information regarding UI elements in [Automate using UI elements](#).



To pause the recording process temporarily, select **Pause**. To add a comment to the recorded actions, select **Add a comment**.



Replicate drag and drop steps

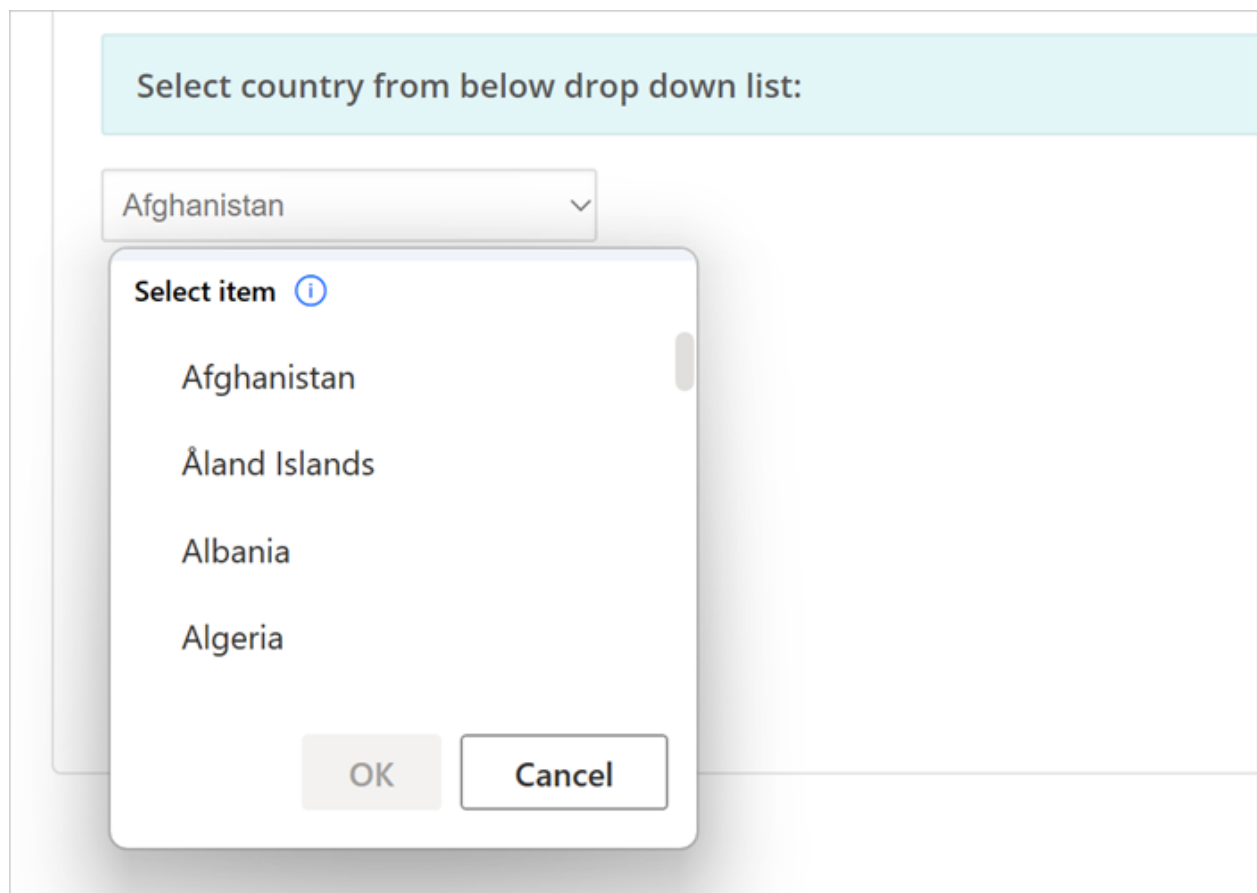
The recorder supports steps related to dragging and dropping the mouse pointer; therefore, the recorder can generate actions like the **Resize window** and **Move window**. Currently, however, the **Drag and drop UI element of a window** action isn't supported.

## Handle drop-down lists

While automating desktop and web applications using the recorder, you may need to handle drop-down lists.

The Power Automate recorder displays a custom screen every time you select a drop-down list, and it helps you choose the desired values. This custom screen allows you to choose one or more values depending on whether the drop-down list is multi-select.

During runtime, Power Automate automatically chooses the defined values and selects the **OK** button.



## Launch a web browser

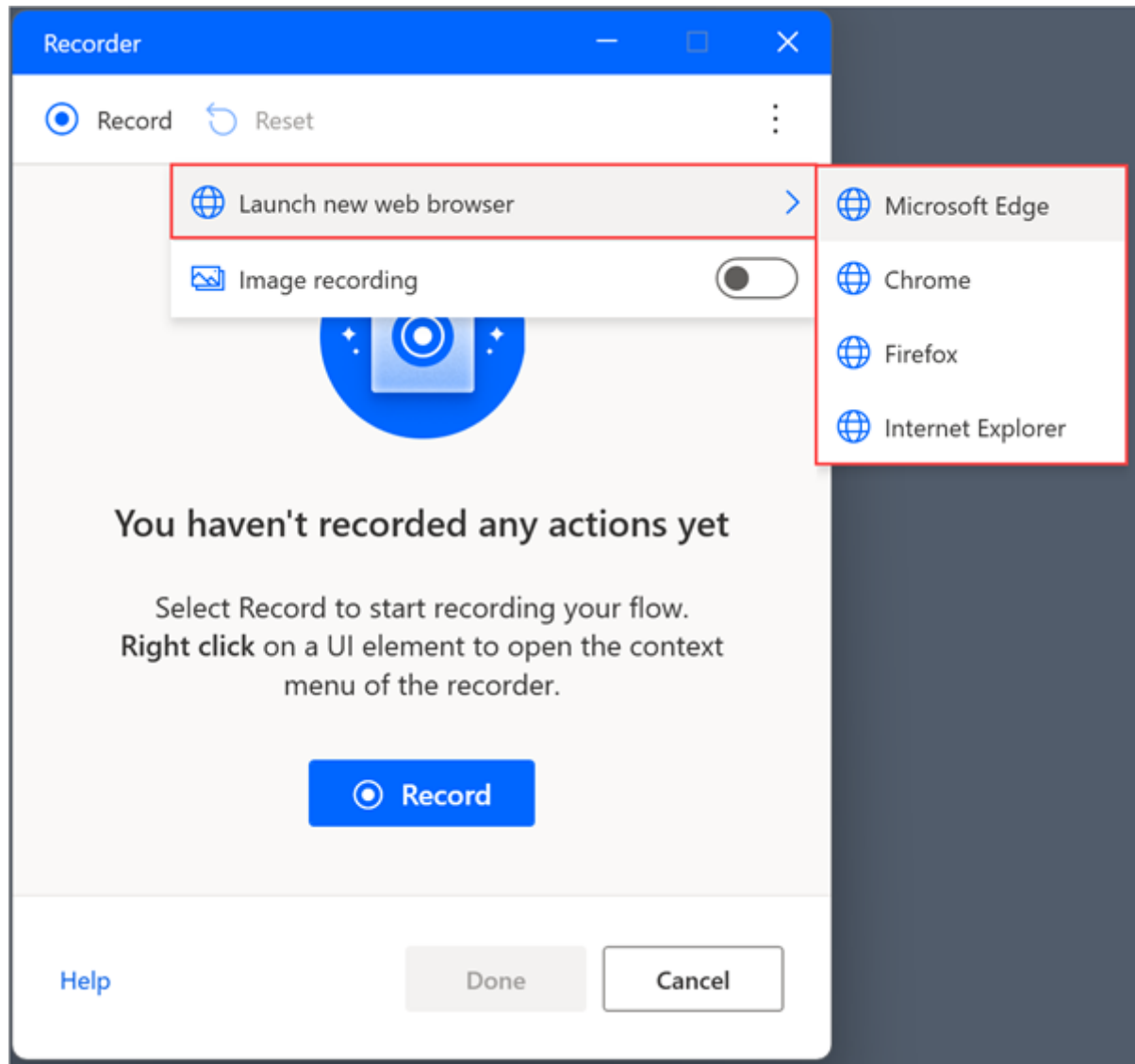
To launch a web browser instance while recording web flows, you can use three different approaches based on the automation scenario.

The first method is to select the dots icon on the right side of the recorder dialog and then **Launch new web browser**. You can choose between Microsoft Edge, Google



Chrome, Mozilla Firefox, and Microsoft Internet Explorer.

After you've selected the proper browser, the recorder will detect the loaded web page automatically and configure the launching browsing step accordingly.



An alternative way to launch a browser is to start recording in an already open web browser. The recorder will automatically detect the loaded page and will create a launching browser action.

The last method to launch a browser is to manually launch it through its shortcut on the desktop, the start menu, the taskbar, or a folder. If you implement this approach, the recorder will generate UI automation actions that click the browser shortcut and launch it.

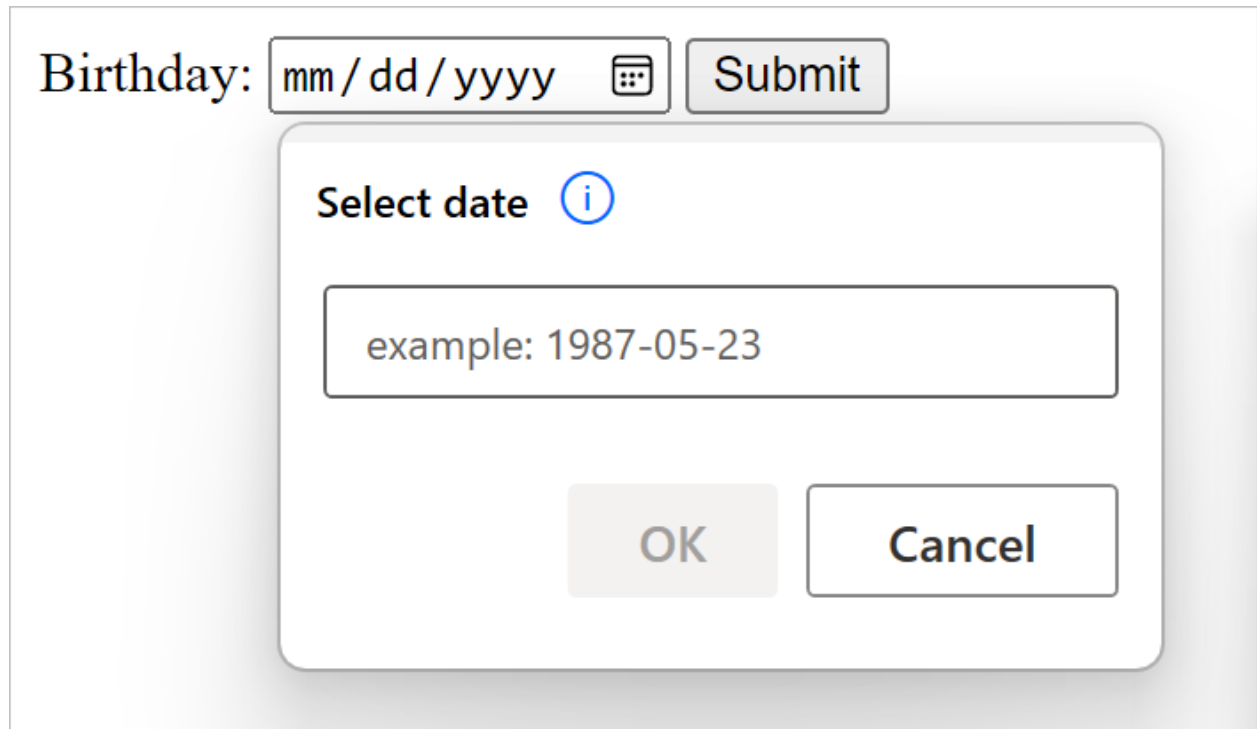
## Handle date and color pickers on web pages

Like drop-down lists, the Power Automate recorder displays custom screens to help you handle date and color pickers on web pages.

When you interact with a date picker, the recorder opens a text field where you can insert the desired date in the specified format.

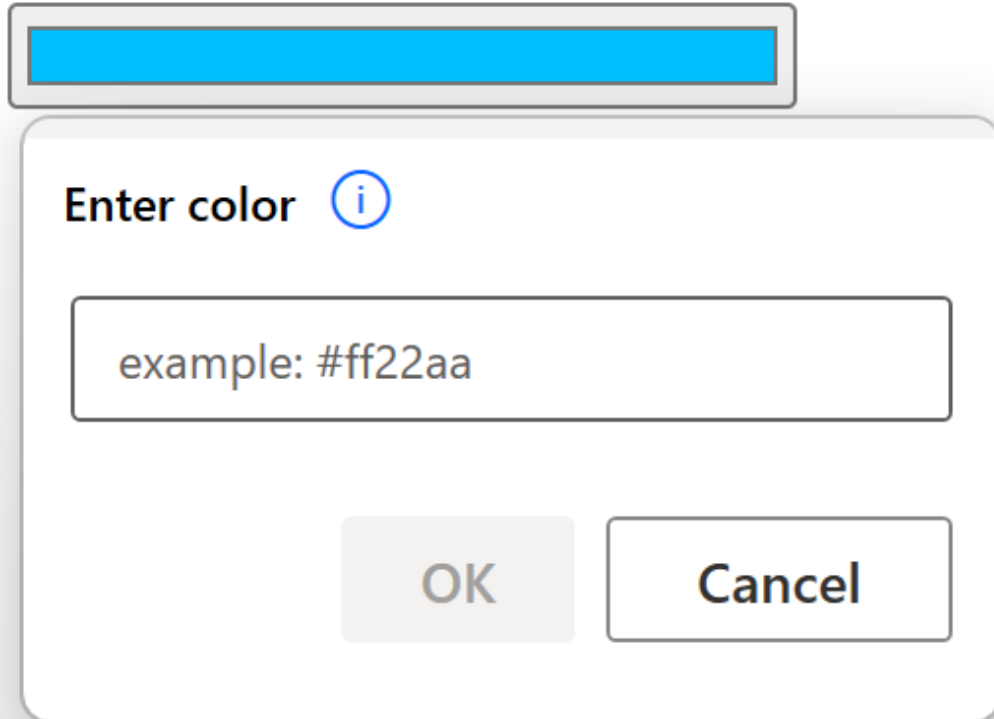
The custom screen appears for the following HTML input types:

- date
- datetime-local
- month
- time
- week



Similarly, when you interact with a color picker, the recorder opens a text field where you can populate the desired color hex code.

# Choose a color:



Enter color ⓘ

example: #ff22aa

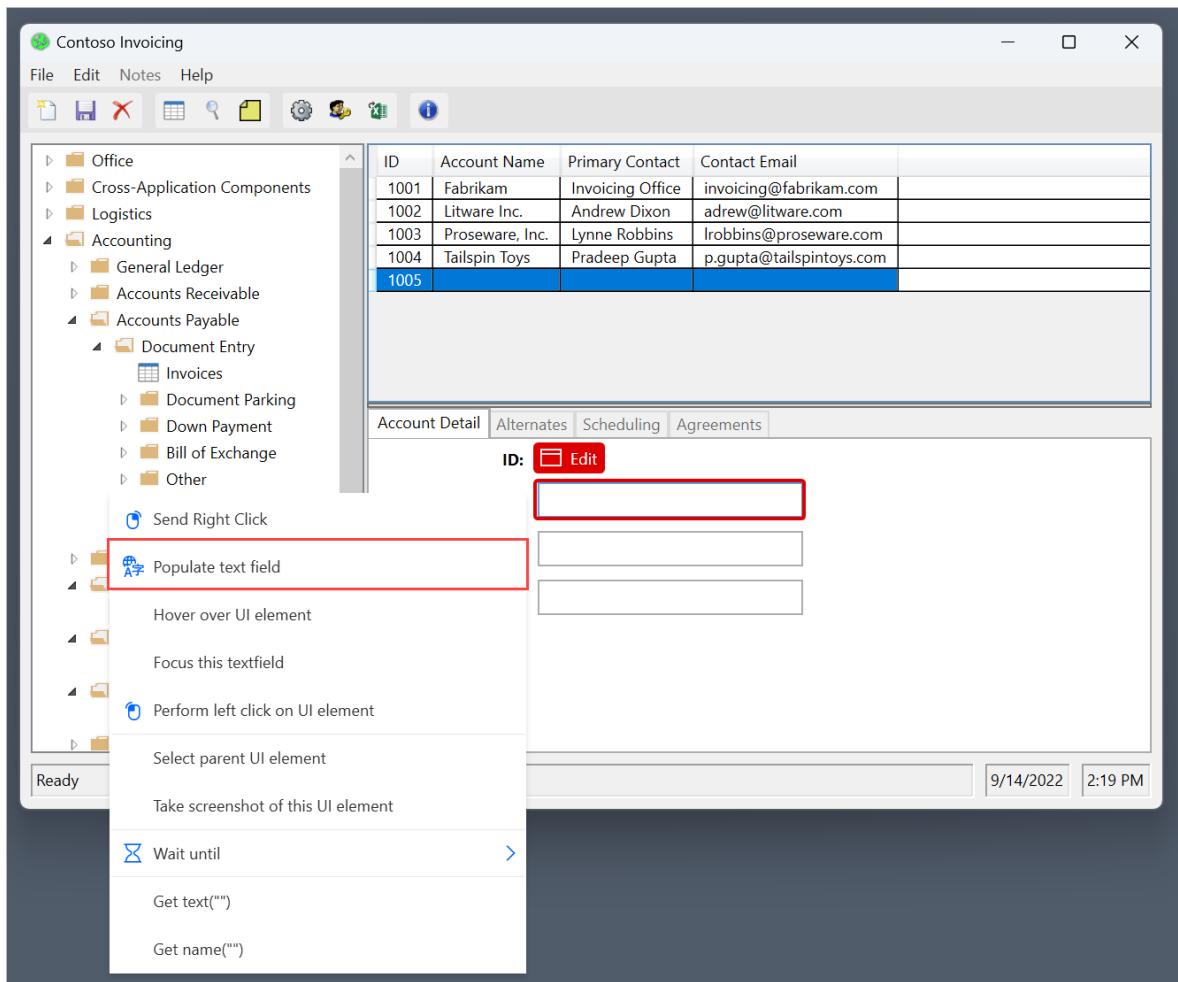
OK Cancel

## Add text using Input Method Editors (IMEs)

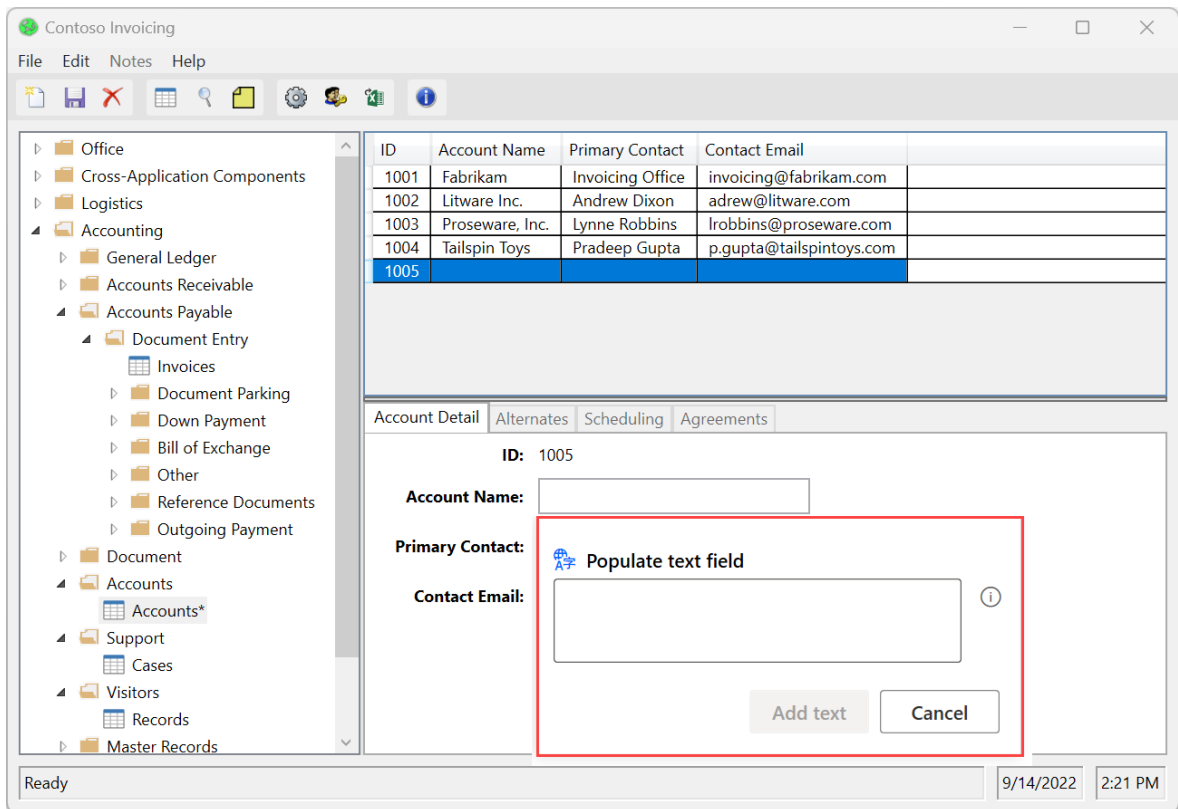
Input Method Editors (IMEs) are software components that enable users to input text in languages that can't be represented easily on a standard QWERTY keyboard. Users can type combinations of keys, and IMEs will generate a character or a list of candidate characters that match the set of keystrokes.

Power Automate for desktop supports the use of IMEs during the flow recording procedure. To populate a text field using an IME:

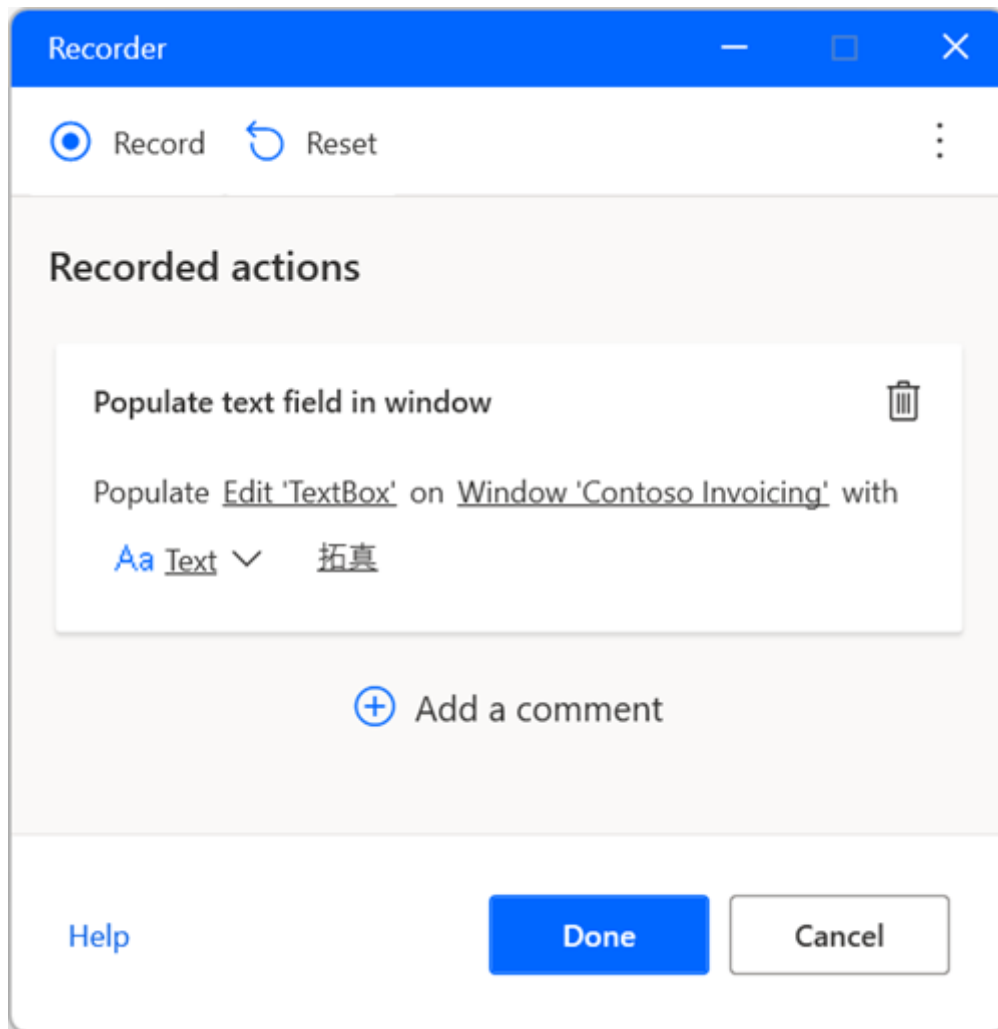
1. Right-click on the text field, and select **Populate text field** on the displayed menu.



2. Populate the popup dialog with the desired text using an IME.



3. Select **Add text** to generate the respective step in the **Recorder** window.



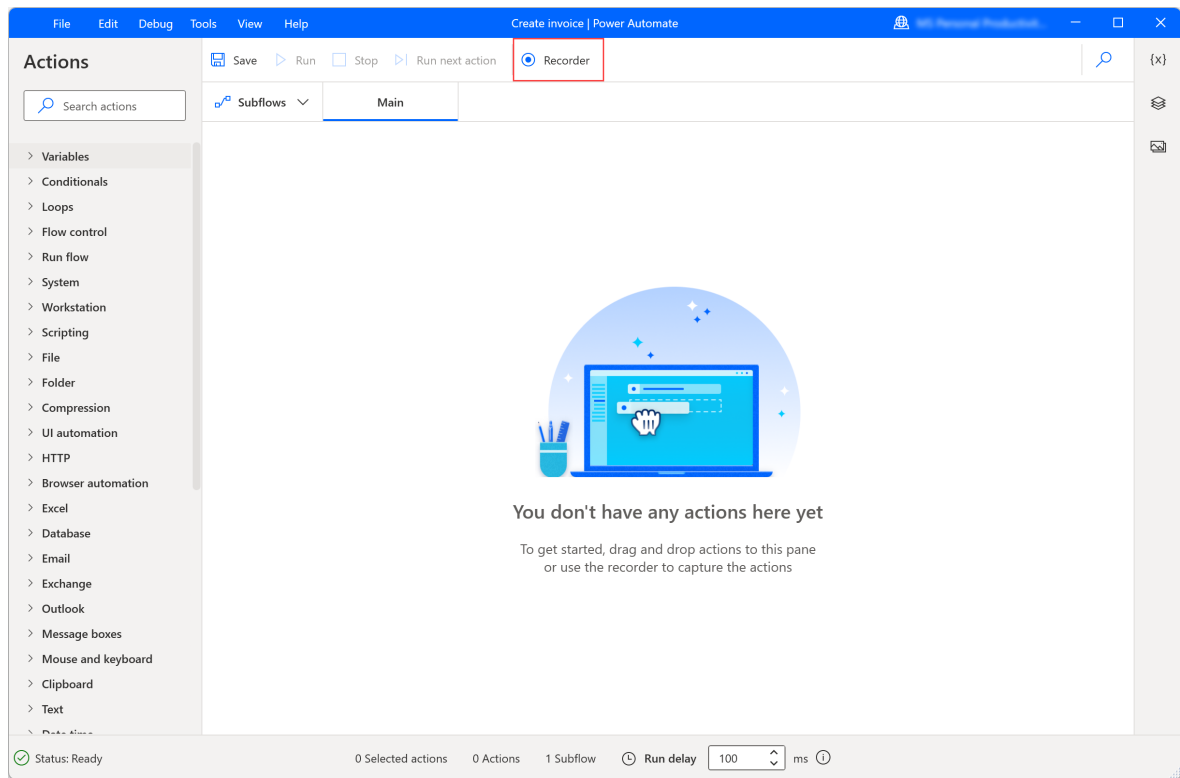
## Image-based recording

In some cases, the recorder may not record actions in specific applications that don't meet the appropriate technical requirements. These applications may not expose their accessibility API or have other technical limitations that block the recording process.

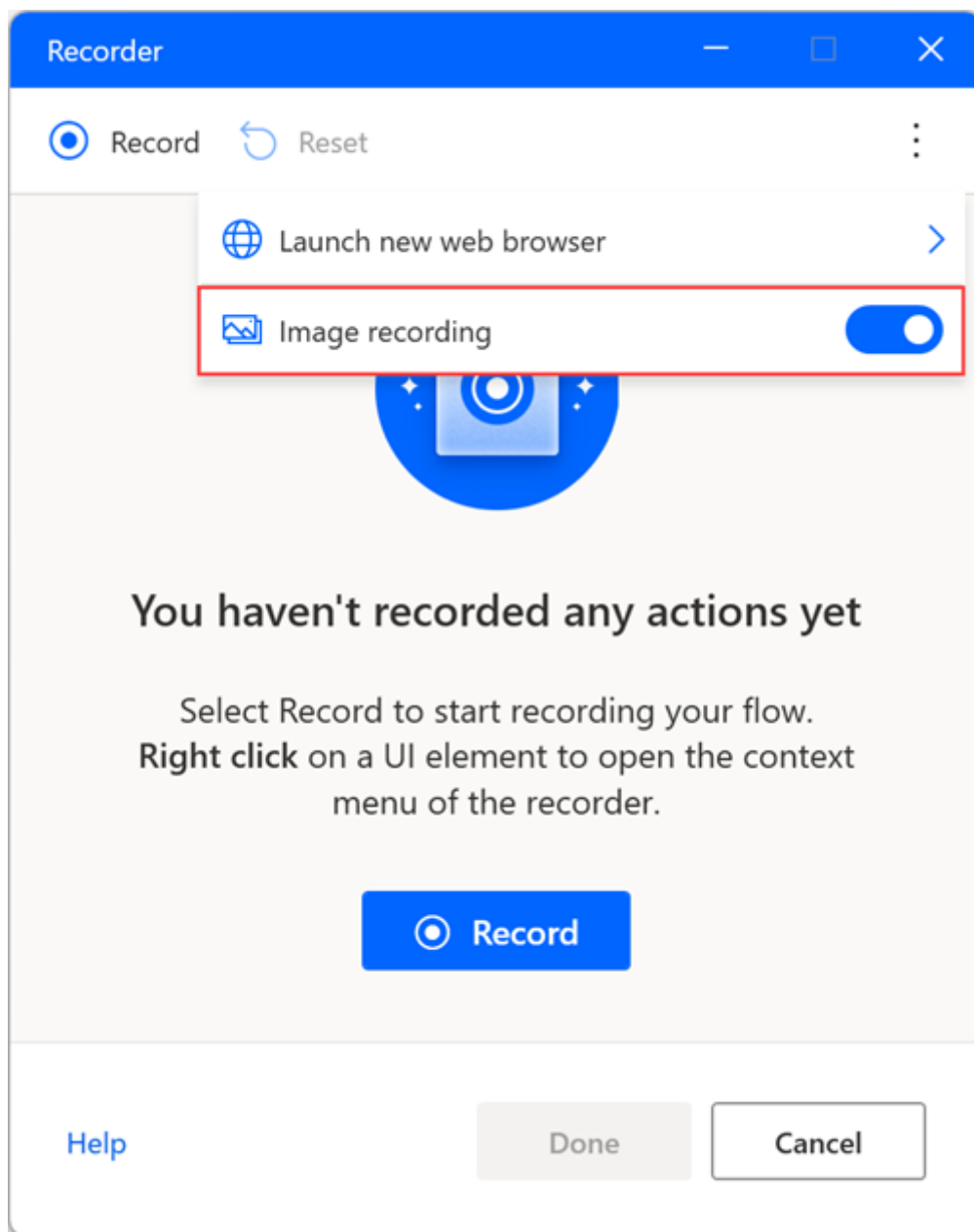
As an alternative way to record flows, Power Automate for desktop provides image-based recording. The image-based recording uses image recognition and OCR to locate specific elements on the screen and extract text.

To record flows using images:

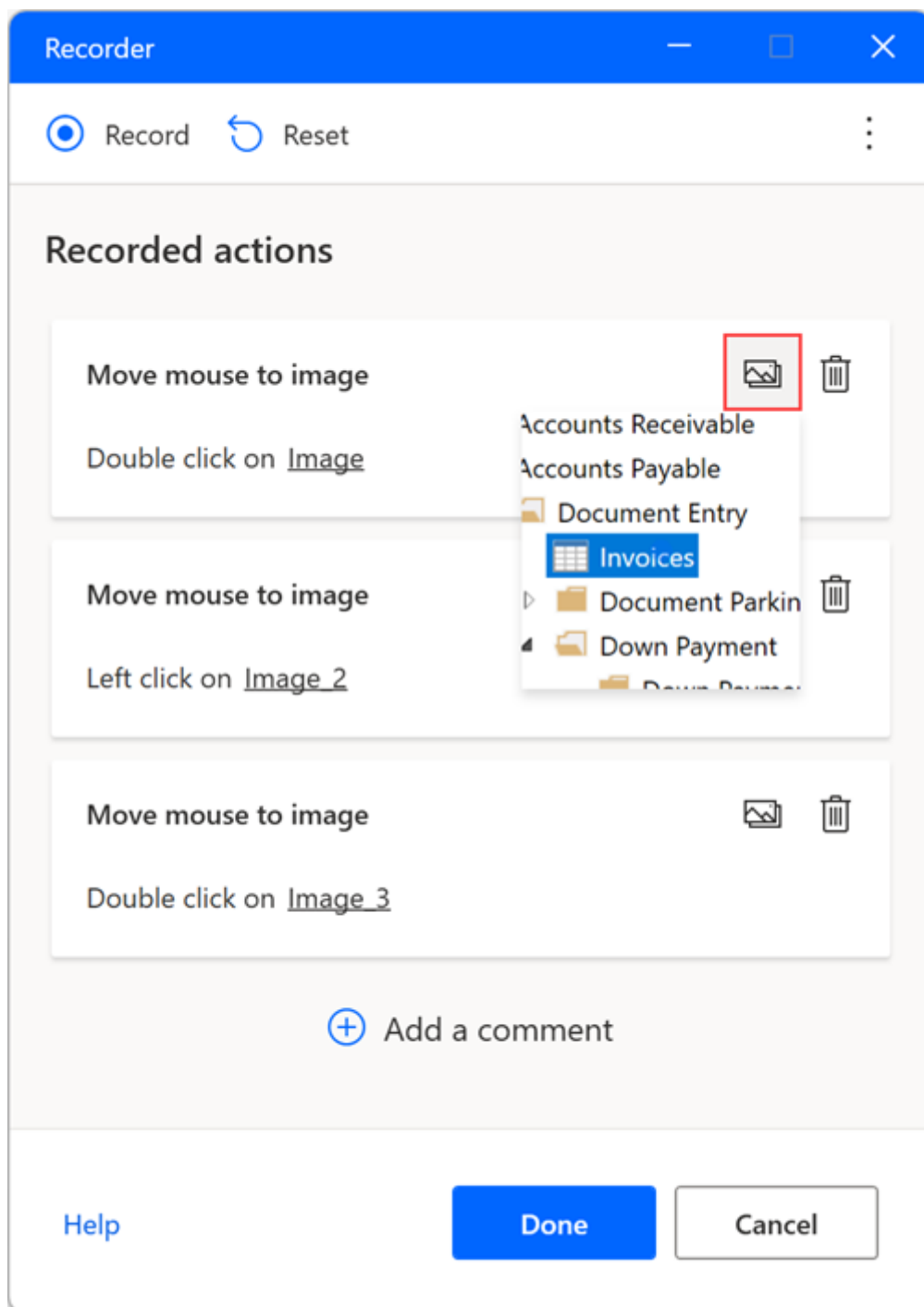
1. Create a new desktop flow and select **Recorder** in the toolbar of the flow designer.



2. Select the dots icon on the right side of the recorder dialog, and then enable **Image recording**. After enabling this option, select **Record** to start recording actions using image recognition.



Upon clicking on an element, an image is captured automatically and saved with a default editable name. To preview the captured image, hover, or select the **preview icon**.

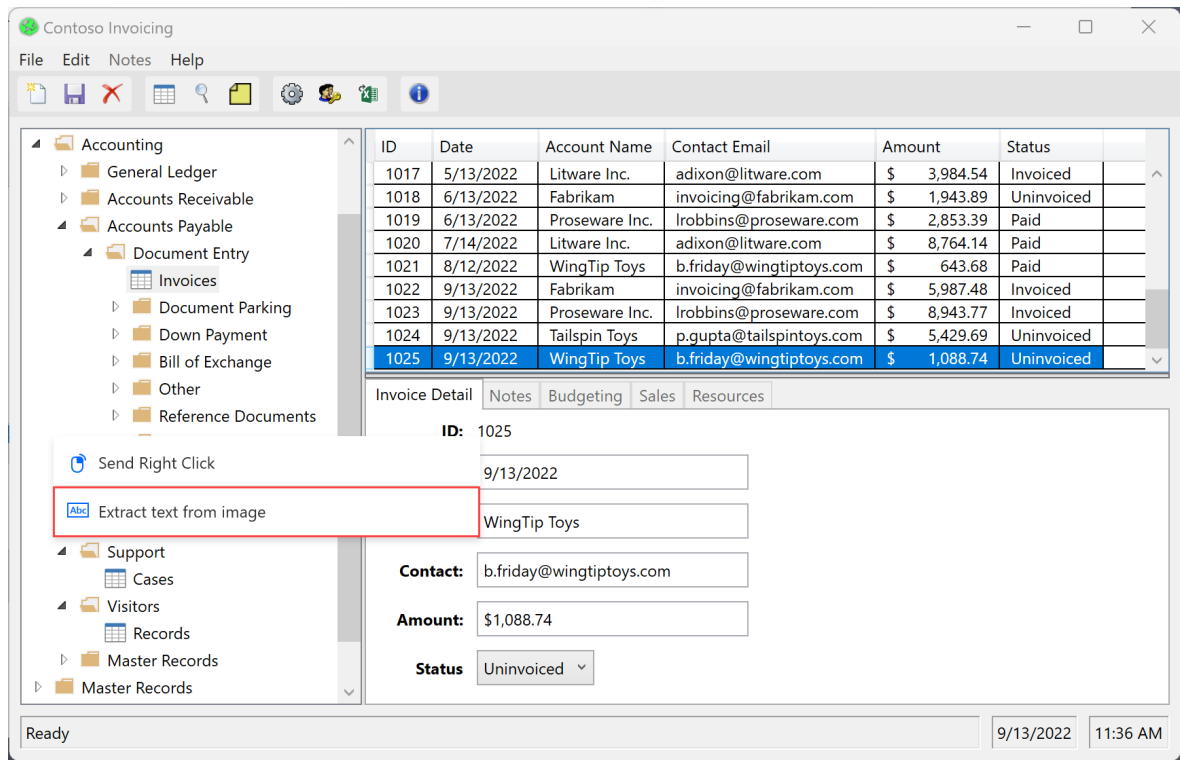


## Extract text with image-based recording

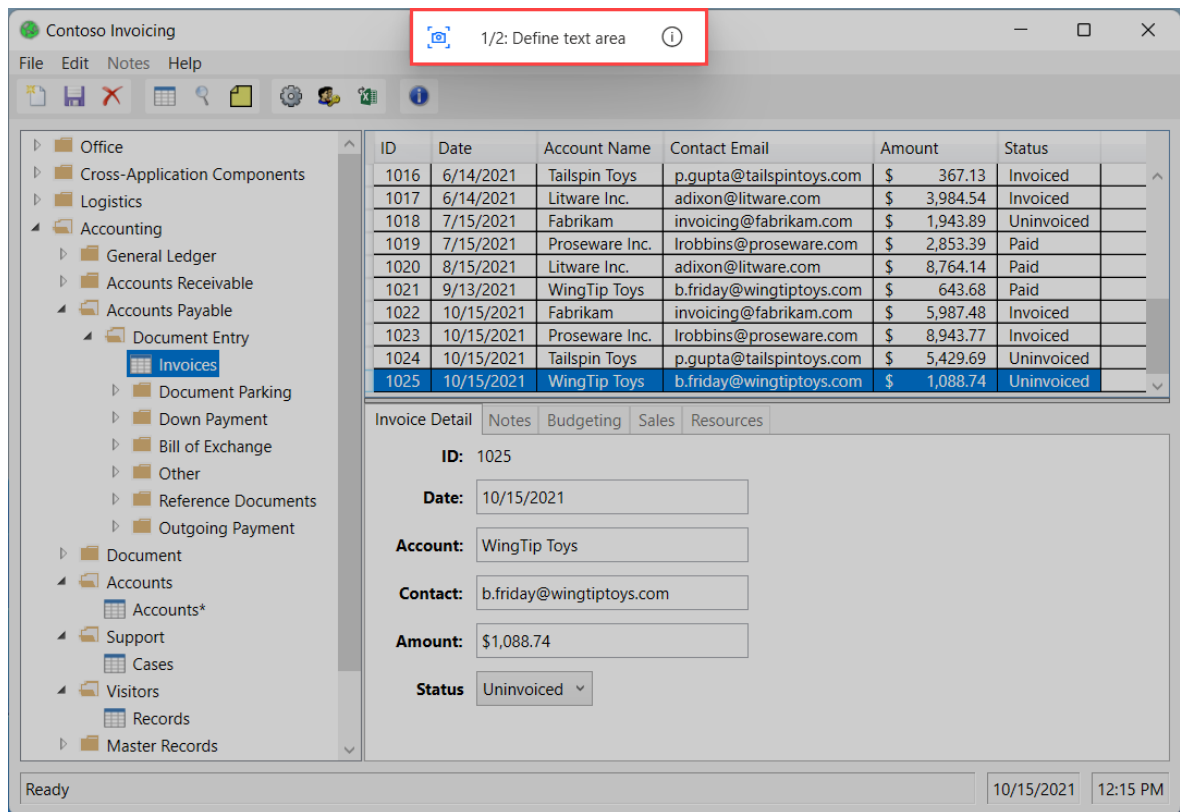
To extract a text value while using image recording:

1. Perform a **right-click** on the screen, and select **Extract text from image**.

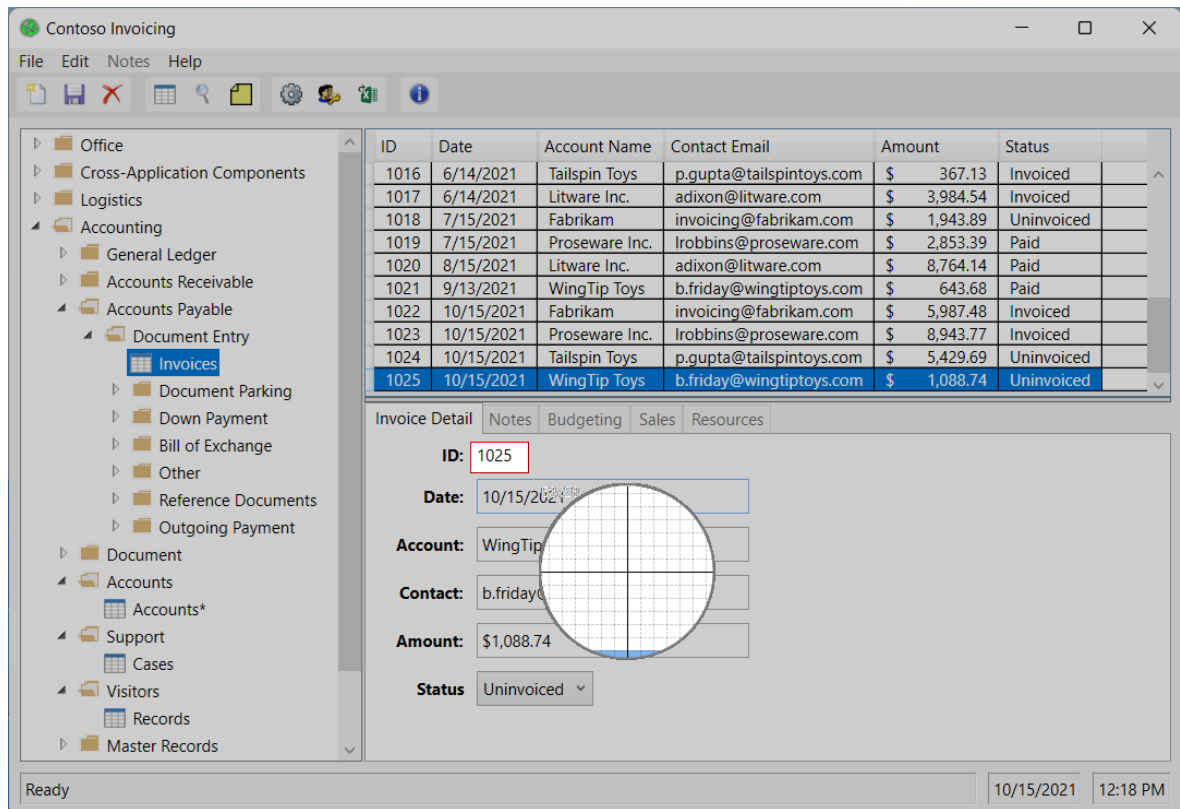




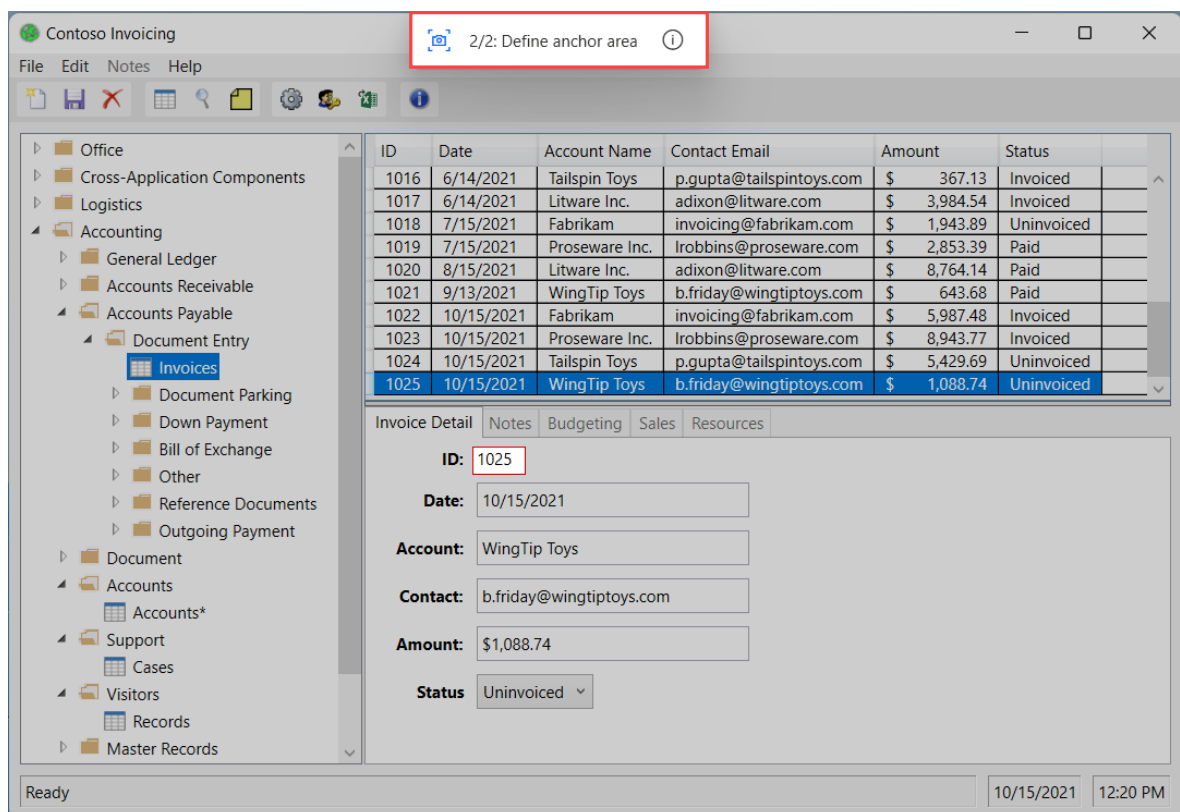
2. Wait for a popup message that will prompt you to select a text area.



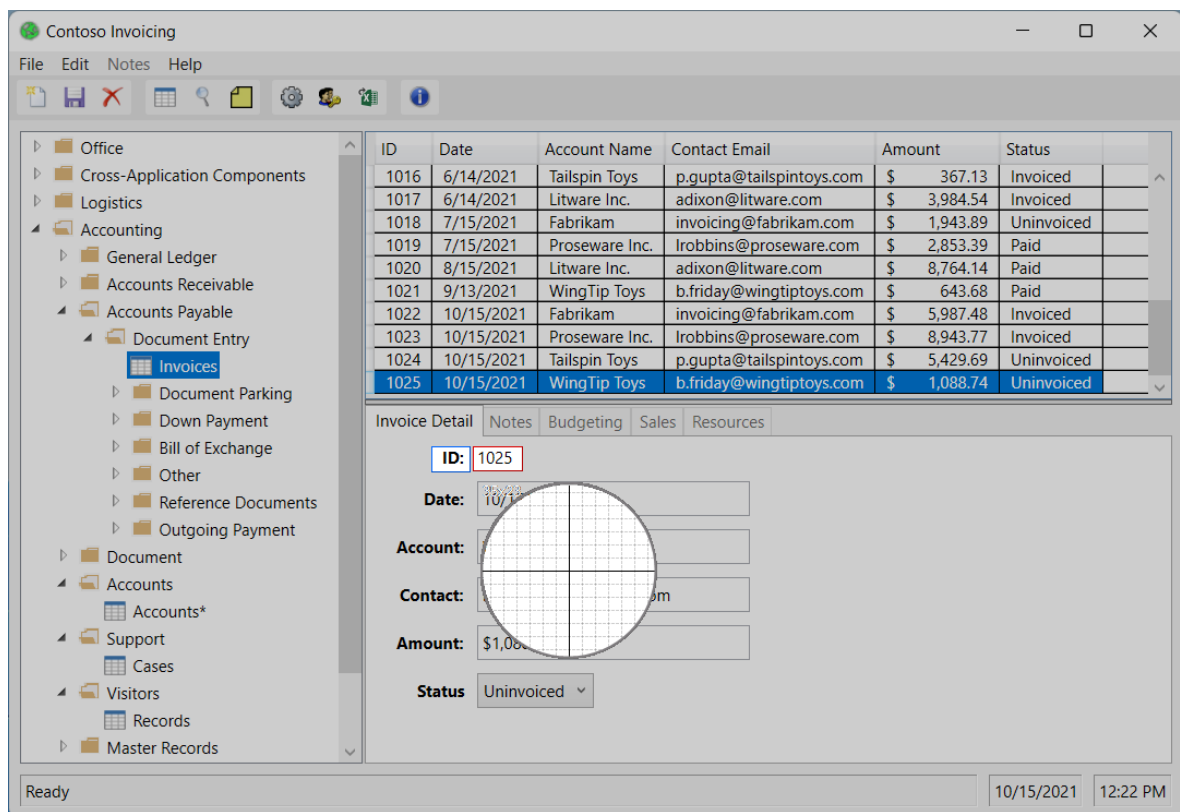
3. Select the text area from which text will be extracted using the Tesseract OCR engine.



4. Wait for a popup message that will prompt you to select an anchor area.



5. Select an anchor area that isn't expected to change, such as the label next to a field.



## Recording vs building a desktop flow

You can edit manually any actions created through the recorder once the recording is finished. Use the recorder in a desktop flow that's already under development to add the recorded steps to it.

### ⓘ Note

Use the recorder to create the backbone of your flow. Certain simple tasks may require no further editing; however, most recorded tasks should be modified to achieve optimal results. Certain types of actions, like conditionals and loops, can't be recorded. Also, there may be redundant actions in a recording that should be removed.

## Known issues and limitations

- **Issue:** The recorder may not record all steps from the Windows Start menu or system tray.

**Workarounds:** None

- **Issue:** While running a flow created through image-based recording, the click may be sent to the wrong place.

**Workarounds:** Edit the auto-generated action **Move mouse to image** through the flow designer and decrease the tolerance parameter in the advanced settings.

- **Issue:** The **Extract text from image** popup that appears after sending a right-click using the recorder may hide behind the popup of the application.

**Workarounds:** Send the right-click to another place on the screen.

- **Issue:** Any keystrokes sent to a maximized RDP window through an image-based recording aren't recorded.

**Workarounds:** Resize the RDP window so that it doesn't cover the full screen.

# Use loops

Article • 02/24/2023

Loops are a fundamental concept in desktop flow development and prove to be invaluable elements in complex flows. The main idea behind a loop is to make a desktop flow repeat one or more actions multiple times.

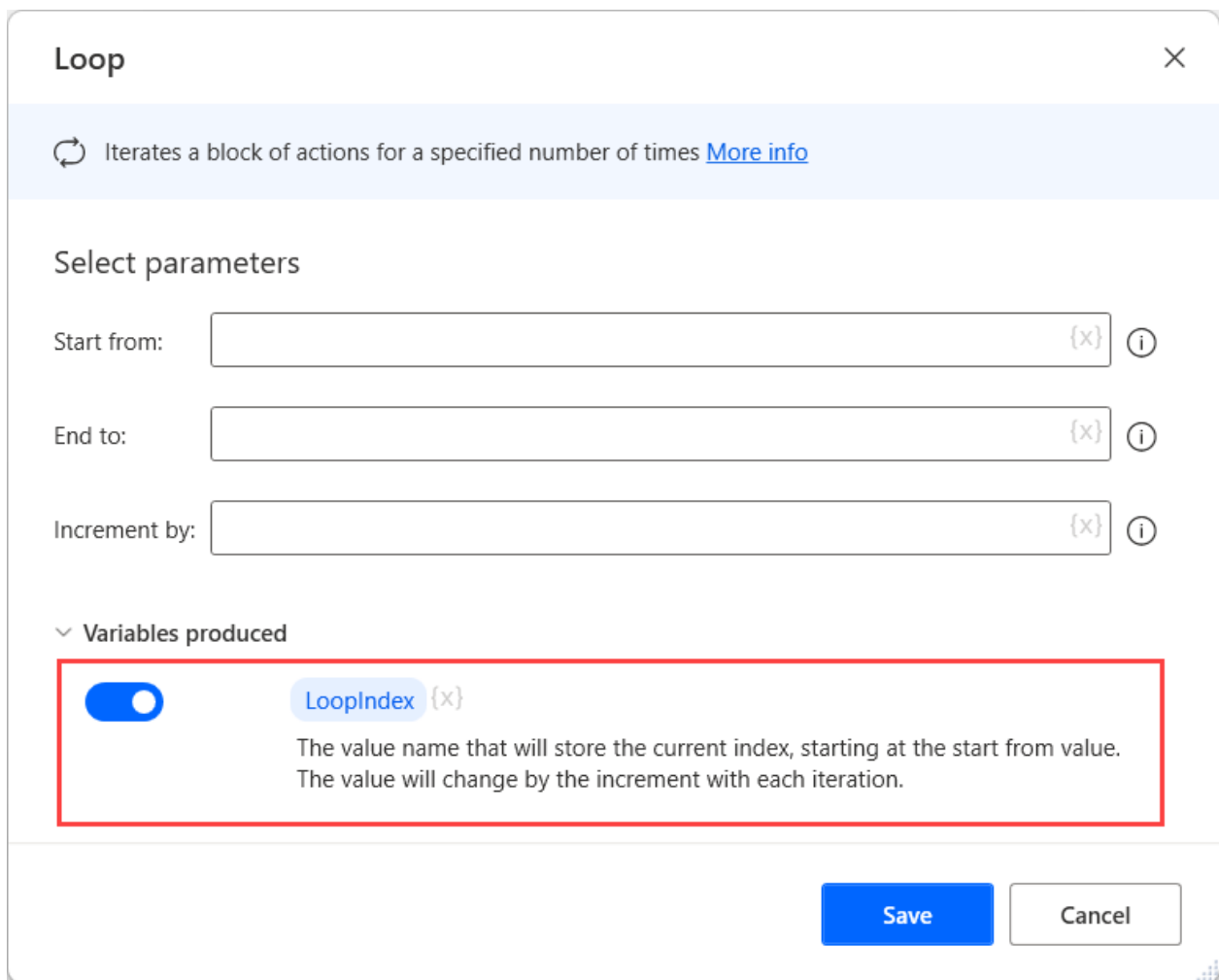
Power Automate provides three different kinds of loops that iterate based on various factors:

- **Simple loops** - Iterate for a set number of times
- **Loops condition** - Iterate as long as a condition is valid
- **For each loops** - Iterate through a list

## Simple loops

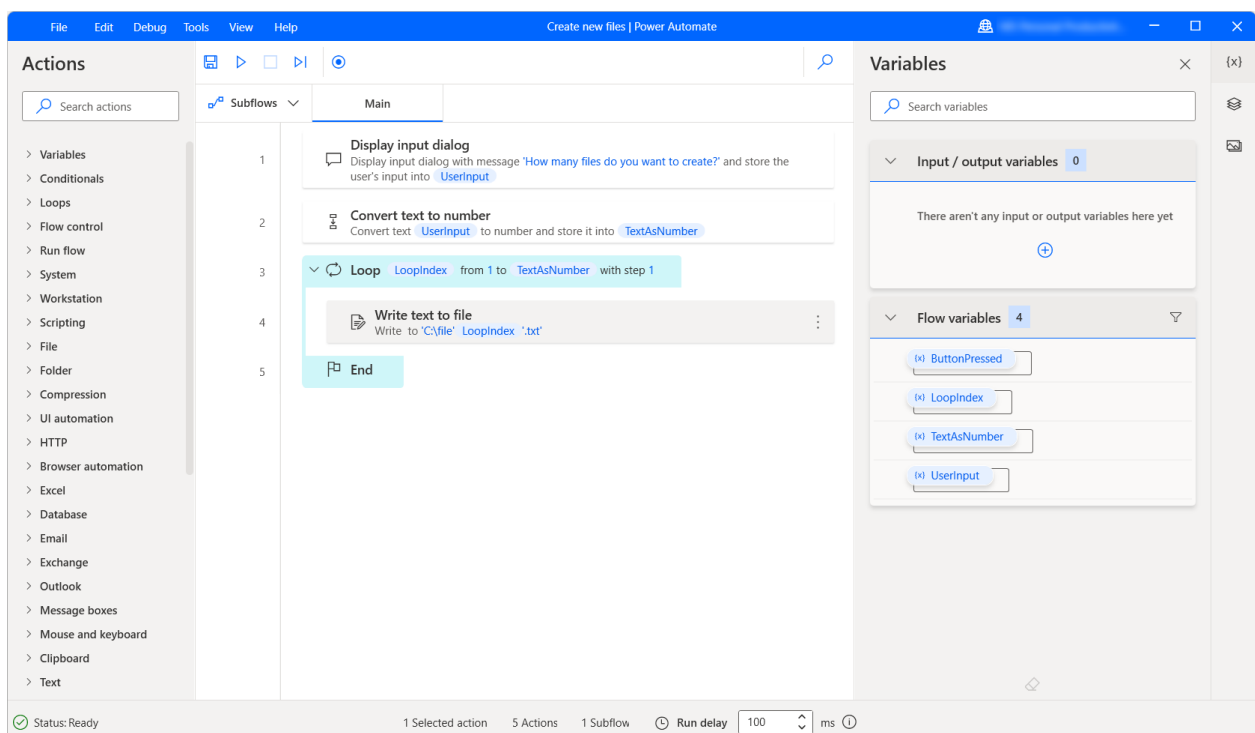
The idea behind a loop is to make a desktop flow repeat one or more actions multiple times. Power Automate implements the simplest type of loops with the **Loop** action.

This loop repeats the actions between the **Loop** and **End** actions for a set number of times. A loop index variable is created automatically to track the current iteration's number.



A simple loop is ideal to use in two cases:

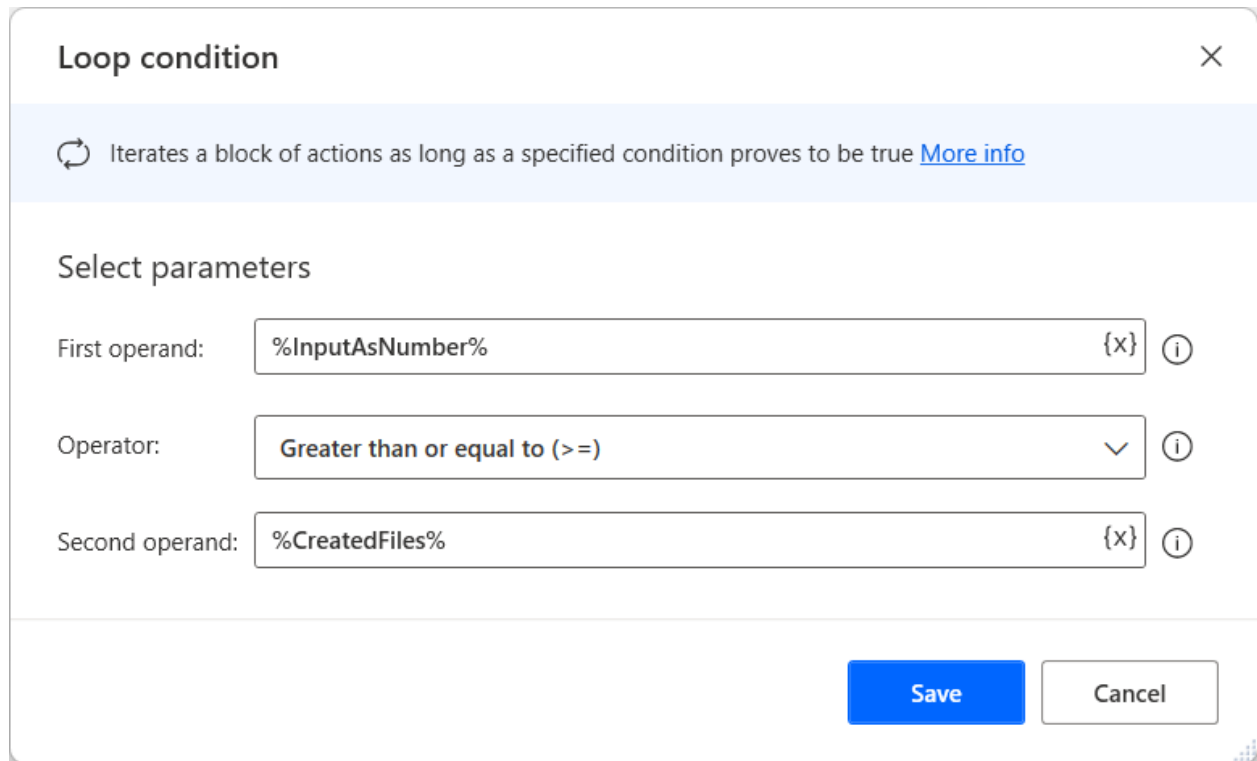
1. The exact number of times that a block of actions should be repeated is known.
2. The loop index variable must be used somewhere inside the loop.



In case you need to exit the loop before the specified iterations are completed, use the **Exit loop** action. To skip the current iteration, use the **Next loop** action.

## Loop condition

Unlike simple loops, the **Loop condition** makes a desktop flow repeat one or more actions as long as a condition is true.



**Loop condition** ×

Iterates a block of actions as long as a specified condition proves to be true [More info](#)

Select parameters

First operand:  {x} ⓘ

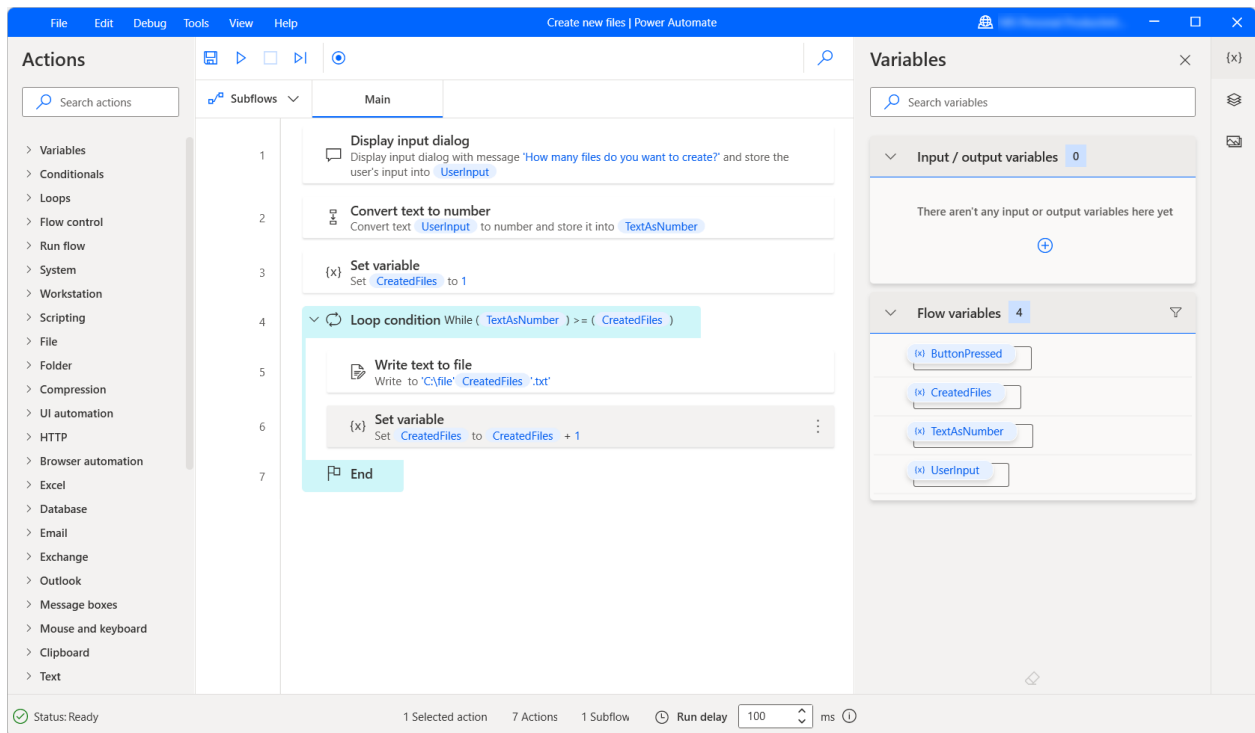
Operator:  ⌵ ⓘ

Second operand:  {x} ⓘ

**Save** Cancel

If the condition is always true, the loop will never end. This situation is called an endless loop.

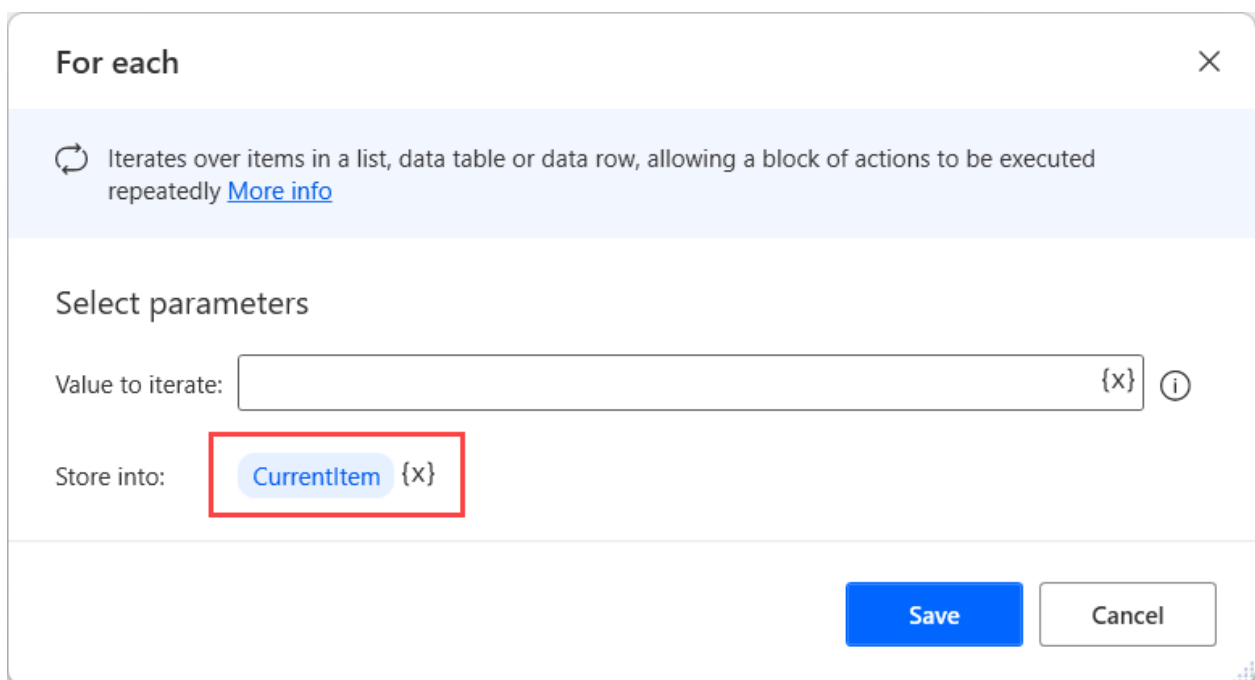
The condition consists of two operands and an operator. The platform supports the most significant logical operations, such as **equal**, **not equal**, and **greater than**.



In case you need to exit the loop before the specified iterations are completed, use the **Exit loop** action. To skip the current iteration, use the **Next loop** action.

## For each loop

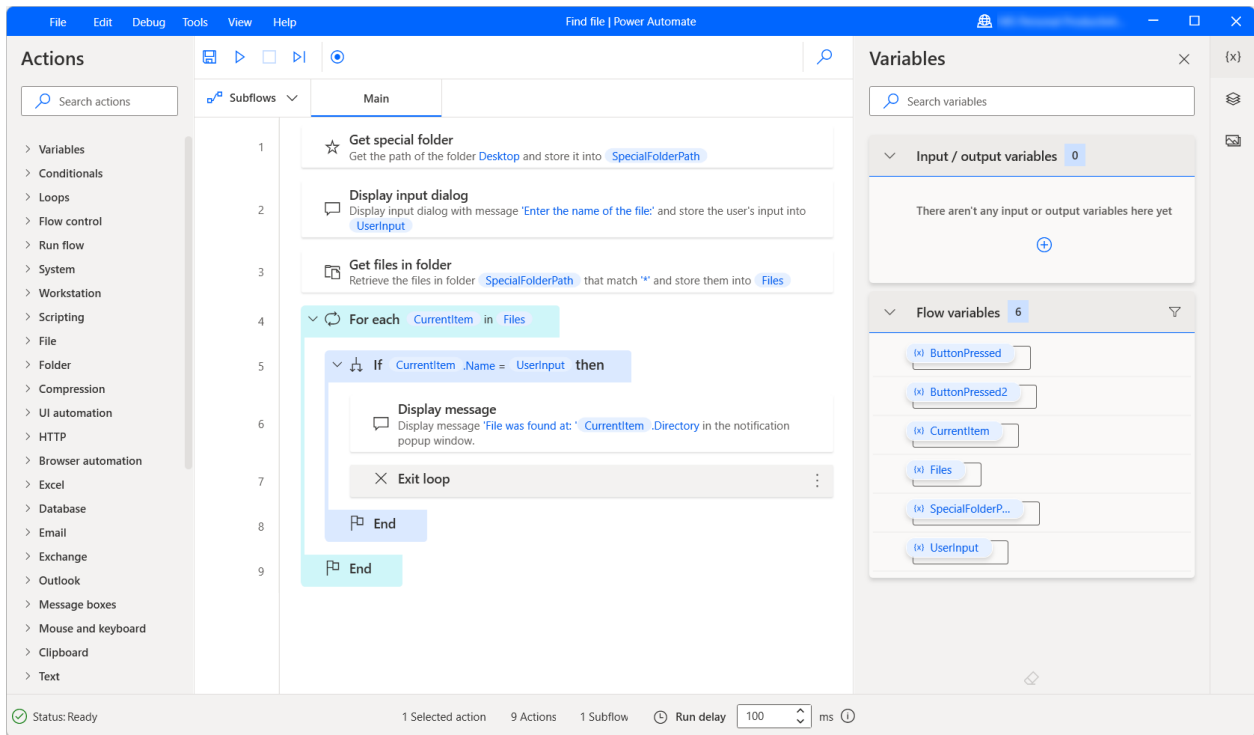
The **For each** loop iterates through a list (or data table) and stores the current item in a variable. Its primary purpose is to get each item of a list (or row of a data table) and use it in other actions.



You can use this kind of loop to search for specific names, contents, or attributes in all kinds of lists. For example, you can iterate through a list of retrieved files to find a file



with a specific name.



In case you need to exit the loop before the specified iterations are completed, use the **Exit loop** action. To skip the current iteration, use the **Next loop** action.

You'll find the list of loop actions available in the [Actions reference](#).

# Use conditionals

Article • 02/24/2023

Conditionals allow you to execute blocks of actions only if a given condition is met. If the condition is false, the block of actions will be skipped.

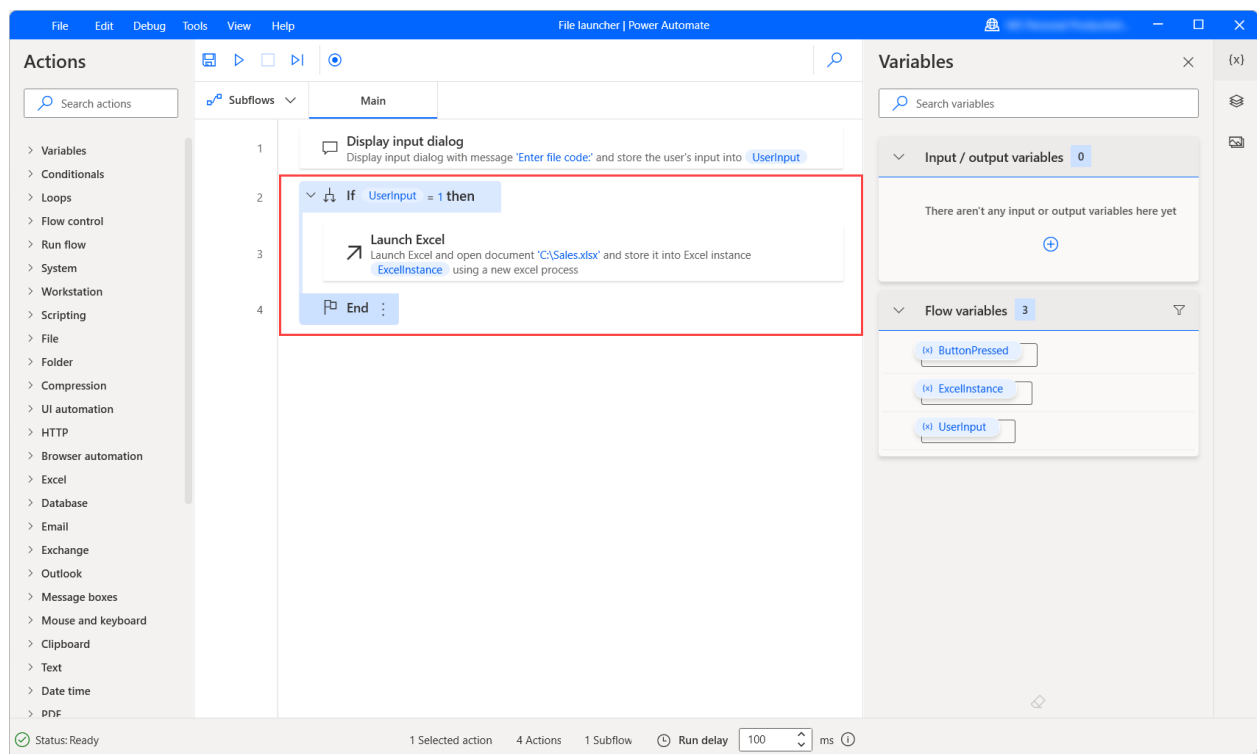
Using conditionals, you can ensure certain elements have a wished value or state before performing other actions. For example, you can check if a file exists before trying to rename it.

## If/else

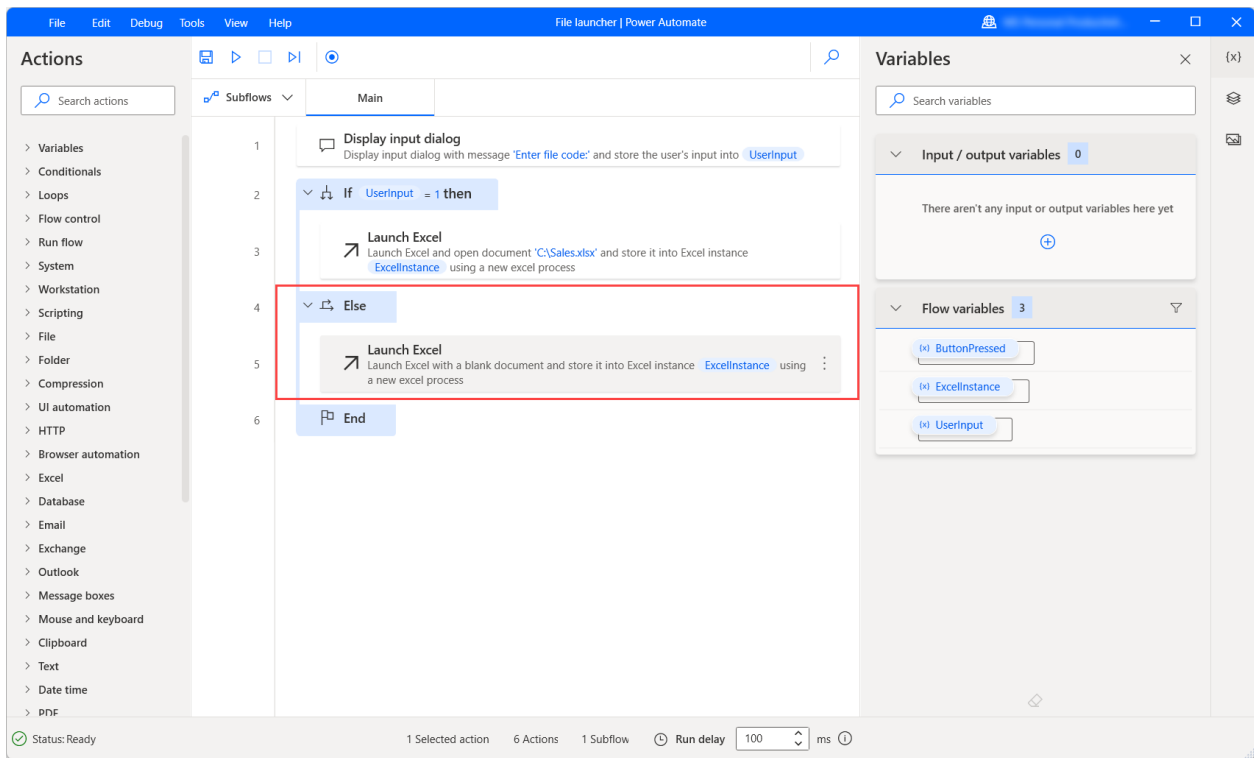
The **If** statement is one of the most commonly used conditionals in flow development and programming.

Power Automate provides the **If** action to check whether a given condition is valid. If the condition is true, the logic between the **If** and **End** is executed.

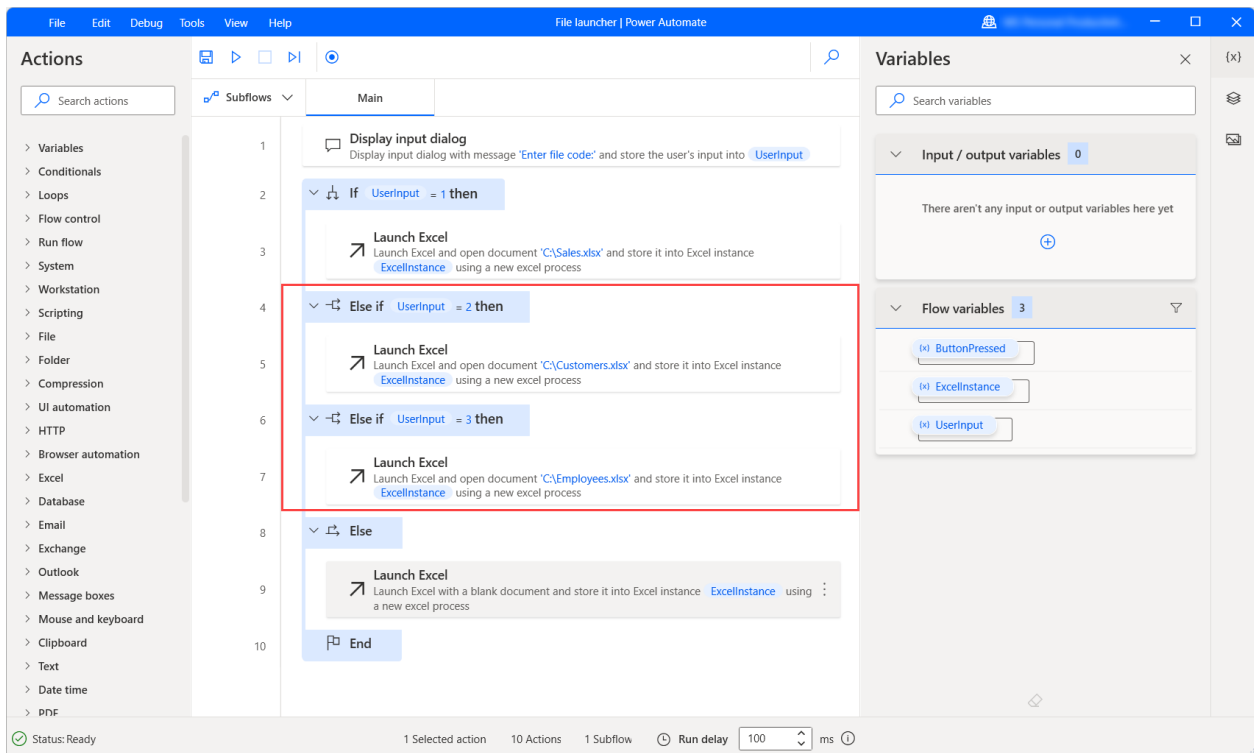
An **If** action consists of two operands and an operator. The platform supports the most significant logical operations, such as **equal**, **not equal**, and **greater than**.



An **If** may optionally contain an **Else** action. The **Else** action defines the logic to be executed when the **If** condition is invalid. It should be placed between the **If** and the **End** actions.



To set multiple conditions for which different logic is executed, deploy the **Else if** action. This action is executed when the previous **If** and **Else if** conditions are invalid. It should be placed within the **If/End** block and always before the **Else** action.



In all cases, the variables and values used as operands must be of the same data type. Comparing variables of different data types makes the condition always false.

## If variations

Apart from the standard **If** action, Power Automate provides some additional conditional actions:

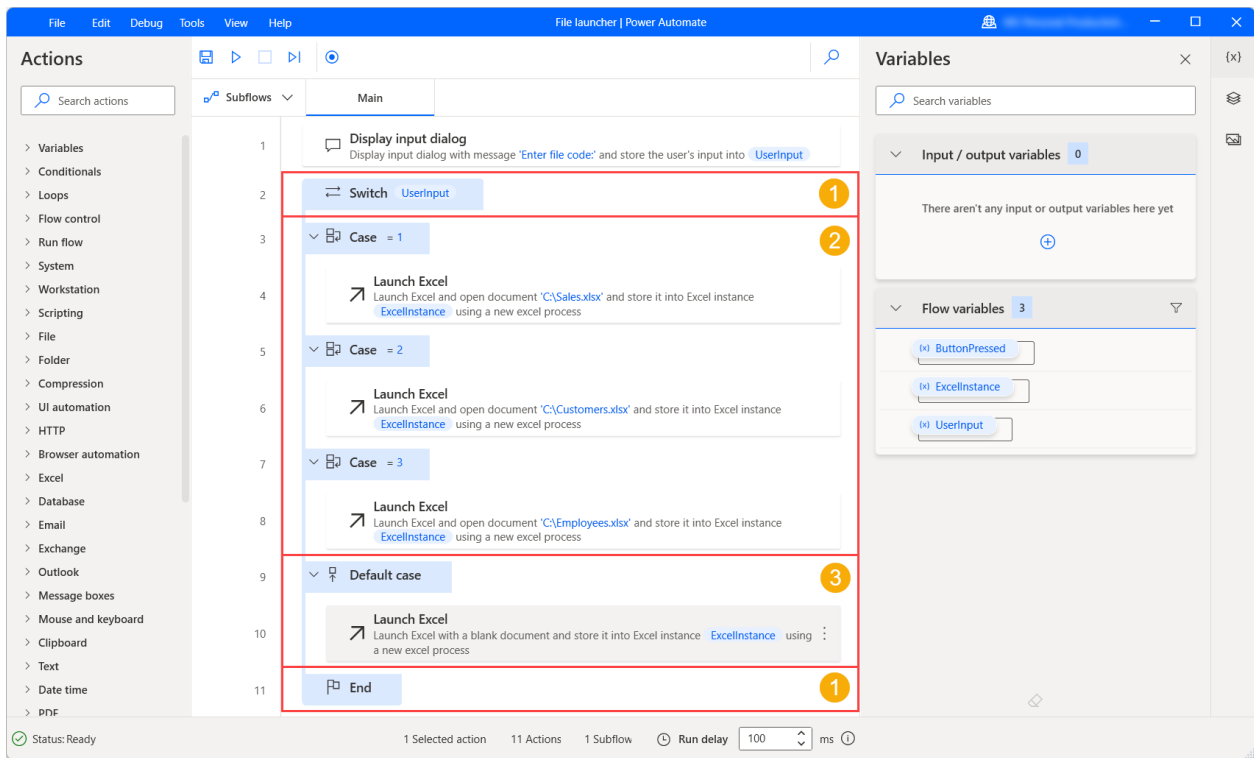
- **If file exists:** Checks if a file exists or not before executing a block of actions. This action can be used to ensure that a file exists before performing other operations on it.
- **If folder exists:** Checks if a folder exists or not before executing a block of actions.
- **If service:** Executes a block of actions if a specific service is running, is paused or is stopped.
- **If process:** Executes a block of actions if a specific Windows process is running, or not.
- **If window:** Executes a block of actions if a specific window is open, or not.
- **If window contains:** Executes a block of actions if a specific text or UI element exists in a window, or not.
- **If image:** Executes a block of actions if a specific image is found on the screen, or not.
- **If web page contains:** Executes a block of actions if a web page contains a specific element or some text, or not.
- **If text on screen (OCR):** Checks if a given text is found on the screen or not, using an OCR Engine of your choice.

## Switch-case model

Unlike if-else conditionals, a switch block can address several possible execution paths. A switch statement is a control mechanism that allows a variable or expression to change the flow's behavior.

A switch block consists of three main parts:

1. The **Switch** action that marks the beginning of a switch block. Every **Switch** is accompanied by an **End** action that marks the switch block's end.
2. Inside the switch block, each **Case** marks a block of actions to execute if the respective condition is true.
3. In case all conditions are invalid, the flow will execute the actions in the **Default case** block, if exists.



You'll find the list of conditional actions available in the [Actions reference](#).

# Automate webpages

Article • 01/29/2024

Power Automate offers several actions under the browser automation group to enable users to interact with web browsers. Browser automation is a special case of UI automation used for interacting with web elements.

Apart from the built-in Automation browser, four web browsers are currently supported:

- Microsoft Edge
- Microsoft Internet Explorer
- Google Chrome
- Mozilla Firefox

## Important

Before automating webpages, you need to install the appropriate browser extension and configure the browser accordingly. To find more information regarding the supported browsers and the required extensions, go to [Install Power Automate browser extensions](#).

To automate a webpage, you must launch or attach to one of the supported browsers, and then deploy browser automation actions. Browser automation actions enable you to interact with webpages and emulate events, such as clicking, using JavaScript scripts. You can develop the flow manually or [using the recorder](#).

## Note

Web automation in Power Automate for desktop has a behavior where it can't open with a different system user or attach to any browser that was opened with a different system user other than the one used to open Power Automate for desktop. This behavior occurs for security reasons.

By default, browser automation actions don't move the mouse pointer on the screen. As a result, they can run even when the web browser is minimized, or the target tab isn't the focused tab. This functionality allows you to perform other activities on your machine while a browser automation flow is running.

However, some actions like **Click link on web page** and **Populate text field on web page** support physical interactions for cases where JavaScript events don't work as

expected. If you enable physical interaction, the browser can't be minimized, and the target tab must be focused.

## Use Internet Explorer vs Automation browser

Although Automation browser is based on Internet Explorer, it provides some features and limitations that increase automation effectiveness.


1. Automation browser works out of the box, while Internet Explorer requires [extra configuration](#). Security configurations may be unwanted in organizations with strict security policies that prohibit manual changes.
2. The **Click download link on web page** action works with Automation browser whatever the Internet Explorer version. For the actual Internet Explorer, the action requires version 8 or below.
3. Automation browser suppresses all message dialog boxes that may pop up unhindered in the Internet Explorer. If this feature is undesirable, apply the **ShowDialogs** suffix at the end of the URL in the **Launch new Internet Explorer** action.
4. Automation browser doesn't support tabs or opening links in windows. When you select a link, the browser opens it in the same window/instance.
5. Automation browser has a small performance advantage because it doesn't load unnecessary elements and add-ons like the Internet Explorer does.

## Automate browsers and web elements

Before deploying any other browser automation actions, use one of the browser-launching actions to create a browser instance. You can start a new browser session or attach to an existing one.

- **Launch new Microsoft Edge**
- **Launch new Internet Explorer**
- **Launch new Chrome**
- **Launch new Firefox**

## Launch new Microsoft Edge ✕

 Launch a new instance of Microsoft Edge for automating web sites and web applications [More info](#)

### Select parameters

Launch mode:  ⓘ

Initial URL:  {x} ⓘ

Window state:  ⓘ

> **Advanced**


> **Variables produced** Browser

When a browser instance is available, you can deploy other browser automation actions to interact with webpages. The web form-filling actions focus on providing input to webpages, while the web data extraction actions draw data from webpages.

You can find a list with all the available browser automation actions in the [Browser automation actions reference](#).



### Populate text field on web page ✕

 Fill a text field in a web page with the specified text [More info](#)

Select parameters

Web browser instance:  ⓘ

UI element:  ⌵ ⓘ

Text:  ⌵ Input as text, variable or expression {X} ⓘ

> Advanced

Apart from a browser instance, most browser automation actions require a UI element to interact with. Existing UI elements are visible in the UI element pane, while new ones can be added directly through the action's properties or the pane. To find more information about UI elements, go to [Automate using UI elements](#).

#### ⓘ Note

Browser automation actions accept exclusively UI elements captured from webpages. Therefore, UI elements captured from desktop applications aren't available in the browser automation actions.

### Populate text field on web page

Fill a text field in a web page with the specified text [More info](#)

Select parameters

Web browser instance: %Browser%

UI element: Local computer > Web Page 'h ... uration=1D' > Div 'curre

Text: Search

UI elements 2

- Local computer
  - Web Page 'h ... uration...'
    - Div 'currencyField-DS-En...

Advanced

Add UI element Select Cancel

On error Save Cancel

To add a new UI element, highlight the appropriate web element and press **Ctrl + Left click**. After adding all the required elements, select **Done** to save them.

Currency Converter

1 USD = 0.7995 GBP

From: Div 'USD \$ - United States Dollar' \$1.00

To: Div 'GBP £ - United Kingdom Pound' £0.7995

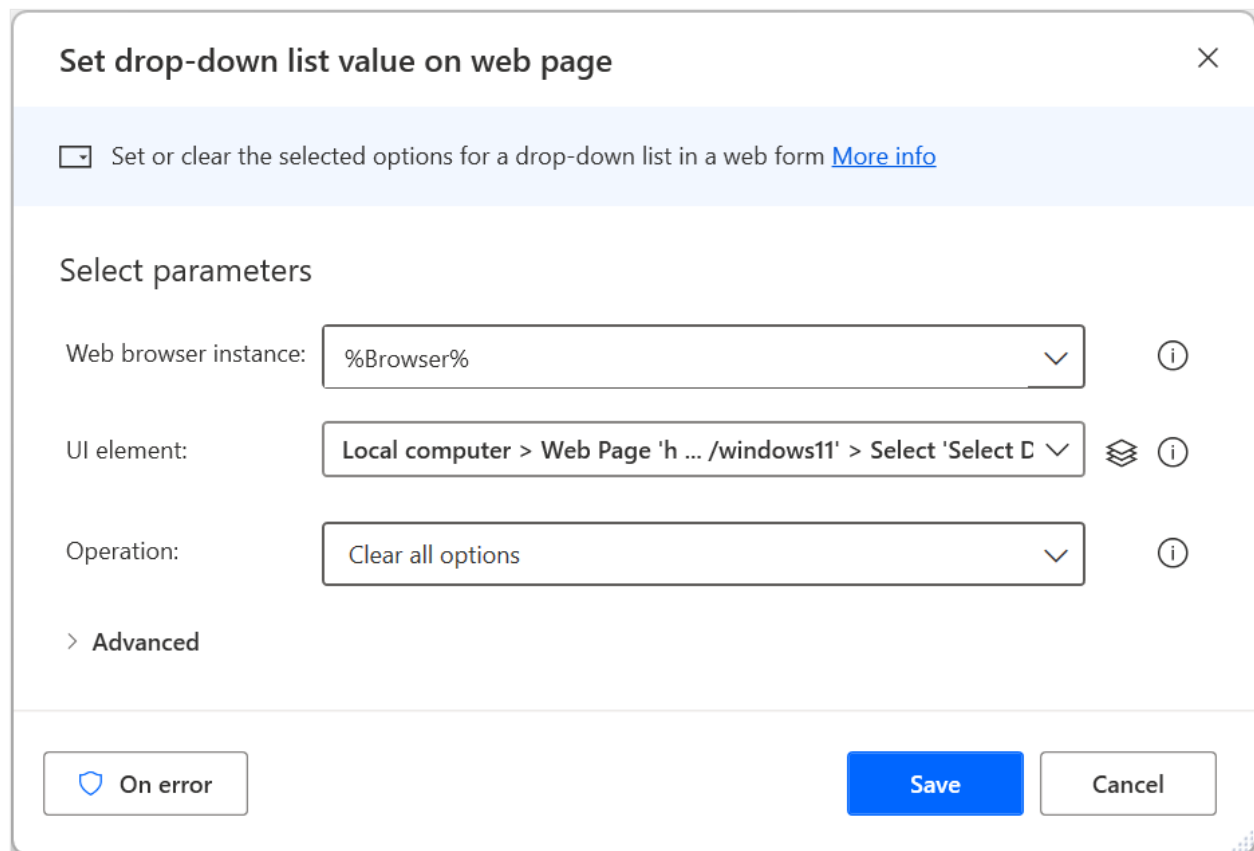
UI element picker

- Computer
  - Web Page 'h ... uration=1D'
    - Div '\$1.00'

Done

# Enter data on webpages

To provide input to a webpage, select the appropriate web form-filling action depending on the nature of the element. For example, use the **Set drop-down list value on web page** action to select an item in a dropdown menu.




The screenshot shows a configuration dialog titled "Set drop-down list value on web page". At the top right is a close button (X). Below the title bar is a description: "Set or clear the selected options for a drop-down list in a web form" with a "More info" link. The "Select parameters" section contains three rows: "Web browser instance:" with a dropdown menu showing "%Browser%", "UI element:" with a breadcrumb-style dropdown showing "Local computer > Web Page 'h ... /windows11' > Select 'Select D", and "Operation:" with a dropdown menu showing "Clear all options". Each row has an information icon (i) to its right. Below the parameters is a collapsed "Advanced" section. At the bottom, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

# Extract data from webpages

To extract a specific piece of data from a webpage, use the **Get details of web page** or the **Get details of element on web page** action, depending on whether the data in question concerns the entire webpage or an element inside it. To find more information regarding details extraction from webpages, go to [Retrieve details from a webpage](#).

### Get details of web page ✕

 Get a property of a web page, such as its title or its source text [More info](#)

Select parameters

Web browser instance:  ⓘ


Get:  ⓘ

> Variables produced WebPageProperty

Apart from the pre-populated options, you can manually select to retrieve any HTML attribute the chosen web element may have.

Additionally, the **Get details of element on web page** action supports the **waelementrectangle** attribute that retrieves the top-left point and the dimensions of a web element. To find more information about this attribute, go to [Get the coordinates and size of a web element](#).

### Get details of element on web page ✕

 Get the value of an element's attribute on a web page [More info](#)

Select parameters

Web browser instance:  ⓘ

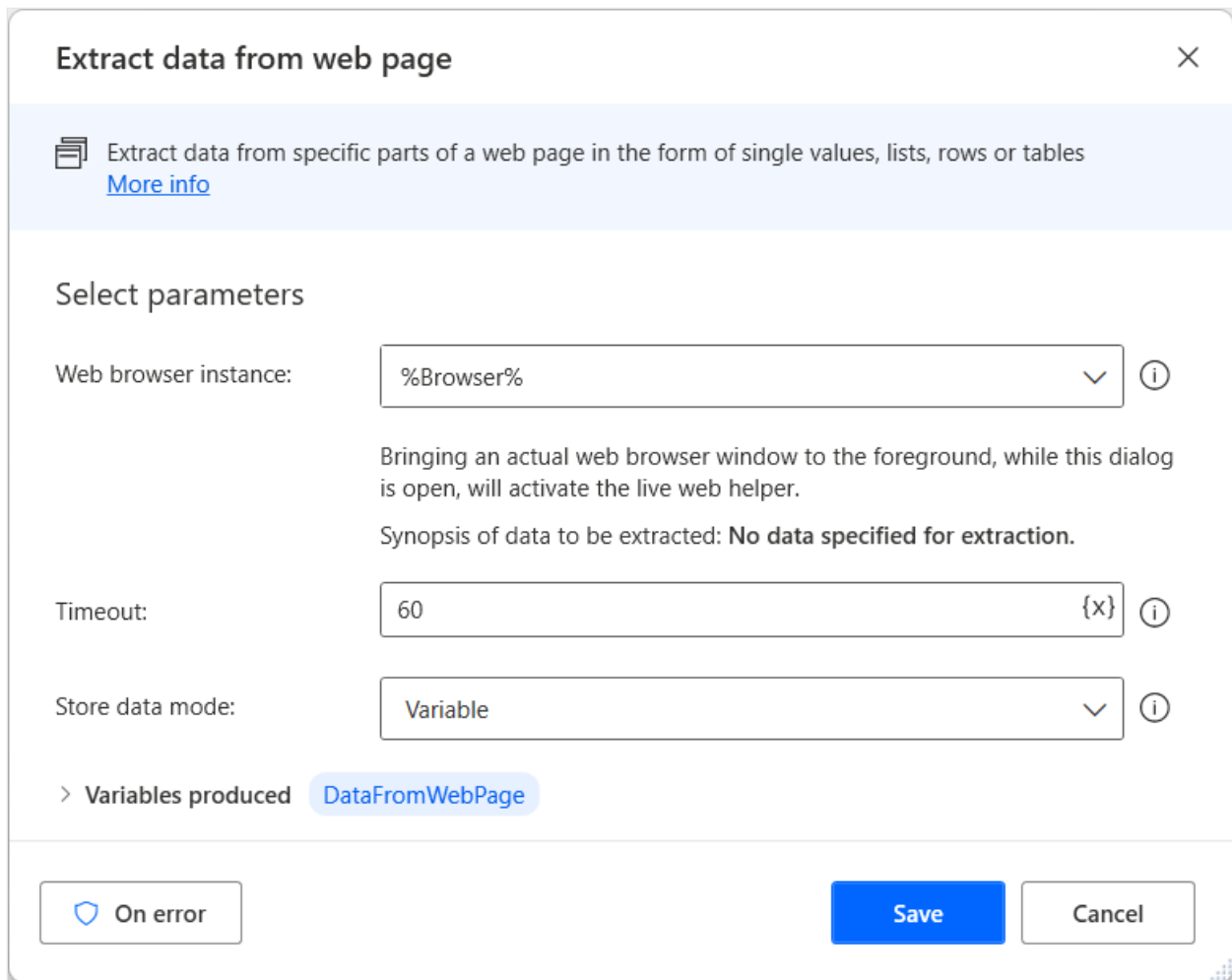
UI element:  ⌵ ⓘ

Attribute name:  ⌵ ⓘ

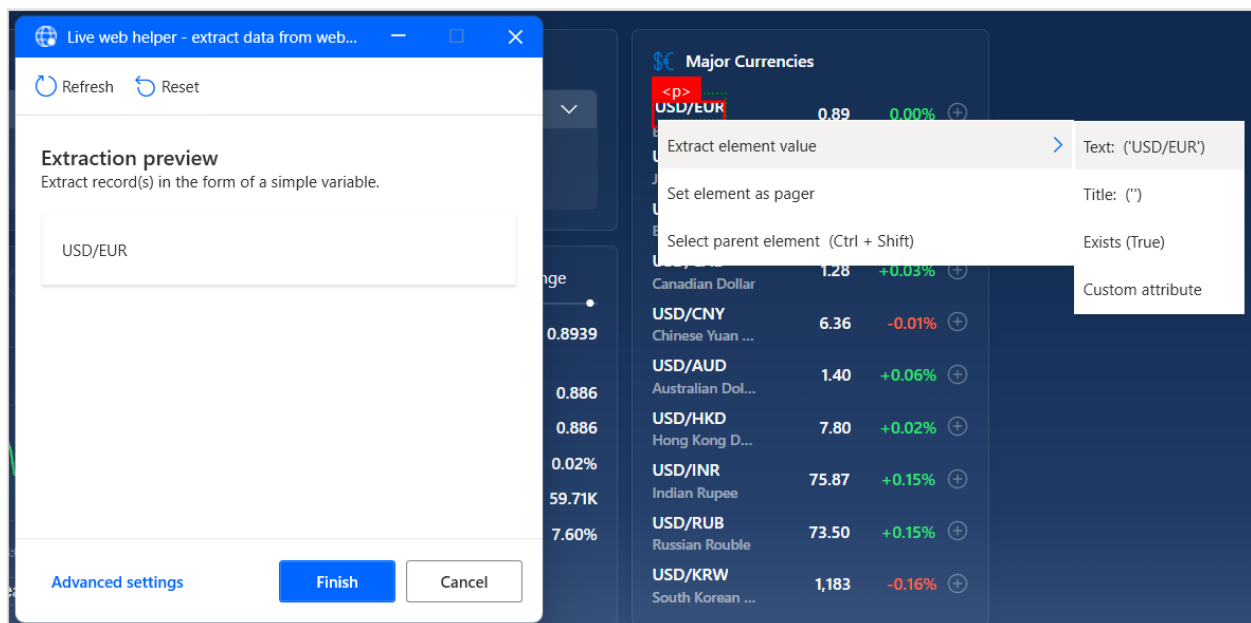
> Variables produced AttributeValue

## Extract structured data from webpages

To extract large amounts of structured data, use the **Extract data from web page** action. You can store the extracted data as single values, lists, and tables, or you can paste them into Excel worksheets.



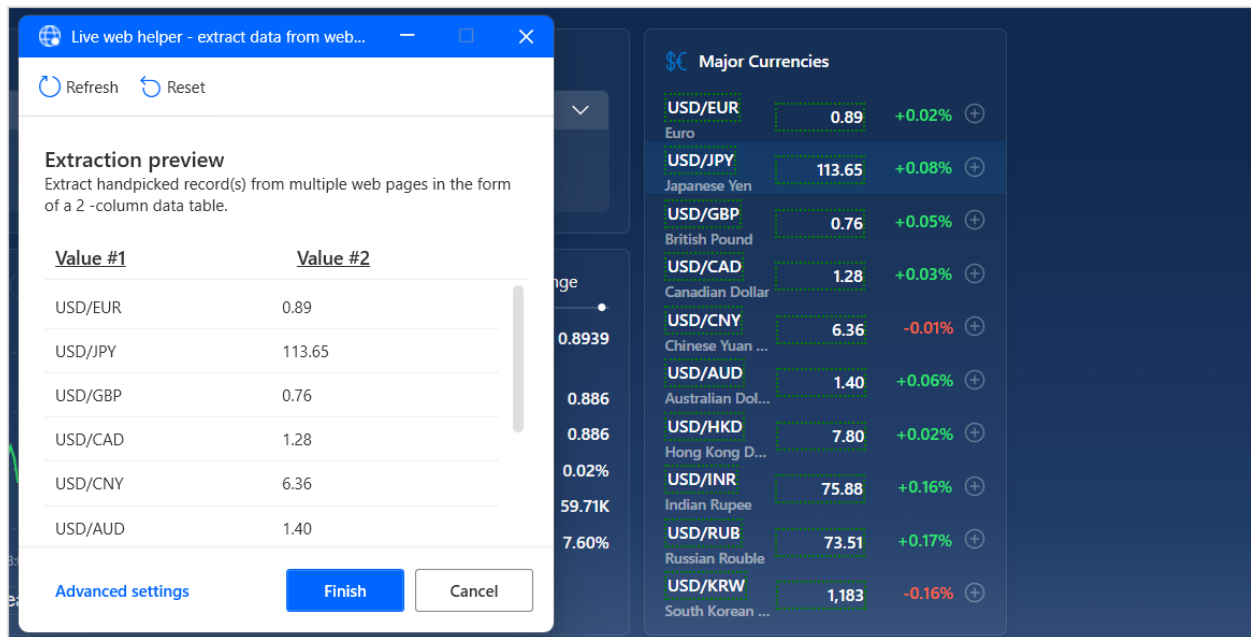
While the live web helper is open, select or right-click the target data to view the available extraction options. To extract a value, select **Extract element value**, and then choose the HTML attribute that you want to retrieve.



Power Automate automatically identifies lists or tables of data after selecting two or more of their elements for extraction.

## ⓘ Note

To extract an entire HTML table faster, select or right-click the table and select **Extract entire HTML table**. This option is available only for elements that Power Automate recognizes as HTML tables. If the data is structured as a table but isn't recognized as an HTML table, extract the first two of their elements, as previously described.



The screenshot shows the 'Live web helper' interface. A white 'Extraction preview' window is open, displaying a table of extracted data. The table has two columns: 'Value #1' and 'Value #2'. The data rows are as follows:

Value #1	Value #2
USD/EUR	0.89
USD/JPY	113.65
USD/GBP	0.76
USD/CAD	1.28
USD/CNY	6.36
USD/AUD	1.40

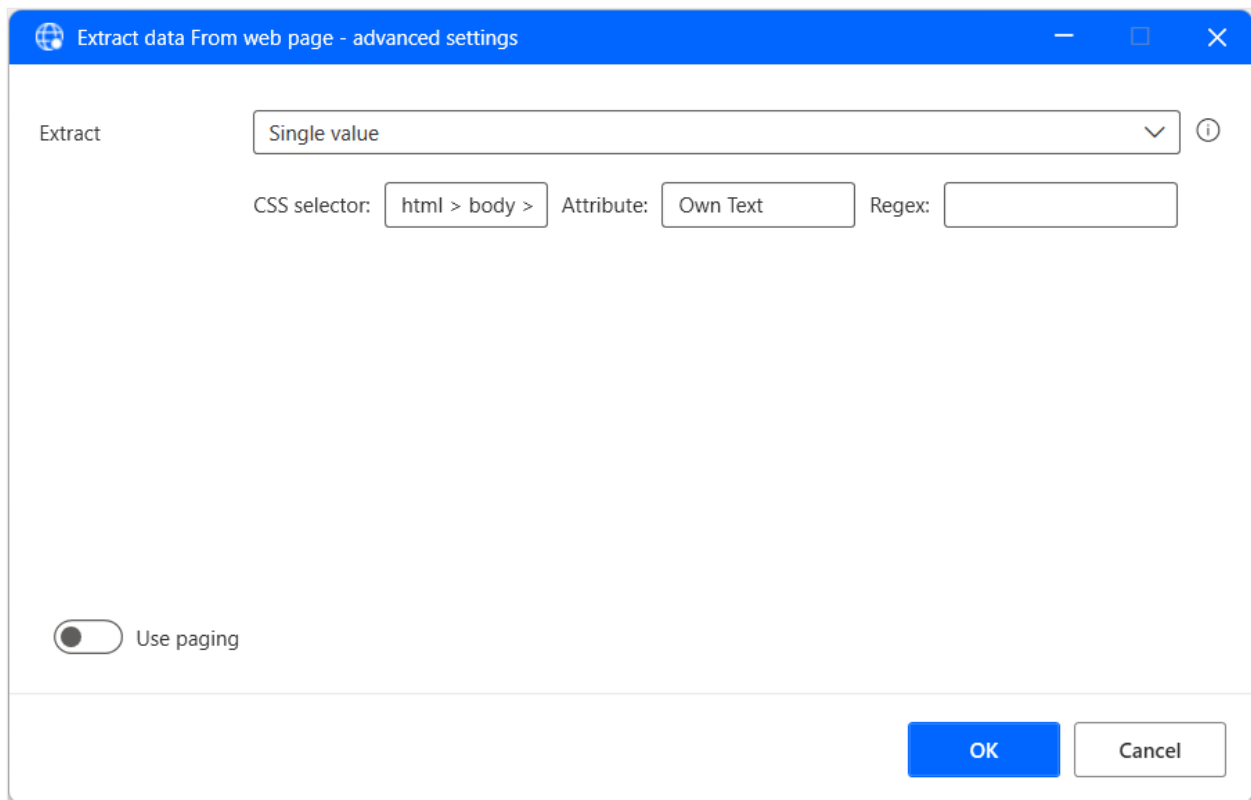
Below the table are buttons for 'Advanced settings', 'Finish', and 'Cancel'. In the background, a dark blue panel titled 'Major Currencies' displays a list of currency pairs with their values and percentage changes:

Pair	Value	Change
USD/EUR	0.89	+0.02%
USD/JPY	113.65	+0.08%
USD/GBP	0.76	+0.05%
USD/CAD	1.28	+0.03%
USD/CNY	6.36	-0.01%
USD/AUD	1.40	+0.06%
USD/HKD	7.80	+0.02%
USD/INR	75.88	+0.16%
USD/RUB	73.51	+0.17%
USD/KRW	1,183	-0.16%

Alternatively, you can manually create or edit CSS selectors that pinpoint specific elements.

To create a CSS selector, select **Advanced settings** in the live web helper, and then choose the type of value you want to extract. You can choose to extract a single value, multiple handpicked values (a different selector defines each value), lists, tables, and entire HTML tables.

Each CSS selector consists of the tree structure of the HTML element, the attribute to extract from it, and optionally a regular expression to implement more advanced selection.

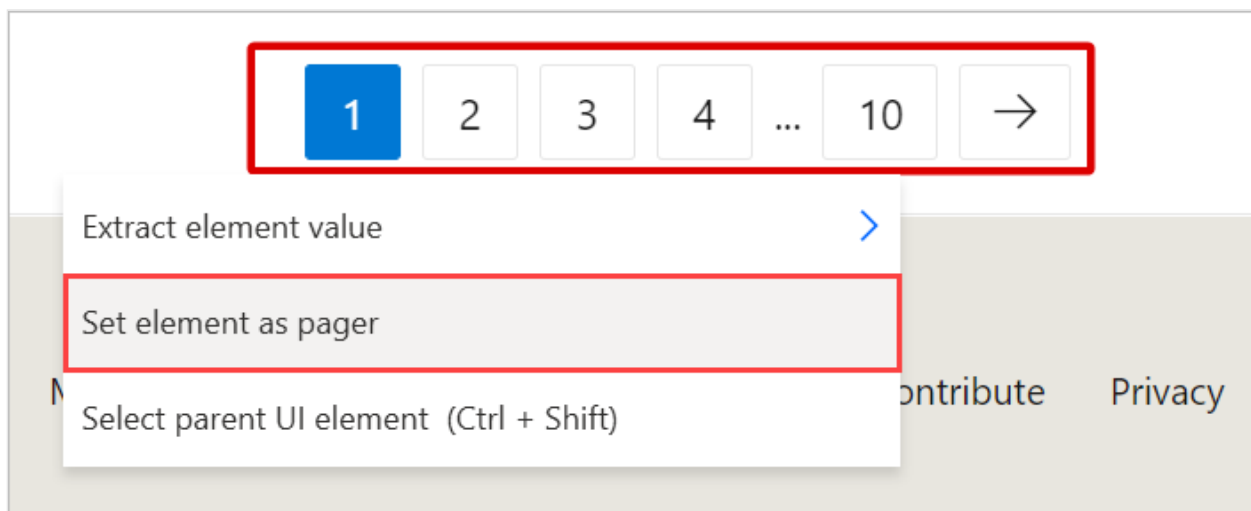


## Extract structured data from multiple pages

If the information to extract is split between multiple pages with the same structure, you need to set the appropriate paging configuration.

Pagers are web elements that allow you to navigate between multiple pages. To set a pager for the data extraction, select or right-click the respective pager element and select **Set element as pager**.

Additionally, you can manually specify a pager through the **Advanced settings** of the live web helper.




When data selection is complete, close the live web helper and configure the appropriate parameters in the **Extract data from web page** action. You can select



between extracting data from all the available pages or a specific number of them.

Optionally, you can enable **Process data upon extraction** to let Power Automate process the extracted data in different ways, such as removing whitespaces and unwanted characters. However, this option may affect performance for large amounts of data.

### Extract data from web page ✕

 Extract data from specific parts of a web page in the form of single values, lists, rows or tables  
[More info](#)

Select parameters

Web browser instance:  ⓘ

Bringing an actual web browser window to the foreground, while this dialog is open, will activate the live web helper.

Synopsis of data to be extracted: **Extract record(s) from multiple web-pages in the form of a List.**

Extract data from:  ⓘ

Max web pages to process:  {x} ⓘ

Process data upon extraction:  ⓘ

Timeout:  {x} ⓘ

Store data mode:  ⓘ

> Variables produced DataFromWebPage

## Interact with web services

Power Automate provides various HTTP actions that enable you to communicate directly with web resources, such as webpages, files, and APIs, without needing a web browser. You can find a list with all the available HTTP actions in the [HTTP actions reference](#).

## Download web resources

Use the **Download from web** action to directly download webpage content or files stored on the web.

Both the **GET** and **POST** methods can be used within this action. Files can be downloaded directly to the disk, while webpage contents are saved into variables.

### Download from web ✕

↓ Downloads text or a file from the web and stores it [More info](#)

Select parameters

URL:  {x} ⓘ

Method:  ▼ ⓘ

Save response:  ▼ ⓘ

▼ **Advanced**

Connection timeout:  {x} ⓘ

Follow redirection:  ⓘ

Clear cookies:  ⓘ

User agent:  {x} ⓘ

Encoding:  ▼ ⓘ

Accept untrusted certificates:  ⓘ

Use credentials:  ⓘ

> Variables produced WebPageText

## Access web APIs

Use the **Invoke web service** action to access web APIs. Various methods are compatible with this action, which is fully customizable in order to accommodate virtually any API.

### ⓘ Note

Before using the **Invoke web service** action, refer to the documentation page of the web service you want to use. The following example can't be applied to all scenarios, as each web service requires a different configuration and syntax.

### Invoke web service

Invokes a web service and stores the response text [More info](#)

Select parameters

URL:  ⓘ

Method:  ⓘ

Accept:  ⓘ

Content type:  ⓘ

Custom headers:  ⓘ

Request body:  ⓘ

Save response:  ⓘ

> **Advanced**

> **Variables produced** WebServiceResponseHeaders WebServiceResponse StatusCode

Apart from the **Invoke web service** action, Power Automate provides the **Invoke SOAP web service** action to interact with SOAP web services.

# Create custom forms

Article • 02/24/2023

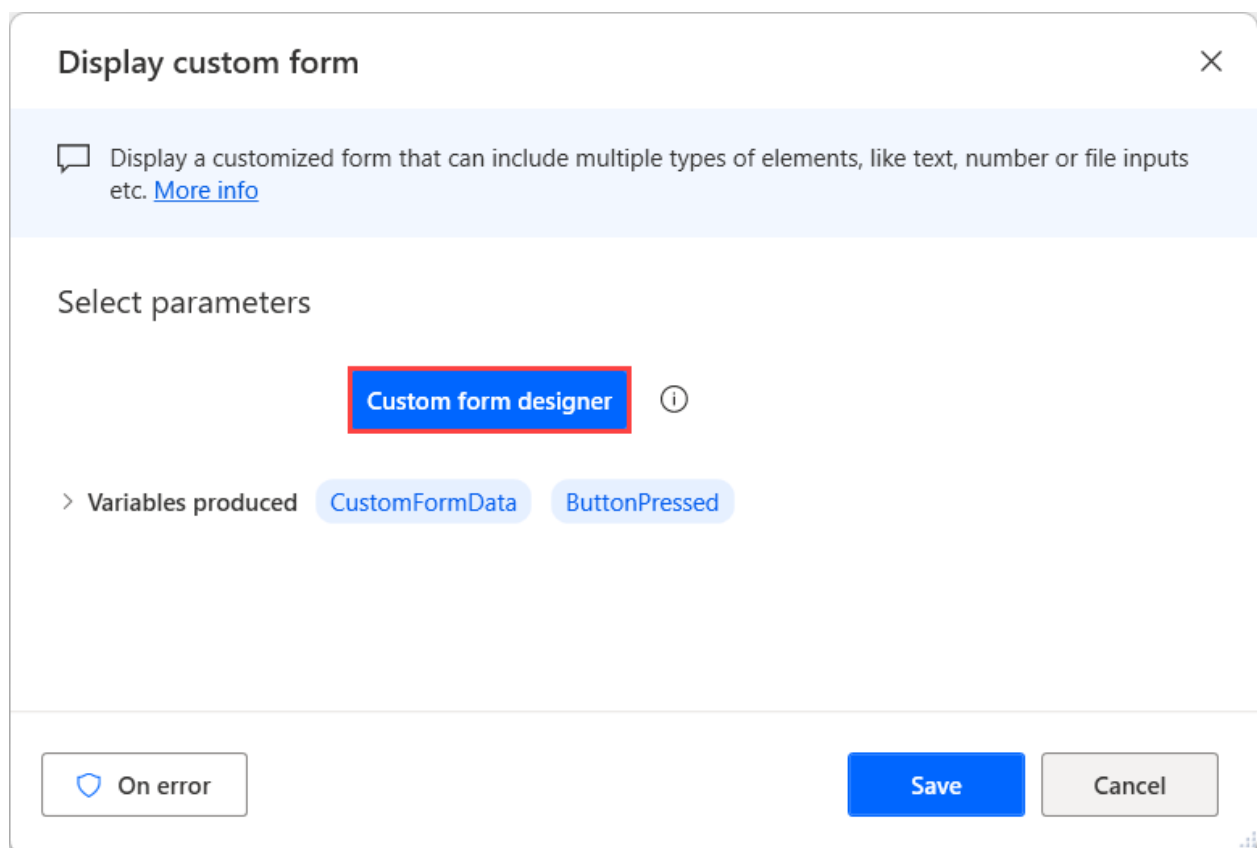
## ⓘ Note

The **Display custom form** action is based on the Adaptive Cards technology. Refer to [this page](#) to find more information regarding Adaptive Cards.

Message boxes enable you to prompt users to enter various inputs, such as text, dates, and files, or display information and results on the screen.

Although most actions of this group can handle scenarios where a single input is required, some automations may require a combination of inputs or/and outputs. The best approach to address these scenarios is the **Display custom form** action.

To create a custom form, deploy the **Display custom form** action and select the **Custom form designer** button to open the form designer.



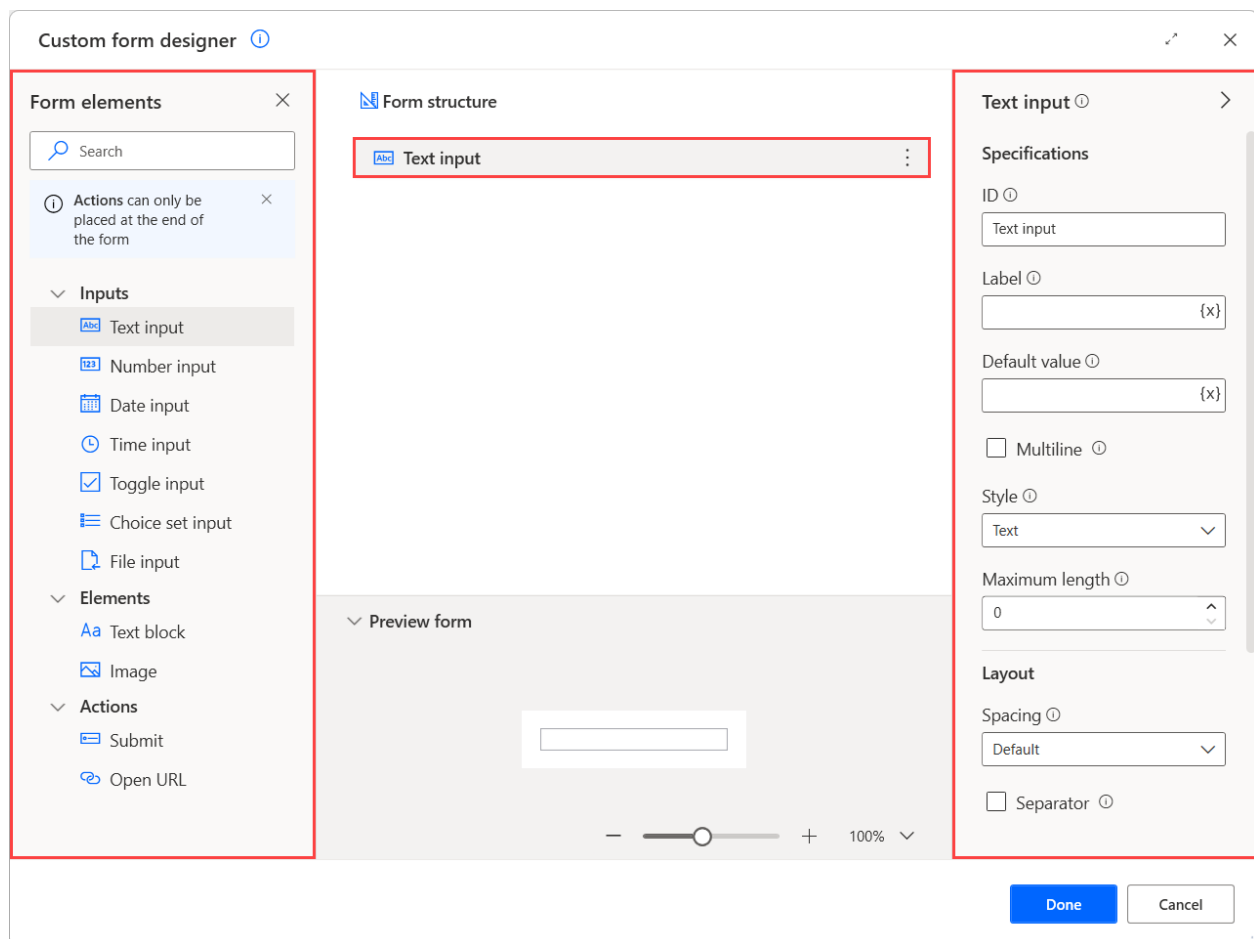
On the left side of the designer, there's a list with all the [available input elements](#) you can add to the form, such as text, date, and file inputs, and some non-interactive elements, such as texts and images.

To add an element to the custom form, double-click it or drag and drop it in the designer's workspace area. Use the preview pane on the bottom part of the form designer to see how the configured form will look during runtime.

After adding an element, you can handle all the [available properties](#) on the right side of the form designer. The available properties may differ depending on the nature of the selected element.

### ⓘ Note

Apart from the form elements, the form designer provides some properties to configure the appearance of the parent dialog of the custom form. To configure them, select an empty space on the workspace and see the available properties on the respective pane.



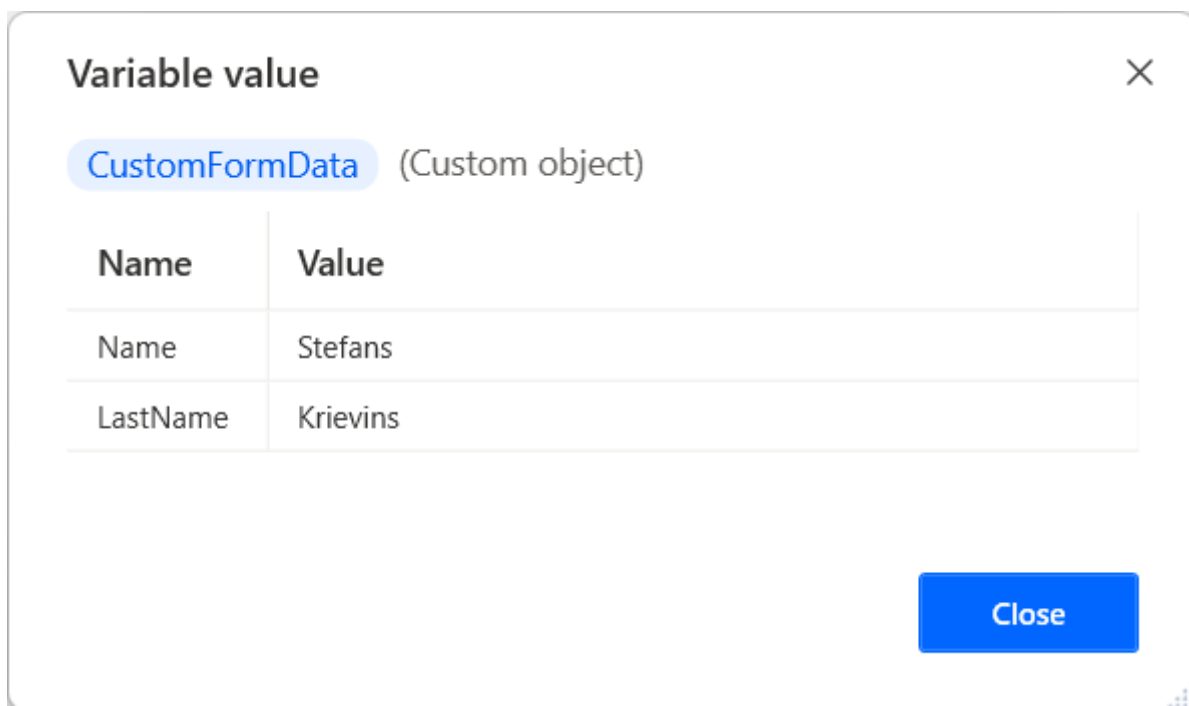
When a user populates a custom form, the provided data are stored into the **CustomFormData** custom object variable. To access the value of a specific input element stored in the custom object, use the following notation:  
`%CustomFormData['ElementID']%`.

### ⓘ Important

The ID of each element must be unique and can't be empty. Also, it must start with a letter and can contain Latin letters, numbers and spaces. You can't use variables in ID fields. If an invalid ID is provided, the last used valid ID will be automatically restored after closing and saving the form designer.

#### ⓘ Note

You can find more information regarding custom objects and how to handle them in [Advanced data types](#).



The screenshot shows a dialog box titled "Variable value" with a close button (X) in the top right corner. Below the title, there is a blue pill-shaped button labeled "CustomFormData" followed by the text "(Custom object)". Below this, there is a table with two columns: "Name" and "Value". The table contains two rows of data: one with "Name" and "Stefans", and another with "LastName" and "Krievins". At the bottom right of the dialog box, there is a blue button labeled "Close".

Name	Value
Name	Stefans
LastName	Krievins

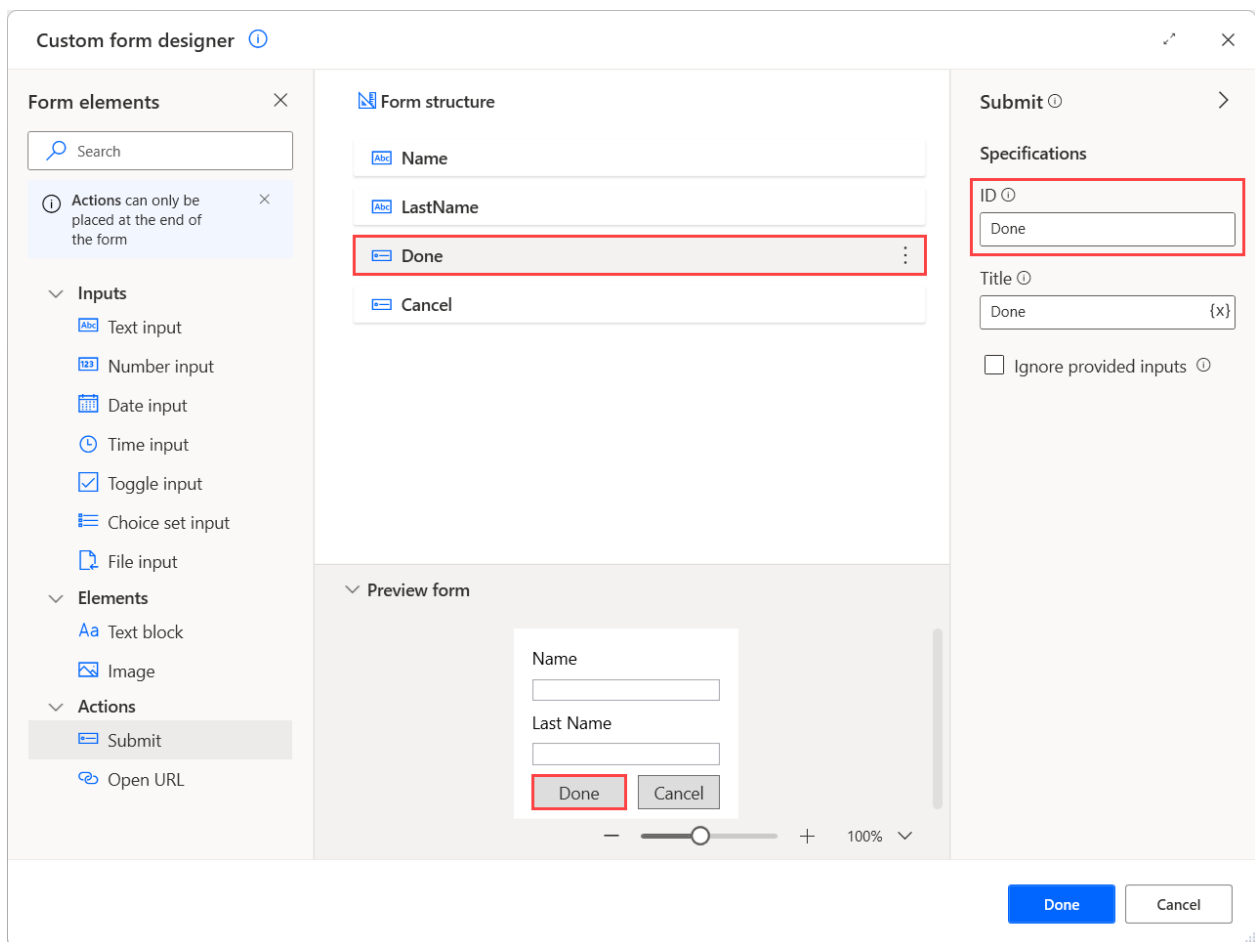
Apart from input and non-interactive elements, the form designer provides some actions to implement additional functionality in your forms.

Consider actions as buttons that allow you to run different functions based on which button was pressed. For example, use a **Submit** action as a save button to gather and store the provided user data for later use in your flow.

#### ⓘ Note

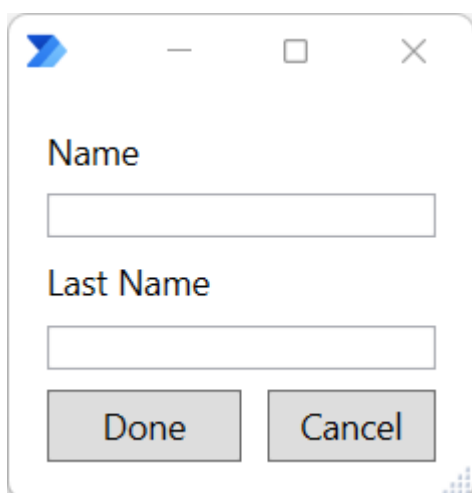
Actions can be added only at the end of the form structure, after any other type of form element.

Like the other elements, each action has an ID that describes it uniquely. When an action is selected, its ID is stored into the **ButtonPressed** variable.



When a form contains multiple actions, use this variable and [conditionals](#) to check which one is pressed and implement different functionality for each scenario. To find more information on implementing this behavior, refer to [Handle custom forms](#).

The following screenshot shows how the previously configured custom form looks when the flow runs.



## Custom form elements

Element name	Type	Specifications	Layout properties	Validaiton properties	Style properties	Background image
--------------	------	----------------	-------------------	-----------------------	------------------	------------------



<b>Element name</b>	<b>Type</b>	<b>Specifications</b>	<b>Layout properties</b>	<b>Validaiton properties</b>	<b>Style properties</b>	<b>Background image</b>
Custom form	Parent dialog	Title	Minimum height in pixels, Vertical content alignment			URL, Fill mode, Horizontal alignment, Vertical alignment
Text input	Input	ID, Label, Default value, Multiline, Style, Maximum length	Spacing, Separator, Height	Validation required, Error message, Pattern		
Number input	Input	ID, Label, Default value, Minimum value, Maximum value	Spacing, Separator, Height	Validation required, Error message		
Date input	Input	ID, Label, Default value, Minimum value, Maximum value	Spacing, Separator, Height	Validation required, Error message		
Time input	Input	ID, Label, Default value, Minimum value, Maximum value	Spacing, Separator, Height	Validation required, Error message		
Toggle input	Input	ID, Label, Title, Default value, Value when on, Value when off	Spacing, Separator, Height Wrap	Validation required, Error message		
Choice set input	Input	ID, Label, Default value, Allow multiple selection, Style, Choices	Spacing, Separator, Height, Wrap	Validation required, Error message		

Element name	Type	Specifications	Layout properties	Validaiton properties	Style properties	Background image
File input	Input	ID, Label, Default value	Spacing, Separator, Height	Validation required, Error message		
Text block	Element	ID, Text	Spacing, Separator, Horizontal alignment, Height, Wrap, Maximum lines, Maximum width		Font type, Size, Weight, Color, Subtle, Italic, Strikethrough	
Image	Element	ID, URL, Alternative text	Spacing, Separator, Horizontal alignment, Height, Height in pixels, Width in pixels, Size		Style, Background color	
Submit	Action	ID, Title, Ignore provided inputs				
Open URL	Action	ID, Title, URL				

## Custom form element properties

Property name	Optional	Accepts	Default	Description
Allow multiple selection	N/A	Boolean value	False	Allows multiple choices to be selected
Alternative text	Yes	Text value		Alternative text describing the image

<b>Property name</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default</b>	<b>Description</b>
Background color	Yes	Text value		Applies a background to a transparent image. This property will respect the image style. Only hex values are acceptable in this property
Choices	Yes	Title and Value		Describes choices for use in the choice set. Consists of a title (text to display) and a value (raw value for the choice)
Color	N/A	Default, Dark, Light, Accent, Good, Warning, Attention	Default	Controls the color of text
Default value	Yes	Text value, Numeric value		The default value of the input element
Error message	Yes	Text value		Error message to display when entered input is invalid
Fill mode	N/A	Cover, Repeat horizontally, Repeat vertically, Repeat		Describes how the image should fill the area
Font type	N/A	Default, Monospace	Default	Type of font to use for rendering
Height	N/A	Auto, Stretch, Pixels	Auto	Specifies the height of the element. The 'Pixels' option is available only for image elements
Height in pixels	No	Numeric value	0	Specifies the desired height of the image. The image will distort to fit that exact height. This overrides the 'Size' property. The default value of 0 determines that no particular height is specified
Horizontal alignment	N/A	Left, Center, Right	Text block: Left Image: Left	Controls how this element is horizontally positioned. For custom forms, it describes how the background image should be aligned if it must be cropped or if using repeat fill mode

<b>Property name</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default</b>	<b>Description</b>
ID	No	Text value	Depends on the element	Unique identifier for the value. Used to identify collected input when the Submit action is performed. If an invalid ID is temporarily used and the form designer is closed, the last valid ID used will apply
Ignore provided inputs	N/A	Boolean value	False	If enabled, this action closes the form without storing the selected inputs, operating as a Cancel button
Italic	N/A	Boolean value	False	If enabled, italicizes the text
Label	Yes	Text value		Label for this input
Maximum length	No	Numeric value	0	Specifies the maximum number of characters to collect. The default value of 0 determines that no maximum length is specified
Maximum lines	No	Numeric value	0	Specifies the maximum number of lines to display. The default value of 0 determines that no maximum lines are specified
Maximum value	Yes	Text value		Hint of maximum value. For date and time inputs, the value must be expressed in your machine's regional format
Maximum width	No	Numeric value	0	Specifies the maximum width of the text block in pixels. The default value of 0 determines that no maximum width is specified
Minimum height in pixels	No	Numeric value	0	Specifies the minimum height of the form. The default value of 0 determines that no minimum height is specified
Minimum value	Yes	Text value		Hint of minimum value. For date and time inputs, the value must be expressed in your machine's regional format
Multiline	N/A	Boolean value	False	If enabled, allows multiple lines of input
Pattern	Yes	Text value		Regular expression indicating the required format of this text input

<b>Property name</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default</b>	<b>Description</b>
Separator	N/A	Boolean value	False	When enabled, draws a separating line at the top of the element
Size	N/A	Text block: Default, Small, Medium, Large, Extra large Image: Auto, Stretch, Small, Medium, Large	Text block: Default Image: Auto	Controls the size of the text or image
Spacing	N/A	Default, None, Small, Medium, Large, Extra large, Padding	Default	Controls the amount of spacing between this element and the preceding element
Strikethrough	N/A	Boolean value	False	If enabled, crosses out the text
Style	N/A	Text input: Text, Tel, URL, Email Choice set input: Compact, Expanded Image: Default, Person	Text input: Text Choice set input: Compact Image: Default	The style of the text hint, choice set or image
Subtle	N/A	Boolean value	False	If enabled, displays text slightly toned down to appear less prominent
Text	Yes	Text value	New text block	Text to display

Property name	Optional	Accepts	Default	Description
Title	Yes	Text value	Toggle input: New toggle input Submit: OK	Title for the custom form or toggle or label for the button that represents this action
URL	Yes	Text value		The URL of the image (for image element and custom form) or the URL to open (for Open URL action)
Validation required	Yes	Boolean value	False	Determines whether this input is required or not
Value when off	Yes	Text value	False	The value when the toggle is off
Value when on	Yes	Text value	True	The value when the toggle is on
Vertical alignment	N/A	Top, Center, Bottom		Describes how the image should be aligned if it must be cropped or if using repeat fill mode
Vertical content alignment	N/A	Top, Center Bottom	Top	Defines how the content should be aligned vertically within the container. Only relevant for fixed-height forms, or forms with a minimum height specified
Weight	N/A	Default, Lighter, Bolder	Default	Controls the weight of text
Width in pixels	No	Numeric value	0	The desired on-screen width of the image. This overrides the 'Size' property. The default value of 0 determines that no particular width is specified
Wrap	N/A	Boolean value	False	If enabled, allows text to wrap. Otherwise, text is clipped

## Known issues and limitations

- **Issue:** The preview pane seems to work as expected when the URL property contains percentage characters, but an **Invalid value** validation error occurs.

- **Workaround:** This issue happens because Power Automate attempts to resolve the percentage characters as variables or expressions. To resolve this case, store the URL in a variable earlier in the flow, [escape the percentage characters](#), and then use that variable in the URL property. The preview won't show the image, but it will be shown during runtime.

# Automate desktop applications

Article • 02/02/2023

Power Automate offers UI automation actions to allow users to interact with Windows applications and their components by either providing input with mouse clicks and keyboard strokes or extracting data.

The actions of the Windows subcategory directly manipulate entire application windows, while form filling actions interact with more specific components, such as text fields and buttons.

UI automation actions require the window they interact with to be in the foreground, or they'll automatically bring it to the foreground.

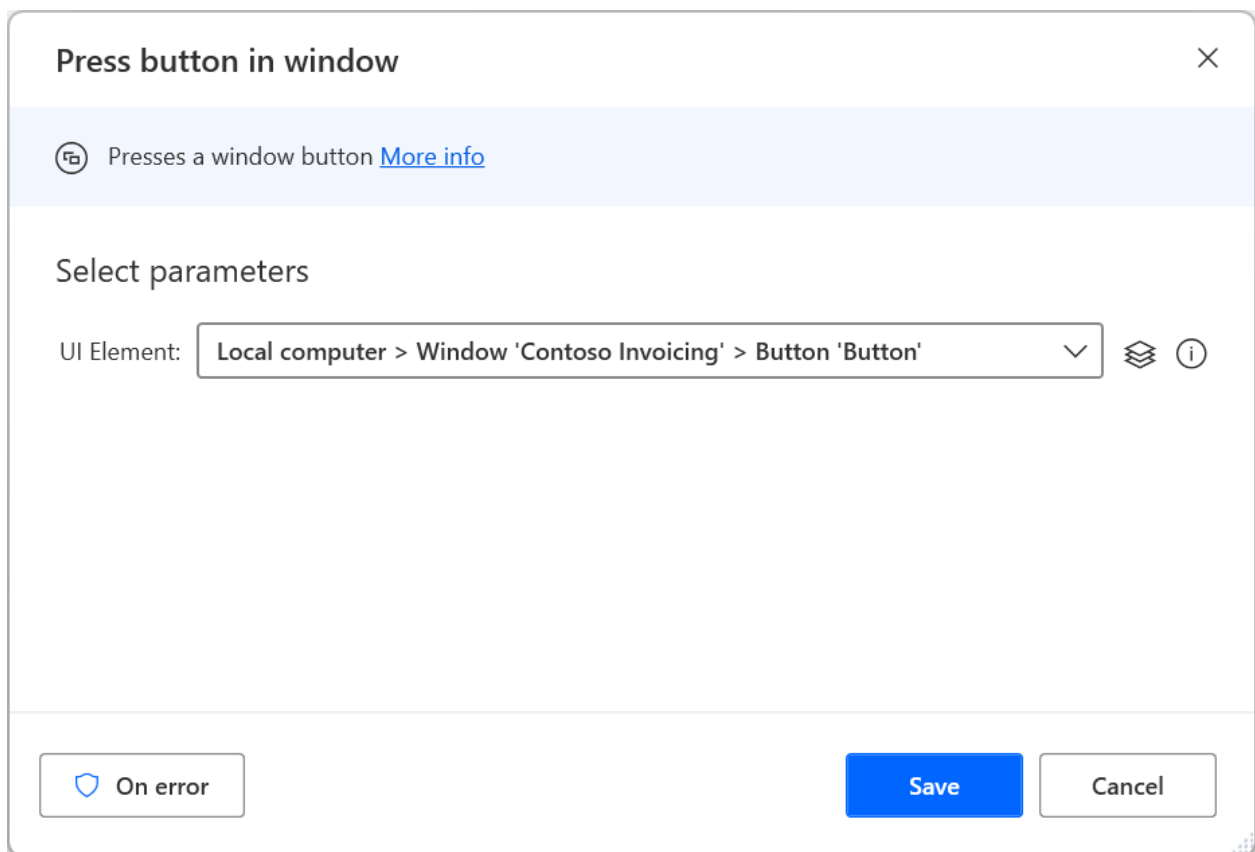
Desktop automation can be performed by manually adding the required actions or [using the recorder](#). You can find a list with all the available UI automation actions in the [UI automation actions reference](#).

## Interacting with desktop applications

To identify windows and components in them, Power Automate utilizes UI elements. UI elements uniquely describe each component and can be managed through the flow designer's UI elements pane.

To configure a UI automation action, determine the specific element it will interact with.



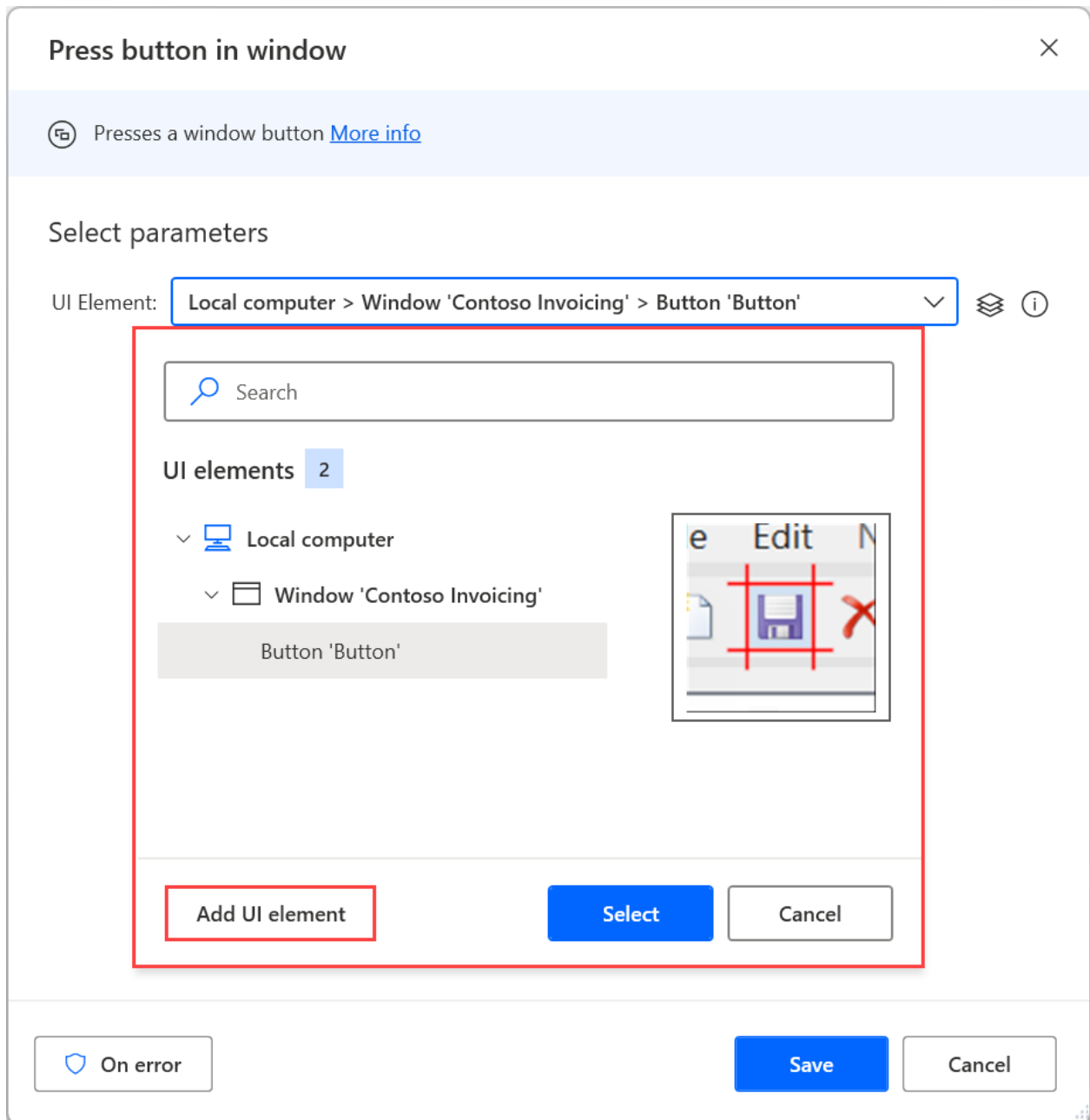


Existing UI elements are displayed in the UI element pane, while new ones can be added directly through the action's properties or the pane. You can find more information regarding UI elements and their different types in [Automate using UI elements](#).

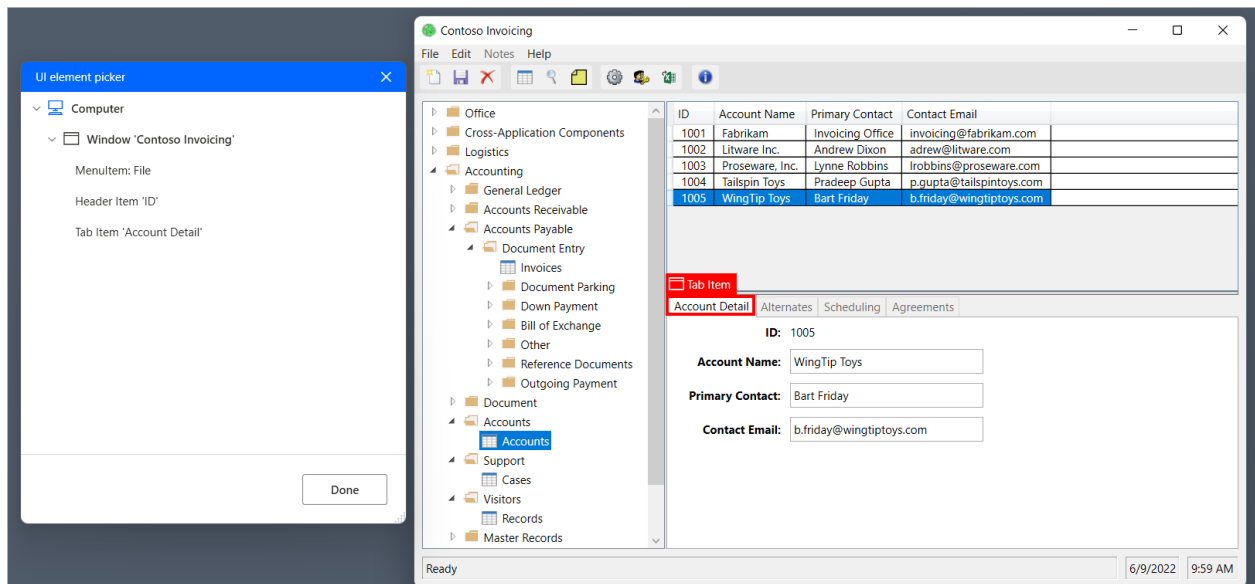
#### **Note**

UI automation actions accept exclusively desktop UI elements. Therefore, UI elements captured from web applications using the UI elements pane aren't displayed in the UI automation actions.

Users can capture elements from web pages through the UI element picker of UI automation actions. However, their selectors will represent desktop elements, not web elements.



To add a new UI element, highlight the appropriate element and press **Ctrl + Left click**. After adding all the elements, select **Done** to save them.



To extract a piece of data from an application window, such as its title, location, or size, use the **Get details of window** action.

The screenshot shows a dialog box titled "Get details of window" with a close button (X) in the top right corner. Below the title bar is a light blue header with a list icon and the text "Gets a property of a window such as its title or its source text [More info](#)".

The main section is titled "Select parameters". It contains two dropdown menus:

- Window:** The selected value is "appmask > Window 'Contoso Invoicing'". To the right of the dropdown are a stack icon and an information icon (i).
- Window property:** The selected value is "Get window title". To the right of the dropdown is an information icon (i).

Below the dropdowns, there is a section for "Variables produced" with a right-pointing chevron and a blue pill-shaped button labeled "WindowProperty".

At the bottom of the dialog, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

On the other hand, to extract data from specific components within a window, use the **Get details of a UI element in window** action.

The screenshot shows a dialog box titled "Get details of the UI element in window" with a close button (X) in the top right corner. Below the title bar is a light blue header with a list icon and the text "Gets the value of a UI element's attribute in a window [More info](#)".

The main section is titled "Select parameters". It contains two dropdown menus:

- UI element:** The selected value is "Local computer > Window 'Contoso Invoicing' > Edit 'TextBox'". To the right of the dropdown are a stack icon and an information icon (i).
- Attribute name:** The selected value is "Own Text". To the right of the dropdown is an information icon (i).

Below the dropdowns, there is a section for "Variables produced" with a right-pointing chevron and a blue pill-shaped button labeled "AttributeValue".

At the bottom of the dialog, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

# Automate on virtual desktops

Article • 05/07/2024

With the Power Automate agent for virtual desktops, you can automate processes on virtual desktops as easily as you can on physical devices. If your virtual desktop uses Citrix or Microsoft Remote Desktop Protocol (RDP), you can [capture UI elements](#), [deploy UI automation actions](#), and [create desktop flows using the recorder](#), just like on your physical desktop.

The Power Automate agent for virtual desktops must be running both while you're designing a flow and when the flow runs. The agent starts automatically when a user logs in to the virtual desktop. If it isn't running on your virtual desktop, launch the agent manually. To launch the Power Automate agent for virtual desktops manually, double-click the shortcut on your desktop, or search for *Power Automate agent for virtual desktops* on the **Start** menu and then select the respective result, or go to the installation directory of the Power Automate agent for virtual desktops (by default, it's `C:\Program Files (x86)\Power Automate agent for virtual desktops`) and double-click **PAD.RDP.ControlAgent.exe**.

It's important to install Power Automate for desktop on the machine where you're developing and executing your desktop flows, and Power Automate agent for virtual desktops on the machine where the flow just interacts with for UI automation actions. This second machine can be a Citrix Desktop, a host machine for a Citrix Virtual App, a remote desktop with Windows RDP communication, or a machine that hosts a Remote Desktop app.

## Prerequisites

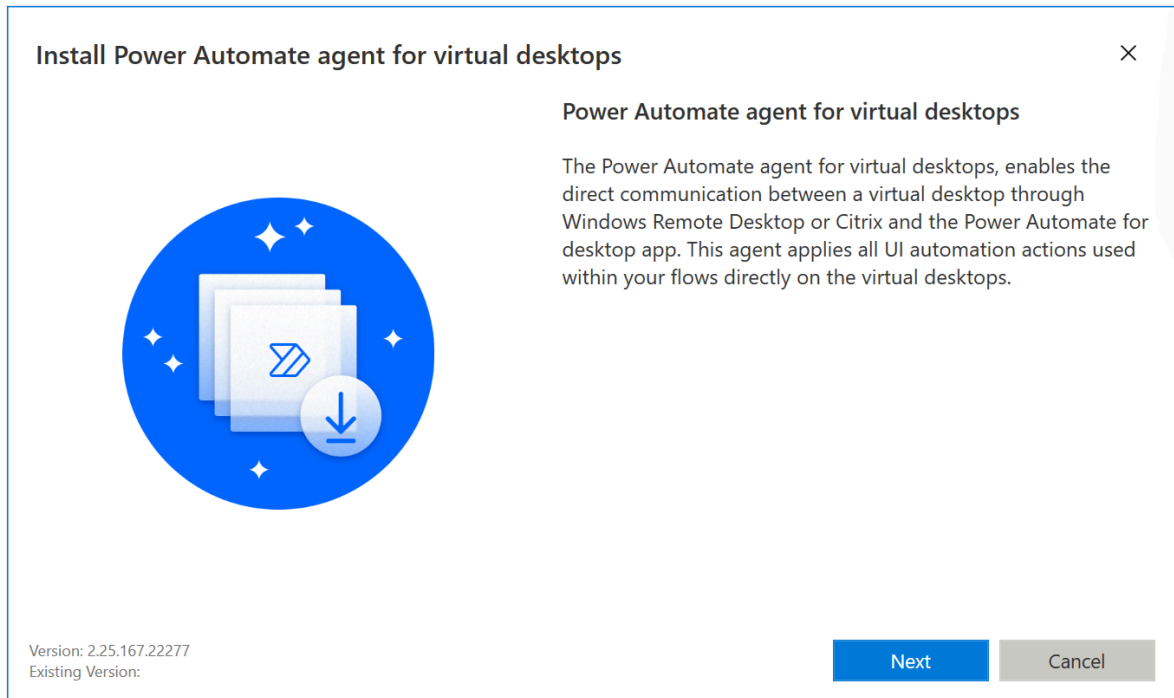
- Your physical device and virtual machine must be running Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, Windows 11 Enterprise, Windows Server 2016, Windows Server 2019, or Windows Server 2022.
- Make sure the Citrix or RDP connection to the virtual desktop is closed and then [install Power Automate on your physical device](#) <sup>↗</sup>.

## Install the Power Automate agent for virtual desktops

1. [Download the Power Automate agent for virtual desktops](#) <sup>↗</sup>.

Alternatively, launch the Power Automate desktop designer and select **Tools > Power Automate for virtual desktops**.

2. Copy the installer to your Citrix or RDP virtual desktop.
3. As an administrator, run the installer.

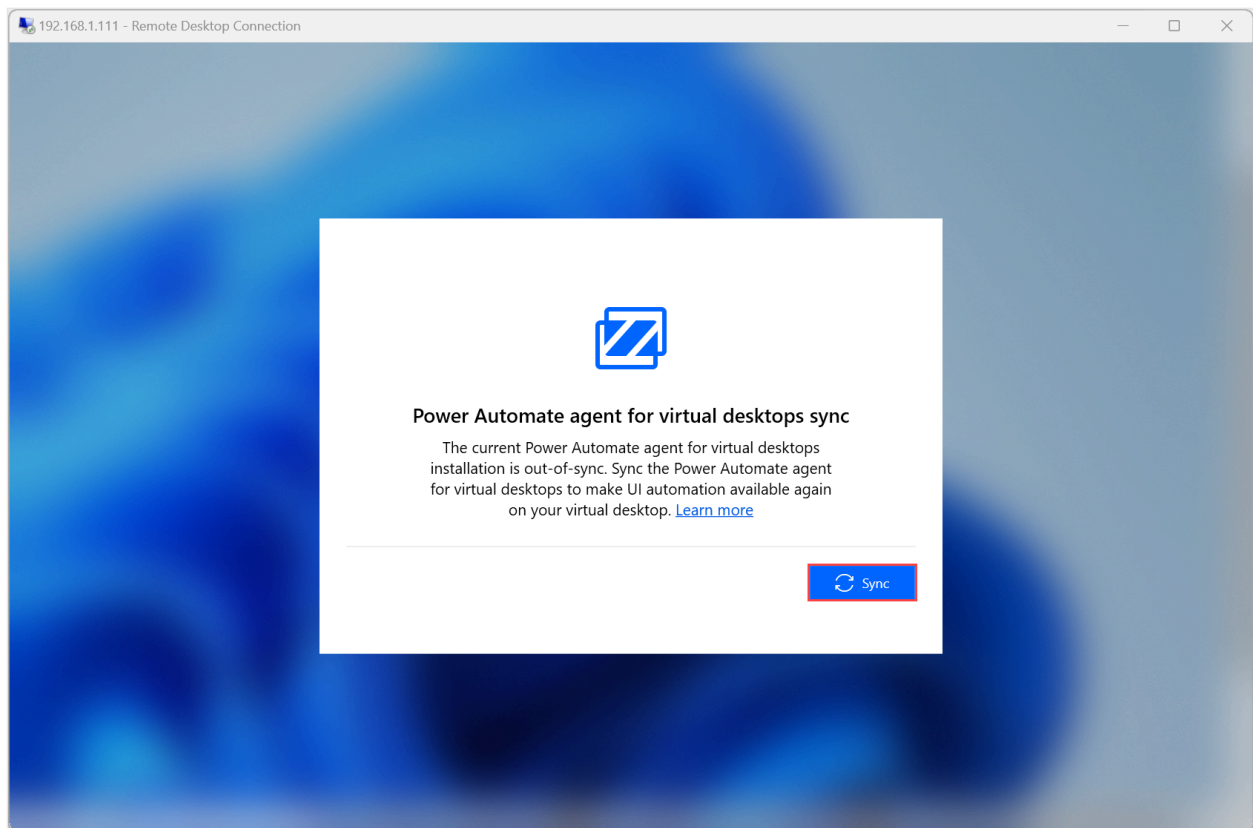


When the installation is complete, make sure the agent appears in the virtual desktop's notification area.

If you notice the agent isn't running, restart it using the shortcut in the notification area. If you encounter an error, refer to [Resolve Power Automate agent for virtual desktops issues](#).

## Sync Power Automate and agent for virtual desktops versions

To automate on virtual desktops, the versions of Power Automate and Power Automate agent for virtual desktops must be the same. If they're different when you start recording or capturing UI elements, select **Sync** when you're prompted to sync them.



If the versions are out of sync when a desktop flow is running, Power Automate syncs them automatically.

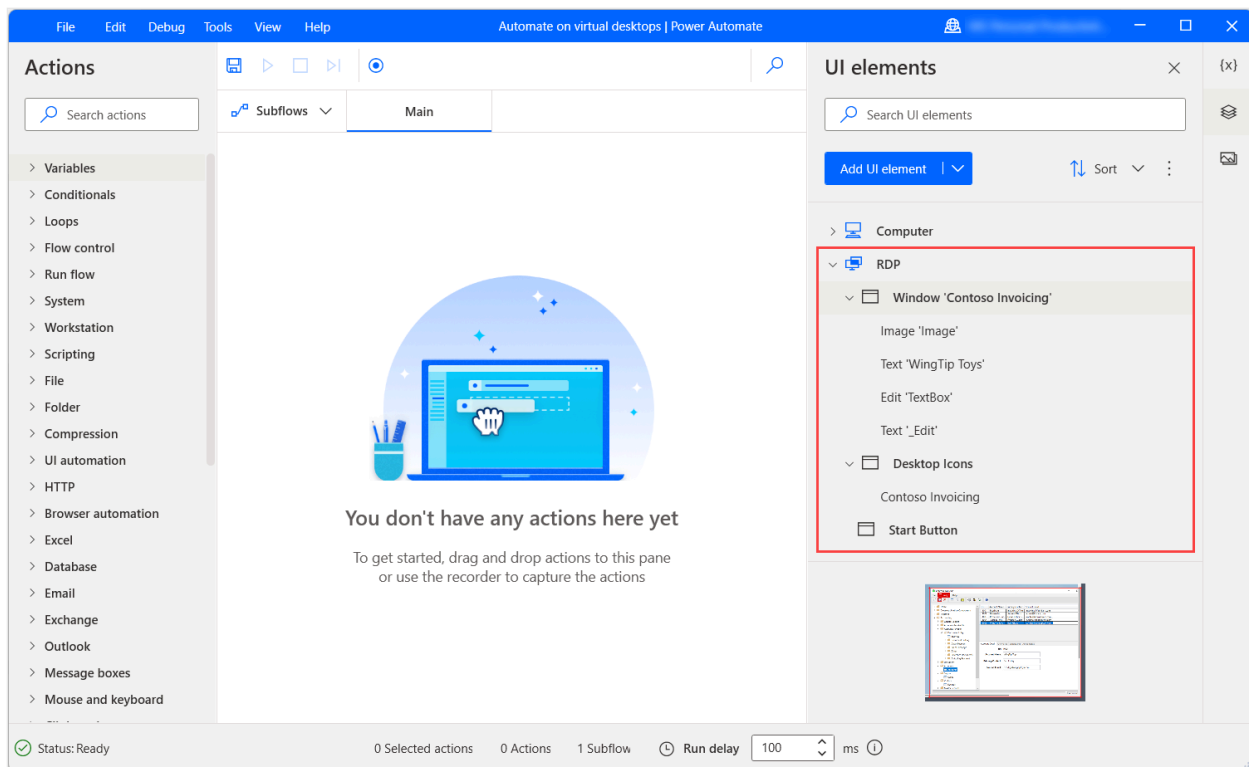
#### ⓘ Note

The DLLs of the synced agent are stored in **C:\Users\username\AppData\Local\Microsoft\Power Automate Desktop\RDP Automation Agents.**

## Distinguish UI elements captured on virtual desktops

Generated selectors of windows and UI elements are the same regardless of whether they were captured on a physical device or a virtual desktop. Visual indications and the tree structure in the UI elements pane help you to distinguish UI elements captured on virtual desktops from those captured on a physical device. [Learn more about UI elements and selectors.](#)

UI elements captured on the physical device are located under the **Computer** parent. UI elements captured on a virtual desktop are located under an **RDP** or **Citrix** parent. Every virtual desktop has its own individual tree. A numeric prefix helps you to distinguish virtual desktops of the same type.



### ! Note

When you capture a UI element in a virtual desktop, virtual app or RemoteApp, it is linked to the details(IP, Name, etc.) of the machine at the time of capture. If you want to interact with the same UI element on a different machine, you will need to capture it again on that machine.

## Communication between Power Automate for desktop and Power Automate agent for virtual desktops if syncing

### Basic information

An automation agent is a specialized agent that is sent to the remote desktop after the initial communication with the control agent is complete. It provides specific functionality for UI automation for the version of Power Automate Desktop that requests it.

The Automation Agent Storage Directory refers to the default path where automation agents are stored. By default, this path is '%LOCALAPPDATA%\Microsoft\Power Automate Desktop\RDP Automation Agents'. However, if the 'PAD\_RDP\_STORAGE\_DIRECTORY' property is defined on the machine, then the path

becomes '%PAD\_RDP\_STORAGE\_DIRECTORY%\Microsoft\Power Automate Desktop\RDP Automation Agents'.

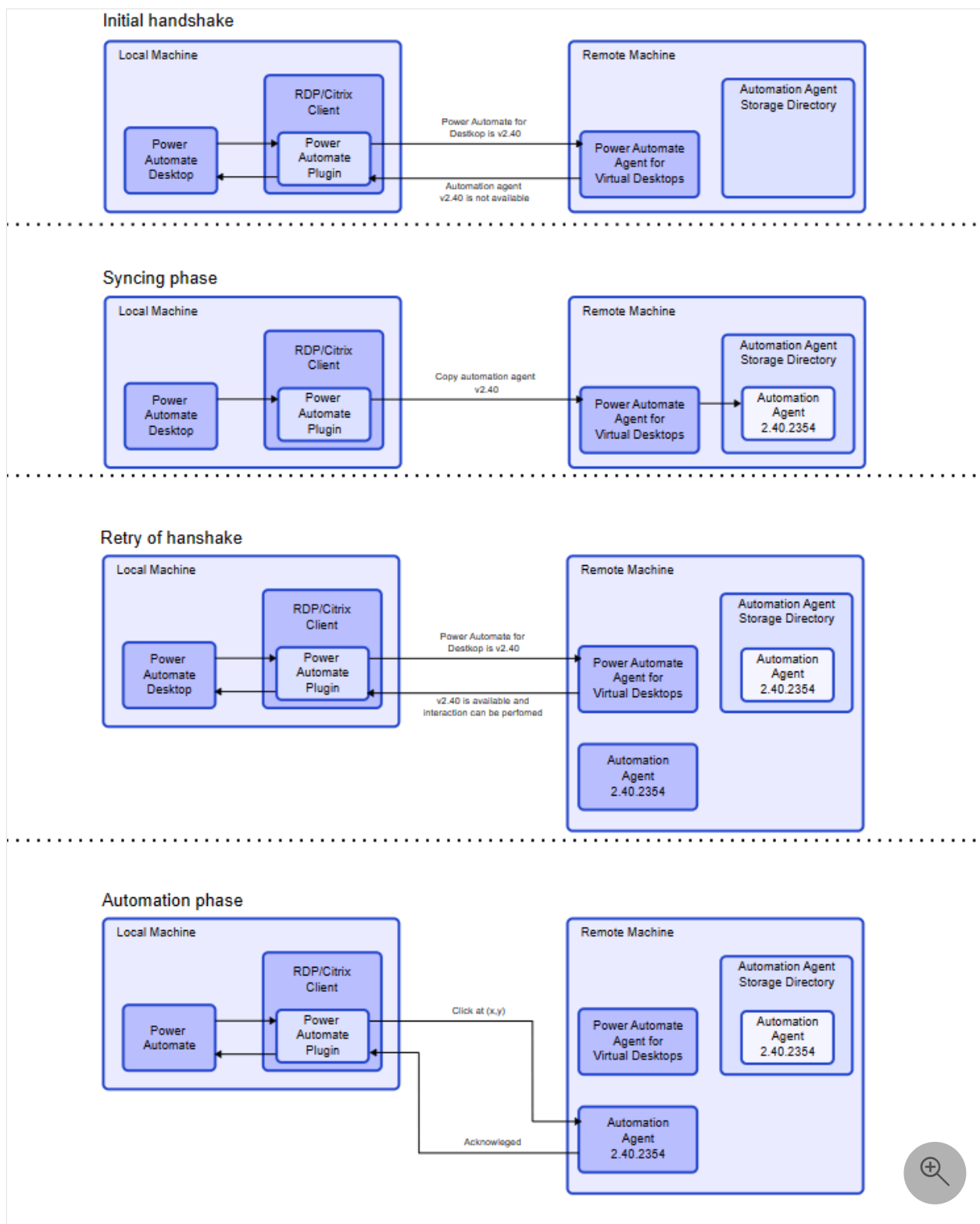
## Communication phases

The following table and diagram depicts the different phases of communication:

 [Expand table](#)

Phase	Description
Initial handshake	The first communication between Power Automate for desktop and the Power Automate agent for virtual desktops. The versions of Power Automate for desktop and Power Automate agent for virtual desktops aren't the same.
Sync	This phase occurs when the user chooses to sync the versions of Power Automate for desktop and Power Automate agent for virtual desktops.
Retry handshake	After the sync process is complete, the handshake between Power Automate for desktop and the Power Automate agent for virtual desktops is retried.
Automation	The runtime of UI automation actions performed on the remote machine through the Power Automate agent for virtual desktops.





## Known issues and limitations

- **Issue:** Virtual desktop automation is available only in Windows RDP, RemoteApp, Citrix Desktop, and Citrix Virtual Apps. Other virtual desktop platforms aren't supported.

**Workaround:** None

- **Issue:** Power Automate agent for virtual desktops isn't compatible with Windows 10 Home and Windows 11 Home.

**Workaround:** None. Remote desktop connection isn't supported in these Windows editions.

- **Issue:** Encounter the 'Error communicating with Power Automate for desktop' message when Power Automate agent for virtual desktop is launched in Citrix Desktop even though you have installed Power Automate for desktop and Power Automate agent for virtual desktops correctly and met all prerequisites.

**Workaround:** Check the 'Virtual channel allow list policy' setting in your Citrix configuration. This setting needs to be disabled to resolve the issue. Check with your Citrix administrator to disable the 'Virtual channel allow list policy' setting if it's enabled.

- **Issue:** Virtual desktop automation isn't supported in Power Automate installed through the Microsoft store.

**Workaround:** Download and install the Microsoft Visual C++ Redistributable, which installs Microsoft C and C++ (MSVC) runtime libraries.

- [Download the x86 version](#) ↗ .
- [Download the x64 version](#) ↗ .

- **Issue:** Citrix and RDP automation doesn't support the use of web automation actions.

**Workarounds:** [Treat web components as desktop UI elements](#), [use mouse, keyboard, and OCR actions](#), or [automate using images](#).

- **Issue:** When a flow is running, an element isn't found if the virtual desktop window is minimized.

**Workaround:** Use a **Focus window** action on the virtual desktop window before deploying UI automation actions to interact with the virtual desktop.

- **Issue:** When you're using the recorder and the virtual desktop window is maximized, the **Populate text field in window** and **Send keys** actions might not work as expected.

**Workaround:** Make sure the virtual desktop window isn't maximized while you're recording.

- **Issue:** UI automation of Java applets running on virtual desktops isn't supported.

**Workaround:** None

- **Issue:** Citrix UI automation doesn't work if you're using Citrix Desktop and Citrix App in the same session.

**Workaround:** None

- **Issue:** Defining a window on virtual desktops using the **Window instance/handle** or **Window title/class** options isn't supported.

**Workaround:** None

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

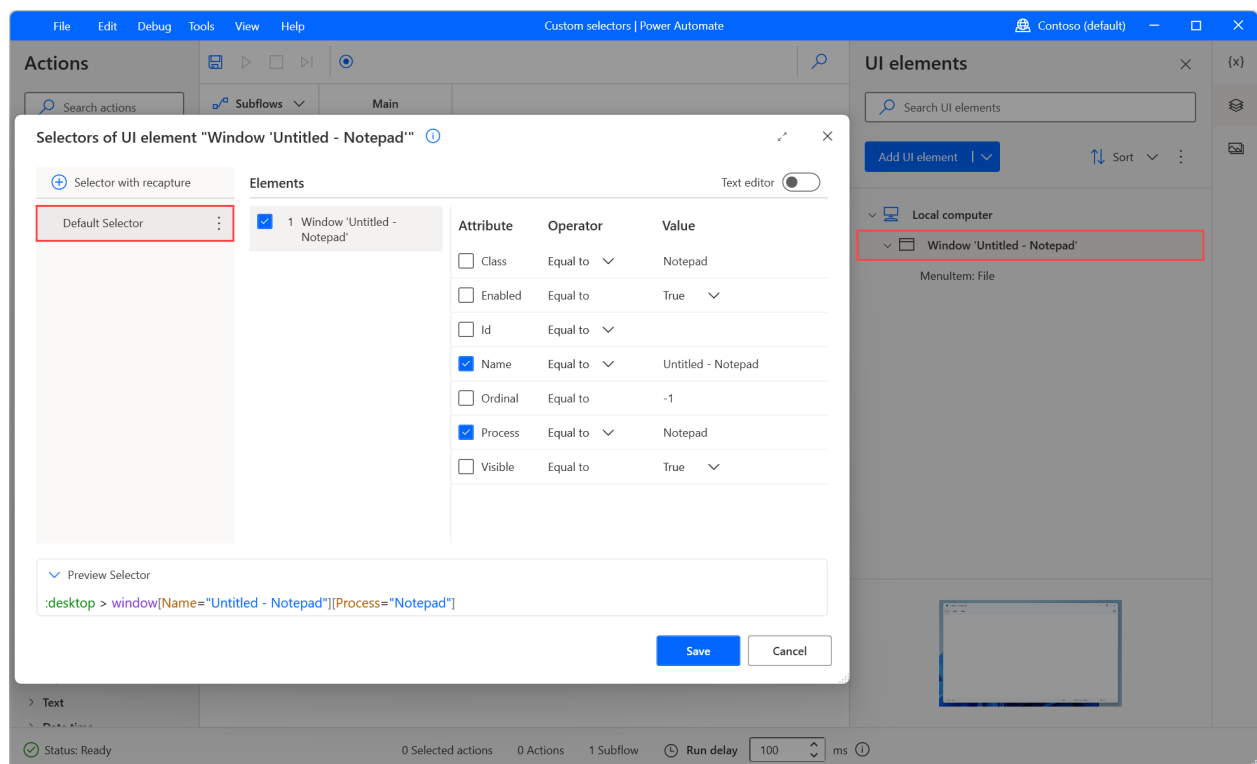
# Build a custom selector

Article • 02/24/2023

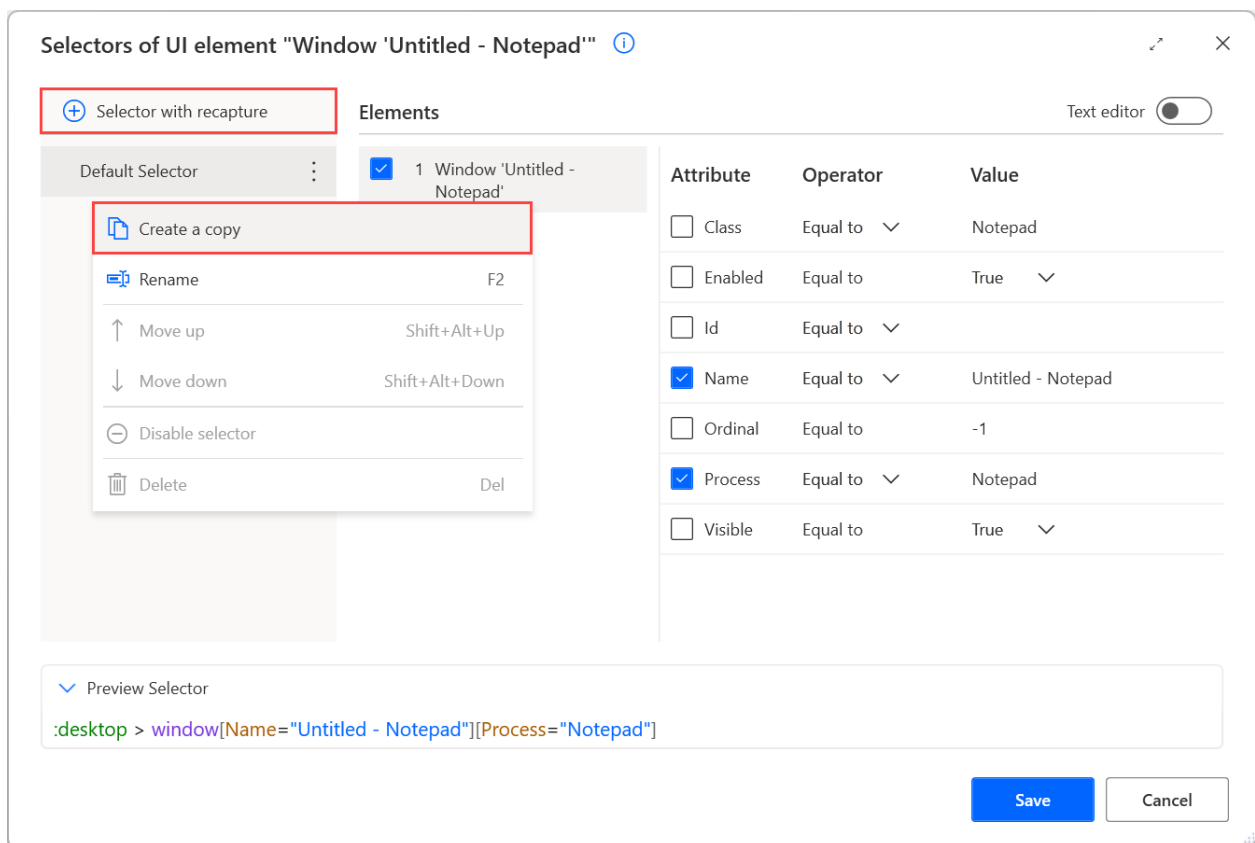
Although Power Automate enables users to create selectors automatically, some particular scenarios need manually created selectors. A common scenario is the automation of applications that display dynamic content.

When a custom selector is needed, you can modify an existing selector or build one from scratch.

To edit an existing selector, select the appropriate UI element and choose the selector you want to edit.



You can create multiple selectors for a UI element. Whenever a selector fails, Power Automate uses the next selector in the defined order. To add more selectors for a UI element, capture a new selector using the **Selector with recapture** button or create a copy of an existing selector. To create a copy, right-click on the existing selector and select **Create a copy**.



In selectors, use the > notation to indicate the hierarchical structure of the selected elements. Each element in the selector is contained within the element on its left and displayed in the following form:

**element[Attribute1="Attribute1Name"][Attribute2="Attribute2Name"]...  
[Attributen="AttributenName"]**

The attributes of an element describe it uniquely and distinguish it from other elements in the same application. Enabling or disabling attributes can change the target application component of the selector.

### ⓘ Note

Web and desktop selectors have the same structure and functionality. The main differences between them are the available attributes. Web selectors use HTML attributes, while desktop selectors use different kinds of attributes based on the application design.

To specify an application component precisely, Power Automate utilizes multiple levels of selectors.

Selectors use a tree structure that describes the exact location of a component in the application or webpage. Each level is the child of the upper-level and the parent of the

lower-level selector. The selector in the lower level describes the component you want to handle.

This functionality enables Power Automate to distinguish a component from components with similar attributes in the same application. Disabling or enabling levels of selectors allows you to change the location in which Power Automate will search for the component.

For example, the following selector pinpoints the **File** menu option in a Notepad window. The first two levels of the selector describe the pane and menu bar of the window, while the third level describes the **File** option.

### ⓘ Note

The Notepad window and the pane are different UI elements, but they have a parent-child relationship.

Selectors of UI element "MenuItem: File" ⓘ

+ Selector with recapture

Default Selector ⋮

Elements

- 1 Pane  
"Windows.UI.Input.InputSite.WindowClass"
- 2 Menu Bar
- 3 Menu Item 'File'

Attribute	Operator	Value
<input type="checkbox"/> Class	Equal to	Windows.UI.Input.InputSite.WindowClass
<input type="checkbox"/> Enabled	Equal to	True
<input type="checkbox"/> Id	Equal to	
<input type="checkbox"/> Name	Equal to	
<input type="checkbox"/> Ordinal	Equal to	-1
<input checked="" type="checkbox"/> Process	Equal to	Notepad
<input type="checkbox"/> Visible	Equal to	True

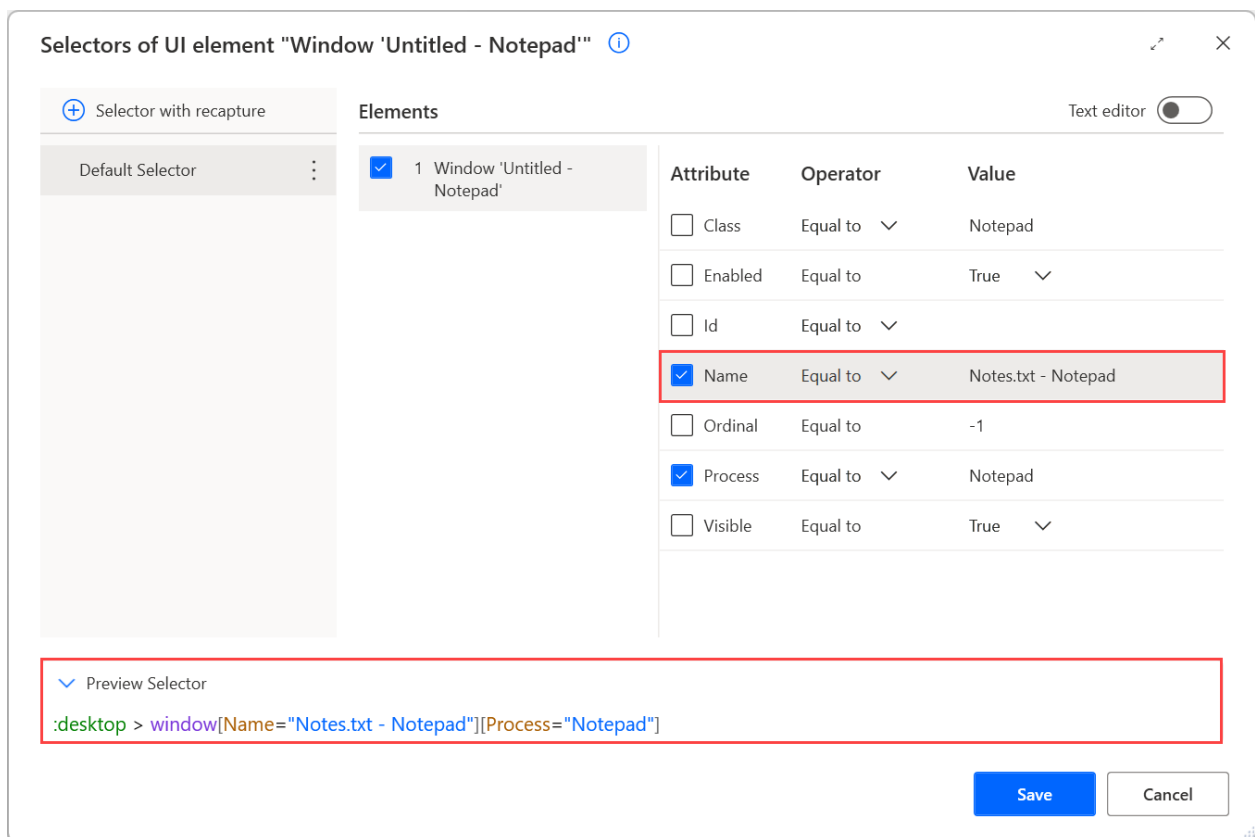
Text editor

Preview Selector

```
> pane[Process="Notepad"] > menubar[Id="MenuBar"] > menuitem[Class="Microsoft.UI.Xaml.Controls.MenuBarItem"][Name="File"]
```

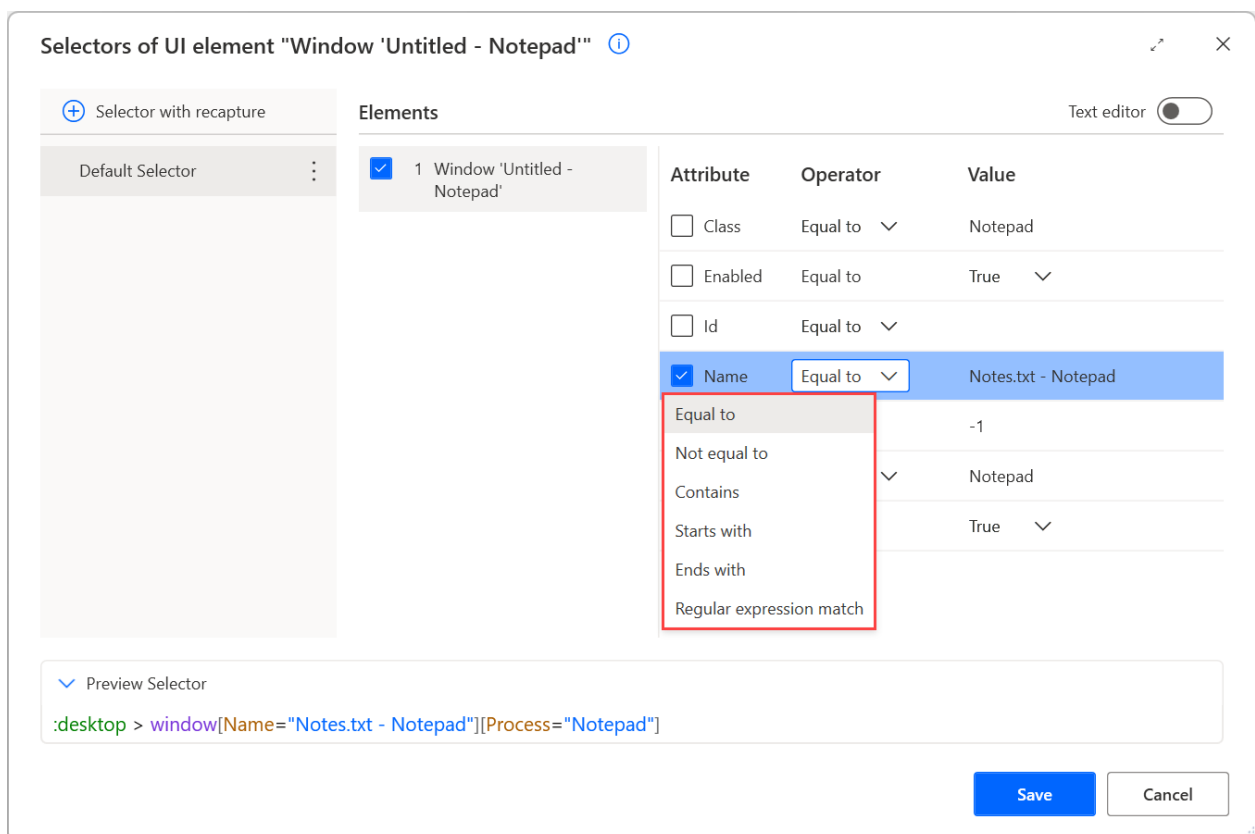
Save Cancel

Assume that you want to edit the selector to work with a Notepad window named **Notes.txt**. To achieve this functionality, change the **Name** attribute of the selector to **Notes.txt - Notepad**. The new selector should be: `:desktop > window[Name="Notes.txt - Notepad"][Process="Notepad"]`.



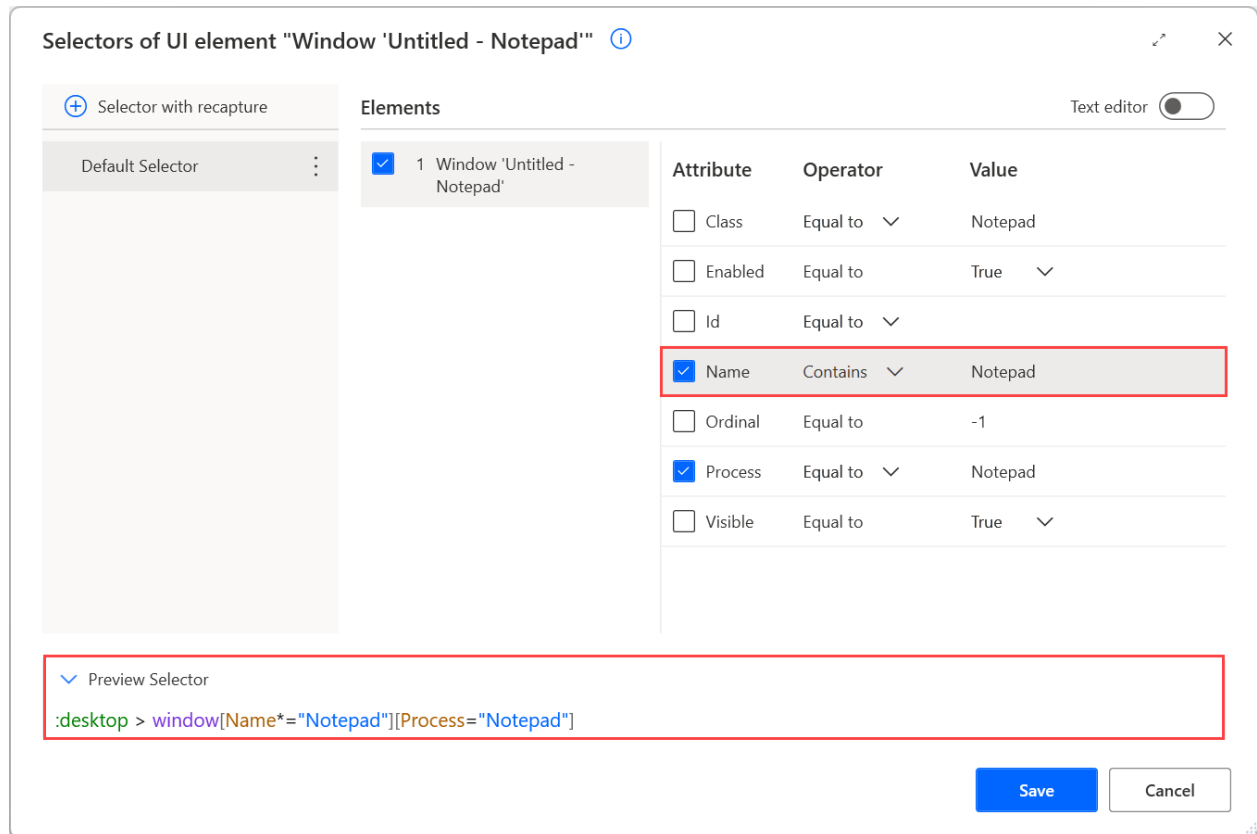
## Use operators in a custom selector

In the previous example, the selector located a Notepad window with a specific title. To make the selector more dynamic, replace the **Equal to** operator with other operators or regular expressions.



The **Equal to** operator makes the selector search for a specific hard-coded value. Although this functionality is effective in static applications, hard-coded values can be a barrier in dynamic applications.

Use the **Contains** operator to locate elements that don't have fixed values but always contain a specific keyword. For example, apply the **Contains** operator in the Notepad selector to make it work with all Notepad windows.



Apart from the **Equal to** and **Contains** operators, Power Automate provides four more operators:

- **Not equal to:** Checks if an attribute contains any value except a specific one.
- **Starts with:** Checks if an attribute contains a value that starts with a particular character, keyword, or phrase.
- **Ends with:** Checks if an attribute contains a value that ends with a particular character, keyword, or phrase
- **Regular expression match:** Checks if an attribute contains a value that matches a custom regular expression. Power Automate's regular expression engine is .NET. You can find more information regarding regular expressions in [Regular Expression Language - Quick Reference](#).

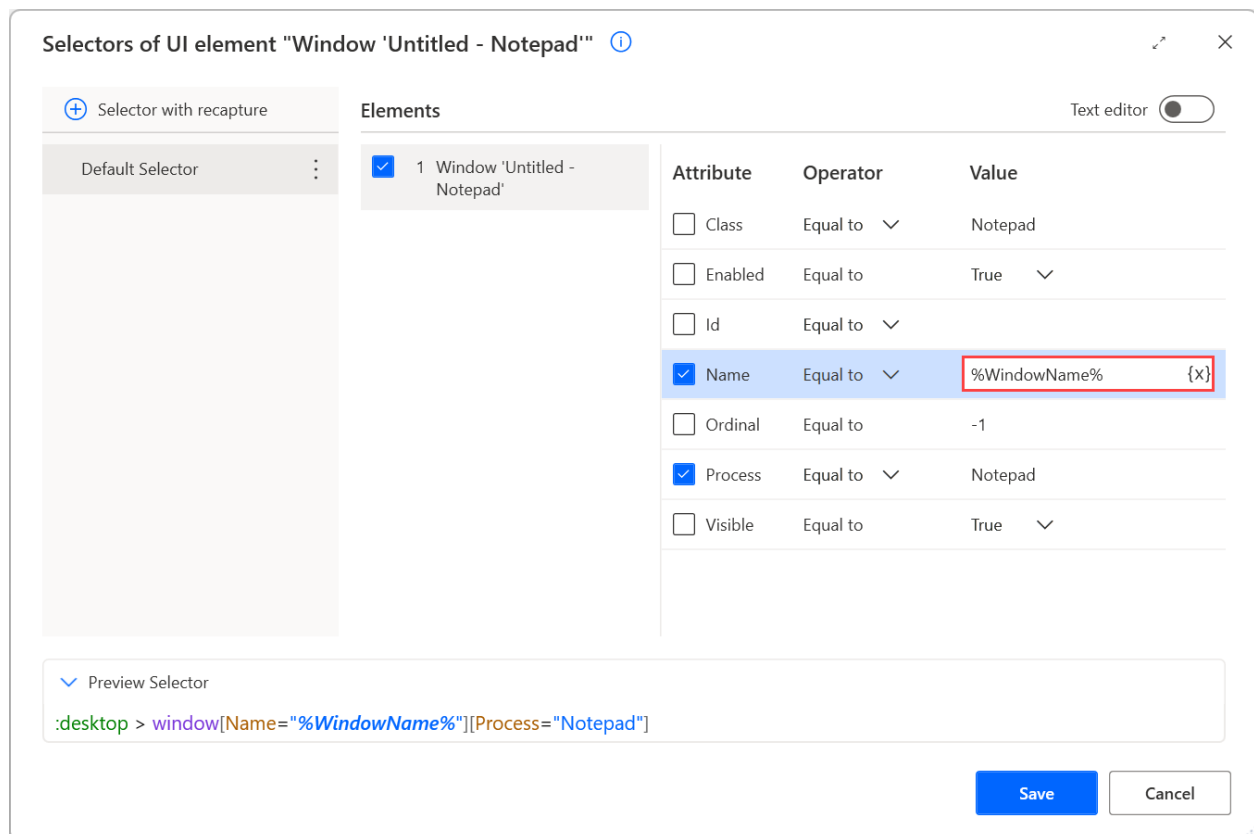
## Use variables in a custom selector



Apart from various operators, Power Automate enables you to create dynamic selectors using variables. If the value of a selector's attribute depends on calculations and results of previous actions, replace the hard-coded value with a variable.

To use a variable in a selector, populate its name manually enclosed by percentage signs (%) or use the variables button. Variables can be used in both the visual and text editor. You can find more information about the percentage notation in [Use variables and the % notation](#).

If you use a variable in the **Name** attribute of the Notepad example, the selector should be `:desktop > window[Name="%WindowName%"][Process="Notepad"]`.



Selectors of UI element "Window 'Untitled - Notepad'" ⓘ

Selector with recapture

Default Selector

Elements

Attribute	Operator	Value
<input type="checkbox"/> Class	Equal to	Notepad
<input type="checkbox"/> Enabled	Equal to	True
<input type="checkbox"/> Id	Equal to	
<input checked="" type="checkbox"/> Name	Equal to	%WindowName% {x}
<input type="checkbox"/> Ordinal	Equal to	-1
<input checked="" type="checkbox"/> Process	Equal to	Notepad
<input type="checkbox"/> Visible	Equal to	True

Preview Selector

```
:desktop > window[Name="%WindowName%"][Process="Notepad"]
```

Save Cancel

# Test a selector

Article • 04/13/2023

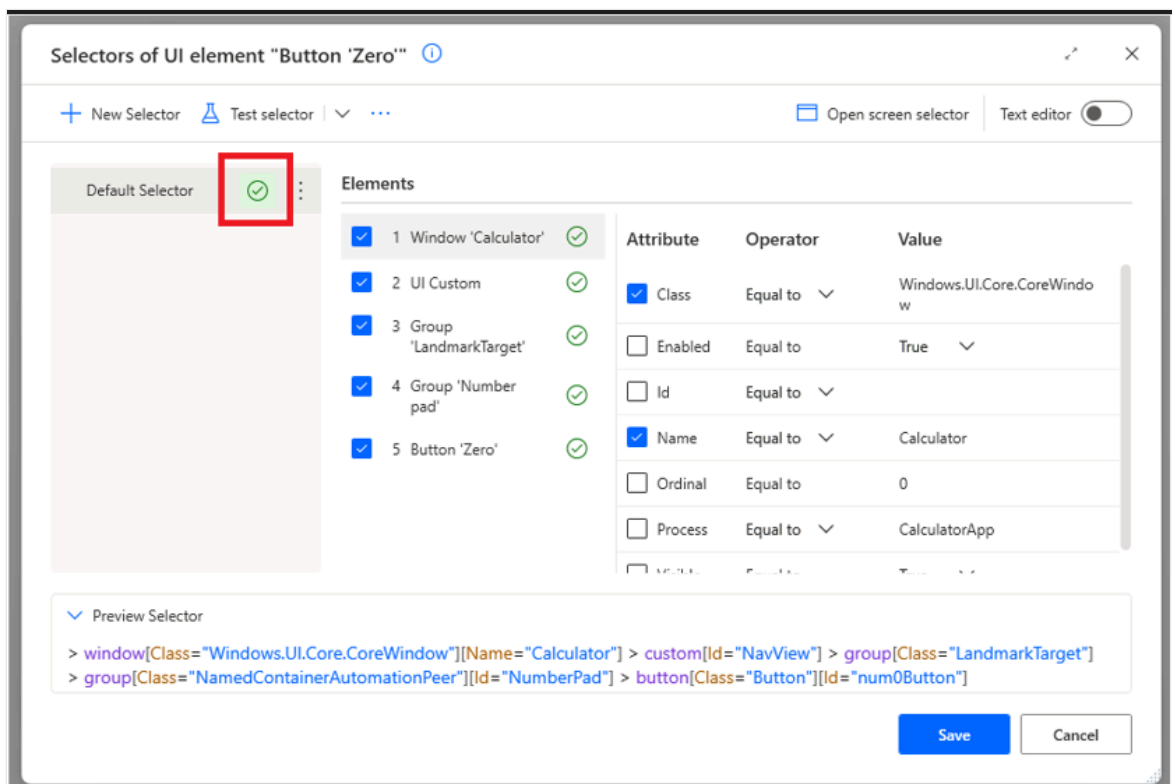
Power Automate enables you to test a selector and ensure that your UI automation flows are running as expected. With the ability to test both desktop and web selectors, you can quickly and efficiently automate your application and webpage interactions.

The selector builder window is used to edit UI elements. There, you can find the option for testing the selector. Select **Test selector** and Power Automate checks whether the specified selector from the list can locate a UI element on the screen.

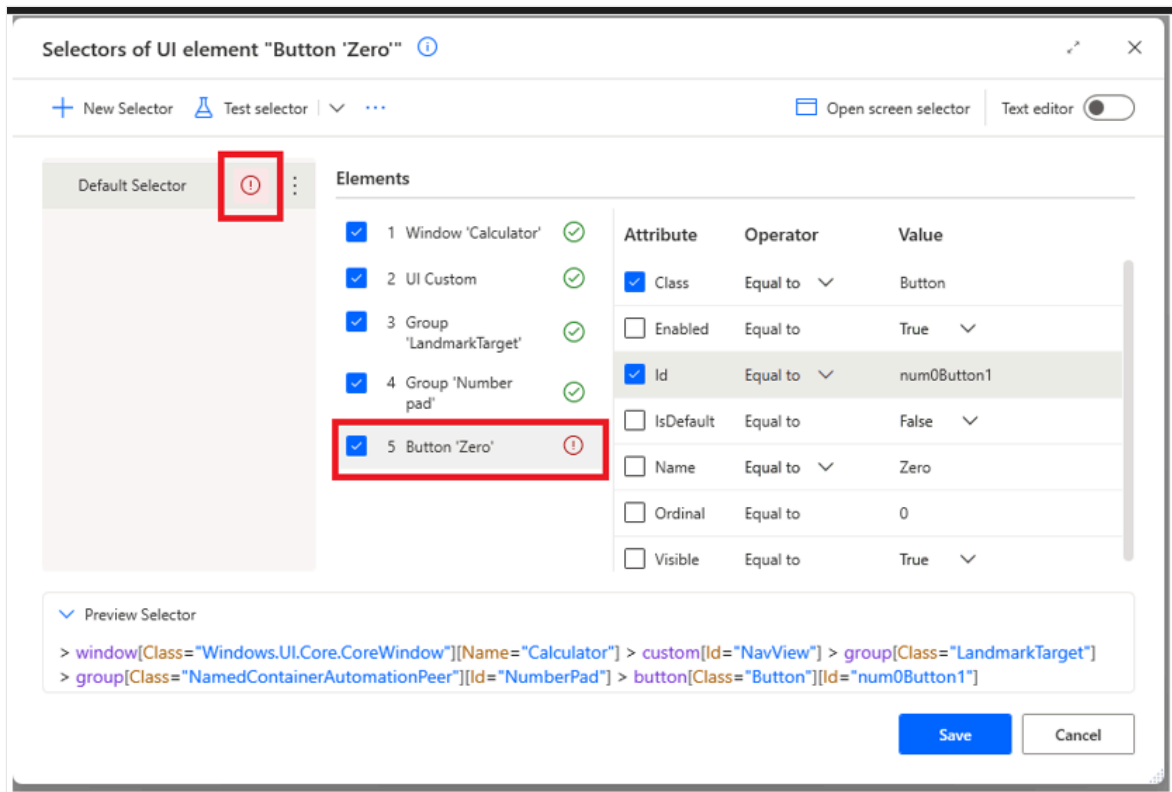
In order to test a selector, you must ensure that a UI element is available on your computer. If one isn't available, after selecting **Test selector** the message **Ensure that the UI element is present in the screen before proceeding with the validation** is displayed.

There are three possible outputs:

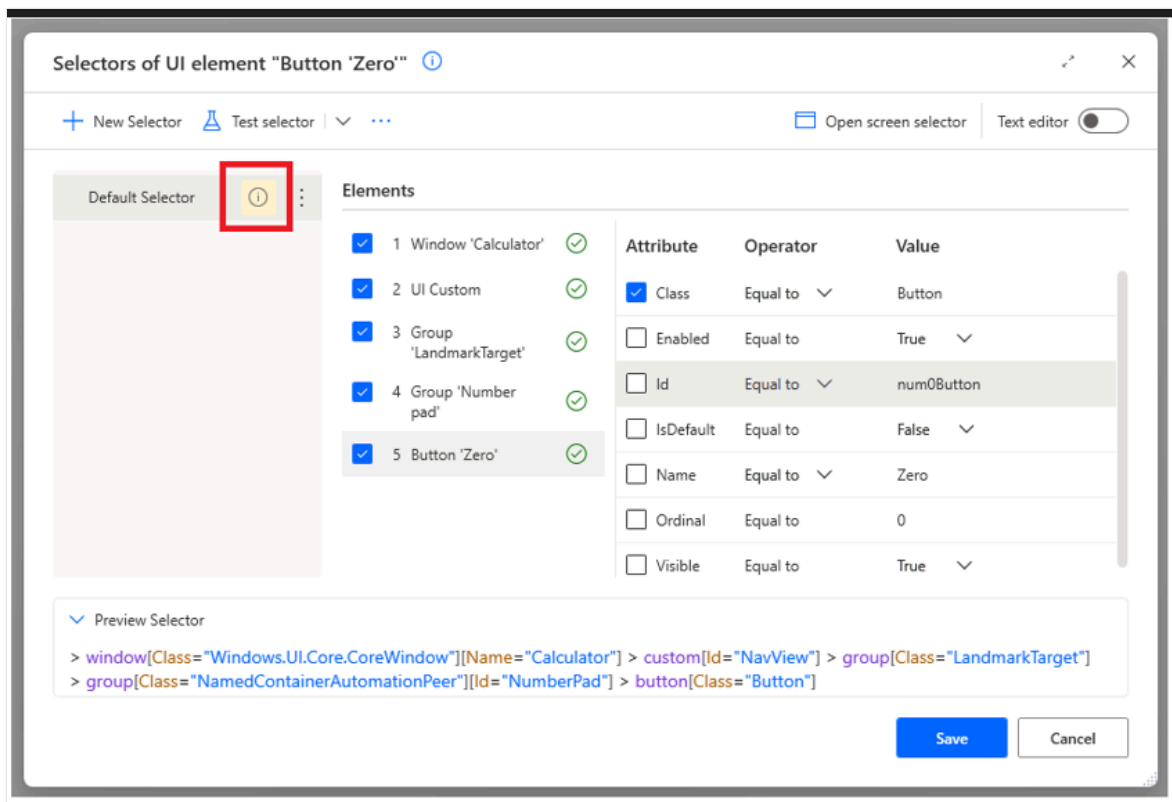
- **Success:** A UI element was found successfully in the screen.



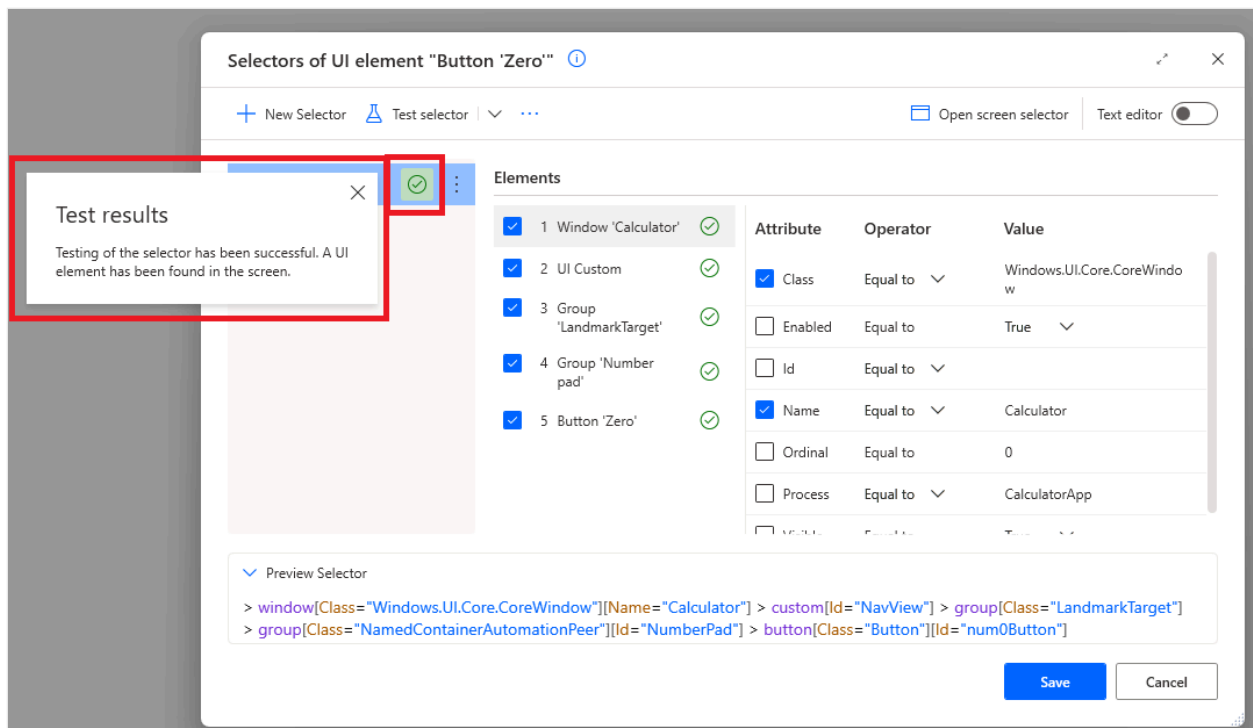
- **Failed:** No UI element was found in the screen. Power Automate highlights the element (level) that wasn't found in the **Elements** list, indicating to the user the element that should be fixed.



- **Multiple UI elements found:** The selector may locate multiple UI elements in the screen. If a UI element is used in an action, at runtime Power Automate interacts with the first respective UI element from the top left corner of the screen. Note that Power Automate highlights at testing the UI element that will be interacted at the runtime if the specific selector is used in an action.



You may get more information for each output by selecting the output icon next to the tested selector.



You can test selectors for both desktop and web UI elements. Desktop selectors are captured from any Windows application and can be used in actions of the UI automation group. Web selectors are captured from webpages and can be used only in browser automation actions.

#### ⓘ Note

Every time you edit a tested selector, the output icon is removed, and the selector should be tested again.

## Testing all selectors

A UI element may have more than one selector for defining its location. The test selector feature allows you to test all selectors by selecting the arrow next to **Test selector**, and then selecting **Test all selectors**.

#### ⓘ Note

When you opt for testing all selectors, the disabled selectors won't be tested from the list. If you need to test a disabled selector, test it individually.

## Desktop UI elements - Open screen selector

Each desktop UI element belongs to a screen (parent UI element). In some cases, testing of the selector can't be performed because the screen can't be found. In this case, you should:

- Ensure that the screen is available on your computer.
- If yes, then select **Open screen selector**, and fix the screen selector. You may perform the test selector feature to the screen selector as well.

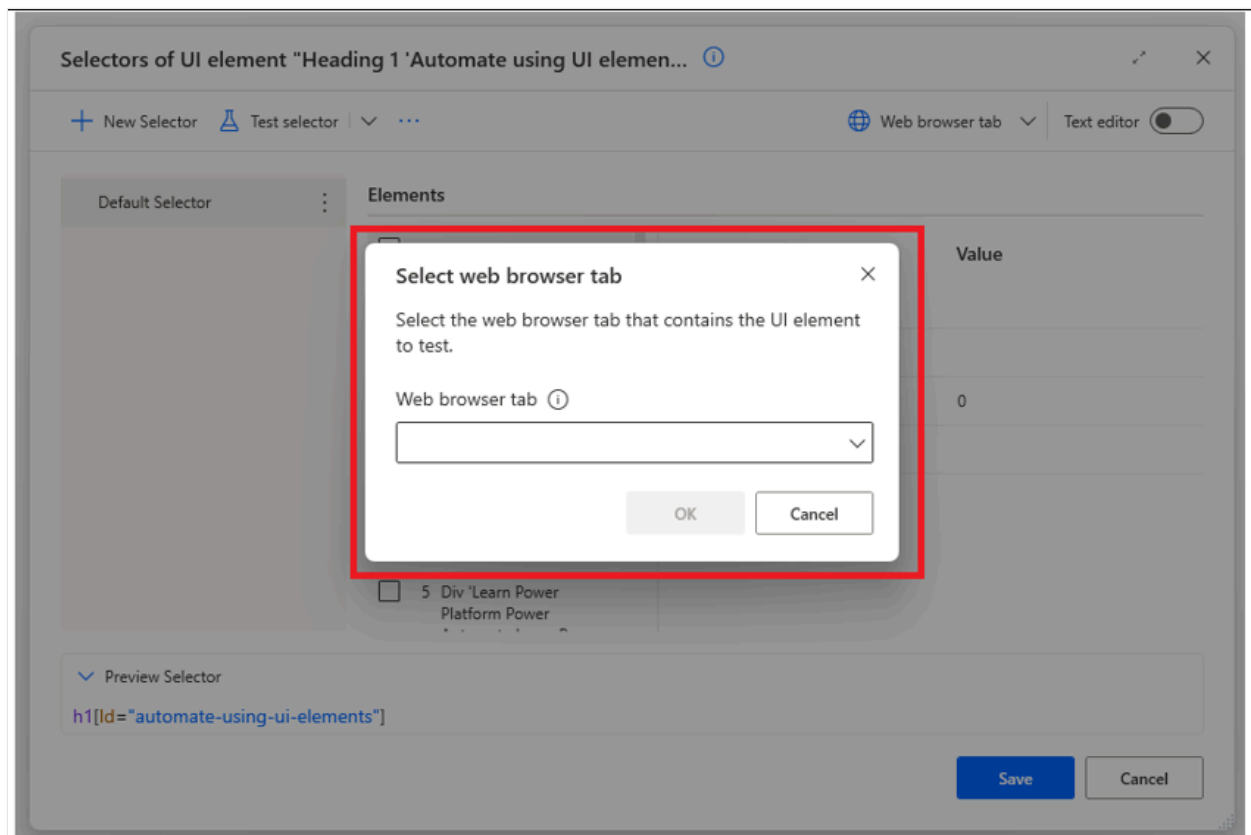
### ⓘ Note

When you navigate to the screen selector through the selector builder window of a child, then you will return to the child view after closing the screen's selector builder window.

## Web UI elements - Open Web browser tab

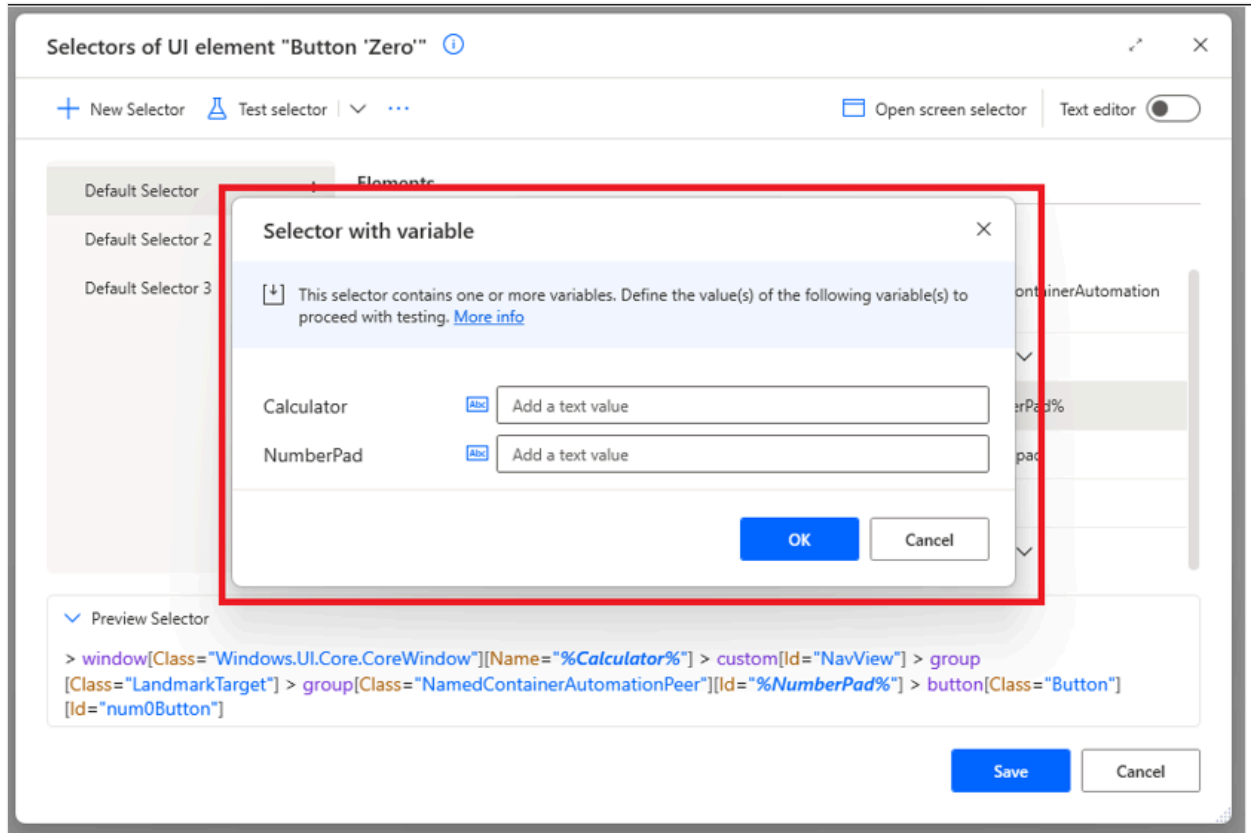
If there's a web UI element, in order to proceed with the test the web page that contains the specific UI element must be available on your computer and the web browser tab should be selected in the **Web browser tab** drop-down list.

If no web browser tab is selected in the list and you select **Test selector**, Power Automate prompts you to select the browser tab before the testing starts.



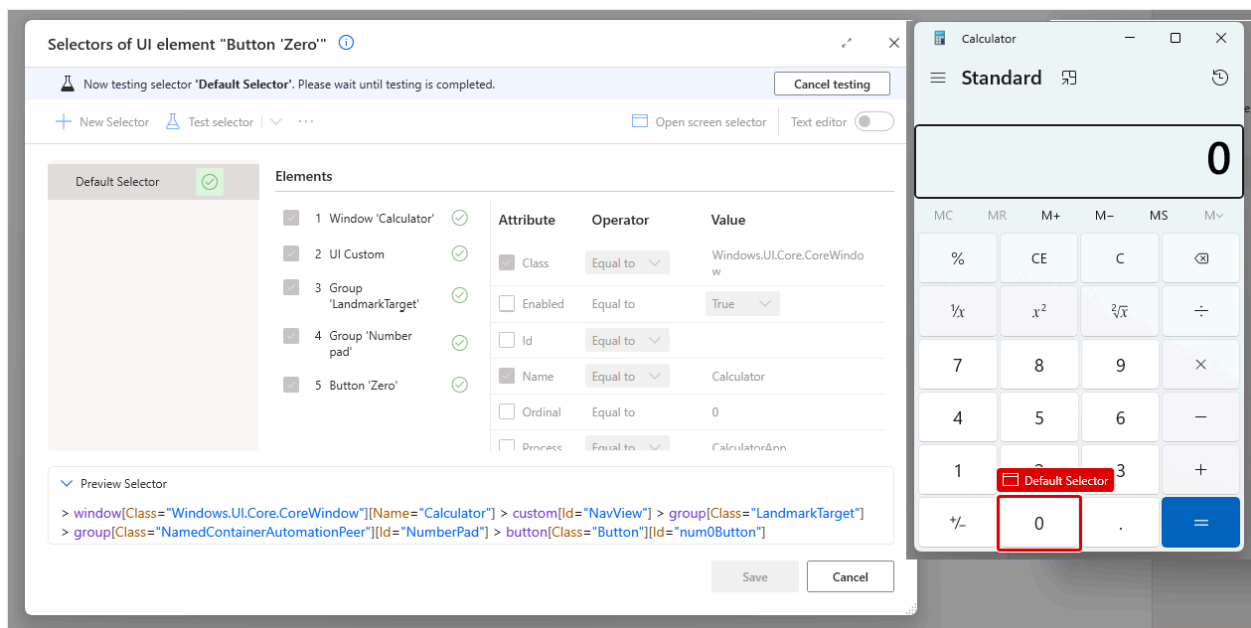
# Variables

You can test a selector even if one or more variables are contained in the selector. You must provide values to the selector's variables for the test to be performed.



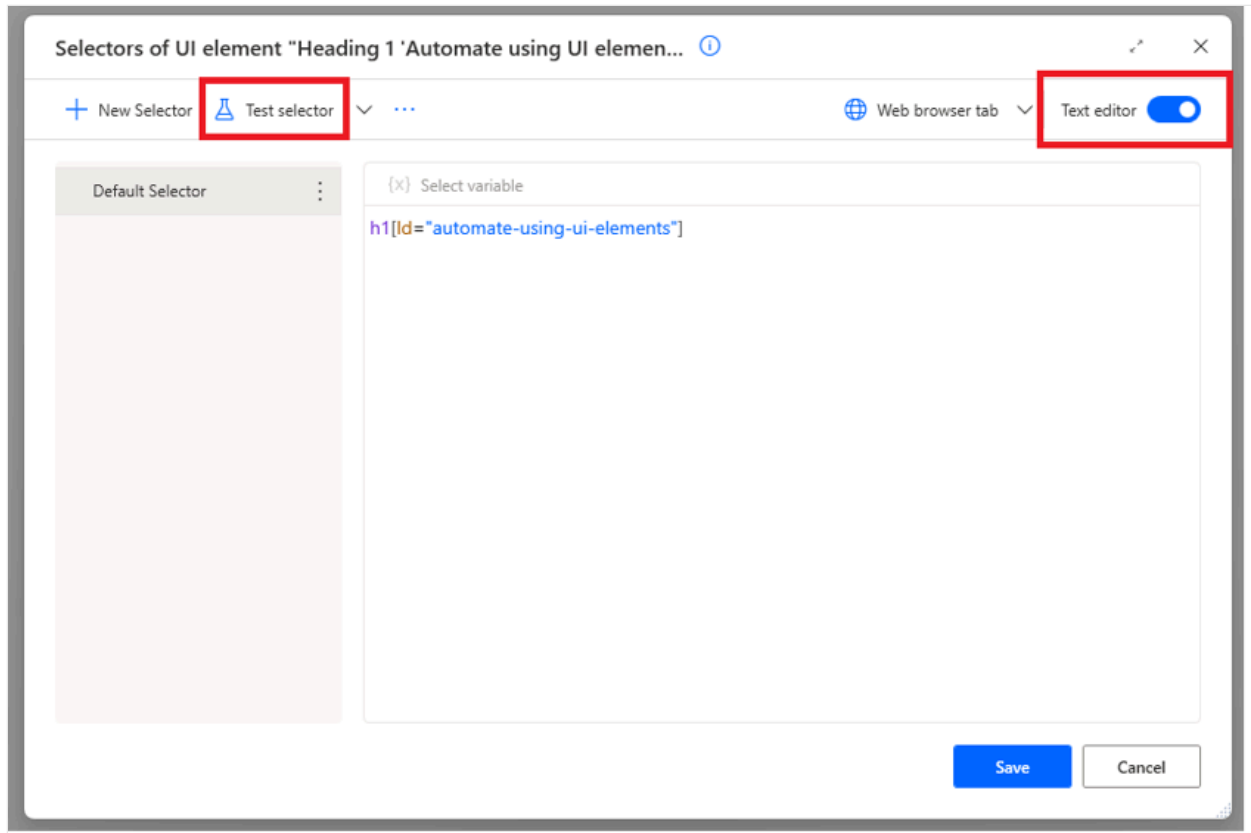
# Highlight

When a selector is tested and the output is success or multiple UI elements found, Power Automate highlights the UI element that is interacted at run time with the specific selector.



# Text editor

Test selector capabilities can be fully used in the **Text editor** view of the selector builder window as well, in the same fashion as in the builder view.



## Related information

[Build a custom selector](#)

## Feedback

Was this page helpful?

[Provide product feedback](#)

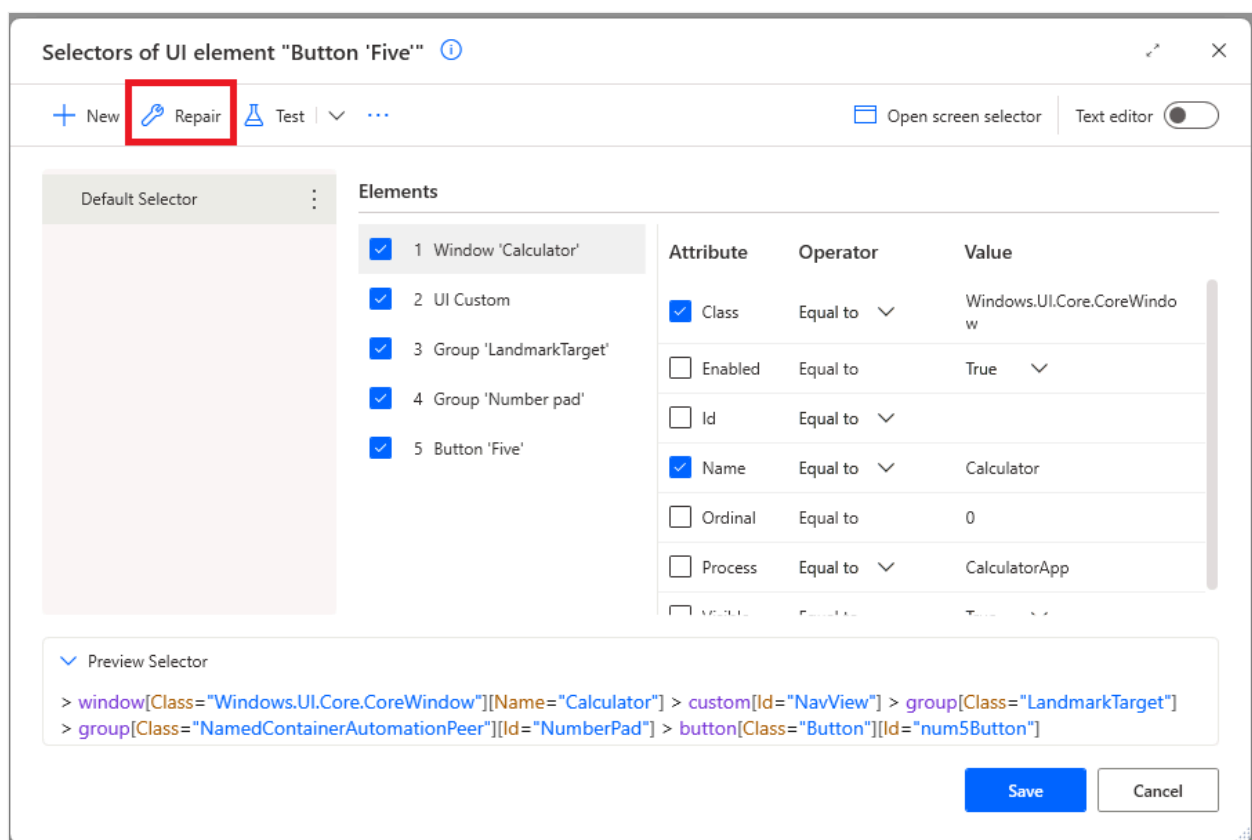
# Repair a selector

Article • 05/12/2023

Repair selector is a powerful feature that enables you to easily and intuitively correct invalid selectors. By automatically generating a repaired selector for the UI element that automation needs to interact with, Power Automate for desktop makes it simple to maintain automation flows. The repair selector feature is available for both desktop and web UI elements. To take advantage of it, open the UI element selector builder window and opt for the related option in the screen. This feature can also be used to fix a screen selector that is the parent element of a desktop UI element.

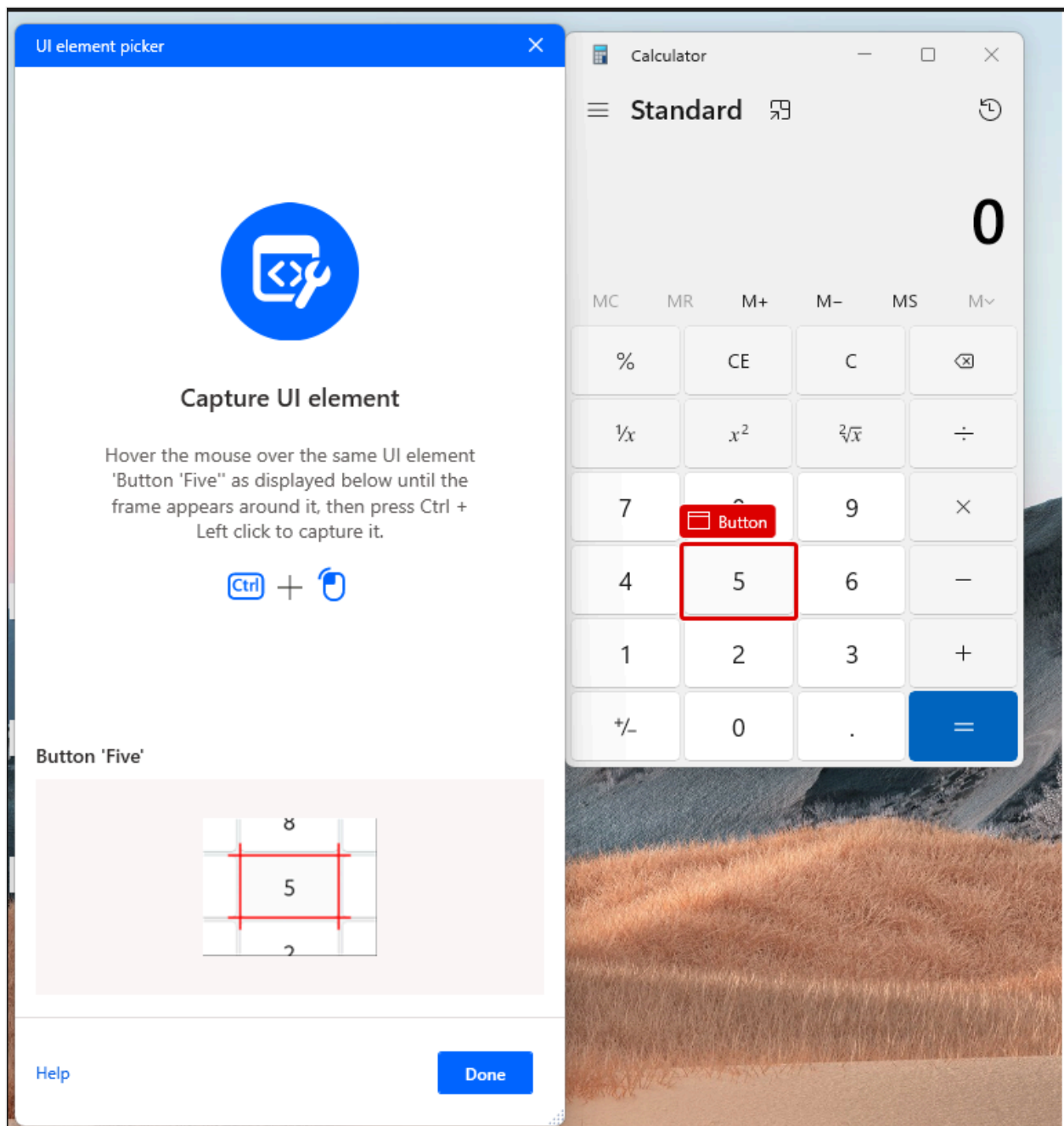
## How to repair a selector

You should select the selector to be repaired and select the **Repair** option on the screen. The **Repair** option can be selected while the user is at the selector builder view or the text editor view.



When you opt for repairing a specific selector, the UI element picker is launched, displaying a screenshot of the UI element to be captured.



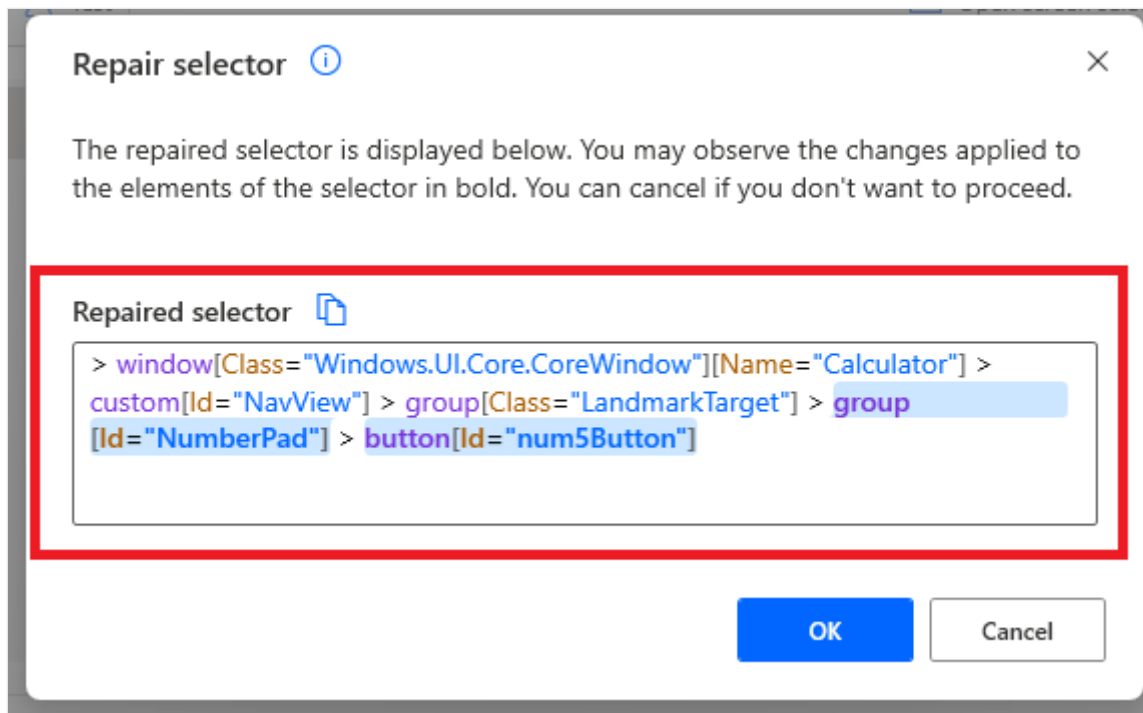


Note that the UI element picker highlights only the UI elements of the same type as the type of the respective selector to be repaired. Therefore, if you repair a desktop UI element, only the desktop UI elements can be highlighted and captured and for the web selector case, only the web UI elements can be highlighted and captured.

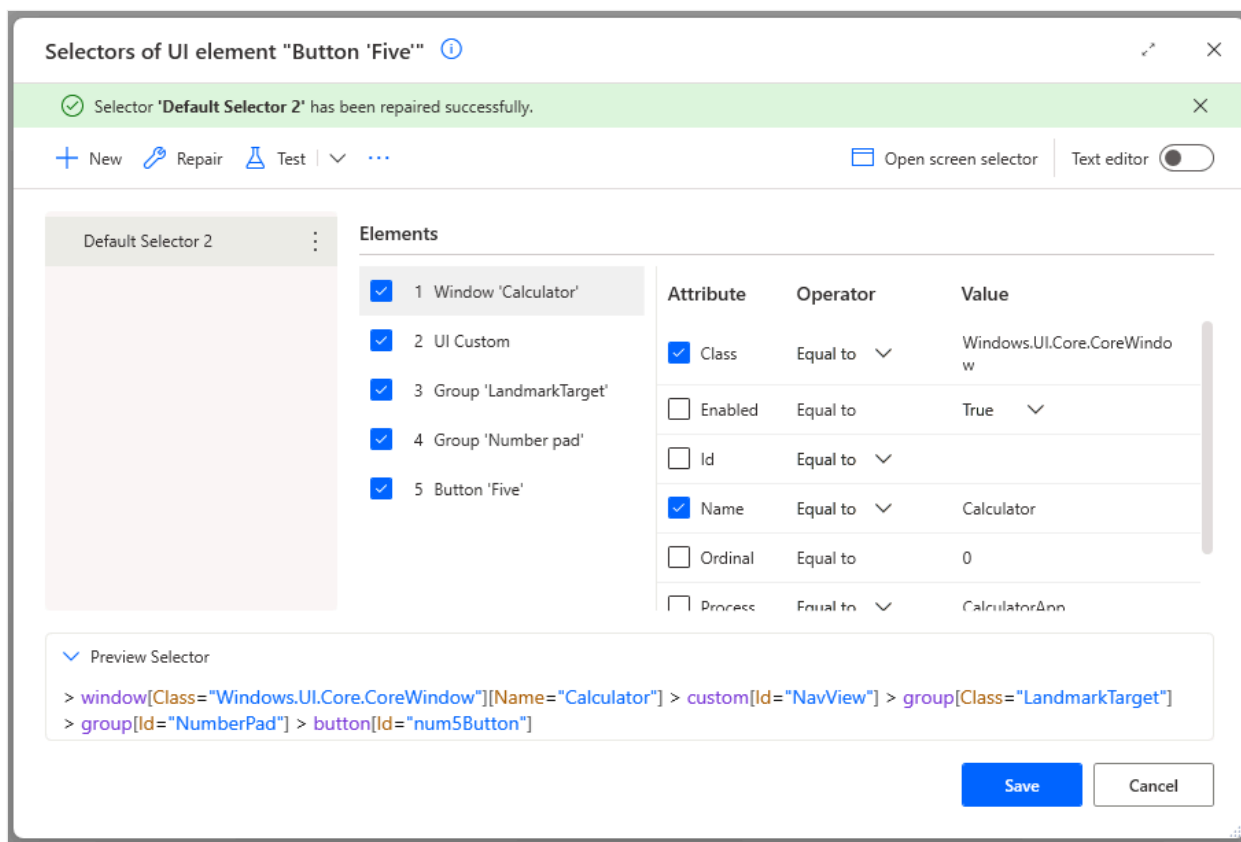
Capture the UI element by hovering over the UI element until the frame appears around it, then press Ctrl+Left click.

After capturing the UI element successfully, Power Automate for desktop generates a selector that takes into account both the old selector that is being repaired and the selector of the just captured UI element.

The repaired selector is presented to you for your review with the changes in the selector highlighted. Select **OK** to accept the suggested repair.



The previous select is replaced by the repaired selector. Select **Save** to complete the repair.



If you select **Cancel**, the selector isn't repaired and the old selector remains intact.

There are cases when Power Automate for desktop won't be able to generate a repaired selector successfully. When this happens, you should make sure that the correct UI element is captured. If the UI element still can't be repaired, you must repair the selector manually.

### ⓘ Note

The selectors that contain one or more variables can't be repaired. Either replace the variables with static values or repair the selector manually. More information:

[Build a custom selector](#)

## Related information

[Build a custom selector](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) ↗

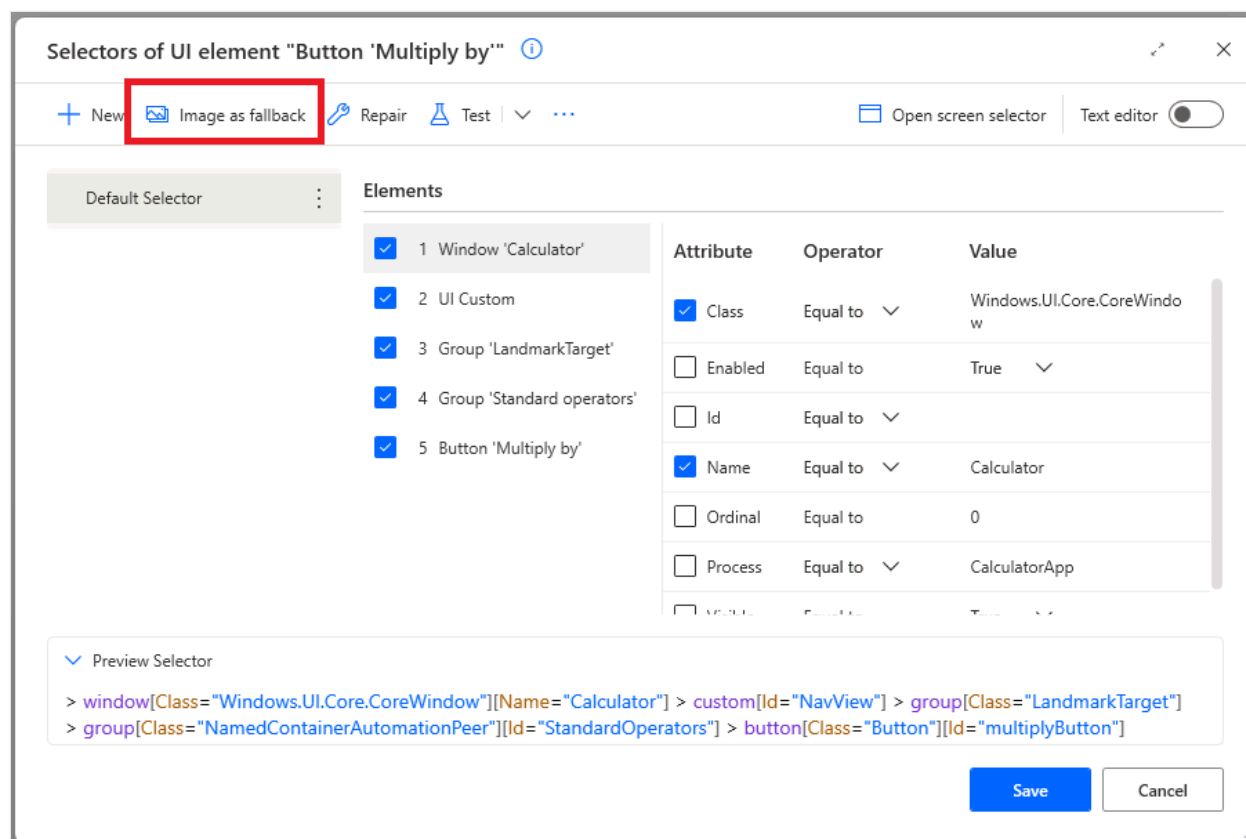
# Fallback mechanism for UI elements

Article • 06/18/2024

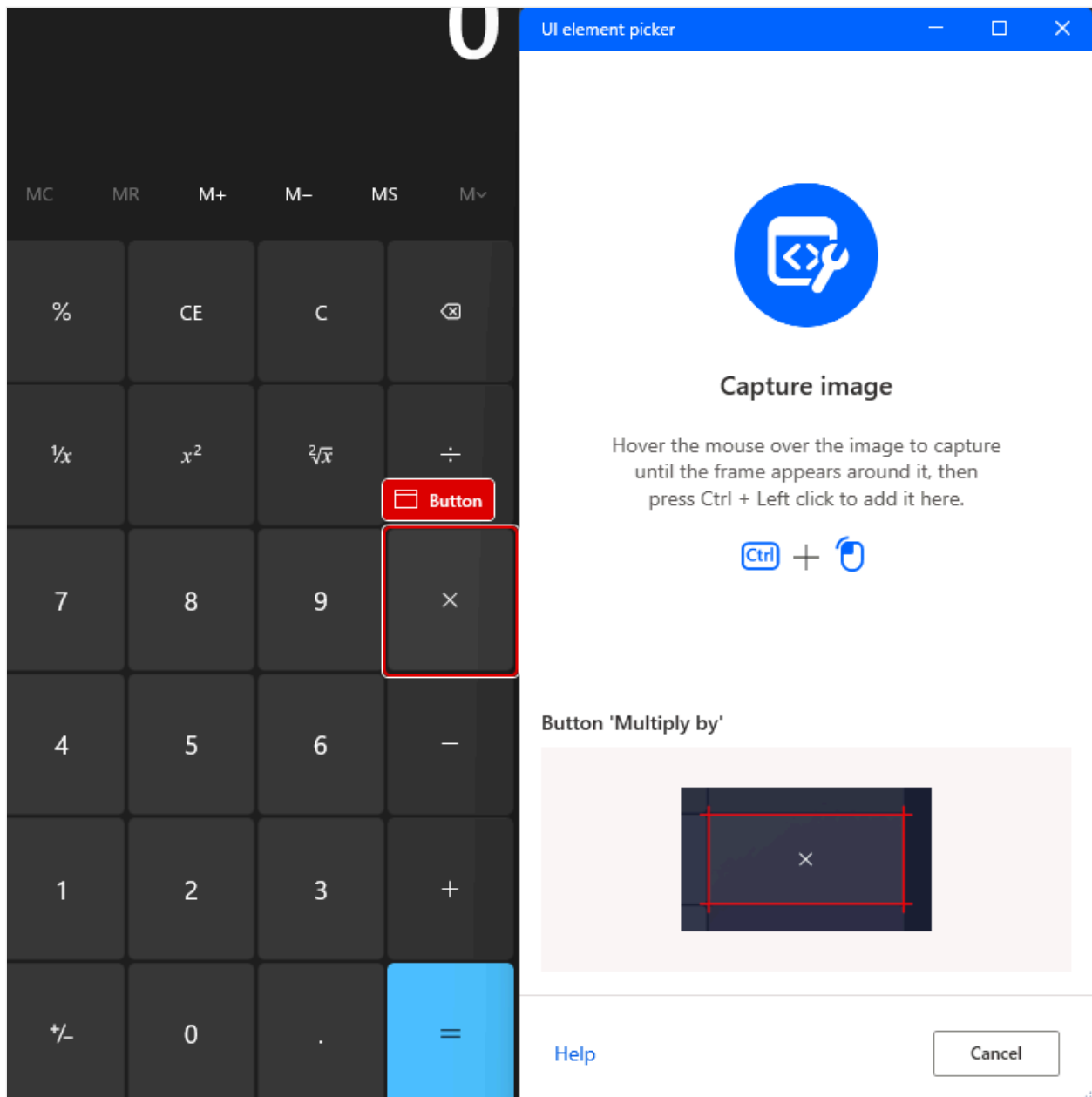
Power Automate for desktop introduces an enhanced method to bolster the robustness of your UI/Browser automation flows. Now, you can designate an image as a fallback mechanism for a UI element, to ensure reliable execution when predefined selectors fail to identify the element at runtime. By incorporating an image fallback, you significantly increase the likelihood of successfully executing UI or browser actions that interact with the specific UI element. When you activate this fallback mechanism and the selectors are unable to locate the UI element on the screen, the system utilizes the designated image to find it.

## How to set up the image fallback mechanism for a UI element

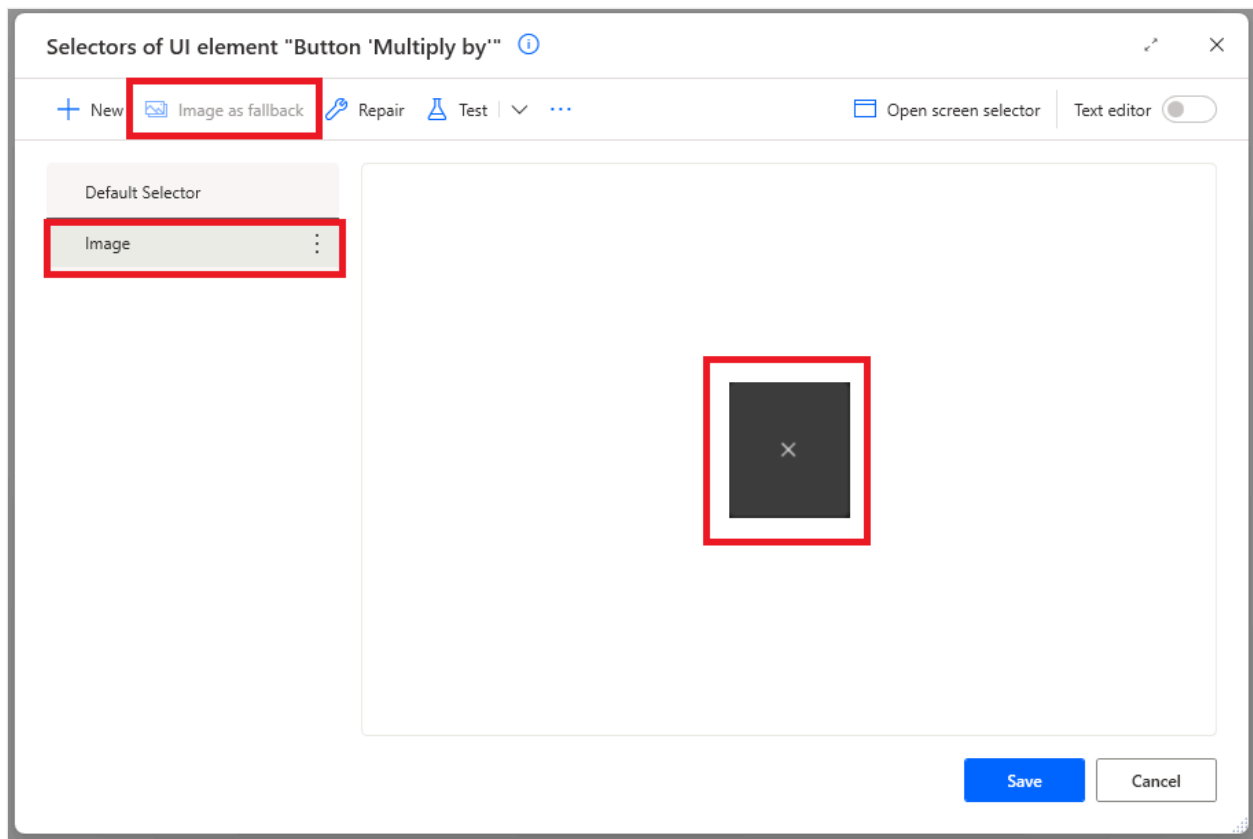
To enable the image fallback mechanism, launch the **Selector Builder** window for the specific UI element. Select **Image as fallback**.



This step opens the UI element picker tool.

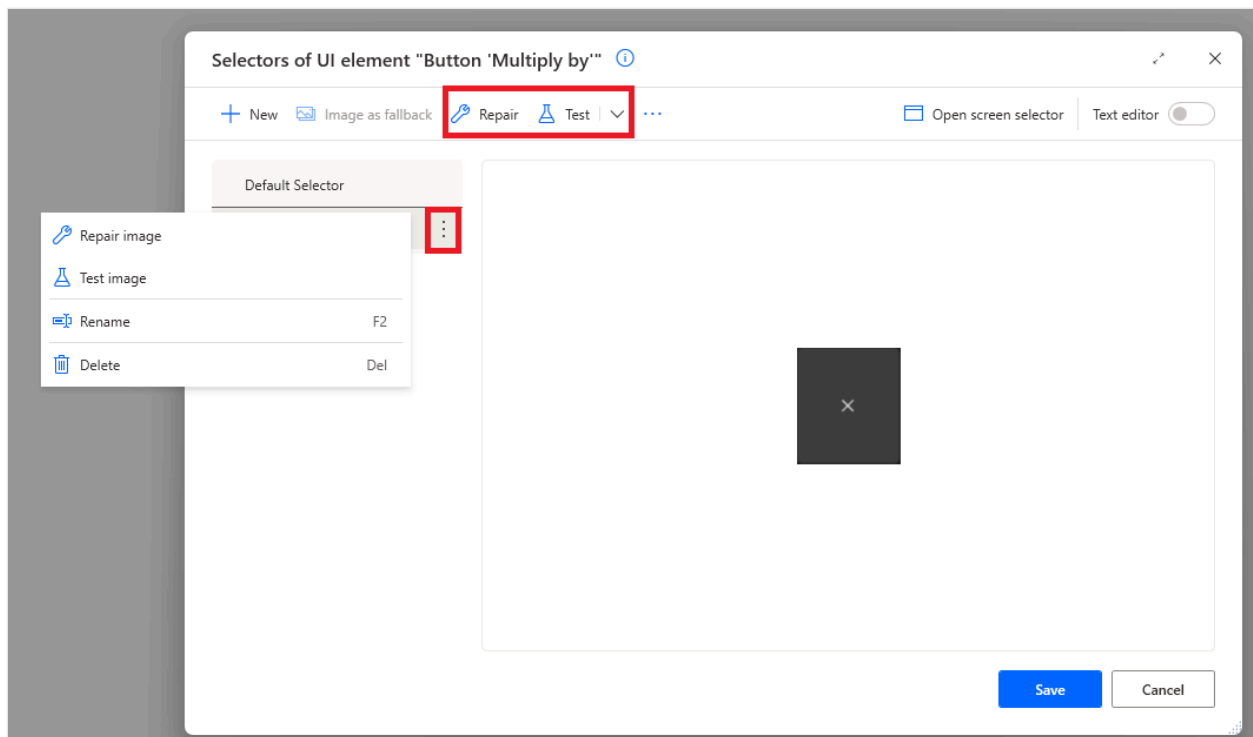


To create an image selector for a specific UI element, left-click on the element while pressing **Ctrl**. This action captures an image of the UI element and generates a corresponding image selector. Only one image selector can be associated with each UI element. As a result, the **Image as fallback** button is disabled once an image selector is created. You can view the captured image by selecting the image selector from the list of selectors in the window.



## Actions on the image selector of the UI element

You can perform various actions on the image selector just as you would with standard selectors. These actions include deleting, renaming, testing, and repairing the image selector. Deleting an image selector removes it if it's no longer needed, while renaming allows you to change its name for better identification. Testing the image selector checks whether the captured image can be found on your screen; remember to ensure that the image is in the foreground for accurate testing. Repairing the image selector enables you to replace the current image with a new one.



## Known issues and limitations

- Fallback mechanism for UI elements isn't supported with the following actions:
  - Data extraction
  - Web data extraction
- The following actions don't support a fallback mechanism for UI elements when the parameters `Check if window`, `Wait until window`, `Check if web page`, or `Wait for web page to` are configured with the conditions `Contains text` or `Doesn't contain text`:
  - If window contains
  - Wait for window content
  - If web page contains
  - Wait for web page content
- The image selector is removed if the following conditions are met:
  - An image is saved as fallback mechanism for a UI component.
  - The flow is later opened and saved in a version of Power Automate for desktop that is v2.44 or earlier.

This deletion is permanent, and the image selector can't be restored, even if the flow is later accessed with a newer version. To work around this issue, don't save the desktop flow in the older version of Power Automate for desktop or recapture the image to set as fallback.

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗



# Power Fx in desktop flows

Article • 04/11/2024

[This article is prerelease documentation and is subject to change.]

**Power Fx** is the low-code language for expressing logic across [Microsoft Power Platform](#). It's a general-purpose, strong-typed, declarative, and functional programming language.

Power Fx is expressed in human-friendly text. It's a low-code language that makers can work with directly in an Excel-like formula bar or Visual Studio Code text window. The "low" in low-code is due to the concise and simple nature of the language, making common programming tasks easy for both makers and developers.

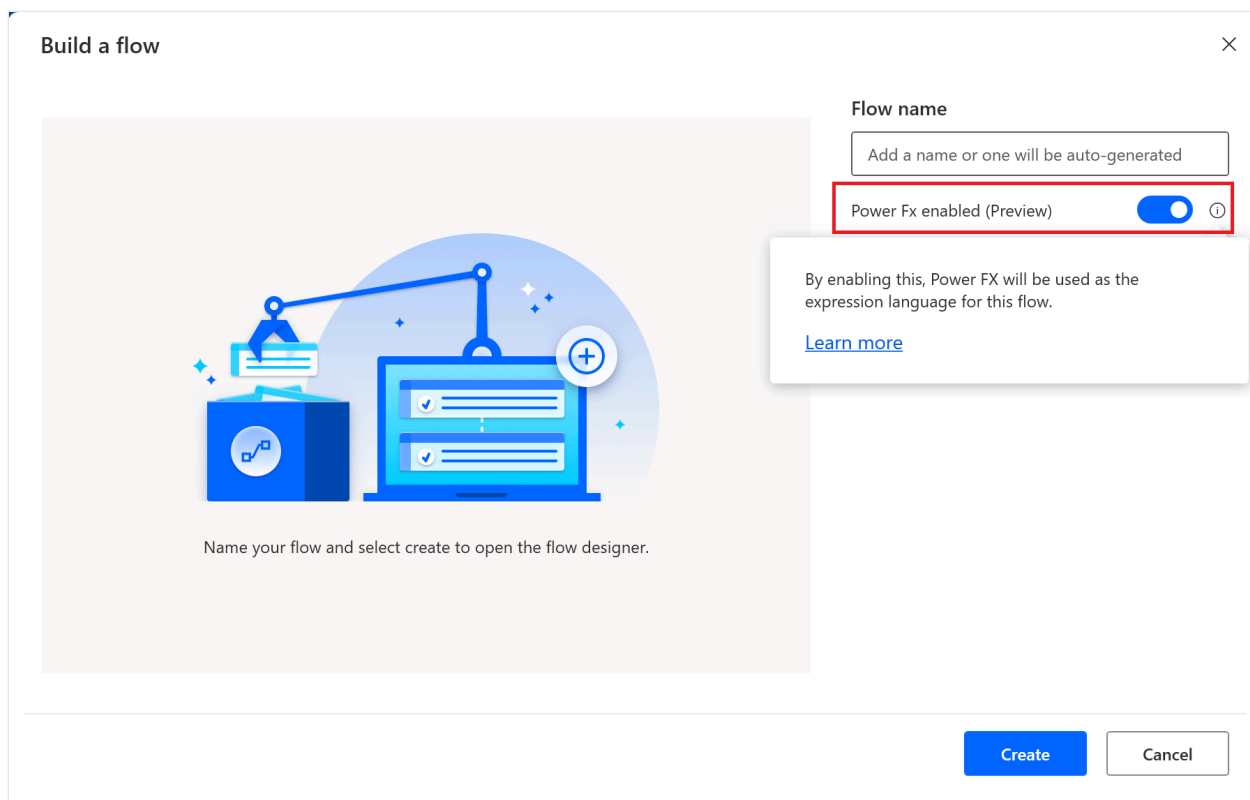
Power Fx enables the full spectrum of development from no-code makers without any programming knowledge to pro-code for the professional developers. It enables diverse teams to collaborate and save time and efforts.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality.
- These features are available before an official release so that customers can get early access and provide feedback.
- This feature requires Power Automate for desktop v2.39 or later.

## Using Power Fx in desktop flow (preview)

To use Power Fx as an expression language in a desktop flow, you have to create a desktop flow and enable the respective toggle button when creating the flow through Power Automate for desktop's console.



#### ⓘ Note

Each Power Fx expression must start with "=" (equals to sign).

In the same fashion as Excel formulas, desktop flows that utilize Power Fx as their expression language use **1** (one) based array indexing instead of **0** (zero) based indexing.

Variable names are case-sensitive in desktop flows with Power Fx. For example, **NewVar** is different than **newVar**.

When Power Fx is enabled in a desktop flow, variable hoisting isn't supported, requiring users to initialize a variable before its use. Trying to utilize an uninitialized variable in Power Fx expressions results in an error.

**If** action accepts a single conditional expression. (Previously, it accepted multiple operands).

Examples:

- The **=1** in an input field is equivalent to the numeric value **1**
- The **= variableName** is equal to the **variableName** variable's value.
- The expression **= {'prop':"value"}** returns a record value that is equivalent to a custom object

- The expression = **Table**({'prop':"value"}) returns a Power Fx table that is equivalent to a list of custom objects
- The expression = **[1,2,3,4]** creates a list of numeric values
- To access the value from a List use the function **Index**(var, number), where var is the name of the List and number is the position of the value to be retrieved
- To access a data table cell using a column index, use the **ReadCell**() function. **ReadCell(DataTableVar, 1, 1)** retrieves the value from the cell in row 1, column 1  
**ReadCell(DataRowVar, 1)** retrieves the value from the cell in row 1
- To include an interpolated value in an input or a UI/web element selector, use the following syntax: Lorem ipsum **`\${variable/ expression}** lorem ipsum
  - Example: The total number is **`\${Sum(10, 20)}**

### ⓘ Note

If you want to use the dollar sign (\$) followed by an opening curly brace sign ({} within a Power Fx expression or in the syntax of a UI/Web element selector and have Power Automate for desktop not treat it as the string interpolation syntax, make sure to follow this syntax: **`\${** (the first dollar sign will act as an escape character)

## Available Power Fx functions

For the complete list of all available functions in Power Automate for desktop flows, go to [Formula reference - desktop flows](#).

## Known issues and limitations

- The following actions from the standard library of automation actions aren't currently supported:
  - Create list
  - Shuffle list
  - Remove item from list
  - Sort list
  - Merge lists
  - Reverse list
  - Remove duplicate items from list
  - Find common list items
  - Retrieve DataTable columns into list
  - Add item to list

- Create new list
- Create new data table
- Insert row into data table
- Update data table item
- Delete row from data table
- Switch
- Case
- Default case

### ⓘ Note

By combining **Run Power Fx expression** action with expressions using **Collect**, **Clear**, **ClearCollect** and **Patch** functions you can emulate behavior found in the actions **Add item to list** and **Insert row into data table** which are currently not available for Power Fx enabled desktop flows.

- **General value** type variables aren't permitted in lists, tables, or as a property for Record values.
- Whenever a **General value** type variable is utilized, a warning message stating "Deferred type provided" is presented. These warnings arise due to Power Fx's strict requirement for strong-typed schemas (strictly defined types).
- Certain automation actions from the standard library of actions, such as **Read from Excel**, **Read from CSV**, **Extract data from a web**, **Extract data from window**, **Execute SQL statement**, and **Convert JSON to a custom object** produce **General type** variables that can't be evaluated yet during the authoring. For the time being, ignore warnings resulting from such cases.
- The General type variables that are produced from the above actions are currently incompatible with the following functions: `Filter()`, `LookUp()`, `Search()`, `CountIf()`, `With()`.
- Some Power Fx functions presented through IntelliSense aren't currently supported in desktop flows. Those functions display the following design time error when used: **Parameter 'Value': PowerFx type 'OptionSetValueType' is not supported.**

## What's new

This section lists what's changed in each update.

### 2.43

In April's release:

- Case sensitivity. For example, *NewVar* is a different variable than *newVar*.
- [Run Power Fx expression](#) action is available under the [Variables](#) group of actions. Run Power Fx expression allows you to execute expressions directly on data sources.
- [Collect](#), [Clear](#), [ClearCollect](#) Power Fx functions are supported in desktop flows.
- [Patch](#) Power Fx functions are supported in desktop flows.
- Variables and Power Fx expressions can be used in UI element or web selector syntax.
- Interpolated values can now be included in the syntax of a UI/web element selector. For interpolated strings, you can use this syntax: ``${ Power Fx expression }``.

### Important

In version 2.43 of Power Automate for desktop, there have been updates for Power Fx enabled desktop flows that could impact the execution of Power Fx enabled desktop flows created with previous versions. Specifically:

- **Case-sensitive variable names:** Variable names within Power Fx enabled desktop flows created with **Power Automate for desktop version 2.43 and later** are case-sensitive. Power Fx desktop flows created with **Power Automate for desktop version 2.42 and earlier** allowed for case-insensitive variable names. For example, *NewVar* and *newVAR* reference the same variable. For Power Fx enabled desktop flows created with **Power Automate for desktop version 2.42 and earlier**, make sure to review and verify that the produced variables are as expected.

## 2.42

In March's release:

- IntelliSense capabilities are now available for Power Fx enabled desktop flows.
  - Syntax colorization
  - Autocomplete functionality during typing with real time suggestions
  - Signature helpers for Power Fx functions

### Note

IntelliSense capabilities are available for expressions. To input an expression use the **equals sign** (= your expression ) at the beginning of the respective input or the **string interpolation notation** (  `${ your expression }` ).

- Function picker
  - You can access the function picker using the fx button in the skittle when interacting with the respective inputs. All Power Fx functions currently supported for desktop flows are available there.

## 2.41

In February's release:

- From now on inputs that don't begin with the equals sign (=) are considered as text type values. Numeric and boolean inputs must always begin with the equals sign.
- Inputs now support interpolated strings. To include an interpolated value in an input use the following syntax: Lorem ipsum  `${variable/ expression}`  lorem ipsum.
  - Example: The total number is  `${Sum(10, 20)}`

### ⓘ Note

To use interpolated string syntax, omit the equals sign at the beginning of the input.

## 2.39

In December's release:

- If the input provided doesn't start with the equals sign, the following rules apply:
  - Numeric values without spaces are interpreted as numeric values.
  - **True/ False** as input, regardless of case and without spaces are interpreted as boolean values.
  - All other inputs are considered of text type values.

# Formula reference - desktop flows

Article • 03/22/2024

In this article, learn about all the functions available in [Power Automate for desktop](#).

## A

**Abs** – Absolute value of a number.

**Acos** – Returns the arccosine of a number, in radians.

**Acot** – Returns the arccotangent of a number, in radians.

**AddColumns** – Returns a table with [columns](#) added.

**AIClassify** – Classifies text into one or more of categories.

**AIExtract** – Extracts specified entities such as registration numbers, phone numbers, or names of people.

**AIReply** – Drafts a reply to the message that you provide.

**AISentiment** – Detects the sentiment of the text that you provide.

**AISummarize** – Summarizes the text that you provide.

**AITranslate** – Translates text from another language.

**And** – Boolean logic AND. Returns **true** if all arguments are **true**. You can also use the [&& operator](#).

**Asin** – Returns the arcsine of a number, in radians.

**Atan** – Returns the arctangent of a number, in radians.

**Atan2** – Returns the arctangent based on an  $(x,y)$  coordinate, in radians.

**Average** – Calculates the average of a table expression or a set of arguments.

## B

**Blank** – Returns a *blank* value that can be used to insert a NULL value in a data source.

**Boolean** – Converts a text string, number, or untyped value to a Boolean value.

## C

**Char** – Translates a character code into a string.

**Coalesce** – Replaces *blank* values while leaving non-*blank* values unchanged.

**Concat** – Concatenates strings in a data source.

**Concatenate** – Concatenates strings.

**Cos** – Returns the cosine of an angle specified in radians.

**Cot** – Returns the cotangent of an angle specified in radians.

**Count** – Counts table records that contain numbers.

**CountA** – Counts table records that aren't *empty*.

**CountIf** – Counts table records that satisfy a condition.

**CountRows** – Counts table records.

## D

**Date** – Returns a date/time value, based on **Year**, **Month**, and **Day** values.

**DateAdd** – Adds days, months, quarters, or years to a date/time value.

**DateDiff** – Subtracts two date values, and shows the result in days, months, quarters, or years.

**DateTime** – Returns a date/time value, based on both date and time components.

**DateTimeValue** – Converts a date and time string to a date/time value.

**DateValue** – Converts a date-only string to a date/time value.

**Day** – Retrieves the day portion of a date/time value.

**Dec2Hex** – Convert a number to a hexadecimal text string.

**Degrees** - Converts radians to degrees.

**Distinct** – Summarizes records of a table, removing duplicates.

**DropColumns** – Returns a table with one or more columns removed.



## E

**EDate** – Adds or subtracts months to a date, without changing the day of the month.

**EncodeUrl** – Encodes special characters using URL encoding.

**EndsWith** – Checks whether a text string ends with another text string.

**EOMonth** – Adds or subtracts months to a date, returning the last day of that month.

**Error** – Create a custom error or pass through an error.

**Exp** - Returns  $e$  raised to a power.

## F

**Filter** – Returns a filtered table based on one or more criteria.

**Find** – Checks whether one string appears within another and returns the location.

**First** – Returns the first record of a table.

**FirstN** – Returns the first set of records (N records) of a table.

**ForAll** – Calculates values and performs actions for all records of a table.

## G

**GUID** – Converts a GUID string to a GUID value or creates a new GUID value.

## H

**Hex2Dec** – Convert a hexadecimal text string to a number.

**Hour** – Returns the hour portion of a date/time value.

## I

**If** – Returns one value if a condition is true and another value if not.

**IfError** - Detects errors and provides an alternative value or takes action.

**Index** – Returns a record from a table based on ordered position.

**Int** – Rounds down to the nearest integer.

**IsBlank** – Checks for a **blank** value.

**IsBlankOrError** – Checks for a **blank** value or error.

**IsEmpty** – Checks for an empty table.

**IsError** – Checks for an error.

**IsNumeric** – Checks for a numeric value.

**IsToday** – Checks whether a date/time value is sometime today in the user's time zone.

## L

**Language** – Returns the language tag of the current user.

**Last** – Returns the last record of a table.

**LastN** – Returns the last set of records (N records) of a table.

**Left** – Returns the left-most portion of a string.

**Len** – Returns the length of a string.

**Ln** – Returns the natural log.

**Log** – Returns the logarithm in any base of a number.

**LookUp** – Looks up a single record in a table based on one or more criteria.

**Lower** – Converts letters in a string of text to all lowercase.

## M

**Max** – Maximum value of a table expression or a set of arguments.

**Mid** – Returns the middle portion of a string.

**Min** – Minimum value of a table expression or a set of arguments.

**Minute** – Retrieves the minute portion of a date/time value.

**Mod** – Returns the remainder after a dividend is divided by a divisor.

**Month** – Retrieves the month portion of a date/time value.

## N

**Not** – Boolean logic NOT. Returns **true** if its argument is **false**, and returns **false** if its argument is **true**. You can also use the **!** operator.

**Now** – Returns the current date/time value in the user's time zone.

## O

**Or** – Boolean logic OR. Returns **true** if any of its arguments are **true**. You can also use the **||** operator.

## P

**Pi** – Returns the number  $\pi$ .

**PlainText** – Removes HTML and XML tags from a string.

**Power** – Returns a number raised to a power. You can also use the **^** operator.

**Proper** – Converts the first letter of each word in a string to uppercase, and converts the rest to lowercase.

## R

**Radians** - Converts degrees to radians.

**Rand** – Returns a pseudo-random number between 0 and 1.

**RandBetween** – Returns a pseudo-random number between two numbers.

**Replace** – Replaces part of a string with another string, by starting position of the string.

**Right** – Returns the right-most portion of a string.

**Round** – Rounds to the closest number.

**RoundDown** – Rounds down to the largest previous number.

**RoundUp** – Rounds up to the smallest next number.

## S

**Second** – Retrieves the second portion of a date/time value.

**Sequence** – Generate a table of sequential numbers, useful when iterating with **ForAll**.

**Shuffle** – Randomly reorders the records of a table.

**Sort** – Returns a sorted table based on a formula.

**Split** – Splits a text string into a table of substrings.

**Sqrt** – Returns the square root of a number.

**StartsWith** – Checks if a text string begins with another text string.

**StdevP** – Returns the standard deviation of its arguments.

**Substitute** – Replaces part of a string with another string, by matching strings.

**Sum** – Calculates the sum of a table expression or a set of arguments.

**Switch** – Matches with a set of values and then evaluates a corresponding formula.

## T

**Table** – Creates a temporary table.

**Tan** - Returns the tangent of an angle specified in radians.

**Text** – Converts any value and formats a number or date/time value to a string of text.

**Time** – Returns a date/time value, based on **Hour**, **Minute**, and **Second** values.

**TimeValue** – Converts a time-only string to a date/time value.

**TimeZoneOffset** – Returns the difference between UTC and the user's local time in minutes.

**Today** – Returns the current date-only value.

**Trim** – Removes extra spaces from the ends and interior of a string of text.

**TrimEnds** – Removes extra spaces from the ends of a string of text only.

**Trunc** – Truncates the number to only the integer portion by removing any decimal portion.

## U

**Upper** – Converts letters in a string of text to all uppercase.

## V

**Value** – Converts a string to a number.

**VarP** – Returns the variance of its arguments.

## W

**Weekday** – Retrieves the weekday portion of a date/time value.

**With** – Calculates values and performs actions for a single record, including inline records of named values.

## Y

**Year** – Retrieves the year portion of a date/time value.

## See also

[Power Fx in desktop flows](#)

# Custom actions in desktop flows

Article • 10/19/2023

Custom actions developed by your organization and uploaded to the respective environments can be included in desktop flows and utilized like actions that belong in the standard library of automation actions.

## Important

- This feature requires Power Automate for desktop v2.32 or later.
- Ensure the .dll files describing Custom actions, their dependency .dll files, and the .cab files are properly signed with a digital certificate trusted by your organization. The certificate should also be installed on the device under the trusted root certificate authority where the desktop flow with custom action dependencies is modified and/or executed.

Custom actions exist at the environment level. As a best practice, use a "dev—test—prod" model when developing custom actions.

## Known limitations

- Custom actions groups can't exceed 30 MB upon upload.
- Specific endpoints must be included in the allowlist for desktop flows containing custom actions to work properly. More information: [Desktop flow services required for runtime](#)
- Application lifecycle management (ALM) isn't fully supported for desktop flows with dependencies on custom actions.
- Upload date might differ in the portal than what is shown in the Assets library inside Power Automate for desktop.
- The Assets library can't display more than 5000 custom actions groups.
- Custom actions are not available for organizations that have enabled [Bring your own key \(BYOK\)](#) from the protection service.
- Machines belonging in a [hosted machine group](#) should have the appropriate certificates required for custom actions, as set by your organization, installed on them. You can create a [golden image](#), containing the respective certificate(s) and provide it during the creation process of the respective hosted machine group.

## Next steps

[Create custom actions](#)

## Related information

- [Assets library](#)
  - [Upload custom actions](#)
  - [Use custom actions](#)
- 

## Feedback

Was this page helpful?



[Provide product feedback](#) 

# Create Power Automate for desktop actions using the Actions SDK

Article • 12/15/2023

This article describes how to create custom actions in Power Automate for desktop.

## Creating custom actions

### Important

Reserved keywords can't be used as action names and/or action properties. Use of reserved keywords as action names and/or action properties result in erroneous behavior. More information: [Reserved keywords in desktop flows](#)

Begin by creating a new Class Library (.NET Framework) project. Select .NET framework version 4.7.2.

To form an action in the custom module created:

- Delete the autogenerated Class1.cs file.
- Create a new class inside your project to represent the custom action give it a distinct name.
- Include the Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK and Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.Attributes namespaces.
- All classes representing actions should have an [Action] attribute above your class.
- The class should have public access and inherit from ActionBase class.

C#

```
using System;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.Attributes;

namespace Modules.MyCustomModule
{
    [Action(Id = "CustomAction")]
    public class CustomAction : ActionBase
    {
        public override void Execute(ActionContext context)
        {
            throw new NotImplementedException();
        }
    }
}
```



```
    }  
  }  
}
```

Most actions have parameters (Input or Output). Input and Output parameters are represented by classic C# properties. Each property should have an appropriate C# attribute, either `[InputArgument]` or `[OutputArgument]` to dictate its type and how they're presented in Power Automate for desktop. Input arguments can also have default values.

C#

```
using System.ComponentModel;  
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK;  
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.Attributes;  
  
namespace Modules.MyCustomModule  
{  
    [Action(Id = "CustomAction")]  
    public class CustomAction : ActionBase  
    {  
        [InputArgument, DefaultValue("Developer")]  
        public string InputName { get; set; }  
  
        [OutputArgument]  
        public string DisplayedMessage { get; set; }  
  
        public override void Execute(ActionContext context)  
        {  
            DisplayedMessage = $"Hello, {InputName}";  
        }  
    }  
}
```

## Adding descriptions to custom actions

Add a description and a friendly name for the modules and actions so that RPA developers know how to best utilize them.

Power Automate for desktop designer shows friendly names and descriptions.

You can create a "Resources.resx" file inside the Properties folder of the module project. The new ".resx" file should be named "Resources.resx".

The format of the descriptions for Modules and Actions should be as follows:

"Module\_Description" or "Action\_Description" and "Module\_FriendlyName" or "Action\_FriendlyName" respectively in the name field. The description in the value field.

We also recommend that you provide descriptions and friendly names for parameters. Their format should be as follows: "Action\_Parameter\_Description", "Action\_Parameter\_FriendlyName".

Name	Value
MyCustomModule_Description	Description of Custom Module.
MyCustomModule_FriendlyName	Friendly Name of Custom Module
CustomAction_Description	Description of Custom Action.
CustomAction_FriendlyName	Custom Action
CustomAction_InputName_FriendlyName	Input Name
CustomAction_InputName_Description	Input arguement of text type. Default value is "Developer".
CustomAction_DisplayedMessage_FriendlyName	Displayed Message
CustomAction_DisplayedMessage_Description	Outpur arguement of text type. Provides a greeting message.

### 💡 Tip

It is recommended to denote what it is you are describing in the comment field (e.g. Module, Action etc.)

These can also be set with the FriendlyName and Description properties of the `[InputArgument]`, `[OutputArgument]` and `[Action]` attributes.

Here's an example of a **Resources.resx** file for a custom module.

Name	Value	Comment
Action1_Description	Description of Action1	
Action1_FriendlyName	Action 1	
Action1_InputArgument1_Description	Description of InputArgument	
Action1_InputArgument1_FriendlyName	Input Argument	
Action1_OutputArgument1_Description	Description of OutputArgument	
Action1_OutputArgument1_FriendlyName	Output Argument	
Action1_Summary	Summary of Action 1	
Category_TestCategory_Description	Description of TestCategory	
Category_TestCategory_FriendlyName	Friendly Name of TestCategory	
Error_ActionError_Description	Description of ActionError	
Error_ActionError_FriendlyName	Friendly Name of ActionError	

Another way to quickly add friendly names and descriptions to actions and parameters is with the FriendlyName and Description properties in the `[Action]`, `[InputArgument]` and `[OutputArgument]` attributes.

### ⚠️ Note

To add a friendly name and description to a module, you must modify the respective .resx file or add the respective C# attributes.

# Resources localization

The default language for modules in Power Automate for desktop is assumed to be English.

The **Resources.resx** file should be in English.

Any other languages can be added with extra **Resources.{locale}.resx** files for localization. For example, **Resources.fr.resx**.

## Custom module categories

Modules can include categories and subcategories for better action organization.

In order to separate custom actions in categories, subcategories, modify the **[Action]** attribute that precedes the class that represents the custom action in the following manner:

```
C#
```

```
[Action(Category = "category.subcategory")]
```

### ⓘ Note

A Module can have multiple categories. Similarly, categories can be comprised by subcategories. This structure can be indefinite.

The Order property dictates the order by which actions are previewed in the designer.

**Action1** belongs in the category "TestCategory" and it's the first action of the module (this way you explain Order and category with an example).

```
C#
```

```
[Action(Id = "Action1", Order = 1, Category = "TestCategory")]
```

## Conditional actions

Conditional actions are actions that return either "True" or "False". 'If file exists' Power Automate for desktop action of the standard library is a good example of a conditional action.

Conditional action example:

```
C#

using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.Attributes;
using System;
using System.ComponentModel;

namespace Modules.CustomModule
{
    [ConditionAction(Id = "ConditionalAction1", ResultPropertyName =
nameof(Result))]
    [Throws("ActionError")] // TODO: change error name (or delete if not
needed)
    public class ConditionalAction1 : ActionBase
    {
        #region Properties

        public bool Result { get; private set; }

        [InputArgument]
        public string InputArgument1 { get; set; }

        #endregion

        #region Methods Overrides

        public override void Execute(ActionContext context)
        {
            try
            {
                //TODO: add action execution code here
            }
            catch (Exception e)
            {
                if (e is ActionException) throw;

                throw new ActionException("ActionError", e.Message,
e.InnerException);
            }
        }

        #endregion
    }
}
```

Notice the **Result** boolean variable.

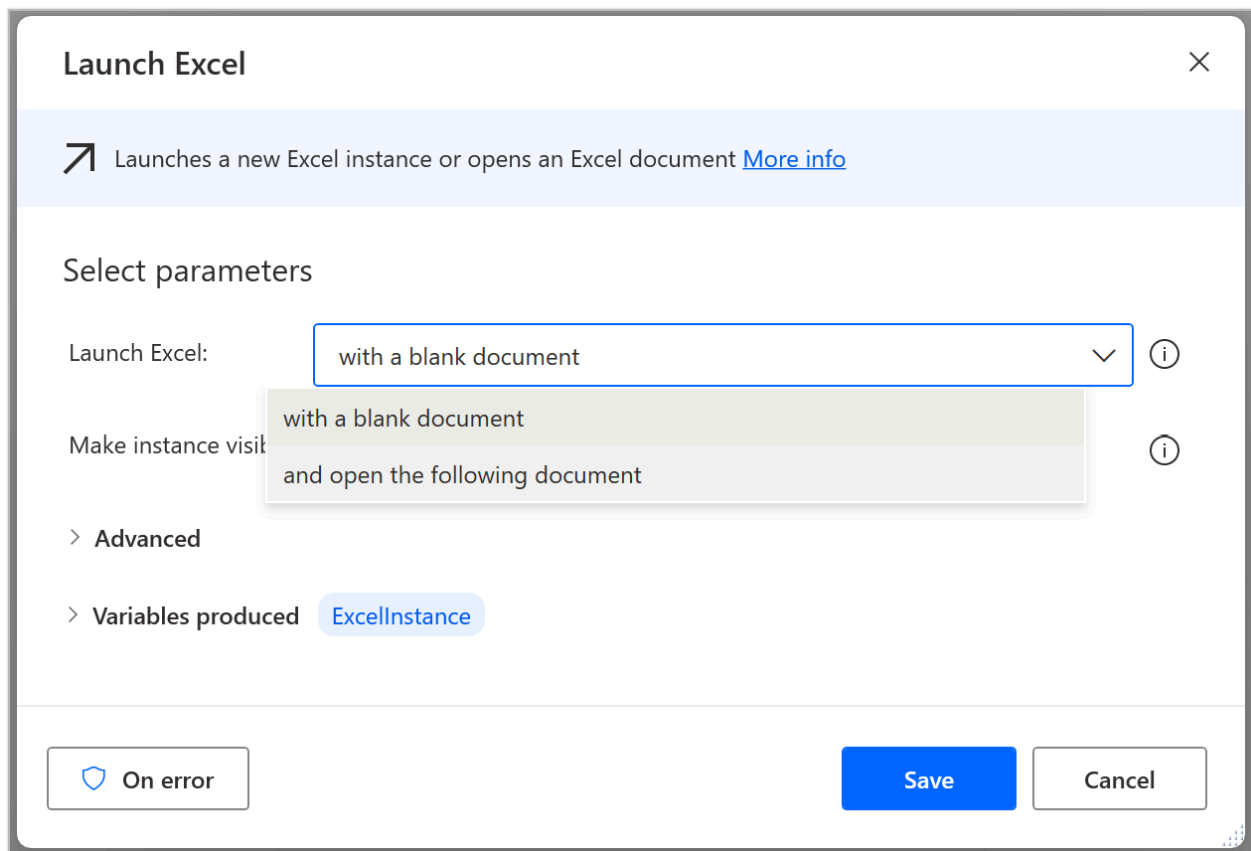
The **If file exists** action doesn't have an output argument. What it returns is either true or false, depending on what the boolean variable **Result** holds.

# Custom action selectors

There are particular cases, in which a custom action might be required to have more than one variation.

An example is the "Launch Excel" action, from the standard library of actions.

Using the "with a blank document" selector, the flow launches a blank Excel document, whereas using the "and open the following document" selection requires the file path of the file to open.



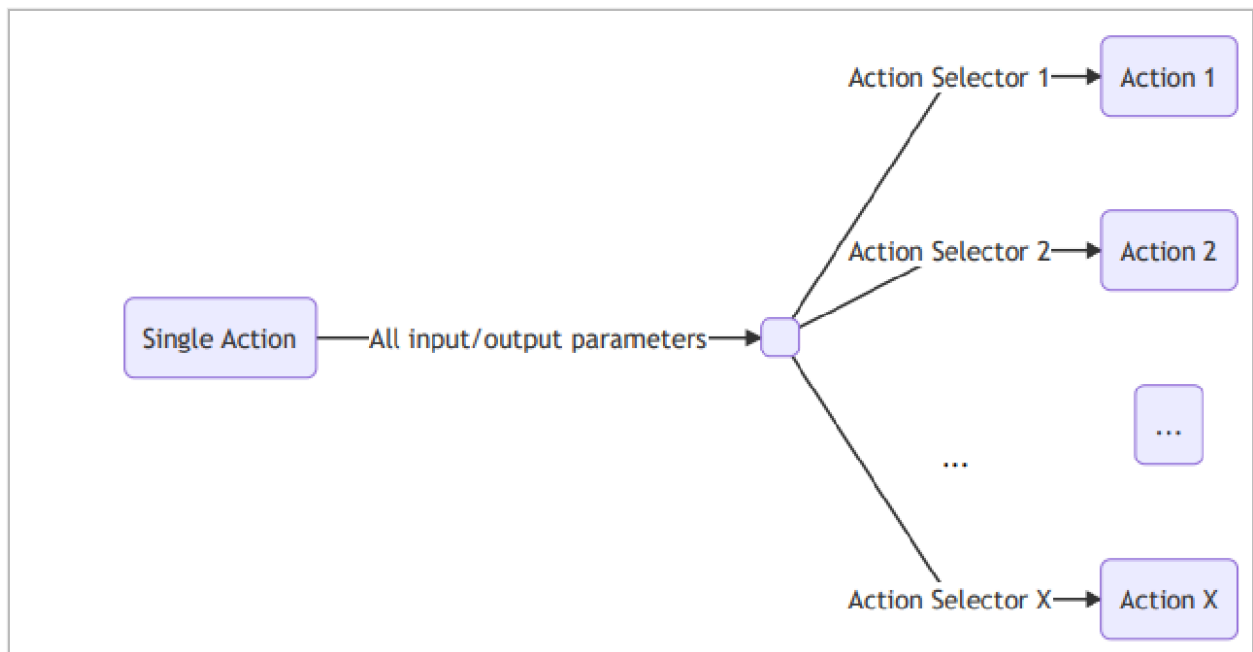
The two actions mentioned above are two selectors of the "Launch Excel" base action.

When creating custom actions, you don't have to rewrite functionality.

You can create a single "base" Action, setting its input and output parameters and then choose what would be visible in each flavor by utilizing action selectors.

Through action selectors a level of abstraction can be added over a single action, allowing for the retrieval of specific functionality from the single "base" action without having to rewrite code to form a new variation of the same action every time.

Think of selectors as choices, filtering a single action and presenting only the information required according to the respective selectors.



To form a new action selector, first create a base action to be utilized by the selectors.

The central action requires either a boolean or an enum property as an input C# argument.

The value of this property determines which selector is utilized.

The most common way is using an enum. Especially when more than two selectors are needed, enums is the only option.

For two selector cases, booleans can be used.

This property, also known as a constraint argument, must have a default value.

The central action is declared as a classic action.

Notice the first property (input argument) is an enum. Based on that property's value, the appropriate selector becomes active.

### ⚠ Note

To have the arguments ordered in your desired manner, you set the Order value next to the InputArgument attribute.

C#

```

using System.ComponentModel;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Desktop.Actions.SDK;
using
Microsoft.PowerPlatform.PowerAutomate.Desktop.Desktop.Actions.SDK.Attributes
;
  
```

```

namespace Modules.CustomModule
{
    [Action(Id = "CentralCustomAction")]
    public class CentralCustomAction : ActionBase
    {
        #region Properties

        [InputArgument, DefaultValue(SelectorChoice.Selector1)]
        public SelectorChoice Selector { get; set; }

        [InputArgument(Order = 1)]
        public string FirstName { get; set; }

        [InputArgument(Order = 2)]
        public string LastName { get; set; }

        [InputArgument(Order = 3)]
        public int Age { get; set; }

        [OutputArgument]
        public string DisplayedMessage { get; set; }

        #endregion

        #region Methods Overrides

        public override void Execute(ActionContext context)
        {
            if (Selector == SelectorChoice.Selector1)
            {
                DisplayedMessage = $"Hello, {FirstName}!";
            }
            else if (Selector == SelectorChoice.Selector2)
            {
                DisplayedMessage = $"Hello, {FirstName} {LastName}!";
            }
            else // The 3rd Selector was chosen
            {
                DisplayedMessage = $"Hello, {FirstName} {LastName}!\nYour
age is: {Age}";
            }
        }

        #endregion
    } // you can see below how to implement an action selector
}

```

## Custom action selectors using enums

In this example, you create three selectors. A simple enum dictates the appropriate selector each time:

C#

```
public enum SelectorChoice
{
    Selector1,
    Selector2,
    Selector3
}
```

Selectors are represented by classes.

Those classes must inherit the `ActionSelector<TBaseActionClass>` class.

#### ⓘ Note

**TBaseActionClass** is the base action class name.

In the **UseName()** method, the name of the action selector is declared. This is used as a name of the action to resolve the resources.

C#

```
public class Selector1 : ActionSelector<CentralCustomAction>
{
    public Selector1()
    {
        UseName("DisplayOnlyFirstName");
        Prop(p => p.Selector).ShouldBe(SelectorChoice.Selector1);
        ShowAll();
        Hide(p => p.LastName);
        Hide(p => p.Age);
        // or
        // Show(p => p.FirstName);
        // Show(p => p.DisplayedMessage);
    }
}
```

#### ⓘ Note

The **Selector** classes should not be declared as actions. The only action is the central one. Selectors act as filters.

In this specific example we want to display only one of the arguments, thus the others are filtered out. Similarly for **Selector2**:



C#

```
public class Selector2 : ActionSelector<CentralCustomAction>
{
    public Selector2()
    {
        UseName("DisplayFullName");
        Prop(p => p.Selector).ShouldBe(SelectorChoice.Selector2);
        ShowAll();
        Hide(p => p.Age);
    }
}
```

And Selector3 classes:

C#

```
public class Selector3 : ActionSelector<CentralCustomAction>
{
    public Selector3()
    {
        UseName("DisplayFullDetails");
        Prop(p => p.Selector).ShouldBe(SelectorChoice.Selector3);
        ShowAll();
    }
}
```

The final execution is achieved through the **Execute(ActionContext context)** method that resides in the central action. Based on the selector, the respective values filtered are displayed.

C#

```
public override void Execute(ActionContext context)
{
    if (Selector == SelectorChoice.Selector1)
    {
        DisplayedMessage = $"Hello, {FirstName}!";
    }
    else if (Selector == SelectorChoice.Selector2)
    {
        DisplayedMessage = $"Hello, {FirstName} {LastName}!";
    }
    else // The 3rd Selector was chosen
    {
        DisplayedMessage = $"Hello, {FirstName} {LastName}!\nYour age is:
{Age}";
    }
}
```

# Custom action selectors using boolean

The following is an example utilizing Boolean instead of enums.

```
C#

using System.ComponentModel;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.ActionSelectors;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.Attributes;

namespace Modules.CustomModule
{
    [Action]
    public class CentralCustomActionWithBoolean : ActionBase
    {
        #region Properties

        [InputArgument, DefaultValue(true)]
        public bool TimeExpired { get; set; }

        [InputArgument]
        public string ElapsedTime { get; set; }

        [InputArgument]
        public string RemainingTime { get; set; }

        [OutputArgument]
        public string DisplayedMessage { get; set; }

        #endregion

        #region Methods Overrides

        public override void Execute(ActionContext context)
        {
            DisplayedMessage = TimeExpired ? $"The timer has expired.
Elapsed time: {ElapsedTime}" : $"Remaining time: {RemainingTime}";
        }

        #endregion
    }

    public class NoTime : ActionSelector<CentralCustomActionWithBoolean>
    {
        public NoTime()
        {
            UseName("TimeHasExpired");
            Prop(p => p.TimeExpired).ShouldBe(true);
            ShowAll();
            Hide(p => p.RemainingTime);
        }
    }
}
```

```

    }

    public class ThereIsTime :
    ActionSelector<CentralCustomActionWithBoolean>
    {
        public ThereIsTime()
        {
            UseName("TimeHasNotExpired");
            Prop(p => p.TimeExpired).ShouldBe(false);
            ShowAll();
            Hide(p => p.RemainingTime);
        }
    }
}

```

## Setting descriptions for custom action selectors

To create a description and a summary for selectors, use the following format in the .resx file of your custom module.

```

SelectorName_Description
SelectorName_Summary

```

This can also be done in the selector with the `WithDescription` and `WithSummary` methods.

### Important

.dll files describing the custom actions, their .dll dependencies and the .cab file containing everything should be properly signed with a digital certificate trusted by your organization. The certificate should also be installed on each machine on which a desktop flow with custom action dependencies is authored/ modified/ executed, present under the Trusted Root Certification Authorities.

## Custom module IDs

Each module has its own ID (assembly name). When creating custom modules make sure you set unique module IDs. To set the assembly name of your module, modify the **Assembly name** property under the General section of the C# project's properties.

 **Warning**

Including modules with the same ID in a flow will result in conflicts

## Custom module name conventions

For the custom modules to be readable through Power Automate for desktop, the AssemblyName must have a filename that follows the below pattern:

```
?*.Modules.*  
Modules.*
```

For example, **Modules.ContosoActions.dll**

The AssemblyTitle in the project settings specifies the module ID. It can only have alphanumeric characters and underscores and must begin with a letter.

## Sign all DLLs inside the custom module

### Important

It is mandatory to have all of the .dll files that comprise a custom module (generated assembly and all its dependencies) signed with a trusted certificate

To finalize the creation of the custom module, all generated .dll files, which can be found under the bin/release or bin/Debug folder of the project, must be signed.

Sign all the .dll files using a trusted certificate by running the following command (for each .dll file) in a Developer Command Prompt for Visual Studio:

Sign the .dlls files using a trusted certificate by running the following command (for each dll) in a Developer Command Prompt for Visual Studio:

```
Signtool sign /f {your certificate name}.pfx /p {your password for exporting  
the certificate} /fd  
SHA256 {path to the .dll you want to sign}.dll
```

or by running the following command (by creating a Windows PowerShell Script .ps1) that iterates through all .dll files and sign each one with the provided certificate:

PowerShell

```
Get-ChildItem {the folder where dll files of custom module exist} -Filter *.dll |  
Foreach-Object {  
    Signtool sign /f {your certificate name}.pfx /p {your password for exporting the certificate} /fd SHA256 $_.FullName  
}
```

### ⓘ Note

The digital certificate must have an exportable private key and code sign capabilities

## Packaging everything in a cabinet file

The .dll containing the custom actions and all its dependencies (.dll files) must be packaged in a cabinet file (.cab).

### ⓘ Note

When naming the .cab file, follow the file and folder naming convention for Windows operating system. Don't use blank spaces or special characters such as `< > : " / \ | ? * .`

Create a Windows PowerShell Script (.ps1) containing the following lines:

PowerShell

```
param(  
  
    [ValidateScript({Test-Path $_ -PathType Container})]  
    [string]  
    $sourceDir,  
  
    [ValidateScript({Test-Path $_ -PathType Container})]  
    [string]  
    $cabOutputDir,  
  
    [string]  
    $cabFilename  
)  
  
$ddf = ".OPTION EXPLICIT  
.Set CabinetName1=$cabFilename
```

```

.Set DiskDirectory1=$cabOutputDir
.Set CompressionType=LZX
.Set Cabinet=on
.Set Compress=on
.Set CabinetFileCountThreshold=0
.Set FolderFileCountThreshold=0
.Set FolderSizeThreshold=0
.Set MaxCabinetSize=0
.Set MaxDiskFileCount=0
.Set MaxDiskSize=0
"
$ddfpath = ($env:TEMP + "\customModule.ddf")
$sourceDirLength = $sourceDir.Length;
$ddf += (Get-ChildItem $sourceDir -Filter "*.dll" | Where-Object {
(!$_.PSIsContainer) -and ($_.Name -ne
"Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.dll") } | Select-
Object -ExpandProperty FullName | ForEach-Object { '"' + $_ + '"' +
($_.Substring($sourceDirLength)) + '"' }) -join "`n`n"
$ddf | Out-File -Encoding UTF8 $ddfpath
makecab.exe /F $ddfpath
Remove-Item $ddfpath

```

This Windows PowerShell Script can then be used for creating the .cab file by invoking it in Windows PowerShell and providing:

- The directory to the .dll files to be compressed.
- The target directory to place the generated .cab file.

Invoke the script using the following syntax:

PowerShell

```

.\{name of script containing the .cab compression directions}.ps1 "{absolute
path to the source directory containing the .dll files}" "{target dir to
save cab}" {cabName}.cab

```

Example:

PowerShell

```

.\makeCabFile.ps1
"C:\Users\Username\source\repos\MyCustomModule\bin\Release\net472"
"C:\Users\Username\MyCustomActions" MyCustomActions.cab

```

### ⓘ Note

- Make sure that the the actual custom actions .dll file is in the root level of the targetted path when creating the .cab file and not in a subfolder.

- The .cab file must also be signed. Unsigned .cab files and/or unsigned .dlls contained in them will not be usable in desktop flows and will result in error during inclusion.

## Next steps

[Upload custom actions](#)

## Related information

- [Assets library](#)
- [Use custom actions](#)
- [Custom actions](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Uploading custom actions to an environment

Article • 10/19/2023

This article explains how to upload custom actions to an environment.

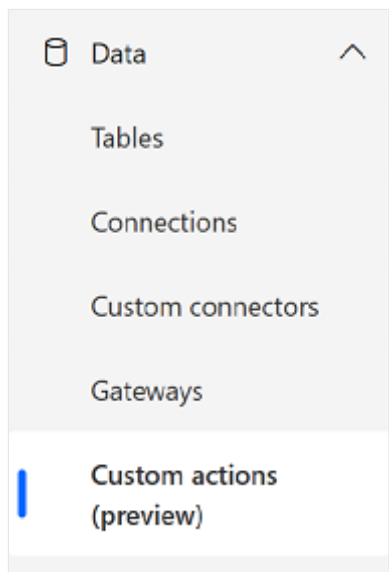
## Prerequisites

Ensure that you have the following permissions to upload a custom actions group to an environment.

- You have access to the Power Platform environment.
- You're assigned **Desktop Flow Module Developer** role in the [Power Platform admin center](#).
- This feature requires Power Automate for desktop v2.32 or later.

## Upload custom actions

1. Go to [Power Automate](#).
2. Select **Custom actions** under **Data**.



3. Select **Upload custom action** from the top of the screen.



Search

+ Upload custom actions

### Custom actions

Upload, manage, and share your custom actions with makers and users of desktop flows that have been built with Power Automate for desktop. [Learn more](#)

4. Enter the required details for your custom actions group.

 Expand table

Name	Required or optional	Description
Name	Required	This is how your custom actions group name appears in the custom actions list, assets library, and if included in a desktop flow, in the actions tree.
Description	Optional	A brief description of the custom actions. This information is visible in the asset library, when the custom actions group is selected.
Select file	Required	Select the signed .cab file containing the custom actions group developed with the custom actions SDK, and any dependent .dll files if applicable.

Environments  
Default environm...

Upload custom group of actions

Name \*

Custom actions group name 1

Description

This is a short description for the custom actions group name 1

Select file \*

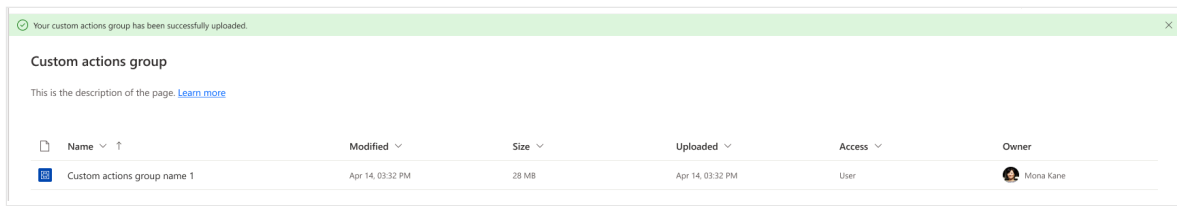
You can upload cab files under 30 MB.

Custom actions group name 1.cab

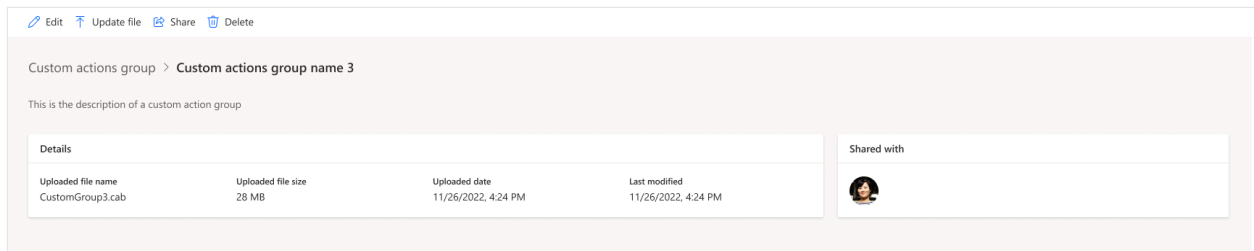
Upload Cancel

5. Select **Upload**.

The newly uploaded custom actions group appears in the list.



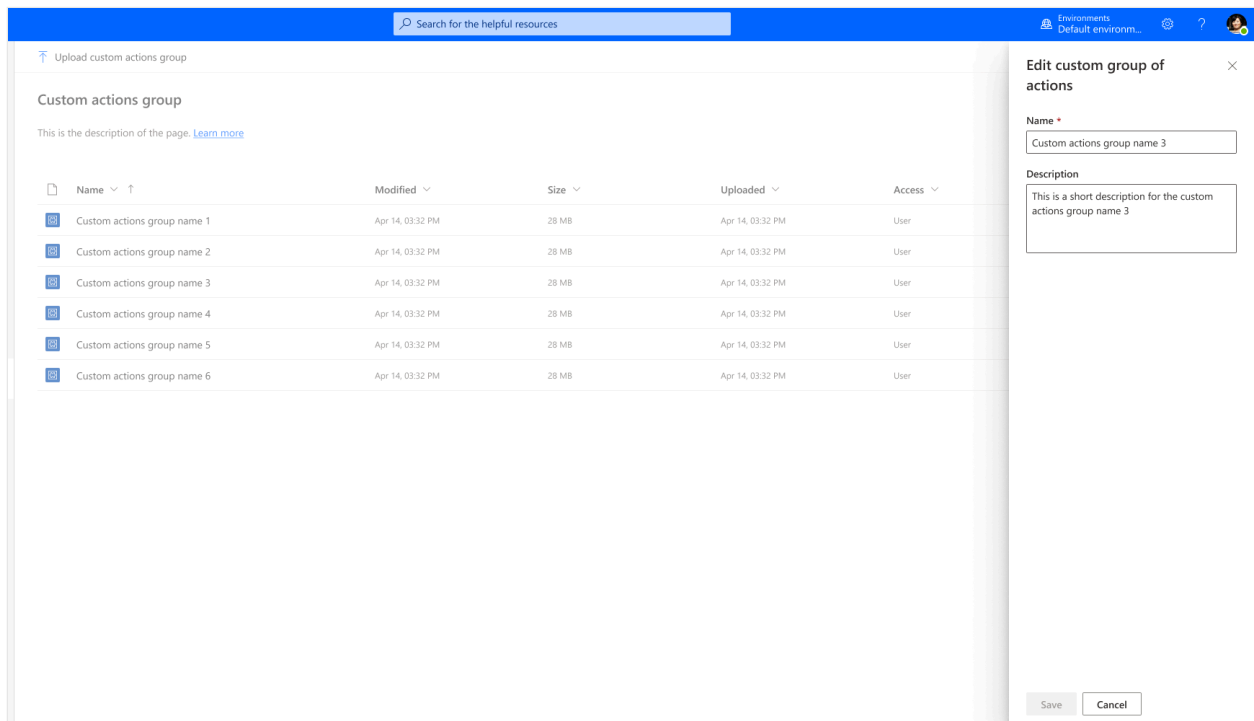
By selecting the uploaded custom actions group, you can go into its details page.



From here, you can perform the following actions.

## Edit custom actions

Edit the uploaded custom actions, modifying its name and/or description.



## Share custom actions

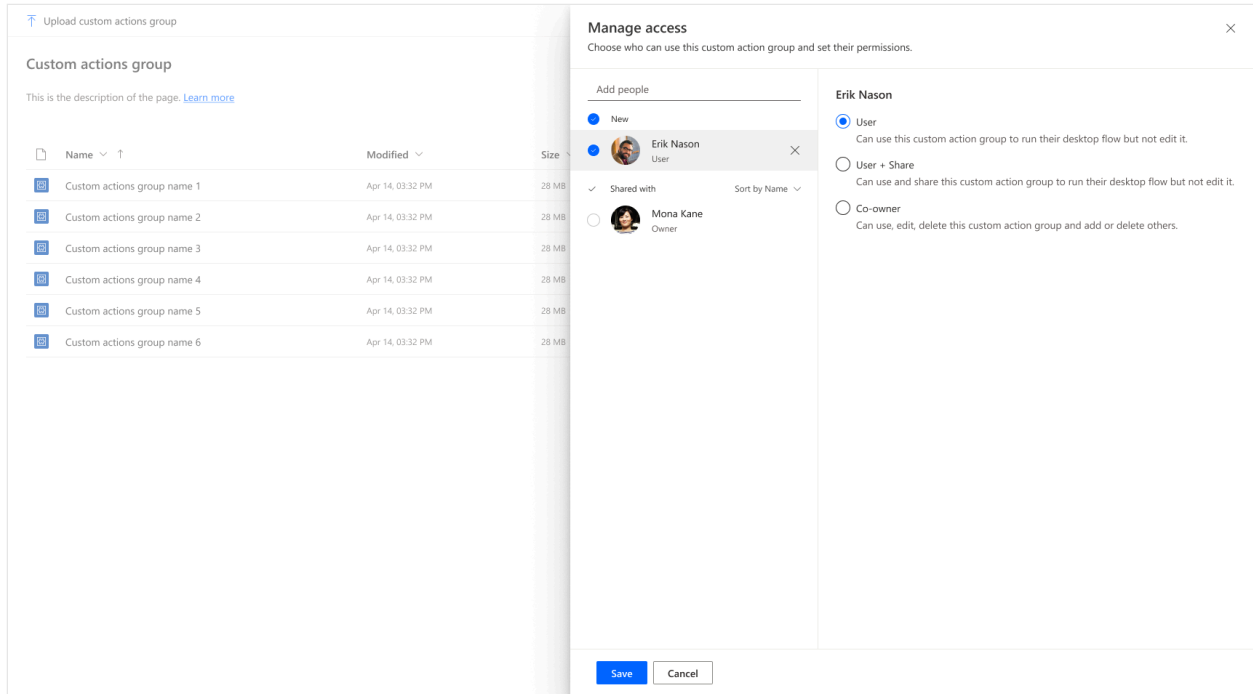
Share custom actions to allow managing who has access to the custom actions uploaded and view the given type of access.

There are three types of access a maker can have regarding custom actions.

- **User** - can only use the respective custom actions in desktop flows.
- **User + Share** – can use and share the custom actions.
- **Co-owner** – can also update/delete the custom actions.

### Important

To be a co-owner, you have to be assigned the **Desktop Flow Module Developer** role in the environment.



The screenshot shows the 'Upload custom actions group' interface. On the left, there is a table of custom actions groups. On the right, the 'Manage access' dialog is open, allowing users to select permissions for Erik Nason (User) and Mona Kane (Owner).

Name	Modified	Size
Custom actions group name 1	Apr 14, 03:32 PM	28 MB
Custom actions group name 2	Apr 14, 03:32 PM	28 MB
Custom actions group name 3	Apr 14, 03:32 PM	28 MB
Custom actions group name 4	Apr 14, 03:32 PM	28 MB
Custom actions group name 5	Apr 14, 03:32 PM	28 MB
Custom actions group name 6	Apr 14, 03:32 PM	28 MB

**Manage access**  
Choose who can use this custom action group and set their permissions.

Add people

- New
- Erik Nason (User)
- Shared with
- Mona Kane (Owner)

**Erik Nason**

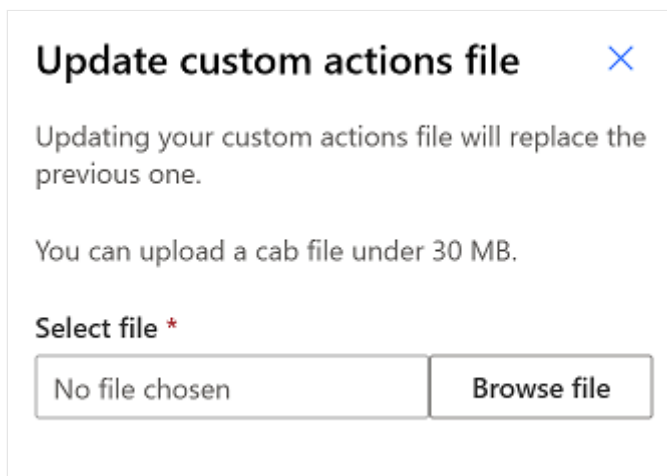
- User  
Can use this custom action group to run their desktop flow but not edit it.
- User + Share  
Can use and share this custom action group to run their desktop flow but not edit it.
- Co-owner  
Can use, edit, delete this custom action group and add or delete others.

Buttons: Save, Cancel


## Update file

Only co-owners can update a file. Update files when you want to update existing custom actions by uploading a .cab file.

Update file (Co-owners only) for when you want to update the existing custom actions etc. by uploading a .cab file.



The screenshot shows the 'Update custom actions file' dialog box. It contains a warning message and a file selection button.

**Update custom actions file** 

Updating your custom actions file will replace the previous one.

You can upload a cab file under 30 MB.

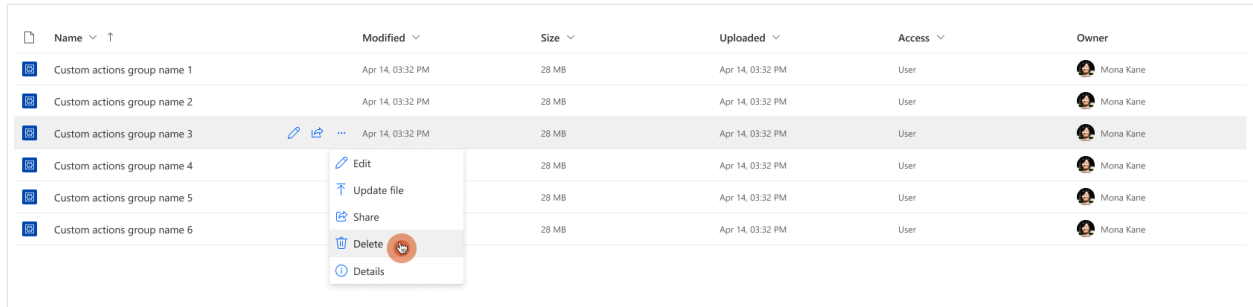
Select file \*

Buttons: No file chosen, Browse file

# Delete file

Only co-owners can delete custom actions. Deleting a custom actions group causes all dependent desktop flows to fail.

Name	Modified	Size	Uploaded	Access	Owner
Custom actions group name 1	Apr 14, 03:32 PM	28 MB	Apr 14, 03:32 PM	User	Mona Kane
Custom actions group name 2	Apr 14, 03:32 PM	28 MB	Apr 14, 03:32 PM	User	Mona Kane
Custom actions group name 3	Apr 14, 03:32 PM	28 MB	Apr 14, 03:32 PM	User	Mona Kane
Custom actions group name 4	Apr 14, 03:32 PM	28 MB	Apr 14, 03:32 PM	User	Mona Kane
Custom actions group name 5	Apr 14, 03:32 PM	28 MB	Apr 14, 03:32 PM	User	Mona Kane
Custom actions group name 6	Apr 14, 03:32 PM	28 MB	Apr 14, 03:32 PM	User	Mona Kane



## Next steps

[Use custom actions](#)

## Related information

- [Assets library](#)
- [Create custom actions](#)
- [Custom actions](#)

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#)

# Using custom actions in desktop flows

Article • 07/26/2024

## ⓘ Note

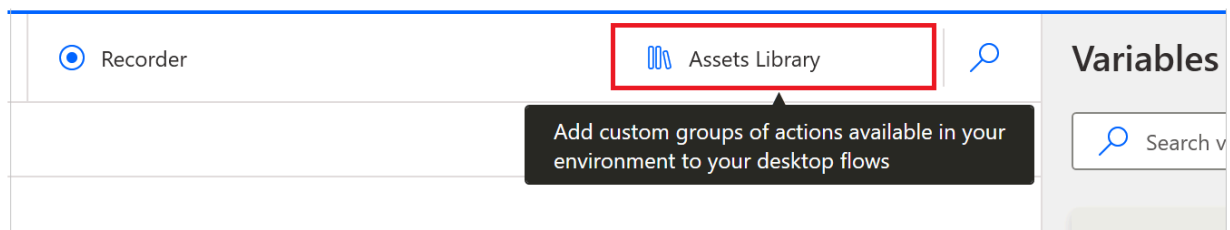
An Attended RPA license is required to include and use custom actions in desktop flows.

## ⓘ Important

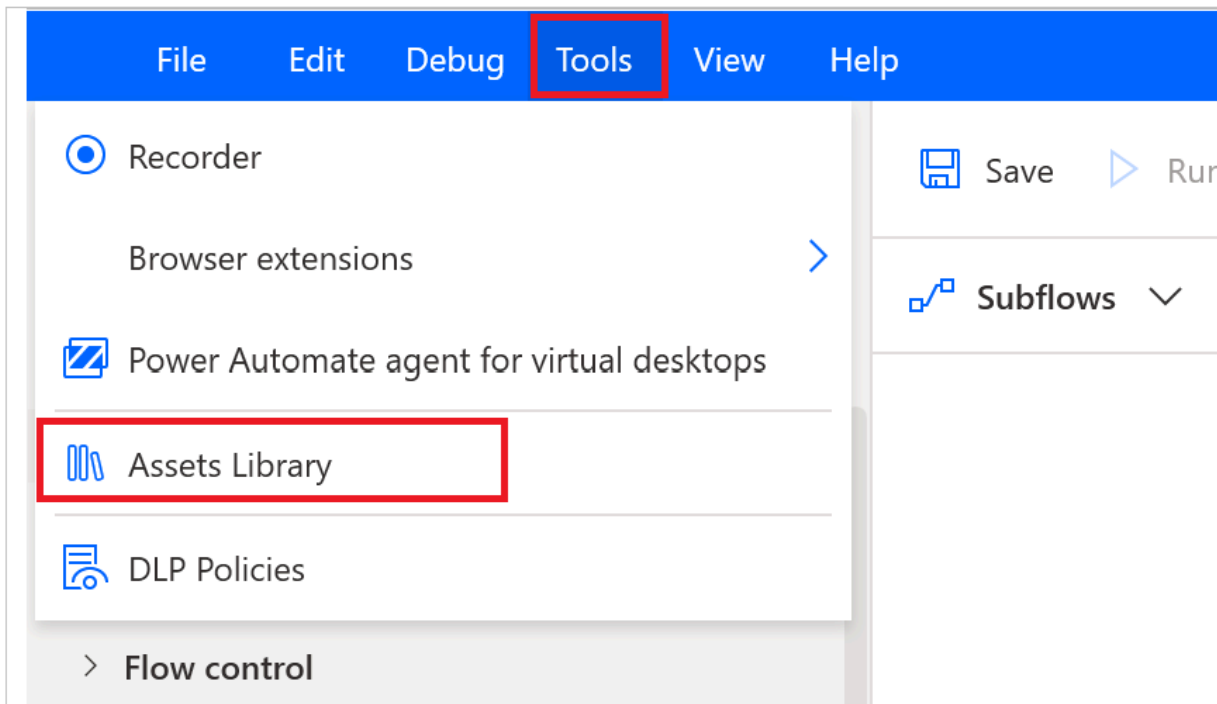
- Ensure the .dll files describing Custom actions, their dependency .dll files, and the .cab files are properly signed with a digital certificate trusted by your organization. The certificate should also be installed on the device under the trusted root certificate authority where the desktop flow with custom action dependencies is modified and/or executed.

You can include custom actions in desktop flows through the [Assets library](#) using Power Automate for desktop's designer.

To use Assets library, select **Assets library** in the designer.



Alternatively, use the **Tools** bar.



### 📌 Important

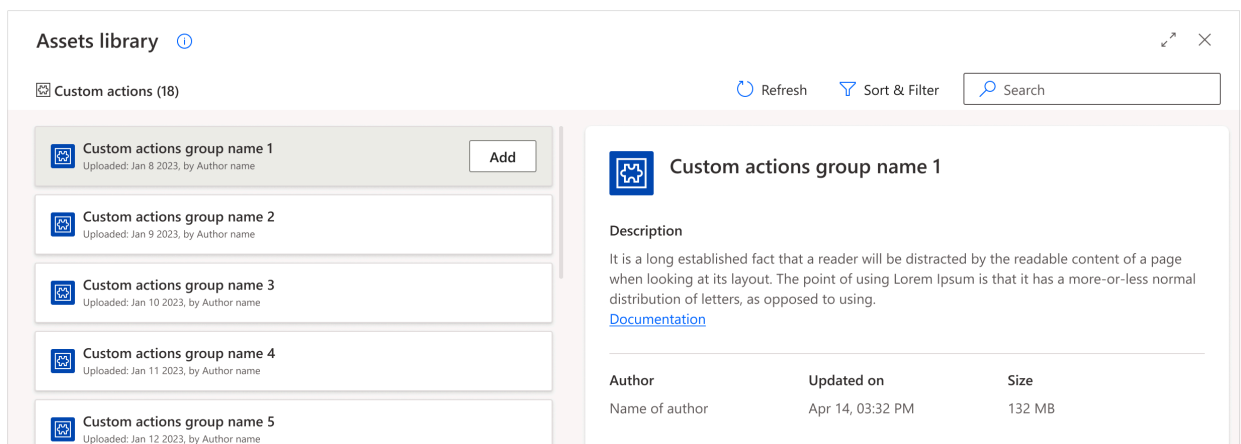
This feature requires Power Automate for desktop v2.32 or later.

## Custom actions tab

**Custom actions** tab shows you the custom actions uploaded in the environment you've selected.

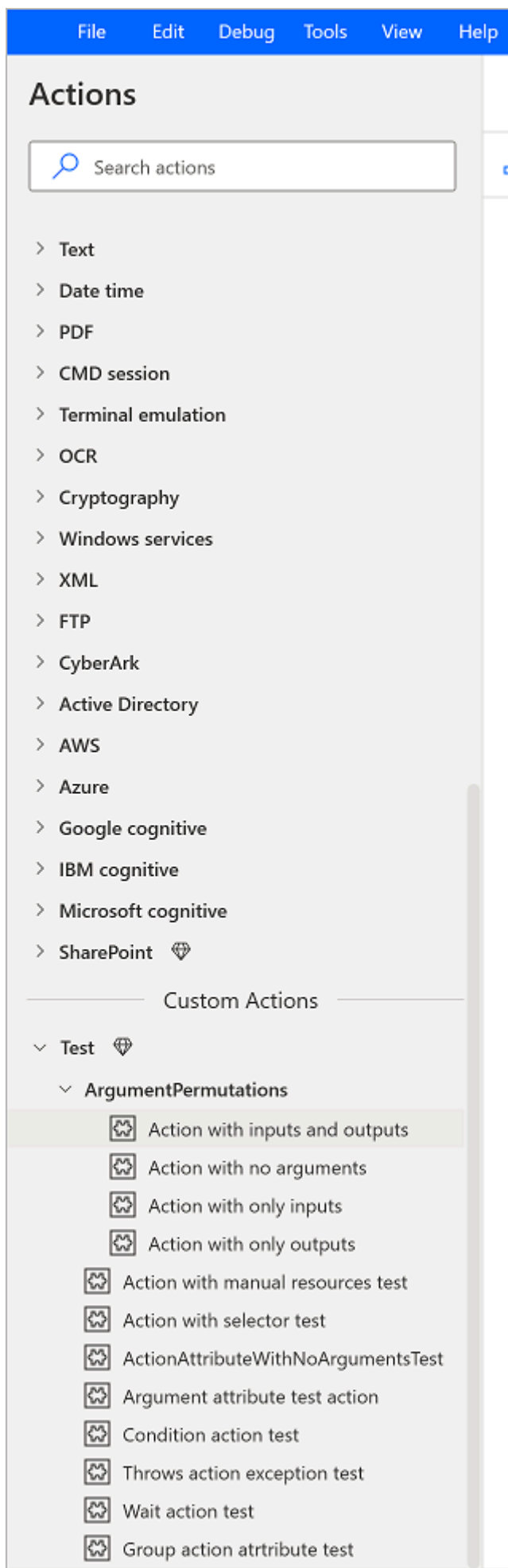
### ⚠️ Note

You can only see custom actions shared with you.



After you complete the custom action inclusion and close the asset library, the custom actions will be listed at the bottom of the **Actions** tree under the **Custom Actions** section.





To include a custom action in a desktop flow, drag and drop or double-click on it.

## Related information

- [Assets library](#)
  - [Upload custom actions](#)
  - [Create custom actions](#)
  - [Custom actions](#)
- 

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# How to build custom actions in Power Automate for desktop

Article • 11/30/2023

Enhance productivity, reusability, and extensibility with custom actions in Power Automate for desktop. This article discusses how [custom actions in Power Automate for desktop](#) can help makers create their own reusable actions that can be used across multiple flows. Makers create custom actions by composing a sequence of steps or functions into a new action. Custom actions are created using the Power Automate for desktop actions SDK, which provides a set of APIs that allow makers to create custom actions using .NET language C#. Custom actions can also be shared with other users through the custom actions section in Power Automate ([make.powerautomate.com](https://make.powerautomate.com)). In this article, find detailed walkthroughs of how to create, build, deploy, use, and update custom actions.

## Important

While the essential features utilized in creating custom actions are supported, the provided solutions, assets, and sample scripts mentioned here serve as an example implementation of these features and don't include support.

## Overview

Custom actions capability in Power Automate for desktop allows you to create your own reusable actions that can be used across multiple desktop flows. Custom actions save you time and effort by allowing you to reuse complex or frequently used actions without having to re-create them each time you build a new flow. Makers can apply their existing skills and knowledge to create custom actions that integrate with other systems and services. Additionally, pro-developers can wrap the existing functions or code libraries to make a new custom action that results in increased reusability of organizational assets.

You create custom actions by composing a sequence of methods or functions into a new action. Once you create a custom action, use it in any desktop flow by dragging and dropping it onto the Power Automate desktop designer canvas.

Custom actions can be shared with other users through the custom actions section in Power Automate, which provides a central repository for sharing and discovering custom actions. This means that users can benefit from the expertise and knowledge of

others in the organization and can easily find and use custom actions created by other makers.

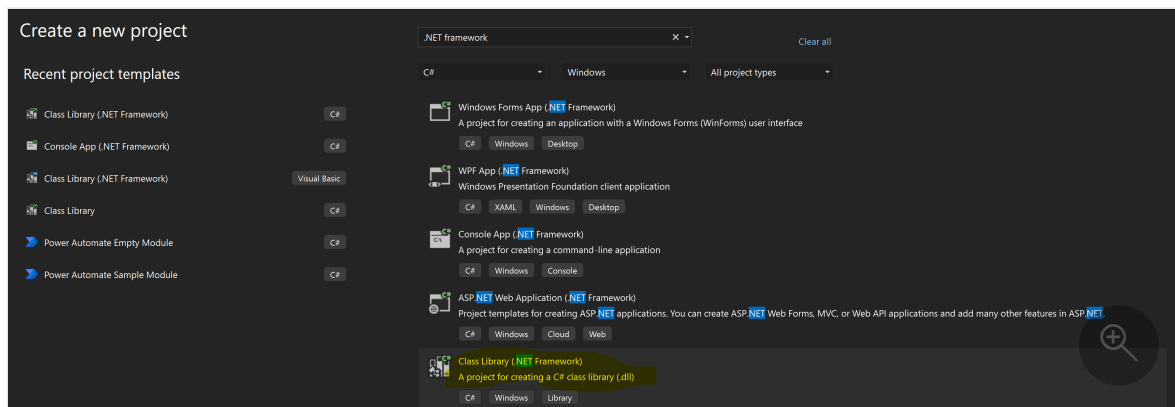
Overall, custom actions in Power Automate for desktop provide a powerful way to extend the functionality of the product, streamline the flow-building process, and foster collaboration and innovation within the organization.

## Prerequisites

- Latest version of Power Automate for desktop – [Install Power Automate](#)
- C# authoring tool such as [Visual Studio Community/Professional/Enterprise 2022](#) with the .NET desktop development workload
- Custom actions SDK – [NuGet Gallery | Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK](#)
- Digital certificate:
  - Generate a self-signed certificate – [Generate Self-Signed Certificates Overview – .NET](#)
  - Enterprise deployment – Your organization’s trusted certificate from certificate authority – [Digital signatures and certificates – Office Support](#)
- SignTool:
  - [Using SignTool to sign a file – Win32 apps](#)
  - [SignTool](#)
- Windows PowerShell Script (.ps1) – [Create custom actions – Power Automate](#)

## Create your own custom action

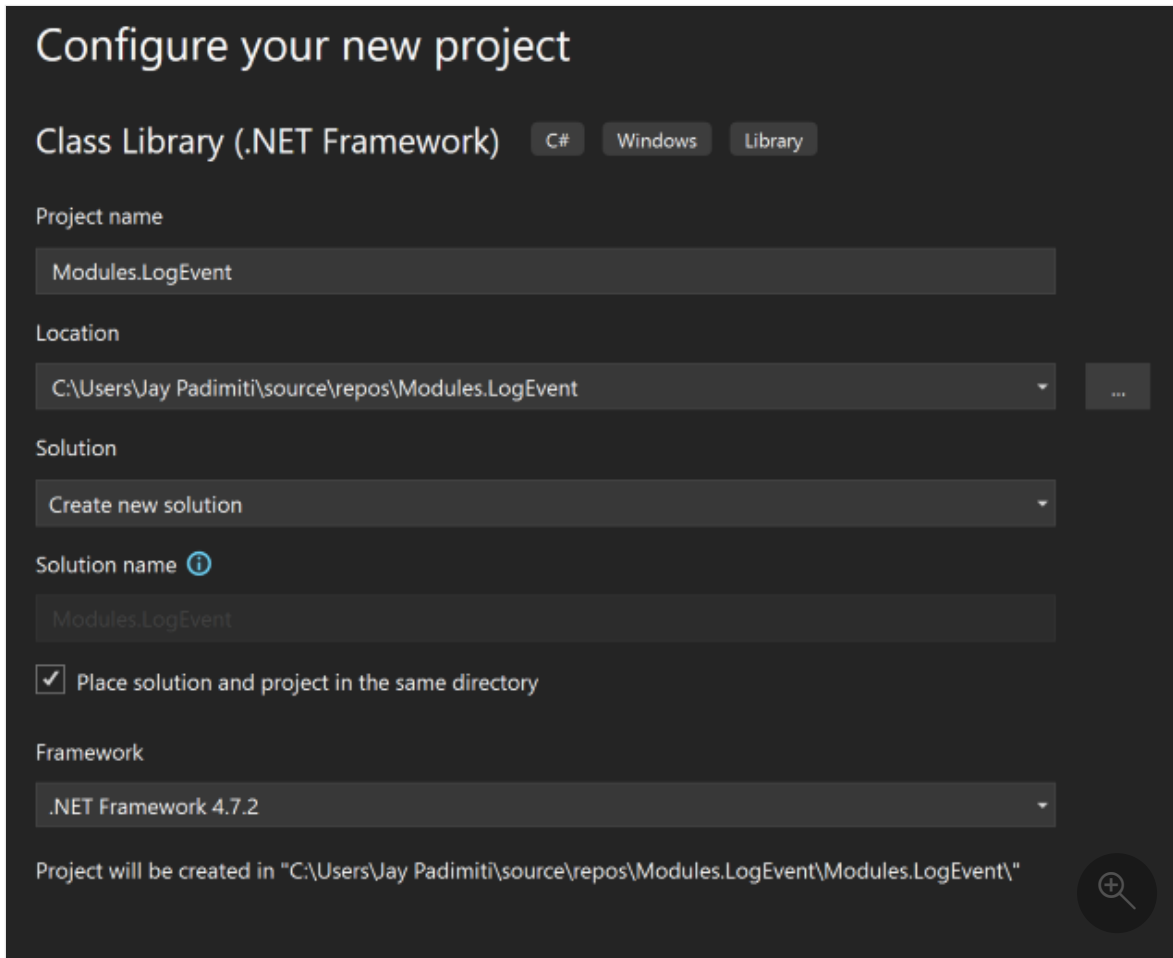
1. Open Visual Studio to create a new project using template of **Class Library (.NET Framework)**.



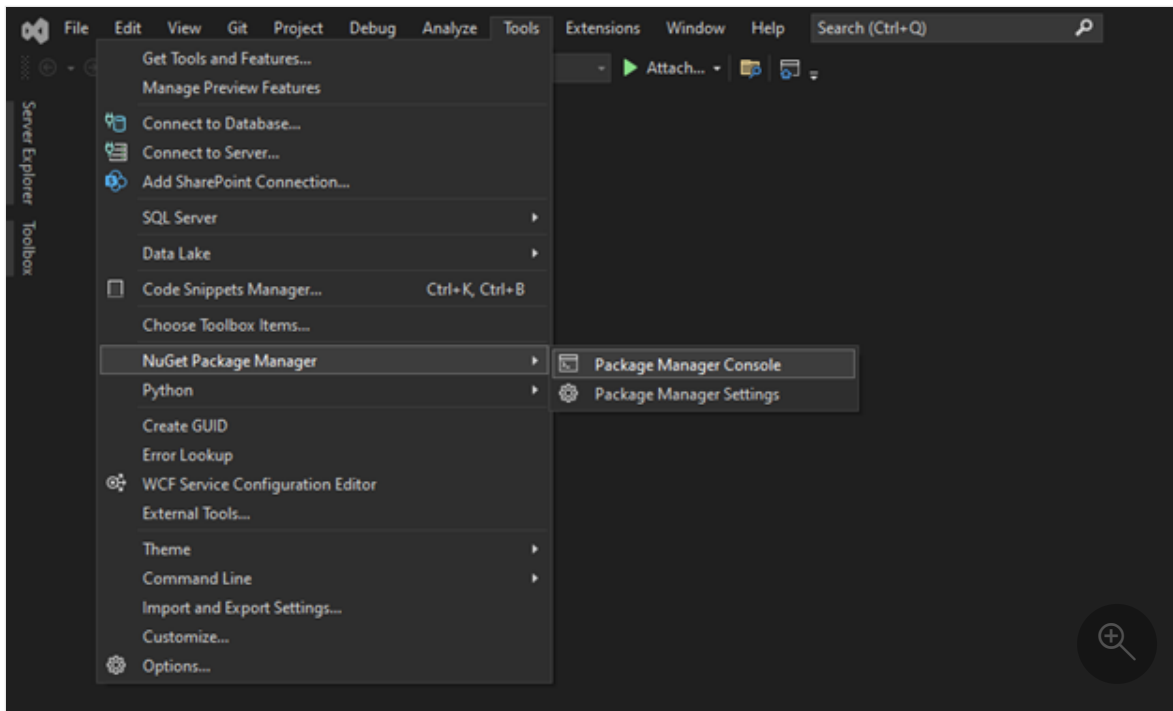
2. Configure your new project with a project name, file location, and set the Framework as **.NET Framework 4.7.2**.

### ⓘ Note

Make sure to follow the naming conventions. More information: [Custom module name conventions](#)



3. In Visual Studio, select **Tools > NuGet Package Manager > Package Manager console**.



4. Open a PowerShell window and install NuGet package **PowerAutomate.Desktop.Actions.SDK** using this PowerShell command.

```
PowerShell

Find-Package Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK
NuGet\Install-Package
Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK
```

5. Follow the steps in [Create custom actions](#) to create the Class file for your custom action.

## Information you can use as reference for your action

Reference solution archive: [.NET Module Solution](#)

**Action:** Write a message to a local file.

**Input parameters:** File name, message to write to the file.

**Output parameters:** Status code – true if successful and false if not successful.

**Class Definition:**

```
C#
```

```

using System;
using System.IO;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK;
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.Attributes;

namespace ModulesLogEvent
{
    [Action(Id = "LogEventToFile" , Order = 1, Category = "Logging")]
    [Throws("LogEventError")]
    public class LogEventToFile : ActionBase
    {
        [InputArgument]
        public string LogFileName { get; set; }

        [InputArgument]
        public string LogMessage { get; set; }

        [OutputArgument]
        public bool StatusCode { get; set; }

        public override void Execute(ActionContext context)
        {
            try
            {
                // To append all of the text to the file
                File.AppendAllText(LogFileName, LogMessage);
                StatusCode = true;
            }
            catch (Exception e)
            {
                if (e is ActionException) throw;

                throw new ActionException("LogEventError", e.Message,
                    e.InnerException);
            }
        }
    }
}

```

**Resources:** This table lists the descriptions and friendly names for parameters in a *Resources.resx* file.

Name	Value	Comment
LogEventToFile_Description	Custom action to log message to the supplied file	Action description
LogEventToFile_FriendlyName	LogEventToFile	Action name
LogEventToFile_LogFileName_Description	Input parameter of text type	Action input description

Name	Value	Comment
LogEventToFile_LogFileName_FriendlyName	LogFileName	Action input name
LogEventToFile_LogMessage_Description	Input parameter of text type	Action input description
LogEventToFile_LogMessage_FriendlyName	LogMessage	Action input Name
LogEventToFile_StatusCode_Description	Output parameter of boolean type	Action output description
LogEventToFile_StatusCode_FriendlyName	LogMessage	Action outputName
ModulesLogEvent_Description	Module to manage log events	Module description
ModulesLogEvent_FriendlyName	LogEvent	Module name

## Build the package and deploy your custom action

Create the package and deploy to Power Automate.

1. Acquire the digital certificate so the custom action DLL file can be signed.

### Important

Self-signed certificates are only for test purposes and aren't recommended for production use. For organizational deployment of custom actions in your environment, we recommend you use a trusted digital certificate that follows your organizational guidelines.

### Tip

To streamline the process of developing and using custom actions for Power Automate for desktop across your organization, you can bundle a trusted digital certificate with the Power Automate for desktop installer that is distributed through SCCM/Appstore. > This will enable the certificate to be installed automatically on both makers and unattended runtime machines



that require Power Automate for desktop, without any need for additional actions.

For this example, a self-signed certificate is used.

a. Create a self-signed certificate using this script.

```
PowerShell

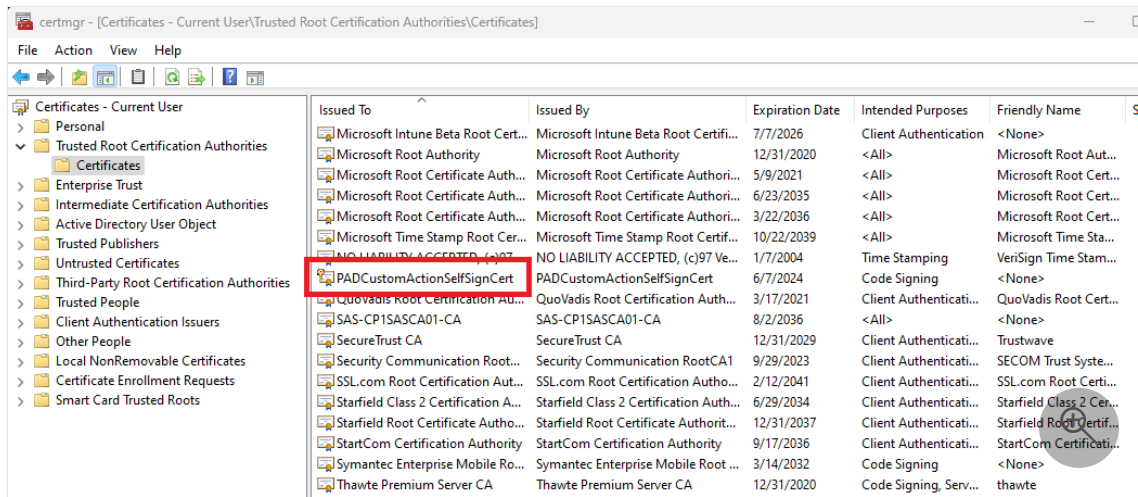
$certPFXFileName="C:\PADCustomAction\PADCustomActionCert.pfx";
$certCERFileName="C:\PADCustomAction\PADCustomActionCert.cer";
$certStoreLocation="Cert:\LocalMachine\AuthRoot";
$certname = "PADCustomActionSelfSignCert"
##Create certificate
$cert = New-SelfSignedCertificate -CertStoreLocation
Cert:\CurrentUser\My -Type CodeSigningCert -Subject "CN=$certname"
-KeyExportPolicy Exportable -KeySpec Signature -KeyLength 2048 -
KeyAlgorithm RSA -HashAlgorithm SHA256
$mypwd = ConvertTo-SecureString -String <YOUR CERT PASSWORD GOES
HERE> -Force -AsPlainText
##Export certificate
$certPFXFile = Export-PfxCertificate -Cert $cert -FilePath
$certPFXFileName -Password $mypwd
$certCERFile = Export-Certificate -Cert $cert -FilePath
$certCERFileName -Type CERT -Verbose -Force
```

b. Import the certificate into certificate store using this command.

```
PowerShell

##Import certificate
Import-Certificate -CertStoreLocation $certStoreLocation -FilePath
$certCERFile
```

c. Validate that the imported certificate appears under **Trusted Root Certification Authorities > Certificates** in Certificates Microsoft Manager Console (MMC) snap-in.



- Finalize the custom module created by signing the DLL file using a trusted certificate. Use Visual Studio's developer command prompt to use the Signtool for this activity.

PowerShell

```

Signtool sign /f "C:/PADActions/PADCustomActionCert.pfx" /p
<YOURCERTPASSWORD> /fd SHA256
"C:/PADActions/PADCustomActionEventLog/Modules.LogEvent.dll"

```

- To deploy the custom action, build the package the contents into a cabinet file (.cab) by using this PowerShell script.

PowerShell

```

.\BuildCAB.ps1 "C:/PADActions/PADCustomActionEventLog"
"C:/PADActions/PADCustomActionEventLog" PADCustomActionEventLog.cab

```

[Go to the sample script file BuildCAB.ps1](#)

- Sign the generated cabinet file using Signtool.

PowerShell

```

Signtool sign /f "C:/PADActions/PADCustomActionCert.pfx" /p
<YOURCERTPASSWORD> /fd SHA256
"C:/PADActions/PADCustomActionEventLog/PADCustomActionEventLog.cab"

```

- Go to the Power Automate custom action section to upload the custom action that you created. Provide the name, description, and cabinet file and then select **Upload**.

**Upload custom actions** ✕

**Name \***

EventLogger

**Description**

Custom action to log messages to a [file](#)

**Select file \***

You can upload a cab file under 30 MB.

PADCustomActionEventL... **Browse file**

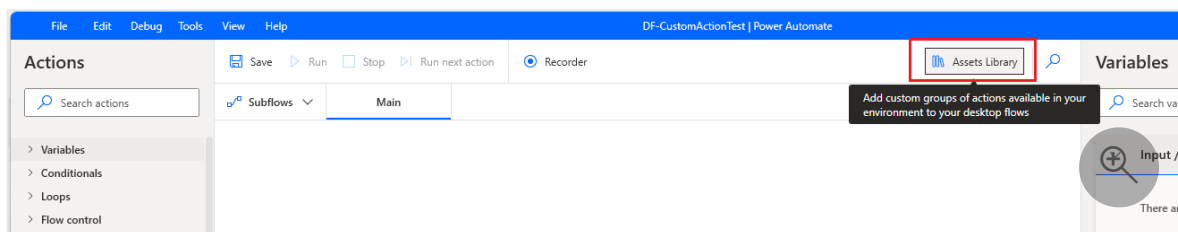
You receive a notification when the action is successfully uploaded.

Following these steps, the custom action module is packaged into a cabinet file and signed with a trusted certificate. Additionally, the custom action cabinet file is uploaded to the custom action library in Power Automate.

More information: [Upload custom actions](#)

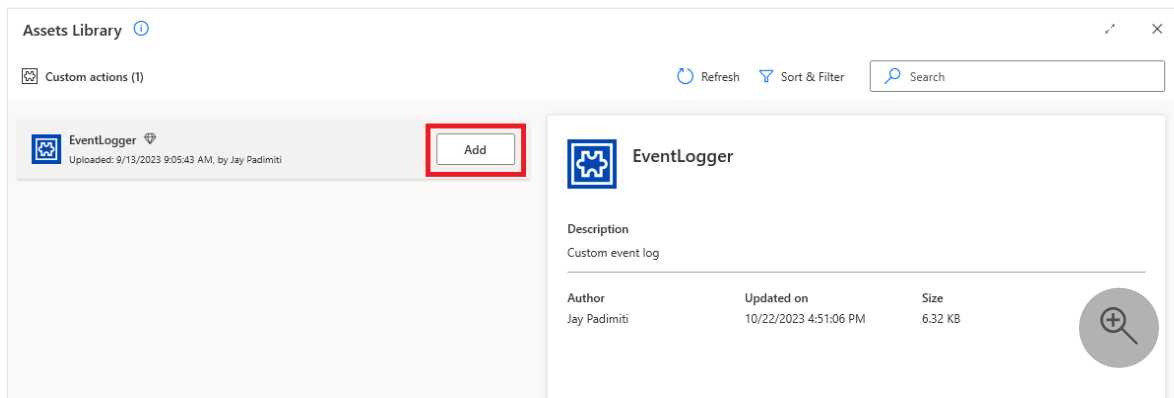
## Use your custom action activity in desktop flow using Power Automate for desktop

1. Create a new desktop flow, and then select the **Assets Library** in the designer.

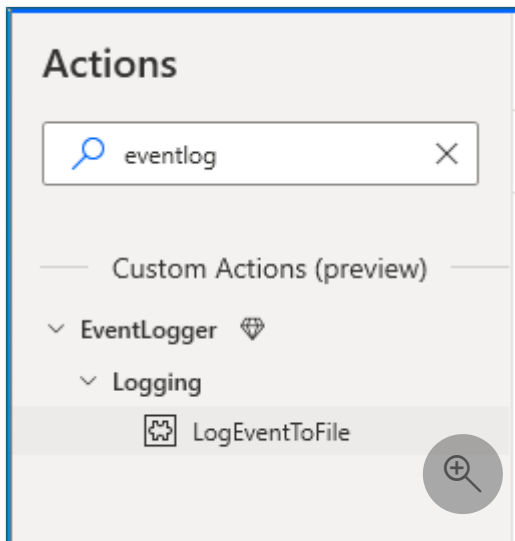


2. Inspect the custom action available in the assets library. Notice the action previously created and uploaded to the custom actions section of Power Automate.

Select **Add** to add this custom action to the **Actions** section of the designer.

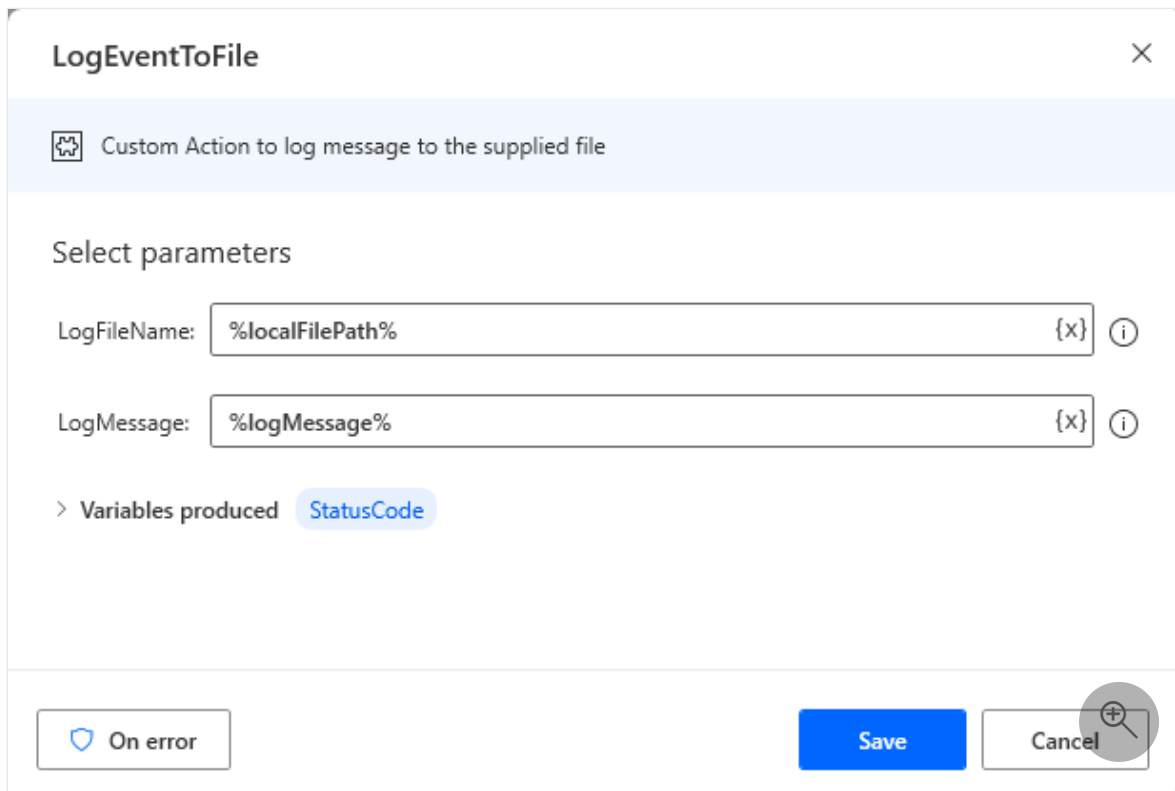


3. Validate that the custom action is added successfully. Search for it on the **Actions** search bar in Power Automate for desktop's designer.

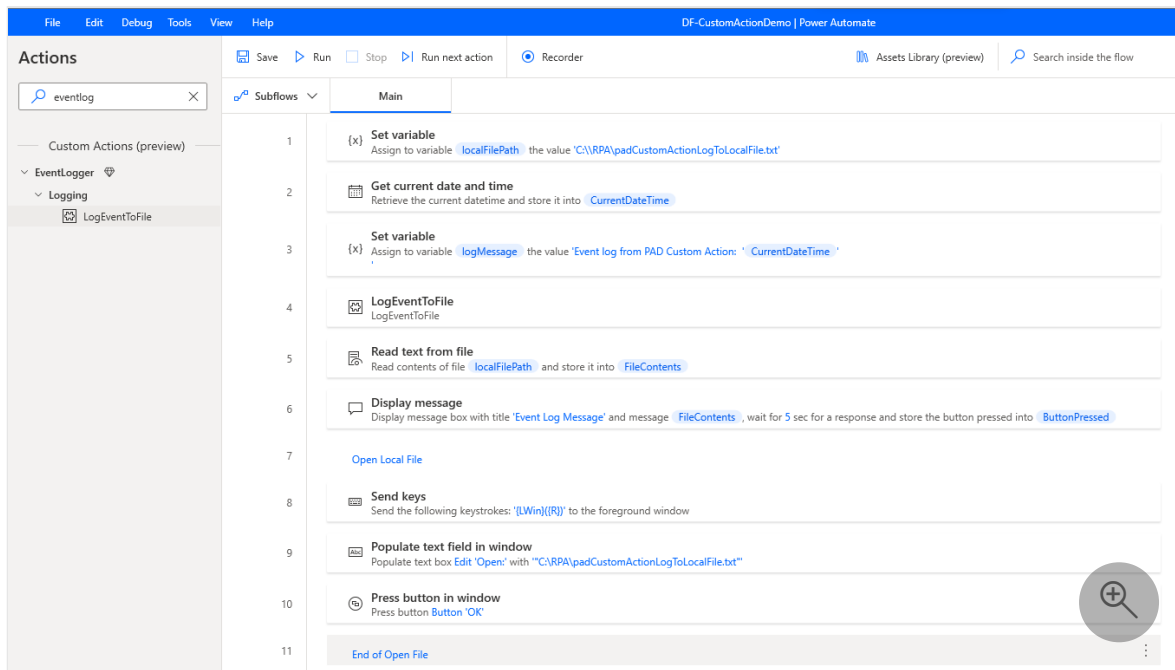


4. Drag the custom action or double-click it to add to the desktop flow.

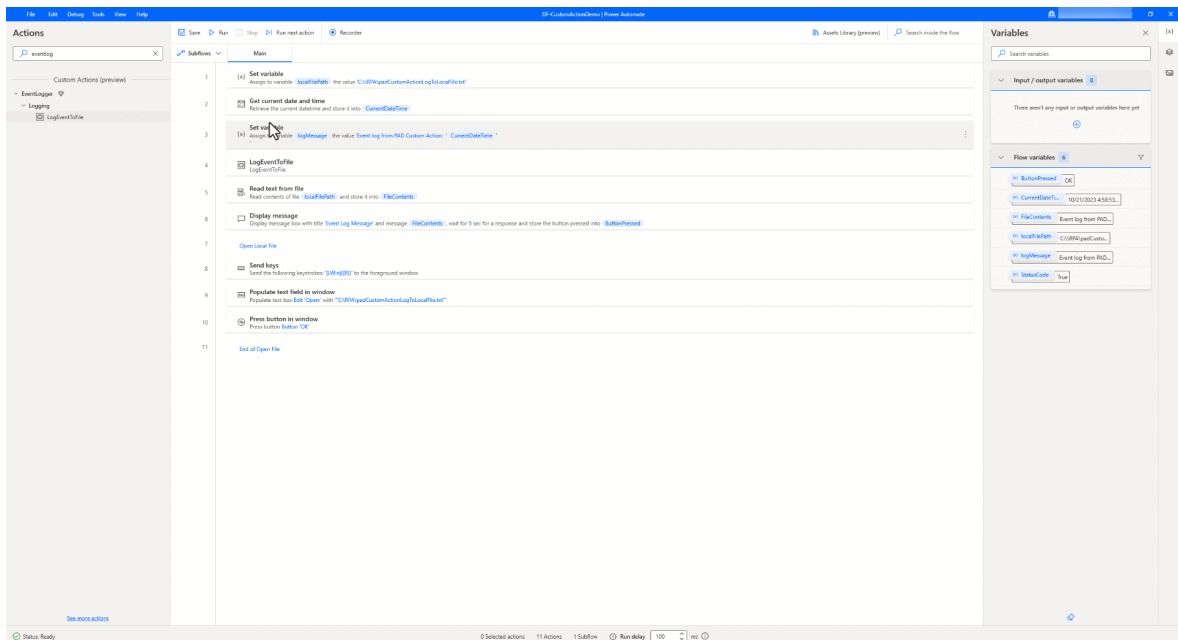
5. Provide the input parameters and additional steps to test the custom action.



Sample desktop flow using the custom action.



6. Test the flow to see the custom action working in real time.



### ! Note

Import the certificate used to sign the cabinet file to the machine used to build desktop flows with custom actions and to each of the runtime machines that will run the desktop flows.

Following these steps, a custom action was created, the module packaged into a cabinet file, signed with a trusted certificate, uploaded to the custom action library in Power Automate, a desktop flow to use the custom action created and tested for a successful run.

## Update and redeploy the custom action

Update the functionality of the custom action to reflect the updated capability by following these steps.

1. Update the class file in Visual Studio solution with new action functionality. More information: [Updated .NET Module solution](#)

Modified the signature of the class file to take in a third input parameter as shown.

```
C#  
  
using System;  
using System.IO;  
using Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK;  
using  
Microsoft.PowerPlatform.PowerAutomate.Desktop.Actions.SDK.Attributes;
```

```

namespace ModulesLogEvent
{
    [Action(Id = "LogEventToFile" , Order = 1, Category = "Logging")]
    [Throws("LogEventError")]
    public class LogEventToFile : ActionBase
    {
        [InputArgument]
        public string LogFileName { get; set; }

        [InputArgument]
        public string LogMessage { get; set; }

        [InputArgument]
        public string LogLevel { get; set; }

        [OutputArgument]
        public bool StatusCode { get; set; }

        public override void Execute(ActionContext context)
        {
            try
            {
                // To append all of the text to the file
                File.AppendAllText(LogFileName, LogLevel + ": " +
LogMessage);
                StatusCode = true;
            }
            catch (Exception e)
            {
                if (e is ActionException) throw;

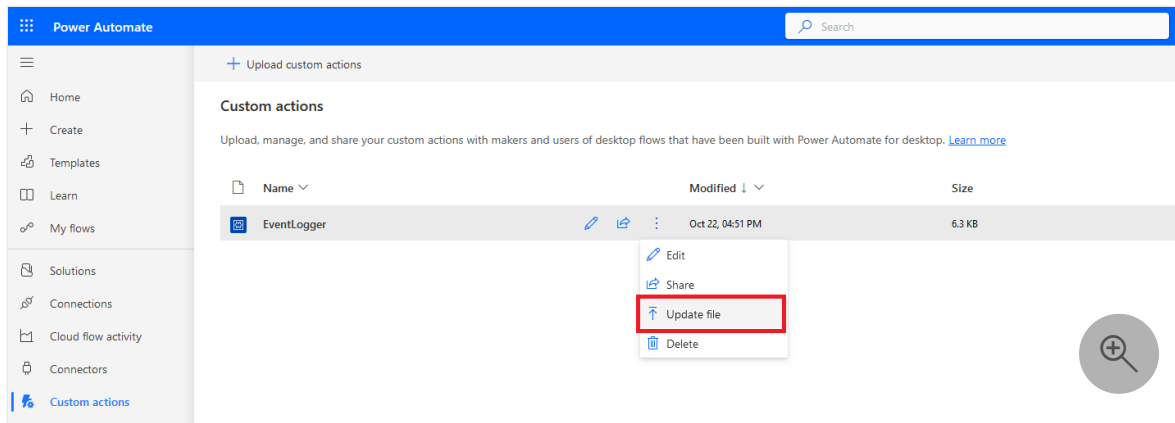
                throw new ActionException("LogEventError", e.Message,
e.InnerException);
            }
        }
    }
}

```

2. Use similar steps described earlier where you sign the DLL file, create the cabinet file, sign the cabinet file, and upload the cabinet file to custom actions section in Power Automate. More information: [Build the package and deploy your custom action](#)

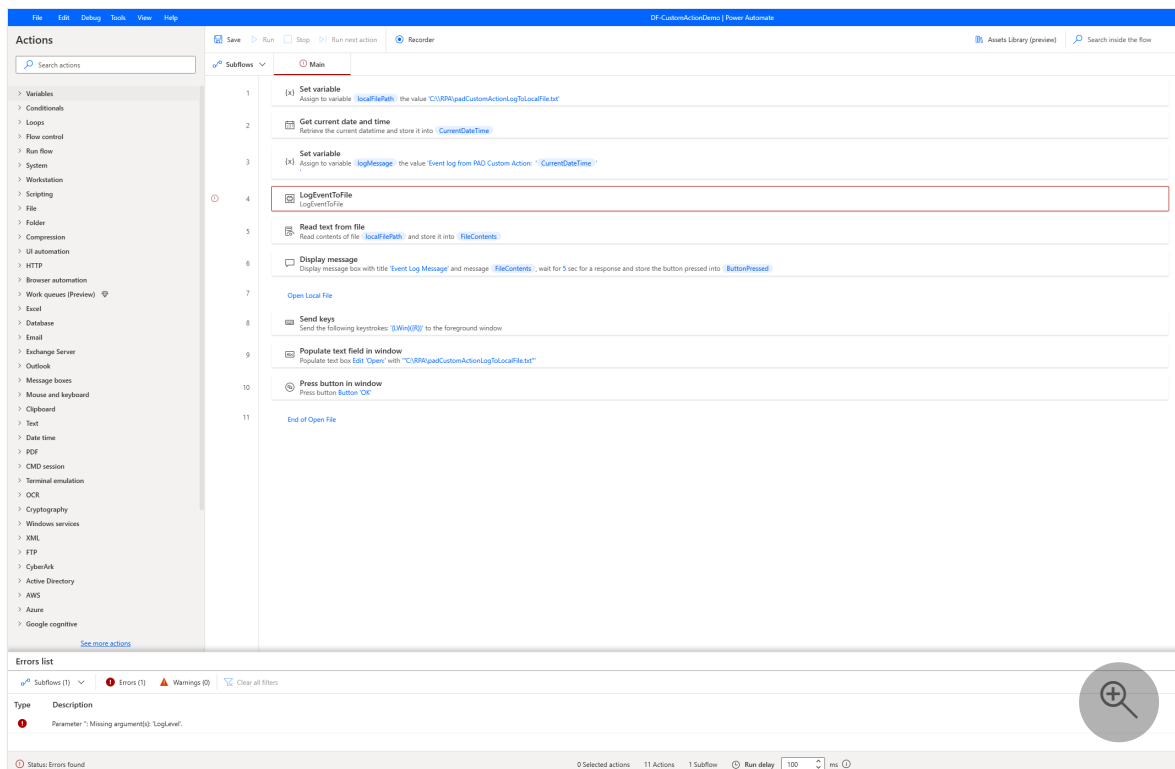
#### ⓘ Note

Before uploading the updated custom action cabinet file, make sure to analyze the impact of this change as desktop flows with this action will be updated with new capabilities.

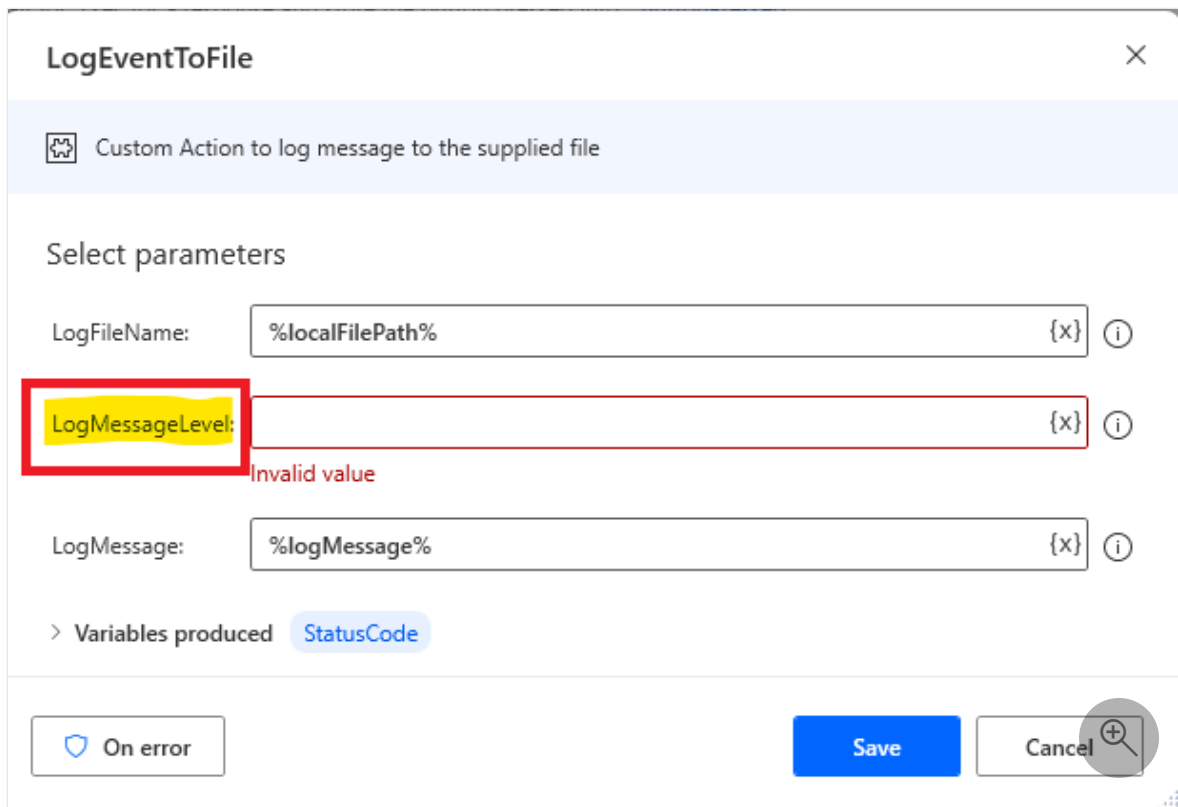


### 3. Update the desktop flow as required.

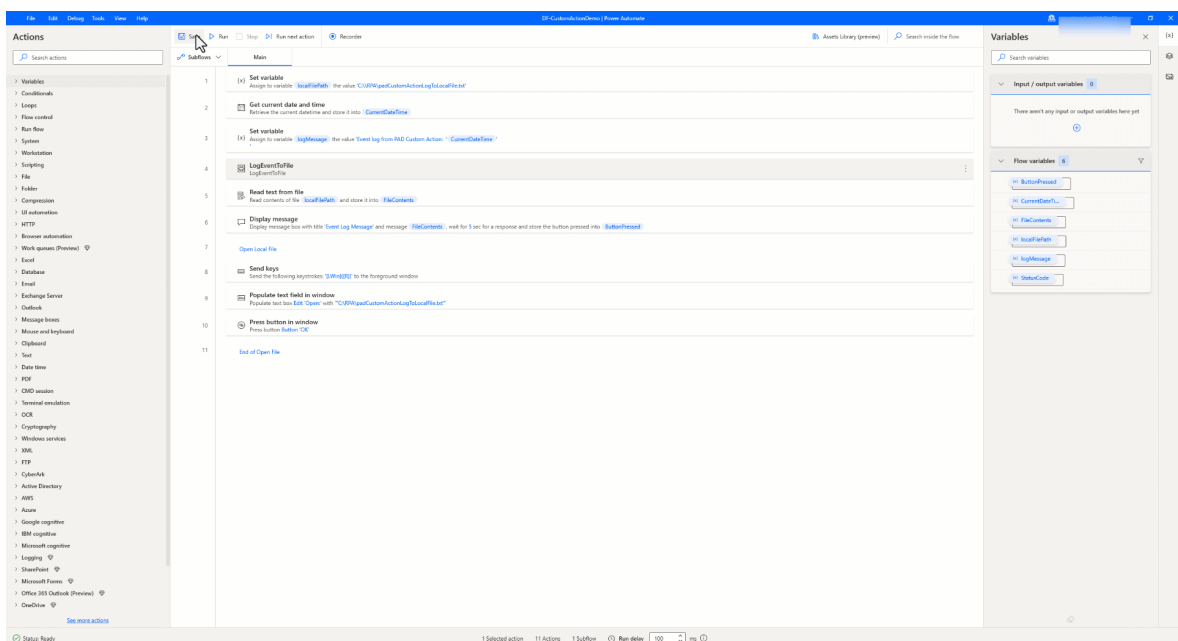
To validate the update capability, we added a third input parameter to the custom action. Notice that custom action activity is marked as Error in the designer, and it needs to be updated with new input parameter.







4. Test the flow to see the updated custom action working in real time.



In this section, you updated the underlying functionality of the custom action, built the package, deployed to Power Automate, refactored the desktop flow, and validated the functionality by running the desktop flow with updated capabilities of the custom action in Power Automate for desktop.

# UI elements collections in desktop flows (preview)

Article • 04/29/2024

[This topic is prerelease documentation and is subject to change.]

UI elements collections developed by organization users and published to the respective environments can be included in desktop flows.

In Power Automate for desktop, UI elements are elements that are grabbed and captured from the various user interfaces (either desktop applications or web pages). These elements can be text fields, buttons, links, or anything else that you can interact with in the target applications.

After these elements are captured, they can be associated with the respective UI or web automation actions, so that the corresponding interaction with the said elements can be automated in the context of desktop flows.

Previously, UI elements were only available separately to each desktop flow. This means that they needed to be captured individually in the context of each desktop flow built, even if the elements happened to be exactly the same among multiple desktop flows. To avoid this, UI elements collections now offer makers and admins the ability to have control and central management over 'groups' of UI elements, which can be shared across multiple users and imported in multiple desktop flows as reusable components. In this way, in case of an application update for instance, the UI elements collection only needs a one-time adjustment - all desktop flows referencing this collection in the same environment should then reflect that change automatically.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

UI elements collections exist at the environment level. As a best practice, use a "dev—test—prod" model when deploying UI elements collections.

## Prerequisites

- Power Automate for desktop 2.43 or later.
- This feature requires an environment where the [Power Automate v2 schema](#) is enabled. In v1 schema environments, UI elements collections aren't available.
- An Attended RPA license is required to include and use UI elements collections in desktop flows, given that access to the flow designer of Power Automate for desktop is needed.

## Known limitations

- Upload date might differ in the portal than what is shown in the Assets library inside Power Automate for desktop.

## Next steps

[Create and publish UI elements collections](#)

## Related information

- [Assets library](#)
- [Manage UI elements collections](#)
- [Use and update UI elements collections](#)

---

## Feedback

Was this page helpful?

Yes

No

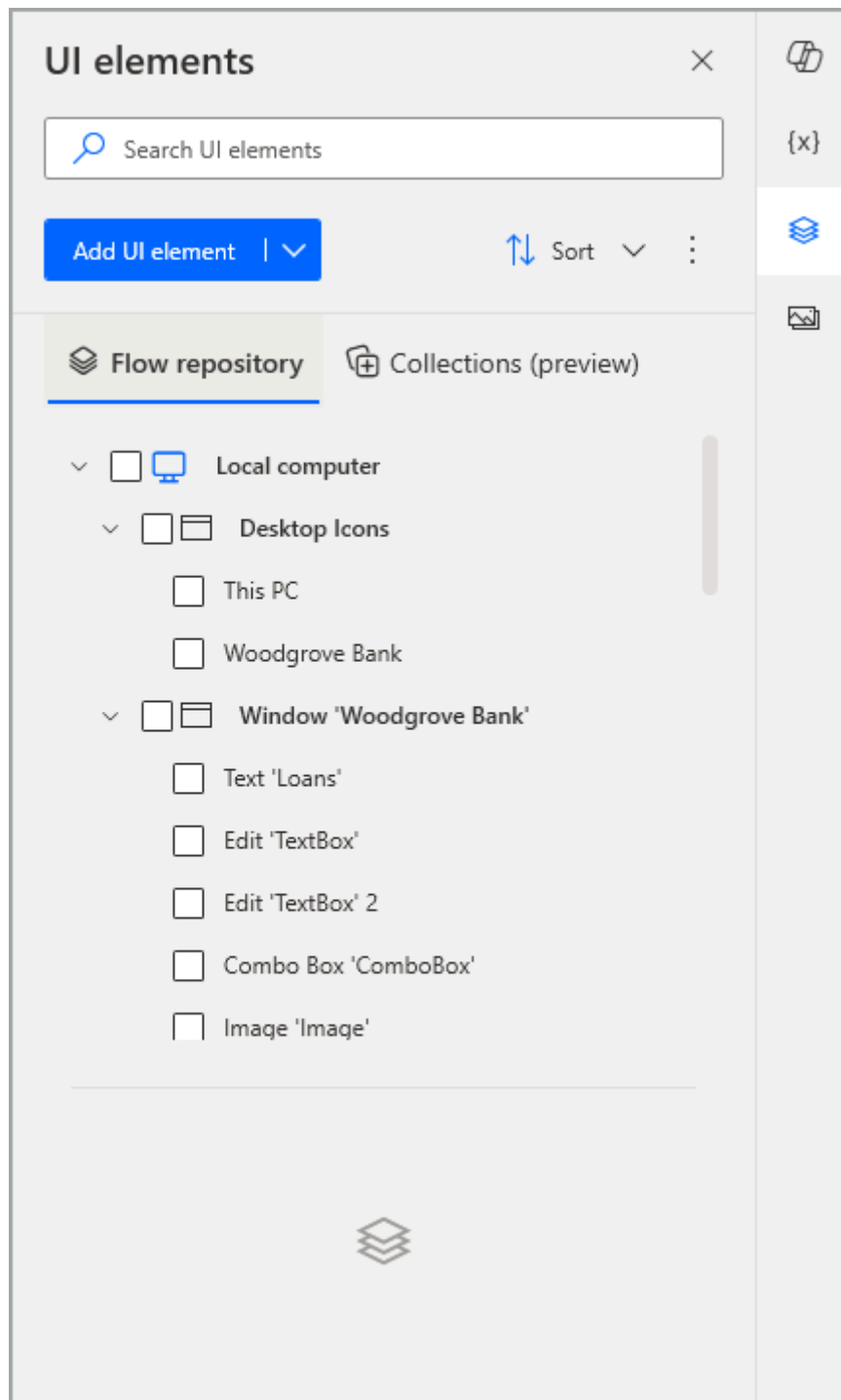
[Provide product feedback](#) 

# Create and publish UI elements collections in desktop flows (preview)

Article • 04/26/2024

[This topic is prerelease documentation and is subject to change.]

Creating and publishing a UI elements collection is possible through the flow designer of any desktop flow, existing or new. In the UI elements pane, there are now two different tabs available, **Flow repository** and **Collections (preview)**.



### 📘 Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

The **Flow repository** tab contains all the UI elements that are available only to that particular desktop flow. Desktop flows created using version 2.42 or earlier, which include UI elements, show these elements within the Flow repository tab after upgrading to version 2.43 or higher, if these flows are part of a schema v2 environment.

### ⚠️ Note

The UI elements collections is a premium feature, available only to organization premium or trial users. Users with a work or school account or a free Microsoft account do not have access to UI elements collections.

To create a new collection of UI elements, the UI elements need to be captured first in the desktop flow, added by default under the Flow repository tab. The tree structure here remains the same. The desktop where the elements were captured appears on top, followed by the web pages or desktop application screens containing the elements, followed by the individual UI elements themselves.

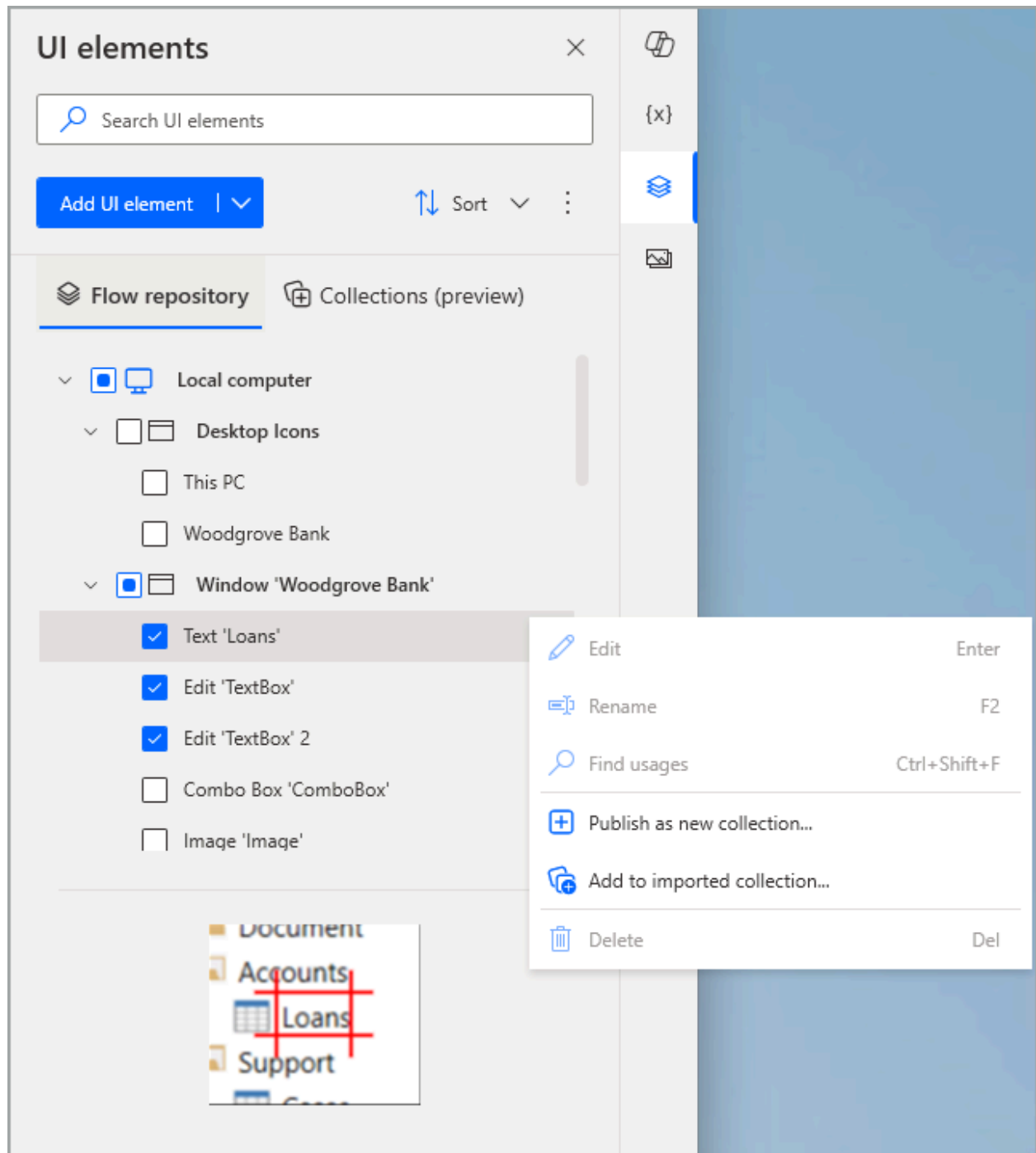
### ⚠️ Note

Any new UI element that is captured via the button **Add UI element** is automatically added under the Flow repository tab. You can't add a new UI element directly into a collection.

## Marking multiple UI elements as checked

Every item in this tree structure comes with a checkbox, which is checked when that item is selected. Selecting a desktop such as Local computer also checks all its contained screens/web pages and UI elements. Similarly, selecting a screen or web page also checks all its related UI elements. This works in the opposite way as well. Checking all the UI elements under a screen/web page also checks the latter. The same behavior applies to screens/web pages and their desktop respectively.

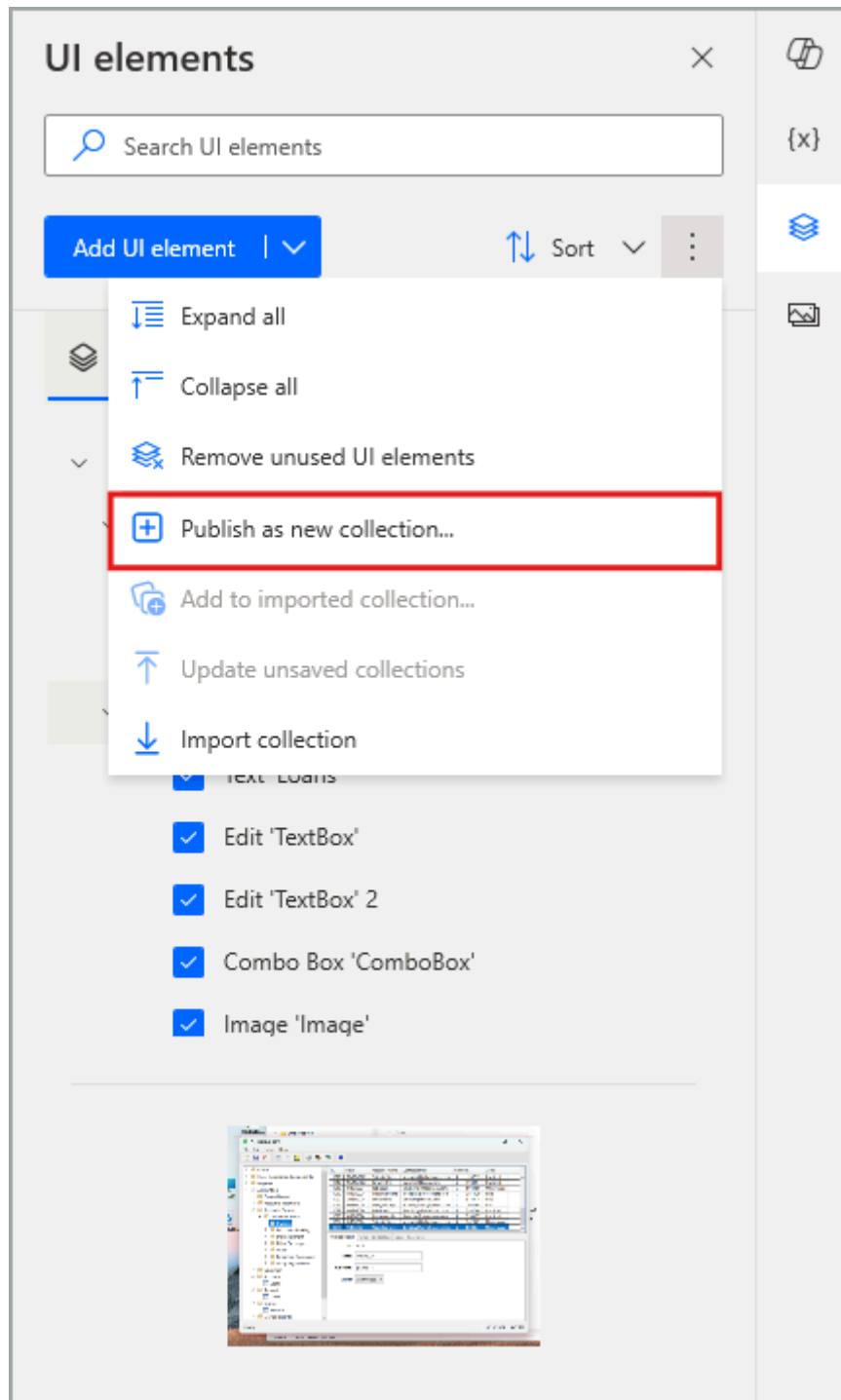
There can only be one selected (highlighted) item at a time, even if more items are checked (either automatically when these items are related to the selected one in the elements structure, or manually when multiple items are checked directly via their checkbox). In the context menu of a selected item, the options 'Edit', 'Rename', 'Find usages' and 'Delete' are individual and apply only to the selected item. However, if more, unrelated items are checked, these options are disabled to prevent any ambiguity regarding which item they target.



## Publish a new UI elements collection

After you checked the UI elements you need to include in a new collection, you can select the option **Publish as new collection**. This can be done through the main context

menu located at the upper right of the UI elements pane or by using the context menu for the currently active (highlighted) element.



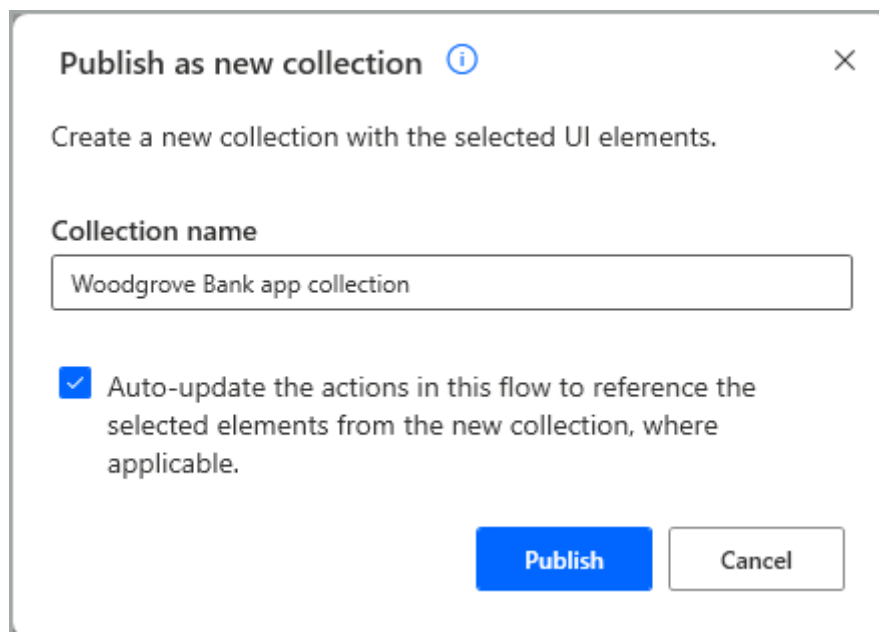
### ⓘ Note

The collection related options in the items' context menus apply to all checked UI elements and screens/web pages.

### ⓘ Important

If you check screens/web pages and UI elements that belong to different desktops at the same time, the option **Publish as new collection** is disabled. To create a new collection, all its UI elements need to be captured in the same desktop (Local computer, RDP, or Citrix).

Selecting this option opens a confirmation dialog, where you can provide a name for the new collection. If you associated any or all of the selected UI elements with UI or web automation actions in your desktop flow, you can also check the 'Auto-update' option below the collection name field. This automatically updates the related actions, ensuring they reference the newly established counterparts in the collection, rather than the UI elements previously accessible only within this flow.

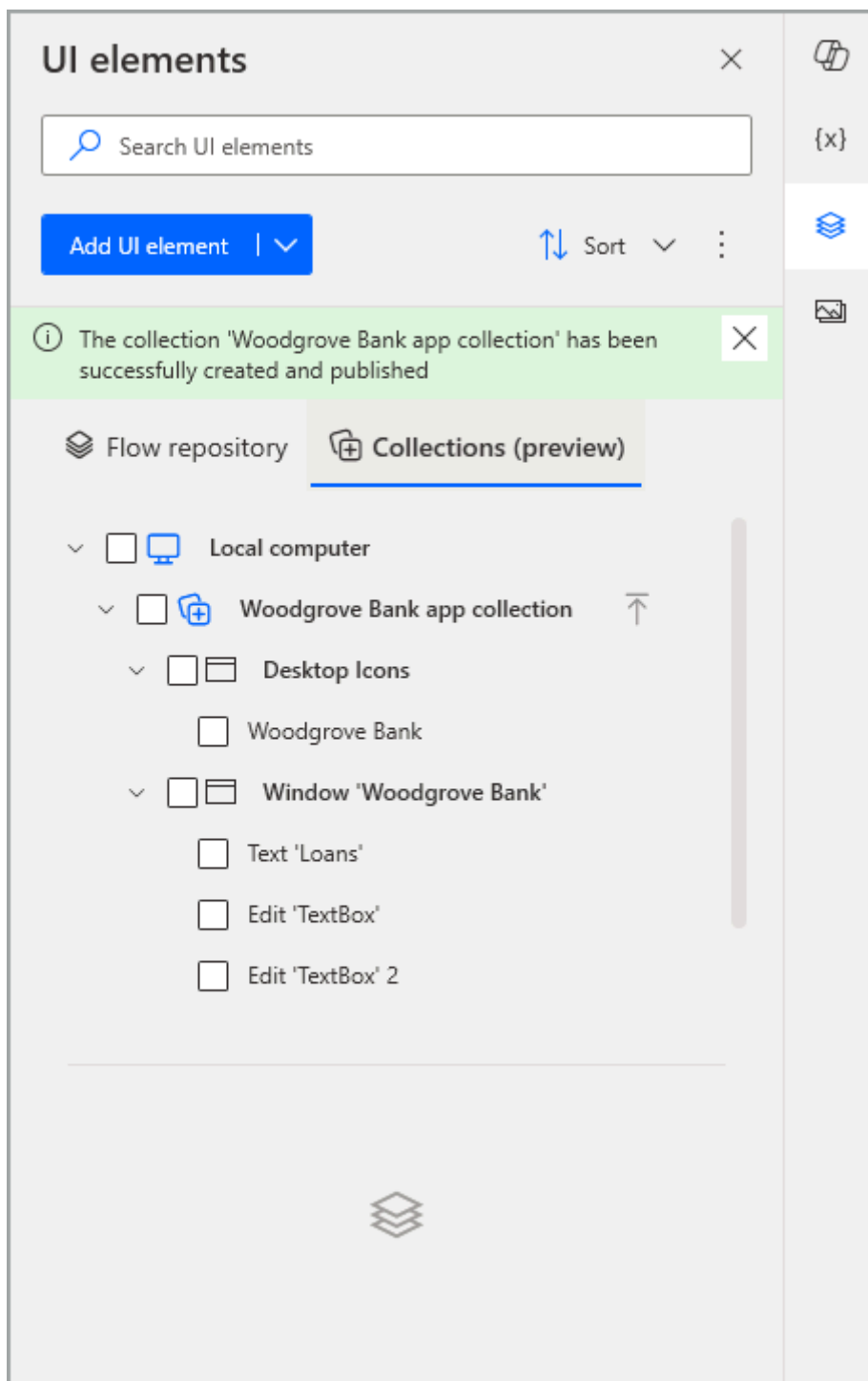


The image shows a dialog box titled "Publish as new collection" with a close button (X) in the top right corner. Below the title is a sub-header "Publish as new collection" followed by an information icon (i). The main text reads "Create a new collection with the selected UI elements." Below this is a text input field labeled "Collection name" containing the text "Woodgrove Bank app collection". Underneath the input field is a checked checkbox (blue square with a white checkmark) followed by the text "Auto-update the actions in this flow to reference the selected elements from the new collection, where applicable." At the bottom of the dialog are two buttons: a blue "Publish" button and a white "Cancel" button with a grey border.

When you select **Publish**, the flow enters a *Publishing* state, during which the collection is saved and uploaded in Dataverse to become available in the specific environment. While publishing takes place, the UI of the flow designer remains disabled.

When the collection is successfully published in this way, a corresponding success banner appears in the UI elements pane to inform you accordingly. In addition, if you look at the Collections (preview) tab, that collection is now automatically imported into this flow from which it was created. More precisely, it's imported by default into the same desktop (for instance Local computer or Remote desktop) in which the collection's UI elements were originally captured. This is done automatically for you, to avoid manually importing each new collection you create into the same flow it's generated from.





### 📌 Note

Picking some UI elements to create a new collection effectively copies (rather than moving) those elements from the context of a single flow to the collection entity, which can then be shared and reused in other flows. While the new collection now appears in the Collections tab, the flow's original UI elements are also still available in the Flow repository tab. If the latter are no longer needed and used in the current flow, you can always use the option **Remove unused UI elements** in the UI elements pane's main context menu.

### **📌 Important**

A collection can only include screens/web pages and their UI elements, not the desktop in which they were captured. This accommodates using the same collection for a target application, independently of whether it's installed in the local computer for some makers, or in a remote desktop for others. The collection would be imported under the proper desktop in each maker's separate flow.

In the Collections tab, as shown in the prior screenshot, the tree structure of the items therein now consists of four levels:

- The desktop in which the collection is imported
- The imported collection
- The screens/web pages included in the collection
- The UI elements included in the collection

### **⚠️ Note**

If needed, you can check multiple UI elements of one or more collections in the Collections tab to create and publish yet another, new collection, following the same steps that were explained earlier. In this scenario, auto-updating will still adjust any affected actions, so they reference the UI elements of the new collection instead of the existing one(s).

After you publish a new collection, the desktop flow needs to be saved to confirm the import of that collection, as this is considered an unsaved change for the flow. However, even if the flow isn't saved, the collection still remains published and available in the environment, so that it can be used in other flows.

## **Known limitations**

- When a name that is used for a new collection already exists, the collection isn't published and the checked UI elements are reset.
- When selected to create a new collection, individual screens and web pages always carry over their child UI elements with them, as the latter are automatically checked.

## **Next steps**

## Related information

- [Assets library](#)
  - [Use and update UI elements collections](#)
  - [UI elements collections](#)
- 

## Feedback

Was this page helpful?



[Provide product feedback](#) 

# Manage UI elements collections in desktop flows (preview)

Article • 07/17/2024

[This topic is prerelease documentation and is subject to change.]

After you publish a UI elements collection through the flow designer of a desktop flow, that collection is uploaded in Dataverse in the same environment where the flow exists.

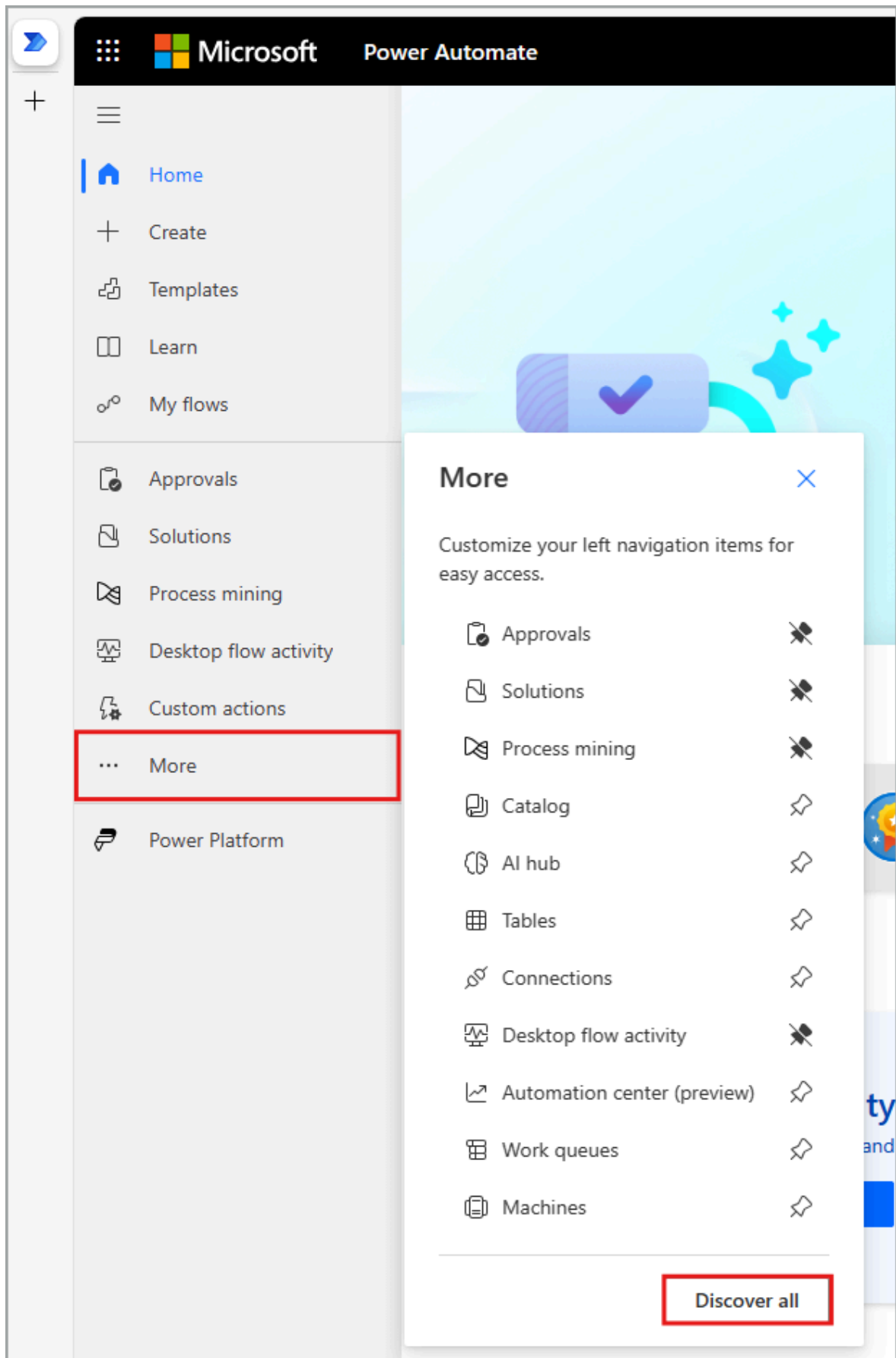
## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

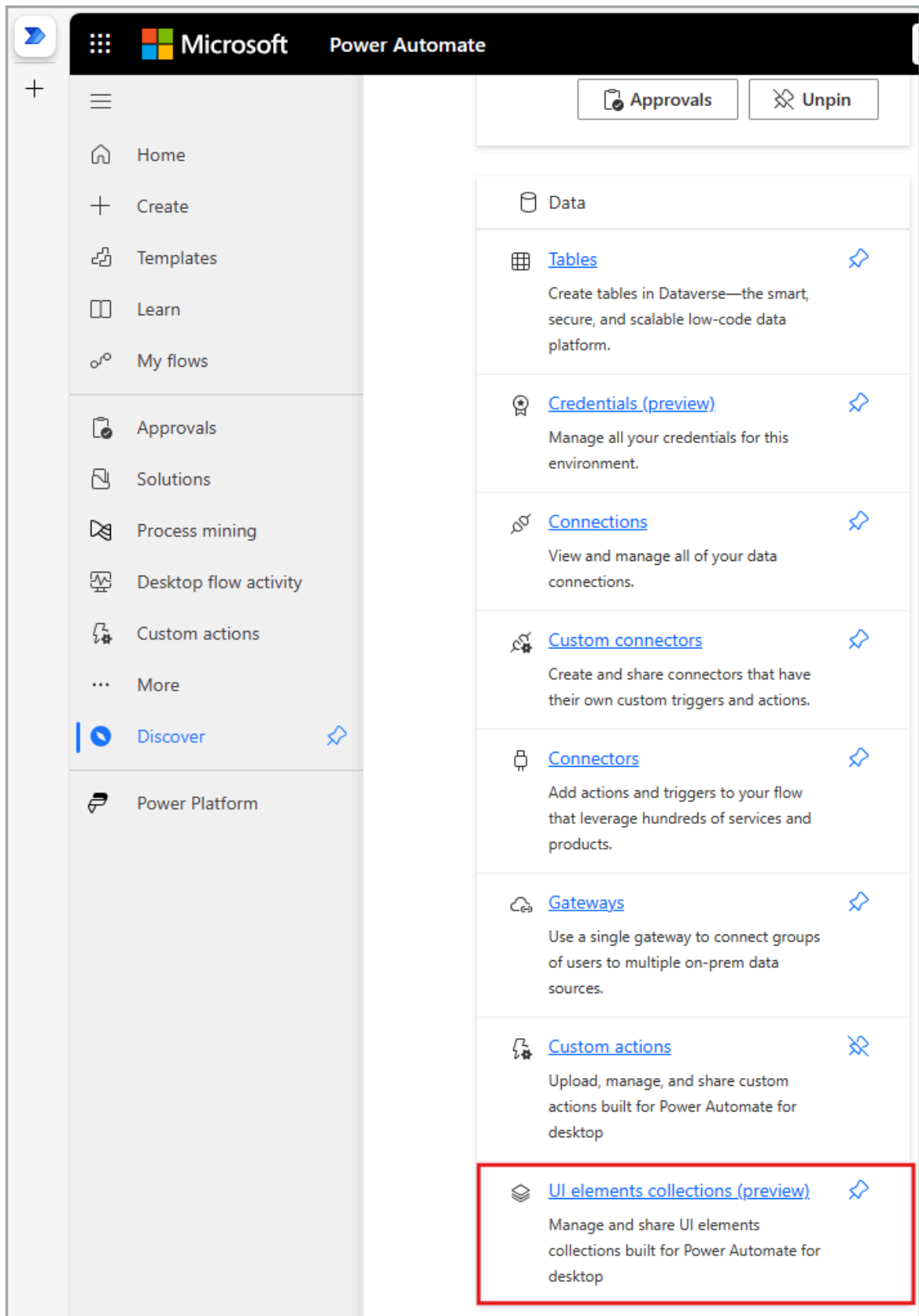
## Portal page of UI elements collections

To inspect this collection, and the list of any other collections that are available to you in this environment, you can:

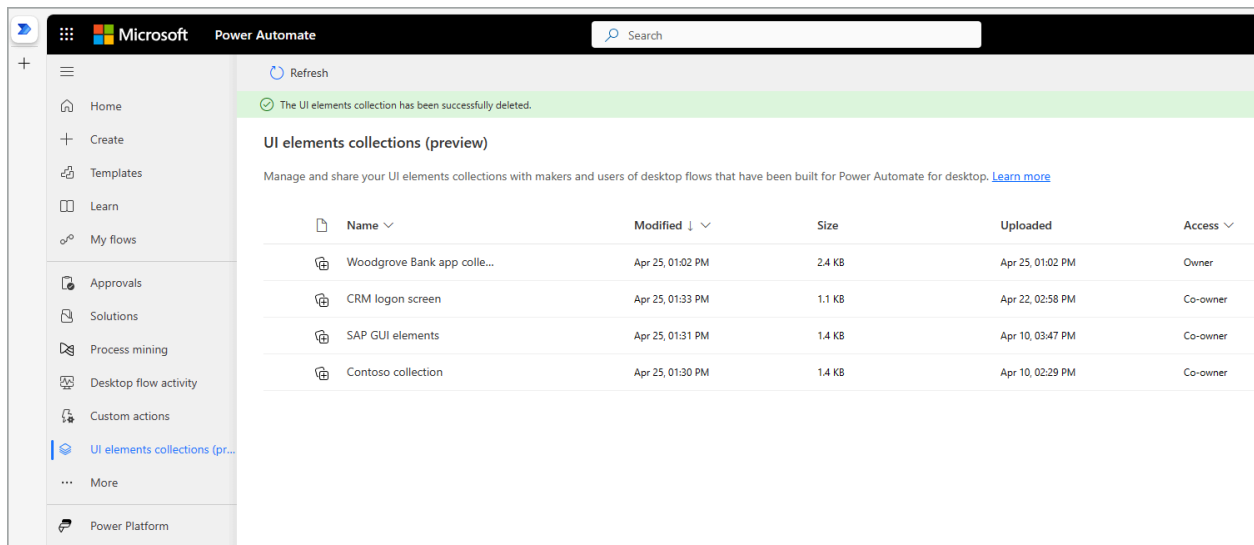
1. Go to [Power Automate](#) .
2. Select **More** in the navigation list on the left, then hit the button **Discover all**.



3. Select **UI elements collections (preview)** under **Data**. You can optionally pin this option, so that it remains visible in the left navigation pane.



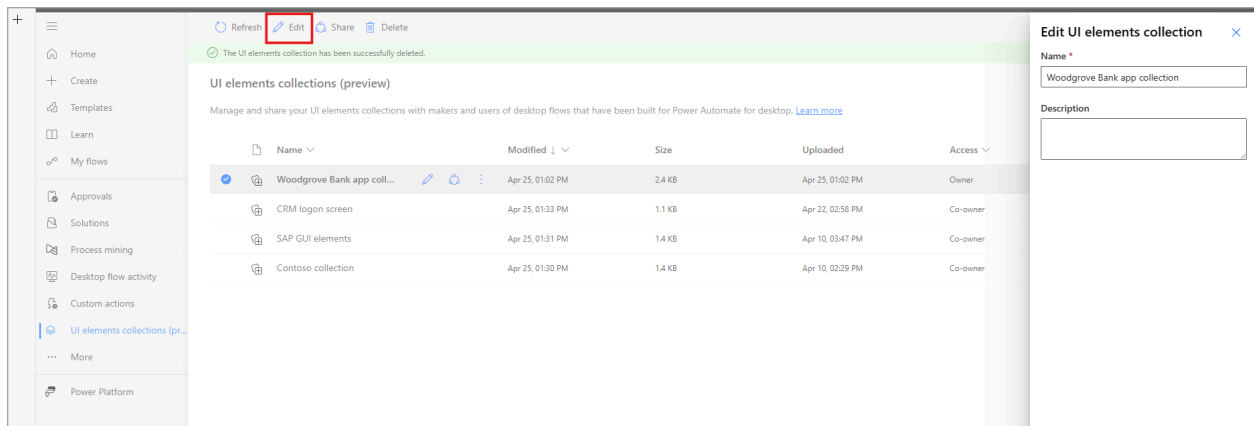
This is the page containing all the collections that are accessible to you. You can hit on the Refresh button at the top, to quickly retrieve any recent changes and update your collections list. By selecting one of the available UI elements collections, you can go into its details page.



For each collection, you can perform the following actions.

## Edit a UI elements collection

Only owners and co-owners can edit collections. You can edit a UI elements collection, modifying its name and/or description.

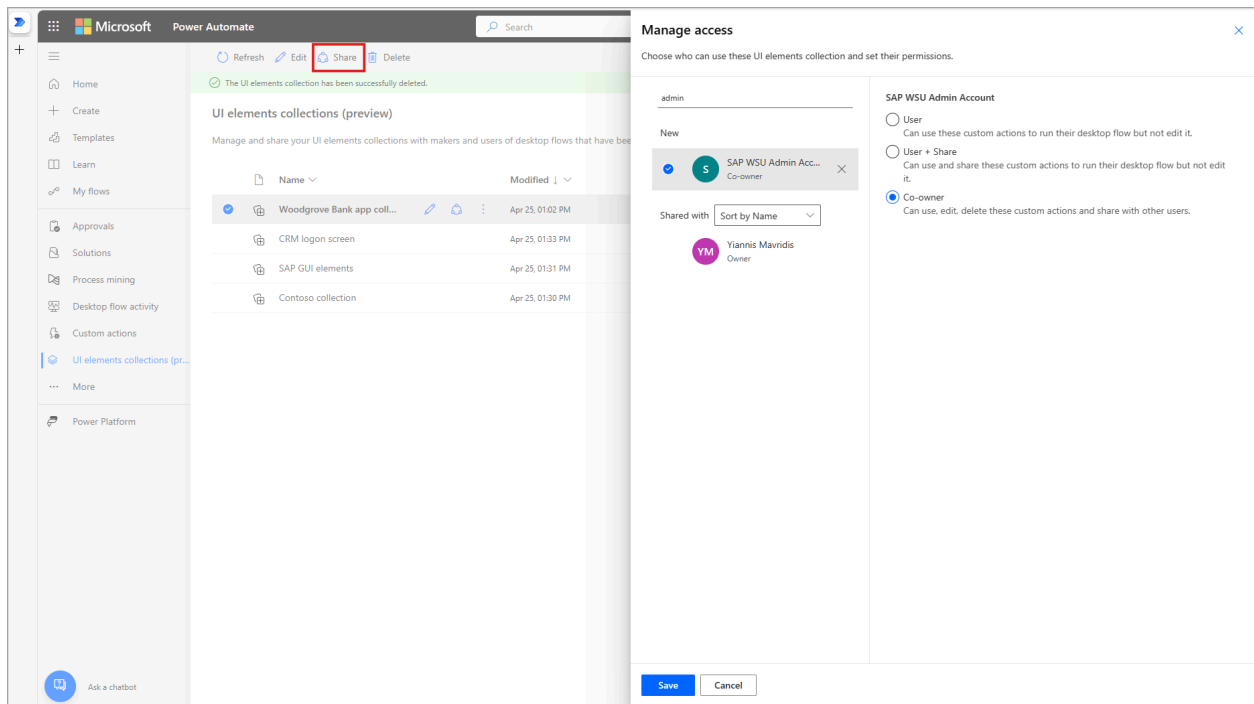


## Share a UI elements collection

You can share UI elements collections to provide access to those collections and determine the given type of access.

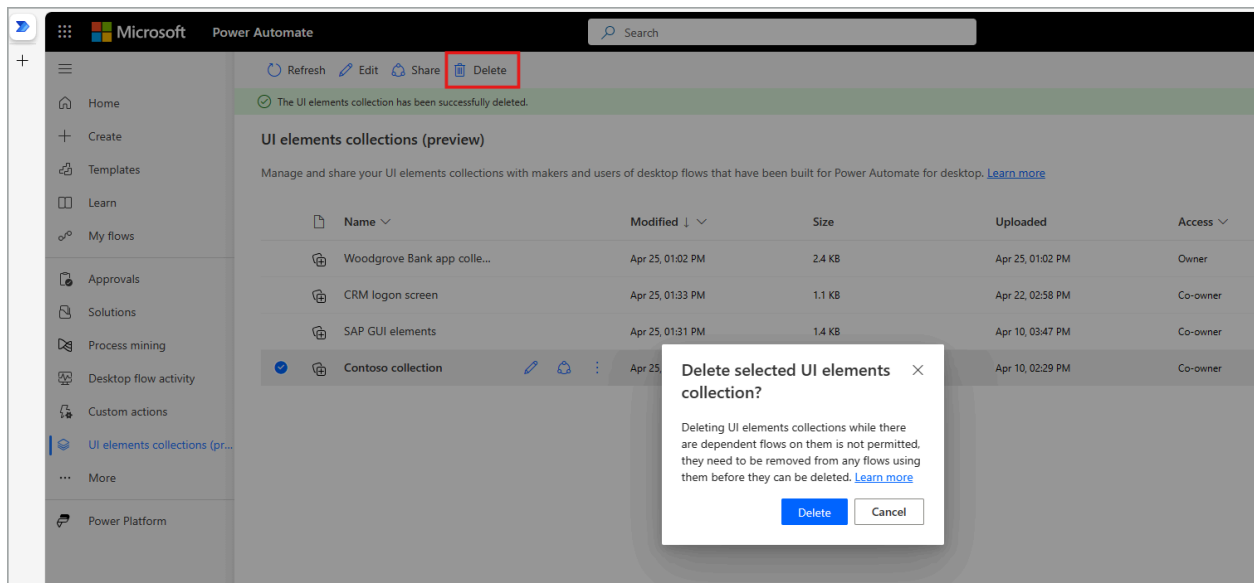
There are three types of access a maker can have regarding UI elements collections.

- **User** – can only use the respective collection in desktop flows.
- **User + Share** – can use, but also share the collection.
- **Co-owner** – can use, share, update and/or delete the collection.



## Delete a UI elements collection

Only owners and co-owners can delete collections. Deleting a collection isn't possible, if that collection is already imported and used in one or more desktop flows. You need to remove it from any flows before you can delete it.



## Create a copy of a UI elements collection

You can quickly create a copy of a collection, selecting the option **Save as**. This option allows you to create a duplicate collection, which you can also rename.

**Note**



Version 2.45 of Power Automate for desktop is required to properly import collections that have been created in this way (copied from other collections).

## Next steps

[Use and update UI elements collections](#)

## Related information

- [Assets library](#)
- [Create and publish UI elements collections](#)
- [UI elements collections](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Use and update UI elements collections (preview)

Article • 04/26/2024

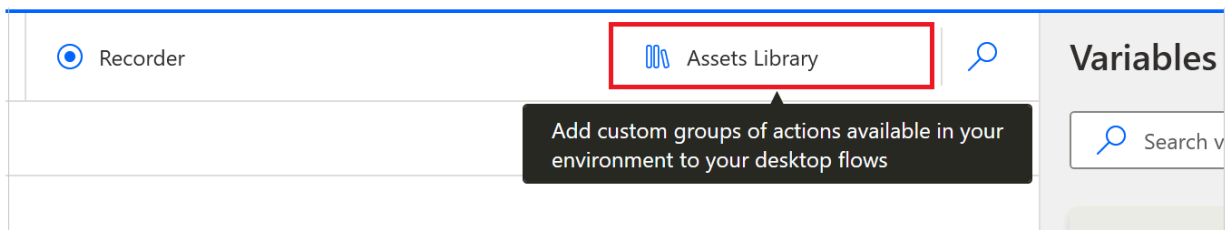
[This topic is prerelease documentation and is subject to change.]

You can include UI elements collections in desktop flows through the [Assets library](#) using Power Automate for desktop's designer.

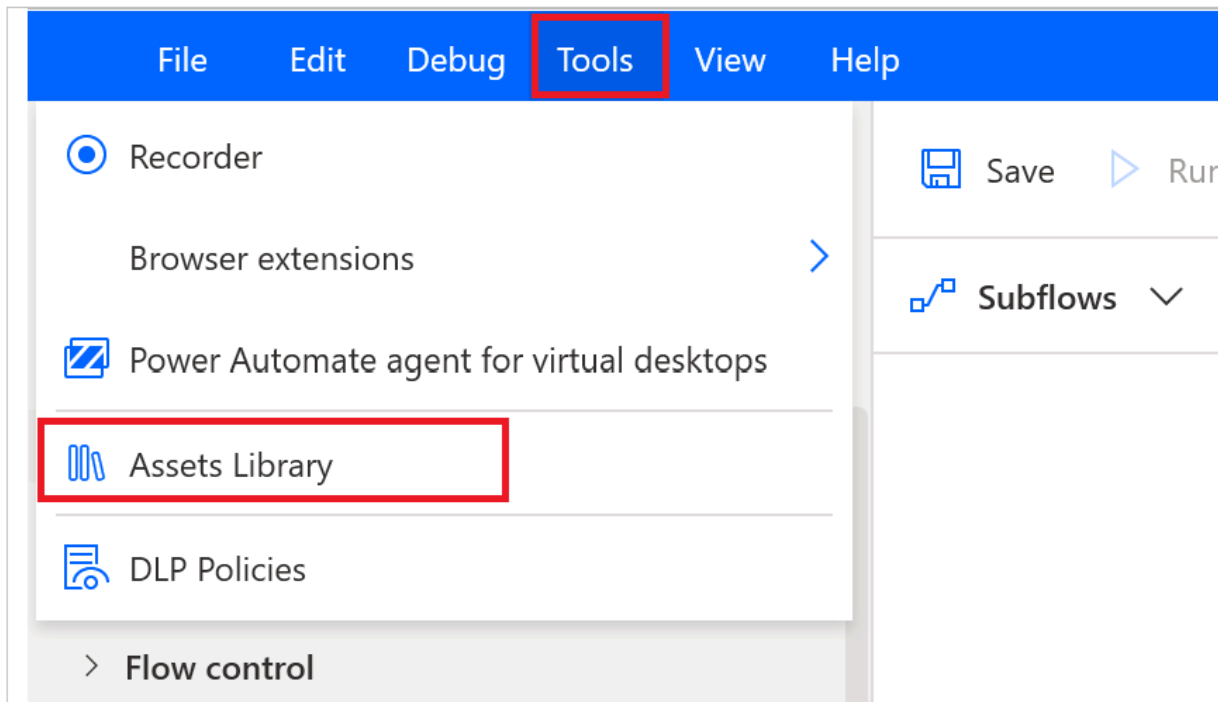
## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

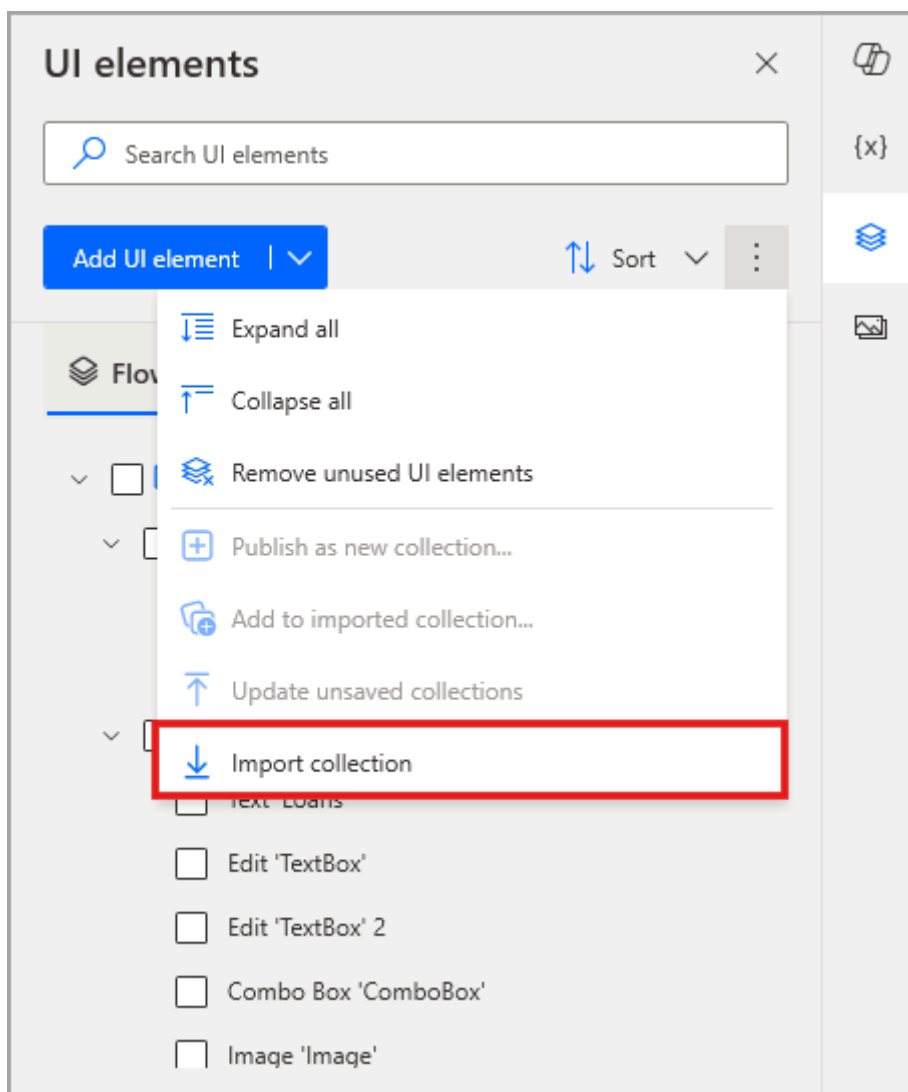
To open the Assets library, select **Assets library** in the designer.



Alternatively, use the **Tools** bar.



You can also use the option **Import collection**, found in the context menu at the top right of the UI elements pane.

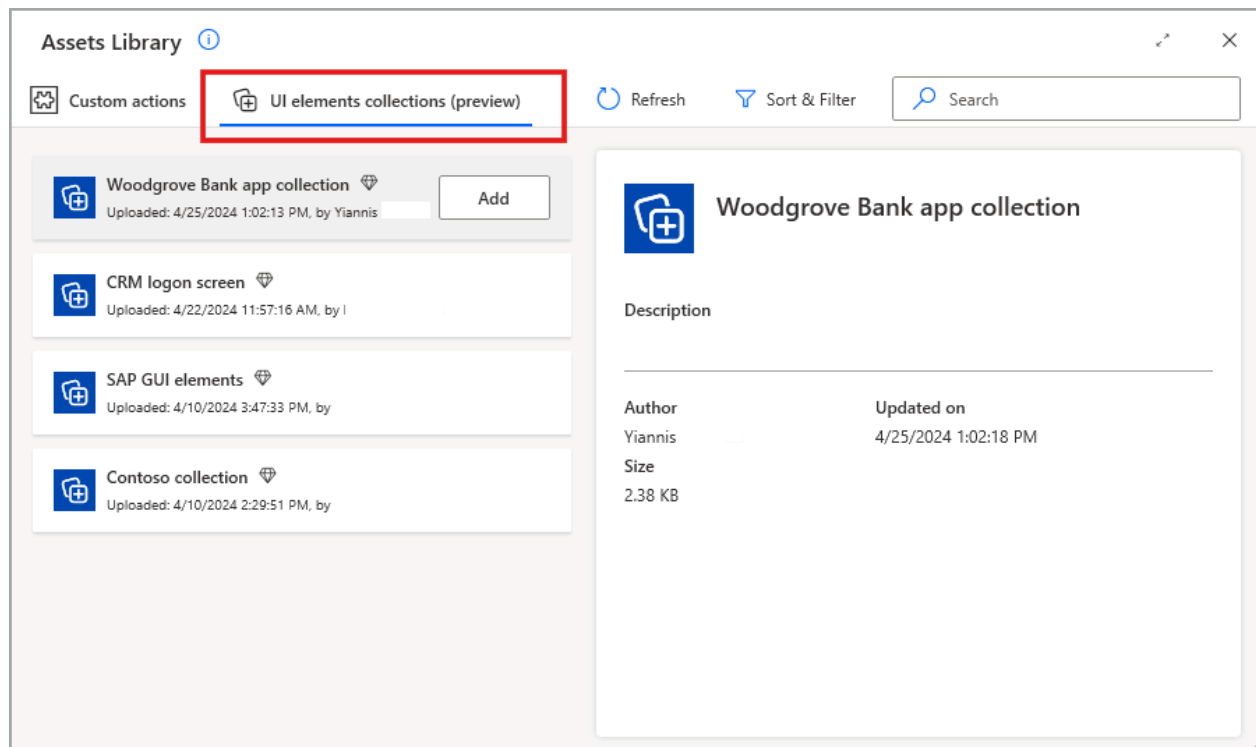


# Import collections

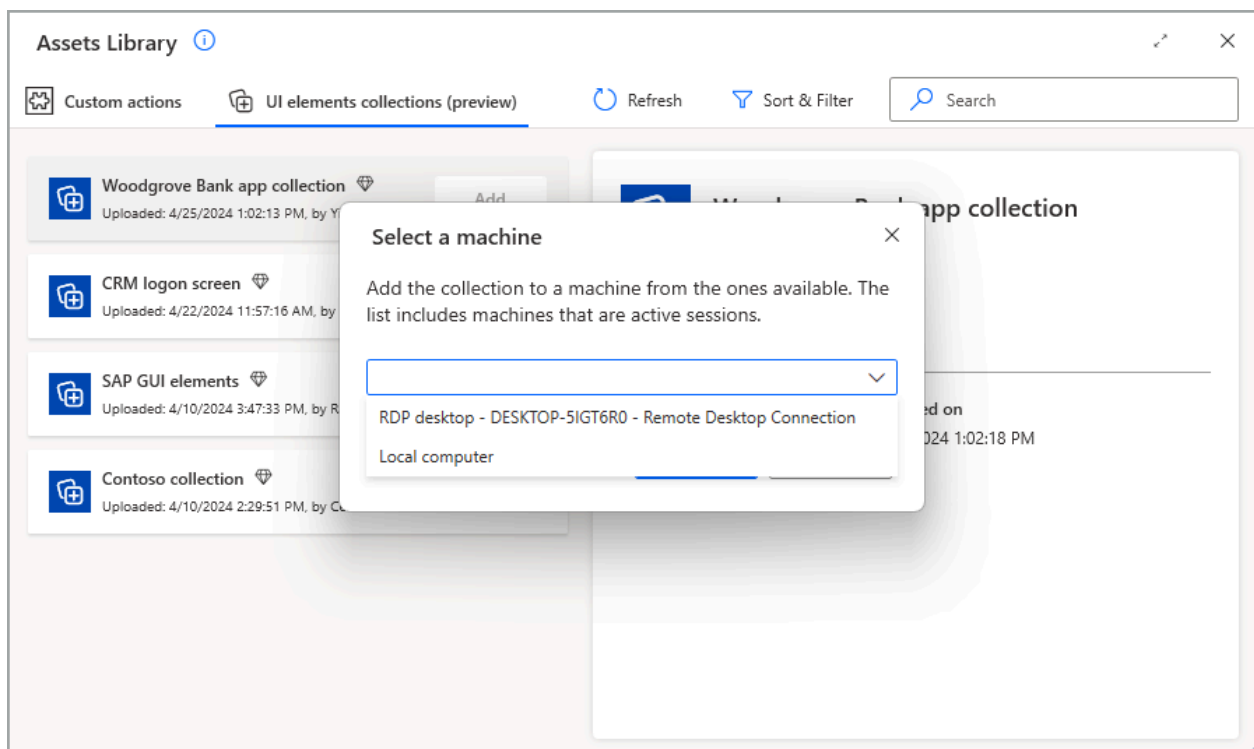
The [UI elements collections](#) tab shows you the collections that are published in the environment you select and are accessible to you.

## ⓘ Note

You can only see UI elements collections that you have created or are shared with you. The list of collections in the respective Assets library tab is identical to the list available in the portal page for each maker.



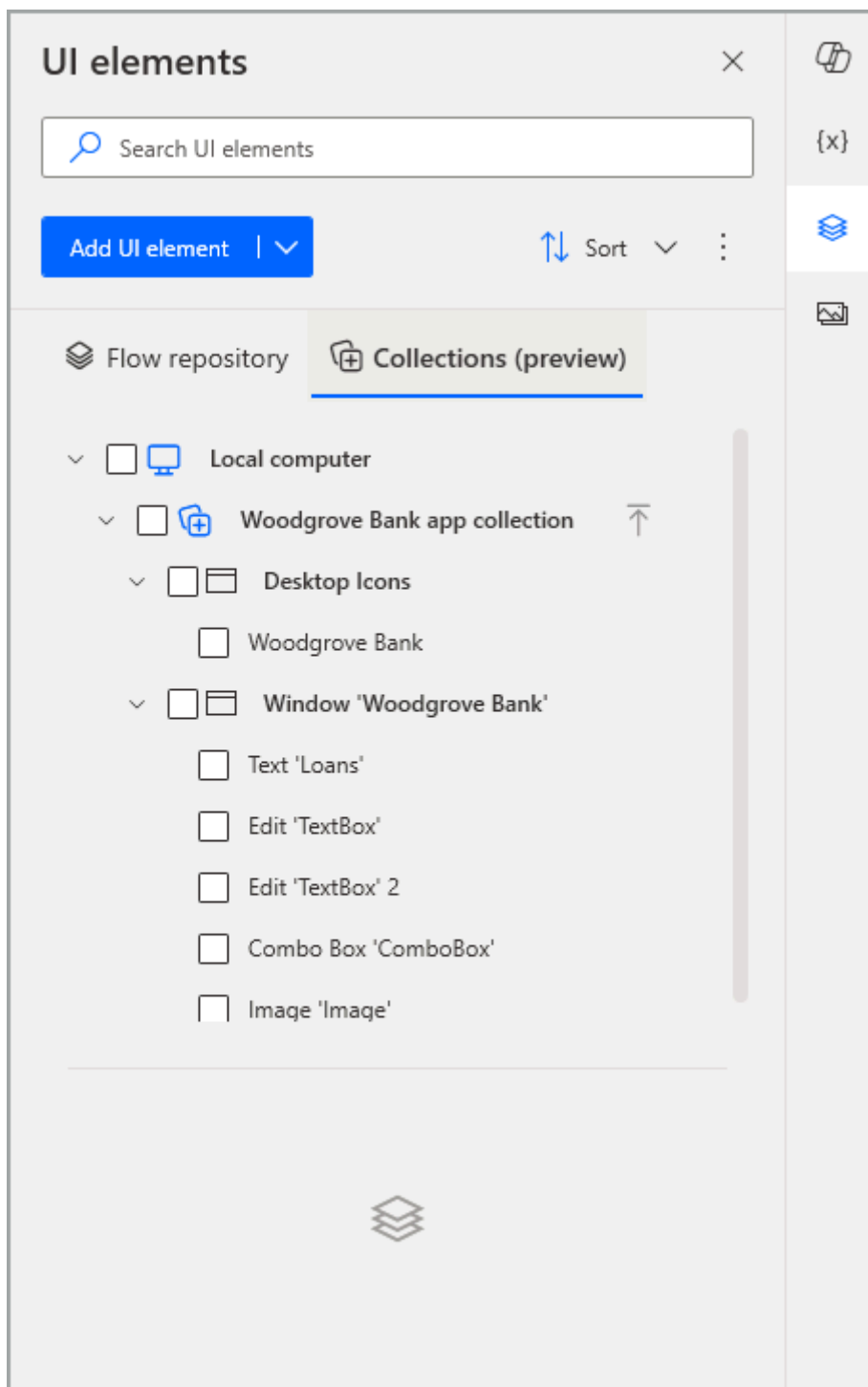
After selecting the collection you want to add to your flow, you also need to select a specific desktop under which the collection will be imported. This determines which desktop the collection's UI elements are searched when the flow runs.



### ⓘ Note

- The list of available desktops includes the local computer, the RDP and/or Citrix desktops that may have already been added in the Flow repository tab, as well as any currently active RDP and/or Citrix connections in your machine.
- Each collection can only be imported in one target desktop per flow.

After you complete the collection inclusion and close the assets library, the collection will now appear in the Collections (preview) tab of the UI elements pane, imported under the desktop that was previously selected.



## Remove collections

After being added to a flow, a collection can similarly be removed through the Assets library. All added collections are tagged accordingly, so you can select the option **Remove** that is available for those collections, to remove them from the flow. In this way, the UI elements they contain are no longer available in that flow.

### Important

Removing a collection from a flow doesn't delete the collection from the environment. Permanently deleting a collection is only available through the UI

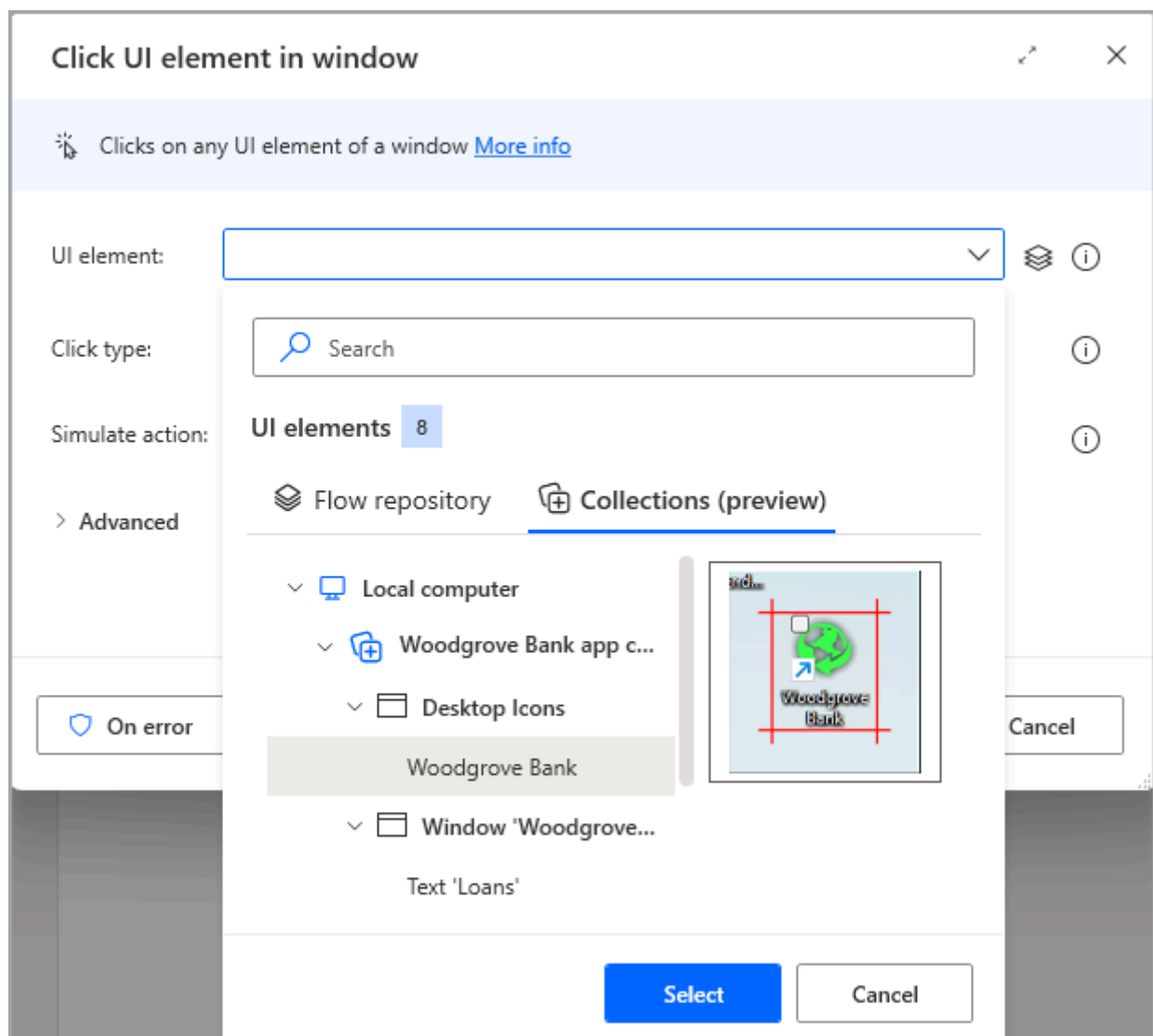
elements collections' dedicated portal page.

### ⓘ Note

If a collection is removed from a flow while any of its UI elements are already used in the flow's actions, those actions will throw an error and will need to be fixed.

## Use UI elements collections in the actions of a flow

After a collection is imported and becomes available in a desktop flow, the UI elements it contains can be used in the UI and web automation actions of that flow. In the corresponding action modals, in the field where the action's associated UI element is specified, you can now find the same two tabs of the UI elements pane, Flow repository and Collections (preview). Under the Collections (preview) tab, you can use any UI element you need that belongs to an imported collection.



# Edit a UI elements collection

After creating and publishing a collection, it can be shared with other users so that it's imported and used in multiple flows. However, the application that the collection targets may eventually undergo an update, which could lead to the need to update the CSS/UI selectors of the UI elements that belong to the said collection. Similarly, you may need to add more UI elements to an existing collection, or remove some obsolete elements that are no longer needed.

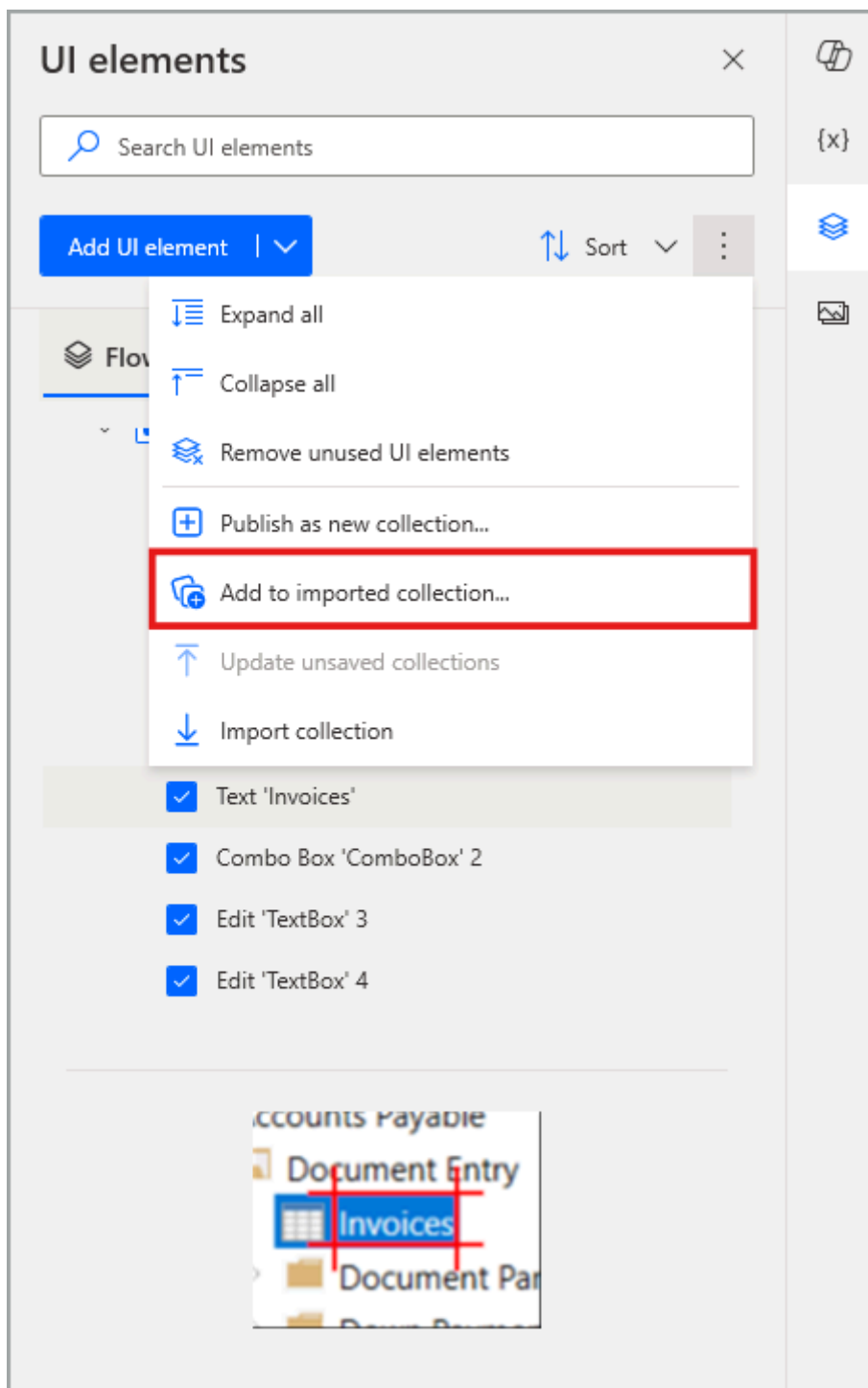
To make any required adjustments to a collection, that collection needs to be imported to a desktop flow, so that you can access the collection's contents in the flow designer. In addition, you need to be an **Owner** or have at least **Co-owner** rights on that collection to be able to modify it.

You can find below all the different ways to edit and update a collection.

## Add more UI elements to an imported collection

When you want to add new UI elements to a collection, you have to normally capture them first, if they aren't already available in the flow via the UI elements pane. You then need to mark those elements as checked through their checkbox in the tree structure, and then select the option **Add to imported collection**, either via the main context menu at the top right of the UI elements pane, or through the context menu of the currently selected (highlighted) element that should be included in the checked ones.





Selecting this option brings up a confirmation dialog, where you need to choose the target collection to which the elements should be added. The respective dropdown field lists all the eligible collections for this action, based on the following criteria:

- The target collection is already imported into this flow.
- All the checked UI elements, and the target collection, belong to the same desktop in the tree structure of the UI elements pane.

Additionally, if you associated any or all of the selected UI elements with UI or web automation actions in your desktop flow, you can check the 'Auto-update' option below the dropdown field. Doing so automatically updates the specified actions for you, so

they no longer reference the UI elements that are only 'locally' available in this flow, but rather their newly added equivalents that are part of the target collection.

**Add to imported collection** ⓘ

Add the UI elements to a collection that has been imported into this flow and under the same target computer. Note that you need to select the option 'Update collection' for these or any other changes to be published.

Woodgrove Bank app collection

Auto-update the actions in this flow to reference the selected elements from this collection, where applicable.

**Add** Cancel

### ⓘ Important

You can't add UI elements to an existing collection that is not imported in the flow you are working on. If no collection is imported or meets the required criteria previously mentioned for a certain selection of UI elements, the option **Add to imported collection** is disabled.

### ⓘ Note

You can add UI elements to an imported collection by making a selection either from the Flow repository tab or the Collections (preview) tab. In the second scenario, you can add UI elements from one collection to another, or even add duplicates to the same collection if needed.

Adding some UI elements to a collection doesn't automatically update that collection with the new changes. For more information, see [Update a UI elements collection](#).

## Edit or rename the UI elements of a collection

Editing a UI element that belongs to a collection is identical to editing any other UI element found in the Flow repository tab. In the Collections (preview) tab, select and highlight the UI element whose CSS/UI selectors you want to edit, then double click on it, press 'Enter', or select the option **Edit** in its context menu. This opens the selectors

screen for that UI element, where you can proceed to the necessary changes to the selectors, and even Repair or Test them through the corresponding options.

Similarly, you can rename a UI element belonging to a collection, by pressing 'F2' or selecting the option **Rename** in its context menu.

#### ⓘ Note

In the context menu of a selected (highlighted) item, the options 'Edit' and 'Rename' are individual and apply only to the said item. However, these options become disabled, if other unrelated items also happen to be checked, to avoid any potential confusion around the item they target.

Editing or renaming UI elements in a collection doesn't automatically update that collection with the new changes. For more information, see [Update a UI elements collection](#).

## Delete UI elements from a collection

Deleting a UI element that belongs to a collection is identical to deleting any other UI element found in the Flow repository tab. In the Collections (preview) tab, select and highlight the UI element you want to delete, then press 'Delete' or select the option **Delete** in its context menu. This brings up the respective confirmation dialog to permanently delete that UI element.

#### ⓘ Important

The option **Remove unused UI elements** in the main context menu at the top right of the UI elements pane is disabled, when you navigate to the Collections (preview) tab. This option is only available in the Flow repository tab. This behavior is meant to protect you from the unintentional deletion of a collection's UI elements; there can be elements that are unused in your current flow, which may still be used in other flows where the same collection is referenced.

#### ⓘ Note

In the context menu of a selected (highlighted) item, the option 'Delete' is individual and applies only to the said item. However, this option becomes

disabled, if other unrelated items also happen to be checked, to avoid any potential confusion around the item it targets.

Deleting UI elements from a collection doesn't automatically update that collection with the new changes. For more information, see [Update a UI elements collection](#).

## Rename a UI elements collection

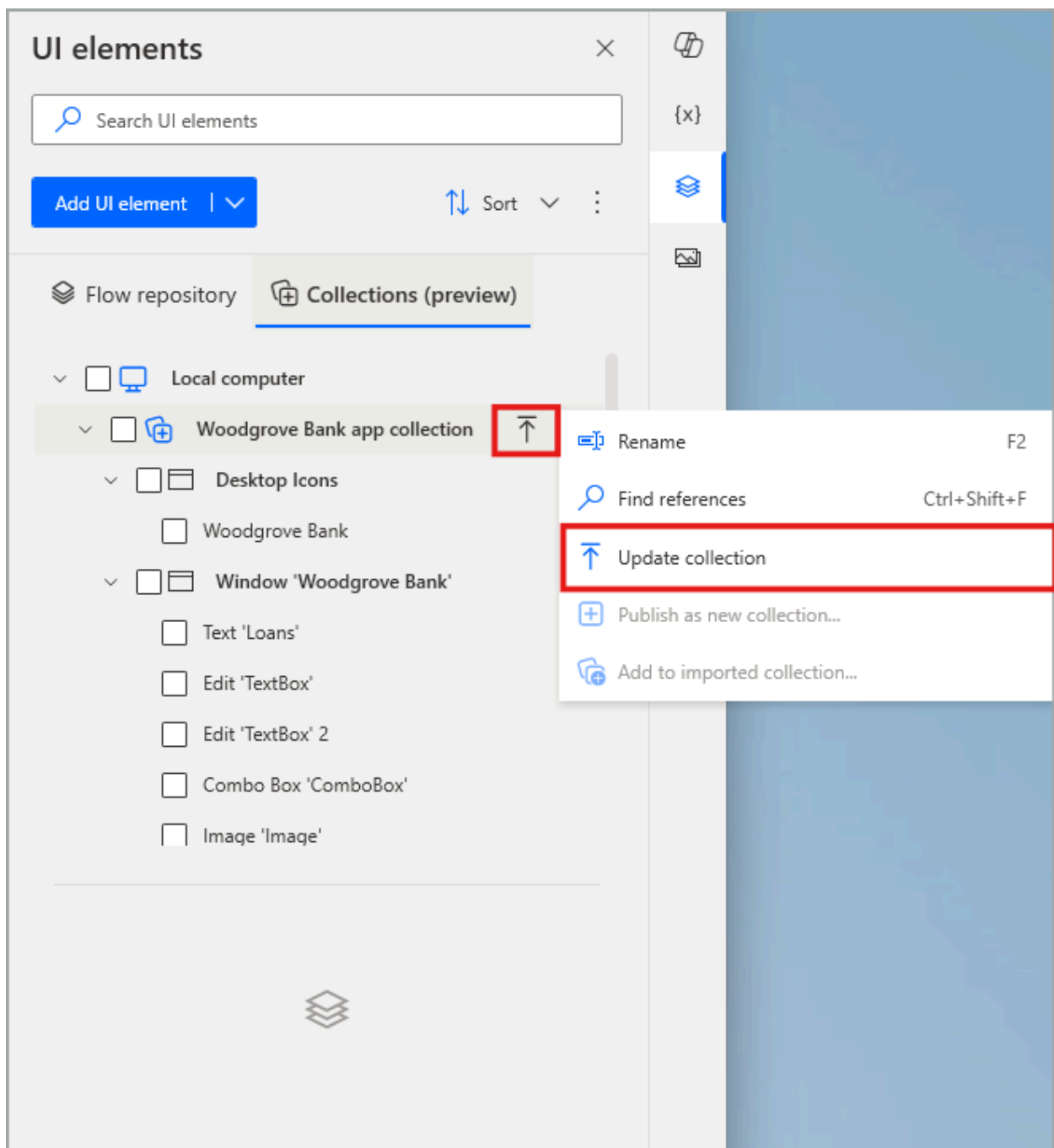
Apart from the portal page, collections can also be renamed via the flow designer, after being imported to a flow. In the Collections (preview) tab, select (highlight) the collection whose name you want to change, and press 'F2' or select **Rename** in its context menu.

Renaming a collection doesn't automatically update that collection with the new change. For more information, see [Update a UI elements collection](#).

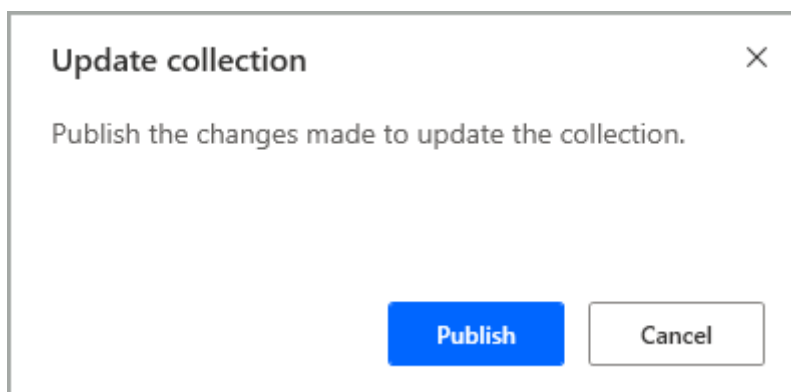
## Update a UI elements collection

After making any of the changes described earlier, a collection is only updated locally within the context of the desktop flow. This is to ensure that you can safely go through the necessary testing and debugging in the flow designer, to confirm your changes in the collection have the expected behavior, before affecting any other flows that reference the same collection.

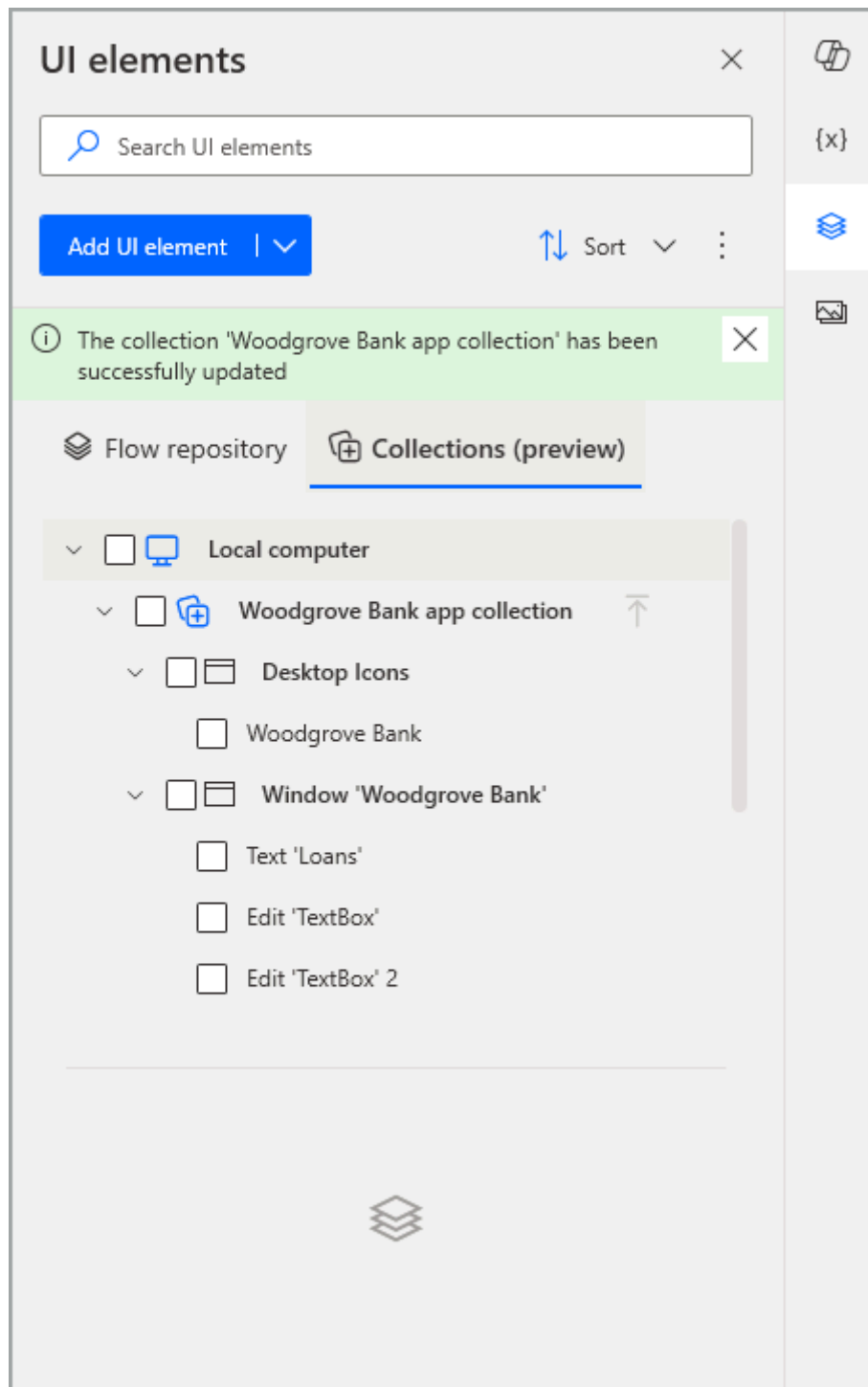
Once you verify the changes to the collection are correct, you can publish your changes by updating the collection. To do this, in the Collections (preview) tab, select the collection that was changed, and then select **Update collection** in its context menu. As a shortcut, you can also select the Update icon, between the collection's name and its context icon.



Upon selecting **Publish** in the confirmation dialog that appears, the flow enters a Publishing state, during which the collection is saved and uploaded in Dataverse, so its changes become available in the specific environment. While publishing takes place, the UI of the flow designer remains disabled.



When the collection is successfully updated in this way, the corresponding success banner appears in the UI elements pane to inform you accordingly. At this point, the collection's new state has overwritten the previous one, and the desktop flows that reference this collection in the current environment are affected accordingly in their following runs, without requiring any manual update themselves.



#### ⓘ Note

If the collection is up-to-date, the **Update collection** option is disabled.

If you made changes in multiple collections at the same time, you can always use the option **Update unsaved collections** in the main context menu at the top right of the UI elements pane, to update all of them at once.

### **Important**

When your imported collections have unpublished changes, trying to save your flow first will prompt you to also update the collections. If you don't confirm publishing the updated state of the collections, your flow won't be saved.

## Known limitations

- When a collection is included in a Dataverse solution via the Power Automate portal, and that collection is updated, the solution isn't updated automatically with the new binaries. The option **Advanced > Add required objects** needs to be selected manually, in the context menu of the collection component in that solution.
- When selected to be added to an imported collection, individual screens and web pages carry over their child UI elements with them, as the latter are automatically checked.

## Related information

- [Assets library](#)
- [Manage UI elements collections](#)
- [Create and publish UI elements collections](#)
- [UI elements collections](#)

---

## Feedback

Was this page helpful?

 **Yes**

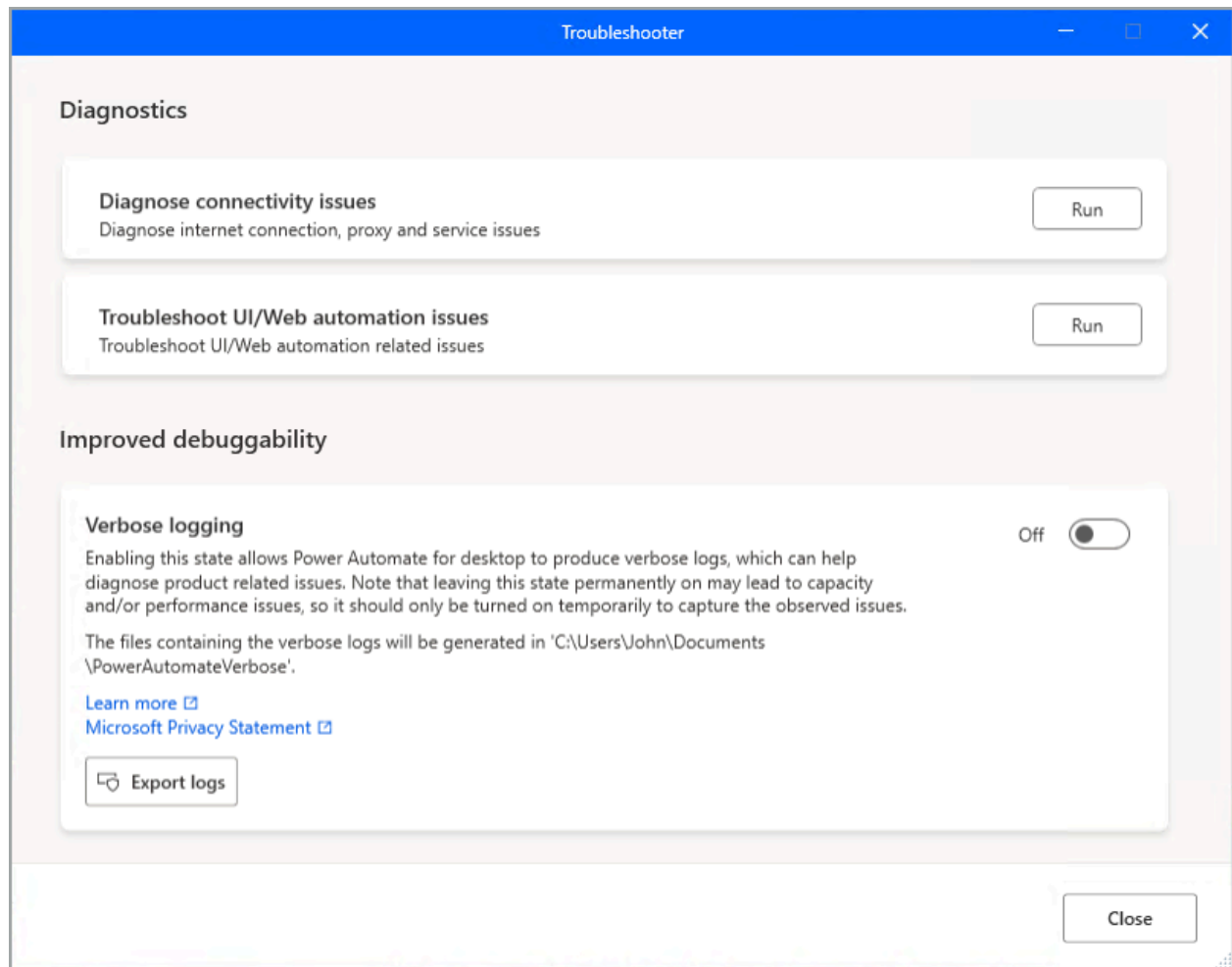
 **No**

[Provide product feedback](#) 

# Troubleshooter

Article • 11/14/2023

The troubleshooter in Power Automate for desktop is a component that allows you to diagnose, and in certain cases, troubleshoot, potential issues that you might face in the desktop application of Power Automate.



The troubleshooter includes two categories of diagnostics, for connectivity and UI/Web automation issues, while it also hosts the functionality that puts Power Automate in an improved diagnostics state for troubleshooting purposes.

## ⓘ Note

The existing categories don't require you to be logged in to use the troubleshooter.

The troubleshooter can be manually opened via the console and the flow designer, through the dedicated menu under **Help > Troubleshooter**. It can also be opened via the process file `PAD.Troubleshooter.exe`, found in the installation folder of Power Automate for desktop.

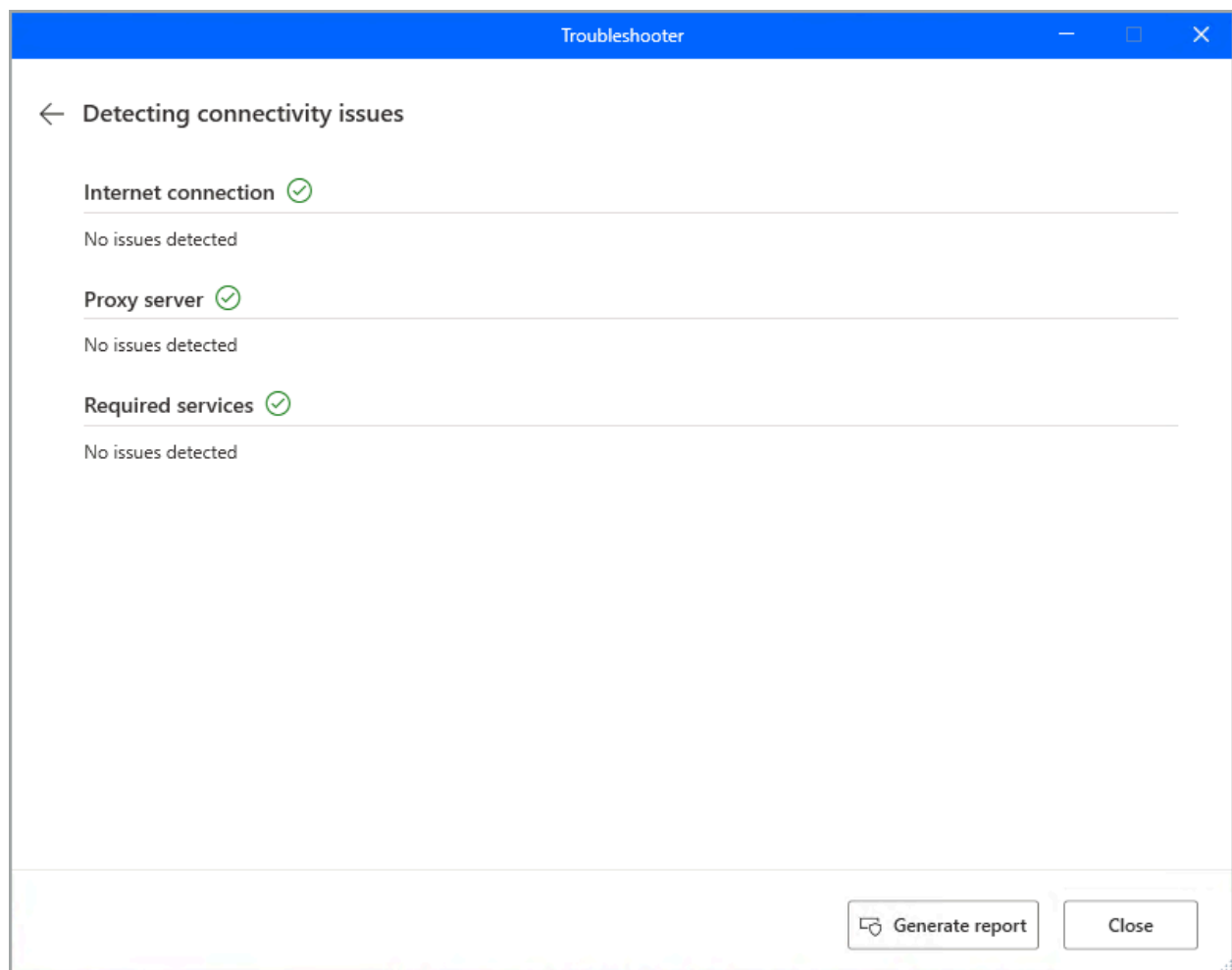


# Connectivity issues

The connectivity issues diagnostic includes a series of steps that are followed in a set order to check whether Power Automate for desktop has the required access to a predetermined list of public endpoints. These are necessary for the desktop application to work without issues.

On a high level, there are three steps that are checked one after the other:

- Internet connection
- Proxy server
- Required services

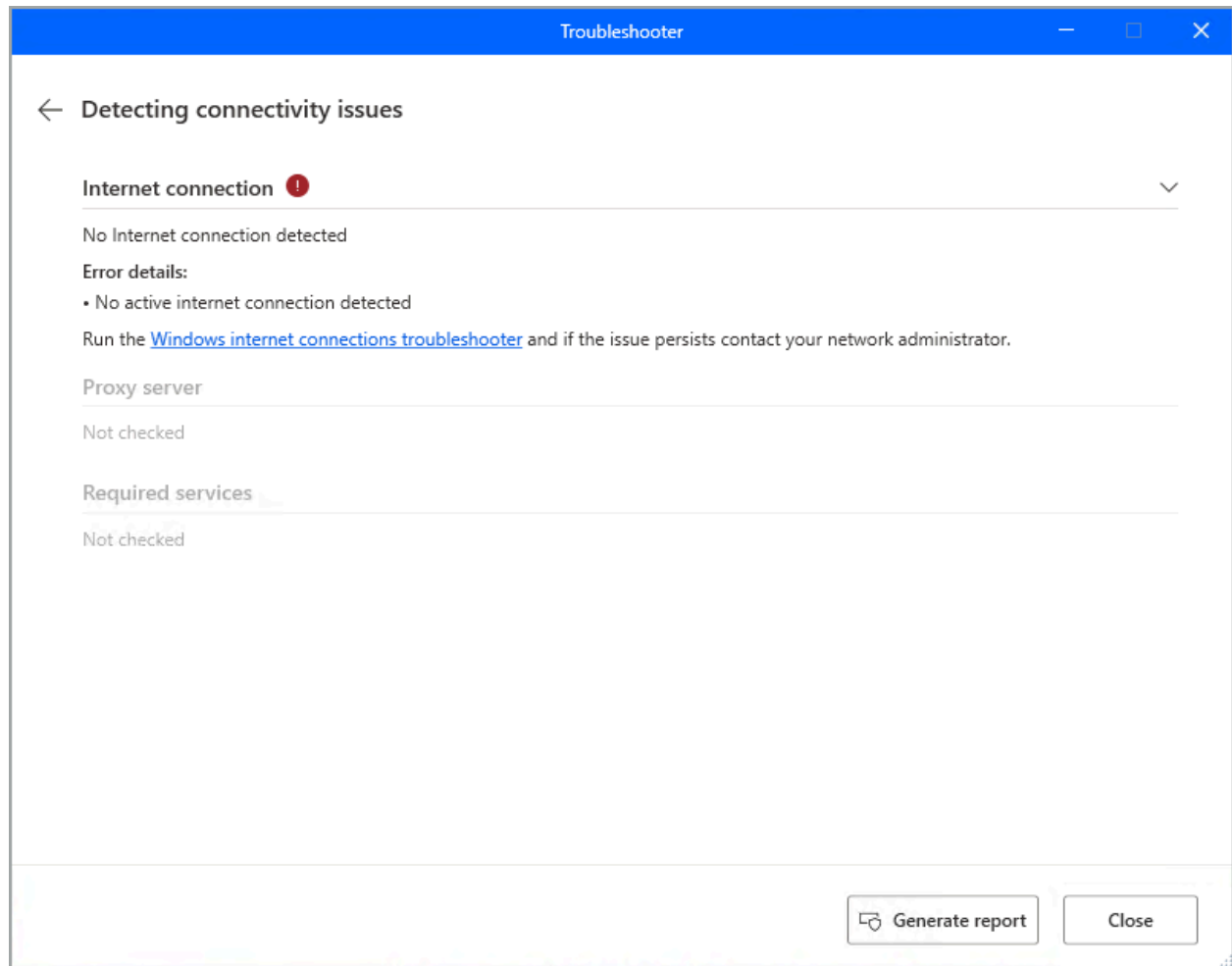


For the **internet connection**, the troubleshooter checks in sequence:

1. If an active internet connection can be detected.
2. If there's proper DNS resolution for the endpoints that need to be checked, mapping their domain names to IP addresses.
3. If a sample Microsoft page can be pinged.
4. If the required endpoints can be reached.

For the **proxy server**, the troubleshooter checks if there's any proxy related error regarding the endpoints. For the **required services**, the troubleshooter checks if the endpoints are properly set up and running.

If one step fails with an error, the following steps aren't checked at all, as the success of one check on connectivity issues is a requirement to proceed to the following step.

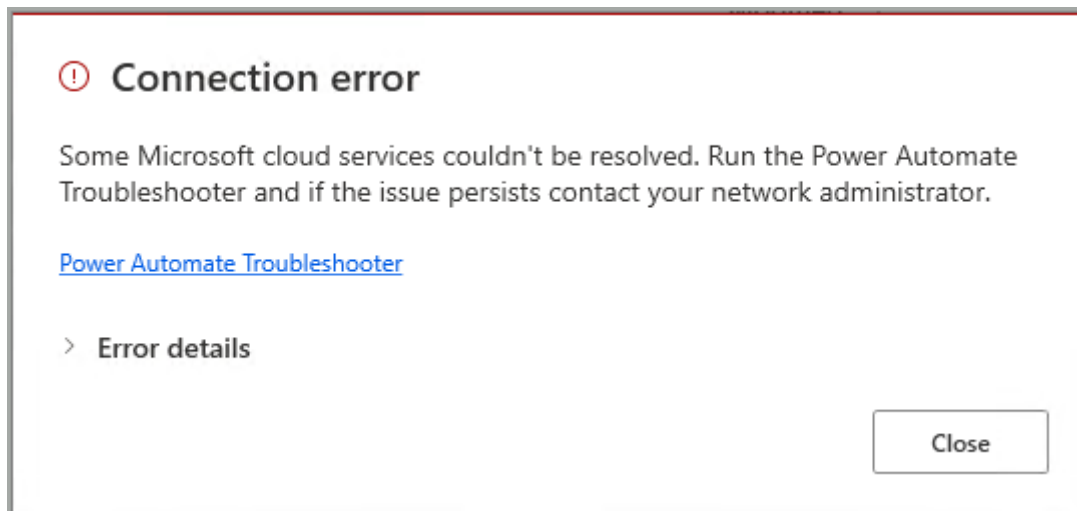


### ⓘ Note

In case of one or more errors, the respective details are displayed in the troubleshooter screen, after expanding the corresponding error.

After a category is checked for issues end to end, there's always the option to generate the report of that check, which includes all the detailed steps that were followed therein. The report is produced in CSV format and is available independently of whether the check was successful or had errors.

There can be relevant connectivity errors while using Power Automate for desktop. In those cases, you're prompted to launch the troubleshooter directly, through a link in the error dialog. Doing so automatically opens and runs the connectivity issues category.



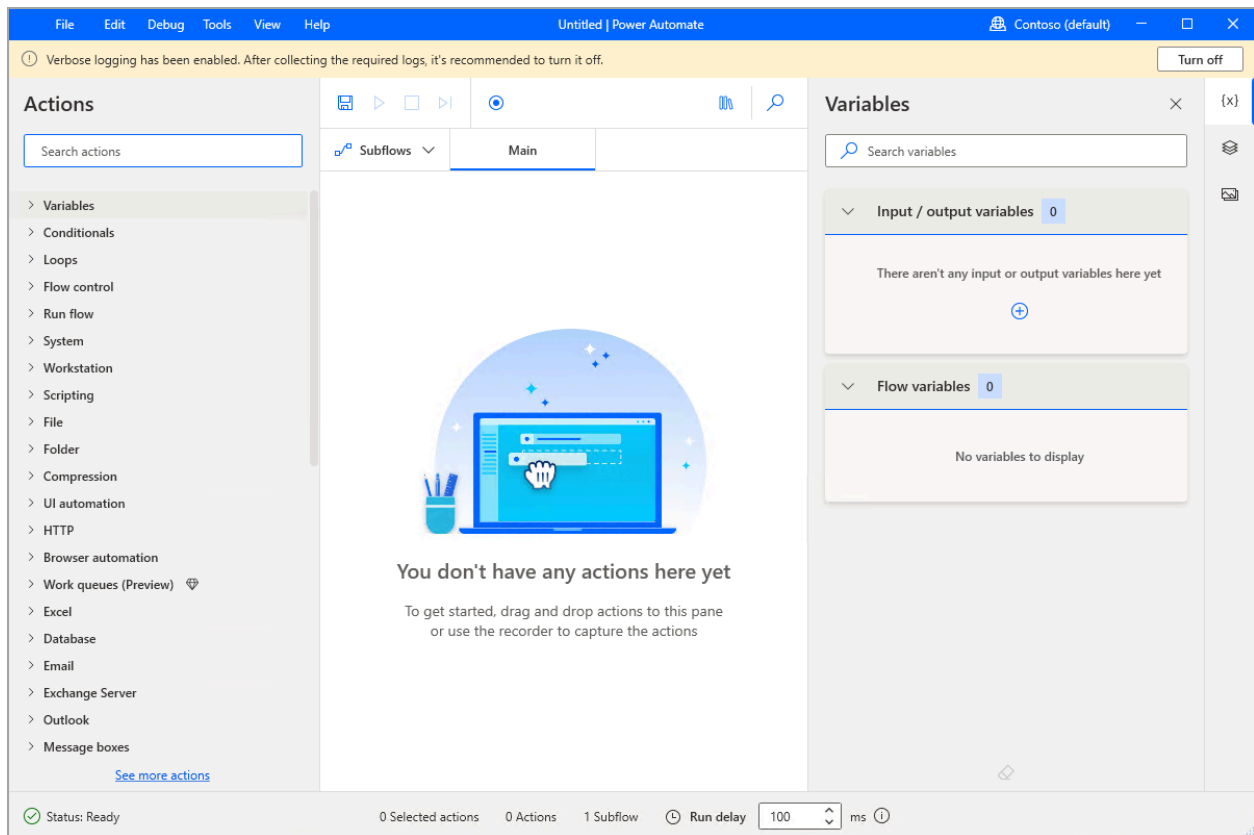
## Improve troubleshooting

Apart from the various diagnostics, the troubleshooter also hosts the verbose logging functionality. As per the respective description in the troubleshooter app, the toggle button can be turned on and off, forcing the Power Automate desktop application to function in a verbose logging state. This means that any action taken from you, from that point on, is logged with verbose details in local files. The log files are generated in the default path mentioned in the description (**PowerAutomateVerbose** subfolder in your **Documents** folder).

Because of this feature's nature, we recommend that you not leave verbose logging on permanently as there might be slower performance and capacity issues. While verbose logging is enabled, Power Automate constantly produces files with verbose logs, which may eventually consume a larger disk capacity. So enable this mode only for the purposes of reproducing the issue faced and capturing the respective logs, before turning it off again.

There are two registry entries related to verbose logging, as explained in [Improve troubleshooting of the Power Automate troubleshooter](#) and [Turn on verbose logging state in Power Automate for desktop](#).

When verbose logging is enabled, the corresponding info banner appears in the console and all the flow designers that are open at the same time. This is so you know that you're in a state that shouldn't be used permanently. You can turn off the functionality directly through that banner.



The console and the designer are affected immediately, when verbose logging is enabled. This means that from that point on, your actions produce verbose logs.

### ! Note

This is not the case for a recording session, or a flow that may be already running - those scenarios respect the state of verbose logging at the beginning of the corresponding procedure, and aren't affected in real time. In other words, verbose logging needs to be already on, before starting a recording session or running a flow, for the respective events to be logged under the verbose state.

When you turn off verbose logging, the **Export logs** button becomes available in the troubleshooter window. This allows you to collect all the produced log files and zip them in a single .zip file for convenience, before deleting the original individual files.

## Known issues and limitations

When **Export logs** is used when at least one flow designer is open, not all files may be saved in the .zip file, as some of them are used in the designer process. Those files can't be automatically deleted.

## Related information

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

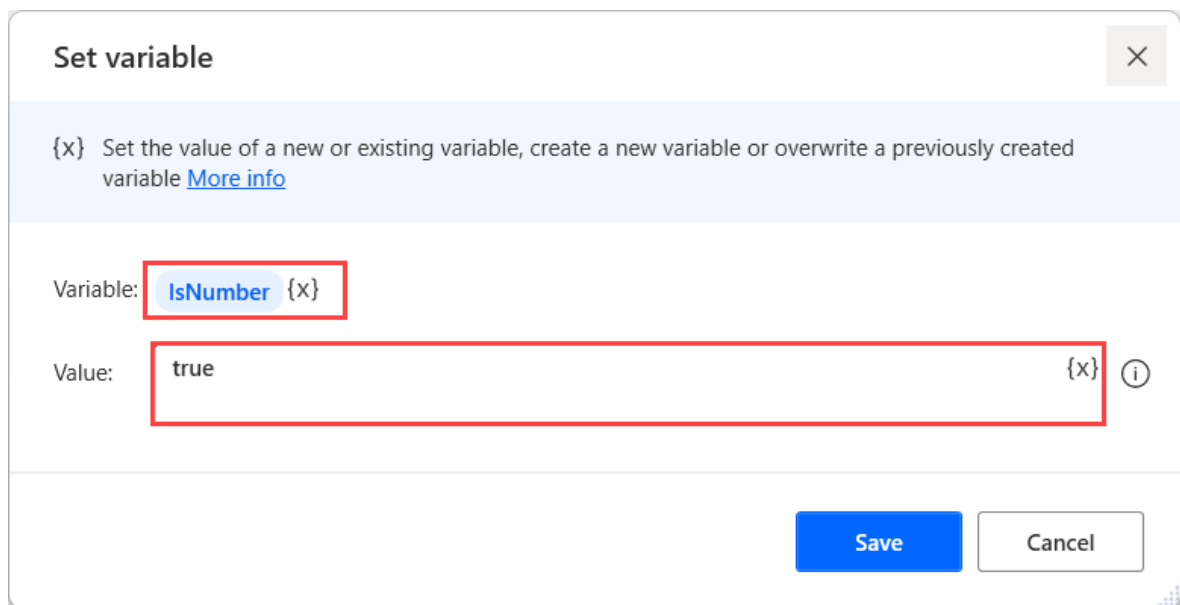
# Check if a variable is numeric

Article • 02/24/2023

Power Automate enables users to insert data into flows using message boxes. In some scenarios, you may want to ensure that the entered data are numbers to make your flow robust to unexpected failures.

To check whether a variable contains a number or not:


1. Use the **Set variable** action to create a new variable that indicates whether the variable you want to check contains a number or not. Initialize this variable to **true**. In the following example, the created variable is named **IsNumber**.



The screenshot shows the 'Set variable' configuration window in Power Automate. The window title is 'Set variable' with a close button (X) in the top right corner. Below the title is a light blue header bar containing the text: '{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)'. The main configuration area has two fields: 'Variable:' with the value 'IsNumber {x}' and 'Value:' with the value 'true'. Both fields are highlighted with red rectangular boxes. At the bottom right of the configuration area, there are two buttons: a blue 'Save' button and a white 'Cancel' button with a grey border. An information icon (i) is located to the right of the 'Value:' field.

2. Deploy the **Convert text to number** action and configure it to convert the variable you want to check to number.


### Convert text to number ✕

 Converts a text representation of a number to a variable that contains a numeric value [More info](#)

Select parameters


Text to convert:  {x} ⓘ

> Variables produced TextAsNumber

 On error
Save
Cancel


3. Select the **On error** option in the action, and create a new rule that sets the **IsNumber** variable to false every time the action fails. Additionally, configure the flow to continue running when an error occurs.

### Convert text to number ✕

 The following rules will apply if the action fails [More info](#)

Retry action if an error occurs

Times  ⓘ Interval  sec ⓘ

∨  **All errors**

+ New rule
 ✕ Clear all


Variable IsNumber {x} to  {x}

Continue flow run

Throw error

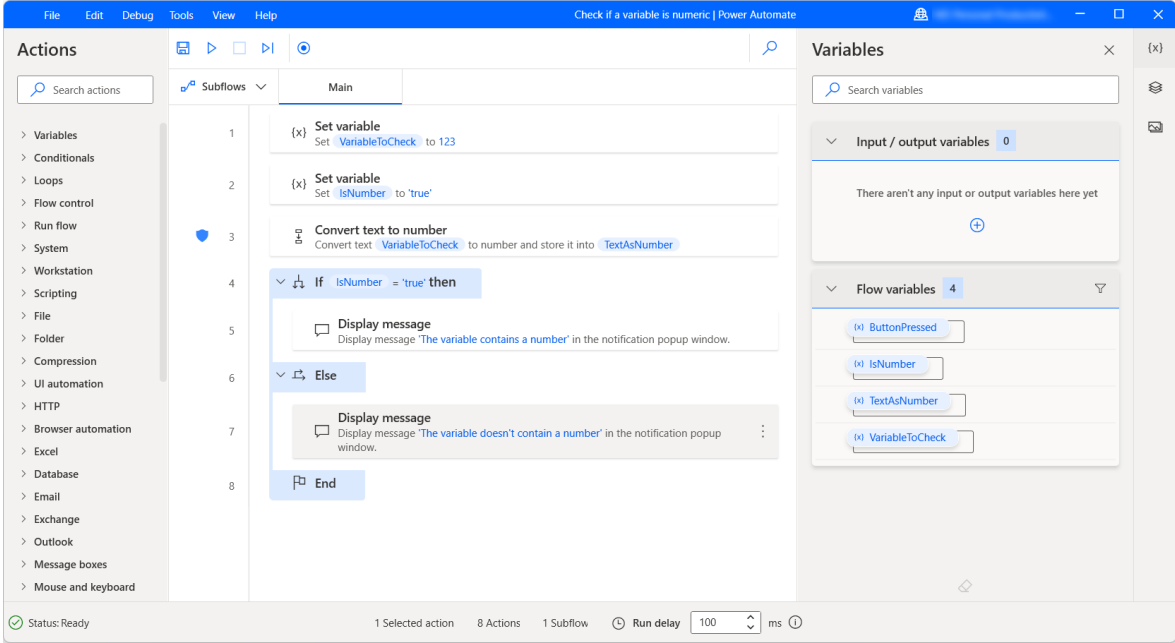
Exception handling mode

Go to next action ∨

>  **Advanced**

← Return to parameters
Save
Cancel

4. Now, you can use conditionals to implement different behavior depending on the value of the **IsNumber** variable.



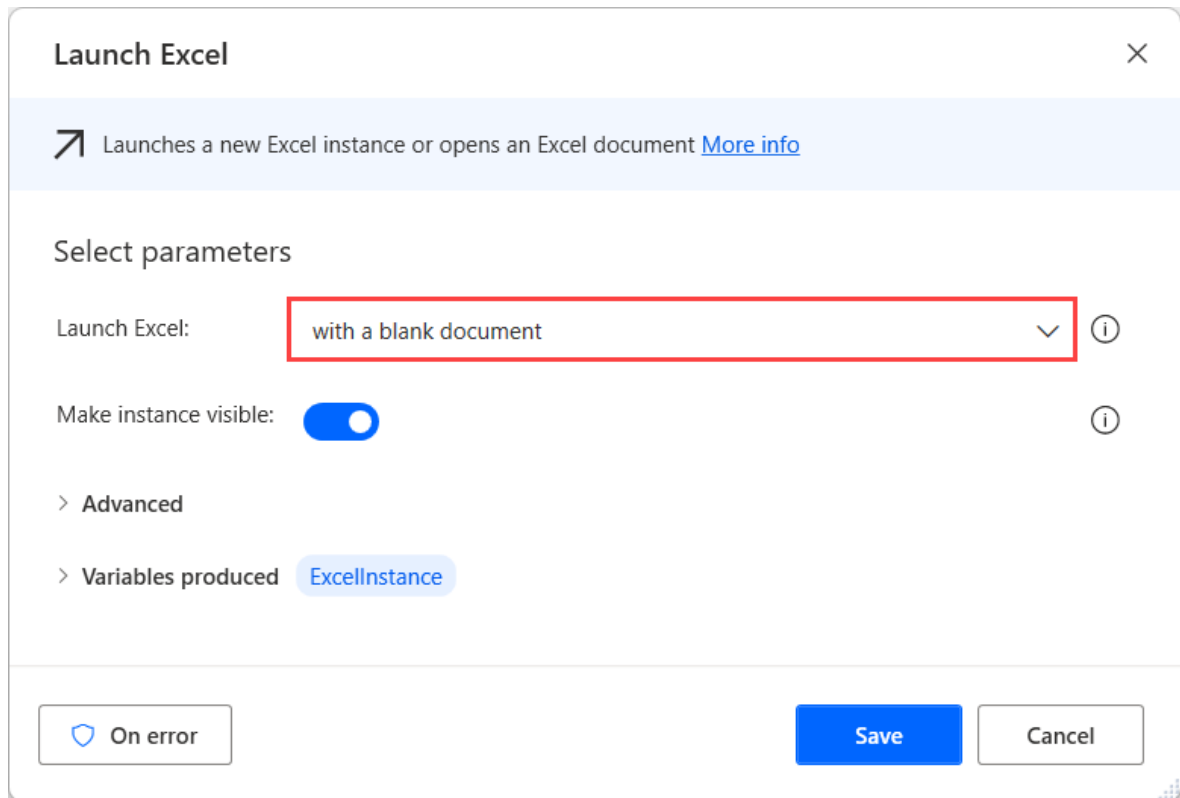


# Delete columns from a datatable

Article • 02/24/2023

Although Power Automate doesn't provide a direct way to delete columns from datatables, this functionality is feasible with the following workaround:

1. Use the **Launch Excel** action to launch a new blank Excel worksheet.



2. Deploy the **Write to Excel worksheet** action and configure it to write the datatable to the previously launched worksheet.

### Write to Excel worksheet

Writes a value into a cell or a range of cells of an Excel instance [More info](#)

Select parameters

Excel instance: %ExcelInstance%

Value to write: %DataTable%

Write mode: On specified cell

Column: 1

Row: 1

- Use the **Delete column from Excel worksheet** action to delete the wanted column of the datatable.

### Delete column from Excel worksheet

Deletes a selected column from an Excel instance [More info](#)


Select parameters

Excel instance: %ExcelInstance%

Delete column: 2

- Deploy the **Read from Excel worksheet** action and read all the available values from the Excel worksheet. The updated datatable is now stored in a variable named **ExcelData**.

### Read from Excel worksheet ✕

 Reads the value of a cell or a range of cells from the active worksheet of an Excel instance [More info](#)

Select parameters

Excel instance:  ⓘ


Retrieve:  ⓘ

> **Advanced**

> Variables produced ExcelData

5. Close the Excel worksheet without saving using the **Close Excel** action.

### Close Excel ✕

 Closes an Excel instance [More info](#)

Select parameters

Excel instance:  ⓘ

Before closing Excel:  ⓘ

# Add images to email messages

Article • 04/06/2023

Sending emails that contain images is common in many business procedures. Power Automate enables users to include images in their emails by attaching them or embedding them to the email body.

## Send images as email attachments

To attach images to an email, use the **Attachment(s)** field in the **Send email**, **Send email message through Outlook**, **Respond to Outlook message**, and **Send Exchange email message** actions.

You can populate the **Attachment(s)** field with file paths or a variable containing files. To populate multiple file paths, enclose them in double quotes (") and separate them by a space character.

## Send email ✕

✉ Creates and sends a new email message [More info](#)

### Select parameters

From:  {x} ⓘ

Sender display name:  {x} ⓘ

To:  {x} ⓘ

CC:  {x} ⓘ

BCC:  {x} ⓘ

Subject:  {x} ⓘ

Body:  {x} ⓘ

Body Is HTML:  ⓘ

Attachment(s):  ⓘ

> SMTP Server

## Embed images to email body

Apart from attaching images to emails, Power Automate allows you to embed images to email bodies using HTML.

To embed an image, check the **Body is HTML** option in the appropriate email action and populate the **Body** field with the following code.

## Send email ✕

✉ Creates and sends a new email message [More info](#)

### Select parameters

From:  {x} ⓘ

Sender display name:  {x} ⓘ

To:  {x} ⓘ



CC:  {x} ⓘ

BCC:  {x} ⓘ

Subject:  {x} ⓘ

Body:  {x} ⓘ

Body Is HTML:  ⓘ

Attachment(s):    {x} ⓘ

> SMTP Server

### ⓘ Note

After copying the following code, replace the **image-url** placeholder with the URL of the image you want to embed or a variable containing it.

HTML

```
<html>  
  <body>
```

```
<h1>Title</h1>
<p>This is a paragraph.</p>

</body>
</html>
```

Where:

- The URL is a link to the image. This can be a public link or dynamic content from a previous action, such as a link for an image in SharePoint.
- The URL can also be a Base64 encoded image. You can find a tool or website online that will encode it for you. Or use the Base64 text that has been generated by a previous "Convert file to Base64" action.
- You can specify additional attributes, such as configuring the size of the image or `alt` text, in case the image can't load. See the Resources section below for more information.

Example image with a link and size:

HTML

```

```

Example image with base64 (clipped for readability) and the `alt` attribute:

HTML

```
\
```

## Resources

More ways to configure `<img>`: [Image Embed element reference](#) [↗](#).

# Use a shared Outlook mailbox in email automations

Article • 02/24/2023

Shared mailboxes allow groups of people to monitor and send emails from public email aliases. When a group user replies to messages sent to a shared mailbox, the email appears to be from the shared address, not from the individual user.

To retrieve emails from a shared mailbox, use the **Retrieve email messages from Outlook** action and populate the name of the mailbox in the **Account** field.



### Retrieve email messages from Outlook ✕

Retrieve email messages from an Outlook account [More info](#)

**Select parameters**

Outlook instance:	<input type="text" value="%OutlookInstance%"/>	▼	(i)
Account:	<input style="border: 2px solid red;" type="text" value="FinanceMailbox"/>	{x}	(i)
Mail folder:	<input type="text" value="Inbox"/>	{x}	(i)
Retrieve:	<input type="text" value="All email messages"/>	▼	(i)
Mark as read:	<input checked="" type="checkbox"/>		(i)
From contains:	<input type="text" value="avery@contoso.com"/>	{x}	(i)
To contains:	<input type="text"/>	{x}	(i)
Subject contains:	<input type="text" value="expenses"/>	{x}	(i)
Body contains:	<input type="text"/>	{x}	(i)
Attachments:	<input type="text" value="Save attachments"/>	▼	(i)
Save attachments into:	<input type="text" value="C:\Users\Administrator\Documents"/>	📁 {x}	(i)

> Variables produced RetrievedEmails

On error

Save


Cancel

To send emails through a shared mailbox, use the **Send email message through Outlook** action.

In the action's properties, select **Other mailbox** in the **Send email message from** drop-down menu, and populate the name or address of the shared mailbox in the **Send from** field. Additionally, populate the **Account** field with the address of your main account.

## Send email message through Outlook



 Create and send a new email message through Outlook [More info](#)

### Select parameters

Outlook instance:  

Account:  

Send email message from:  

Send from:  

To:  

CC:  

BCC:  

Subject:  

Body:  

Let us know if you have any questions about the attached expense report.

Best regards,  
Finance department

Body is HTML:  

Attachment(s):    

 On error

Save

Cancel

# Automate email accounts with two-step verification

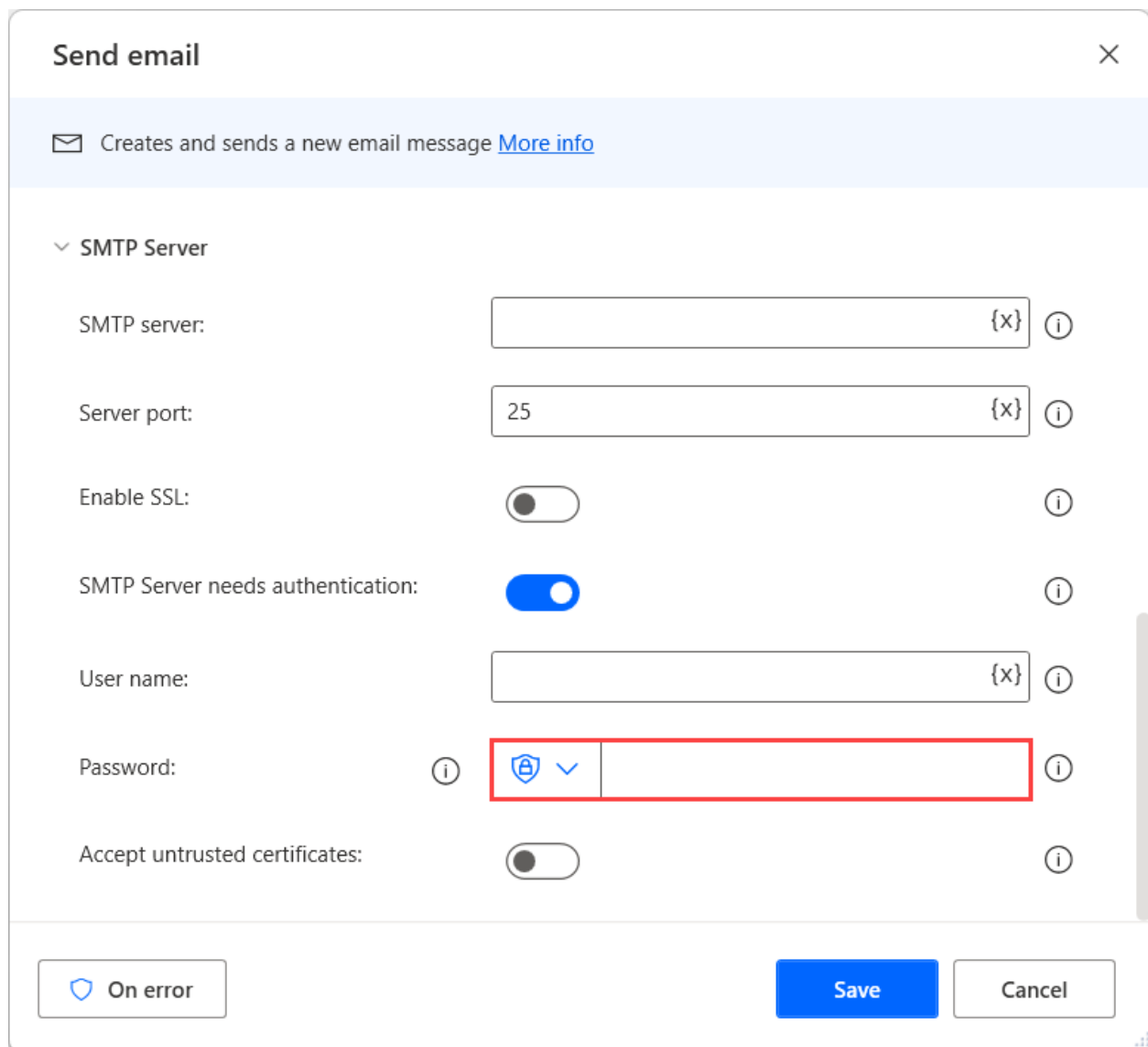
Article • 02/24/2023

To automate an email account protected with two-step verification, you need to create an app password.

App passwords are randomly generated passwords that can be used only once when you sign in to an application or device that doesn't support two-step verification.

To create app passwords for Microsoft personal or organizational accounts, follow the instructions in [Create new app passwords](#). To create app passwords for other webmail services, search for information on their help page or community site.

After creating an app password, populate it in the **Password** field of the **IMAP server** or **SMTP server** section of the email actions.



**Send email** ✕

✉ Creates and sends a new email message [More info](#)

▼ SMTP Server

SMTP server:  ⓘ

Server port:  {x} ⓘ

Enable SSL:  ⓘ

SMTP Server needs authentication:  ⓘ

User name:  ⓘ

Password: ⓘ  ⓘ

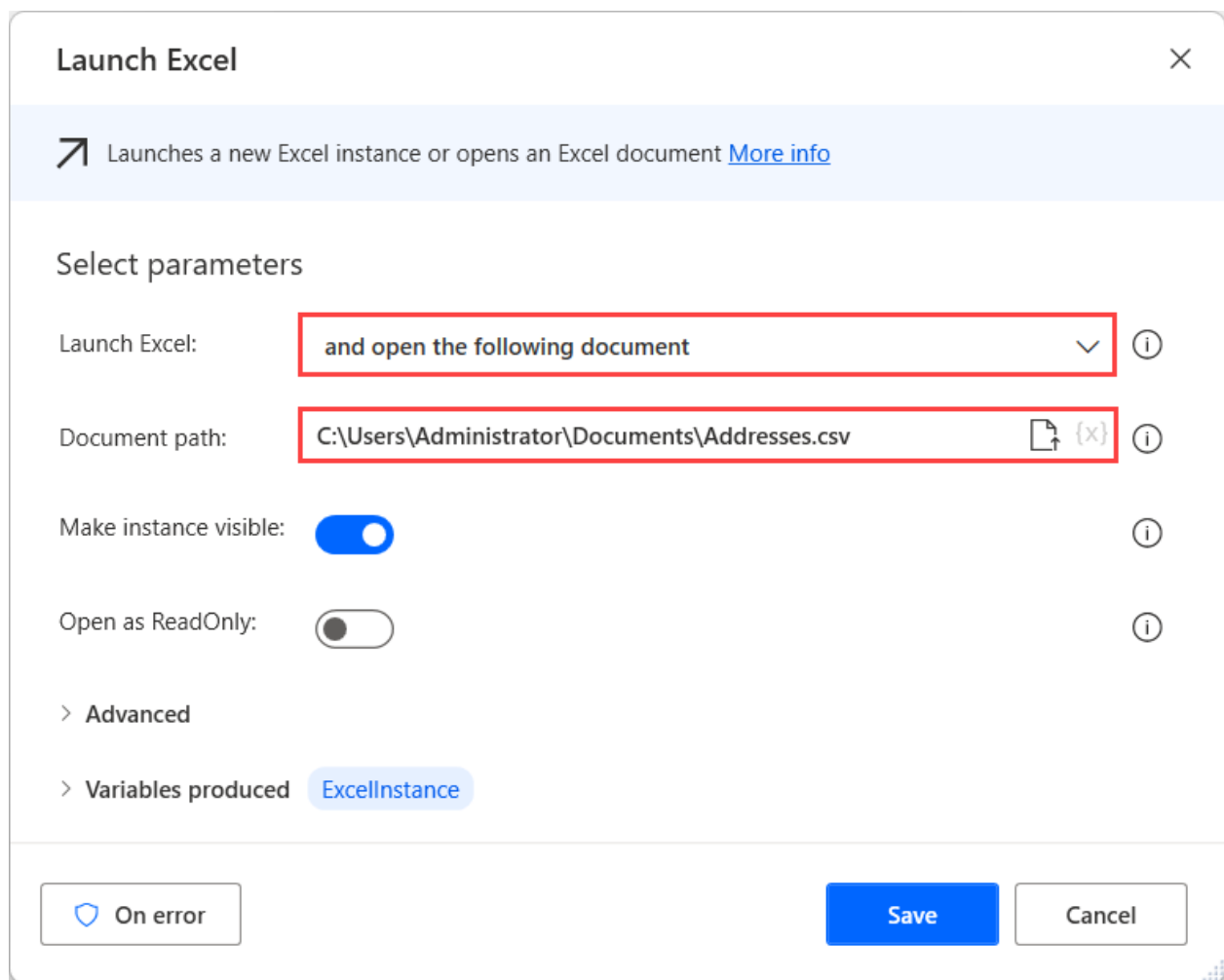
Accept untrusted certificates:  ⓘ

# Convert a CSV file into an Excel spreadsheet

Article • 02/24/2023

A comma-separated values file (CSV) is a delimited text file that uses a specific character to separate a series of values.

Power Automate allows you to open comma-delimited and tab-delimited CSV files directly through the **Launch Excel** action.



The screenshot shows the 'Launch Excel' action configuration window. At the top, there is a title bar with 'Launch Excel' and a close button. Below the title bar, there is a description: 'Launches a new Excel instance or opens an Excel document' with a 'More info' link. The main area is titled 'Select parameters' and contains the following settings:

- Launch Excel:** A dropdown menu with the selected option 'and open the following document'.
- Document path:** A text input field containing 'C:\Users\Administrator\Documents\Addresses.csv'.
- Make instance visible:** A toggle switch that is currently turned on.
- Open as ReadOnly:** A toggle switch that is currently turned off.

Below the main settings, there are two expandable sections: '> Advanced' and '> Variables produced'. The 'Variables produced' section shows 'ExcelInstance' as the output variable.

At the bottom of the window, there are three buttons: 'On error' (with a shield icon), 'Save' (in blue), and 'Cancel'.

To convert a CSV file of this type to XLSX, open the file and then save it as a new Excel workbook using the **Save document as** option in the **Close Excel** action.

### Close Excel

✕

↶ Closes an Excel instance [More info](#)

#### Select parameters

Excel instance:  ⓘ

Before closing Excel:  ⓘ

Document format:  ⓘ

Document path:  ⓘ

Although the **Launch Excel** action can handle the previously mentioned cases, semicolon-delimited CSV files may require a different approach.

#### ⓘ Note

Excel uses the list separators defined in the Windows regional settings. In some regions, you have to manually set the semicolon character as a separator or apply the following workaround.

To overcome this limitation, deploy the **Read from CSV file** action and set the semicolon character (;) as a custom separator in the advanced options. If the first row of the CSV file contains headers, enable the **First line contains column names** option to use the respective headers at the retrieved datatable.

### Read from CSV file

Aa Read a CSV file into a data table [More info](#)

#### Select parameters

File path:   ⓘ

Encoding:  ⓘ

▼ **Advanced**

Trim fields:  ⓘ

First line contains column names:  ⓘ


Columns separator:  ⓘ

Custom separator:  ⓘ

> **Variables produced** CSVTable

Next, launch a blank Excel document using the **Launch Excel** action and paste the CSV table into cell A1 using the **Write to Excel worksheet** action.

### Write to Excel worksheet ✕

 Writes a value into a cell or a range of cells of an Excel instance [More info](#)

#### Select parameters

Excel instance:  ⓘ

Value to write:  {x} ⓘ

Write mode:  ⓘ

Column:  {x} ⓘ

Row:  {x} ⓘ

Now, you can deploy the **Close Excel** action to save the Excel worksheet as a new XLSX file.

# Run macros on an Excel workbook

Article • 02/24/2023


The **Run Excel macro** action enables you to run macros in open Excel instances.

To create an Excel instance, deploy the **Launch Excel** action and select to open the Excel file containing the needed macro.



## Important



To run macros stored in your personal macro workbook (PERSONAL.XLSB), enable the **Nest under a new Excel process** and **Load add-ins and macros** options located in the advanced options of the **Launch Excel** action.


### Launch Excel ✕


 Launches a new Excel instance or opens an Excel document [More info](#)

#### Select parameters


Launch Excel: and open the following document  





Document path: C:\Users\Administrator\Desktop\Workbook.xlsm  {x} 


Make instance visible:  

Open as ReadOnly:  

**Advanced**

Nest under a new Excel process:  

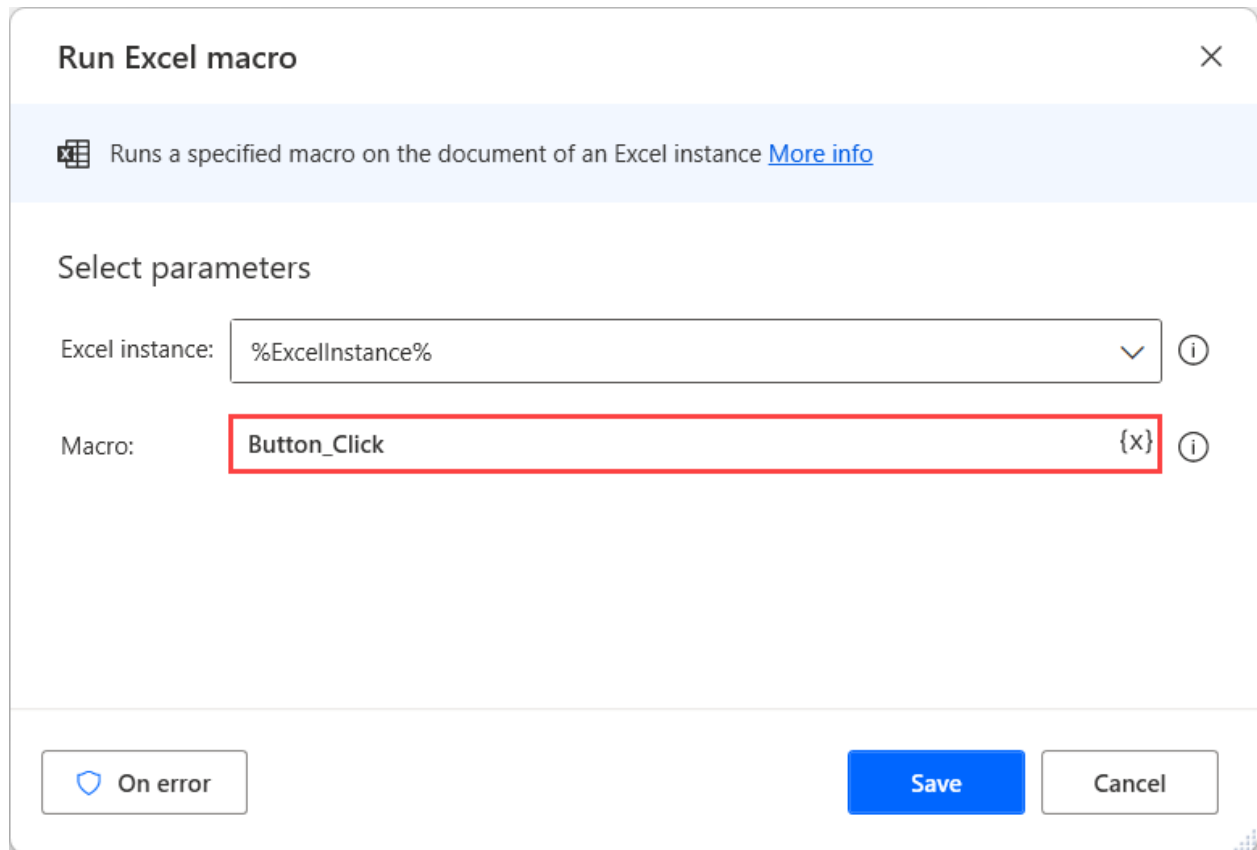
Password:     

Load add-ins and macros:  

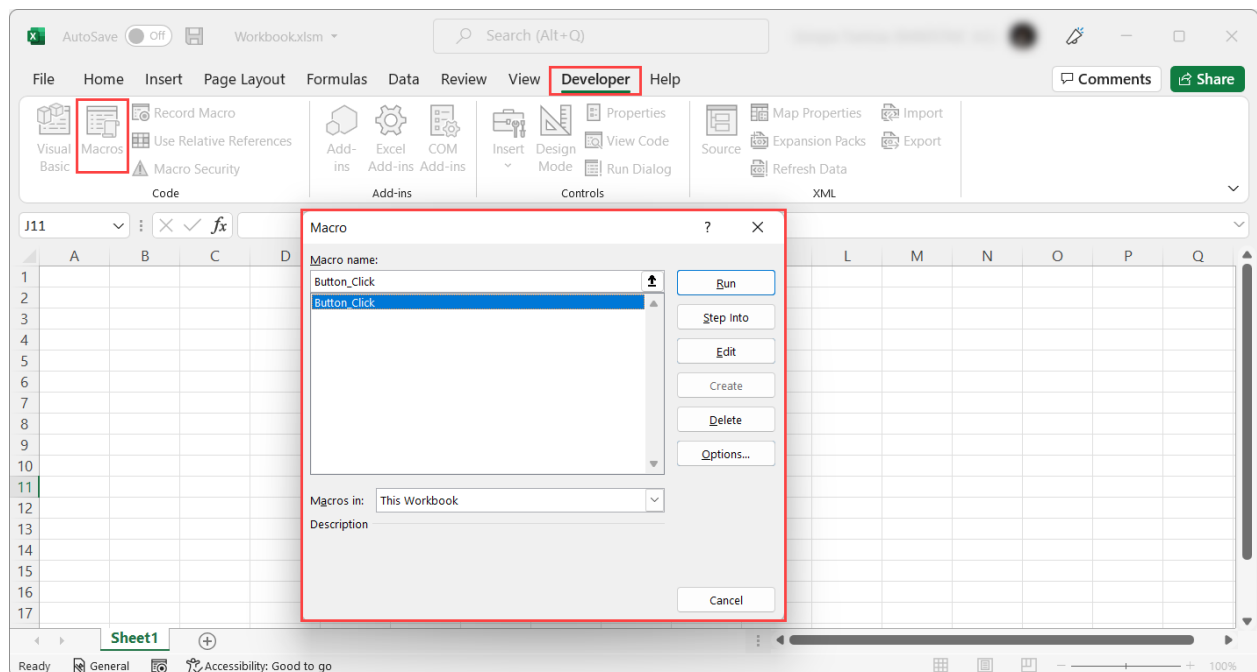
> Variables produced ExcelInstance



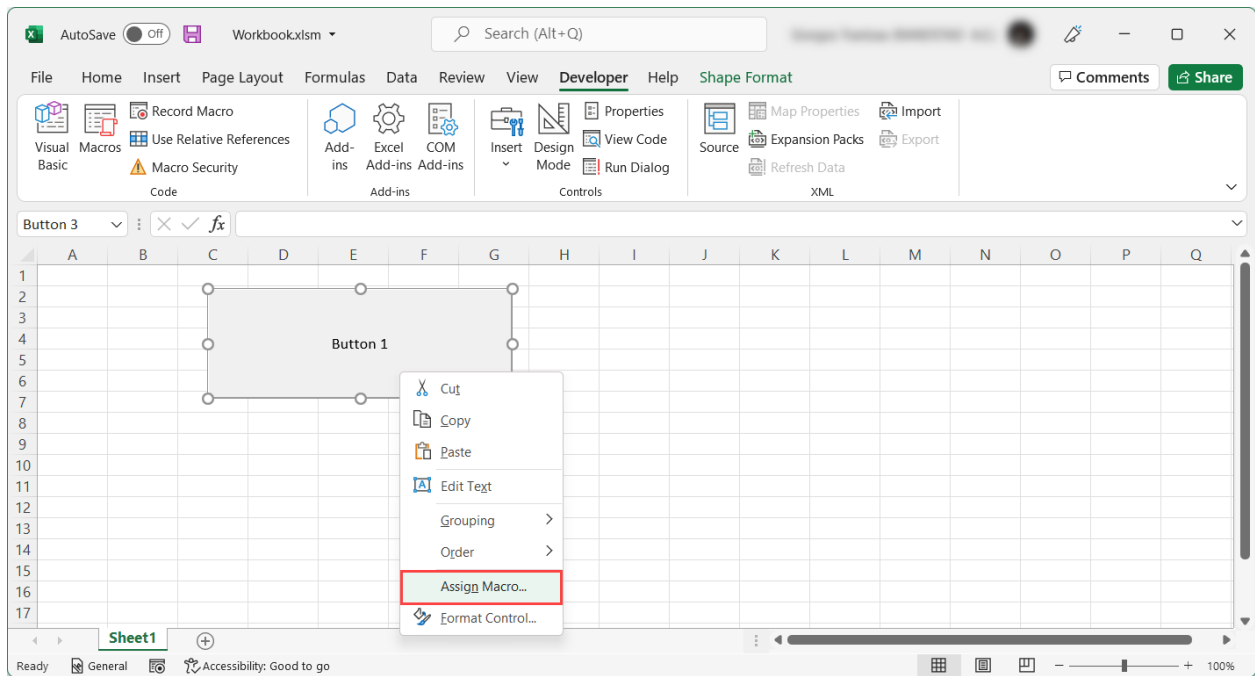
To run the macro, deploy the **Run Excel macro** action and populate its name in the **Macro** field.



To find the name of a macro, open the respective workbook and navigate to **Developer** > **Macros**. The pop-up dialog displays all the available macros in the workbook.



To find the name of a macro assigned to a button, open the workbook, right-click on the button, and select **Assign Macro**. The pop-up dialog is the same as in the previous case.



# Run SQL queries on Excel files

Article • 02/24/2023

Although Excel actions can handle most Excel automation scenarios, SQL queries can retrieve and manipulate significant amounts of Excel data more efficiently.

Suppose a flow has to modify only the Excel registries that contain a particular value. To achieve this functionality without SQL queries, you need loops, conditionals, and multiple Excel actions.

Alternatively, you can implement this functionality with SQL queries using only two actions, **Open SQL connection** and **Execute SQL statements**.

## Open a SQL connection to an Excel file

Before running a SQL query, you have to open a connection with the Excel file you want to access.

To establish the connection, create a new variable named `%Excel_File_Path%` and initialize it with the Excel file path. Optionally, you can skip this step and use the hard-coded path of the file later in the flow.

**Set variable** [X]

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **Excel\_File\_Path** {x}

Value: **C:\Users\Administrator\Desktop\Employees.xlsx** {x} ⓘ

**Save** **Cancel**

Now, deploy the **Open SQL connection** action and populate the following connection string in its properties.

```
Provider=Microsoft.ACE.OLEDB.12.0;Data Source=%Excel_File_Path%;Extended Properties="Excel 12.0 Xml;HDR=YES";
```

### ⓘ Note

To use the presented connection string successfully, you have to download and install [Microsoft Access Database Engine 2010 Redistributable](#) ↗.

**Open SQL connection** [X]

Open a new connection to a database [More info](#)

Select parameters

Connection string: `Provider=Microsoft.ACE.OLEDB.12.0;Data Source=%Excel_File_Path %;Extended Properties="Excel 12.0 Xml;HDR=YES";` [Settings] [X] ⓘ

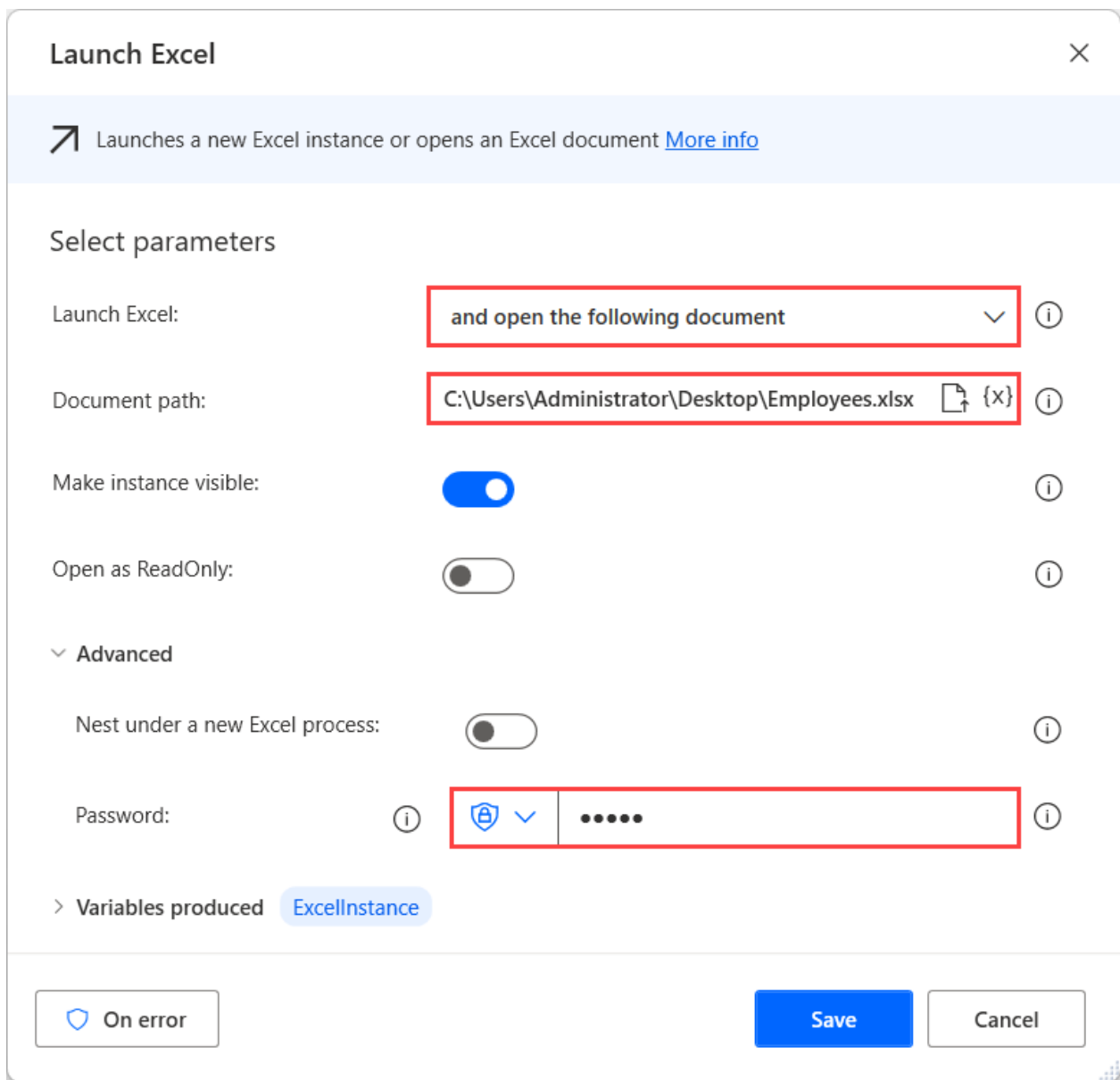
> Variables produced `SQLConnection`

[On error] [Save] [Cancel]

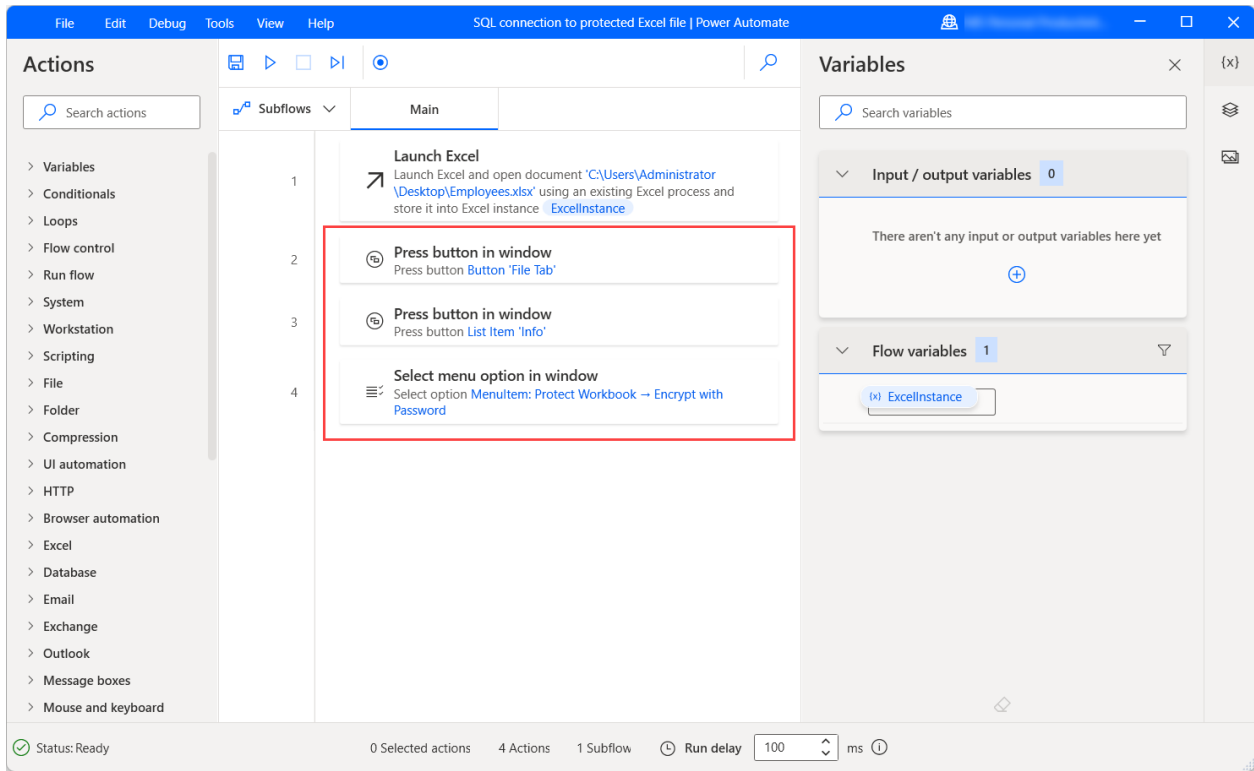
## Open a SQL connection to a password-protected Excel file

A different approach is required in scenarios where you run SQL queries on password-protected Excel files. The **Open SQL connection** action can't connect to password-protected Excel files, so you have to remove the protection.

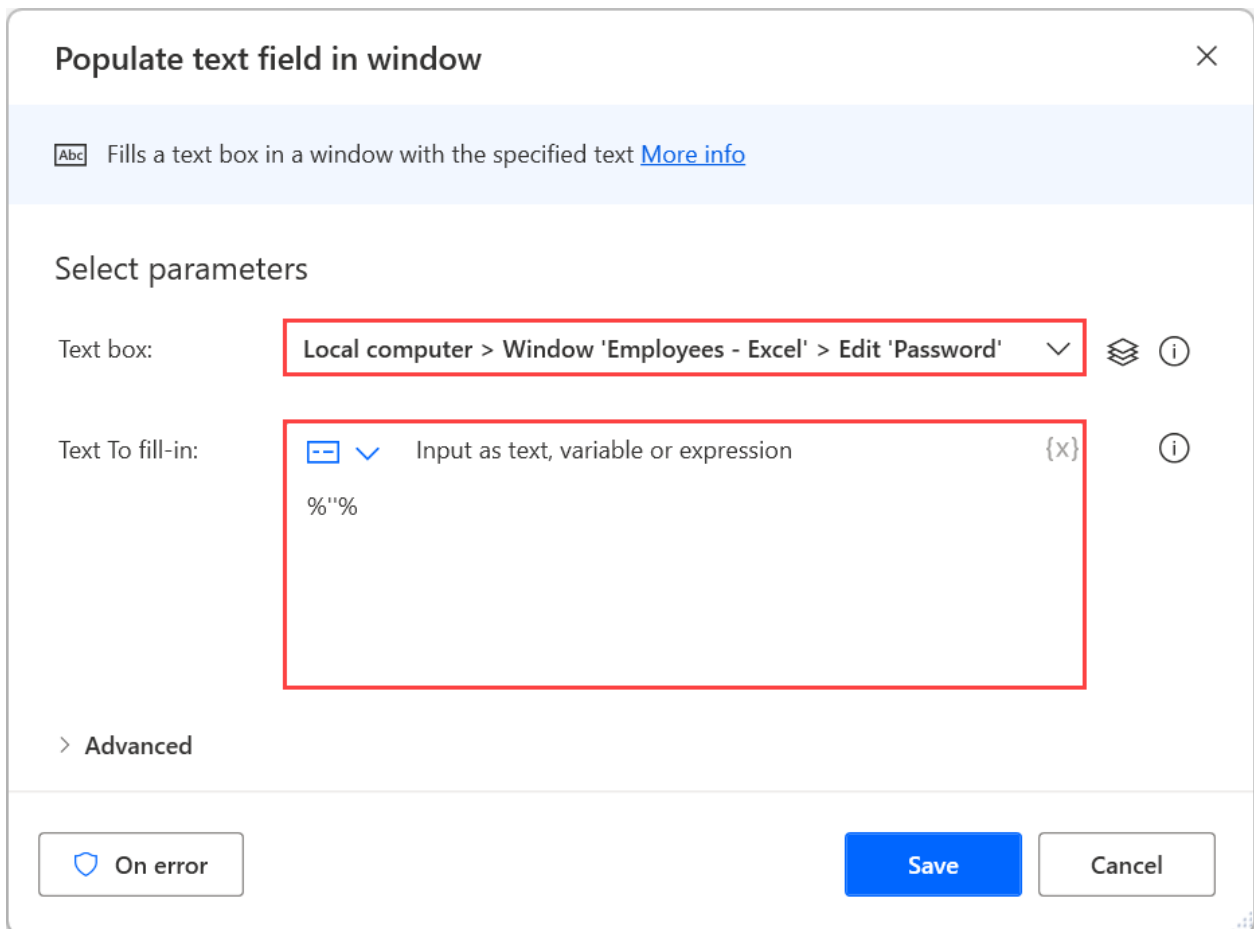
To achieve that, launch the Excel file using the **Launch Excel** action. The file is password-protected, so enter the appropriate password in the **Password** field.



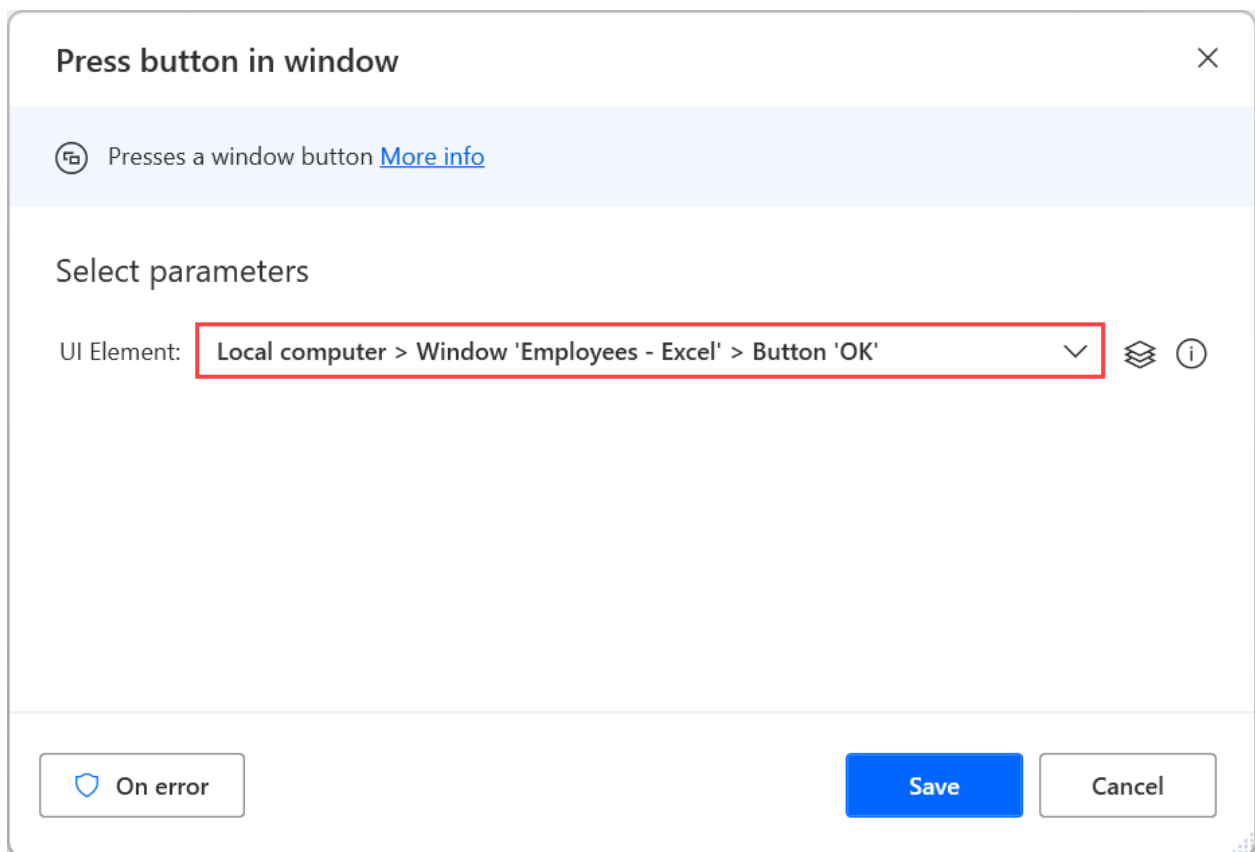
Next, deploy the appropriate UI automation actions and navigate to **File > Info > Protect Workbook > Encrypt with Password**. You can find more information about UI automation and how to use the respective actions in [Automate desktop applications](#).



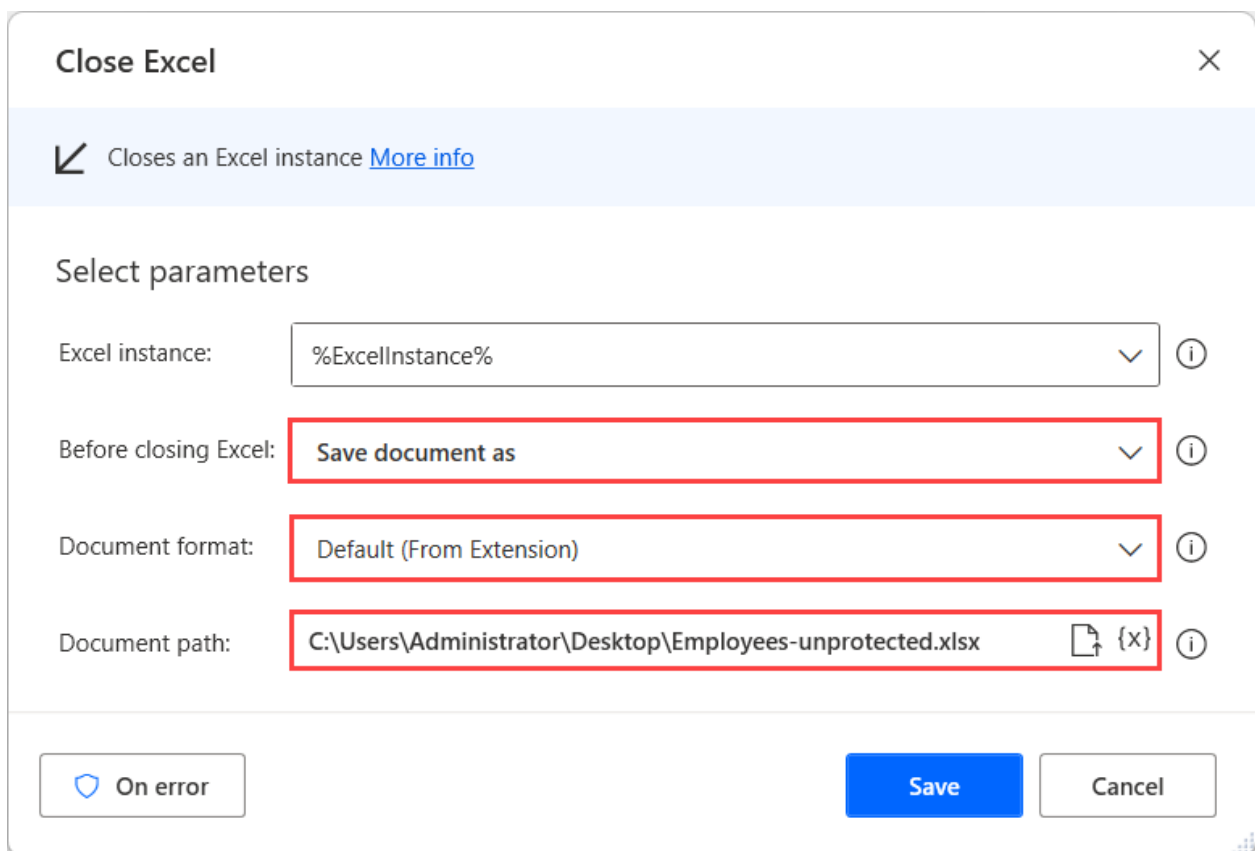
After selecting **Encrypt with Password**, populate an empty string in the pop-up dialog using the **Populate text field in window** action. To populate an empty string, use the following expression: %""%.



To press the **OK** button in the dialog and apply the changes, deploy the **Press button in window** action.

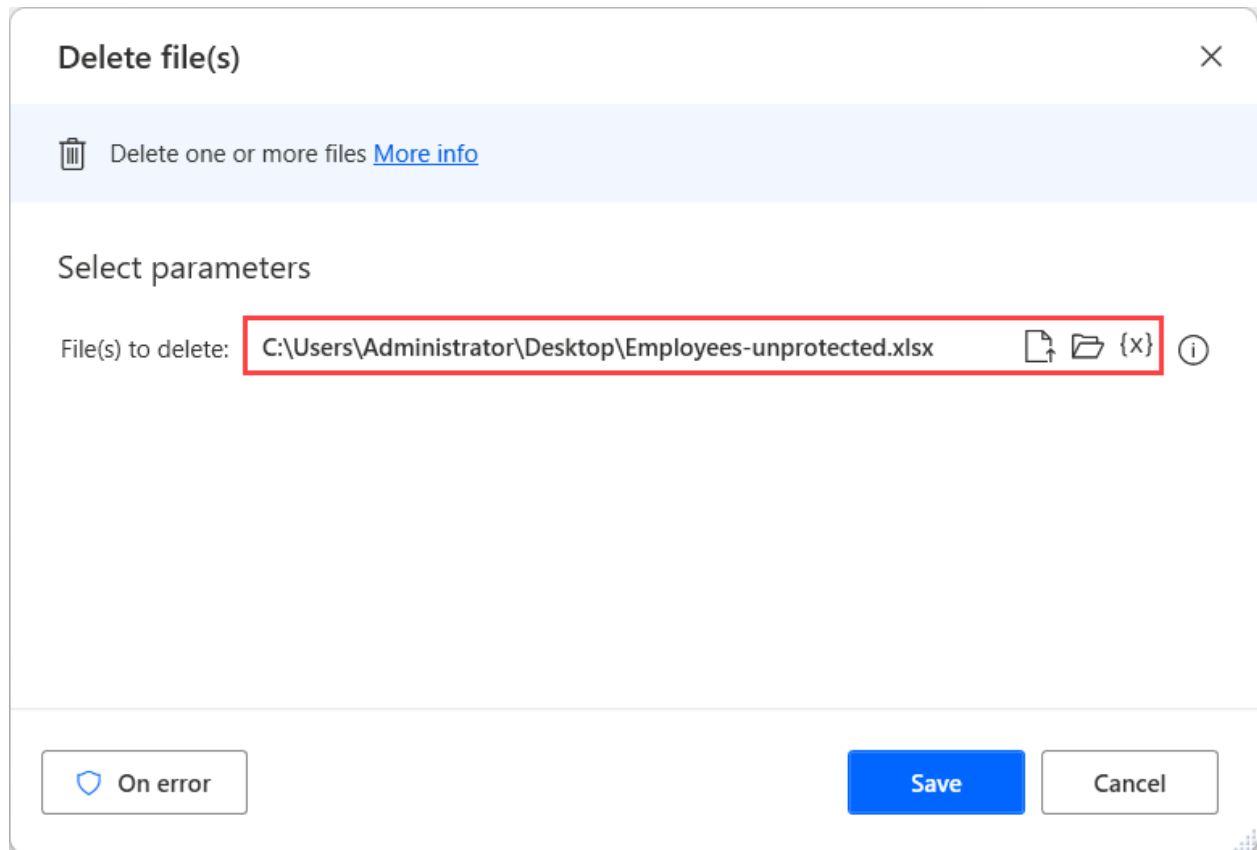


Lastly, deploy the **Close Excel** action to save the nonprotected workbook as a new Excel file.



After saving the file, follow the instructions in [Open a SQL connection to an Excel file](#) to open a connection to it.

When the manipulation of the Excel file is complete, use the **Delete file(s)** action to delete the nonprotected copy of the Excel file.



## Read contents of an Excel spreadsheet

Although the **Read from Excel worksheet** action can read the contents of an Excel worksheet, loops can take a significant time to iterate through the retrieved data.

A more efficient way to retrieve specific values from spreadsheets is to treat Excel files as databases and execute SQL queries on them. This approach is faster and increases the performance of the flow.

To retrieve all the contents of a spreadsheet, you can use the following SQL query in the **Execute SQL statement** action.

SQL

```
SELECT * FROM [SHEET$]
```



### Execute SQL statement ✕

📄 Connect to a database and execute an SQL statement [More info](#)

#### Select parameters

Get connection by:  ⓘ

SQL connection:  {x} ⓘ

SQL statement:  {x} ⓘ

Timeout:  {x} ⓘ

> Variables produced QueryResult

#### ⓘ Note

To apply this SQL query in your flows, replace the **SHEET** placeholder with the name of the spreadsheet you want to access.

To retrieve the rows that contain a particular value in a specific column, use the following SQL query:

SQL

```
SELECT * FROM [SHEET$] WHERE [COLUMN NAME] = 'VALUE'
```

#### ⓘ Note

To apply this SQL query in your flows, replace:

- **SHEET** with the name of the spreadsheet you want to access.

- **COLUMN NAME** with the column that contains the value you want to find.  
The columns in the first row of the Excel worksheet are identified as the table's column names.
- **VALUE** with the value you want to find.

## Delete data from an Excel row

Although Excel doesn't support the **DELETE** SQL query, you can use the **UPDATE** query to set all the cells of a specific row to null.

More precisely, you can use the following SQL query:

SQL

```
UPDATE [SHEET$] SET [COLUMN1]=NULL, [COLUMN2]=NULL WHERE [COLUMN1]='VALUE'
```

### Execute SQL statement

Connect to a database and execute an SQL statement [More info](#)

Select parameters

Get connection by:  ⓘ

SQL connection:  {x} ⓘ

SQL statement: 

```
1 UPDATE [SHEET$] SET [COLUMN1]=NULL, [COLUMN2]=NULL
2 WHERE [COLUMN1]='VALUE'
```

 {x} ⓘ

Timeout:  {x} ⓘ

> Variables produced QueryResult

While developing your flow, you have to replace the **SHEET** placeholder with the name of the spreadsheet you want to access.

The **COLUMN1** and **COLUMN2** placeholders represent the names of the columns to handle. This example has two columns, but in a real scenario, the number of the columns may differ. The columns in the first row of the Excel worksheet are identified as the table's column names.

The **[COLUMN1]='VALUE'** part of the query defines the row you want to update. In your flow, use the column name and the value based on which combination describes the rows uniquely.

## Retrieve Excel data except for a specific row

In some scenarios, you may need to retrieve all the contents of an Excel spreadsheet except for a specific row.


A convenient way to achieve this is to set the values of the unwanted row to null and then retrieve all the values except for the null ones.

To change the values of a specific row in the spreadsheet, you can use an **UPDATE** SQL query, as presented in [Delete data from an Excel row](#):

SQL

```
UPDATE [SHEET$] SET [COLUMN1]=NULL, [COLUMN2]=NULL WHERE [COLUMN1]='VALUE'
```

### Execute SQL statement ✕

 Connect to a database and execute an SQL statement [More info](#)

#### Select parameters

Get connection by:  ⓘ

SQL connection:  {x} ⓘ

SQL statement: 

```
1 UPDATE [SHEET$] SET [COLUMN1]=NULL, [COLUMN2]=NULL
2 WHERE [COLUMN1]='VALUE'
```

 {x} ⓘ

Timeout:  {x} ⓘ

> Variables produced QueryResult

Next, run the following SQL query to retrieve all the rows of the spreadsheet that don't contain null values:

```
SQL
SELECT * FROM [SHEET$] WHERE [COLUMN1] IS NOT NULL OR [COLUMN2] IS NOT NULL
```

The COLUMN1 and COLUMN2 placeholders represent the names of the columns to handle. This example has two columns, but in a real table, the number of the columns may differ. All the columns in the first row of the Excel worksheet are identified as the table's column names.

# Autofit Excel columns using VBScript

Article • 02/24/2023

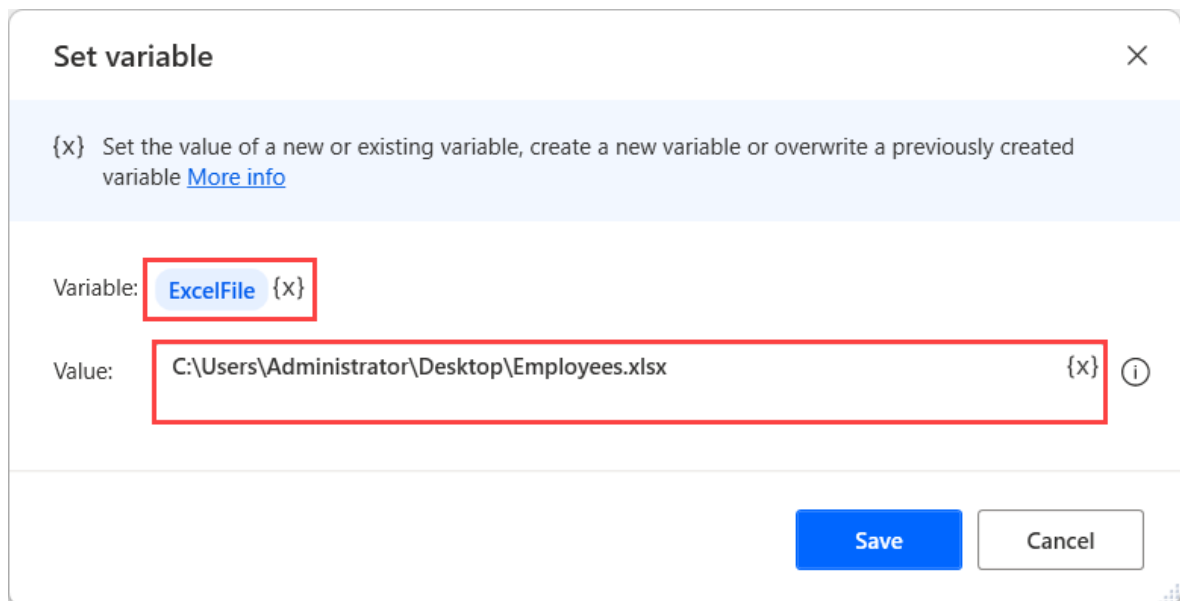
## ⓘ Note

Desktop flows provide the **Resize columns/rows in Excel worksheet** action to facilitate the resizing of Excel columns and rows. This article shows an alternative way to resize Excel columns and rows using scripting.

The autofit feature in Excel enables users to resize cells in worksheets to accommodate different-sized data without manually changing the column width and row height.

To autofit Excel columns using scripting in Power Automate:

1. Use the **Set variable** action to create a new variable containing the path of the Excel file you want to manipulate. In this example, the variable is named **ExcelFile**.



The screenshot shows the 'Set variable' dialog box in Power Automate. The dialog has a title bar with 'Set variable' and a close button. Below the title bar, there is a description: '{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)'. The 'Variable:' field contains 'ExcelFile {x}' and is highlighted with a red box. The 'Value:' field contains 'C:\Users\Administrator\Desktop\Employees.xlsx' and is also highlighted with a red box. At the bottom right, there are two buttons: 'Save' (blue) and 'Cancel' (white).

2. Deploy the **Run VBScript** action and populate the following code. Before running the flow, replace the **SheetName** placeholder with the name of the sheet you want to autofit or a variable containing it.

VBScript

```
'Opens the Excel file'  
Set objExcel = CreateObject("Excel.Application")  
Set objWorkbook = objExcel.Workbooks.Open("%ExcelFile%")  
objExcel.Application.Visible = True  
  
'Selects the specified sheet'  
Set objSheet = objWorkbook.Sheets("SheetName")
```

```
'Autofits the columns of the sheet'S
for col=1 to 19
objSheet.columns(col).AutoFit()
next
```

```
'Saves and closes the Excel file'
objWorkbook.Save
objWorkbook.Close SaveChanges = True
```

### Run VBScript

Executes some custom VBScript code and retrieves its output into a variable [More info](#)

Select parameters

VBScript to run:

```
1 'Opens the Excel file'
2 Set objExcel = CreateObject("Excel.Application")
3 Set objWorkbook = objExcel.Workbooks.Open("%ExcelFile%")
4 objExcel.Application.Visible = True
5
6 'Selects the specified sheet'
7 Set objSheet = objWorkbook.Sheets("SheetName")
8
9 'Autofits the columns of the sheet'S
10 for col=1 to 19
11 objSheet.columns(col).AutoFit()
12 next
13
14 'Saves and closes the Excel file'
15 objWorkbook.Save
16 objWorkbook.Close SaveChanges = True
```

> Variables produced VBScriptOutput ScriptError

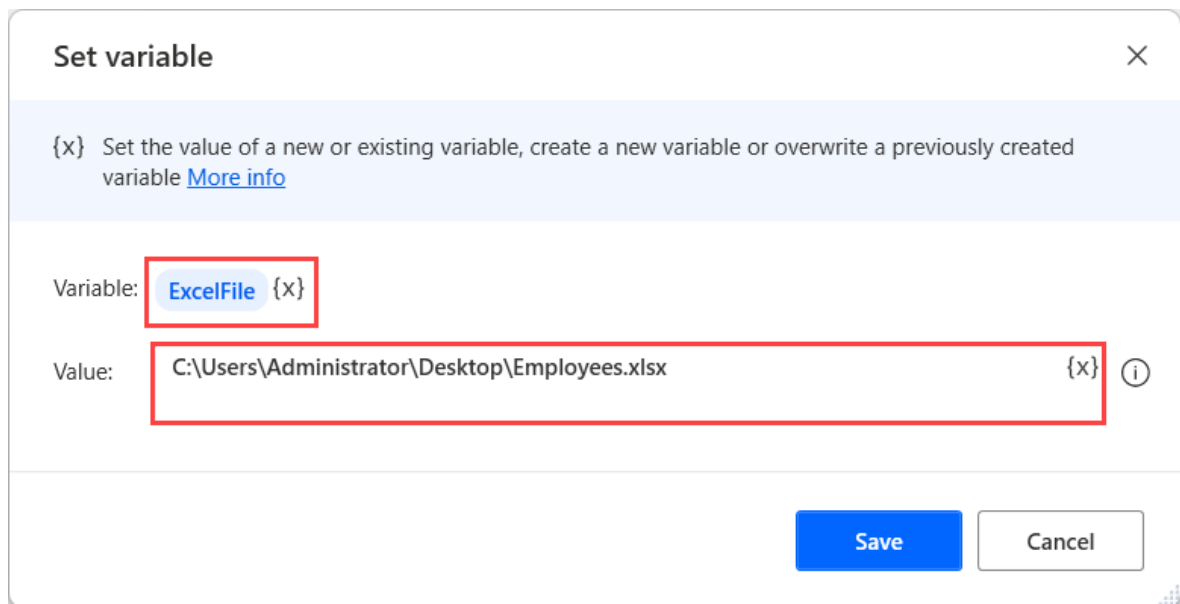
Save Cancel

# Unhide worksheets in Excel using VBScript

Article • 02/24/2023

If an Excel file contains hidden worksheets, replicate the following steps to make them visible:

1. Use the **Set variable** action to create a new variable containing the file path of the respective Excel file. In this example, the variable is named **ExcelFile**.



**Set variable**

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **ExcelFile** {x}

Value: C:\Users\Administrator\Desktop\Employees.xlsx {x} ⓘ

**Save** Cancel

2. Deploy the **Run VBScript** action and populate the following code.

```
VBScript


'Opens the Excel file'
Set objExcel = CreateObject("Excel.Application")
Set objWorkbook = objExcel.Workbooks.Open("%ExcelFile%")
objExcel.Application.Visible = True

'Unhides all the worksheets of the Excel file'
For i=1 To objWorkbook.Sheets.Count
objWorkbook.Sheets(i).Visible = True
Next

'Saves and closes the Excel file'
objWorkbook.Save
objWorkbook.Close SaveChanges = True
```

## Run VBScript



 Executes some custom VBScript code and retrieves its output into a variable [More info](#)

### Select parameters

VBScript to run:

```
1 'Opens the Excel file'
2 Set objExcel = CreateObject("Excel.Application")
3 Set objWorkbook = objExcel.Workbooks.Open("%ExcelFile%")
4 objExcel.Application.Visible = True
5
6 'Unhides all the worksheets of the Excel file'
7 For i=1 To objWorkbook.Sheets.Count
8 objWorkbook.Sheets(i).Visible = True
9 Next
10
11 'Saves and closes the Excel file'
12 objWorkbook.Save
13 objWorkbook.Close SaveChanges = True
```

{x} ⓘ

> Variables produced VBScriptOutput ScriptError

Save

Cancel



# Use image recognition on machines with different screen resolutions

Article • 02/24/2023

When you capture images in Power Automate, the stored images are affected by the source machine's screen resolution and DPI scaling.

In cases where flows perform image recognition on different screens or machines, you must ensure that all the screens have the exact screen resolution.

To achieve this functionality, you can use the **Set screen resolution** action to change the screen resolution of the target machines.

The new resolution has to be the same as the source machine from which the image was captured. To find the resolution of the source machine, use a temporary **Get screen resolution** action or check the Windows display settings.


## 📘 Important

To use the **Set screen resolution** action in flows triggered through the Power Automate portal, you have to be connected to the console session of your machine, where you can manually change the screen resolution. For example, you can use your machine's physical screen to connect to the machine. In remote sessions, such as unattended scenarios that use remote desktop clients, the action has no effect, as users can't manually change the resolution.


## ⚠️ Note

Before using image recognition, ensure that DPI scaling stays the same among the screens. The use of varying DPI scalings may cause the flow to fail.

## Set screen resolution ✕

 Sets the width, height, bit count and frequency of a selected monitor [More info](#)

### Select parameters

 Available screen resolutions ▾


Monitor number:	<input type="text" value="1"/> <span>{x}</span> <span>i</span>
Monitor width:	<input type="text" value="1920"/> <span>{x}</span> <span>i</span>
Monitor height:	<input type="text" value="1080"/> <span>{x}</span> <span>i</span>
Monitor bit count:	<input type="text" value="32"/> <span>{x}</span> <span>i</span>
Monitor frequency:	<input type="text" value="60"/> <span>{x}</span> <span>i</span>

If you want to roll back to the original resolution later in the flow, add a **Get screen resolution** before the **Set screen resolution** action.


When all the image recognition procedures are completed, use the retrieved values and a second **Set screen resolution** action to set the screen back to the original resolution.

## Set screen resolution



 Sets the width, height, bit count and frequency of a selected monitor [More info](#)

### Select parameters

 Available screen resolutions ▼

Monitor number:



Monitor width:



Monitor height:



Monitor bit count:



Monitor frequency:



 On error

Save

Cancel

# Perform OCR on multilingual documents

Article • 02/24/2023


Optical character recognition (OCR) enables you to locate and extract text from images or the screen.

Although most scenarios require you to handle text in a specific language, there are cases where the sources are multilingual.

To perform OCR on these sources, use a Tesseract engine in the respective OCR action and enable the **Use other languages** option in the engine settings.

### Extract text with OCR ✕

*i* The 'OCR engine variable' as an engine type is going to be deprecated. Make sure you update your flows using alternative OCR engine types.

 Extract text from a given source using the specified OCR engine [More info](#)

#### Select parameters

OCR engine type: Tesseract engine *i*

OCR source: Screen *i*

Search mode: Whole of specified source *i*

▼ **OCR engine settings**


Use other language:  *i*

Tesseract language: English *i*

Image width multiplier: 1 {x} *i*

Image height multiplier: 1 {x} *i*

> Variables produced OcrText

 On error

Save


Cancel

When the **Use other languages** option is enabled, the action displays two additional settings: the **Language abbreviation** and **Language data path** fields.

The **Language abbreviation** field indicates to the engine which language to look for during OCR. The **Language data path** field contains the language data files (.traineddata) used to train the OCR engine.

### Extract text with OCR ✕

*i* The 'OCR engine variable' as an engine type is going to be deprecated. Make sure you update your flows using alternative OCR engine types.

 Extract text from a given source using the specified OCR engine [More info](#)

#### Select parameters

OCR engine type:  *i*

OCR source:  *i*

Search mode:  *i*

▼ **OCR engine settings**

Use other language:  *i*

Language abbreviation:  *i* {x}


Language data path:  *i*  {x}

Image width multiplier:  *i* {x}

Image height multiplier:  *i* {x}

> **Variables produced** OcrText

After downloading the data files for the needed languages, move them to a common folder to make them available under the same path.


Next, select the created folder in the **Language data path** field, and populate the corresponding language codes in the **Language abbreviation** field. To separate the language codes, use the plus character (+).

*i* **Note**

You can find all the available language codes in the source of the language data files. In the following example, the used codes represent Telugu, Hindi, and English.

### Extract text with OCR ✕

*i* The 'OCR engine variable' as an engine type is going to be deprecated. Make sure you update your flows using alternative OCR engine types.

 Extract text from a given source using the specified OCR engine [More info](#)

#### Select parameters

OCR engine type:  *i*

OCR source:  *i*

Search mode:  *i*

▼ **OCR engine settings**

Use other language:  *i*

Language abbreviation:  {x} *i*


Language data path:   {x} *i*

Image width multiplier:  {x} *i*

Image height multiplier:  {x} *i*

> **Variables produced** OcrText

# Print images

Article • 02/24/2023

Although Power Automate enables you to print documents using the **Print document** action, printing image files requires a different approach.

To print an image file, create a batch script that launches Microsoft Paint and prints the selected image file through it. To develop the script, create a new .txt file, copy the following code, and save it as **Image-printing.bat**.

## ⓘ Note

Before saving the script, replace the **Image\_Path** placeholder with the file path of the image you want to print.

Batch

```
@echo off+
```

```
title Print Images
```

```
rem The following command launches Microsoft Paint and prints the selected  
file using the default printer.
```

```
mspaint /p "Image_Path"
```

```
rem The following command ends the Microsoft Paint process.
```

```
taskkill /IM "mspaint.exe"
```

To run the script, use the **Run application** action and populate the path of the batch file in the **Application path** field.



### Run application

Executes an application or opens a document by executing the associated application [More info](#)

Select parameters

Application path:  {x} ⓘ

Command line arguments:  {x} ⓘ

Working folder:  {x} ⓘ

Window style:  ⓘ

After application launch:  ⓘ

> Variables produced **AppProcessId**

Alternatively, you can print image files using the **Run DOS command** action with the following command as an input:

#### ⓘ Note

Before running the flow, replace the **Image\_Path** and **Printer\_Name** placeholders with the file path and the printer's name, respectively.

DOS

```
rundll32 C:\WINDOWS\system32\shimgvw.dll,ImageView_PrintTo "Image_Path"  
"Printer_Name"
```

# Identify a window by its handle

Article • 02/24/2023

It's common in flow development to create flows that use several windows with the same title and class.

Power Automate enables users to distinguish identical windows using handles. Handles are numbers that uniquely identify each window.

To retrieve the handle of a window, launch the application with the **Run application** action and set the **After application launch** drop-down menu to **Wait for application to load**. The handle is stored by default in a variable named **WindowHandle**.

### Run application ✕

▶ Executes an application or opens a document by executing the associated application [More info](#)

#### Select parameters

Application path:  {x} i

Command line arguments:  {x} i

Working folder:  {x} i

Window style:  ▼ i

After application launch:  ▼ i

Timeout:  {x} i

▼ Variables produced


**AppProcessId** {x}  
The process ID output

**WindowHandle** {x}  
The window handle. When opening a new window, this will catch the value of the window handle, and store it in this variable. A window handle is useful to specifically identify a window in a later action



Alternatively, you can use the **Get details of a UI element in window** action to retrieve the handle from an already open window.


Select to retrieve the attribute **parentwindowhandle** from a random element within the window. The retrieved attribute is stored by default in a variable named **AttributeValue**.

### Get details of the UI element in window ✕

 Gets the value of a UI element's attribute in a window [More info](#)

Select parameters

UI element:   

Attribute name:  

Variables produced

AttributeValue {x}  
The value of the UI element's text

On error Save Cancel

#### Note

The **Get details of a UI element in window** action requires a UI element that specifies the selected element in the window. You can find more information regarding UI elements in [Automate using UI elements](#).

You can use handles to manipulate windows through the following Windows actions of the UI automation group:

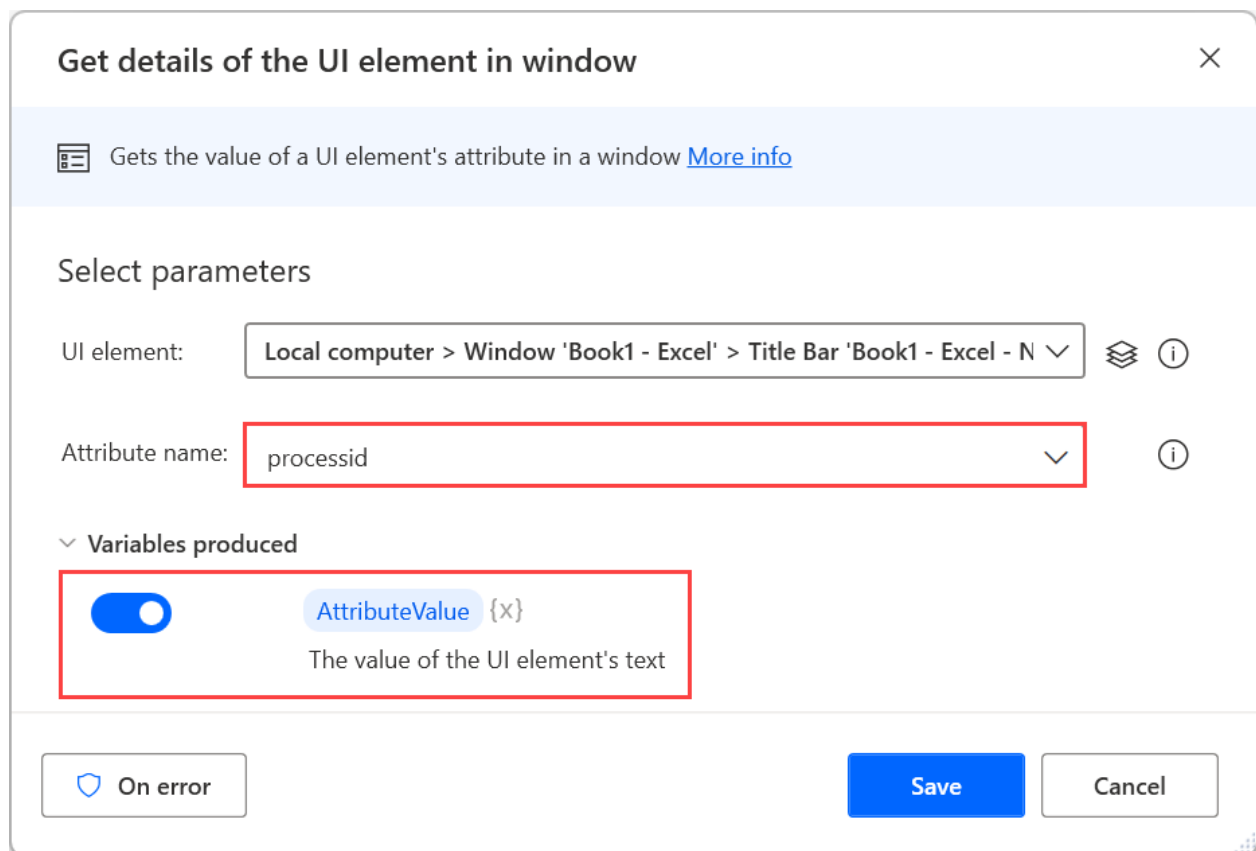
- [Focus window](#)
- [Set window state](#)
- [Set window visibility](#)
- [Move window](#)
- [Resize window](#)
- [Close window](#)

# Close any window through its process ID

Article • 02/24/2023

When you handle desktop application, you may meet scenarios in which applications don't have static titles or have the same title as other windows. Power Automate allows users to close these applications using their process ID.

To get the process ID of a window, use the **Get details of a UI element in window** action and retrieve the attribute **processid** from a random element within the window. The retrieved attribute is stored by default in a variable named **AttributeValue**.



The screenshot shows the configuration interface for the 'Get details of the UI element in window' action. The title bar includes the action name and a close button. Below the title is a description: 'Gets the value of a UI element's attribute in a window' with a 'More info' link. The 'Select parameters' section contains two fields: 'UI element' with a dropdown menu showing the path 'Local computer > Window 'Book1 - Excel' > Title Bar 'Book1 - Excel - N', and 'Attribute name' with a dropdown menu set to 'processid'. Below this is a 'Variables produced' section with a toggle switch turned on, showing a variable named 'AttributeValue' with a description 'The value of the UI element's text'. At the bottom, there are three buttons: 'On error' (with a shield icon), 'Save', and 'Cancel'.

## ⓘ Note

The **Get details of a UI element in window** action requires a UI element that specifies the selected element in the window. You can find more information regarding UI elements in [Automate using UI elements](#).

To close the window, use the **Terminate process** action and set it to stop the process with the previously retrieved ID.


## Terminate process



⊗ Immediately stops a running process [More info](#)

### Select parameters

Specify process by:  

Process ID:  

 On error

Save

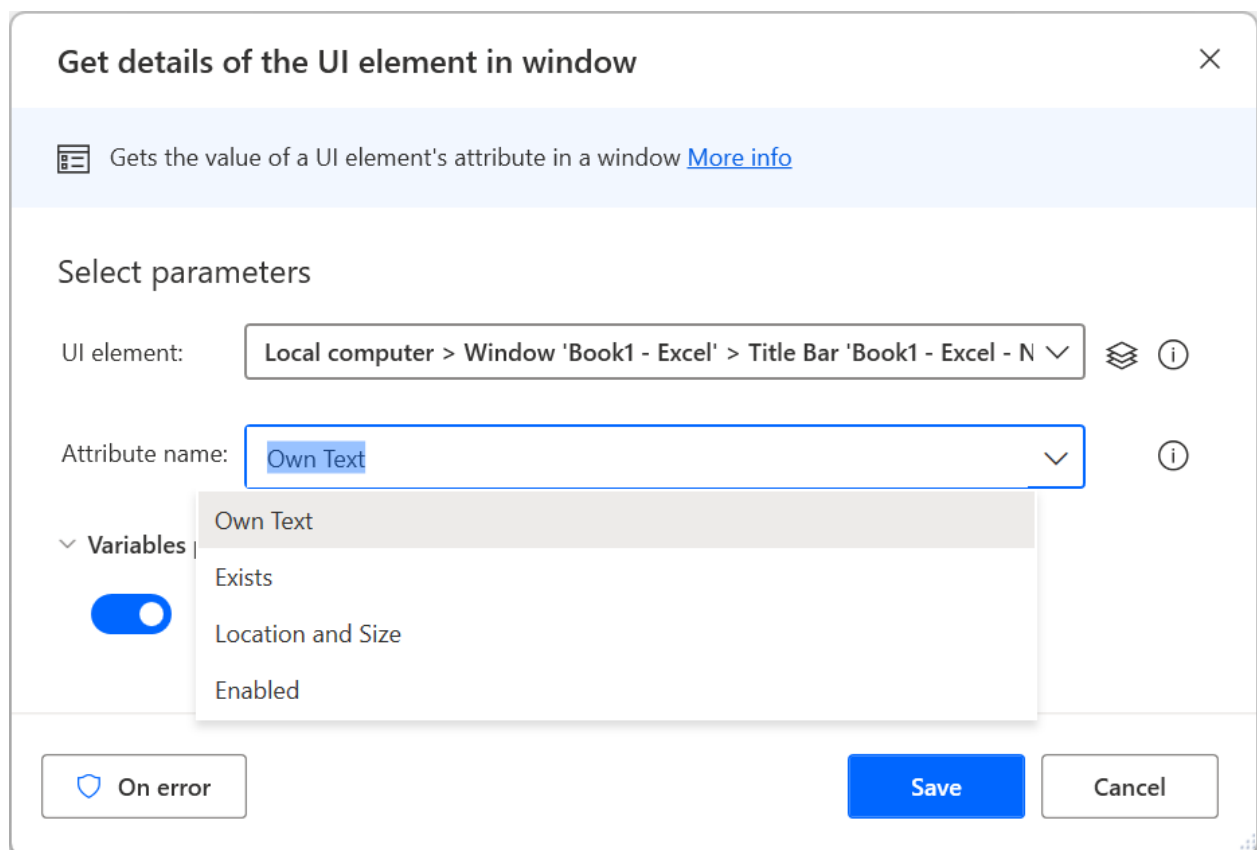
Cancel

# Extract attributes from window elements

Article • 02/24/2023

The **Get details of a UI element in window** action enables users to retrieve the values of various attributes that window elements may have.

These values can be used in various operations, such as [managing windows by their handles](#) and [closing windows through their process IDs](#).



Apart from the four predefined attributes that the action provides, you also retrieve the following attributes:

Attribute	Description
Acceleratorkey	The accelerator key combinations for the automation element.
Accesskey	The access key that allows you to quickly navigate to the web server control.
bulktext	The text of the element regardless of whether the element or its subelements are hidden or not.
class	The class of the element.

<b>Attribute</b>	<b>Description</b>
controltype	The control tyoe of the element.
haskeyboardfocus	Indicates whether the element has keyboard focus
helptext	The help text of the element.
id	The id of the element.
iscontentelement	Indicates whether the element is a content element.
iscontrolelement	Indicates whether the element is a control element.
lskeyboardfocusable	Indicates whether the element is keyboard focusable.
isoffscreen	Indicates whether the element is visible on the screen.
ispassword	Indicates whether the element is a password.
localizedcontroltype	A localized description of the control type.
name	The name of the element.
parentwindowhandle	The handle of the parent window.
processid	The process ID of the parent window.
processname	The process name of the parent window.
windowtitle	The title of the parent window.

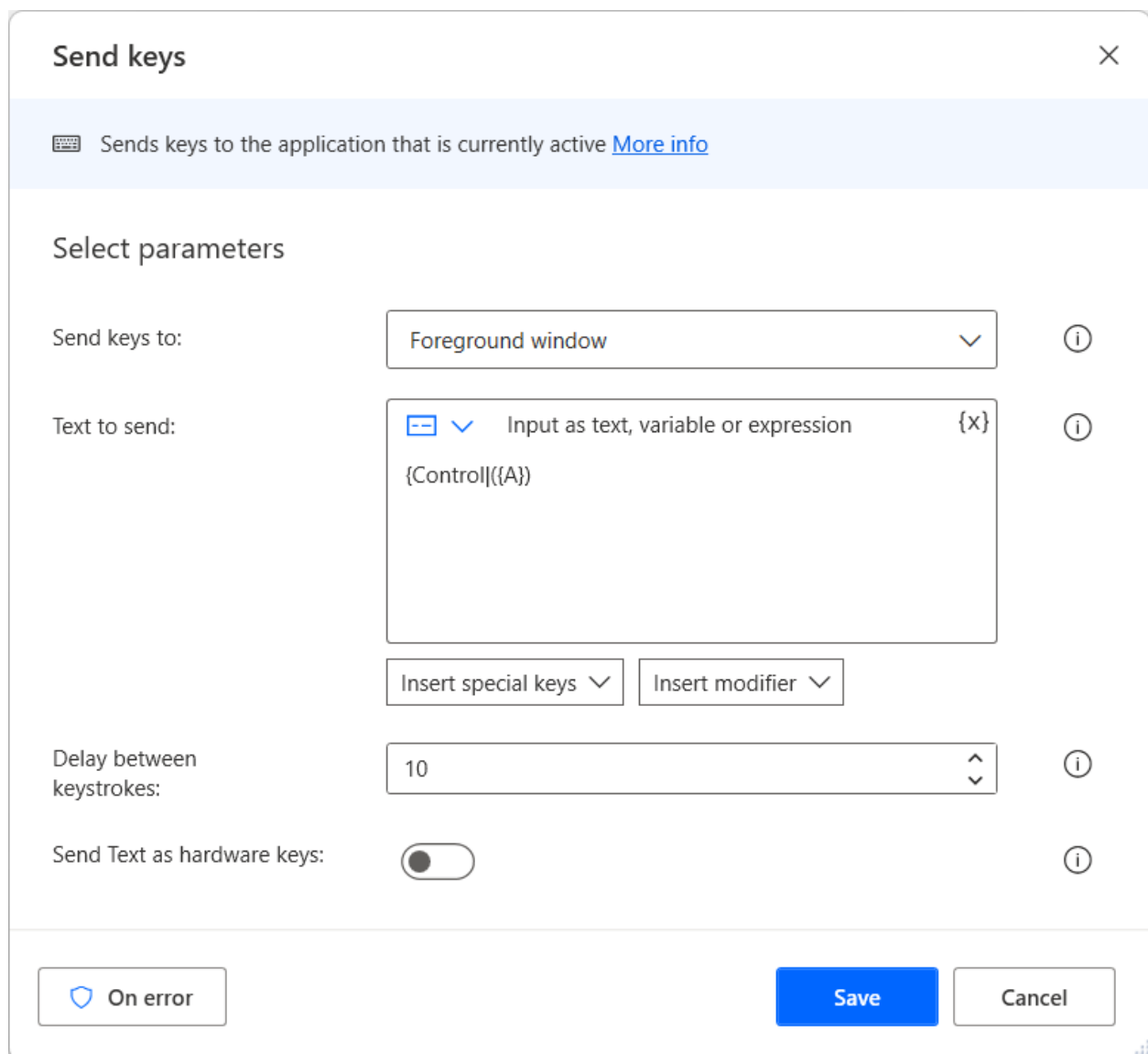


# Ensure that application windows become focused

Article • 02/24/2023

Although Power Automate provides the **Focus window** action, depending on the nature of the selected application, the action may not bring the window to focus.

To verify that the **Focus window** action can't bring a specific window to focus, send some keystrokes using the **Send keys** action. If the window isn't focused, the keystrokes won't work as expected.



The screenshot shows the 'Send keys' configuration window. At the top, it says 'Sends keys to the application that is currently active' with a 'More info' link. Under 'Select parameters', there are several fields: 'Send keys to:' is set to 'Foreground window'; 'Text to send:' is set to '{Control|({A})' with a dropdown menu open showing 'Input as text, variable or expression'; 'Delay between keystrokes:' is set to '10'; and 'Send Text as hardware keys:' is a toggle switch that is currently off. At the bottom, there are buttons for 'On error', 'Save', and 'Cancel'.

To ensure that the window will become focused, send a click on it after deploying the **Focus window** action. Depending on the scenario, you can use either of the following actions to send a click on the window:

- [Click UI element in window](#)
- [Move mouse to image](#) - Enable the **Send a click after moving mouse** option

- [Send mouse click](#)
- [Move mouse to text on screen \(OCR\)](#) - Enable the **Send a click after moving mouse** option

ⓘ **Note**

You can find more information regarding sending keystrokes in **Automate applications using keyboard shortcuts**.

# Get the position and size of a window

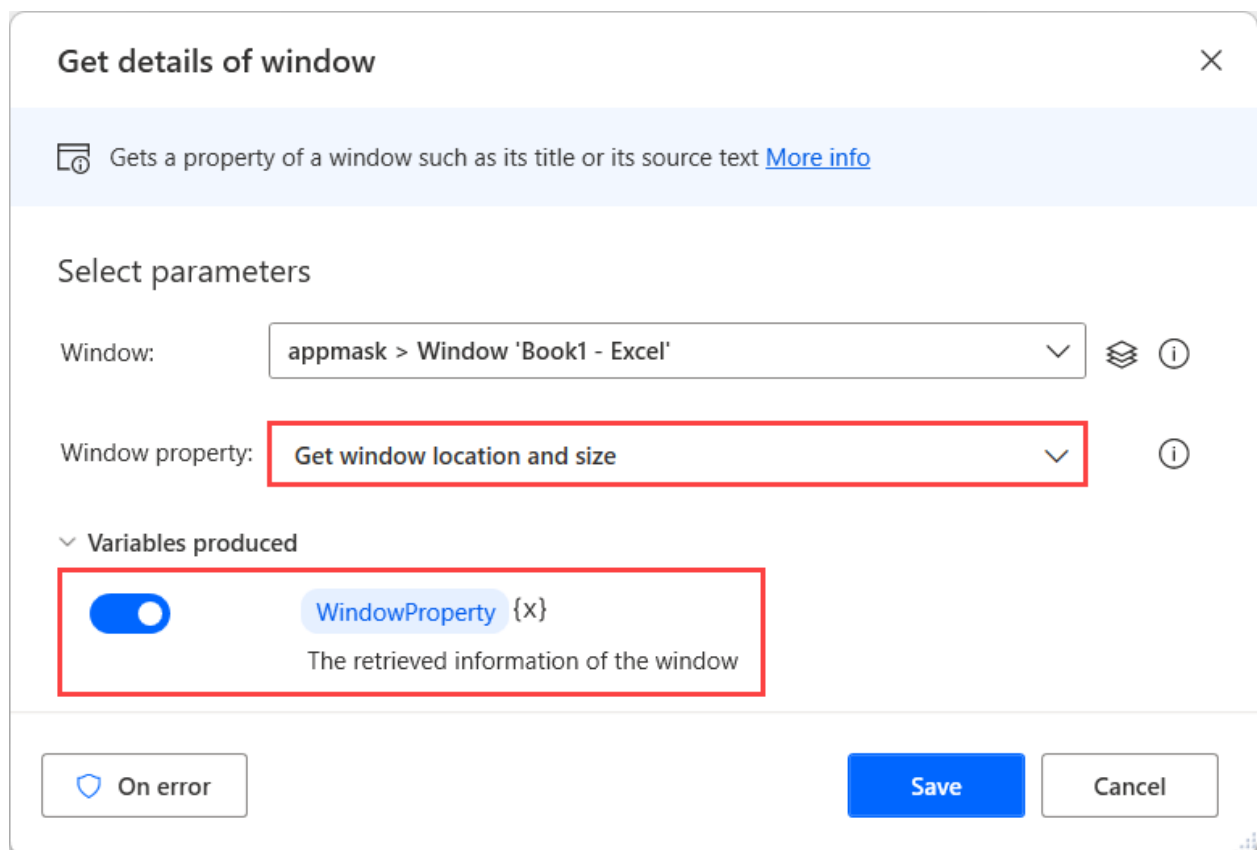
Article • 02/24/2023

When you automate windows and desktop applications, you may need to know the exact position and size of a window.

To retrieve this information, use the **Get details of window** action and set the **Window property** option to **Get window location and size**. The action stores the retrieved values in a text variable named **WindowProperty**.

## ⓘ Note

The **Get details of window** action requires a UI element that specifies the window from which it will retrieve the selected attribute. You can find more information regarding UI elements in [Automate using UI elements](#).



The screenshot shows the configuration interface for the 'Get details of window' action. The title bar reads 'Get details of window' with a close button. Below the title bar is a description: 'Gets a property of a window such as its title or its source text' with a 'More info' link. The 'Select parameters' section contains two dropdown menus: 'Window:' is set to 'appmask > Window 'Book1 - Excel'' and 'Window property:' is set to 'Get window location and size'. The 'Variables produced' section is expanded, showing a toggle switch turned on and a variable named 'WindowProperty {x}' with the description 'The retrieved information of the window'. At the bottom, there is an 'On error' dropdown, a blue 'Save' button, and a 'Cancel' button.

After retrieving the **WindowProperty** text value, you have to split it into separate values and convert them to numbers.

To split the text value, deploy the **Split text** action and separate the values using the comma character (,) as a delimiter. The separated values are stored in a list variable named **TextList**.

### Split text

Creates a list containing the substrings of a text that is separated by a specified delimiter or a regular expression [More info](#)

Select parameters

Text to split:  {x} ⓘ

Delimiter type:  ⓘ

Custom delimiter:  {x} ⓘ

Is regular expression:

Variables produced

**TextList** {x}  
The new list

Before converting the texts to numbers, use the **Create new list** action to create a list that will store the converted numbers in the following steps.

### Create new list

+ Create a new empty list [More info](#)

Variables produced

**List** {x}  
The new list

To access each item of the **TextList** independently, deploy a **For each** loop.

### For each

Iterates over items in a list, data table or data row, allowing a block of actions to be executed repeatedly [More info](#)

Select parameters

Value to iterate:  {x} ⓘ

Store into:  {x}

Inside the loop, use a **Convert text to number** action to convert the current text item of the loop to number.

### Convert text to number

Converts a text representation of a number to a variable that contains a numeric value [More info](#)

Select parameters

Text to convert:  {x} ⓘ

Variables produced

{x}  
The new numeric value

Next, use the **Add item to list** action to store the produced number to the previously created list.

**Add item to list** ×

Append a new item to a list [More info](#)

Select parameters

Add item:  {x} ⓘ

Into list:  {x} ⓘ

**Save** **Cancel**

To access the final position and size values later in your flow, use the following notations:

- **List[0]** - The left point of the window
- **List[1]** - The top point of the window
- **List[2]** - The width of the window
- **List[3]** - the height of the window

To calculate the right and bottom points of the window, you can use the following expressions:

- **%List[0] + List[2]%** - The right point of the window
- **%List[1] + List[3]%** - The bottom point of the window

#### ⓘ Note

You can find more information about lists and the **VariableName[ItemNumber]** notation in **Variable datatypes**.

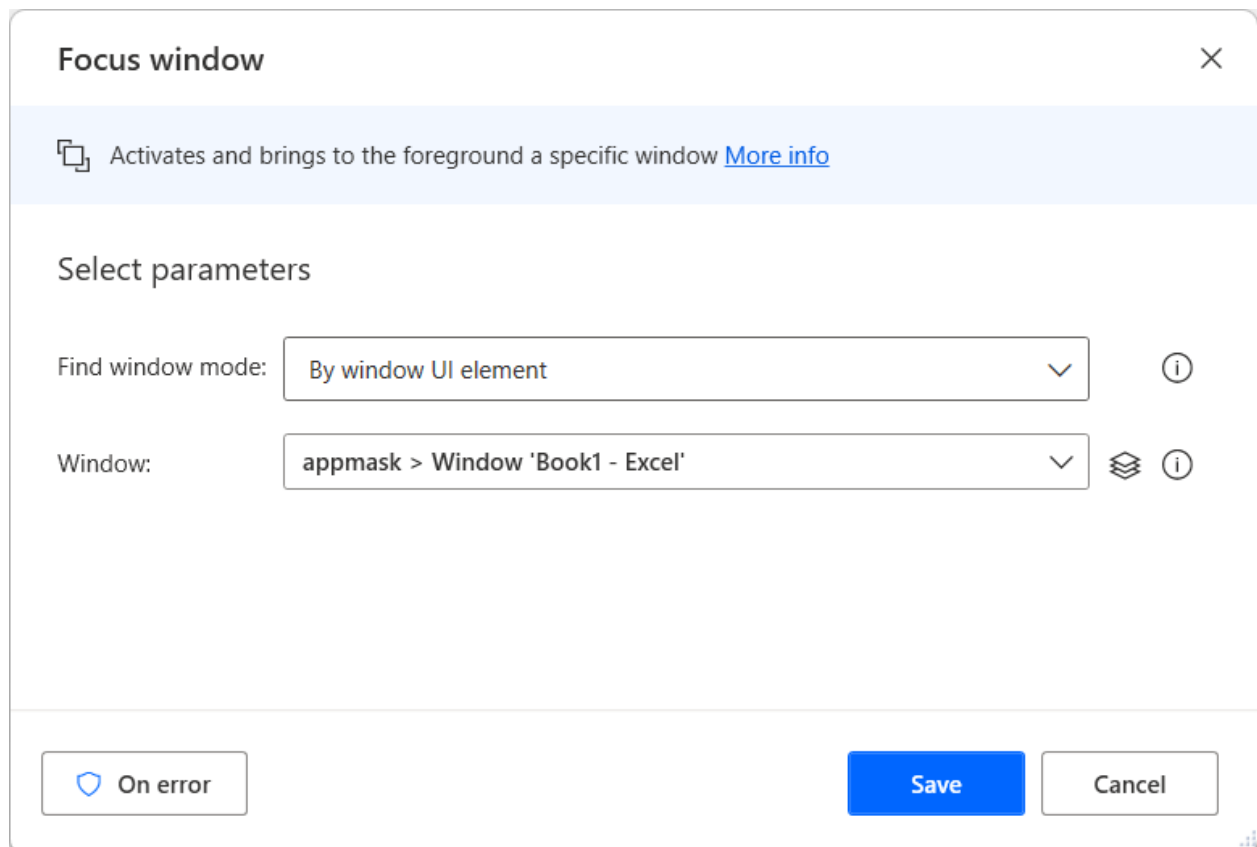
# Automate applications using keyboard shortcuts

Article • 02/24/2023

Many desktop applications provide keyboard shortcuts that make multi-step tasks easy and fast to perform. Power Automate allows you to apply these shortcuts to create shorter and less complicated flows.

## 📘 Important

Before sending keystrokes to an open application, use the **Focus window** action to activate the respective window. To select a specific element in the window, use the appropriate UI automation action, such as the **Click UI element in windows** action.



The screenshot shows the configuration interface for the 'Focus window' action. At the top, the title 'Focus window' is displayed with a close button (X). Below the title, a description reads: 'Activates and brings to the foreground a specific window' followed by a 'More info' link. The 'Select parameters' section contains two dropdown menus: 'Find window mode:' set to 'By window UI element' and 'Window:' set to 'appmask > Window 'Book1 - Excel''. Each dropdown has an information icon (i) to its right. At the bottom, there are three buttons: 'On error' (with a shield icon), 'Save' (in blue), and 'Cancel'.

When the window is activated or the required element is selected, use the **Send keys** action to send the intended keystrokes.

To send a key, enclose its name inside curly brackets ({}). The curly brackets notation makes the action simulate the key's physical press. To populate hardcoded text values in a field, enter the respective text without any notations.

### ⓘ Note

To send a specific key multiple times, you can use the following expression instead of entering the key numerous times: **{Key:numberOfTimes}**.

Apart from sending keys individually, you can use the **Send keys** action to send combinations of keys. To achieve this functionality, enclose the modifier inside curly brackets and the rest of the keys inside a pair of parentheses. The parentheses indicate that the keys inside them will be pressed simultaneously with the modifier key.

For example, you can use the **Ctrl + B** shortcut to apply bold formatting in the currently selected Excel cell. To use this shortcut, populate the **Text to send** field of the **Send keys** action with the following expression: **{Control}({B})**

**Send keys** [Close]

🖨️ Sends keys to the application that is currently active [More info](#)

Select parameters

Send keys to:  ⓘ

Text to send:  ⓘ

Insert special keys  Insert modifier

Delay between keystrokes:  ⓘ

Send Text as hardware keys:  ⓘ

### ⓘ Note

You can find all the available Excel keyboard shortcuts in [this article](#).





# Automate with mouse, keyboard, and OCR actions (recommended for automation in VDI)

Article • 02/24/2023

For cases that a user isn't able to access the UI elements of web or UI applications and thus can't automate using Browser or UI actions or the recorders, it's strongly recommended to use alternative methods of automation such as the use of Images or mouse and keyboard.


The image method, captures sections of the screen which are then used as references to perform clicks, send text and mouse clicks. Image-based automation can be either recorded by the [image-based recorder](#) or developed manually. Read more on how to automate using images in [this topic](#).

Conversely, for cases that an image can't be used as a point of reference, consider using the OCR capabilities to navigate through the screen. Information on OCR capabilities can be found in the respective [actions reference](#).

In both alternatives described above, the best way to navigate is using mouse clicks and keystrokes which are explained in the [actions reference](#).

Before building your automation, ensure that the appropriate window is focused and maximized using the **Focus window** and **Set window state** actions.

### Focus window ✕

 Activates and brings to the foreground a specific window [More info](#)

Select parameters

Find window mode:  ⓘ

Window:  ☰ ⓘ

If you need to wait for specific components to load before running an action, use the wait group of actions.

Use the **Wait** action to wait for a set amount of time, the **Wait for image** action to wait for an image to appear/disappear, or the **Wait for text on screen (OCR)** action to wait for a text to appear/disappear.

### Wait for text on screen (OCR) ✕

i The 'OCR engine variable' as an engine type is going to be deprecated. Make sure you update your flows using alternative OCR engine types.

⌚ Wait until a specific text appears/disappears on the screen, the foreground window, or relative to an image on the screen or foreground window using OCR [More info](#)

#### Select parameters

Wait for text to:  i

OCR engine type:  i

Text to find:  {x} i

Is regular expression:  i

Search for text on:  i

Search mode:  i

> **OCR engine settings**

Fail with timeout error:  i

> **Variables produced** LocationOfTextFoundX LocationOfTextFoundY

🛡️ On error

Save

Cancel

To navigate through the web page or application and interact with its components, use the mouse and keyboard actions.

For example, deploy the **Send keys** action to use the available keyboard shortcuts, or the **Move mouse to image** and **Move mouse to text on screen (OCR)** actions to move the cursor to a specific image or text, respectively.


**Move mouse to image**
✕

🖱️ Moves the mouse over an image found on screen or on the foreground window [More info](#)

### Select parameters

Image to move mouse to

🖼️ Save button
⋮


(i)

🖼️ Select image(s)

Mouse movement style: Instant (i)

Occurrence: 1 (i)

Send a click after moving mouse:  (i)

> **Advanced**

> **Variables produced** X Y

🛡️ On error


Save

Cancel

To retrieve text from the screen and store it into a variable, deploy either the clipboard actions or the **Extract text with OCR** action. To store a text in the clipboard, highlight the text using either the **Send keys** or the **Send mouse click** action.

You can configure the **Send keys** action to send the **CTRL + A** keyboard shortcut that selects all the text on the web page or application.

## Send keys ✕

 Sends keys to the application that is currently active [More info](#)

### Select parameters

Send keys to:  ⓘ

Text to send:   
{Control}{{A}} ⓘ

Delay between keystrokes:  ⓘ


Send Text as hardware keys:  ⓘ

### ⓘ Note

You can find more information regarding automation using keyboard shortcuts in [Automate applications using keyboard shortcuts](#).

Alternatively, you can use the **Send mouse click** action to send a **Left button down** at the beginning of the text you want to select and then a **Left button up** at the end.

### Send mouse click ✕

 Sends a mouse click event [More info](#)

Select parameters


Mouse event to send:  ⓘ

Wait:  ⓘ

Move mouse:  ⓘ

After highlighting, deploy the **Send keys** action to send the **CTRL + C** keyboard shortcut that stores the selected text in the clipboard. After storing the text in the clipboard, use the **Get clipboard text** action to store the clipboard content into a variable.

### Get clipboard text ✕

 Gets clipboard text [More info](#)

Variables produced

**ClipboardText** {x}  
The text stored in the clipboard

# Access elements that depend on how the window appears on the screen

Article • 02/24/2023

There are cases where Power Automate can't detect UI elements if they aren't visible on the computer screen.

These elements may be located in areas not directly visible on the screen or may not appear on the window at all. An element may be missing because the window's zoom level isn't suitable or the screen resolution is low.

To resolve this issue, you can:

- Increase the resolution of the screen manually or using the **Set screen resolution** action.

**Set screen resolution** ×

Sets the width, height, bit count and frequency of a selected monitor [More info](#)

Select parameters

Available screen resolutions ▾

Monitor number:  {x} ⓘ

Monitor width:  {x} ⓘ

Monitor height:  {x} ⓘ

Monitor bit count:  {x} ⓘ

Monitor frequency:  {x} ⓘ

On error Save Cancel

## ⓘ Important

To use the **Set screen resolution** action in flows triggered through the Power Automate portal, you have to be connected to the console session of your



machine, where you can manually change the screen resolution. For example, you can use your machine's physical screen to connect to the machine. In remote sessions, such as unattended scenarios that use remote desktop clients, the action has no effect, as users can't manually change the resolution.

- Maximize the window of the application using the **Set window state** action.

**Set window state** [Close]

Restores, maximizes or minimizes a specific window [More info](#)

Select parameters

Find window mode: By window UI element [Info]

Window: appmask > Window 'Contoso Invoicing' [Info]

Window state: **Maximized** [Info]

[On error] [Save] [Cancel]

- Zoom in or out of the window.

In some cases, you can create dynamic selectors that adapt to the state of the window or application. You can find more information about dynamic selectors in [Build a custom selector](#).

# Automate Java applications

Article • 11/08/2023

Currently, Power Automate for desktop supports the use of UI automation in all Java apps and applets for the following Java versions:

- Java apps: Java version 7 and above.
- Java applets: Java version 7 and version 8.

The following sections include information for enabling the UI automation in Java applets.

## Installing Java configuration

In order to automate Java applications, particular settings must be in place.

To install the Java configuration manually, after Power Automate for desktop has been installed, navigate to the installation folder (C:\Program Files (x86)\Power Automate Desktop) and run the **PAD.Java.Installer.exe** as an administrator.

Logs for Java automation with Power Automate for desktop can be found in the %temp%/ java\_automation\_log folder (for example, C:\Users\username\AppData\Local\Temp\java\_automation\_log).

## Utilization of the default UI automation instead of Java UI automation

To prevent the [recorder](#) and the [UI element picker](#) from recognizing Java elements built with the SWT framework and make them work with the default desktop UI elements:

- Edit the configuration file located under the machine's Program Files: **Power Automate Desktop\Microsoft.Flow.RPA.Desktop.UIAutomation.Plugin.Java.dll.config**.
- Set the **BlockSwt** property to **true**.

## Uninstalling Java configuration

To uninstall the Java configuration (revert all changes applied to the machine by the Java installer):

1. Launch the Command Line tool (cmd)

2. Run the following command:

```
CMD

PAD.Java.Installer.exe -u
```

## Troubleshooting

If you come across any issues while automating Java applications:

1. Make sure that you have Java installed on your machine:

- Open the Command Line tool (cmd) and run the following command:

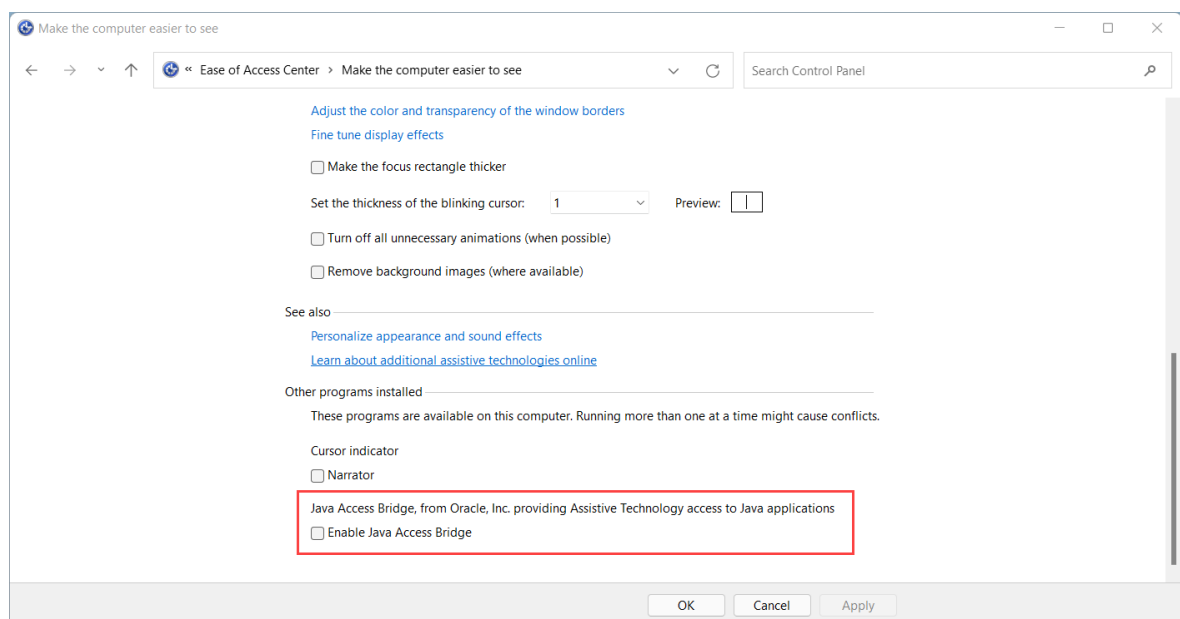
```
CMD

java -version
```

- If Java isn't installed on your machine, you'll receive an error message similar to: **'java' is not recognized as an internal or external command, operable program or batch file.**

2. The Java Access Bridge option from the Control Panel should be disabled:

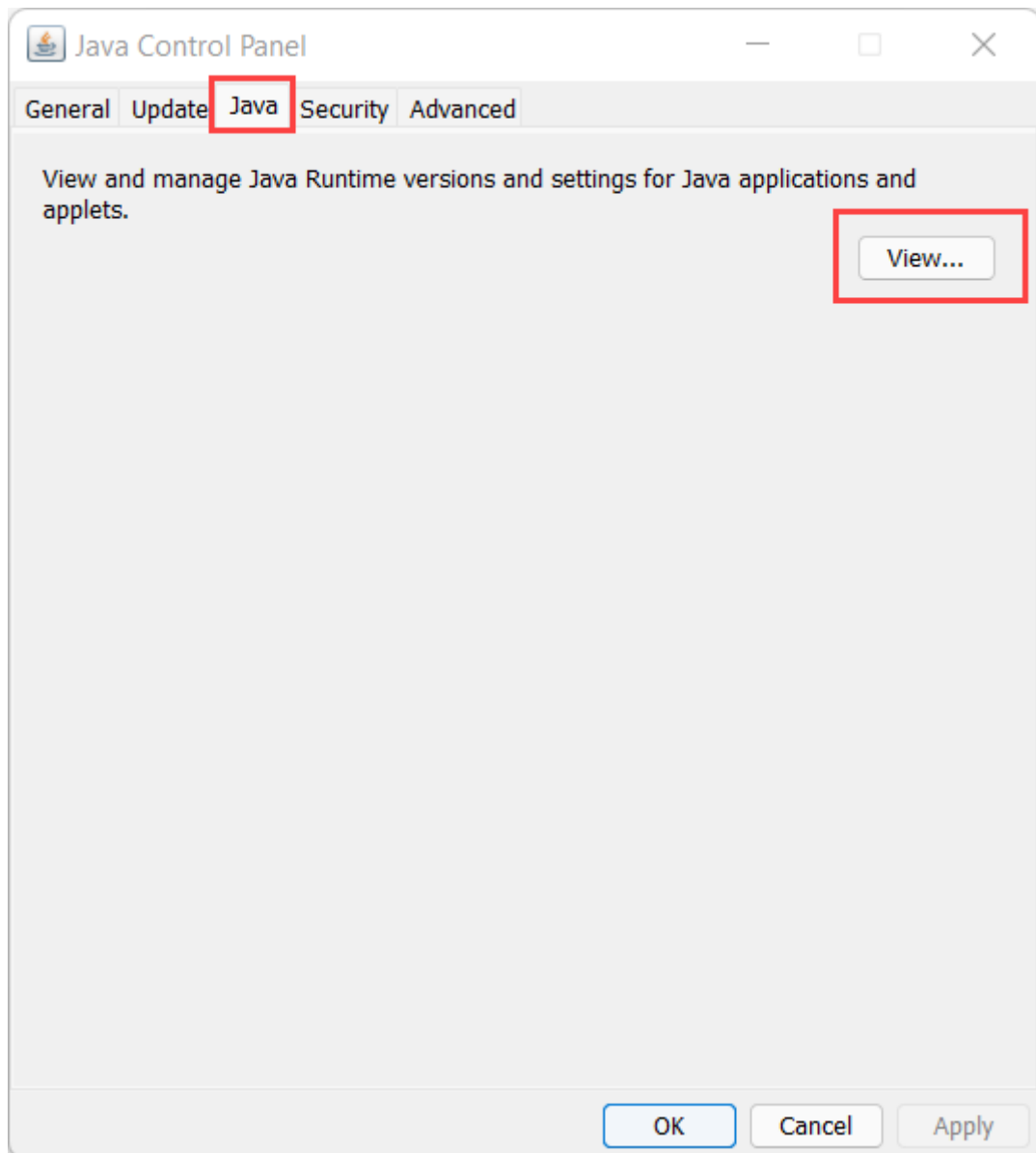
Navigate to **Control Panel -> Ease of Access -> Optimize visual display -> Java Access Bridge from Oracle, Inc. Providing Assistive Technology access to Java applications** and disable (uncheck) the **Enable Java Access Bridge** option.



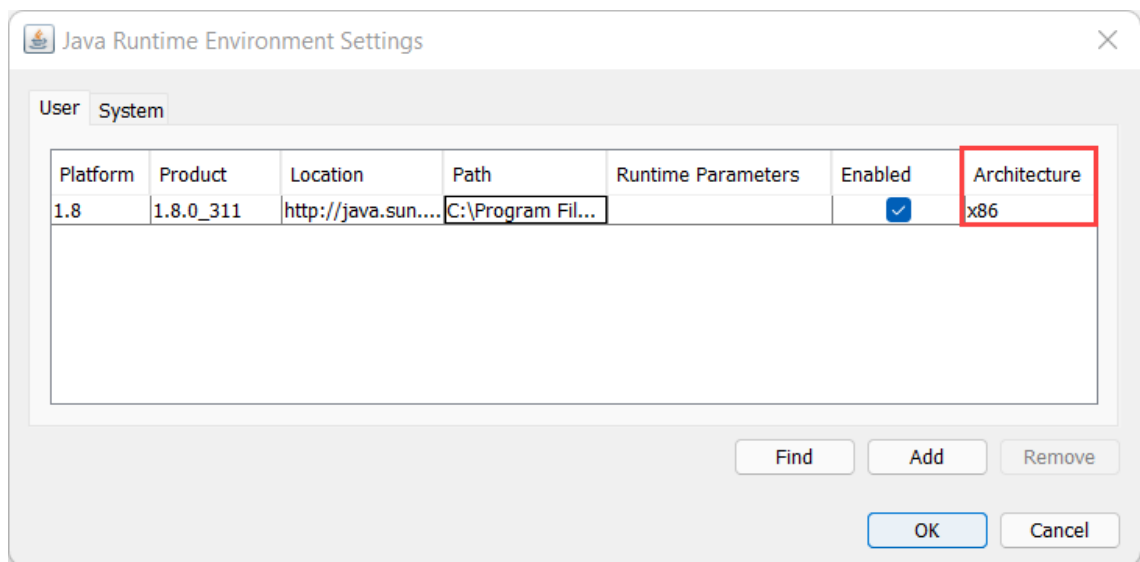
3. Specific files have to exist in the Java folder(s) of the machine after the Power Automate for desktop installation.

To check the installed Java version and installation path on your machine:

- a. Type **Configure Java** in the Search bar of Windows
- b. Launch the Java Control Panel
- c. Navigate to the **Java** tab and select **View**



d. Check the values in the **Path** column. The row with **Architecture** equal to **x86** refers to a 32-bit Java installation, while the row with value **x86x64** refers to a 64-bit Java installation.



Additionally, you can check the following files:

For 64-bit Java installation:

- File **Microsoft.Flow.RPA.Desktop.UIAutomation.Java.Bridge.Native.dll** should have been replaced in the folder **C:\Program Files\Java\jre1.8.0\_271\bin**. (jre1.8.0\_271 could be replaced with your machine's Java installation)
- File **accessibility.properties** should have been replaced in the folder **C:\Program Files\Java\jre1.8.0\_271\lib**. (jre1.8.0\_271 could be replaced with your machine's Java installation)

If you edit the file with a notepad, it should have the following value:  
**assistive\_technologies=com.sun.java.accessibility.AccessBridge,  
 microsoft.flows.rpa.desktop.uiautomation.JavaBridge**

- File **PAD.JavaBridge.jar** should have been inserted in the folder **C:\Program Files\Java\jre1.8.0\_271\lib\ext**. (jre1.8.0\_271 could be replaced with your machine's Java installation)

For 32-bit Java installation:

- Same actions for the same files as above but in the folder path **C:\Program Files (x86) \Java\...**

4. Make sure that there isn't an **.accessibility.properties** file present in your user folder. Check if a file named **.accessibility.properties** is present in the **C:\Users\user** folder. If yes, then rename it.



5. Ensure that **VC\_redist.x64.exe** and/or **VC\_redist.x86.exe** have been run.

App list

Microsoft visual ✕

Sort by: Name ▾ Filter by: All drives ▾

4 apps found

	Microsoft Visual C++ 2015-2019 Redistributable (x64) - 14.29.30133 14.29.30133.0   Microsoft Corporation   10/15/2021	20.1 MB	<span>⋮</span>
	Microsoft Visual C++ 2015-2019 Redistributable (x86) - 14.29.30133 14.29.30133.0   Microsoft Corporation   10/15/2021	17.9 MB	<span>⋮</span>

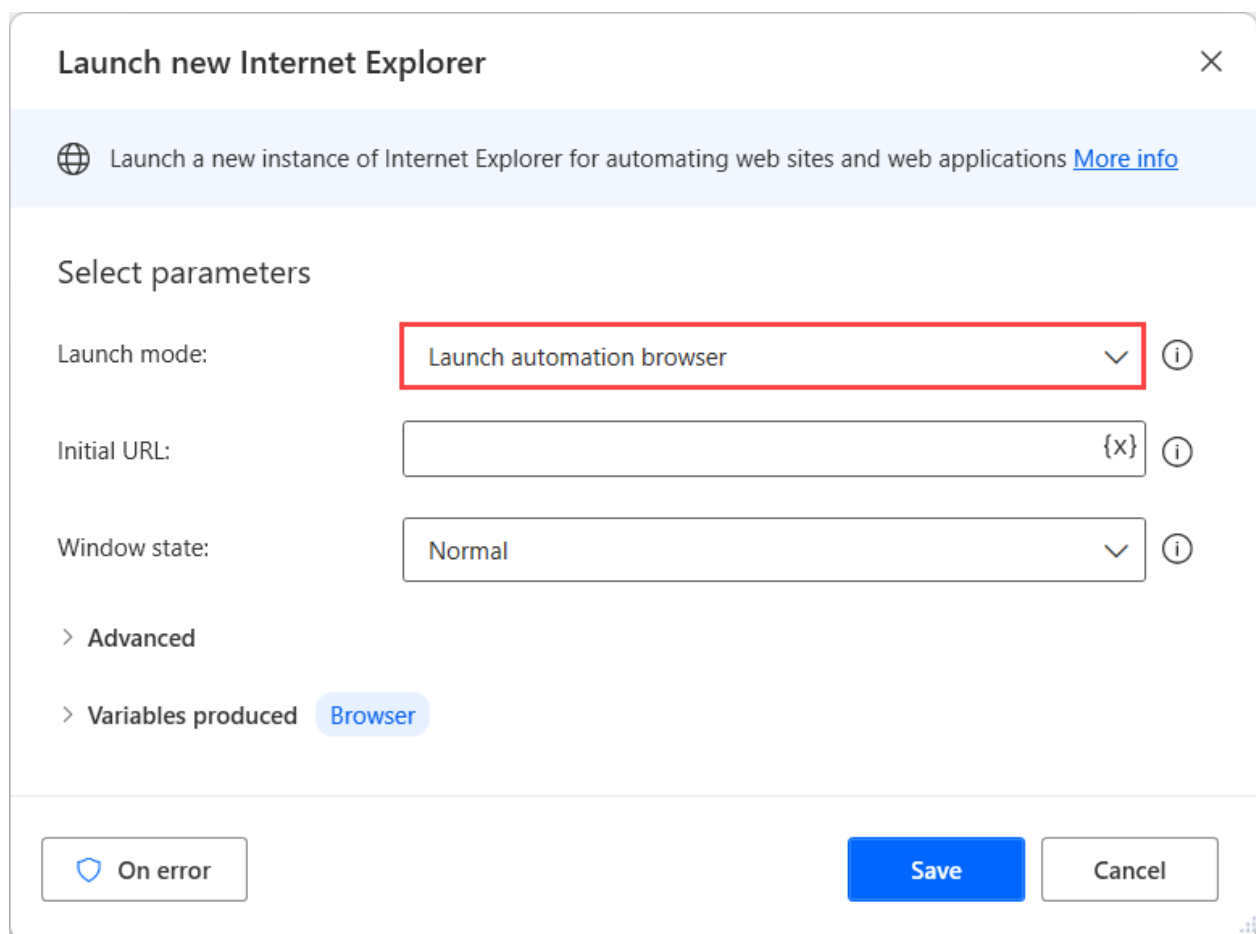
# Handle links that open new tabs

Article • 02/24/2023

Desktop flows use browser instances to pinpoint specific web pages located in specific tabs on browser windows.

If a flow clicks a link that opens a new tab, you have to apply additional configuration to continue automating inside this new tab.

The most straightforward approach is the use of the embedded automation browser that doesn't support tabs. It opens all the links in the same instance.



**Launch new Internet Explorer** [Close]

Launch a new instance of Internet Explorer for automating web sites and web applications [More info](#)

Select parameters

Launch mode: **Launch automation browser** [Info]

Initial URL: [ ] [x] [Info]

Window state: Normal [ ] [Info]

> **Advanced**

> Variables produced **Browser**

[On error] [Save] [Cancel]

## ⓘ Note

You can find more information about the features and limitations of the automation browser in [Use browsers and manage extensions](#).

To navigate back to the previous page, you can use the **Go to web page** action.

If your flow uses Edge, Internet Explorer, Chrome, or Firefox, there are also methods to handle links that open new tabs.

You can retrieve the URL behind the link using the **HRef** option in the **Attribute name** field of the **Get details of element on web page** action. Then, you can navigate to the retrieved link in the same tab using the **Go to web page** action.

The screenshot shows a configuration window titled "Get details of element on web page". At the top, there is a description: "Get the value of an element's attribute on a web page" with a "More info" link. Below this, the "Select parameters" section includes a "Web browser instance" dropdown set to "%Browser%" and an empty "UI element" dropdown. The "Advanced" section has an "Attribute name" dropdown set to "HRef", which is highlighted with a red rectangular box. The "Variables produced" section shows a toggle switch turned on, with a variable named "AttributeValue {x}" and a description: "The value of the web element's attribute". At the bottom, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".


If the link is in JavaScript, you can retrieve the JavaScript function and run it as a URL in the **Go to web page** action. In this case, you should enter **JavaScript:** and the function to run.

Another approach is to click the link and then use the **Attach to running instance** option of the previously mentioned browsers to attach your flow to the newly created tab.



## Launch new Microsoft Edge



 Launch a new instance of Microsoft Edge for automating web sites and web applications [More info](#)

### Select parameters

Launch mode:

Attach to running instance



Attach to Microsoft Edge tab:

By title



Tab title:

{x}



> Advanced

> Variables produced **Browser**

 On error

Save

Cancel

# Retrieve details from a web page

Article • 02/24/2023

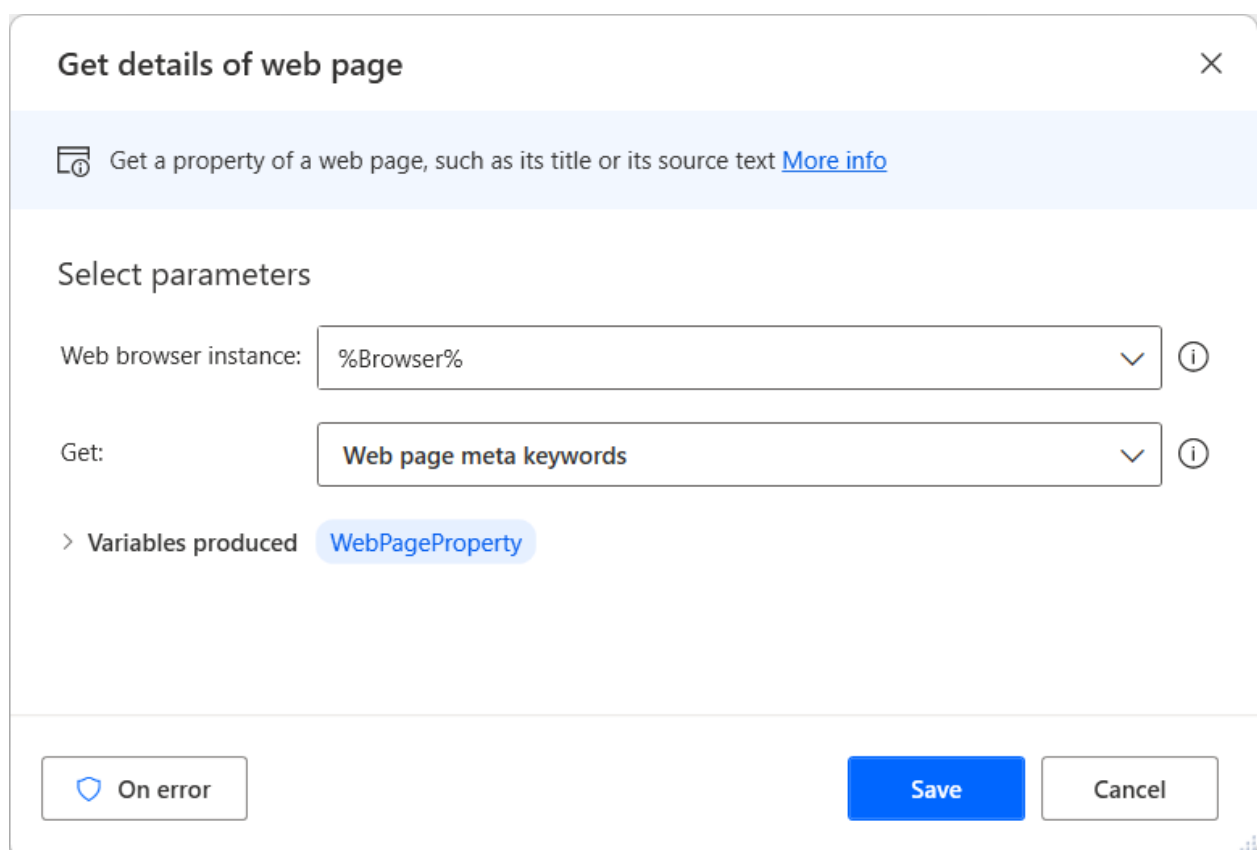
Extracting information regarding web pages is an essential function in most web-related flows. The **Get details of web page** action allows you to retrieve various details from web pages and handle them in your desktop flows.

To use the action, you need an already created browser instance that specifies the web page you want to extract details from. A browser instance can be created with any [browser-launching action](#).

After selecting the appropriate browser instance, choose the information you want to extract from the web page. The **Get details of web page** action offers six different options:

- The description of the web page
- The meta keywords of the web page
- The title of the web page
- The text of the web page
- The source code of the web page
- The URL address of the web page

The retrieved information is stored for later use in a text variable named **WebPageProperty**.



The screenshot shows a configuration window titled "Get details of web page" with a close button (X) in the top right corner. Below the title bar is a light blue header with a document icon and the text "Get a property of a web page, such as its title or its source text [More info](#)".

The main area is titled "Select parameters". It contains two dropdown menus:

- "Web browser instance:" with the value "%Browser%" and an information icon (i).
- "Get:" with the value "Web page meta keywords" and an information icon (i).

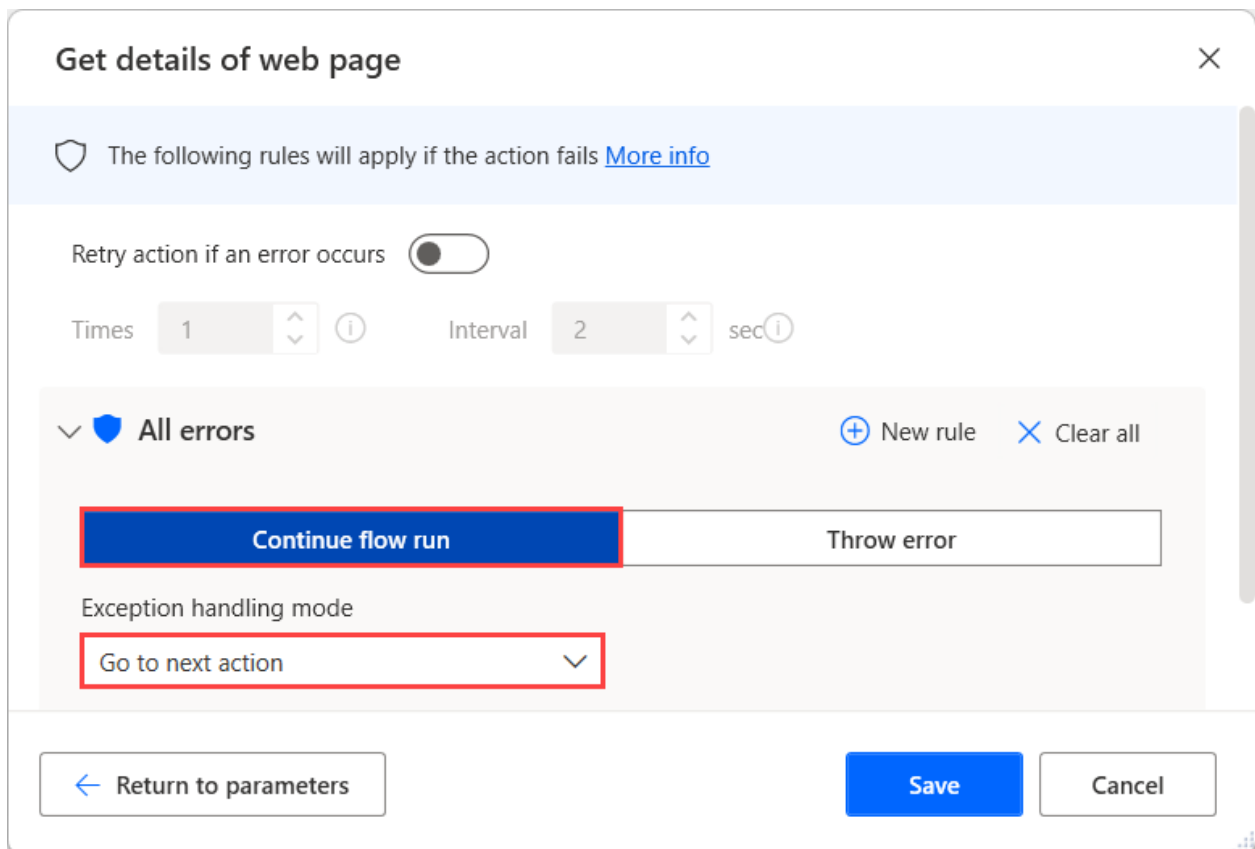
Below these is a section for "Variables produced" with a chevron icon and a blue pill-shaped button labeled "WebPageProperty".

At the bottom, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

# Prevent errors while retrieving details

Although most properties exist virtually on every web page, there are scenarios in which the **Get details of web page** action fails to retrieve the selected detail. For example, web pages without meta keywords are a common occurrence.

If you're unsure if an attribute exists on a web page, configure the **On error** options of the **Get details of web page** action to continue running the flow after failure. To find more information about action error handling, refer to [Handle errors in desktop flows](#).



The screenshot shows the configuration window for the 'Get details of web page' action. At the top, it states 'The following rules will apply if the action fails' with a link to 'More info'. Below this, there is a toggle for 'Retry action if an error occurs' which is currently turned off. Underneath, 'Times' is set to 1 and 'Interval' is set to 2 seconds. A section titled 'All errors' contains two radio buttons: 'Continue flow run' (which is selected and highlighted with a red box) and 'Throw error'. Below the radio buttons, the 'Exception handling mode' is set to 'Go to next action' (also highlighted with a red box). At the bottom of the dialog, there are three buttons: 'Return to parameters', 'Save', and 'Cancel'.

To determine whether the data extraction is successful, use an **If** conditional to check if the **WebPageProperty** variable is empty or not.

The conditional allows you to implement different functionality for the cases of successful and unsuccessful data extraction. You can find more information regarding conditionals in [Use conditionals](#).

The following example subflow retrieves the available meta keywords from a web page and displays them in a message box. If the extraction is unsuccessful, the flow stops and returns an error message.

File Edit Debug Tools View Help Extract keywords from web page | Power Automate

### Actions

Search actions

- > Variables
- > Conditionals
- > Loops
- > Flow control
- > Run flow
- > System
- > Workstation
- > Scripting
- > File
- > Folder
- > Compression
- > UI automation
- > HTTP
- > Browser automation
- > Excel
- > Database
- > Email
- > Exchange
- > Outlook
- > Message boxes
- > Mouse and keyboard

Subflows Main

- 1 **Launch new Microsoft Edge**  
Launch Microsoft Edge, navigate to 'www.microsoft.com' and store the instance into `Browser`
- 2 **Get details of web page**  
Get the `Web page meta keywords` and store it into `WebPageProperty`
- 3 **If `WebPageProperty` is empty then**
- 4  **Stop flow** with error message: 'The flow failed to retrieve meta keywords.'
- 5 **End**
- 6 **Display message**  
Display message 'Retrieved meta keywords: `WebPageProperty` in the notification popup window.'

### Variables

Search variables

Input / output variables 0

There aren't any input or output variables here yet

Flow variables 3

- (x) `Browser`
- (x) `ButtonPressed`
- (x) `WebPageProp...`

Status: Ready 1 Selected action 6 Actions 1 Subflow Run delay 100 ms

Activate V

# Get the coordinates and size of a web element

Article • 02/24/2023

When you automate web applications and web pages, you may need to know the exact location and size of a specific element.

To retrieve this information, create a browser instance and deploy the **Get details of element on web page** action. In the action's properties, set the **Attribute name** option to **waelementrectangle**. The action stores the retrieved values in a text variable named **AttributeValue**.

## ⓘ Note

The **Get details of element on web page** action requires a UI element that specifies the web element from which it will retrieve the selected attribute. You can find more information regarding UI elements in [Automate using UI elements](#).

**Get details of element on web page** ×

🗑️ Get the value of an element's attribute on a web page [More info](#)

Select parameters

Web browser instance: %Browser% ⓘ

UI element: Local computer > Web Page 'h ... /windows11' > Anchor 'windows' ⓘ

Attribute name: waelementrectangle ⓘ

Variables produced

**AttributeValue** {x}

The value of the web element's attribute

🛡️ On error Save Cancel

After retrieving the **AttributeValue** text value, you have to split it into separate values and convert them to numbers.

To split the text value, deploy the **Split text** action and separate the values using the comma character (,) as a delimiter. The separated values are stored in a list variable named **TextList**.

**Split text** ×

Abc def Creates a list containing the substrings of a text that is separated by a specified delimiter or a regular expression [More info](#)

Select parameters

Text to split:  {x} ⓘ

Delimiter type:  {x} ⓘ

Custom delimiter:  {x} ⓘ

Is regular expression:  ⓘ

Variables produced

**TextList** {x}

The new list

Before converting the texts to numbers, use the **Create new list** action to create a list that will store the converted numbers in the following steps.

**Create new list** ×

+ Create a new empty list [More info](#)

Variables produced

**List** {x}

The new list

To access each item of the **TextList** independently, deploy a **For each** loop.

**For each** ✕

Iterates over items in a list, data table or data row, allowing a block of actions to be executed repeatedly [More info](#)

Select parameters

Value to iterate:  {x} ⓘ

Store into:  {x}

Inside the loop, use a **Convert text to number** action to convert the current text item of the loop to number.

**Convert text to number** ✕

Converts a text representation of a number to a variable that contains a numeric value [More info](#)

Select parameters

Text to convert:  {x} ⓘ

Variables produced

{x}  
The new numeric value

Next, use the **Add item to list** action to store the produced number to the previously created list.

**Add item to list** ×

Append a new item to a list [More info](#)

Select parameters

Add item:  {x} ⓘ

Into list:  {x} ⓘ

**Save** Cancel

To access the final coordinates and size values later in your flow, use the following notations:

- **List[0]** - The left point of the web element, relative to the top left corner of the HTML page
- **List[1]** - The top point of the web element, relative to the top left corner of the HTML page
- **List[2]** - The width of the web element
- **List[3]** - the height of the web element

To calculate the right and bottom points of the window, you can use the following expressions:

- **%List[0] + List[2]%** - The right point of the web element
- **%List[1] + List[3]%** - The bottom point of the web element

#### ⓘ Note

You can find more information about lists and the **VariableName[ItemNumber]** notation in **Variable datatypes**.

To find the coordinates of the top left corner of an HTML page, you can use the web browser's instance properties **DisplayRectangleX** and **DisplayRectangleY**.

After storing a browser's instance into a variable named **%Browser%**, use the **%Browser.DisplayRectangleX%** and **%Browser.DisplayRectangleY%** expressions to retrieve the X and Y dimensions.



### Set variable ✕

{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **YDimension** {x}

Value:  {x} ⓘ

**Save**

Additionally, you can retrieve the coordinates specifying the center of a web element using the `waelementcentercoords` attribute in the **Get details of element on web page** action.

# Send physical clicks on a web element

Article • 02/24/2023

There are cases where emulated clicks don't function as expected and don't select links successfully. Sending physical clicks can help you automate web pages that don't support emulated clicks.

To send a physical click:

1. Deploy the **Click link on web page** action and populate a browser instance and the UI element that specifies the link you want to click. You can find more information regarding UI elements in [Automate using UI elements](#).

**Click link on web page** ×

🔗 Click on a link or any other element of a web page [More info](#)

Select parameters

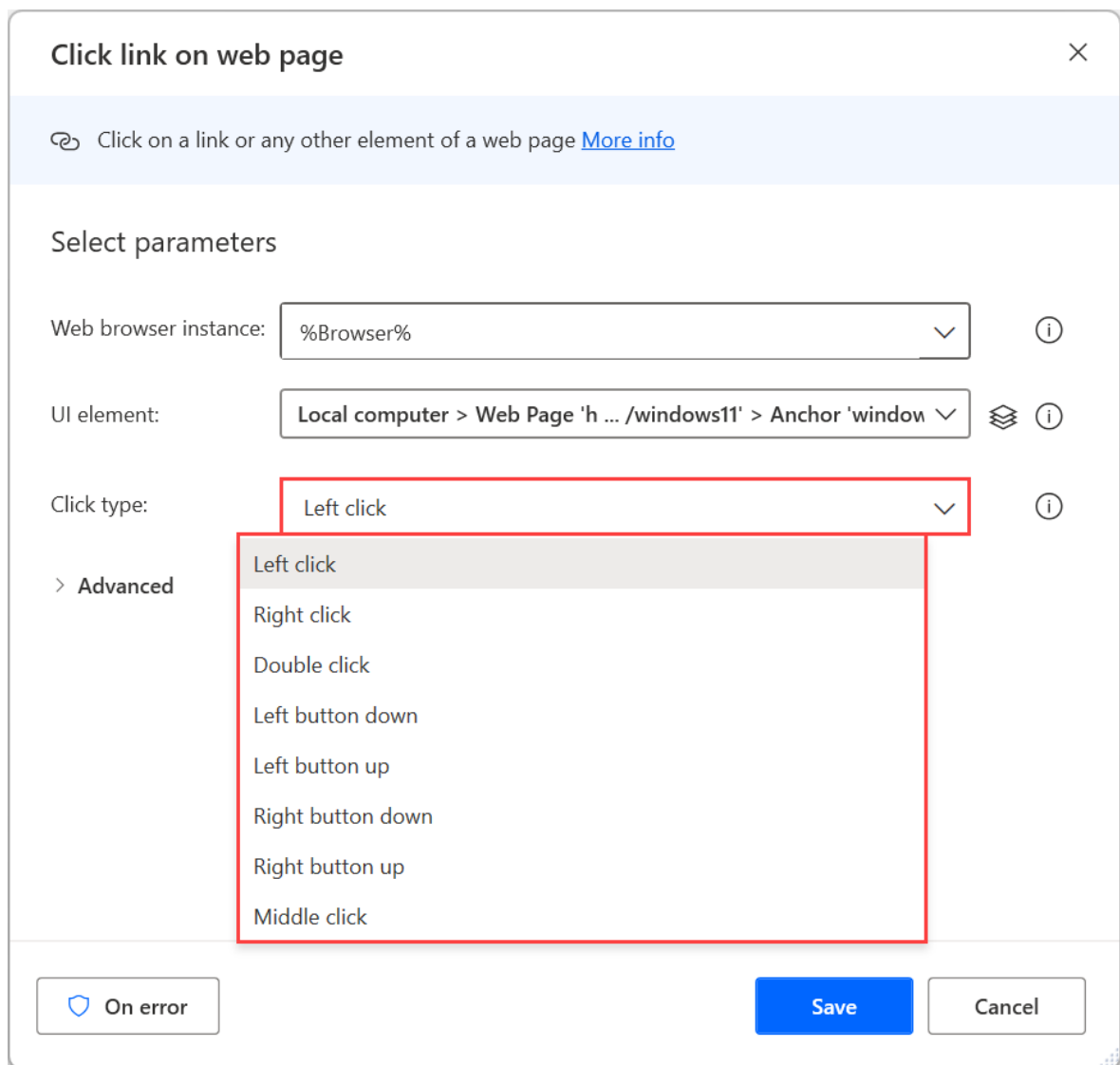
Web browser instance:  ⓘ

UI element:  ⓘ

Click type:  ⓘ

> **Advanced**

2. Choose the type of click you want to perform in the **Click type** field.



3. Extend the **Advanced** settings of the action and enable the **Send physical click** toggle button. This option automatically focuses on the parent window of the link, moves the mouse cursor to the appropriate location, and sends a physical click to the selected link.

## Click link on web page



Click on a link or any other element of a web page [More info](#)

### Select parameters

Web browser instance:

UI element:

Click type:

### Advanced

Send physical click:

Wait for page to load:

Timeout on webpage load:

If a pop-up dialog appears:

Mouse Position Relative To Element: 

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

 Offset X:  {X}   
Offset Y:  {X}

On error

Save

Cancel

# Click all the elements in a list of links

Article • 02/24/2023

In browser automation, it's common to meet scenarios that require you to click all the elements in a list of links.

To automate these scenarios, use the **Extract data from web page** action and extract a random value from two consecutive links. Power Automate will automatically extract the respective value from all the links in the list.

The image shows a screenshot of a web page titled "Product Directory" with a list of links. A red box highlights a "Live web helper" window in the background, which displays an "Extraction preview" of the links from the page. The preview shows a list of 12 URLs, with the first 11 visible. The "Finish" button is highlighted in blue.

INDEX	
Product Directory	
Explore our guides and articles by product.	
<a href="#">.NET</a>	<a href="#">GitHub Actions for Azure</a>
<a href="#">Adaptive Cards</a>	<a href="#">Internet Information Services</a>
<a href="#">ASP.NET</a>	<a href="#">Microsoft 365</a>
<a href="#">Azure</a>	<a href="#">Microsoft 365 Business</a>
<a href="#">Azure Architecture Center</a>	<a href="#">Microsoft 365 Enterprise</a>
<a href="#">Azure Bot Service</a>	<a href="#">Microsoft Advertising</a>
<a href="#">Azure DevOps</a>	<a href="#">Microsoft Bookings</a>
<a href="#">Azure Health Bot</a>	<a href="#">Microsoft Cloud for Healthcare</a>
<a href="#">Azure IoT</a>	<a href="#">Microsoft Compliance</a>
<a href="#">Azure Quantum</a>	<a href="#">Microsoft Edge</a>
<a href="#">Azure Sphere</a>	<a href="#">Microsoft Education</a>
<a href="#">Bing Maps</a>	<a href="#">Microsoft Endpoint Configuration Manager</a>

Extraction preview  
Extract record(s) in the form of a list.

1. <https://docs.microsoft.com/en-us/dotnet/>
2. <https://docs.microsoft.com/en-us/adaptive-cards/>
3. <https://docs.microsoft.com/en-us/aspnet/core/>
4. <https://docs.microsoft.com/en-us/azure/>
5. <https://docs.microsoft.com/en-us/azure/architecture/>
6. <https://docs.microsoft.com/en-us/bot-framework/>
7. <https://docs.microsoft.com/en-us/azure/devops/>
8. <https://docs.microsoft.com/en-us/azure/health-bot/>
9. <https://docs.microsoft.com/en-us/azure/iot-fundamentals/>
10. <https://docs.microsoft.com/en-us/azure/quantum>
11. <https://docs.microsoft.com/en-us/azure-sphere/>
12. <https://docs.microsoft.com/en-us/azure-sphere/>

Advanced settings **Finish** Cancel

## ! Note

You can find more information regarding web data extraction in **Automate web flows**.

After the extraction, you can use the **DataFromWebPage.RowsCount** property to get the number of the elements in the list.

To make the flow iterate through all the links on the page, use a **Loop** action. The loop should start from 0 and end at **%DataFromWebPage.RowsCount-1%**.

### Loop

Iterates a block of actions for a specified number of times [More info](#)

Select parameters

Start from:  {x} ⓘ

End to:  {x} ⓘ

Increment by:  {x} ⓘ

> Variables produced LoopIndex

Inside the loop, use the **Click link on web page** action and select a UI element of the first link as an input.

### Click link on web page

Click on a link or any other element of a web page [More info](#)

Select parameters

Web browser instance:  ⓘ

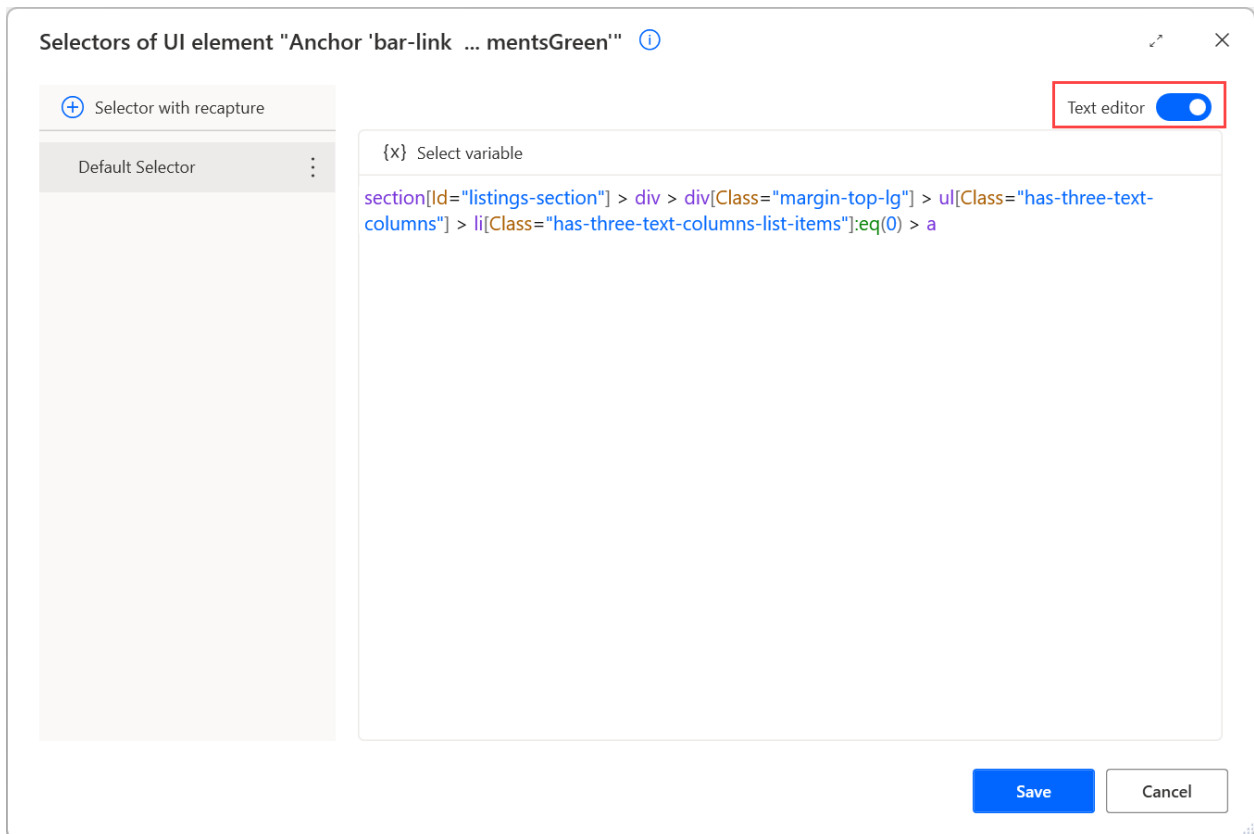
UI element:  ⓘ

Click type:  ⓘ

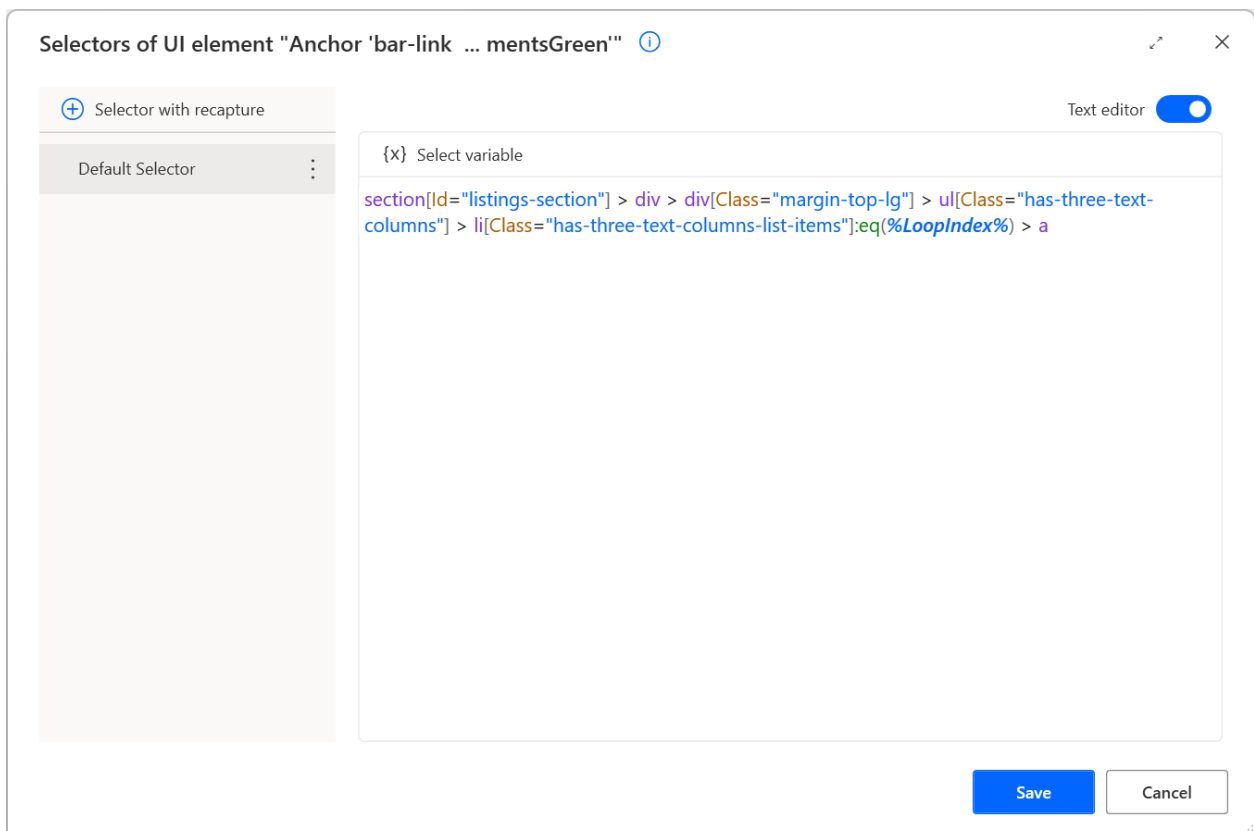
> Advanced

To make the action click all the links, modify the selector to click a different link in each loop iteration.

To achieve this functionality, edit the selector with the **Text editor**. In this step, the right part of the selector should look something like the following example: `ul[properties] > li[properties]:eq(0) > a[properties]`



To make it select a different link in each iteration, change the `tr:eq(0)` part to `tr:eq(%LoopIndex%)`.



ⓘ Note

You can find more information regarding custom selectors in **Build a custom selector**.

Lastly, use the **Go to web page** action to go back to the original page after each click. You can perform additional operations on each loaded page between the **Click link on web page** and **Go to web page** actions.

### Go to web page ✕

Navigate the web browser to a new page [More info](#)

Select parameters

Web browser instance:  ⓘ

Navigate:  ⓘ

> **Advanced**



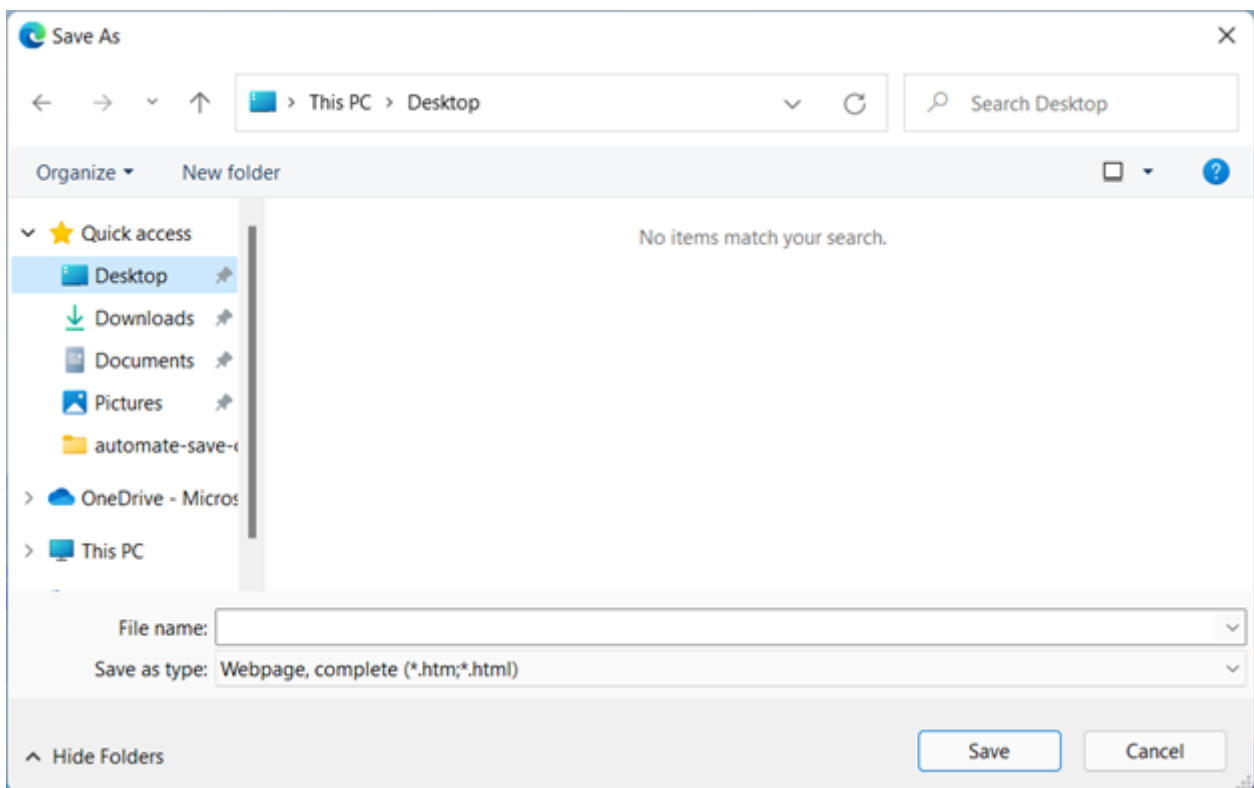
# Automate browser prompts

Article • 02/24/2023

Many web pages display **Save as**, **Open**, and **Upload** dialogs to prompt users to select destination folders and files, respectively.

These dialogs aren't part of the web page, but they're handled by the web browser application or Windows File Explorer. As a result, you can't use the browser automation actions to automate them.

To automate these dialogs, use either the [recorder](#) or the [UI automation group of actions](#).



# Scroll on a web page

Article • 02/24/2023

In some browser automation flows, you may need to scroll on web pages to make specific elements visible on the screen.

Power Automate allows scrolling on web pages through two different approaches. The first one requires the **Focus text field on web page** action, while the second requires JavaScript scripting.

## Scroll on a web page using the Focus text field on web page action


To scroll to a specific element on a web page, you can deploy the **Focus text field on web page** action.

In the action's properties, you have to create a UI element that selects the target element of the scrolling. Although the action's primary purpose is to focus on text fields, you can use it for scrolling to any element.

### 📌 Note

You can find more information about UI elements in [Automate using UI elements](#).

### Focus text field on web page ✕

 Set the focus on an input element of a web page and scroll it into view [More info](#)

Select parameters

Web browser instance:  i

UI element:  ⌵ i

> **Advanced**

Usually, web applications contain **loading more** elements at the bottom of pages that display many elements. In these cases, you can target the **loading more** element to scroll at the bottom of the page.

## Scroll on a web page using JavaScript

Apart from the **Focus text field on web page** action, you can scroll on web pages using JavaScript. To run JavaScript on web pages, use the **Execute Javascript function on web page** action.

JavaScript provides the `window.scrollTo(xpos, ypos)` function that scrolls to a specific part of a web page. The `xpos` placeholder indicates the horizontal scroll, while the `ypos` placeholder indicates the vertical scroll.

JavaScript

```
function ExecuteScript()  
{  
  window.scrollTo(xpos, ypos);  
}
```

You can replace both placeholders with hardcoded values, properties, or variables. In the following example, the function contains hardcoded values.

### Run JavaScript function on web page ✕

JS Run a JavaScript function on the web page and get the returned result [More info](#)

Select parameters

Web browser instance:  ⓘ

JavaScript function: 

```
1 function ExecuteScript()
2 {
3   window.scrollTo(0, 500);
4 }
```

{x} ⓘ

> Variables produced Result

If you want to scroll to the bottom of a web page, you can replace the **ypos** placeholder with the **document.body.scrollHeight** property.

```
JavaScript

function ExecuteScript()
{
  window.scrollTo(0, document.body.scrollHeight);
}
```

### Run JavaScript function on web page

JS Run a JavaScript function on the web page and get the returned result [More info](#)

Select parameters

Web browser instance:  ⓘ

JavaScript function:  ⓘ

> Variables produced [Result](#)

If you want to scroll inside an element of a web page, not the page itself, you can use the HTML DOM property **scrollTop**. In the following example, the function locates the **divElem** and scrolls vertically 10 pixels down.

```
JavaScript

function ExecuteScript()
{
document.getElementById('divElem').scrollTop -= 10;
}
```

## Run JavaScript function on web page




JS Run a JavaScript function on the web page and get the returned result [More info](#)

### Select parameters

Web browser instance:  

JavaScript function: 

```
1 function ExecuteScript()  
2 {  
3   document.getElementById('divElem').scrollTop -= 10;  
4 }
```



> Variables produced Result

 On error

Save

Cancel

# Handle iframes on a web page

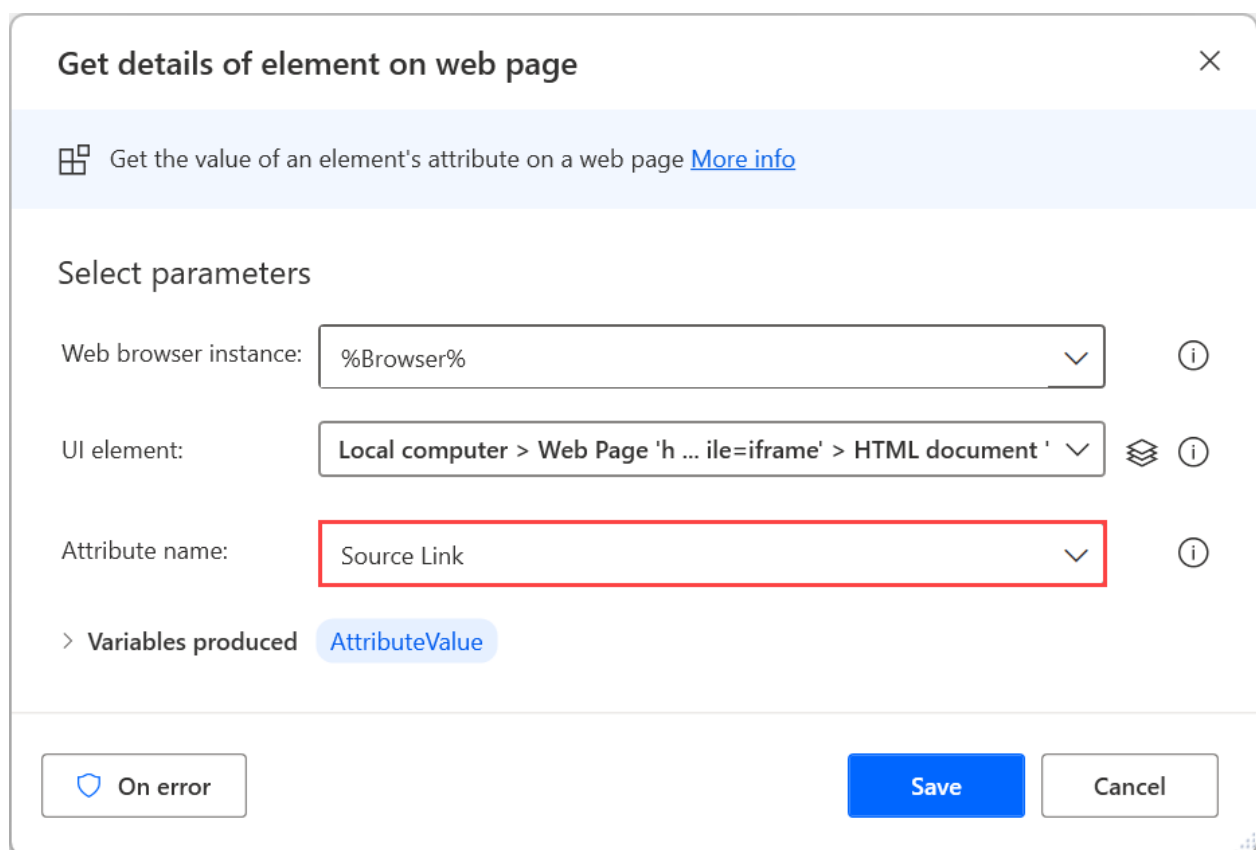
Article • 02/24/2023

Iframes are HTML documents embedded inside other HTML documents. These elements are often used to insert content from external sources into web pages.

When an iframe belongs to the same domain as the original page, you can use the browser automation actions to automate it. You can find more information about browser automation in [Automate web flows](#).

If the browser automation actions don't work correctly with a particular iframe, you can use the UI automation actions to handle it. You can find more information about UI automation in [Automate desktop flows](#).

If an iframe is cross-domain, deploy the **Get details of element on web page** to retrieve the **Source Link** attribute of the element.



**Get details of element on web page** ✕

🗑️ Get the value of an element's attribute on a web page [More info](#)

Select parameters

Web browser instance: %Browser% ⌵ ⓘ

UI element: Local computer > Web Page 'h ... ile=iframe' > HTML document ' ⌵ ⓘ

Attribute name: Source Link ⌵ ⓘ


> Variables produced AttributeValue

🛡️ On error Save Cancel


Next, use the **Go to web page** action or the **Create new tab** action to navigate to the retrieved source. Now, you can use the browser automation actions to interact with the iframe.

## Go to web page



 Navigate the web browser to a new page [More info](#)

### Select parameters

Web browser instance:  

Navigate:  

URL:  

> **Advanced**

 On error

Save

Cancel



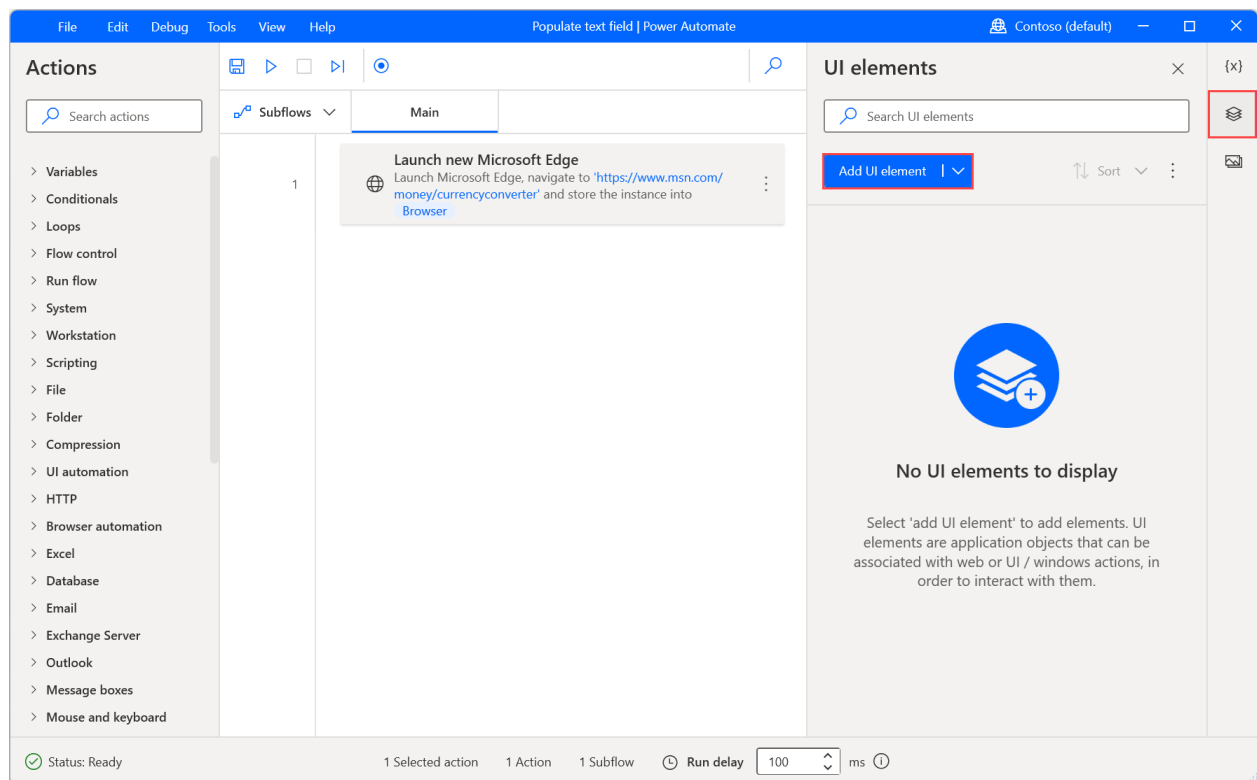
# Populate text fields and click on links using JavaScript

Article • 02/24/2023

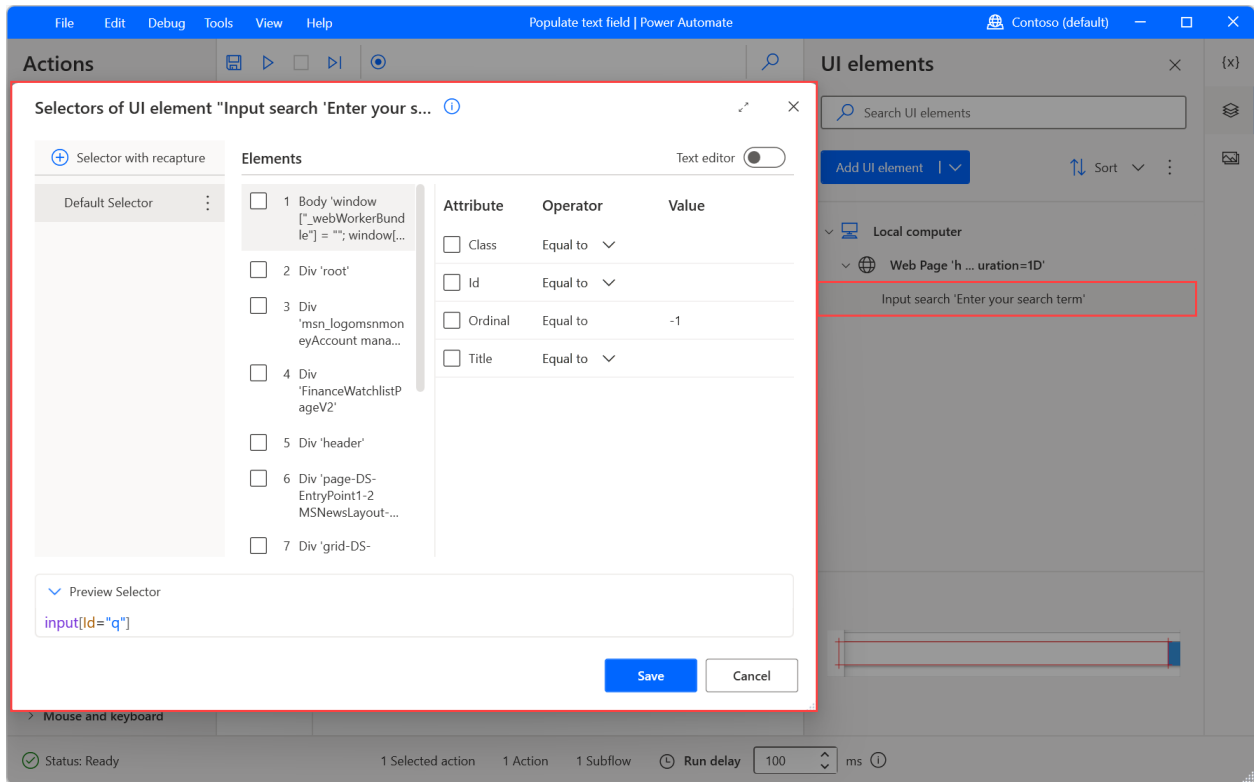
Some web applications may have design constraints that don't allow browser automation actions to populate text fields or click on links and buttons.

An alternative approach to automate these web applications is the use of the **Run JavaScript function on web page** action, which allows you to run JavaScript code on web pages.

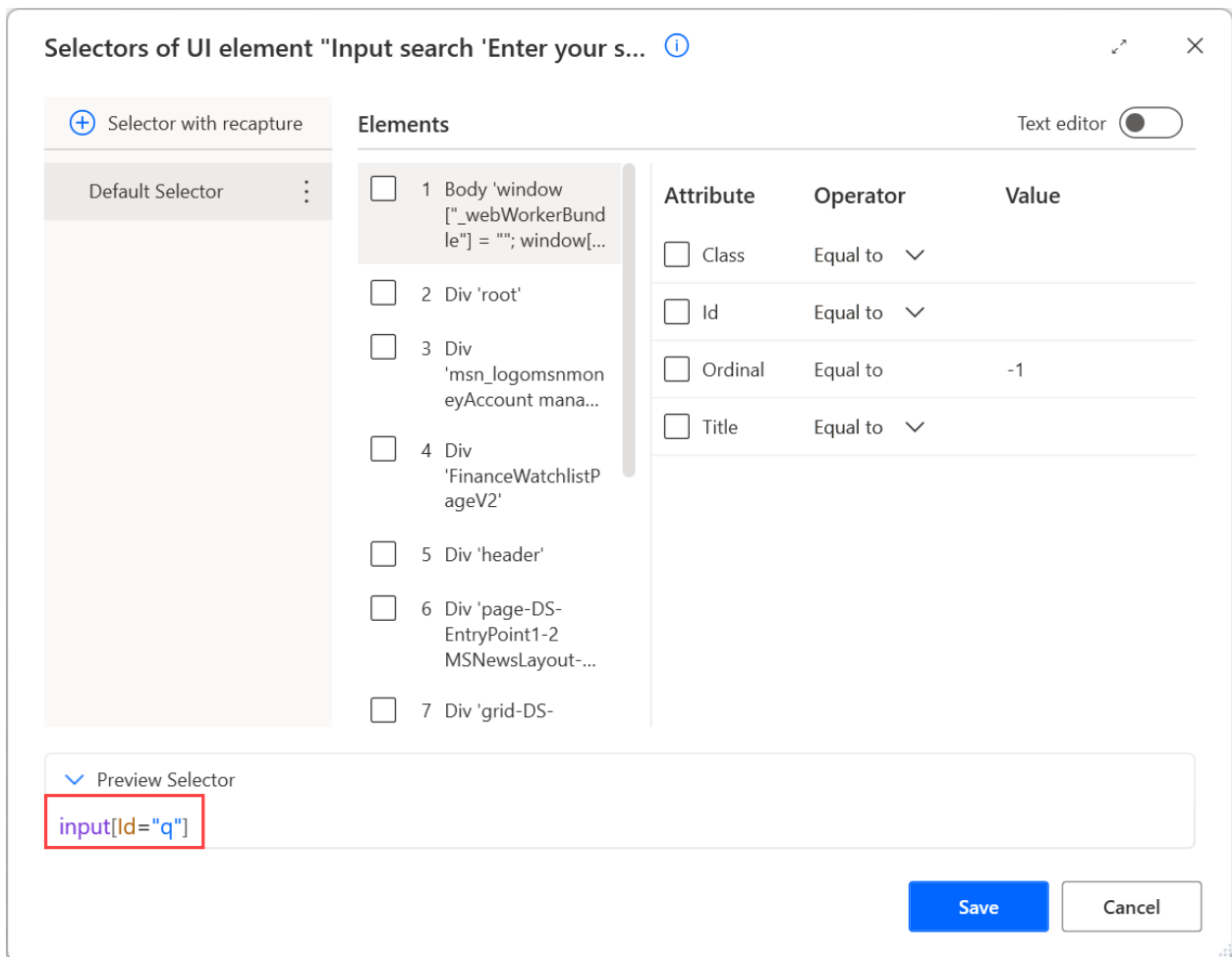
Before deploying the **Run JavaScript function on web page** action, you need the CSS selector of the element you want to populate or click. To get the selector, navigate to the **UI elements** tab and select **Add UI element**.



After creating the UI element, navigate again to the **UI elements** tab, select the created UI element, and open the selector with the **Selector builder**.



Now, copy the last element of the selector located on the right side of the last occurred > character.



! Note

You can find more information about selectors in [Build a custom selector](#).

To populate a text field, deploy the **Run JavaScript function on web page** action and populate the following code in the **JavaScript function** field. After pasting the code, replace the **CSS-selector** and **value-to-populate** placeholders with the previously copied selector and the value to populate, respectively.

```
JavaScript

function ExecuteScript()
{
document.querySelectorAll('CSS-selector')[0].value="value-to-populate";
}

OR

function ExecuteScript()
{
document.querySelectorAll('CSS-selector')[0].innerText="value-to-populate";
}
```

**Run JavaScript function on web page** ×

JS Run a JavaScript function on the web page and get the returned result [More info](#)

Select parameters

Web browser instance:  ⌵ ⓘ

JavaScript function: 

```
1 function ExecuteScript()
2 {
3 document.querySelectorAll("input[id="q"]")[0].value="test";
4 }
```

{x} ⓘ

> Variables produced Result

To click a link or press a button, use the following code:

```
JavaScript
```

```
function ExecuteScript()  
{  
  document.querySelectorAll('CSS-Selector')[0].click();  
}
```

# Convert a text value to datetime

Article • 02/24/2023

When a desktop flow reads entries from files or extracts values from applications, the returned values usually are texts.

It's common in flow development to convert these values to other datatypes to perform additional operations. For example, you could convert a text value that represents a date to a datetime variable for later use in datetime actions.

Power Automate provides the **Convert text to datetime** action to perform the conversion. This action enables you to convert a date represented in the default format of your system or a custom format.

The default format is specified by the region and language settings of your machine. For example, the default date format for the United States is **MM-dd-yyyy**. The time part, if it exists, can be represented in both 12-hour and 24-hour formats.

The screenshot shows the configuration window for the 'Convert text to datetime' action. The window title is 'Convert text to datetime' with a close button (X) in the top right corner. Below the title bar, there is a description: 'Converts a text representation of a date and/or time value to a datetime value' with a 'More info' link. The 'Select parameters' section includes a 'Text to convert' field with the value '%05/03/2022 8:00:00 AM%' and a placeholder '{x}'. Below this is a toggle switch for 'Date is represented in custom format', which is currently turned off. At the bottom of the parameters section, it shows 'Variables produced' as 'TextAsDateTime'. The bottom of the window features three buttons: 'On error' (with a shield icon), 'Save' (in blue), and 'Cancel'.

## ⓘ Note

If the value doesn't contain a time part, the time of the generated datetime variable will be automatically set to **12:00:00 AM**.

### 📌 Note

Power Automate allows you to use all the standard date separators for the different parts of the date value. In the previous example, dates represented in the **MM-dd-yyyy** and **MM/dd/yyyy** notations will have the same result.

If the value to convert is represented in a custom format, enable the **Date is represented in custom format** option and populate the respective format.

You can find all the available notations in the following table:

<b>Notation</b>	<b>Description</b>
yyyy	Year
MM	Month
dd	Day
HH	Hour
mm	Minutes
ss	Seconds
ff	Milliseconds
zzz	UTC Offset

To separate the different parts of the date, you can use all the standard date separators, like forward slashes (/), dashes (-), and dots (.).

## Convert text to datetime



Converts a text representation of a date and/or time value to a datetime value [More info](#)

### Select parameters

Text to convert:



Date is represented in custom format:



Custom format:



> Variables produced

TextAsDateTime



On error

Save

Cancel

# Convert data using PowerShell

Article • 02/24/2023

Data conversion is an essential functionality in desktop flows, as different actions and applications may require data in specific formats. Power Automate offers various actions to direct convert data formats, such as the **Convert text to number** and **Convert file to Base64** actions.

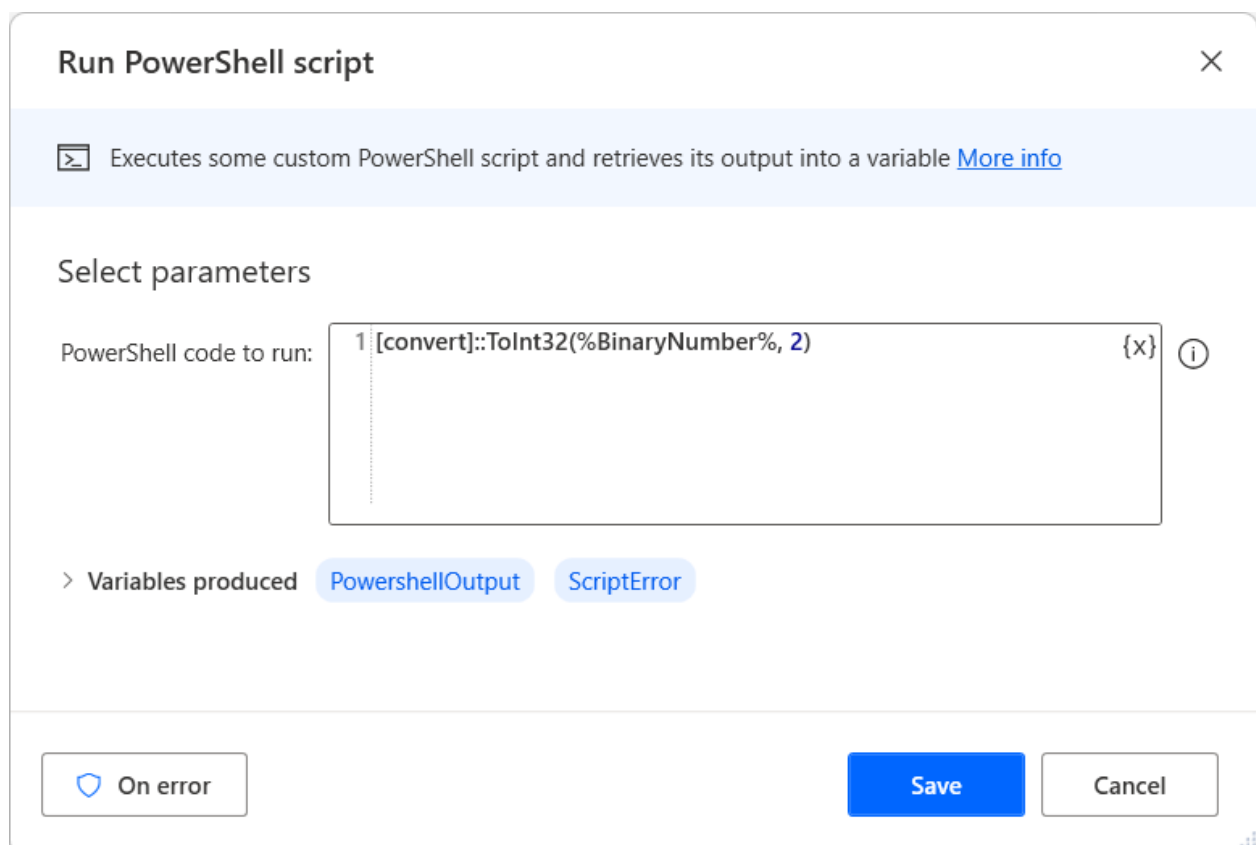
However, there are conversion scenarios that can't be handled by the available actions. To address these cases, run a PowerShell script that performs the desired conversion.

To run a PowerShell script, use the **Run PowerShell script** action and populate the appropriate command for the conversion you want to do. For example, the following PowerShell script converts a binary number stored in the **BinaryNumber** variable to decimal.

The action produces the **PowershellOutput** variable that stores the result of the conversion as a text.

## ⓘ Note

You can find more information regarding PowerShell conversion methods in [this article](#).



The screenshot shows the configuration window for the 'Run PowerShell script' action. The window title is 'Run PowerShell script' with a close button (X) in the top right corner. Below the title bar, there is a description: 'Executes some custom PowerShell script and retrieves its output into a variable' followed by a 'More info' link. The 'Select parameters' section contains a text area labeled 'PowerShell code to run:' with the code: `1 [convert]::ToInt32(%BinaryNumber%, 2)`. To the right of the code area are a '{x}' icon and an information icon (i). Below the code area, there is a section for 'Variables produced' with a chevron icon, containing two variable names: 'PowershellOutput' and 'ScriptError'. At the bottom of the window, there are three buttons: 'On error' (with a shield icon), 'Save' (in blue), and 'Cancel'.

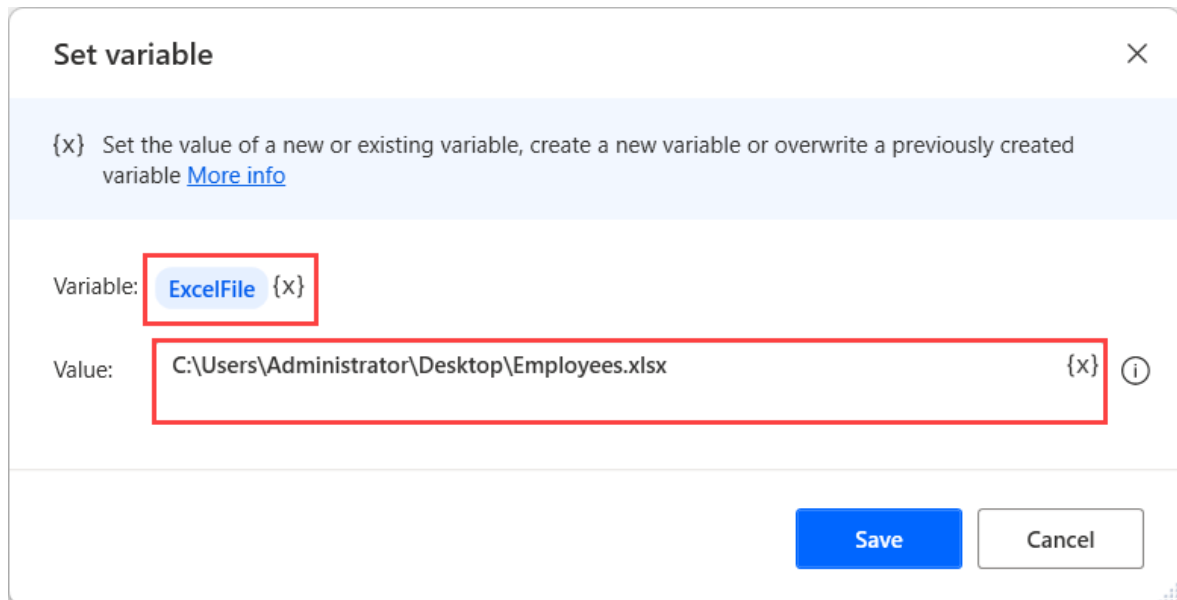


# Convert Excel to PDF using VBScript

Article • 02/24/2023

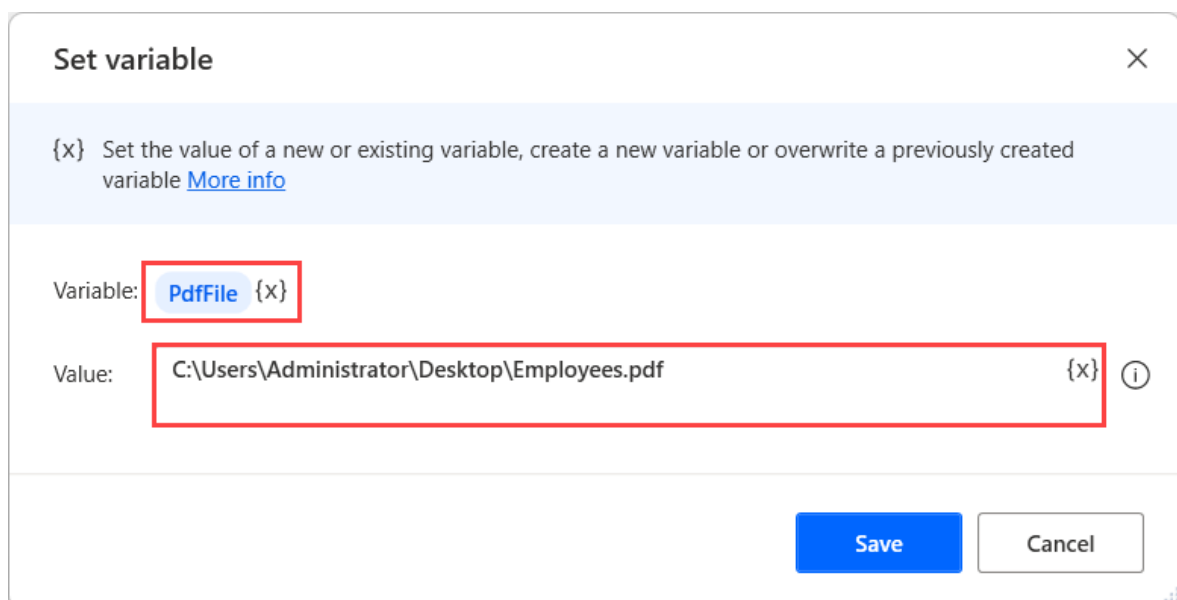
To convert an Excel file to PDF:

1. Use the **Set variable** action to create a new variable containing the path of the Excel file you want to convert. In this example, the variable is named **ExcelFile**.



The screenshot shows a 'Set variable' dialog box with a close button (X) in the top right corner. Below the title bar, there is a light blue header area containing the text: '{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)'. The main area contains two fields: 'Variable:' with the value 'ExcelFile {x}' and 'Value:' with the value 'C:\Users\Administrator\Desktop\Employees.xlsx {x}'. Both fields are highlighted with red boxes. At the bottom right, there are two buttons: 'Save' (blue) and 'Cancel' (white).

2. Use a second **Set variable** action to create a variable containing the path of the PDF file you want to create. In this example, the variable is named **PdfFile**.



The screenshot shows a 'Set variable' dialog box with a close button (X) in the top right corner. Below the title bar, there is a light blue header area containing the text: '{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)'. The main area contains two fields: 'Variable:' with the value 'PdfFile {x}' and 'Value:' with the value 'C:\Users\Administrator\Desktop\Employees.pdf {x}'. Both fields are highlighted with red boxes. At the bottom right, there are two buttons: 'Save' (blue) and 'Cancel' (white).


3. Deploy the **Run VBScript** action and populate the following code.

VBScript

```
Dim Excel  
Dim ExcelDoc
```

```
'Opens the Excel file'  
Set Excel = CreateObject("Excel.Application")  
Set ExcelDoc = Excel.Workbooks.open("%ExcelFile%")  
  
'Creates the pdf file'  
Excel.ActiveSheet.ExportAsFixedFormat 0, "%PdfFile%" ,0, 1, 0,,0  
  
'Closes the Excel file'  
Excel.ActiveWorkbook.Close  
Excel.Application.Quit
```

**Run VBScript** ✕

 Executes some custom VBScript code and retrieves its output into a variable [More info](#)

Select parameters

VBScript to run: {x} i

```
1 Dim Excel  
2 Dim ExcelDoc  
3  
4 'Opens the Excel file'  
5 Set Excel = CreateObject("Excel.Application")  
6 Set ExcelDoc = Excel.Workbooks.open("%ExcelFile%")  
7  
8 'Creates the pdf file'  
9 Excel.ActiveSheet.ExportAsFixedFormat 0, "%PdfFile%" ,0, 1, 0,,0  
10  
11 'Closes the Excel file'  
12 Excel.ActiveWorkbook.Close  
13 Excel.Application.Quit
```

> Variables produced VBScriptOutput ScriptError

Save Cancel

# Convert Base64 text to hexadecimal format

Article • 02/24/2023

Although cryptography actions produce variables encoded in Base64 format, some cryptography engines use the hexadecimal representation of the encrypted value.

To convert the Base64 text to hexadecimal format, use the **Run PowerShell script** action and populate the following command. Before deploying the **Run PowerShell script** action, use a **Set variable** action to store the text you want to convert into a variable. In this example, the script converts the text stored into the **Base64Text** variable.

PowerShell

```
[System.Convert]::FromBase64String("%Base64Text%") | Format-Hex
```

## ⓘ Note

You can find more information regarding PowerShell utility cmdlets in [this article](#).

The action produces the PowershellOutput variable that stores the encrypted or hashed value in hexadecimal format.

### Run PowerShell script

Executes some custom PowerShell script and retrieves its output into a variable [More info](#)

Select parameters

PowerShell code to run:

```
1 [System.Convert]::FromBase64String("%Base64Text%") | Format-Hex {x} ⓘ
```

> Variables produced **PowershellOutput** **ScriptError**

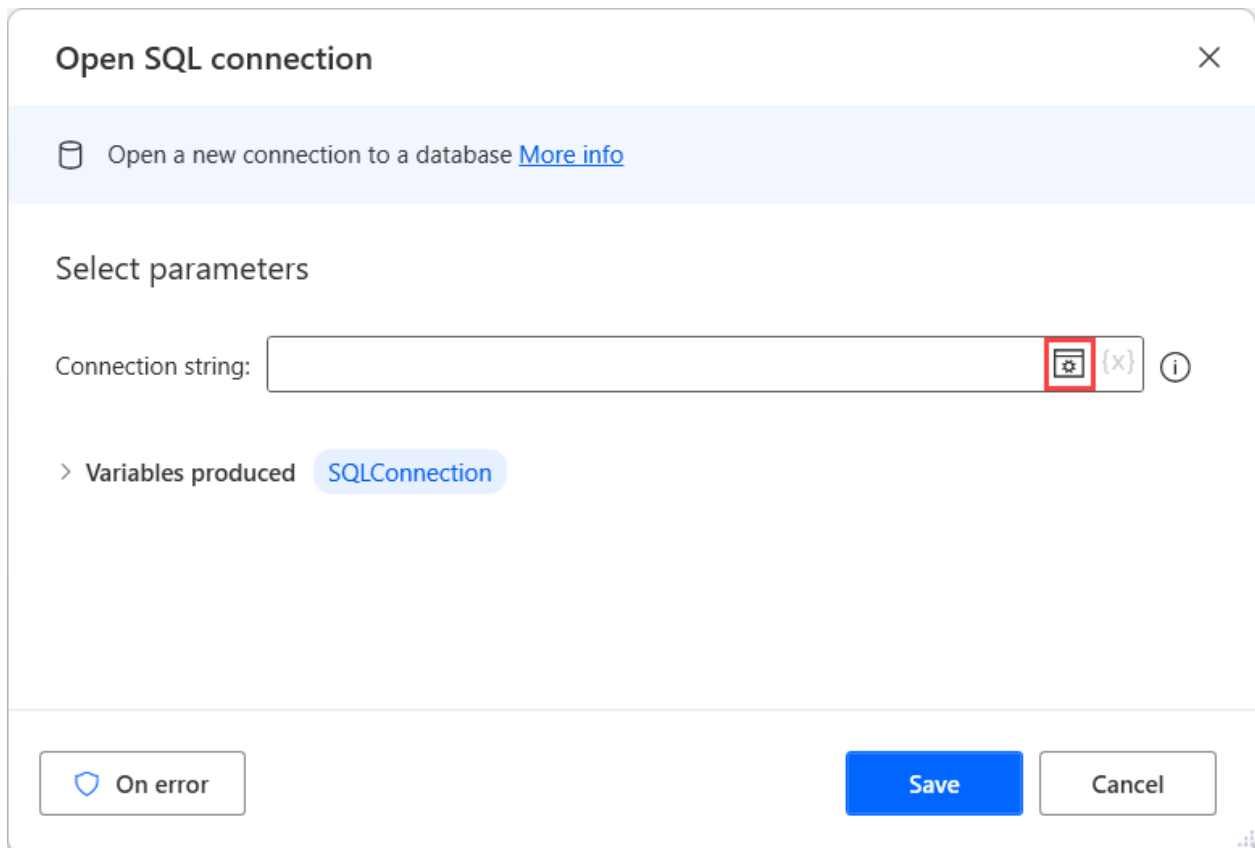
On error **Save** Cancel

# Run SQL queries to Microsoft Access

Article • 02/24/2023

Apart from database servers, Power Automate supports the automation of Microsoft Access databases.

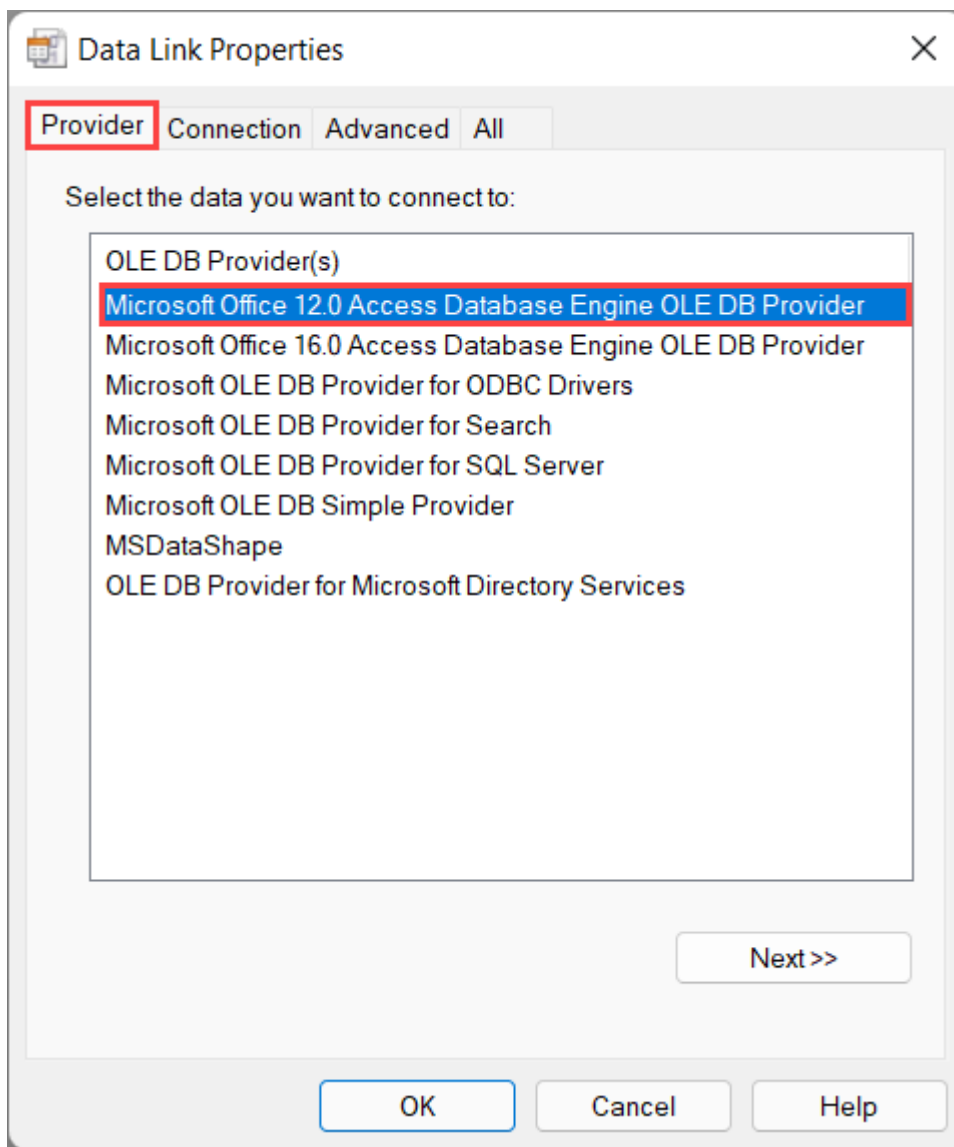
To establish a connection with a Microsoft Access database, use the **Open SQL connection** action, and open the connection string builder.



In the **Provider** tab of the appeared dialog, select **Microsoft Office 12.0 Access Database Engine OLE DB Provider**.

## ⓘ Note

If the presented provider is missing from the available options, you have to download and install [Microsoft Access Database Engine 2010 Redistributable](#).



Next, populate the path of the Microsoft Access database in the **Data Source** field of the **Connection** tab.

The screenshot shows the 'Data Link Properties' dialog box with the 'Connection' tab selected. The 'Data Source' field is highlighted with a red box and contains the path 'C:\Users\Administrator\Desktop\Database'. The 'User name' field contains 'Admin'. The 'Blank password' checkbox is checked. The 'Test Connection' button is visible at the bottom right of the dialog box.

The generated connection string must be similar to the following one:

**Provider=Microsoft.ACE.OLEDB.12.0;Data Source=DatabasePath;Persist Security Info=False**

#### ⓘ Note

All the connection strings that establish connections with Microsoft Access databases consist of three main parts: the provider, the data source, and the security credentials (if applicable).

### Open SQL connection ✕

Open a new connection to a database [More info](#)

#### Select parameters


Connection string: Provider=Microsoft.ACE.OLEDB.12.0;Data Source=C:\Users\Administrator\Desktop\Database.accdb;Persist Security Info=False ⚙️ {x} ⓘ

> Variables produced SQLConnection

🛡️ On error Save Cancel

To run queries on the connected database, use the **Execute SQL statement** action. Power Automate supports all the essential queries, such as **SELECT**, **INSERT INTO**, and **UPDATE**.

### Execute SQL statement ✕

 Connect to a database and execute an SQL statement [More info](#)

#### Select parameters

Get connection by:  ⓘ

SQL connection:  {x} ⓘ

SQL statement: 

{x} ⓘ

Timeout:  {x} ⓘ

> Variables produced QueryResult

When all the queries have been executed, deploy the **Close SQL connection** to close the connection with the database.



# Troubleshoot SQL queries

Article • 02/24/2023

While developing desktop flows, you may encounter errors caused by deployed database actions that run queries on databases. If you can't identify the source of the issue through the displayed error messages, perform the following troubleshooting steps:

1. Replace any single quote (') characters with double quotes (") or the other way around.

For example, the following query produces an error because of the single quote at the end of the variable's value.

SQL

```
SELECT * FROM SALES WHERE VALUE = '%value%';
```

To resolve this issue, replace the single quotes in the SQL statement with double-quotes.

SQL

```
SELECT * FROM SALES WHERE VALUE = "%value%";
```

2. Escape percentage signs (%) that don't indicate variables.

Power Automate identifies percentage signs as characters that indicate variables. To use them as normal characters, escape them using an extra percentage sign.

## ⓘ Note

You can find more information about the percentage signs in [Use variables and the % notation](#).

3. Ensure that the same versions (32 bit or 64 bit) of database, database server, and Power Automate for desktop are installed on your desktop.
4. Verify that the firewall or any other network security system isn't blocking the connection between Power Automate and the database.

5. If you're using database actions to run queries on Excel files, ensure that you've applied the following practices:

- The name of the Excel worksheet is used as a database name. Enclose the worksheet name in brackets ([ ]) and add a dollar sign (\$) at the end, for example [Sheet1\$].
- The database columns are the headers of the Excel data table.

SQL

```
SELECT * FROM [Sheet1$] WHERE Value = "%value%";
```

#### ⓘ Note

You can find more information regarding running SQL queries on Excel in [Run SQL queries on Excel files](#).

# Configure Power Automate for desktop proxy settings

Article • 06/17/2024

To reach Microsoft's cloud services, it might be necessary for web requests originating from various Power Automate for desktop components to be directed through a network proxy server.

## When to configure proxy settings

Configure proxy settings when you're connected to the internet using a proxy server.

The following are some of the proxy related errors you might encounter in a Power Automate for desktop component:

- `System.Net.WebException: The remote server returned an error: (407) Proxy Authentication Required`
- `System.Net.WebException`

This issue might occur if Power Automate for desktop is installed by someone other than the intended user, such as help desk personnel or through automated deployment solutions like Configuration Manager.

- `The proxy server in your network requires authentication.`
- `The communication with the cloud services requires network proxy authentication.`
- `During startup Power Automate couldn't sign you in. The proxy server in your network requires authentication.`

## How to configure proxy settings

Configure how Power Automate for desktop interacts with a proxy server using the Power Automate proxy configuration files. As an alternative, you can use the Windows registry to configure proxy settings that aren't available in the proxy configuration files.

### 📌 Important

- From Power Automate for desktop version 2.45, the proxy settings can be configured in centralized way, through the Power Automate proxy configuration files, and are not overridden on a product upgrade.
- It is suggested that you configure the proxy settings using only the **Power Automate proxy configuration files**, as they apply to all the on-premises components. Proxy settings configured through **Windows registry** apply only to a subset of components like the Console and Designer.
- If a proxy setting is configured in both Windows registry and configuration files, the registry key takes precedence. [Learn how to configure proxy settings through Windows registry.](#)

Proxy setting	Description	Configuration file element/value	Registry key
Proxy server	The proxy address and port	proxyaddress="your_proxy_address"	ProxyServer
Use default credentials	Authenticate to the proxy server with default account credentials	useDefaultCredentials="True"	UseDefaultProxyCredentials
Bypass proxy server	Don't honor the Windows Proxy settings and bypass the proxy server	enabled = "False"	DisableWindowsProxy
Bypass list of IP addresses	Provide a set of regular expressions that describe addresses that don't use a proxy	<code>&lt;bypasslist&gt; &lt;add address="bypassed_address" /&gt; &lt;add address="bypassed_address" /&gt; &lt;/bypasslist&gt;</code>	ProxyBypassList
Use network credentials	Authenticate with a generic credential from Windows' Credential Manager	Not applicable	ProxyNetworkCredentialsKey
Automatic detection of proxy configuration script	Location of the proxy configuration script	scriptLocation="your_proxy_script_location"	Not applicable

## How to update proxy configuration files

All proxy configuration files are stored in the installation folder and are listed in the following table. The default installation folder location is "C:\Program Files (x86)\Power Automate Desktop".

 Expand table

Proxy file	Related component	Description	Component type	Account type
<i>PAD.Proxy.config</i>	All Power Automate for desktop application components	Console, Designer, some machine runtime app functionalities such as list environments and edit machine details, etc.	Application	User
<i>UIFlowService.Proxy.config</i>	UIFlowService.exe	The Power Automate service (UIFlowService) communicates with Power Automate cloud services	Service	Virtual account

Proxy file	Related component	Description	Component type	Account type
		for machine registration and running desktop flows		
<i>Microsoft.Flow.RPA.LogShipper.Proxy.config</i>	Microsoft.Flow.RPA.LogShipper.exe	Logs collector service	Service	NetworkService
<i>Microsoft.Flow.RPA.UpdateService.Proxy.config</i>	Microsoft.Flow.RPA.UpdateService.exe	Update applications service	Service	System

To configure the proxy settings:

1. Close all instances of Power Automate for desktop.
  - Ensure that the icon doesn't exist in the system tray.
  - Ensure that no processes are running in the background using Windows Task Manager.
2. For all the proxy files, edit each file with administrator rights as shown in the following examples:

Example #1 – Configure proxy with address and authenticate with default account credentials

```
XML
<defaultProxy useDefaultCredentials="True">
  <proxy
    bypassonlocal="True"
    proxyaddress="replace_with_your_proxy_address"
  />
</defaultProxy>
```

Example #2 - Configure proxy with script location and authenticate with default account credentials

```
XML
<defaultProxy useDefaultCredentials="True">
  <proxy
    scriptLocation="replace_with_your_proxy_script_location"
  />
</defaultProxy>
```

Example #3 - Configure proxy with address and don't authenticate with default account credentials

```
XML
<defaultProxy>
  <proxy
    bypassonlocal="True"
    proxyaddress="replace_with_your_proxy_address"
  />
</defaultProxy>
```

For more examples of how to update proxy configuration files, refer to [.NET documentation](#).

3. Save the changes.
4. Restart Power Automate for desktop.

5. Restart the Power Automate services:

- a. In Windows, open the **Services** desktop app. Press **Windows** + **R** to open the **Run** box, enter `services.msc`, and then press **Enter** or select **OK**.
- b. Look for **Power Automate service**, **Power Automate log shipper service**, and **Power Automate update service**.
- c. Right-click on each service and select **Restart**.

#### ⓘ Note

If the new proxy settings do not take effect even after restarting the services, try clearing the internet cache from your system. Go to **Control Panel**, search for and open **Internet Options**. From the **General** tab, select **Delete**. Ensure that at least **Temporary Internet files** and **Cookies** are selected, and select **Delete**.

## For authenticated proxy servers, change the "Power Automate Service" (UIFlowService.exe) account with an allowed domain service account

To [change the on-premises Service account](#), use the **Troubleshoot** tab in the **Power Automate machine runtime application** or use the `TroubleshootingTool.Console.exe` command line utility.

---

## Feedback

Was this page helpful?



[Provide product feedback](#) ↗

# Reduce the size of desktop flows in a solution

Article • 07/16/2024

This article provides a workaround to reduce the size of desktop flows in a solution by removing all UI element screenshots of the flows. The objective is to minimize the total size of the solution to prevent export failures caused by its size.

UI element screenshots help in identifying the captured UI elements when creating a flow. However, they don't affect the flow's operation or modification and can safely be removed.

## ⊗ Caution

Remove only the **Desktop flow ui element screenshot** objects from the solution. Removing any other desktop flow binary object will result in data loss for the desktop flow, and you will encounter issues editing or running the flow in the target environment.

## ⓘ Note

- This workaround applies only to desktop flows saved in v2 Dataverse [schema](#).
- Learn more about size limit related errors during flow save at [Exceeded size limit](#).

To remove all UI element screenshots of desktop flows within a solution:

1. Sign in to the [Power Automate portal](#) [↗](#).
2. Go to **Solutions**.
3. Select the solution that contains one or more desktop flows.
4. Select all items with name **Desktop flow ui element screenshot**.
5. Select **Remove** > **Remove from this solution**.

Power Automate

Search

Environments  
Contoso (default)

Objects

Automation project > All

Remove from this solution  
Delete from this environment

Display name	Name	Type	Managed	Customized	Last Modif...	Owner	Status
Desktop flow images	Desktop flow im...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow manifest file	Desktop flow ma...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui element screenshot	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Desktop flow ui elements	Desktop flow ui ...	Desktop Flow Bl...	No	No	1 minute ago	Allan Deyoung	Off
Flow with many UI elements	Flow with many ...	Desktop Flow	No	No	1 minute ago	Allan Deyoung	On

# Feedback

Was this page helpful?



[Provide product feedback](#)



# Use logical operations on conditional statements

Article • 02/24/2023

Data validation is a typical requirement in most business tasks and allows the implementation of different behavior based on the available data.

Power Automate provides various conditionals that run blocks of actions only if a given condition is met. If the condition is false, the actions are skipped.

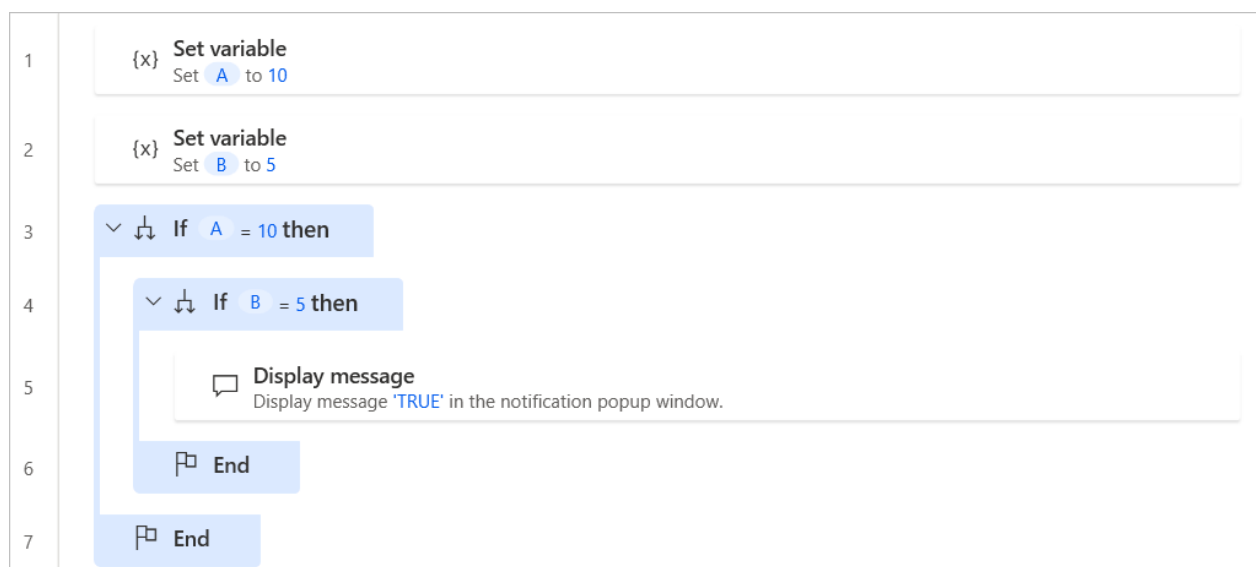
## ⓘ Note

You can find more information regarding conditionals in [Use conditionals](#).

While validating data, you may encounter cases where you need to check multiple variables in the same part of the flow. For example, you may want to run a set of actions only if two variables have specific values.

To implement this functionality, you can use either multiple nested **If** actions or a single **If** action containing a complex logical expression.

To create a nested if statement, deploy an **If** action within the block of another **If** action. All the actions inside the nested block will run only when both if statements are valid.



Although the implementation of nested if statements is convenient in some cases, it can lead to complicated flows when many checks are needed.

A more efficient way to achieve the same results is the use of logical expressions. In the following example, a single **If** action offers the same result as the previously nested **If**

actions.

The expression in the **First operand** field uses the **AND** operator to check whether the variables **A** and **B** contain the values **10** and **5**, respectively.

**If** ×

↓ Marks the beginning of a block of actions that is run if the condition specified in this statement is met  
[More info](#)

Select parameters

First operand:  {x} ⓘ

Operator:  ▾ ⓘ

Second operand:  {x} ⓘ

**Save**

In general, logical operators can check multiple conditions simultaneously, allowing you to implement more complex logic in a single expression. The **AND** operator returns **TRUE** when both parts of the expression are valid. To check if either of the two parts (or both) are valid, use the **OR** operator.

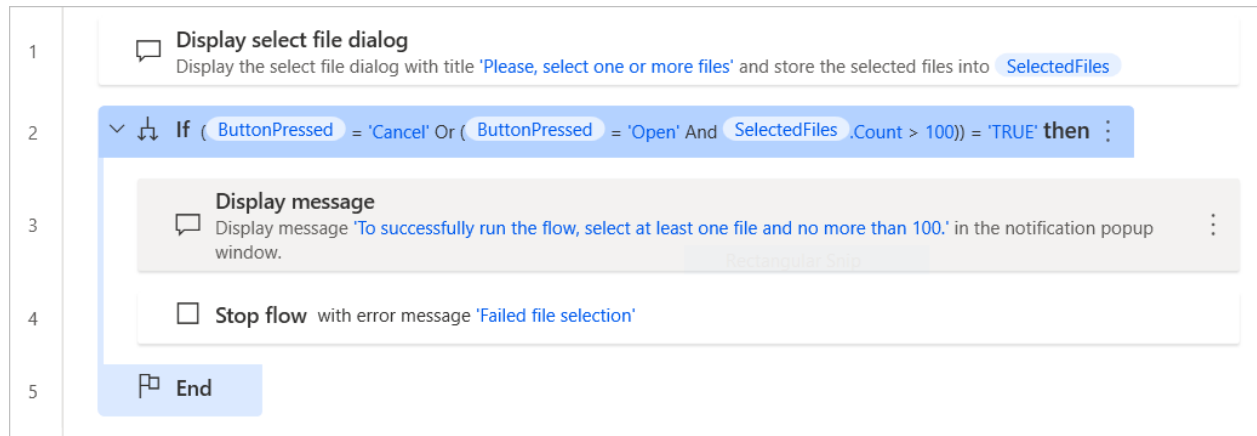
The **Second operand** field is populated with the value **TRUE**, while the selected **Operator** is **Equals to**. This configuration makes the action check if the expression in the **First operand** field is valid. If it's valid, the actions inside the if block will run. To check if an expression is invalid, populate the value **FALSE** in the **Second operand** field.

#### ⓘ Note

Logical expressions must be enclosed by percentage signs (%). The percentage sign is used as a special character to denote variables and expressions. You can find more information regarding the percentage notation and logical expressions in **Use variables and the % notation**.

To handle more demanding validation scenarios, use multiple logical operators and parentheses. Parentheses allow you to change the order of operations and work the same way as in algebra and programming languages.

In the following example, the flow displays a dialog that prompts users to select one or more files from their desktop. The **If** action checks whether the user has pressed **Cancel** in the dialog or selected more than 100 files.




The first part of the expression on the left of the **OR** operator returns **True** when the user presses **Cancel** in the dialog. In this case, there are no selected files to process, so the flow has to stop.

The second part of the expression returns **True** when the user selects **Open**, but the selected files are more than 100. This condition ensures that the user can't select too many files and prevents the flow from running too long.

If one of these conditions (or both) is valid, the flow will stop and display a dialog informing the user about the implemented limitations.

If



 Marks the beginning of a block of actions that is run if the condition specified in this statement is met  
[More info](#)

### Select parameters

First operand:  {x} ⓘ

Operator:  ⌵ ⓘ

Second operand:  {x} ⓘ

Save

Cancel

# Use passwords

Article • 07/09/2024

Certain actions within desktop workflows require the use of passwords. For example, the configuration of the [Launch Excel](#) action is essential for accessing an Excel file secured by a password.

Launch Excel

Launches a new Excel instance or opens an Excel document [More info](#)

Launch Excel: and open the following document

Document path: {path to protected excel file}

Make instance visible:

Open as ReadOnly:

Advanced

Nest under a new Excel process:

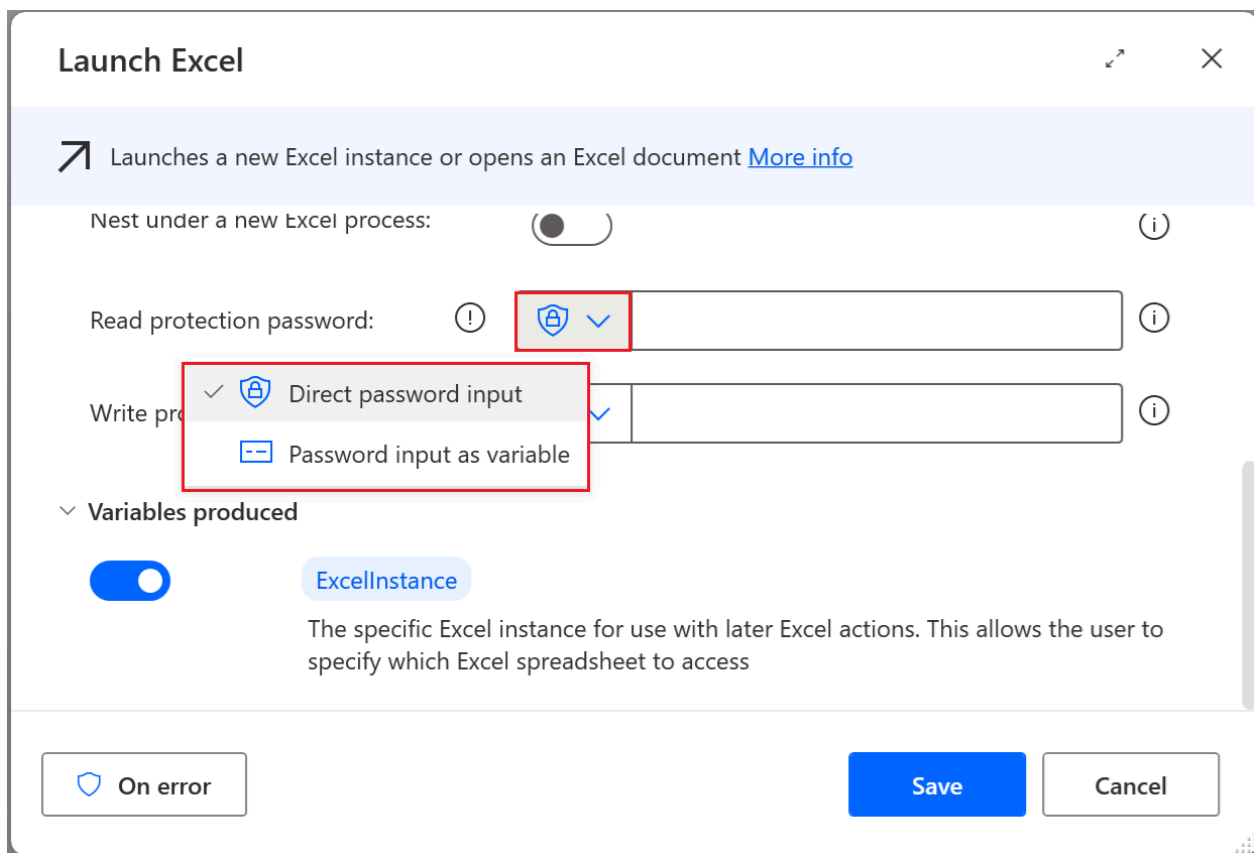
Read protection password:

Write protection password:

> Variables produced **ExcelInstance**

On error Save Cancel

Desktop flows allow you to either provide a password directly or use a variable as a password input in the designated password-required fields.



The option **Direct password input** uses encryption that is machine based to ensure a maximum level of security.

### **Important**

Passwords entered in designated fields only work on the machine where they were initially set. This is due to the machine-specific encryption used for direct password inputs. If the flow is opened on a different machine, these passwords will not be valid and will need to be re-entered.

Flows set up with direct password input in specific fields are shown as invalid when opened on a machine other than the one where the password was first entered. In such cases, you need to reenter the passwords.

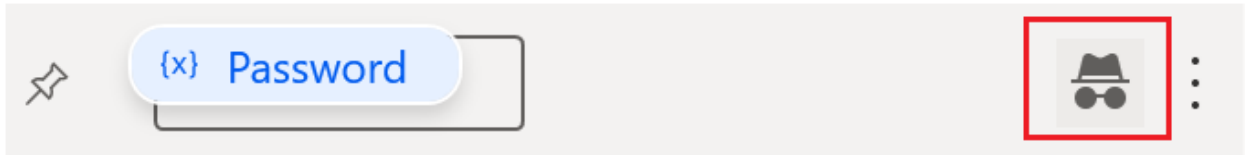
To allow the use of such flows from other machines, you can use the **Password input as variable** option.

### **Important**

Marking variables as sensitive does not secure hardcoded information. Avoid embedding sensitive details such as passwords and PINs directly into action properties like Set variable, even if you classify these variables as sensitive. While desktop flow logs safeguard this data, hardcoded values remain exposed in both

the modal and the flow definition in Microsoft Dataverse. For additional guidance on handling sensitive inputs in cloud flows, learn more in [Manage sensitive input like passwords](#).

To enhance the security of the "Password input as variable" feature, it's important to designate the corresponding variable as **sensitive**.



## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

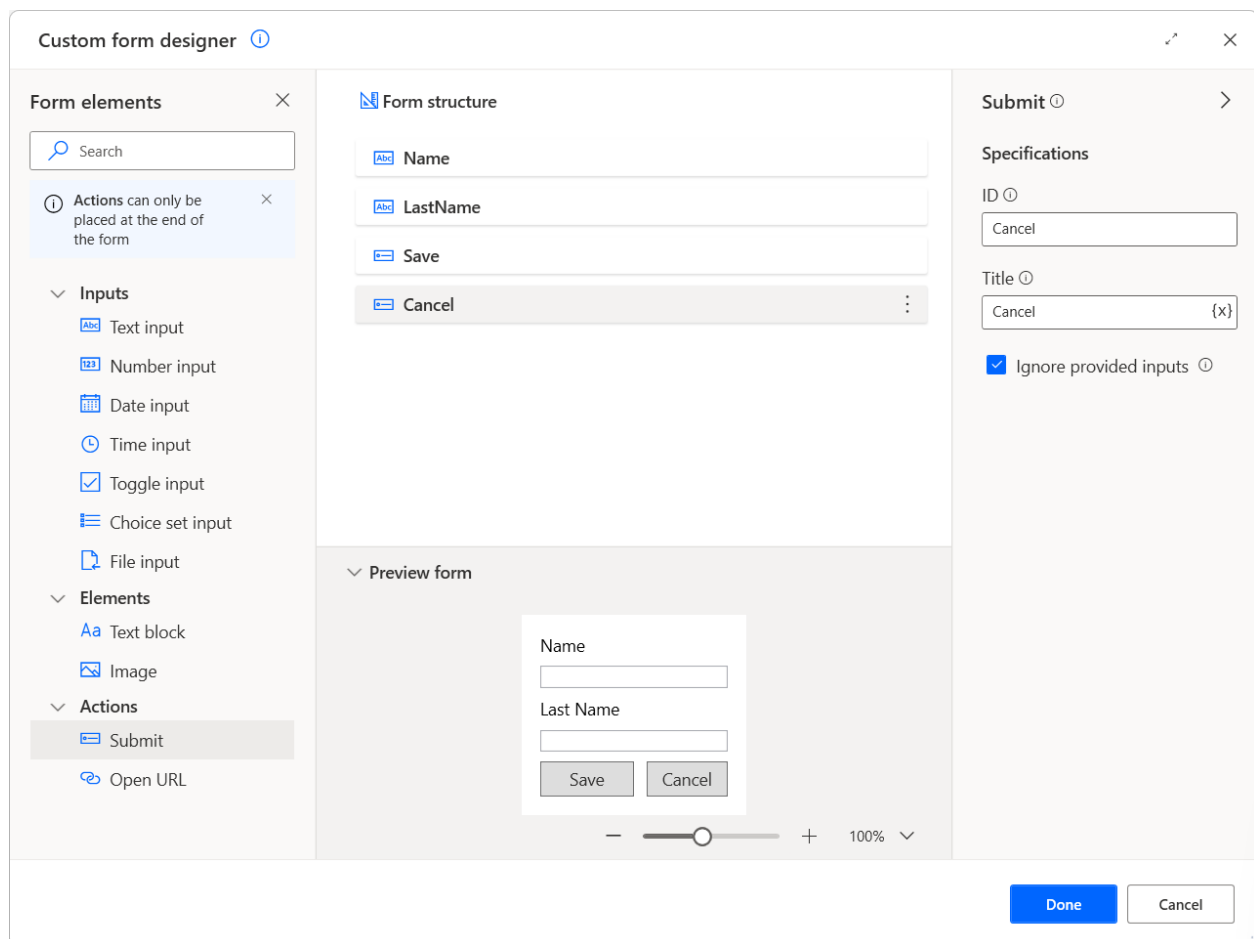
# Handle custom forms

Article • 02/24/2023

After [creating a custom form](#), it's typical to check which button is pressed and handle the gathered data accordingly.

To become familiar with this functionality, create a new custom form containing the following elements:

- A text input with ID **Name** that stores the name of a customer
- A text input with ID **LastName** that stores the last name of a customer
- A submit action with ID **Save**
- A submit action with ID **Cancel** and the option **Ignore provided inputs** enabled.



The purpose of the flow is to check which form action is pressed. When the **Save** action is pressed, the flow stores the gathered data into an Excel spreadsheet. When the **Cancel** action is pressed, the flow stops and returns an error.

To implement this behaviour:

1. Deploy an **If** action and check whether the **ButtonPressed** variable contains the value **Save**.



**If**
✕

Marks the beginning of a block of actions that is run if the condition specified in this statement is met [More info](#)

**Select parameters**

First operand:  {x} ⓘ

Operator:  ▾ ⓘ

Second operand:  {x} ⓘ

2. Inside the if block, launch an Excel spreadsheet. For this example, the spreadsheet must contain two columns for the name and last name of the customer.

**Launch Excel**
✕

Launches a new Excel instance or opens an Excel document [More info](#)

**Select parameters**

Launch Excel:  ▾ ⓘ

Document path:  📄 {x} ⓘ

Make instance visible:  ⓘ


Open as ReadOnly:  ⓘ

> **Advanced**

> **Variables produced** ExcelInstance

3. Use a **Get first free column/row from Excel worksheet** action to find the first available row in the spreadsheet.

### Get first free column/row from Excel worksheet ✕

 Retrieves the first free column and/or row of the active worksheet. This is useful for adding new data into a worksheet that already has data in it [More info](#)

Select parameters

Excel instance:  ⌵ i

> Variables produced FirstFreeColumn FirstFreeRow

🛡️ On error Save Cancel


4. Deploy a **Write to Excel worksheet** action and write the customer's name in the first column of the first available spreadsheet row.

All the form inputs are stored in the **CustomFormData** custom object variable. To access the value of a specific element of the custom object, use the following notation: `%CustomFormData['ElementID']%`.

#### ⓘ Note

You can find more information regarding custom objects in **Advanced data types**

### Write to Excel worksheet ✕

 Writes a value into a cell or a range of cells of an Excel instance [More info](#)

Select parameters

Excel instance:  ▼ ⓘ

Value to write:  {x} ⓘ


Write mode:  ▼ ⓘ

Column:  {x} ⓘ

Row:  {x} ⓘ

5. Use a second **Write to Excel worksheet** action to write the customer's last name in the second column of the first available spreadsheet row.

### Write to Excel worksheet ✕

 Writes a value into a cell or a range of cells of an Excel instance [More info](#)

Select parameters

Excel instance:  ▼ ⓘ

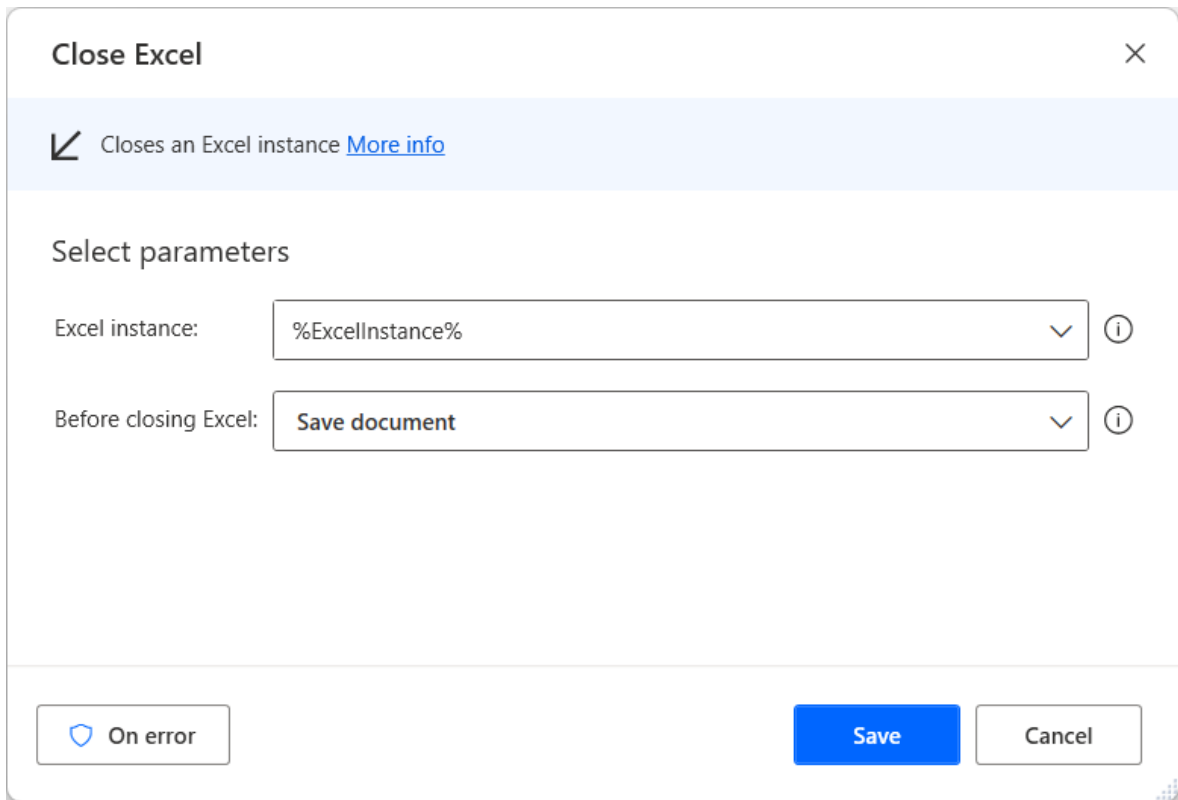
Value to write:  {x} ⓘ

Write mode:  ▼ ⓘ

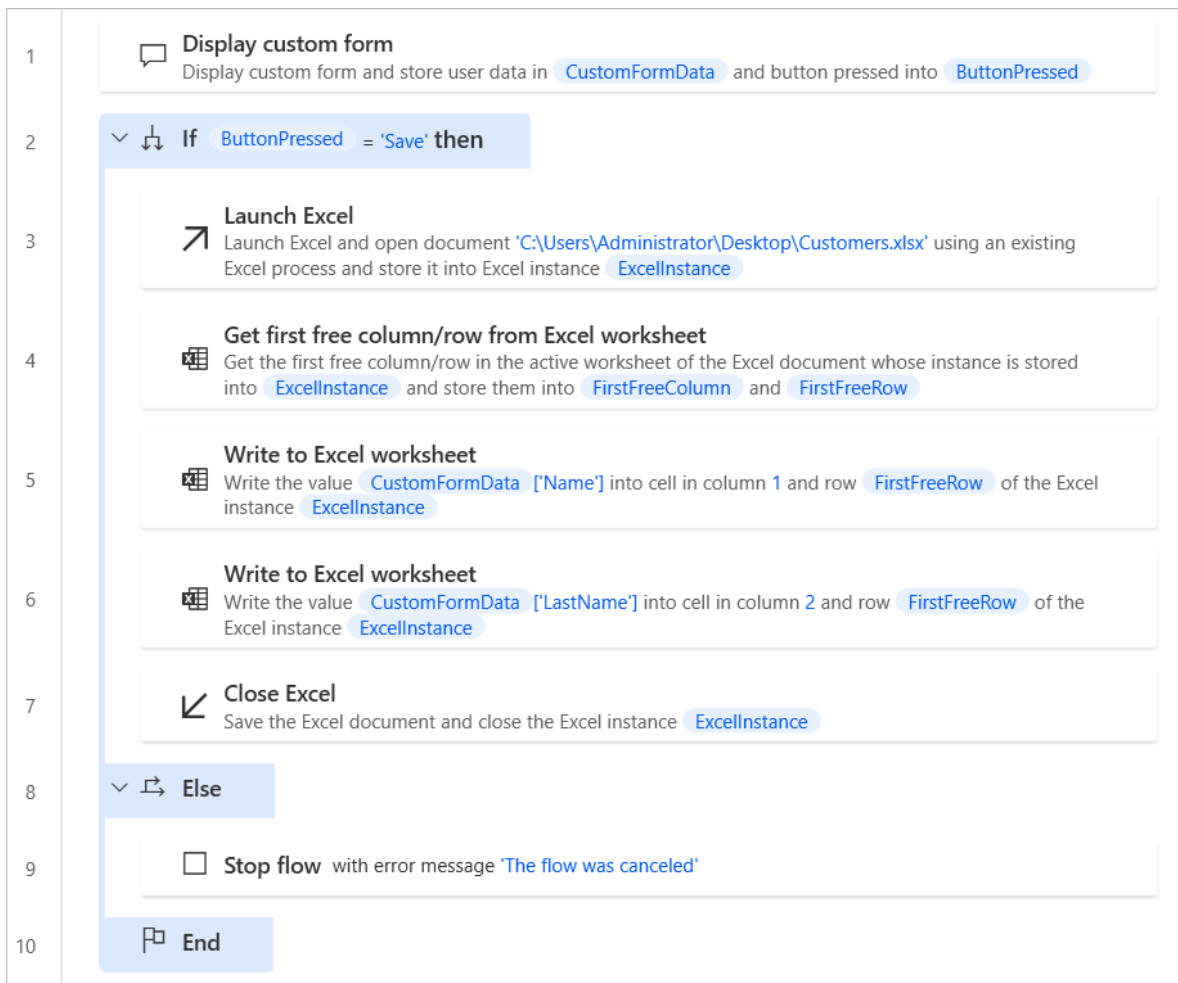
Column:  {x} ⓘ

Row:  {x} ⓘ

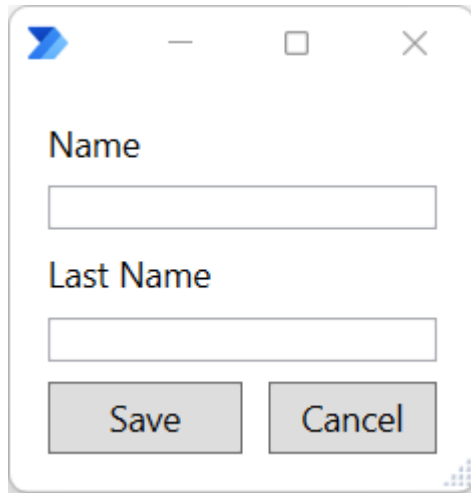
6. Save and close the Excel file using the **Close Excel** action.



7. Add an **Else** action inside the if block and use a **Stop flow** action to stop the flow when the if statement is false.



8. When running the desktop flow, the displayed form will be similar to the one presented in the following screenshot:



The screenshot shows a standard Windows-style dialog box. At the top left is a blue arrow icon. To its right are the standard window control buttons: a minus sign for minimize, a square for maximize, and an 'X' for close. Below the title bar, the text 'Name' is positioned above a single-line text input field. Underneath that, the text 'Last Name' is positioned above another single-line text input field. At the bottom of the dialog, there are two buttons: 'Save' on the left and 'Cancel' on the right. The dialog box has a thin border and a small icon in the bottom right corner.

# Share/export a desktop flow

Article • 11/07/2023

To replicate a desktop flow regardless of your account, edit it through the flow designer, and copy the actions within a subflow.

The copied text can be sent directly to others users or saved to a text file for easier sharing. The receiver can paste the text to a flow designer and run it.

## ⓘ Note

When copying actions, all their parameters, images, and UI elements are copied as well. Only one subflow can be copied at a time. If there are more than one subflows, repeat the procedure for each one individually or save the actions into separate text files.

If you've signed in with an organization premium account, you can also choose one of the following methods:

1. Share the desktop flow directly through the Power Automate portal.

To share a desktop flow with other users in your organization, give them specific permissions to access the flow. You can find more information regarding sharing flows through Power Automate portal in [Share desktop flows](#).

## ⓘ Note

Desktop flows connection cannot be shared with other users.

2. Export a solution that contains the desktop flow.

To move a desktop flow from one environment to another, host it in a solution. For more information about importing flows into solutions and building solution-aware flows, see [Overview of solution-aware flows](#).

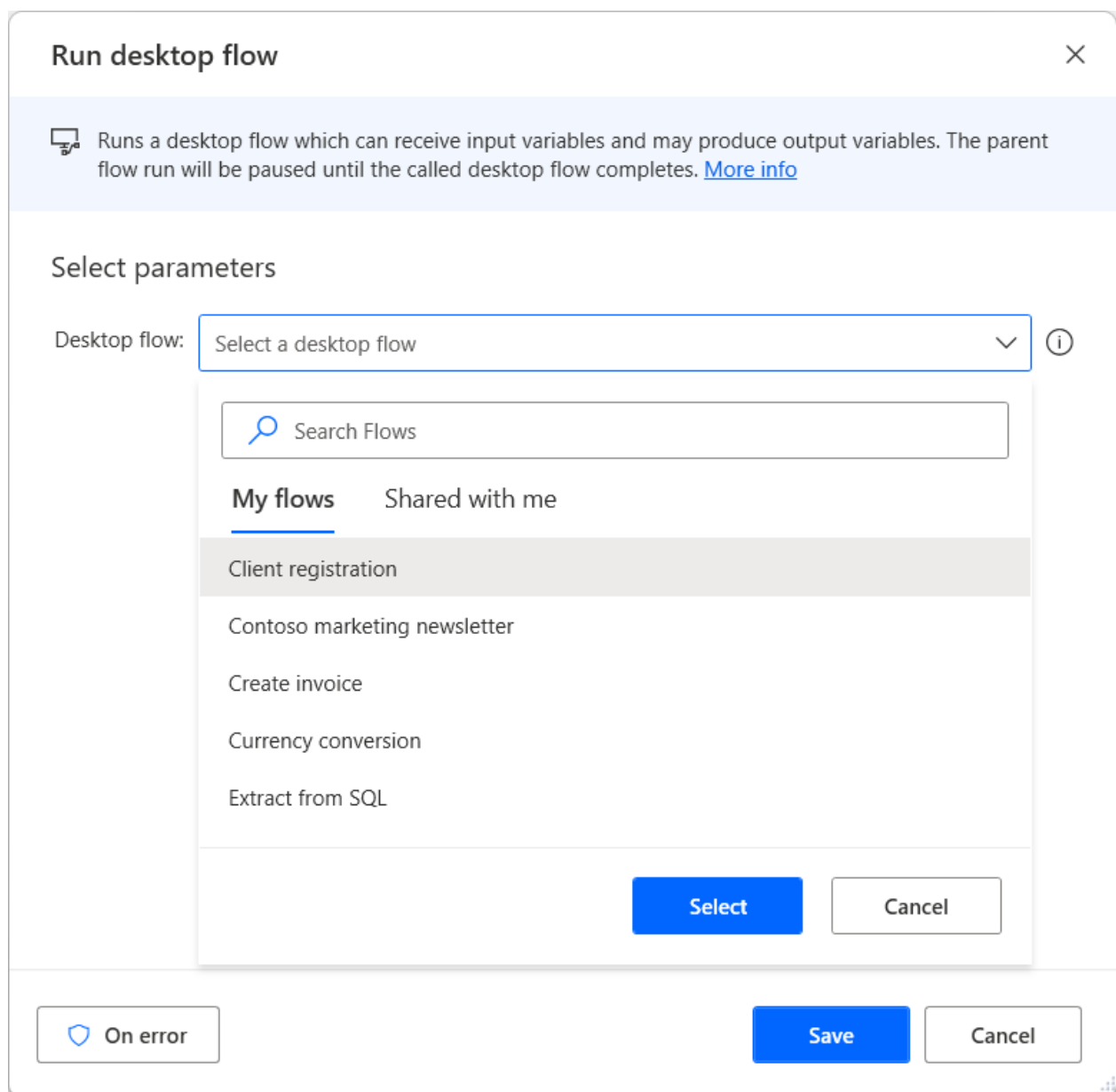
# Run desktop flow from other desktop flows

Article • 02/24/2023

Power Automate provides the **Run desktop flow** action to enable users to call desktop flows while running other desktop flows.

Using this feature, you can split complicated flows into smaller ones and call them when needed. For example, you can create separate flows to handle specific error scenarios in the main flow.

To use the action, add it to the workspace and select the desktop flow you want to call.



The screenshot shows the 'Run desktop flow' configuration dialog. At the top, there is a title bar with the text 'Run desktop flow' and a close button (X). Below the title bar, there is a description: 'Runs a desktop flow which can receive input variables and may produce output variables. The parent flow run will be paused until the called desktop flow completes. [More info](#)'. The main section is titled 'Select parameters'. Under this title, there is a dropdown menu labeled 'Desktop flow:' with the text 'Select a desktop flow' and a downward arrow. To the right of the dropdown is an information icon (i). Below the dropdown is a search box with a magnifying glass icon and the text 'Search Flows'. Under the search box, there are two tabs: 'My flows' (which is selected) and 'Shared with me'. Below the tabs is a list of desktop flows: 'Client registration', 'Contoso marketing newsletter', 'Create invoice', 'Currency conversion', and 'Extract from SQL'. At the bottom of the list are two buttons: 'Select' (in blue) and 'Cancel'. At the bottom of the dialog, there are three buttons: 'On error' (with a shield icon), 'Save' (in blue), and 'Cancel'.

Every time the action runs, the parent flow is paused until the called desktop flow completes. If the called flow contains input variables, you'll be prompted to populate them.

Likewise, if the called flow has output variables, the action will return their values in the parent flow.

ⓘ **Note**

You can find more information regarding input and output variables in **Input and output variables**.

### Run desktop flow

Runs a desktop flow which can receive input variables and may produce output variables. The parent flow run will be paused until the called desktop flow completes. [More info](#)

Select parameters

Desktop flow: Client registration ⓘ

Input variables

Name: ⓘ

LastName: ⓘ

Variables produced

Result {x}

On error Save Cancel

Power Automate doesn't allow two flows to directly or indirectly call each other to prevent recursions. Additionally, a flow can't have more than 30 dependent flows. If a dependent flow is missing or the parent flow has more than 30 dependencies, the flow won't run.



# Use connector actions in desktop flows

Article • 07/23/2024

In desktop flows, you can utilize not only the standard set of actions available in the action library but also some of the most popular [connectors](#). These connectors act as proxies or wrappers around APIs, enabling the underlying services to communicate with Microsoft Power Automate, Microsoft Power Apps, and Azure Logic Apps. They allow users to link their accounts and use a collection of prebuilt actions and triggers to create their apps and workflows.

## Connections

Connectors require [connections](#). In Power Automate, a connection refers to the authenticated link between Power Automate and an external service. This connection allows Power Automate to access and perform actions on data from various services, such as Microsoft 365, SharePoint, SQL Server, and many others. Each connection is specific to a user and requires authentication to ensure secure access to data and services. This authentication is typically done using OAuth, API keys, or other authentication methods provided by the external service.

## Connection references

Desktop flows utilize [connection references](#). In Power Automate, a connection reference is an abstraction layer that points to a specific connection used by actions within your flows. Instead of hardcoding connections directly into each action, connection references allow for a more modular and reusable approach, enabling easier management and sharing of flows, especially within Power Platform solutions.

## Key concepts

The following are some key concepts of connection references:

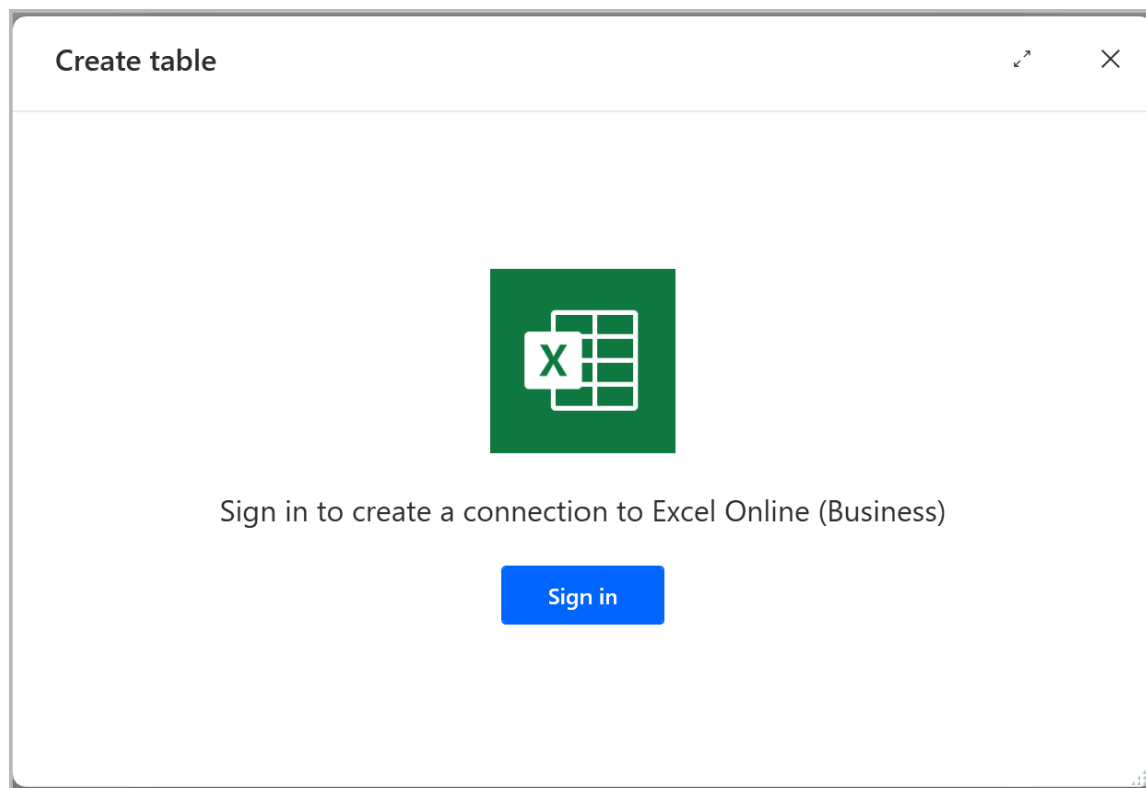
- **Abstraction:** A connection reference abstracts the connection details from the actions, allowing you to manage connections separately from the logic of the flow.
- **Reusability:** Connection references can be reused across multiple flows and environments, simplifying the process of updating connections if credentials or endpoints change.

- **Portability:** Using connection references makes it easier to move flows between different environments (for example development, testing, production) because the connection reference remains consistent, even if the actual connection details are different between environments.
- **Simplified management:** By centralizing connection details, it becomes easier to update or replace connections without needing to modify each individual action that uses the connection.

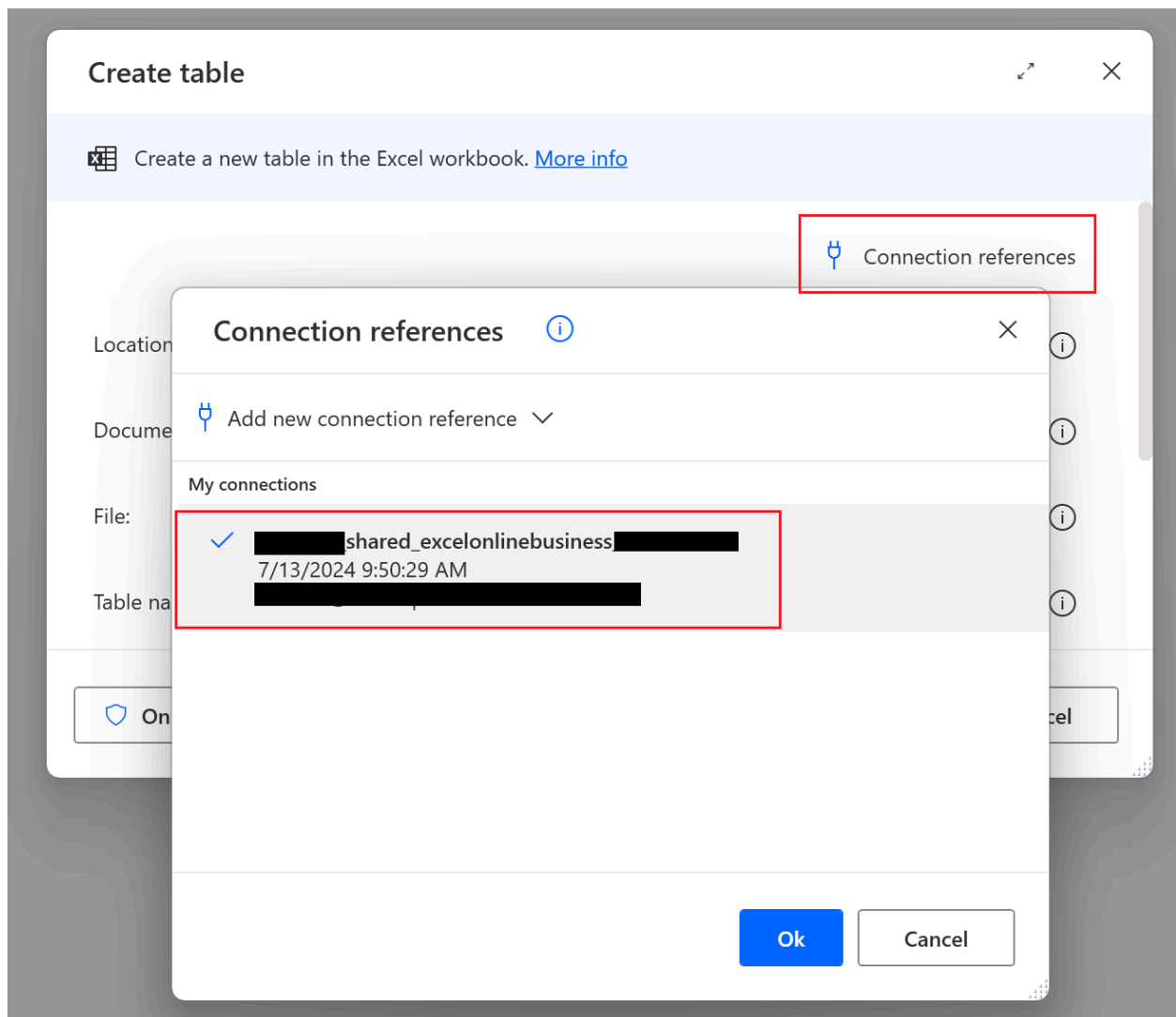
## Use a connector action in desktop flows

In Power Automate for desktop, you can find some of the most popular connectors (for example, SharePoint, Office 365 Outlook, and OneDrive) in the standard library of actions. You can use their actions the same way every other action is utilized. Either double-click or drag and drop the desired action in the designer canvas.

If there are no compatible connection references available for the connector you want to use, a prompt appears for you to create a new connection reference.



To select a connection reference, in the action configuration window, select the socket icon. Once you select it, all the available connection references compatible with the connector appear.



To create a new connection reference, select the **Add new connection reference** button. You can use an existing connection that is compatible with the respective connector and create a new connection reference for it. Alternatively, you can create a new connection and include it in a new connection reference.

Once the connection reference is set up, you're all set. You can now access the underlying data and configure the respective action as desired.

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Share desktop flows that contain connector actions

Article • 07/23/2024

Sharing a desktop flow that uses connectors follows the same principles as any other desktop flow. However, there are a few more steps required due to the connection references in the desktop flows.

## ⓘ Note

Connectors require connections. In Power Automate, a connection refers to the authenticated link between Power Automate and an external service. This connection allows Power Automate to access and perform actions on data from various services, such as Office 365, SharePoint, SQL Server, and many others. Each connection is specific to a user and requires authentication to ensure secure access to data and services. This is typically done using OAuth, API keys, or other authentication methods provided by the external service.

## ⓘ Important

Sharing a desktop flow does not automatically provide access to the underlying connections utilized.

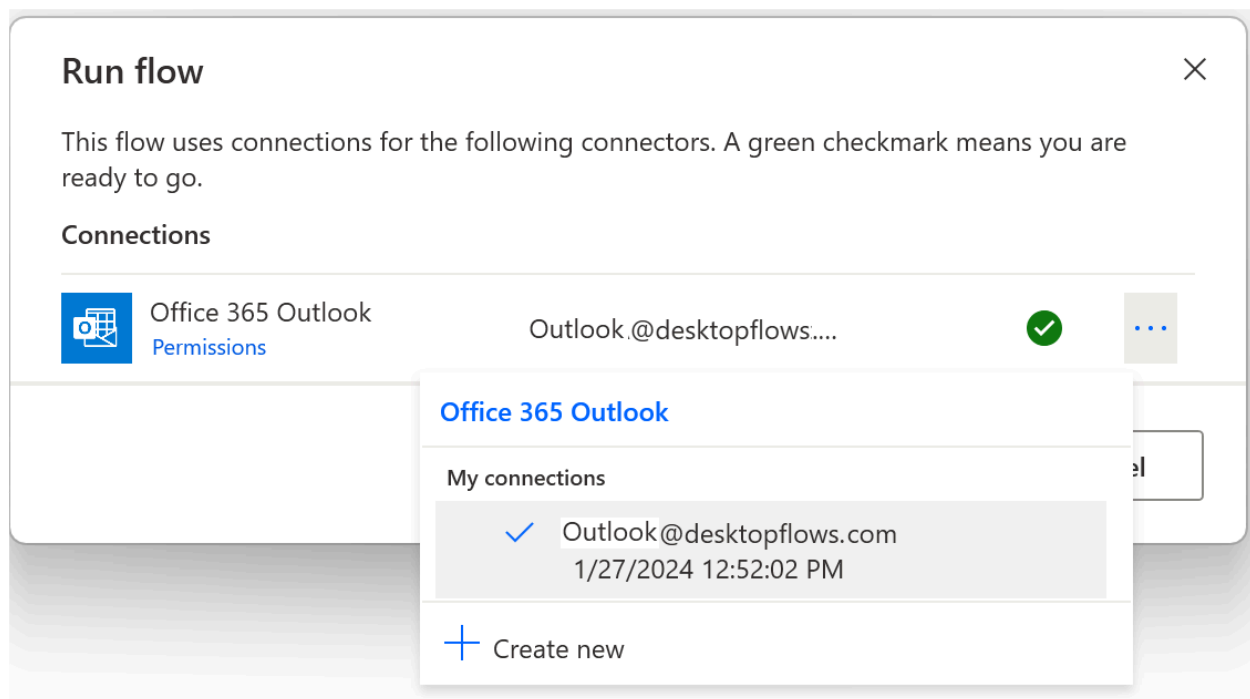
You can share a desktop flow that uses connections with:

- users (run-only level access)
- co-owners

## Run a shared desktop flow that contains connector actions as a user

Makers with user access on a shared desktop flow must always bring their own connections when they run the flow. They can only perform attended console initiated runs.

Once you run a shared desktop flow that contains connector actions through the console, a prompt appears for you to provide a valid connection to be used.



If there are compatible existing connections available, the first one is selected by default.

## Run a shared desktop flow that contains connector actions as a co-owner

Co-owners have the ability to modify shared desktop flows in addition to running them. Co-owners have the ability to *embed* (preview) the connection references (and as a result their underlying connections) to the desktop flows they have access to. By embedding a connection reference to a desktop flow, you allow other co-owners to have access to the underlying data provided by it, for both modifying as well as running the desktop flow.

### ⓘ Note

You can only embed or remove connection references that you own from a desktop flow. Connection references added by other co-owners can only be managed by them.

### ⓘ Important

Embedded connection references are only available to other co-owners in the scope of the shared desktop flow.

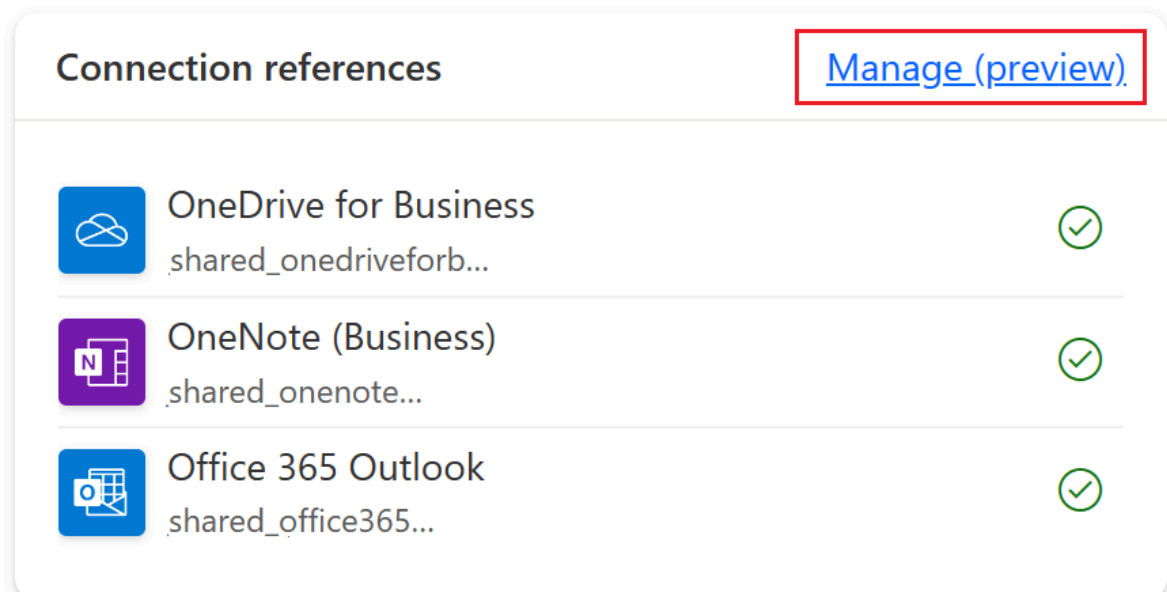
## Cloud initiated runs

To successfully invoke a desktop flow containing connector actions from a cloud flow, it must meet the following two requirements:

- The desktop flow must use the [Power Automate v2 schema](#).
- All of its connection references must be marked as embedded.

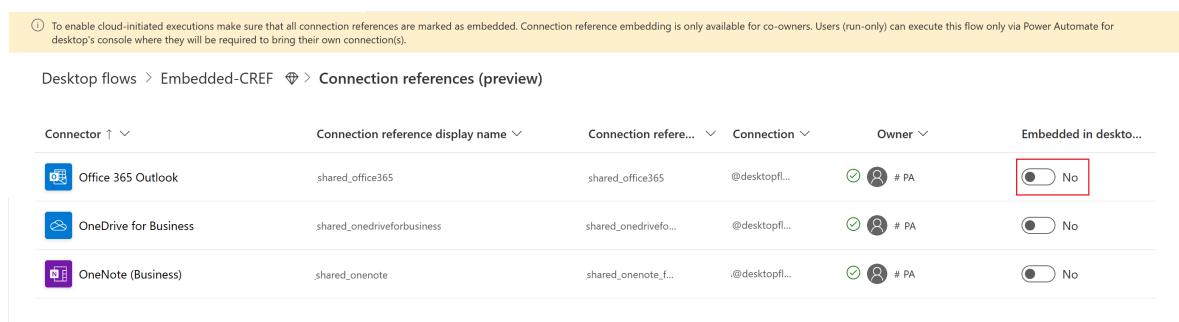
To embed a connection reference to a flow that you have access to as a co-owner:

1. Select the desktop flow in [Power Automate](#) and then select **Details**.
2. In the **Connection references** section, select **Manage**.



In the **Connection references** screen, all of the connection references used in a flow are displayed.

3. Set the **Embed in desktop flow** option to **Yes** to enable it.



4. After you confirm your selection, the connection reference is embedded in the desktop flow.

## Console runs

Similar to the user use-case, when you run a shared desktop flow with connector actions through the console, a prompt appears for you to provide a valid connection to be used.

---

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Set screen resolution on unattended mode

Article • 03/04/2024

In some scenarios, Power Automate might run unattended flows in a lower resolution than the one used to develop the flows. As a result, some UI elements could be hidden from the screen, while any images captured might not be identified at runtime under a different resolution. This might cause flows to fail. In such cases, you can follow one of the two approaches explained in this article to adjust the screen resolution used for unattended flows accordingly.

## ⓘ Note

The screen resolution can be adjusted per target machine, not per flow. If you need one of your unattended flows to run in another resolution, a different target machine needs to be used.

## With Windows registry

Set the screen resolution for unattended flows using the Window registry. This method can be used with Power Automate flows starting with version 2.35.

## ⓘ Important

This task contains steps that tell you how to modify the registry. However, serious problems might occur if you modify the registry incorrectly. Therefore, make sure that you follow these steps carefully. For added protection, back up the registry before you modify it. Then, you can restore the registry if a problem occurs. For more information about how to back up and restore the registry, go to: [How to back up and restore the registry in Windows](#).

Setting the **ScreenResolutionEnabled** registry key to 1 overrides the settings in the **UIFlowService.exe.config** file. The registry settings for screen resolution persist after an upgrade of Power Automate Desktop, the **UIFlowService.exe.config** file is overwritten with default values during upgrades.

Open the registry editor (Windows key + R, and type 'regedit'), and then set the following values.

 Expand table

Hive	Key	Name	Type	Description
HKEY_LOCAL_MACHINE	SOFTWARE\WOW6432Node\Microsoft\Power Automate Desktop\Global\Screen	ScreenResolutionEnabled	DWORD	If set to '1', will enable the custom resolution settings.
HKEY_LOCAL_MACHINE	SOFTWARE\WOW6432Node\Microsoft\Power Automate Desktop\Global\Screen	Width	DWORD	Set the screen resolution width.



Hive	Key	Name	Type	Description
HKEY_LOCAL_MACHINE	SOFTWARE\WOW6432Node\Microsoft\Power Automate Desktop\Global\Screen	Height	DWORD	Set the screen resolution height.
HKEY_LOCAL_MACHINE	SOFTWARE\WOW6432Node\Microsoft\Power Automate Desktop\Global\Screen	Scale	DWORD	Set the screen resolution scale.

## With UIFlowService.exe.config file

To change the resolution in which unattended flows are run by editing the UIFlowService.exe.config:

1. Go to C:\Program Files (x86)\Power Automate Desktop, and then open the UIFlowService.exe.config file.
2. Set the value of the Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionEnabled element to true.

XML

```
<add key="Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionEnabled" value="true" />
```

3. Change the values of the following elements to the proper screen resolution width, height, and scale, respectively. The following code sets the default resolution to 1920 x 1,080 pixels.

XML

```
<add key="Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionWidth" value="1920" />
<add key="Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionHeight" value="1080" />
<add key="Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionScale" value="100" />
```

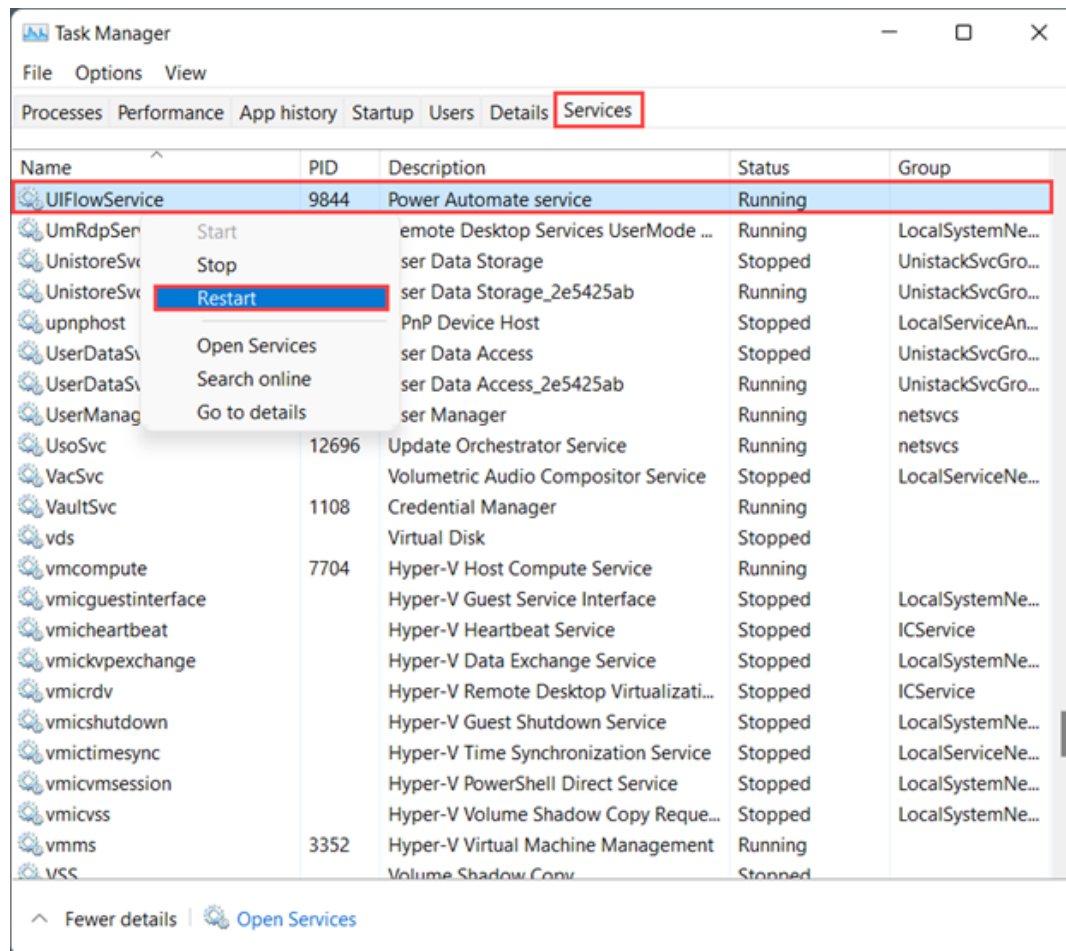
```

1 <?xml version="1.0" encoding="utf-8"?>
2 <configuration>
3   <startup>
4     <supportedRuntime version="v4.0" sku=".NETFramework,Version=v4.6.2" />
5   </startup>
6   <!-- Default is two in .NET framework, limiting relay listeners to two max concurrent requests.-->
7   <system.net>
8     <connectionManagement>
9       <add address="*" maxconnection="50" />
10    </connectionManagement>
11  </system.net>
12  <appSettings>
13    <!-- Authorization settings -->
14    <add key="Microsoft.Flow.RPA.UIFlowService.EnforceTokenAuth" value="true" />
15    <add key="Microsoft.Flow.RPA.Agent.TokenAudience" value="https://service.flow.microsoft.com/,https://gov.service.flow.microsoft.us/,https://
16    <add key="Microsoft.Flow.RPA.Agent.TokenAuthContext" value="https://login.microsoftonline.com/common/v2.0/.well-known/openid-configuration
17    <!-- Screen resolution settings -->
18    <add key="Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionEnabled" value="true" />
19    <add key="Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionWidth" value="1920" />
20    <add key="Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionHeight" value="1080" />
21    <add key="Microsoft.Flow.RPA.UIFlowService.ScreenDefaultResolutionScale" value="100" />
22    <!-- HTTP server shutdown timeouts -->
23    <add key="Microsoft.Flow.RPA.UIFlowService.RelayOpenTimeout" value="00:00:10" />
24    <add key="Microsoft.Flow.RPA.UIFlowService.RequestDrainTimeout" value="00:00:10" />
25    <add key="Microsoft.Flow.RPA.UIFlowService.RelayCloseTimeout" value="00:00:03" />

```

4. Restart the UIFlowService service.

To restart the service, start Windows Task Manager, select the **Services** tab, right-click the **UIFlowService** service, and then select **Restart**.



#### ⓘ Note

An alternative to restarting the UIFlowService is to restart your machine.

# Run Power Automate with elevated rights

Article • 02/24/2023

During desktop flow development, some actions may need to access resources with elevated rights, such as files and applications. To run these actions successfully, launch Power Automate as administrator:

## Important

- To run desktop flows through the flow designer or the console to interact with applications running with elevated rights, launch Power Automate as an administrator.
- When a desktop flow is triggered by a cloud flow, the actions contained in the desktop flow that require elevated privileges won't have any effect. Therefore, Power Automate won't be able to access applications that run with elevated rights.

1. Before launching Power Automate, ensure that the application is closed, and doesn't appear on the Windows system tray.
2. Right-click on the Power Automate icon and select **Run as administrator**.
3. To confirm that Power Automate is launched with administrator rights, open Windows Task Manager, navigate to the **Details** tab, and check that Power Automate runs with elevated privileges.

Task Manager

File Options View

Processes Performance App history Startup Users Details Services

Name	PID	Status	User name	CPU	Memory (ac...	Architec...	Elevated	Description
msedge.exe	13896	Running	Administrat...	00	37,340 K	x64	No	Microsoft Edge
msedge.exe	12628	Running	Administrat...	00	81,380 K	x64	No	Microsoft Edge
msedge.exe	2104	Running	Administrat...	00	116,836 K	x64	No	Microsoft Edge
msedge.exe	12392	Running	Administrat...	00	1,012 K	x64	No	Microsoft Edge
msedge.exe	3612	Running	Administrat...	00	183,596 K	x64	No	Microsoft Edge
msedge.exe	20384	Running	Administrat...	00	13,216 K	x64	No	Microsoft Edge
msedge.exe	18452	Running	Administrat...	00	4,960 K	x64	No	Microsoft Edge
msedge.exe	18628	Running	Administrat...	00	94,072 K	x64	No	Microsoft Edge
msedge.exe	11996	Running	Administrat...	00	43,188 K	x64	No	Microsoft Edge
msedge.exe	7696	Running	Administrat...	00	15,984 K	x64	No	Microsoft Edge
msedge.exe	17156	Running	Administrat...	00	22,768 K	x64	No	Microsoft Edge
msedge.exe	816	Running	Administrat...	00	3,076 K	x64	No	Microsoft Edge
MsMpEng.exe	5916	Running	SYSTEM	00	228,852 K	x64	Yes	Antimalware Service Executable
MSOIDSVC.EXE	5216	Running	SYSTEM	00	1,196 K	x64	Yes	Microsoft® Microsoft Online Services ID Se...
MSOIDSVCM.EXE	5844	Running	SYSTEM	00	40 K	x64	Yes	Microsoft® Microsoft Online Services ID Se...
MsSense.exe	5384	Running	SYSTEM	01	87,836 K	x64	Yes	Windows Defender Advanced Threat Prote...
NisSrv.exe	8684	Running	LOCAL SER...	00	8,884 K	x64	Yes	Microsoft Network Realtime Inspection Ser...
OfficeClickToRun.exe	4984	Running	SYSTEM	00	15,988 K	x64	Yes	Microsoft Office Click-to-Run (SxS)
OneApp.IGCC.WinSer...	5032	Running	SYSTEM	00	3,576 K	x64	Yes	Intel® Graphics Command Center Service
OneDrive.exe	15332	Running	Administrat...	00	11,532 K	x64	No	Microsoft OneDrive
PAD.BrowserNativeM...	19460	Running	Administrat...	00	13,972 K	x64	No	Web Automation Native Message Host
PAD.Console.Host.exe	12260	Running	Administrat...	00	181,440 K	x64	Yes	Power Automate
PAD.Designer.exe	2280	Running	Administrat...	00	252,992 K	x64	Yes	Power Automate
PowerMan.exe	15900	Running	Administrat...	00	860 K	x64	No	Legacy Power Manager Host

^ Fewer details

End task

# Extract text from a Word document using VBScript

Article • 02/24/2023

Although you can use optical character recognition (OCR) to extract text from Word documents, this approach can become complicated for multi-page documents that require scrolling.

A more efficient way to extract text from Word documents is the use of VBScript. Power Automate provides the **Run VBScript** action that enables you to run scripts on your desktop.

To extract text from a Word document, deploy the **Run VBScript** action and paste the following code in the **VBScript to run** field.

VBScript

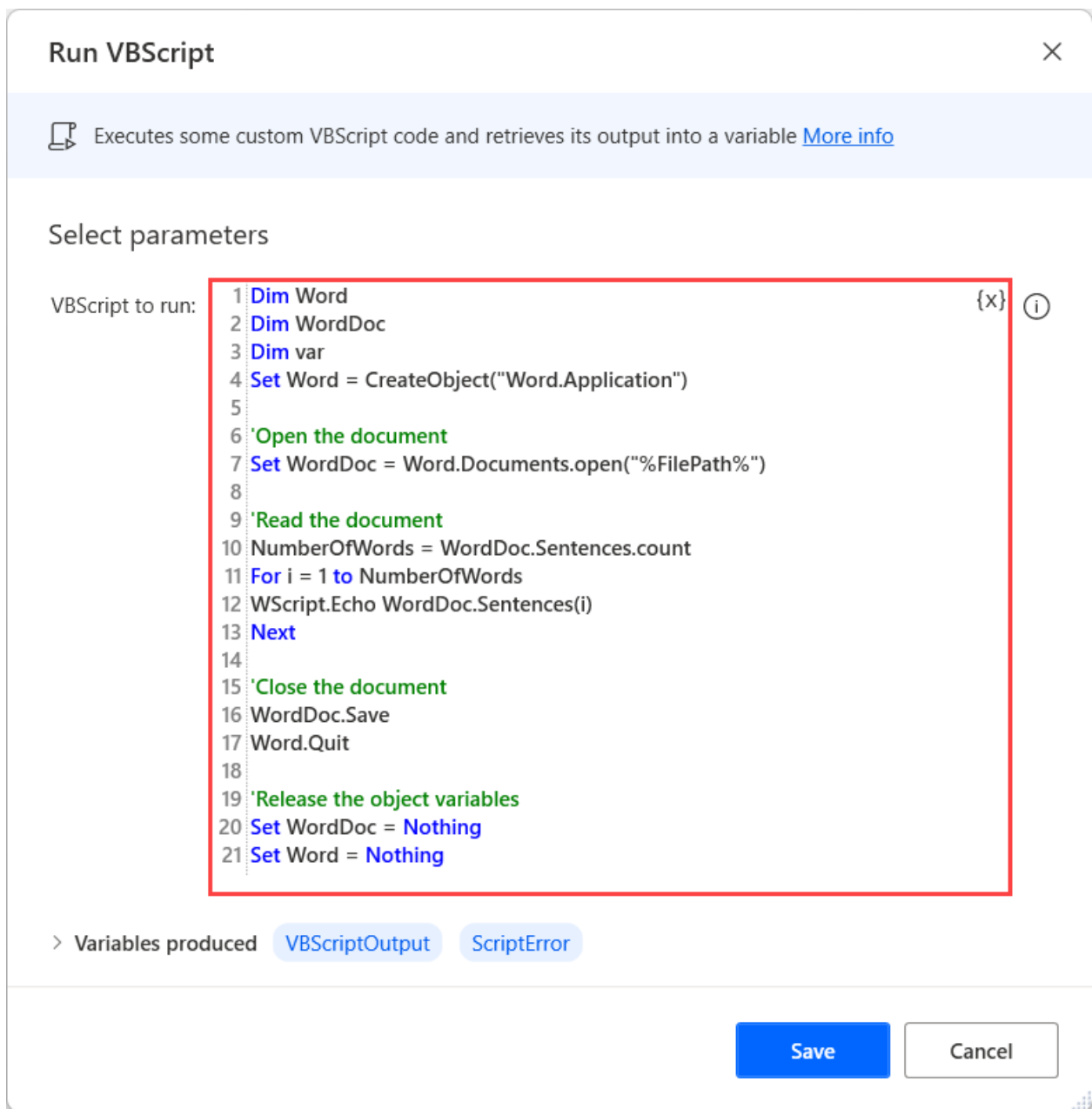
```
Dim Word
Dim WordDoc
Dim var
Set Word = CreateObject("Word.Application")

'Open the document
Set WordDoc = Word.Documents.open("%FilePath%")

'Read the document
NumberOfWords = WordDoc.Sentences.count
For i = 1 to NumberOfWords
WScript.Echo WordDoc.Sentences(i)
Next

'Close the document
WordDoc.Save
Word.Quit

'Release the object variables
Set WordDoc = Nothing
Set Word = Nothing
```



The script contains a variable named **FilePath** that specifies the file path of the Word document. You can initialize this variable using a **Set variable** action before the **Run VBScript** action or replace it with a hardcoded value.

### Set variable ✕


{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)

Variable: **FilePath** {x}

Value:  {x} ⓘ

The **Run VBScript** action stores the extracted text by default in a variable named **VBScriptOutput**. You can use this variable as an input in the available Text actions to manipulate the retrieved text.

### Trim text ✕

 Removes all occurrences of white space characters (such as space, tab, or new line) from the beginning and/or end of an existing text [More info](#)

Select parameters

Text to trim:  {x} ⓘ

What to trim:  ⓘ

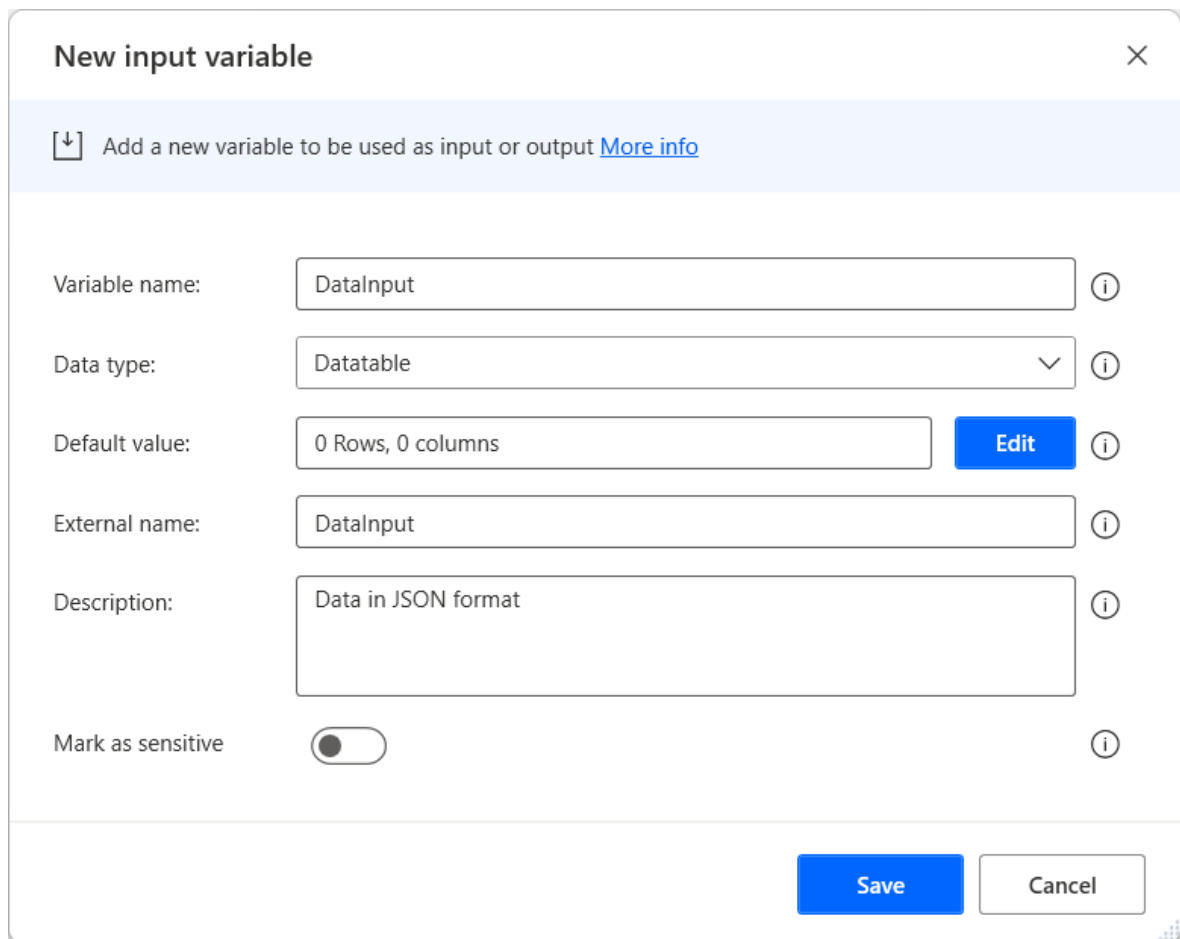
> Variables produced **TrimmedText**

# Pass a datatable from a cloud flow to a desktop flow

Article • 02/24/2023

Some automation scenarios require users to pass data in tabular form from a cloud flow to a desktop flow. To implement this functionality, replicate the following steps:

1. Create a new [input variable](#) of a [datatable datatype](#). In this example, the input variable is named **DataInput**.



The screenshot shows a 'New input variable' dialog box with the following fields and controls:

- Variable name:** DataInput
- Data type:** Datatable
- Default value:** 0 Rows, 0 columns (with an 'Edit' button)
- External name:** DataInput
- Description:** Data in JSON format
- Mark as sensitive:** A toggle switch is currently turned off.
- Buttons:** 'Save' and 'Cancel' buttons are located at the bottom right.

2. Inside your cloud flow, initialize a new variable of type array with an array of objects (JSON) representing your datatable. Then, use it as an input value in the **Run a flow built with Power Automate for desktop** action.



The image shows two screenshots from the Microsoft Power Automate interface. The top screenshot is titled "Initialize variable" and shows a variable named "DatatableAsJson" of type "Array". The value is a JSON array of three objects, each representing a person with fields for Name, Last Name, and Email. The bottom screenshot is titled "Run a flow built with Power Automate for desktop" and shows the configuration for a "Datatable flow" in "Attended" mode. The "Data input" field is set to the "DatatableAsJson" variable. An arrow points from the JSON value in the first screenshot to the "Data input" field in the second screenshot.

**Initialize variable**

\* Name: DatatableAsJson

\* Type: Array

Value:

```
[
  {
    "Name": "Tania",
    "Last Name": "Agius",
    "Email": "taniaagius@contoso.com"
  },
  {
    "Name": "Ditiro",
    "Last Name": "Kgosi",
    "Email": "ditirokgosi@contoso.com"
  },
  {
    "Name": "Zoltan",
    "Last Name": "Gal",
    "Email": "zoltangal@contoso.com"
  }
]
```

**Run a flow built with Power Automate for desktop**

\* Desktop flow: Datatable flow [Edit](#)

\* Run Mode: Attended (runs when you're signed in)

Data input: {x} DatatableAsJson x

[Show advanced options](#)

In the following example, you can see the structure of a JSON block:

```
JSON

[
  {
    "Name": "Tania",
    "Last Name": "Agius",
    "Email": "taniaagius@contoso.com"
  },
  {
    "Name": "Ditiro",
```

```
"Last Name": "Kgosi",  
"Email": "ditirokgosi@contoso.com"  
},  
{  
"Name": "Zoltan",  
"Last Name": "Gal",  
"Email": "zoltangal@contoso.com"  
}  
]
```

To find more information regarding passing data from cloud flows to desktop flows, refer to [Trigger desktop flows from cloud flows](#).

# Delete desktop flow run history data

Article • 04/11/2023

Effective management of historical data generated by [Microsoft Power Automate](#) can be important to ensure that your Microsoft Dataverse environments remain efficient and cost-effective. By implementing data retention policies and utilizing features like [Bulk Record Deletion](#) of [Microsoft Dataverse](#) and the Power Platform admin center, you can proactively manage the accumulation of historical data.

In the following sections, we'll walk you through the steps on how to purge historical desktop flow data from your environment using Dataverse's built-in [bulk-delete feature](#). This feature allows you to quickly and easily [remove large amounts of data](#) from your environment in compliance with your specific data retention policies, ensuring efficient data storage and performance management. In addition to ad-hoc bulk-delete jobs, you could also schedule recurrent bulk-delete jobs that will find and delete records in a table that are, for example, *OlderThanXDays*.

We'll cover how to identify the desktop flow data that could be purged, how to create a bulk delete job to delete the data, and how to monitor the progress of the job.

## ⊗ Caution

Before deleting Dataverse data, it is important to understand that the data is **permanently** deleted from your environment, and there's no way to recover individual records once they've been deleted.

## ⓘ Note

To create bulk-delete jobs in Dataverse, you need to have the **Bulk Delete** privilege in at least one of the roles that have been assigned to you.

## Desktop flow tables with potentially large data volumes

Display name	System name	Details
--------------	-------------	---------

Display name	System name	Details
Flow Session	flowsession	The Flow Session table stores metadata about desktop flow runs, such as the start time, completion time, context, detailed action logs and status of the run. The <b>Regarding</b> field in this table is referencing a desktop flow ID (workflowid) for which the flow session record has been created for.
Workflow Binary	workflowbinary	The Workflow Binary table stores binary data for all types of workflow runs, such as the input and output data and exceptions screenshots if there's desktop flow runs.

### Important

The **Flow Session** and **Workflow Binary** tables in Dataverse have a **cascade relationship**. The cascade relationship between these two tables ensures that when a desktop flow run is deleted from the **Flow Session** table, all associated **Workflow Binary** records are also deleted. This helps to keep the Dataverse database clean and avoids orphaned records.

## Creating a bulk-delete job to delete desktop flow runs

To bulk-delete data in Dataverse, follow the detailed steps below.

### Important

Before performing any bulk delete operations, it is important to thoroughly test and review your filter results since bulk-delete operations are **irreversible**.

1. Sign in to the **Power Platform admin center**.
2. Select **Environments** in the left navigation pane, **select your environment**, and then select **Settings** on the top menu bar.
3. Select Data management > **Bulk deletion**.
4. From the Bulk Record Deletion grid, select **New** on the command bar. This will open the Bulk Deletion wizard that allows you to define a query for the records you want deleted.
5. In the **Look for** list, select the **Flow Sessions** table from the list.

6. In the search criteria area, add desired filter that should return the records that you want to be deleted. Here's an example that will find all **desktop flow runs that are older than 6 months** (format: Field | Filter Type | Value):

```
Completed On | Older Than X Months | 6
```

7. Select **Next**.
8. In the Name text box, type a name for the bulk deletion job for example "**Bulk-delete of desktop flow sessions older than 6 months**".
9. Select a date and time for the job start time (preferably a time when users are typically not online).
10. Select the **Run this job after every** check box, and then in the days list, select the frequency you want the job to run.
11. If you want a notification e-mail sent, select the **Send an email to me** (email@domain.com) when this job is finished check box.
12. Select **Next**, review the bulk deletion job, and then select **Submit** to create the recurring job.

## Advanced record filtering

Using Dataverse's Bulk Deletion Wizard, you can create more advanced queries to filter your records using more complex filter criteria options. For instance, you could use grouping features such as AND and OR and even search for data in related tables to combine multiple conditions into a single query.

In the following filter example screen we're searching for all **Flow Session** records that are **older than six months**, with a status of **Canceled, Failed or Succeeded**, and associated with a specific **flow type** and **user** who initially created the flow. To achieve this, we've applied multiple **Group AND** options and used the **Regarding (Process)** fields of the related **Process** table to filter based on **Desktop Flow Type** and **Created By** a specific user.

**Define Search Criteria** Help

Select search criteria to identify records to delete.

**Look for:** Flow Sessions **Use Saved View:** [new]

Clear Group AND Group OR

AND
Completed On Older Than X Months 6  
Status Reason Equals Cancelled;Failed;Succeeded

Select

Regarding\_(Process)

AND
Created By Equals Apostolis Papaioannou  
Desktop Flow Type Equals Power Automate Desktop

Select

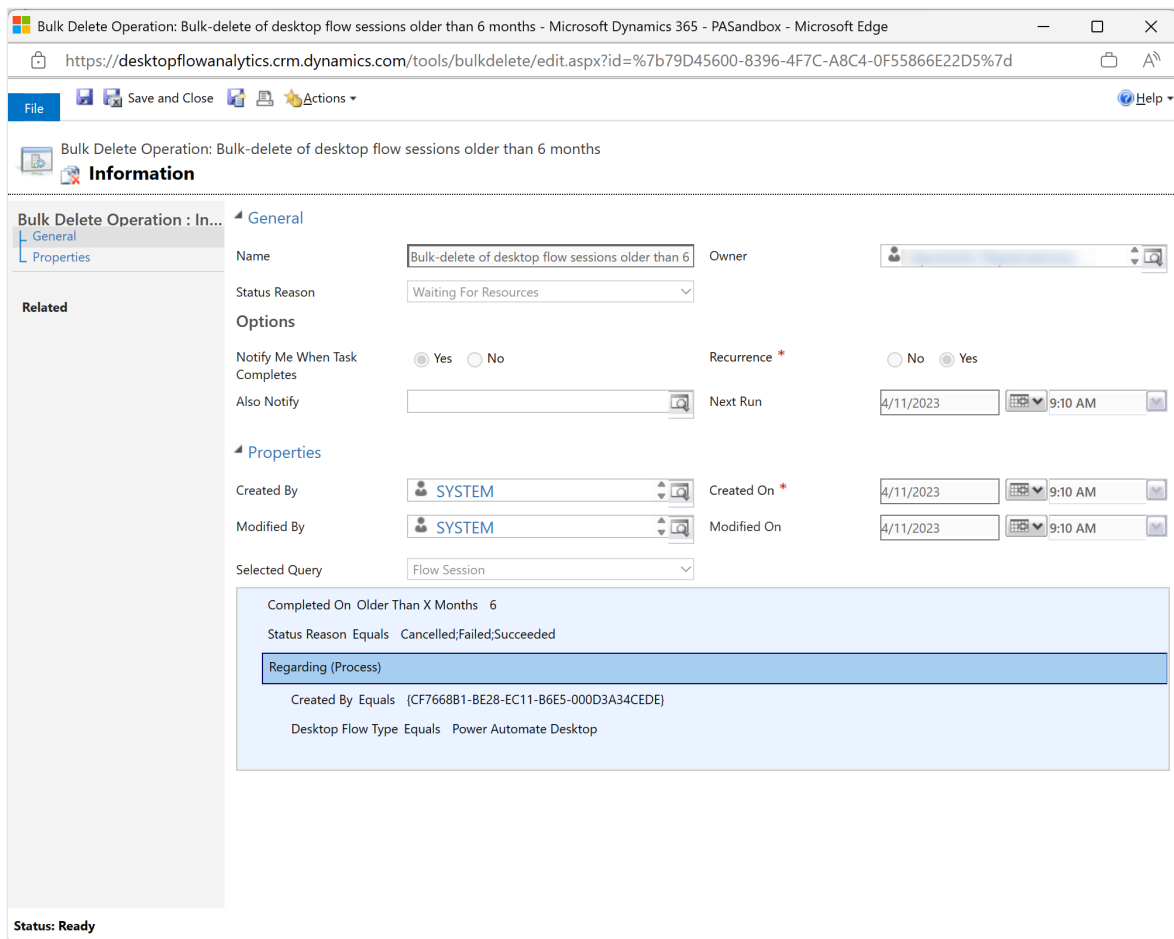
Preview Records

Back Next Cancel

## Monitoring bulk-delete jobs

To monitor Dataverse bulk-delete jobs, please follow these steps:

1. Sign in to the **Power Platform admin center**.
2. Select **Environments** in the left navigation pane, **select your environment**, and then select **Settings** on the top menu bar.
3. Select Data management > **Bulk deletion**.
4. From the Bulk Record Deletion grid, you can use the view selector to view the **completed, in-progress, pending, and recurring bulk deletion system jobs**.
5. The **Recurring Bulk Deletion System Jobs** view shows the job definitions for the bulk deletion system jobs that you've created together with the ones that are included out of the box. If you open one of these recurring bulk deletion system job records, you can see the query the job uses to identify which records to delete and the schedule the job runs on. For these out-of-the-box system jobs, you can't modify the query used by the system job, but you can modify the schedule the job runs on.



6. If you update the view selector to show jobs that have already been scheduled, are in progress, or executed, you can cancel, resume, or postpone the job. You can find these options in the Actions menu when you open the record.

## Learn more

- [Delete data in bulk](#)
- [Remove a large amount of specific, targeted data with bulk deletion](#)
- [View and take action on bulk deletion jobs](#)

# Timeout configuration for UI and browser automation

Article • 07/09/2024

Power Automate for desktop provides various components, including the designer, recorder, Power Automate agent for virtual desktops, and actions from UI automation and browser automation groups. However, in some cases, these components might fail due to time-out constraints. To overcome this issue, users can adjust the time-out settings for distinct desktop and web automation scenarios. When you modify a configuration file and add the appropriate key or value pairs for the desired scenarios, users can customize the timeout duration for specific operations based on the specified configuration value.

## Before creating the configuration file

Before creating the configuration file, it's crucial to make sure that Power Automate for desktop and all its components aren't running. To do this, open Task Manager, go to the **Details** tab, and sort the processes by name. Check that no process related to Power Automate is currently active.

If you need to stop the 'PAD.BrowserNativeMessageHost' process, you should first deactivate the Power Automate web extension and close all browser windows. Once you have finished configuring the settings, you can re-enable the Power Automate web extension.

## How to create the configuration file

1. In File Explorer, go to the `%LOCALAPPDATA%\Microsoft\Power Automate Desktop` folder.
2. Check if a folder named **Configurations** exists. If not, create it.
3. Create a new file with name `UIAutomationTimeOut.config` inside the **Configurations** folder.
4. The template of the XML code to be copied inside the file can be viewed in the following XML snippet. Add the key and value pairs you need, inside the `appSettings` section. Replace everything between `<appSettings>` and `</appSettings>`.

📌 **Note**



The provided sample is only a template and is non-functional. Populate it with the required key-value pairs to make it functional.

XML

```
<?xml version="1.0" encoding="utf-8" ?>

<configuration>

    <appSettings>

        <!-- Please add here the key values for the configuration. See
examples below:

        <add key="AutomationServerEndpoint.DesignTime.ConnectionTimeout"
value="00:01:00" />

        <add key="AutomationServerEndpoint.DesignTime.CallTimeout"
value="00:00:30" />

        -->

    </appSettings>

</configuration>
```

5. Save the file.

6. Open Power Automate for desktop.

## Key values editing

Each XML configuration item follows these rules:

- **key**: The name of the configuration item. This is a reserved word and should be listed in the XML configuration file for the elements that follow:
  - **Automation Server**: This is a Power Automate for desktop unit, where several other Power Automate for desktop components such as designer, robot, recorder, and so on, that utilize desktop and web automation capabilities, communicate with to perform various operations either at design or run time:
  - **AutomationServerEndpoint.DesignTime.ConnectionTimeout**: The timeout period for designer or recorder to establish a connection with the Automation Server. This configuration might be useful when an error that indicates that a connection couldn't be successfully established at a specific period of time is shown. Increasing the default timeout value of this setting could resolve the issue.

- `AutomationServerEndpoint.DesignTime.CallTimeout`: The timeout period for designer or recorder to send and receive messages with the Automation Server through an already established connection. This setting can be useful in cases when capturing an element, either using the UI element picker (designer) or the recorder, takes too long without capturing the element. Increasing the timeout value to a greater value than the default might resolve the issue.
- `AutomationServerEndpoint.Runtime.ConnectionTimeout`: The timeout period for the Power Automate for desktop robot to establish a connection with the Automation Server when a UI automation or a browser automation action is executed. This configuration might be useful when an error that indicates that a connection couldn't be successfully established at a specific period of time is shown.
- `AutomationServerEndpoint.Runtime.CallTimeout`: The timeout period for the robot to send and receive messages with the Automation Server through an already established connection, when a UI automation or browser automation action is executed. This configuration can be useful in cases where the execution of a UI or browser automation action might take too much time and fails due to timeout.
- `AutomationServerEndpoint.ExtractDataFromWeb.ConnectTimeout`: The timeout period for the `ExtractDataFromWeb` module to establish a connection with the Automation Server. This setting might be useful when an error that indicates that a connection couldn't be successfully established at a specific period of time when trying to capture the data to be extracted at design time. Increasing the default timeout value of this setting might resolve the issue.
- `AutomationServerEndpoint.ExtractDataFromWeb.CallTimeout`: The timeout period for the `ExtractDataFromWeb` module to send and receive messages through the connection established with the Automation Server. This setting might be useful during the design time when trying to capture the data to be extracted at design time but the elements aren't captured without any specific error.
- `SAP Bridge`: This is the Power Automate for desktop module where several UI automation modules communicate with SAP bridge to perform various operations related to SAP applications:
  - `Sap.Bridge.Client.OpenTimeout`: The timeout period for a Power Automate for desktop client module (designer, robot, recorder) to open a connection with the SAP bridge. This setting might be useful during runtime or design time, when an error that indicates that a connection couldn't be successfully established at a specific period of time with the SAP bridge is shown. Increasing the default timeout value of this setting might resolve the issue.

- `Sap.Bridge.Client.CloseTimeout`: The timeout period for a Power Automate for desktop client module (designer, robot, recorder) to close a connection with the SAP bridge. This setting might be useful during runtime or design time, when an error that indicates that a connection couldn't be successfully closed at a specific period of time with the SAP bridge is shown. Increasing the default timeout value of this setting might resolve the issue.
- `Sap.Bridge.Client.SendTimeout`: The timeout period for a Power Automate for desktop client module (designer, robot, recorder) to send a message over a connection established with the SAP bridge. This setting might be useful during runtime or design time, when an error that indicates that a message couldn't be sent at a specific period of time to the SAP bridge is shown. Increasing the default timeout value of this setting might resolve the issue.
- `Sap.Bridge.Client.ReceiveTimeout`: The timeout period for a Power Automate for desktop client module (designer, robot, recorder) to receive a message over a connection established with the SAP bridge. This setting might be useful during runtime or design time, when an error that indicates that a response couldn't be received at a specific period of time from the SAP bridge is shown. Increasing the default timeout value of this setting might resolve the issue.
- **\*\*Java Bridge**: This is the Power Automate for desktop module where several UI automation modules communicate with the Java bridge to perform various operations related to Java applications.
  - `Java.Bridge.Client.ConnectTimeout`: The timeout period for a Power Automate for desktop client module (designer, robot, recorder) to connect with the Java bridge. This setting might be useful during runtime or design time when an error that indicates a connection couldn't be successfully established at a specific period of time with the Java bridge is shown. Increasing the default timeout value of this setting might resolve the issue.
  - `Java.Bridge.Client.ReadWriteTimeout`: The timeout period for a Power Automate for desktop client module (designer, robot, recorder) to send or receive messages through a connection established with the Java bridge. This setting might be useful during runtime or design time, when an error that indicates that a message couldn't be sent, or a response couldn't be received at a specific period of time when communicating with the Java bridge is shown. Increasing the default timeout value of this setting might resolve the issue.
- **Web Extensions Message Proxy**:
  - `WebExtensionsMessageProxy.OpenTimeout`: The timeout period for Power Automate for desktop to open a connection with the browser web extension message host. This setting might be useful during runtime or design time,

- when an error is shown indicating that a connection couldn't be successfully established at a specific period of time with the browser native message host. Increasing the default timeout value of this setting might resolve the issue.
- `Host.WebExtensionsMessageProxy.CloseTimeout`: The timeout period for Power Automate for desktop to close an established connection with the browser web extension message host. This setting might be useful during runtime or design time when an error that indicates that a connection couldn't be successfully closed at a specific period of time with the browser native message host. Increasing the default timeout value of this setting might resolve the issue.
  - `WebExtensionsMessageProxy.SendTimeout`: The timeout period for Power Automate for desktop to send a message through an established connection with the browser web extension message host. This setting might be useful during runtime or design time when an error that indicates that a message couldn't be sent at a specific period of time to browser native message host. Increasing the default timeout value of this setting might resolve the issue.
  - `WebExtensionsMessageProxy.ReceiveTimeout`: The timeout period for Power Automate for desktop to send a message through an established connection with the browser web extension message host. This setting might be useful during runtime or design time when an error that indicates that a response could not be received at a specific period of time from the browser native message host is shown.
  - `RDP.Client.ConnectTimeout`: The timeout period for a Power Automate for desktop client module, running on the host, such as the designer or robot, to establish a connection with the Remote Desktop agent that is running on the remote machine. This setting might be useful in case a Remote Desktop automation is performed and an error that indicates that a connection with the Remote Desktop Agent couldn't be established for a specific period of time. Increasing the default timeout value of this setting might resolve the issue.
  - `RDP.Client.CallTimeout`: The timeout period for a Power Automate for desktop client module, running on the host, such as the designer or robot, to send or receive messages through a connection with the Remote Desktop agent that is running on the remote machine. This setting might be useful in case a Remote Desktop automation is performed and an error that indicates a connection with the Remote Desktop Agent that a message couldn't be sent or received for a specific period of time. Increasing the default timeout value of this setting might resolve the issue.
  - `Recorder.LaunchBrowserTimeout`: The timeout period for the launch browser option inside the recorder. Increasing this might avoid issues with extension

installation popup windows appearing when choosing the option in the recorder.

- `value`: The timeout value. The value should be in the format HH:MM:SS. For example, if you want to set the timeout to five seconds then use 00:00:05 as value.

## Sample XML configuration file

XML

```
<?xml version="1.0" encoding="utf-8" ?>

  <configuration>

    <appSettings>

      <!--Automation Server Endpoint Configuration for Designer -->

      <add key="AutomationServerEndpoint.DesignTime.ConnectionTimeout"
value="00:01:00" />

      <add key="AutomationServerEndpoint.DesignTime.CallTimeout"
value="00:00:30" />

      <!--Automation Server Endpoint Configuration for Runtime -->

      <add key="AutomationServerEndpoint.Runtime.ConnectionTimeout"
value="00:05:00" />

      <add key="AutomationServerEndpoint.Runtime.CallTimeout"
value="00:05:00" />

      <!--Automation Server Endpoint Configuration for ExtractFromWeb
-->

      <add
key="AutomationServerEndpoint.ExtractDataFromWeb.ConnectTimeout"
value="00:01:00" />

      <add
key="AutomationServerEndpoint.ExtractDataFromWeb.CallTimeout"
value="00:00:30" />

      <!--SAP Bridge Client Configuration -->
```

```
<add key="Sap.Bridge.Client.SendTimeout" value="00:10:00"/>

<add key="Sap.Bridge.Client.ReceiveTimeout" value="00:10:00"/>

<add key="Sap.Bridge.Client.OpenTimeout" value="00:01:00"/>

<add key="Sap.Bridge.Client.CloseTimeout" value="00:01:00"/>

<!--Java Bridge Configuration -->

    <add key="Java.Bridge.Client.ConnectTimeout" value="00:00:05"/>

    <add key="Java.Bridge.Client.ReadWriteTimeout"
value="00:01:00"/>

    <!-- Web Extensions Message Proxy-->

    <add key="WebExtensionsMessageProxy.SendTimeout"
value="00:01:00"/>

    <add key="WebExtensionsMessageProxy.ReceiveTimeOut"
value="00:01:00"/>

    <add key="WebExtensionsMessageProxy.OpenTimeout"
value="00:01:00" />

    <add key="WebExtensionsMessageProxy.CloseTimeout"
value="00:01:00" />

    <!--RDP Client Configuration-->

    <add key="RDP.Client.ConnectTimeOut" value="00:00:10" />

    <add key="RDP.Client.CallTimeOut" value="00:00:15" />

<!-- Recorder Configuration-->

    <add key="Recorder.LaunchBrowserTimeout" value="00:00:10" />

</appSettings>

</configuration>
```

---

# Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Overview for configuring ALM for desktop flows

Article • 09/07/2023

This article provides an overview for the tasks involved in how to set up a healthy application lifecycle management (ALM) strategy for your Power Automate desktop flows. For information about ALM in the Power Platform, go to [Power Platform ALM resources](#).

Follow the list of tasks described in this article to set up your ALM strategy for cloud flows and desktop flows. To benefit from the latest features of desktop flows, we recommend following those steps in an environment with [schema v2 activated](#).

Task	Description	More information
1. Set up your DevOps project	Create your Azure DevOps or GitHub repository	<a href="#">Continuous integration</a> <a href="#">Create a project</a>
2. Create and configure a service principal	How to create a Service Principal in Azure and link it to your environment as an Application User	<a href="#">Create a Service Principal</a> <a href="#">Configure service connection using Service Principal</a>
3. Create a solution with cloud flow, desktop flow and connection reference	Learn how to create and add your cloud flow, desktop flow and connection reference to your solution.	<a href="#">Create a solution and a publisher</a> <a href="#">Add desktop flow, cloud flow and connection reference</a>
4. Configure an ADO pipeline to export and commit into your repository	Learn how to set up your ADO pipeline to export and commit changes into your repository.	<a href="#">Build pipeline</a>
5. Review your changes	Learn how to compare changes between two versions of your solution	<a href="#">Use Azure DevOps to see diff</a>
6. Share a machine with a Service Principal and create a connection	Learn how to share a machine with a Service Principal and create a connection to the machine	<a href="#">Share a machine with a Service Principal and create a connection</a>
7. Create a setting file and configure connection references	Learn how to create a setting file for your deployment and set the connection ID used by the connection reference.	<a href="#">Prepopulate connection references for automated deployment</a>



Task	Description	More information
8. Build and deploy	Learn how to build your application and deploy it	<a href="#">Build your solution</a> <a href="#">Deploy your solution</a>

# Add a cloud flow, desktop flow and connection reference to a solution

Article • 09/07/2023

If you've followed the article [for configuring ALM for desktop flows](#), at this point you've created a solution. Now, add a desktop flow and a cloud flow to this solution. If you haven't created a solution yet, [create a publisher and a solution](#)

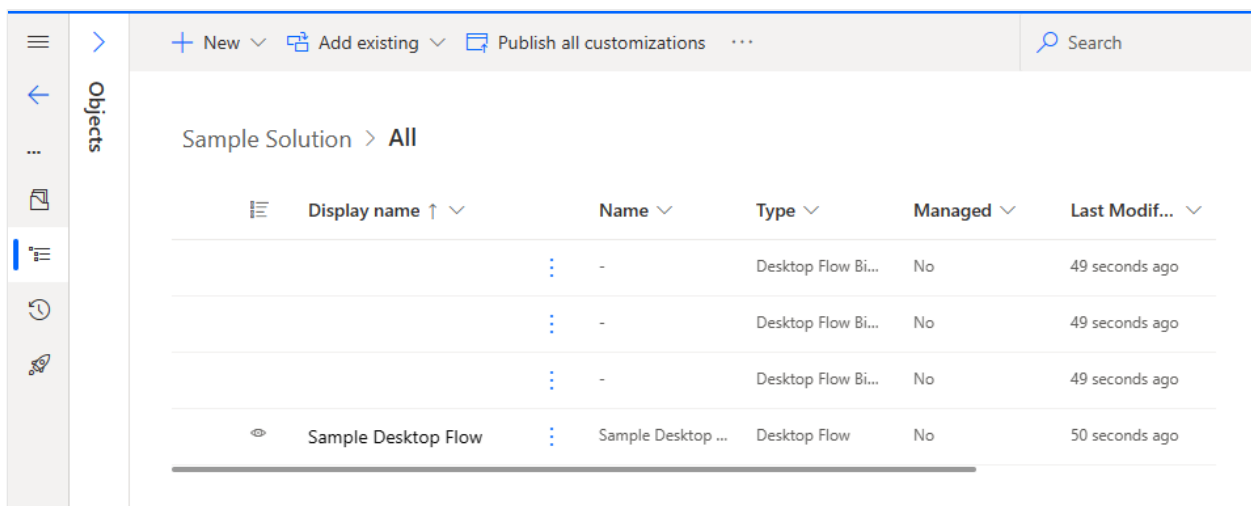
## 📘 Important

In order for a cloud flow to be added to a solution, the cloud flow has to be created in the solution. You can't add a cloud flow to a solution after it's been created.

## Create a desktop flow

1. Sign in to [Power Automate](#), and then go to **Solutions**, and then open the unmanaged solution you want or select **New solution** to [create a solution](#).
2. Select **New > Automation > Desktop flow**.

You're redirected to Power Automate desktop, once you have finished editing your desktop flow, go back to the solution page to see your desktop flow appear.



The screenshot shows the Power Automate interface for a solution named 'Sample Solution'. The 'All' tab is selected, displaying a table of desktop flows. The table has columns for 'Display name', 'Name', 'Type', 'Managed', and 'Last Modified'. There are four rows of desktop flows, with the last one being 'Sample Desktop Flow'.

Display name ↑	Name ↓	Type ↓	Managed ↓	Last Modified ↓
	-	Desktop Flow Bi...	No	49 seconds ago
	-	Desktop Flow Bi...	No	49 seconds ago
	-	Desktop Flow Bi...	No	49 seconds ago
Sample Desktop Flow	Sample Desktop ...	Desktop Flow	No	50 seconds ago

## Create a cloud flow

From within the solution, select **New > Automation > Cloud flow > Scheduled**.

You're redirected to the cloud flow designer. Edit to add an action with a desktop flow, and if needed, create a connection. You need to use the **Unattended** run mode.

The connection you use won't be the connection that is used in your production environment.

Display name ↑	Name ↓	Type ↓	Managed ↓	Last Modif... ↓
	-	Desktop Flow Bi...	No	6 minutes ago
	-	Desktop Flow Bi...	No	6 minutes ago
	-	Desktop Flow Bi...	No	6 minutes ago
Desktop flows Sample...	cr663_shareduifl...	Connection Refe...	No	29 seconds ago
Sample Desktop Flow	Sample Desktop ...	Desktop Flow	No	6 minutes ago
Scheduled Sample Clo...	Scheduled Sampl...	Cloud Flow	No	just now

You see the cloud flow in your solution and a connection reference.

## Next steps

- [Configure your build pipeline to export your solution](#)

# Compare your desktop flow changes

Article • 07/26/2024

When you commit a change to your repository by running your export pipeline, you can see the differences between two versions of your solutions by going to Azure DevOps.

## Compare the desktop flow definition

The desktop flow definition is stored in the **Workflow** folder in a file with the extension `.json.data.xml`. From [Azure DevOps](#), you can open the file on the **History** tab to observe the difference.

```
26 26 <Dependencies>{ "childFlows": [] } </Dependencies>
27 27 <ConnectionReferences>[] </ConnectionReferences>
28 - <Definition>"@@ConnectionString: ''\r\n@@Type: 'Local'\r\n@@DesktopType:
- 'local'\r\n@@DisplayName: 'Local computer'\r\nIMPORT 'controlRepo.appmask' AS
- appmask\r\nIMPORT 'imageRepo.imgrepo' AS imgrepo\r\n@SENSITIVE: []\r\nVariables.
- TruncateNumber.GetIntegerPart Number: 1 Result=&gt; TruncatedValue\r\n# Start of
- autogenerated actions using the recorder\r\n@@source: 'Recorder'\r\nUIAutomation.
- PressButton Button: appmask['Window \\'Calculator\\'] ['Button \\'Reciprocal\\']
- \r\n@@source: 'Recorder'\r\nUIAutomation.PressButton Button: appmask['Window
- \\'Calculator\\'] ['Button \\'Seven\\']\r\n@@source: 'Recorder'\r\nUIAutomation.
- PressButton Button: appmask['Window \\'Calculator\\'] ['Button \\'Four\\']\r\n@@source:
- 'Recorder'\r\nUIAutomation.PressButton Button: appmask['Window \\'Calculator\\'] ['Button
- \\'One\\']\r\n@@source: 'Recorder'\r\nUIAutomation.PressButton Button: appmask['Window
- \\'Calculator\\'] ['Button \\'Positive negative\\']\r\n# End of autogenerated actions
- using the recorder\r\n" </Definition>
28 + <Definition>"@@ConnectionString: ''\r\n@@Type: 'Local'\r\n@@DesktopType:
+ 'local'\r\n@@DisplayName: 'Local computer'\r\nIMPORT 'controlRepo.appmask' AS
+ appmask\r\nIMPORT 'imageRepo.imgrepo' AS imgrepo\r\n@SENSITIVE: []\r\nVariables.
+ TruncateNumber.GetIntegerPart Number: 1 Result=&gt; TruncatedValue\r\n# Start of
+ autogenerated actions using the recorder\r\n@@source: 'Recorder'\r\nUIAutomation.
+ PressButton Button: appmask['Window \\'Calculator\\'] ['Button \\'Reciprocal\\']
+ \r\n@@source: 'Recorder'\r\nUIAutomation.PressButton Button: appmask['Window
+ \\'Calculator\\'] ['Button \\'Seven\\']\r\n@@source: 'Recorder'\r\nUIAutomation.
+ PressButton Button: appmask['Window \\'Calculator\\'] ['Button \\'Four\\']\r\n@@source:
+ 'Recorder'\r\nUIAutomation.PressButton Button: appmask['Window \\'Calculator\\'] ['Button
+ \\'One\\']\r\n@@source: 'Recorder'\r\nUIAutomation.PressButton Button: appmask['Window
+ \\'Calculator\\'] ['Button \\'Positive negative\\']\r\nVariables.TruncateNumber.
+ GetIntegerPart Number: 1 Result=&gt; TruncatedValue2\r\n# End of autogenerated actions
+ using the recorder\r\n" </Definition>
29 29 <SchemaVersion>2022.07</SchemaVersion>
```

## New image or control added to the desktop flow

When a new image or a control is added to your desktop flow, they're added as a new folder in the `desktopflowbinaries` folder. Each image has a dedicated folder, with a subfolder, which contains the screenshot. The file is named **Untitled.txt**.

```
1 <desktopflowbinary desktopflowbinaryid="7ff73ec8-8bc7-4280-b658-800cd2d48085">
2   <data mimetype="text/plain">Untitled.txt</data>
3   <iscustomizable>1</iscustomizable>
4   <metadata{}</metadata>
5   <process>
6     <workflowid>f139f22a-ce98-4ecc-8d2a-5caa4c5a3ad0</workflowid>
7   </process>
8   <reference>imageRepo-screenshots\32f1391d-7b9a-4d73-942e-6513818cdfb2.png</reference>
9   <statecode>0</statecode>
10  <statuscode>1</statuscode>
11  <type>ImageRepositoryImageFile</type>
12 </desktopflowbinary>
```

## Related information

[Overview for configuring ALM for desktop flows](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#)

# Create a connection with a service principal

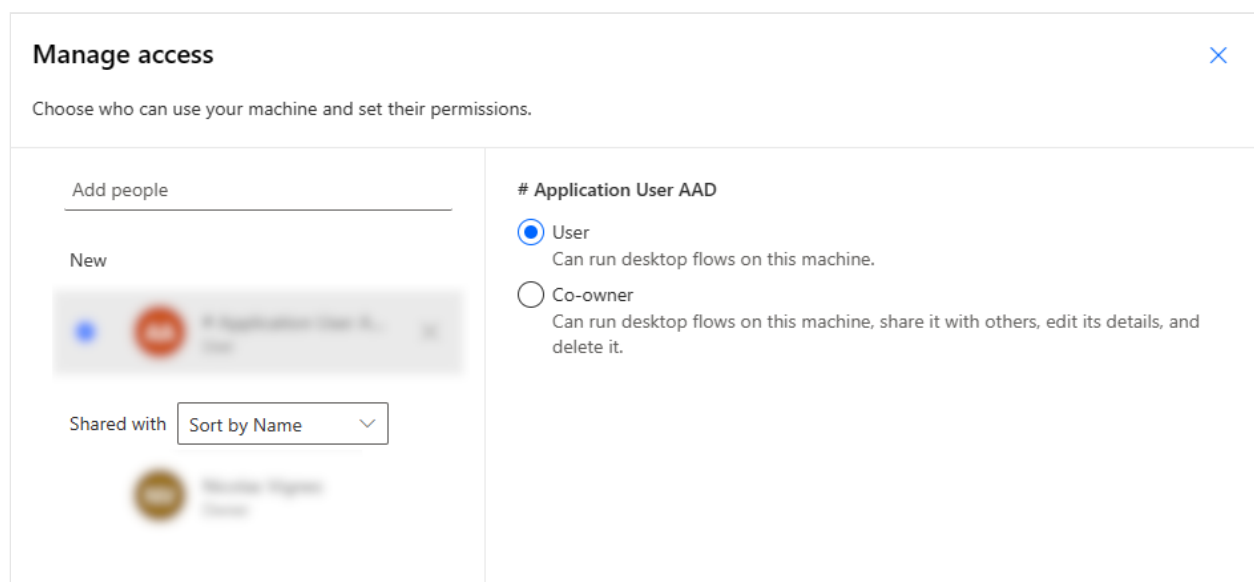
Article • 09/07/2023

To create a connection with a service principal, the best approach is to register the machine using a [service principal with silent registration](#). Alternatively, you can give permissions to the service principal on the machine or the machine group and then create a connection using the service principal.

## Give permissions on the machine or machine group

To give permissions on the machine:

1. Sign into [Power Automate](#), and then select **Machines** on the left navigation pane. If the item isn't in the left navigation pane, select ... **More** and then select the item you want.
2. Select the machine or machine group you want to share.
3. Select **Share**, and then search for and select the **Application User AAD** in your Dataverse instance.
4. Select **User**, and then select **Save**.



## Create the connection using a service principal

Once you have shared the machine with the application user, create the connection. You need to create the connection as the service principal. Creating a connection as a service

principal isn't supported with the Power Automate web portal. This is currently only supported with a direct call to the Web API.

## Request an access token

First, request an access token to interact with the Power Platform API. More information: [Request an access token](#).

## Get the group ID of the machine or group

To be able to create the connection, get the group ID associated with the machine or machine group.

- If it's a group, you can go to **Monitor > Machines > Machine groups** and select the group. You can then get the group ID from the URL.
- If it's a machine, go to **Data > Tables > All > Flow Machine Group**. Search for your machine in the list and display the column **Flow Machine Group**, it's the group ID associated with your machine.

## Create a connection using your service principal

To create a connection, send an `HTTP PUT` to the Power Apps API to create the connection, using the access token that you obtained earlier.

HTTP

PUT

```
https://{ENVIRONMENT_ID_URL}.environment.api.powerplatform.com/connectivity/
connectors/shared_uiflow/connections/{CONNECTION_ID}?api-version=1
```

```
Content-Type: application/json
```

```
Host: {ENVIRONMENT_ID_URL}.environment.api.powerplatform.com
```

```
Accept: application/json
```

```
Authorization: Bearer eyJ0eXAiOiJKV1QiLCJ...
```

```
BODY:
```

```
{
  "properties":
  {
    "environment":
    {
      "id":
"/providers/Microsoft.PowerApps/environments/{ENVIRONMENT_ID}",
      "name": "{ENVIRONMENT_ID}"
    },
    "connectionParametersSet":
    {
      "name": "azureRelay",
```

```
    "values":
      {
        "username":{"value":"{MACHINE_ACCOUNT}"},
        "password":{"value":"{MACHINE_PASSWORD}"},
        "targetId":{"value":"{GROUP_ID}"}
      }
    }
  }
}
```

The above example contains placeholders:

- `ENVIRONMENT_ID_URL`: The environment ID, with all separators removed, and the last two characters separated by a period. (Example: `37520647-dbdf-49fa-ba01-6134c14680c4` -> `37520647dbdf49faba016134c14680.c4`).
- `ENVIRONMENT_ID`: The environment ID.
- `CONNECTION_ID`: The connection ID used to create the connection. It needs to be a valid GUID. (You can use the `New-Guid` PowerShell command to get this).
- `MACHINE_ACCOUNT`: The username of the account used to open a Windows session.
- `MACHINE_PASSWORD`: The password for the account.
- `GROUP_ID`: The group ID you want to create the connection for. More information: [Get the group ID of the machine or group](#)

Once the request is completed, save the connection ID that you used in your request. You'll use it in the next step to [Prepopulate connection references for automated deployment](#).

## Next steps

- [Prepopulate connection references for automated deployment](#)



# Reserved keywords in desktop flows

Article • 07/26/2024

Reserved keywords for the Power Automate for desktop's engine can't be used for the following items:

- Variable names.
- Custom object properties.
- Action names and property names in custom actions.

## List of reserved keywords

### Important

Keywords are case insensitive. For example, **ACTION** is the same as **action**.

- ACTION
- AND
- AS
- BLOCK
- CALL
- CASE
- DEFAULT
- DISABLE
- ELSE
- END
- ERROR
- EXIT
- FALSE
- FOR
- FOREACH
- FROM
- FUNCTION
- GLOBAL
- GOTO
- IF
- IMPORT
- IN
- INPUT

- LABEL
- LOOP
- MAIN
- MOD
- NEXT
- NO
- NOT
- ON
- OR
- OUTPUT
- REPEAT
- SET
- STEP
- SWITCH
- THEN
- THROW
- TIMES
- TO
- TRUE
- WAIT
- WHILE
- XOR
- YES

## Related information

- [Variables](#)
- [Custom objects](#)
- [Custom actions](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Actions reference

Article • 07/24/2023

In this section, you can find a reference to all actions of the Power Automate.

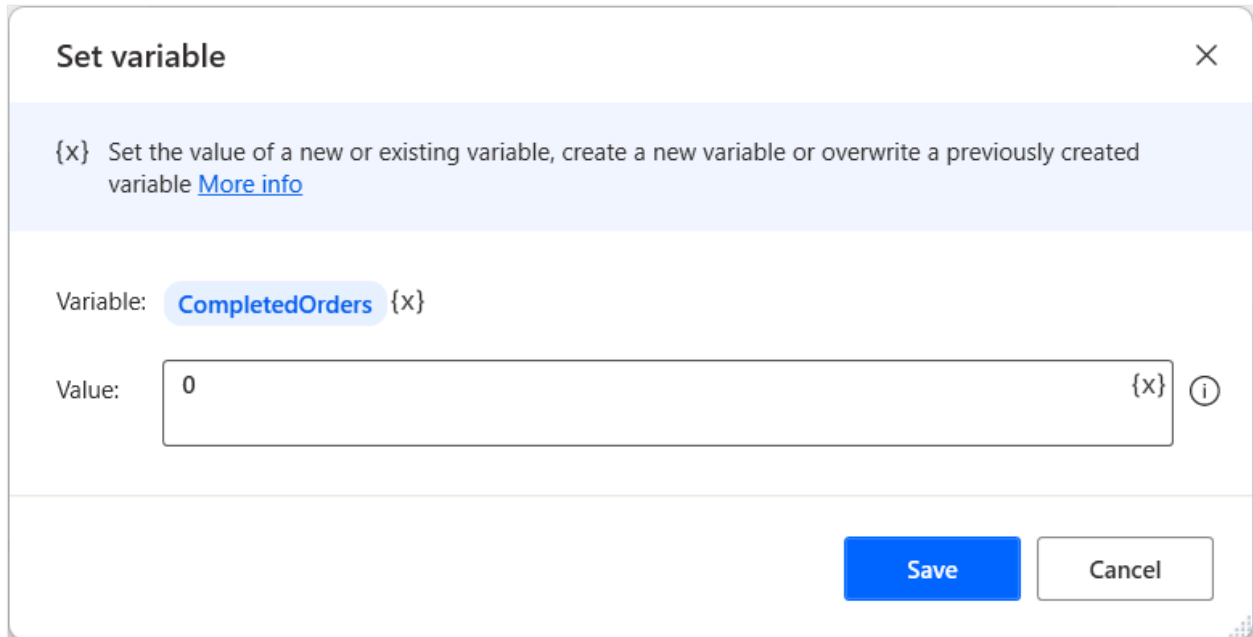
Select on any of the action groups and the list of actions will appear along with their parameters to assist you configure them.

<b>A - C</b>	<b>D - G</b>	<b>H - R</b>	<b>S - Z</b>
<a href="#">Active Directory</a>	<a href="#">Database</a>	<a href="#">HTTP</a>	<a href="#">Scripting</a>
<a href="#">AWS</a>	<a href="#">Date time</a>	<a href="#">IBM Cognitive</a>	<a href="#">SharePoint</a>
<a href="#">Azure</a>	<a href="#">Email</a>	<a href="#">Logging</a>	<a href="#">System</a>
<a href="#">Browser automation</a>	<a href="#">Excel</a>	<a href="#">Loops</a>	<a href="#">Terminal emulation</a>
<a href="#">Clipboard</a>	<a href="#">Exchange</a>	<a href="#">Message boxes</a>	<a href="#">Text</a>
<a href="#">CMD session</a>	<a href="#">File</a>	<a href="#">Microsoft Cognitive</a>	<a href="#">UI automation</a>
<a href="#">Compression</a>	<a href="#">Flow control</a>	<a href="#">Mouse and keyboard</a>	<a href="#">Variables</a>
<a href="#">Conditionals</a>	<a href="#">Folder</a>	<a href="#">OCR</a>	<a href="#">Windows services</a>
<a href="#">Custom actions (preview)</a>	<a href="#">FTP</a>	<a href="#">Outlook</a>	<a href="#">Workstation</a>
<a href="#">Cryptography</a>	<a href="#">Google Cognitive</a>	<a href="#">PDF</a>	<a href="#">Workqueues</a>
<a href="#">CyberArk</a>		<a href="#">Run flow</a>	<a href="#">XML</a>

# Variables actions

Article • 06/20/2024

To manually create a variable in a desktop flow, deploy the **Set variable** action. This action requires you to provide a name and a value for the new variable.



The screenshot shows a dialog box titled "Set variable" with a close button (X) in the top right corner. Below the title bar, there is a light blue header area containing the text: "{x} Set the value of a new or existing variable, create a new variable or overwrite a previously created variable [More info](#)".

The main area of the dialog has two fields:

- Variable:** A text input field containing "CompletedOrders" followed by a "{x}" icon.
- Value:** A text input field containing "0" followed by a "{x}" icon and an information icon (i).

At the bottom right of the dialog, there are two buttons: a blue "Save" button and a white "Cancel" button with a grey border.

## **i** Important

Reserved keywords can't be used as variable names. For the full list of reserved keywords go to [Reserved keywords in desktop flows](#).

To increase or decrease the value of a numeric variable, use the **Increase variable** and **Decrease variable** actions, respectively.

### Increase variable ✕

↗ Increase the value of a variable by a specific amount [More info](#)

Select parameters


Variable name:  {x} ⓘ

Increase by:  {x} ⓘ

Most actions output their result into a variable. For example, the **Create new list** action produces an empty list.

Similarly, the **Generate random number** action produces a random numeric value. If you enable **Generate multiple numbers** in this action, you create a list variable containing multiple random numeric values.

### Generate random number ✕

 Generate a random number or a list of random numbers that fall between a minimum and maximum value [More info](#)

Select parameters

Minimum value:  {x} ⓘ

Maximum value:  {x} ⓘ

Generate multiple numbers:  ⓘ

How many numbers:  {x} ⓘ

Allow duplicates:  ⓘ

> Variables produced RandomNumbers

To add items to an existing list, deploy the **Add item to list** action, and populate a hard-coded value or a variable to define the item to add. Likewise, you can remove items from a list with the **Remove item from list** action.

### ⓘ Note

List indexes start from 0, meaning that the first item in the list always has an index of 0. Use the notation `%ListName[0]%` to refer to the first item in the list, `%ListName[1]%` to the second, and so on.

If you want to create a data table variable, deploy the **Create new data table** action and specify the initial items of it using the visual builder.

To manipulate a data table variable, use the actions of the respective action subgroup, such as the **Find or replace in data table** and **Update data table item** actions.

**Create new data table** [X]

Creates a new data table variable [More info](#)

Select parameters

New Table: 0 Rows, 0 columns [Edit] ⓘ

> Variables produced: DataTable

[Save] [Cancel]

## Create new data table

Creates a new data table variable.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
New table	No	Datatable		The input data table

## Variables produced

 Expand table

Argument	Type	Description
DataTable	<a href="#">Datatable</a>	The new data table

## Exceptions

This action doesn't include any exceptions.

## Insert row into data table

Inserts a row at the end or before a specific index value.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. This variable must have been previously specified by an action that produces a data table variable
Into location	N/A	End of data table, Before row index	End of data table	Specify whether to insert the new row at the end of the data table or before a specified row index
Row index	No	<a href="#">Numeric value</a>		Insert the row index value to be used when before row index is specified as the into location parameter
New value(s)	No	<a href="#">List</a> , <a href="#">Datarow</a>		This parameter accepts a list or datarow variable where the column count should match the column count in the data table

## Variables produced

This action doesn't produce any variables.

# Exceptions

 Expand table

Exception	Description
Item index is out of range	Indicates that the provided item index is out of range
Invalid input arguments	Indicates that there's an invalid input parameter
Incompatible type error	Indicates that an input parameter of an incompatible type is provided

## Delete row from data table

Delete a data table row at the corresponding row index.

## Input parameters


 Expand table

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. This variable must be specified by an action that produces a data table variable
Row index	No	<a href="#">Numeric value</a>		The row index within a data table that should be deleted

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Item index is out of range	Indicates that the specified data table item is out of range



# Update data table item

Update a data table row item on a defined column.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. This variable must have been previously specified by an action that produces a data table variable.
Column	No	<a href="#">Text value</a>		The column name or index of the item to update.
Row	No	<a href="#">Numeric value</a>		The row index of the item to update.
New value	No	<a href="#">Text value</a>		The new value to update at the specified row index and column.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Item index is out of range	Indicates that the specified data table item is out of range
Column name doesn't exist	Indicates that the provided column name doesn't exist
Column index is out of range	Indicates that the provided column index is out of range
Incompatible type error	Indicates that an input parameter of an incompatible type was provided

# Find or replace in data table

Finds and/or replaces data table values.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. This variable must have been previously specified by an action that produces a data table variable
Search mode	N/A	Find, Find and replace	Find	The mode to search with (find or find and replace)
All matches	N/A	<a href="#">Boolean value</a>	True	Specify whether to find or replace text in all the matching cells found or the first matching cell only
Text to find	No	<a href="#">Text value</a>		The text to find in the data table
Find using a regular expression	N/A	<a href="#">Boolean value</a>	False	Specify whether to use a regular expression to match the cell contents with the text to find
Match case	N/A	<a href="#">Boolean value</a>	False	Specify whether to search for case-sensitive data
Match entire cell contents	N/A	<a href="#">Boolean value</a>	False	Specify whether to search for cells that contain just the specified text
Text to replace with	No	<a href="#">Text value</a>		The text used to replace the matching cells
Search by	N/A	Everywhere, On column	Everywhere	The order in which to search for the text (everywhere, or on column)
Column index or name	No	<a href="#">Text value</a>		The column header or index value

## Variables produced

 Expand table

Argument	Type	Description
DataTableMatches	<a href="#">Datatable</a>	The data table containing the row and column indexes for matches

## Exceptions

[Expand table](#)

Exception	Description
Provided regular expression is invalid	Indicates that the provided regular expression is invalid
Column name doesn't exist	Indicates that the provided column name doesn't exist
Column index is out of range	Indicates that the provided column index is out of range
Incompatible type error	Indicates that an input parameter of an incompatible type is provided

## Insert column into data table

Inserts a column at the end or before a specific index value.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. This variable must be specified by an action that produces a data table variable.
Into location	N/A	End of data table, Before column index	End of data table	Specify whether to insert the new column at the end of the data table or before a specified column index.
Column name	No	<a href="#">Text value</a>		Specify the header of the new column.
Column index	No	<a href="#">Numeric value</a>		Specify the column index value that is utilized when the <b>Before column index</b>

Argument	Optional	Accepts	Default Value	Description
				option is selected for the Into location parameter.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Column index is out of range	Indicates that the provided column index is out of range.
Duplicate column name	Indicates that the provided column name already exists.

## Delete column from data table

Delete a data table column at the specified column index or column name.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. This variable must be specified by an action that produces a data table variable.
Specify column with	N/A	Name, Index	Name	Specify whether to find the column by name or index.
Column name	No	<a href="#">Text value</a>		The name of the column that should be deleted.
Column index	No	<a href="#">Numeric value</a>		The index of the column that should be deleted. Column indexes start from 0.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Column name doesn't exist	Indicates that the provided column name doesn't exist
Column index is out of range	Indicates that the provided column index is out of range

## Delete empty rows from data table

Deletes the rows of the data table that have all of their cells empty.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. This variable must have been previously specified by an action that produces a data table variable

## Variables produced

This action doesn't produce any variables.


## Exceptions

This action doesn't include any exceptions.

## Delete duplicate rows from data table

Deletes all the rows that are duplicate from the data table, if the values have the same data type in each column.

## Input parameters


 Expand table

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. The specified variable must be defined through an action that generates a data table variable.

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Type mismatch in the cells of a column	Indicates that two or more values in a single column are of different data type

## Clear data table

Deletes all the rows of the data table, keeping table headers unaffected.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. The specified variable must be defined through an action that generates a data table variable.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Sort data table

Sorts the data table rows in ascending or descending order by the specified column, if all its values have the same data type.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. The specified variable must be defined through an action that generates a data table variable.
Specify column with	N/A	Name, Index	Name	Specify whether to find the column by name or index.
Column name	No	<a href="#">Text value</a>		The name of the column that should be sorted.
Column index	No	<a href="#">Numeric value</a>		The index of the column that should be sorted. Column indexes start from 0.
Order	N/A	Ascending, Descending	Ascending	The order to sort the data table.

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Column name doesn't exist	Indicates that the provided column name doesn't exist

Exception	Description
Column index is out of range	Indicates that the provided column index is out of range
Type mismatch in the cells of a column	Indicates that two or more values in a single column are of different data type

## Filter data table

Filters the data table rows based on the applied rules.

In the action's built-in wizard that helps you create the filters needed, you can apply multiple filters to different columns that are defined by name or index. Every filter is composed of a specific column it targets, an operator that is selected, and the value that is assigned to it.

In addition, multiple filters are applied together via AND and/or OR rules. AND rules are resolved first in the resulting filter expression, followed by the OR rules.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. The specified variable must be defined through an action that generates a data table variable.
Filters to apply	No	Filtering rules as defined by the user	N/A	Filtering rules applied to the defined columns

## Variables produced

 Expand table

Argument	Type	Description
FilteredDataTable	<a href="#">Datatable</a>	The generated data table after applying the filters



# Exceptions

 Expand table

Exception	Description
Column name doesn't exist	Indicates that the provided column name doesn't exist
Column index is out of range	Indicates that the provided column index is out of range
Type mismatch in the cells of a column	Indicates that two or more values in a single column are of different data type

## Merge data tables

Merges two data tables together, specifying the merging behavior in case their number of columns is different.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
First data table	No	<a href="#">Datatable</a>		The first data table variable to work with. This is also the action's produced variable that holds the merged data table
Second data table	No	<a href="#">Datatable</a>		The second data table that is merged into the first data table
Merge mode	N/A	Add extra columns, Ignore extra columns, Error on extra columns	Add extra columns	The merging behavior that is applied when the tables don't have the same number of columns

### Variables produced

This action doesn't produce any variables.

### Exceptions

 Expand table

Exception	Description
Missing Schema	Indicates that the data tables don't have the same number of columns

## Join data tables

Joins two data tables based on the specified join rule.

In the action's built-in wizard that helps you create the join rules needed, you can set multiple rules by specifying the column from the first and the second datatable accordingly, and the comparison operator that applies between them.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
First data table	No	<a href="#">Datatable</a>		The first data table variable to work with. The specified variable must be defined through an action that generates a data table variable.
Second data table	No	<a href="#">Datatable</a>		The second data table variable to work with. The specified variable must be defined through an action that generates a data table variable.
Join operation	N/A	Inner, Left, Full	Inner	The join operation that is used to join the two tables
Join rules	No	Join rules as defined by the user	N/A	Define the columns and the operation to be used for joining the two data tables

## Variables produced

 Expand table

Argument	Type	Description
JoinedDataTable	<a href="#">Datatable</a>	The generated data table after the join operation

# Exceptions

[Expand table](#)

Exception	Description
Column name doesn't exist	Indicates that the provided column name doesn't exist
Column index is out of range	Indicates that the provided column index is out of range

## Read from CSV text variable

Generates a data table from a CSV text.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
CSV text	No	<a href="#">Text value</a>		The CSV text variable to read.
Trim fields	N/A	<a href="#">Boolean value</a>	True	Specifies whether to automatically trim off the leading and trailing whitespaces of the extracted cells.
First line contains column names	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use the first row of the CSV text to set the column names of the resulting data table. Enable this option to avoid reading the names as data into the table. Subsequent actions might access the data held by the data table using column names (instead of column numbers).
Get CSV fields as text	N/A	<a href="#">Boolean value</a>	False	Specify whether to retrieve the content of the CSV text fields purely as text or as the closest matching type. For example, Date Time for dates and Numeric for numbers.
Columns separator	N/A	Predefined, Custom, Fixed Column Widths	Predefined	Specifies whether to use a predefined columns separator, a custom separator, or fixed column widths.

Argument	Optional	Accepts	Default Value	Description
Separator	N/A	System default, Comma, Semicolon, Tab	System default	The column-separator to parse the CSV text.
Custom separator	No	<a href="#">Text value</a>		The custom column-separator to use for parsing the CSV text.
Fixed column widths	No	<a href="#">Text value</a>		The fixed column-widths to use for parsing the CSV text. Separate the widths using commas, spaces, tabs, or newlines.

## Variables produced

[Expand table](#)

Argument	Type	Description
CSVTable	<a href="#">Datatable</a>	The contents of the CSV text as a data table

## Exceptions

[Expand table](#)

Exception	Description
CSV parsing failed	Indicates a problem parsing the CSV text

## Convert data table to text

Converts a data table to a CSV text.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table variable to work with. The specified variable must be defined through an action that generates a data table variable.
Include column names	N/A	<a href="#">Boolean value</a>	False	Specifies whether the column names of the variant specified should become the first row of the CSV text.
Use custom columns separator	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use a custom column separator or a predefined column separator.
Separator	N/A	System default, Comma, Semicolon, Tab	System default	The column separator to use in the specified CSV text.
Custom columns separator	No	<a href="#">Text value</a>		The custom column separator to use in the specified CSV text.

## Variables produced

[Expand table](#)

Argument	Type	Description
CSVText	<a href="#">Text value</a>	The variable in which the CSV result is stored

## Exceptions

[Expand table](#)

Exception	Description
Conversion failed	Indicates a problem converting the data table to CSV text

## Truncate number

Get the integral or fractional digits of a numeric value, or round up the value to a specified number of decimal places.

# Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Number to truncate	No	<a href="#">Numeric value</a>		The number or variable that holds the numeric value to truncate/round up
Operation	N/A	Get integer part, Get decimal part, Round number	Get integer part	Specifies the operation to perform on the given number
Decimal places	Yes	<a href="#">Numeric value</a>	3	The number of decimal places to round the given number up to. Enter 0 to return an integer as a result

# Variables produced

[Expand table](#)

Argument	Type	Description
TruncatedValue	<a href="#">Numeric value</a>	The truncated or rounded number

# Exceptions

This action doesn't include any exceptions.

# Generate random number

Generate a random number or a list of random numbers that fall between a minimum and maximum value.

# Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Minimum value	Yes	<a href="#">Numeric value</a>	0	The lower boundary for the random number(s) to generate
Maximum value	Yes	<a href="#">Numeric value</a>	100	The upper boundary for the random number(s) to generate
Generate multiple numbers	N/A	<a href="#">Boolean value</a>	False	Specifies whether to generate a single random number or a list of random numbers
How many numbers	Yes	<a href="#">Numeric value</a>	10	Specifies how many random numbers to generate
Allow duplicates	N/A	<a href="#">Boolean value</a>	False	Specifies whether to permit or prevent the same number from appearing more than once in the random numbers list

## Variables produced

[Expand table](#)

Argument	Type	Description
RandomNumber	<a href="#">Numeric value</a>	The newly generated random number
RandomNumbers	<a href="#">List of Numeric values</a>	The newly generated list of random numbers

## Exceptions

[Expand table](#)

Exception	Description
Failed to generate random number	Indicates that there's an error generating a random number

## Clear list

Remove all items from a list.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
List to clear	No	<a href="#">List of General values</a>		A list variable to remove its elements

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Remove item from list

Remove one or multiple items from a list.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Remove item by	N/A	Index, Value	Index	Specifies whether to remove the item at a specified index or the item(s) with a specific value
At index	No	<a href="#">Numeric value</a>		The index number of the item to remove
With value	No	<a href="#">General value</a>		The item to remove
Remove all item occurrences	N/A	<a href="#">Boolean value</a>	False	Removes all the occurrences that match the item specified
From list	No	<a href="#">List of General values</a>		The list with items to remove



## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Item index is out of range	Indicates that item index is out of range
Item not found	Indicates that item doesn't exist in the list

## Sort list

Sort the items of a list. Use items of the same type.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
List to sort	No	List of General values		The variable that holds the list to sort
Sort by list item's properties	N/A	Boolean value	False	If the list items are objects (such as files, folders, etc.), enable this option to sort the item by a specific property. Leave this option disabled to sort the elements by their default property (for example, file objects are sorted by their full path)
First property to sort by	Yes	Text value		The name of an item's property to sort the list by. Refer to the help file for the property names of each object
Sort	N/A	Ascending, Descending	Ascending	Specifies whether to sort by the first property ascending or descending
Second property to sort by	Yes	Text value		The name of a second property to sort the list by

Argument	Optional	Accepts	Default Value	Description
Sort	N/A	Ascending, Descending	Ascending	Specifies whether to sort by the second property ascending or descending
Third property to sort by	Yes	<a href="#">Text value</a>		The name of a third property to sort the list by
Sort	N/A	Ascending, Descending	Ascending	Specifies whether to sort by the third property ascending or descending

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Shuffle list

Create a random permutation of a list.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
List to shuffle	No	<a href="#">List of General values</a>		The variable that contains the list to shuffle

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# Merge lists

Merge two lists into one.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
First list	No	List of <a href="#">General values</a>		The first list of items to merge
Second list	No	List of <a href="#">General values</a>		The second list of items to merge

## Variables produced

[Expand table](#)

Argument	Type	Description
OutputList	List of <a href="#">General values</a>	The merged list. The initial lists aren't affected

## Exceptions

[Expand table](#)

Exception	Description
The lists supplied are of incompatible types	Indicates that the lists supplied are of incompatible types

# Reverse list

Reverse the order of the items of a list.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
List to reverse	No	List of <a href="#">General values</a>		The list whose items order to reverse

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# Remove duplicate items from list

Remove the multiple occurrences of items in a list, so that in the resulting list each item is unique.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
List to remove duplicate items from	No	List of <a href="#">General values</a>		The list variable to remove duplicate items from
Ignore text case while searching for duplicate items	N/A	<a href="#">Boolean value</a>	False	Specifies whether to perform case insensitive comparison of text while searching for duplicate items (only applies to lists made of text items)

## Variables produced

This action doesn't produce any variables.


## Exceptions

This action doesn't include any exceptions.

# Find common list items

Compare two lists and create a new list with the items that are common to both.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
First list	No	List of <a href="#">General values</a>		The variable that contains the first list to compare
Second list	No	List of <a href="#">General values</a>		The variable that contains the second list to compare

## Variables produced

 Expand table

Argument	Type	Description
IntersectionList	List of <a href="#">General values</a>	The new list of common items

## Exceptions

This action doesn't include any exceptions.

## Subtract lists

Compare two lists and create a new list with the items that are in the first list but not in the second.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
First list	No	List of <a href="#">General values</a>		The variable that holds the first list to compare
Second list	No	List of <a href="#">General values</a>		The variable that holds the second list to compare

## Variables produced

[Expand table](#)

Argument	Type	Description
ListDifference	List of <a href="#">General values</a>	The new resulting list

## Exceptions

This action doesn't include any exceptions.

# Retrieve data table column into list

Convert the contents of a data table column into a list.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Data table	No	<a href="#">Datatable</a>		The data table with the column to convert into a list
Column name or index	No	<a href="#">Text value</a>		The column name, if column names are defined, or the index number of the column to retrieve

## Variables produced

[Expand table](#)

Argument	Type	Description
ColumnAsList	List of <a href="#">General values</a>	The new list that holds the contents of the specified data table

## Exceptions

[Expand table](#)

Exception	Description
Column name doesn't exist	Indicates that the column name isn't in the data table
Column index is out of range	Indicates that the column index is out of range

## Convert JSON to custom object

Convert a JSON string to a custom object.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
JSON	No	<a href="#">Text value</a>		A JSON text, or a previously created variable containing one, to convert it to a custom object

### Variables produced

[Expand table](#)

Argument	Type	Description
JsonAsCustomObject	<a href="#">General value</a>	The converted custom object from the provided JSON

## Exceptions

[Expand table](#)

Exception	Description
Error parsing the JSON	Indicates that there's an error parsing the specified JSON

## Convert custom object to JSON

Convert a custom object to a JSON string.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Custom object	No	<a href="#">Custom object</a>		The custom object to convert to JSON

### Variables produced

[Expand table](#)

Argument	Type	Description
CustomObjectAsJson	<a href="#">Text value</a>	The converted JSON from the provided custom object

### Exceptions

[Expand table](#)

Exception	Description
Error parsing the custom object	Indicates that there's an error parsing the custom object

## Add item to list

Append a new item to a list.

### Input parameters



[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Add item	No	<a href="#">General value</a>		A value or a variable to add to the list. Provide a list of values to append multiple elements. If the list has a specific type of elements, the new element is converted over to that type
Into list	No	<a href="#">List of General values</a>		A list variable to append the new elements to

## Variables produced

[Expand table](#)

Argument	Type	Description
NewList	<a href="#">List of General values</a>	The new list

## Exceptions

This action doesn't include any exceptions.

## Create new list

Create a new empty list.

## Input parameters

This action doesn't require any input.

## Variables produced

[Expand table](#)

Argument	Type	Description
List	<a href="#">List of General values</a>	The new list

## Exceptions

This action doesn't include any exceptions.

## Increase variable

Increase the value of a variable by a specific amount.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Variable name	No	Numeric value		The numeric value to increase
Increase by	No	Numeric value		A numeric value, or a previously created variable containing one, to increase the variable by

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Decrease variable

Decrease the value of a variable by a specific amount.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Variable name	No	Numeric value		A numeric value, or a previously created variable containing one, to decrease the variable by
Decrease by	No	Numeric value		A numeric value, or a previously created variable containing one, to decrease the variable by

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Run Power Fx expression

Runs the provided Power Fx expression.

### ⓘ Note

This action is only available for Power Fx enabled desktop flows (preview).

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Expression	No	*		The Power Fx expression to run

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Set variable

Set the value of a new or existing variable, create a new variable or overwrite a previously created variable.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
To	No	*		The value to assign to the variable

### Variables produced

[Expand table](#)

Argument	Type	Description
NewVar	*	The name of the variable to set

#### Note

Variable names must start with either a letter or an underscore (`_`). After the first character, variable names can contain letters, underscores, and digits (0-9). Names are not case-sensitive, meaning `myVar`, `myvar`, and `MYVAR` are considered the same variable. The following reserved keywords cannot be used as variable names: `if`, `then`, `else`, `switch`, `case`, `default`, `loop`, `from`, `to`, `step`, `foreach`, `in`, `while`, `next`, `exit`, `label`, `goto`, `call`, `output`, `function`, `block`, `end`, `error`, `wait`, `for`, `set`, `main`, `and`, `or`, `xor`, `not`, `true`, `false`, `yes`, `no`, `disable`, `on`, `repeat`, `times`, `throw`, `action`, `mod`, `global`, `input`, `import`

### Exceptions

This action doesn't include any exceptions.

---

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗

# Conditional actions

Article • 01/18/2024

Conditional actions allow you to adjust which actions to run based on the outcomes of conditional statements.

The following list displays some applications and features:

- Use **If** conditionals to evaluate any type of condition.
- Use **Switch** conditionals to compare a single variable with multiple possible values.
- Cover multiple scenarios by employing nested conditionals.
- Provide default and alternative behaviors to your desktop flows based on the available data.

To find more information on how to use the conditionals, go to [Use conditionals](#).

## Case

An expression that, if met, a block of actions associated with that particular case runs.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Operator	N/A	Equal to (=), Not equal to (<>), Greater than (>), Greater than or equal to (>=), Less than (<), Less than or equal to (<=), Contains, Does not contain, Is empty, Is not empty, Starts with, Does not start with, Ends with, Does not end with, Is blank, Is not blank	Equal to (=)	The comparison operator of this case
Value to compare	No	*		Enter a value to compare with the switch-block value

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Default case

A block of actions that is run, if no case expression has been met in the switch body.

## Input parameters

This action doesn't require any input.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Else

Marks the beginning of a block of actions that ran if the condition specified in the preceding 'If' statements aren't met.

## Input parameters

This action doesn't require any input.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Else if

Marks the beginning of a block of actions that run if the conditions specified in the preceding 'If' statements aren't met, but the condition specified in this statement is met.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Operator	N/A	Equal to (=), Not equal to (<>), Greater than (>), Greater than or equal to (>=), Less than (<), Less than or equal to (<=), Contains, Does not contain, Is empty, Is not empty, Starts with, Does not start with, Ends with, Does not end with, Is blank, Is not blank	Equal to (=)	Choose the relationship of first operand to the second operand.
First operand	No	*		Enter a value name defined by a previous action, text, number or expression to compare with the second operand.
Second operand	No	*		Enter a value name produced by a previous action, text, number or expression to compare with the first operand.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## If



Marks the beginning of a block of actions that is run if the condition specified in this statement is met.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Operator	N/A	Equal to (=), Not equal to (<>), Greater than (>), Greater than or equal to (>=), Less than (<), Less than or equal to (<=), Contains, Does not contain, Is empty, Is not empty, Starts with, Does not start with, Ends with, Does not end with, Is blank, Is not blank	Equal to (=)	Choose the relationship of first operand to the second operand.
First operand	No	*		Enter a value name defined by a previous action, text, number or expression to compare with the second operand.
Second operand	No	*		Enter a value name produced by a previous action, text, number or expression to compare with the first operand.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Switch

Dispatches execution to different parts of the switch body based on the value of the expression.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Value to check	No	*		Enter a value name, text, or number to compare with the following cases.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# Loop actions

Article • 12/16/2022

Use loops to automate repetitive sections of your desktop flows and avoid running the same actions multiple times.

The following list presents some useful applications and features of loops:

- Use simple loops to perform a specific number of repetitions and iterate through data.
- Deploy **Loop condition** to repeat actions until a condition is met.
- Iterate through the items of a list using **For each** loops.
- Explicitly end loops when required.

To find more information on how to use loops, go to [Use loops](#).

## Exit loop

Terminates the loop and the flow resumes at the next action or statement following the loop.

## Input parameters

This action doesn't require any input.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## For each

Iterates over items in a list, data table or data row, allowing a block of actions to be executed repeatedly.

## Input parameters

---

Argument	Optional	Accepts	Default Value	Description
Value to iterate	No	*		Enter a list, data row, or data table value to iterate through it.

## Variables produced

Argument	Type	Description
	*	The value name that will store the current item value in each iteration.

## Exceptions

This action doesn't include any exceptions.

## Loop

Iterates a block of actions for a specified number of times

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Start from	No	Numeric value		Set the starting point of the loop counter.
Increment by	No	Numeric value		Set the increment that the loop counter variable is increased by.
End to	No	Numeric value		Set the ending point of the loop counter.

## Variables produced

Argument	Type	Description
	*	The value name that will store the current index, starting at the start from value. The value will change by the increment with each iteration.

## Exceptions

This action doesn't include any exceptions.

## Loop condition

Iterates a block of actions as long as a specified condition proves to be true.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Operator	N/A	Equal to (=), Not equal to (<>), Greater than (>), Greater than or equal to (>=), Less than (<), Less than or equal to (<=)	Equal to (=)	Choose the relationship of first operand to second operand.
First operand	No	*		Enter a value name defined by a previous action, text, number or expression to compare with the second operand.
Second operand	No	*		Enter a value name produced by a previous action, text, number or expression to compare with the first operand.

### Variables produced

This action doesn't produce any variables.

### Exceptions

This action doesn't include any exceptions.

### Next loop

Forces the next iteration of the block to take place, skipping any actions in between.

### Input parameters

This action doesn't require any input.

## **Variables produced**

This action doesn't produce any variables.

## **Exceptions**

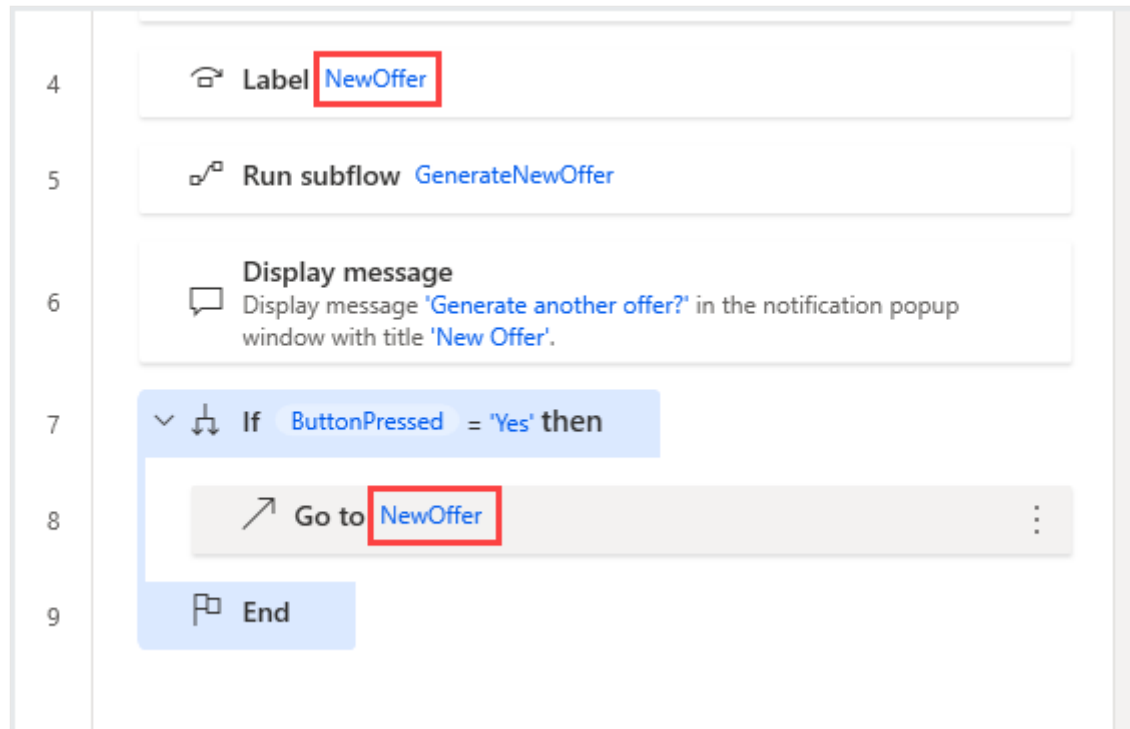
This action doesn't include any exceptions.

# Flow control actions

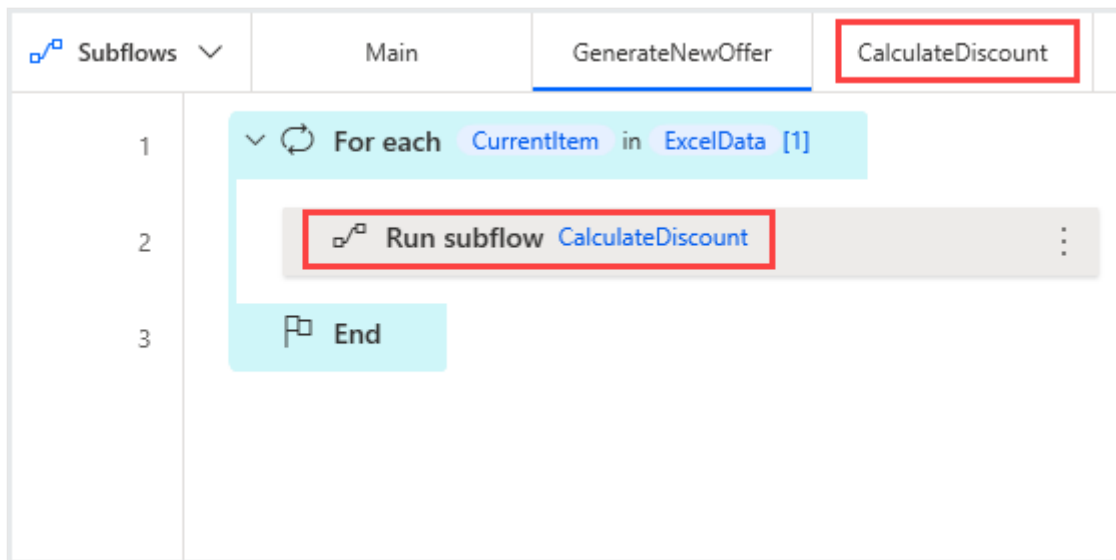
Article • 07/17/2024

Flow control is the act of controlling the order in which actions and subflows run. Power Automate enables you to implement flow control through the flow control actions.

**Labels** are used to create points of reference for the **Go to** action that changes the running point of the desktop flow. The following example directs the flow to a label earlier in the flow to repeat a series of actions.



The **Run subflow** action interrupts the subflow in which it's placed and runs another subflow. When the second subflow completes, the flow reverts to the original subflow to continue running. The following example runs the **Calculate Discount** subflow multiple times throughout the runtime of the flow to avoid repeating the same code.



To visually organize your actions into groups for easier management, enclose them between a **Region** and an **End region** action, and give the region a distinctive name.

These actions don't have any functional effect, but they help group and organize actions for maintenance and readability purposes. For example, you can collapse and expand a region to help focus attention where needed.

You can only use the **Region** and **End region** actions as pairs, and they must belong to the same scope to interlock correctly. If one of the two actions belongs to another group of actions, such as a loop or a conditional, the actions can't form a proper region.

### ⓘ Note

If you create multiple regions in a subflow, there's no predetermined mapping between specific **Region** and **End region** actions. Instead, the last **Region** action will try to form a pair with the first available **End region** action that follows.

## Comment

User comment.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Comment	Yes	Text value		User comment



## **Variables produced**

This action doesn't produce any variables.

## **Exceptions**

This action doesn't include any exceptions.

## **End**

Signifies the end of a block.

## **Input parameters**

This action doesn't require any input.

## **Variables produced**

This action doesn't produce any variables.

## **Exceptions**

This action doesn't include any exceptions.

## **End region**

Marks the end of a group of actions.

## **Input parameters**

This action doesn't require any input.

## **Variables produced**

This action doesn't produce any variables.

## **Exceptions**

This action doesn't include any exceptions.

# Exit subflow

Exits current subflow and returns to the point it was called from.

## Input parameters

This action doesn't require any input.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# Get last error

Retrieves the last error that occurred in the flow.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Clear error	N/A	Boolean value	False	After the error is stored in the variable, it's cleared so that next time the error is retrieved, it won't retrieve the same error value

## Variables produced

[Expand table](#)

Argument	Type	Description
LastError	Error	The details of the error that last occurred in the flow

## Exceptions

This action doesn't include any exceptions.

## Go to

Transfers the flow of execution to another point, indicated by a label.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Go to label	No	<a href="#">Text value</a>		Label in the flow

### Variables produced

This action doesn't produce any variables.

### Exceptions

This action doesn't include any exceptions.

## Label

Acts as the destination of a 'go to' statement.

From version 2.46 and on, labels can also be used in a different scope than the corresponding **Go to** action (e.g. in a conditional block), except error blocks, loops, and/or other subflows.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Label name	No	<a href="#">Text value</a>		Label in the program

### Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## On block error

Marks the beginning of a block to handle actions errors.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Name	No	Text value		The name of the Exception Block for Visual purposes only.
Capture unexpected logic errors	N/A	Boolean value	False	Expand the scope of error handling, also capturing logical errors in the flow, for example, dividing a number by zero or trying to access an item from an out of bounds position.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Region

Marks the beginning of a group of actions.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Name	Yes	<a href="#">Text value</a>		The name of the region.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Run subflow

Run a subflow specifying any required arguments.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Subflow name	No	<a href="#">Subflow</a>		The name of the subflow to call

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Stop flow

Terminates the flow.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
End flow	No	Successfully, With error message	Successfully	Terminate the execution of the flow, either successfully or with an error
Error message	No	<a href="#">Text value</a>		The error message to return to the flow caller upon exit

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Wait

Suspends the execution of the flow for a specified amount of seconds.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Duration	No	<a href="#">Numeric value</a>		Time duration in seconds

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

---

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗

# Run desktop flow action

Article • 03/15/2024

The **Run desktop flow** action enables you to call other desktop flows while running a specific desktop flow. To use the action, add it to the workspace and select the desktop flow you want to call. If the called flow contains input variables, the action will prompt you to enter their values.

To find more information about how to use the **Run desktop flow** action, go to [Run desktop flow from other desktop flows](#).

## ⓘ Note

- A flow's dependencies can't be more than 150 other flows.
- Two flows can't directly or indirectly call one-another as this causes a recursion.
- In org tenants, the flows must be under the same environment.

### Run desktop flow

Runs a desktop flow which can receive input variables and may produce output variables. The parent flow run will be paused until the called desktop flow completes. [More info](#)

Select parameters

Desktop flow: Client registration

Input variables

Name: {x}

LastName: {x}

> Variables produced **Result**

On error Save Cancel

## Run desktop flow



Runs a desktop flow that can receive input variables and might produce output variables. The parent flow run will be paused until the called desktop flow completes.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Desktop flow	No	Desktop flow		Select the desktop flow to run from within this flow. The called flow always runs in the same Windows session as the parent flow.

## Variables produced

This action produces the output variables of the selected flow.

## Exceptions

[Expand table](#)

Exception	Description
Run desktop flow failed	Indicates a problem while running the desktop flow

# System actions

Article • 12/16/2022

## ⓘ Note

The System group of actions has been segregated into some new categories. To find more information about these categories, go to [Workstation](#) and [Scripting](#) actions references.

Use the system actions to automate tasks fundamental to the Windows operating system.

Launch any of your installed applications with the **Run application** action. You must enclose any command line arguments in double quotes and separate them by space. The following example opens a specific Word document in quiet mode.

## ⓘ Note

The Application path field has to point to the executable of the application. You can open certain default Windows applications by entering their name, such as **notepad** for Notepad.

## Run application ✕

▶ Executes an application or opens a document by executing the associated application [More info](#)

### Select parameters

Application path:  📄 {x} ⓘ

Command line arguments:  {x} ⓘ

Working folder:  📁 {x} ⓘ

Window style:  ▼ ⓘ

After application launch:  ▼ ⓘ

> Variables produced AppProcessId

Additionally, desktop flows enable you to terminate processes by name or ID through the **Terminate process** action, and wait for processes to start or stop through the **Wait for process** action.

**Wait for process**
✕

⌚ Suspend the execution until a process starts or stops [More info](#)

Select parameters

Process name:  {x} ▾ ⓘ

Wait for process to:  ▾ ⓘ

Fail with timeout error:  ⓘ

🛡️ On error

Save

Cancel

To handle Windows environment variables, use the **Set Windows environment variable**, **Get Windows environment variable**, and **Delete Windows environment variable** actions for the respective tasks.

## If process

Marks the beginning of a conditional block of actions depending on whether a process is running or not.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
If process	N/A	Is running, Isn't running	Is running	State of the process to check
Process name	No	<a href="#">Text value</a>		The name of the process to check

### Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't retrieve list of processes	Indicates a problem retrieving the list of processes

## Wait for process

Suspends the execution until a process starts or stops.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Process name	No	Text value		The name of the process to check
Wait for process to	N/A	Start, Stop	Start	Whether to wait until a certain process starts or stops

### Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't retrieve list of processes	Indicates a problem retrieving the list of processes

## Run application

Executes an application or opens a document by executing the associated application.

### Important

Many applications with advanced functionality require elevated rights to prevent unauthorized access to system resources. To launch these applications using the **Run application** action, run Power Automate with administrator rights. To find more

information regarding running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Application path	No	<a href="#">File</a>		The executable file as a complete file path
Command line arguments	Yes	<a href="#">Text value</a>		Add extra arguments that would go after the executable file name. For example, enter notepad.exe in the application path and a specific text file in the command line arguments
Working folder	Yes	<a href="#">Folder</a>		The full path of the folder to work out of, if applicable.
Window style	N/A	Normal, Hidden, Minimized, Maximized	Normal	Choose the appearance and size of the application window when it opens
After application launch	N/A	Continue immediately, Wait for application to load, Wait for application to complete	Continue immediately	Whether the next action executes immediately, or waits until the program loads or completes
Timeout	Yes	<a href="#">Numeric value</a>	0	The maximum wait time, and how long before forcing a continue

## Variables produced

Argument	Type	Description
AppProcessId	<a href="#">Numeric value</a>	The process ID output
AppExitCode	<a href="#">Numeric value</a>	The application exit code

Argument	Type	Description
WindowHandle	Numeric value	The window handle. When opening a new window, this variable will catch the value of the window handle, and store it in this variable. A window handle is useful to specifically identify a window in a later action

## Exceptions

Exception	Description
File or application not found	Indicates that the specified file or application wasn't found
Access denied for application or File	Indicates that access was denied for the specified application or file
Can't retrieve application's main window handle	Indicates a problem retrieving the application's main window handle
Can't execute application or open file	Indicates a problem executing the specified application or opening the specified file

## Terminate process

Immediately stops a running process.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Specify process by	N/A	Process ID, Process name	Process name	Specify whether the process to terminate will be specified by its name, or by its ID
Process ID	No	Numeric value		The ID of the process to terminate
Process name	No	Text value		The name of the process to terminate. If more than one process with the same name is running, all of them will be terminated

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Process with specified ID not running	Indicates that a process with the specified ID isn't running
Failed to terminate process	Indicates a problem terminating the process

## Ping

Sends a message to determine whether a remote computer is accessible over the network.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Host name	No	Text value		The name of the remote computer or an IP address
Timeout	Yes	Numeric value	5000	The maximum number of milliseconds to wait for the Ping reply message

## Variables produced

Argument	Type	Description
PingResult	Text value	The status of the ping message (success or failure)
RoundTripTime	Numeric value	The number of milliseconds taken for the Ping to complete

## Exceptions

Exception	Description
Can't complete ping action	Indicates a problem completing the ping action

## Set Windows environment variable



Sets an environment variable to a given value.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Environment variable name	No	Text value		The name of the environment variable
New environment variable value	No	Text value		The value that is set to the environment variable
Type	N/A	User, System	User	The type of the environment variable

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Indicates a problem setting the environment variable's value	Indicates a problem setting the environment variable's value
Insufficient permissions	Indicates that the user has insufficient permissions to perform this action

## Get Windows environment variable

Retrieves the value of an environment variable.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Environment variable name	No	Text value		The name of the environment variable whose value will be retrieved
Search for variable only in scope	N/A	Boolean value	False	Specify whether to search for the variable only in a specific scope

Argument	Optional	Accepts	Default Value	Description
Scope	N/A	User, System	User	The scope from which the environment variable should be retrieved

## Variables produced

Argument	Type	Description
EnvironmentVariableValue	Text value	The environment variable's value

## Exceptions

Exception	Description
Environment variable doesn't exist	Indicates that the specified environment variable doesn't exist
Insufficient permissions	Indicates that the user has insufficient permissions to perform this action

# Delete Windows environment variable

Deletes an environment variable from a given scope.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Environment variable name	No	Text value		The name of the environment variable to delete
Type	N/A	User, System	User	The type of the environment variable to delete

## Variables produced

This action doesn't produce any variables.

## Exceptions

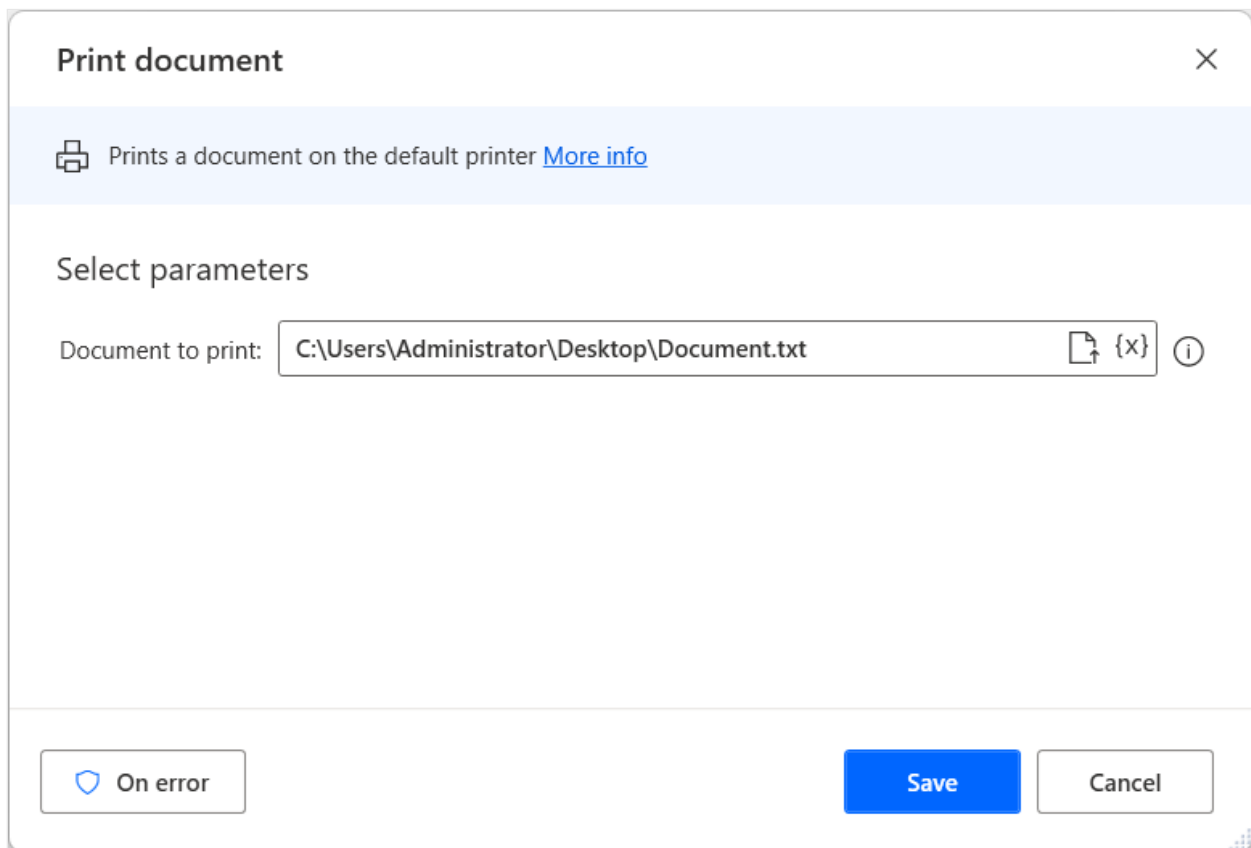
<b>Exception</b>	<b>Description</b>
Failed to delete environment variable	Indicates a problem deleting an environment variable
Insufficient permissions	Indicates that the user has insufficient permissions to perform this action

# Workstation actions

Article • 12/16/2022

The workstation group of actions provides a collection of actions that automate some essential functionalities of your workstation.

To print a document, deploy the **Print document** action and populate the path of the file you want to print.



To change the default printer of the workstation, use the **Set default printer** action. To check which is the current default printer, use the **Get default printer** action.

If you want to sign out of your Windows account, use the **Log off user** action. Additionally, you can use the **Shutdown computer** and **Lock workstation** actions to shut down or lock your workstation, respectively.

To change the resolution of any of your screens, use the **Set screen resolution**. This action requires you to populate the ID number of the screen, the width and height, the bit count, and the frequency. You can select **Available screen resolutions** to see all the available resolutions for each screen. Also, you can retrieve the current values of the mentioned attributes with the **Get screen resolution** action.

**Set screen resolution**
✕

Sets the width, height, bit count and frequency of a selected monitor [More info](#)

Select parameters

Available screen resolutions ▼

Monitor number:

{x}
ⓘ

Monitor width:

{x}
ⓘ

Monitor height:

{x}
ⓘ

Monitor bit count:

{x}
ⓘ

Monitor frequency:

{x}
ⓘ

On error

Save

Cancel

## Print document

Prints a document on the default printer.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Document to print	No	<a href="#">File</a>		The path of the document to print

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
Document not found	Indicates that the specified document wasn't found

Exception	Description
Access denied for document	Indicates that access was denied for the provided document
Can't print document	Indicates a problem printing the specified document

## Get default printer

Gets the name of the default printer.

### Input parameters

This action doesn't require any input.

### Variables produced

Argument	Type	Description
PrinterName	Text value	The name of the default printer

### Exceptions

Exception	Description
Can't get default printer	Indicates a problem getting the default printer

## Set default printer

Sets a printer as the default printer.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Printer name	No	Text value		The name of the printer to set as default

### Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't set default printer	Indicates a problem setting the default printer

## Show desktop

Shows the desktop.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Operation	N/A	Minimize all windows (show desktop), Restore all windows (undo show desktop)	Minimize all windows (show desktop)	Specify whether to minimize all windows to reveal the desktop or restore all windows to their original respective states

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Lock workstation

Locks the workstation's display to protect it from unauthorized use.

## Input parameters

This action doesn't require any input.

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't lock the computer in non interactive mode	Indicates a problem locking the computer in non interactive mode
Can't lock the computer	Indicates a problem locking the computer in non-interactive mode

## Play sound

Plays a system sound or a wav file.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Play sound from	N/A	System, WAV file	System	The type of sound to play
Sound to play	N/A	Asterisk, Beep, Exclamation, Hand, Question	Asterisk	The specific sound to play
File to play	No	<a href="#">File</a>		The full path of the specific WAV file to play

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't find sound file	Indicates that the sound file couldn't be found
Invalid sound file	Indicates an invalid sound file

## Empty recycle bin



Deletes all files from the windows recycle bin.

## Input parameters

This action doesn't require any input.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Take screenshot

Takes a screenshot of the foreground window or the specified screen and saves the image in a file or to the clipboard.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Capture	N/A	All screens, Primary screen, Select screen, Foreground window	All screens	The area to capture
Screen to capture	No	<a href="#">Numeric value</a>		Specify which screen to capture
Save screenshot to	N/A	Clipboard, File	Clipboard	The location to save the screenshot to
Image file	No	<a href="#">File</a>		The full path of the file name where the captured image will be saved
Image format	N/A	BMP, EMF, EXIF, GIF, JPG, PNG, TIFF, WMF	BMP	The format for the image file to save

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Failed to take screenshot	Indicates a problem taking the screenshot
Failed to save screenshot to file	Indicates a problem saving the screenshot to a file
Failed to set screenshot to clipboard	Indicates a problem setting the screenshot to the clipboard
Failed to get specified screen	Indicates a problem getting the specified screen

## Control screen saver

Enables, disables, starts or stops the screensaver.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Screen saver action	N/A	Enable, Disable, Start, Stop	Enable	The function of the screensaver

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Get screen resolution

Gets the width, height, bit count and frequency of a selected monitor.

## Input parameters

---

Argument	Optional	Accepts	Default Value	Description
Monitor number	No	Numeric value		The number of the monitor to get the resolution of

## Variables produced

Argument	Type	Description
MonitorWidth	Numeric value	The width of the monitor
MonitorHeight	Numeric value	The height of the monitor
MonitorBitCount	Numeric value	The monitor bit count
MonitorFrequency	Numeric value	The monitor frequency

## Exceptions

Exception	Description
Failed to get the screen's resolution	Indicates a problem getting the screen's resolution

## Set screen resolution

Sets the width, height, bit count and frequency of a selected monitor during an attended desktop flow run.

### Important

To use the **Set screen resolution** action in flows triggered through cloud flows, you must be connected to the console session of your machine, where you can manually change the screen resolution. For example, you can use your machine's physical screen to connect to the machine. In remote sessions, such as unattended scenarios that use remote desktop clients, the action has no effect, as users can't manually change the resolution.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Monitor number	No	Numeric value		The number of monitor to set the resolution of
Monitor width	No	Numeric value		The value to set the monitor width to
Monitor height	No	Numeric value		The value to set the monitor height to
Monitor bit count	No	Numeric value		The value to set the monitor bit count to
Monitor frequency	No	Numeric value		The value to set the monitor frequency to

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Failed to set the screen's resolution	Indicates a problem setting the screen's resolution

## Log off user

Logs off the current user.

### ⓘ Note

When you run the **Log off user** action through the flow designer, the action prompts you to verify that you want to log off the current user. However, the action doesn't require confirmation when the flow runs through the console or cloud flows. In all cases, the action will terminate the flow.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Force log off	N/A	Boolean value	False	Specify whether to force the user account to log off, regardless of unsaved files or programs that won't close

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't log off user in non interactive mode	Indicates a problem logging off the user in non-interactive mode
Can't log off the current user	Indicates a problem logging off the current user

## Shutdown computer

Instructs the computer to shut down.

### Important

- Although a desktop flow containing the **Shutdown computer** action is set to shut down the machine, some unrelated factors, such as other running Windows processes, may prevent it from achieving it.
- When you run the **Shutdown computer** action through the flow designer, the action prompts you to verify that you want to shut down the computer. However, the action doesn't require confirmation when the flow is run through the console or cloud flows. In all cases, the action will terminate the flow.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

Argument	Optional	Accepts	Default Value	Description
Action to perform	N/A	Shutdown, Restart, Suspend, Hibernate	Shutdown	Specify which shutdown option the computer will perform
Force	N/A	Boolean value	False	Specify whether to force the computer to shut down, regardless of unsaved files or programs that won't close

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't shut down the computer	Indicates a problem shutting down the computer

# Scripting actions

Article • 04/11/2024

## 📘 Important

To prevent unauthorized access, Windows require administrator rights to access protected resources. To access protected resources (such as files) using the scripting actions, run Power Automate with administrator rights. To find more information regarding running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).

Scripting actions enable you to run blocks of code and implement custom behavior in your desktop flows.

## 📘 Important

As announced on [October 2023](#), VBScript is deprecated from Windows. In future releases of Windows, VBScript will be available as a feature on demand before its removal from the operating system. [For more information, see Resources for deprecated features](#).

All scripting actions follow the basic structure of the respective programming or scripting language: PowerShell, Python, VBScript, JavaScript and C#/VB.NET.

## ⚠️ Note

Supported version for C#: v 5.0. For VB.NET: v 11.0

## Natural language to script powered by copilot (preview)

[This topic is prerelease documentation and is subject to change.]

Natural language to code is a new copilot capability added in Power Automate for desktop. It lets you quickly generate code used in the scripting actions by describing it. This feature is available in the following scripting actions:

- **Run PowerShell**

- Run VBScript
- Run DOS command
- Run Python
- Run JavaScript

### Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

## Availability by region

Currently, copilot in Power Automate for desktop is only available in environments located in the United States.

## Availability by account type

Currently, copilot in Power Automate for desktop is only available for users with a work or school account.

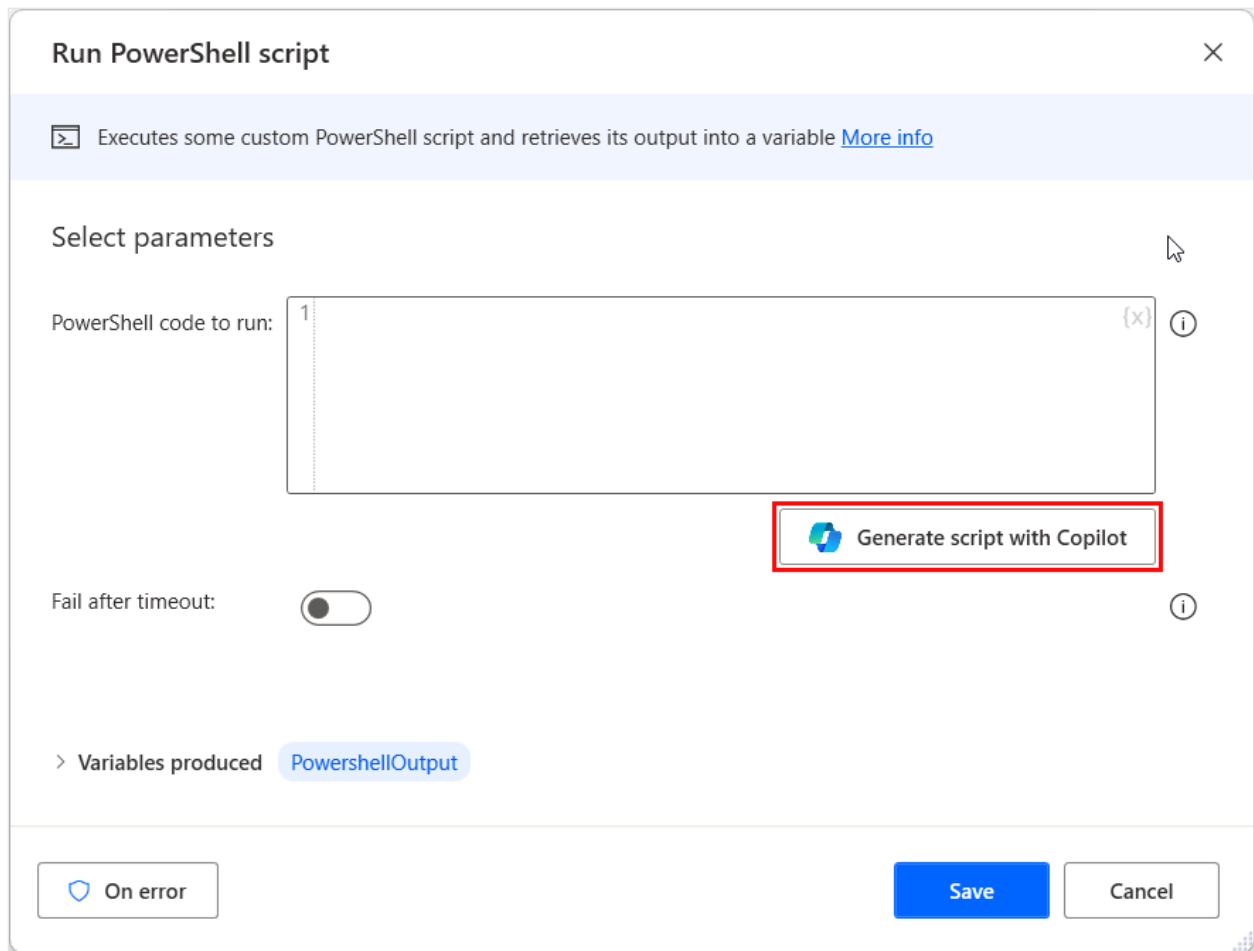
### Note

If your environment is in the region listed above and you still need to see the copilot in Power Automate for desktop experience, contact your tenant administrator. They might have turned off the copilot functionality.

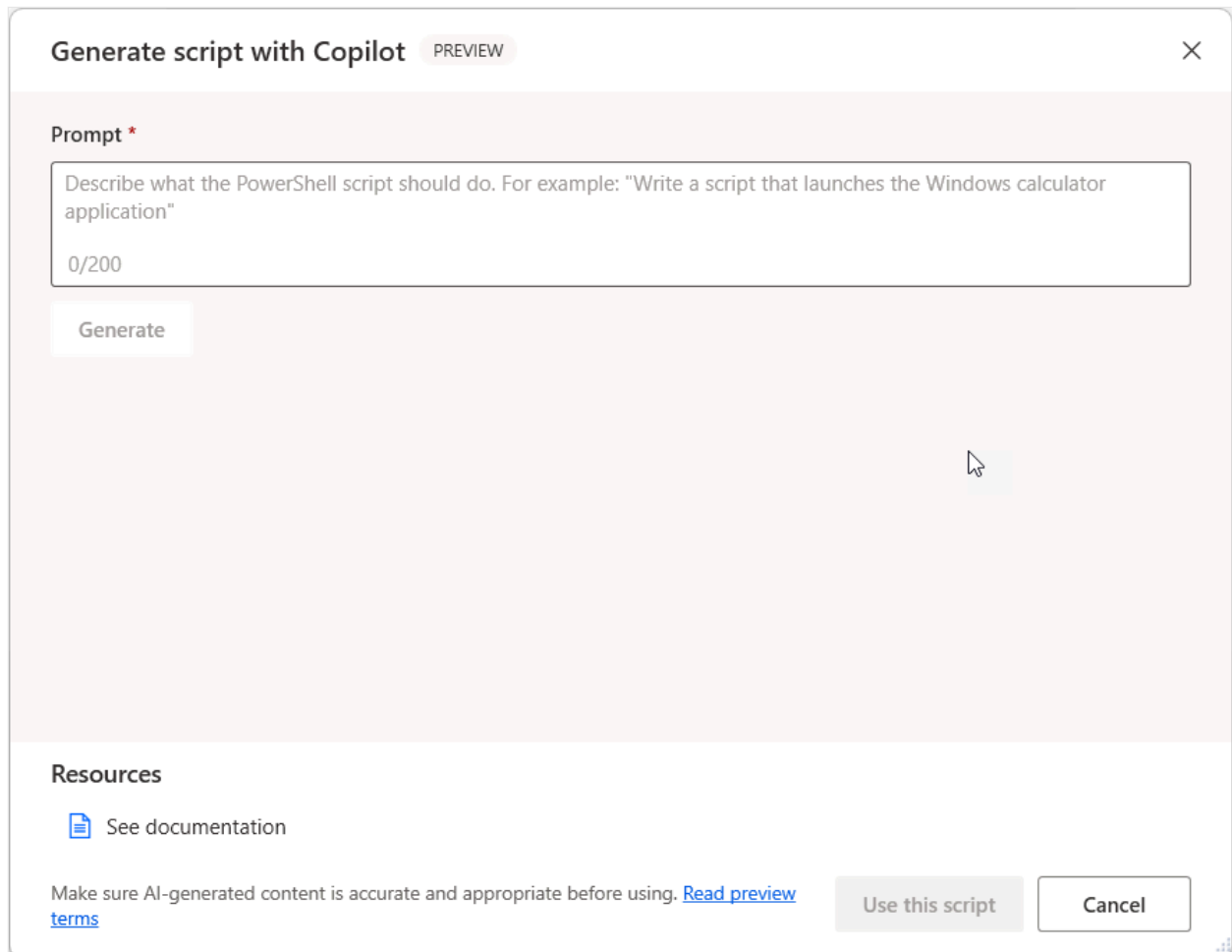
## How to generate scripts using copilot and natural language

To generate scripts in one of the supported scripting actions drag and drop the action in the designer and select **Generate script with Copilot**.





The create prompt screen opens where you can type your natural language prompt.



To create a script, write your prompt and select **Generate**. If you need to re-create it, you can change the prompt and select **Regenerate**. Otherwise, select **Use this script** to go back to the main action window, where you can modify it and add any necessary variables.

### Generate script with Copilot PREVIEW

Prompt \*



Create a script that will perform a POST call to [www.contoso.com](http://www.contoso.com) and pass the "error\_details" variable


102/200

Regenerate

Suggested script

```
1 # This code has been generated by AI. Original prompt:  
2 # Create a script that will perform a POST call to www.contoso.com and pass the  
3 # "error_details" variable  
4 $uri = "http://www.contoso.com"  
5 $body = @{  
6     "error_details" = "%error_details%"  
7 }  
8 Invoke-RestMethod -Uri $uri -Method POST -Body $body -ContentType "application/json"
```

Resources AI-generated content may be incorrect  

 [See documentation](#)

Make sure AI-generated content is accurate and appropriate before using. [Read preview terms](#)

**Use this script** Cancel

### Important

Make sure that you always review the content generated by the AI model.

## Help us improve this feature

Send feedback by selecting the thumb up or thumb down icon underneath the AI-generated content. Once you do, a feedback dialog appears, which you can use to

submit feedback to Microsoft.

**Submit feedback to Microsoft** ×

What did you like?

Give as much detail as you can, but do not include any private or sensitive information.

By pressing Submit, your feedback will be used to improve Microsoft products and services. IT admins for your organization will be able to view and manage your feedback data. [Privacy statement](#).

**Submit** Cancel

#### ⓘ Note

If you can't see the dialog, your tenant admin might have turned it off. More information: [Disabling the user feedback functionality](#).

## Disabling the user feedback functionality

As a tenant admin you can prevent your users from sending feedback to Microsoft by disabling the `disableSurveyFeedback` tenant setting. Find more information about viewing and setting tenant settings:

- [List tenant settings \(preview\)](#)
- [Set TenantSettings](#)

## Data subject rights requests on user feedback

Tenant administrators can view, export, and delete the feedback from their users by signing in to the [Microsoft 365 admin center](#), and then selecting **Health > Product feedback**.

## AI with Power Automate resources

- [FAQ for Generating scripts with natural language](#)
- [Responsible AI FAQs for Power Automate](#)

- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

## Working with variables in scripting actions

To declare variables in scripting actions and return results in Power Automate, use the following commands:

- To declare new variables in PowerShell scripts, use the \$ notation. To return values from [Run PowerShell script](#) actions to Power Automate, use the **Write-Output** command.

```
PowerShell

$variableName = "variableValue"
Write-Output $variableName
```

- Python scripts don't require any special notation to declare new variables. To return values from [Run Python script](#) actions, use the **print** function.

```
Python

variableName = "variableValue"
print variableName
```

- VBScript doesn't require any special notation to declare new variables. Use the **WScript.Echo** function to return values from [Run VBScript](#) actions to Power Automate.

```
VBScript

variableName = "variableValue"
WScript.Echo variableName
```

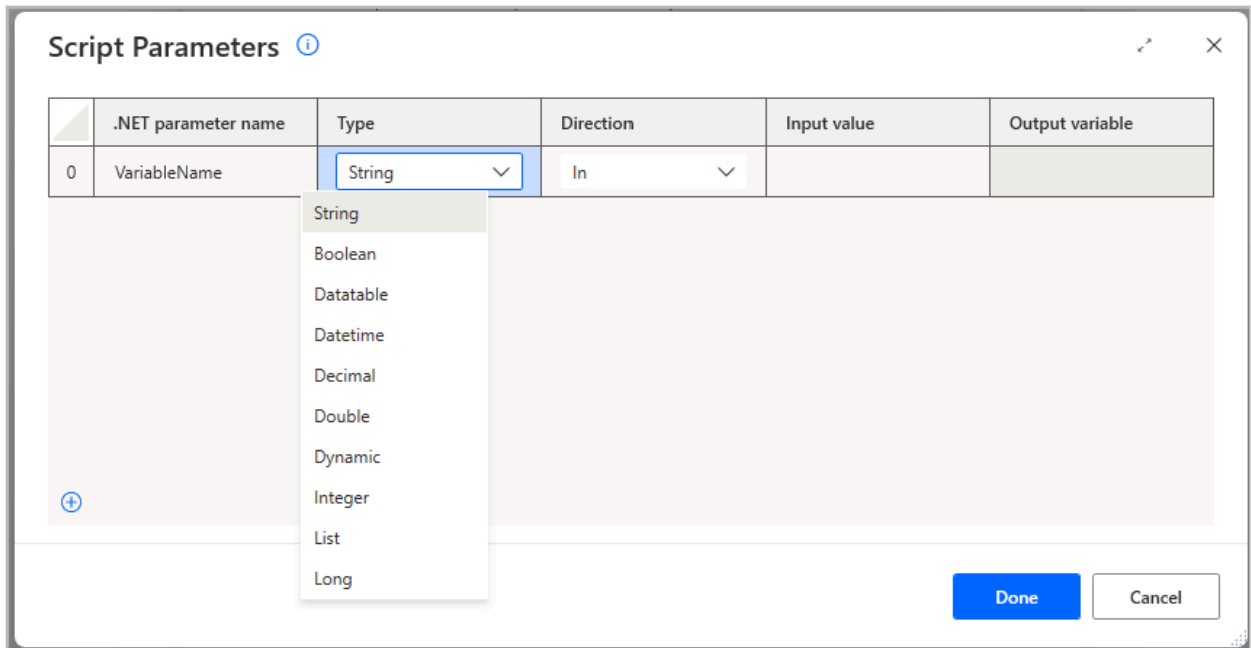
- In JavaScript scripts, use the **var** notation to declare new variables and the **WScript.Echo** function to return values from [Run JavaScript](#) actions.

```
JavaScript

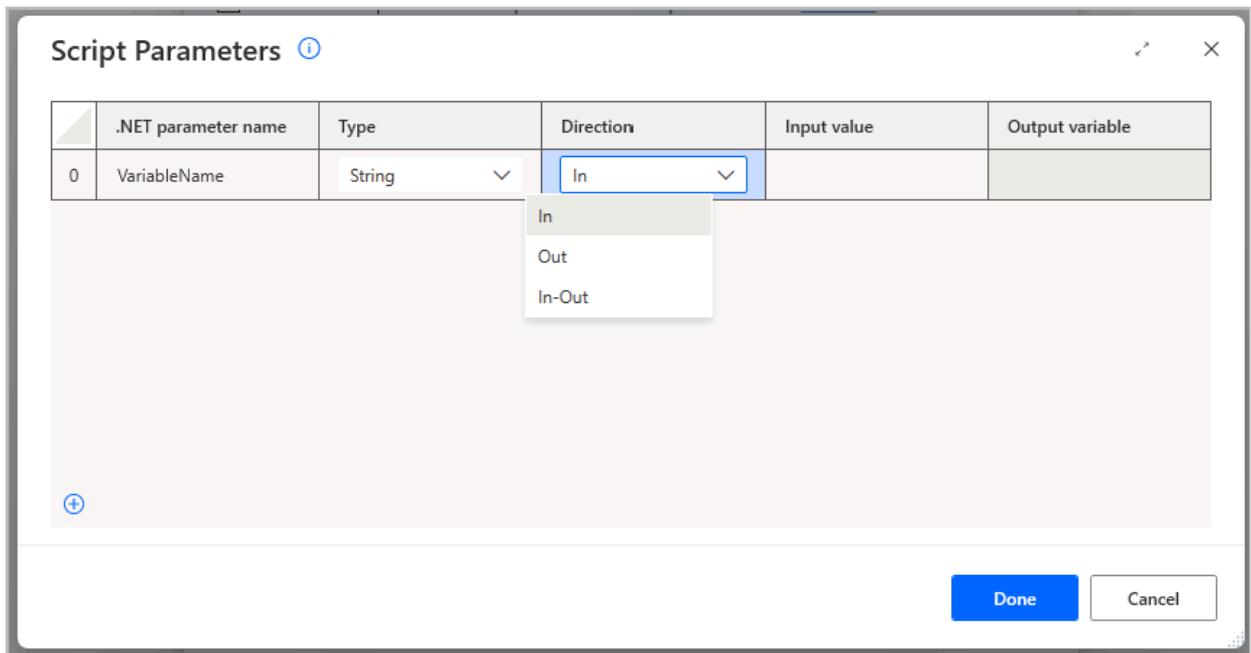
var variableName = "variableValue";
WScript.Echo(variableName);
```

- For .NET scripts, use the **Script Parameters** window, accessed through the [Run .NET script](#) action's configuration card. You can set the type of the respective

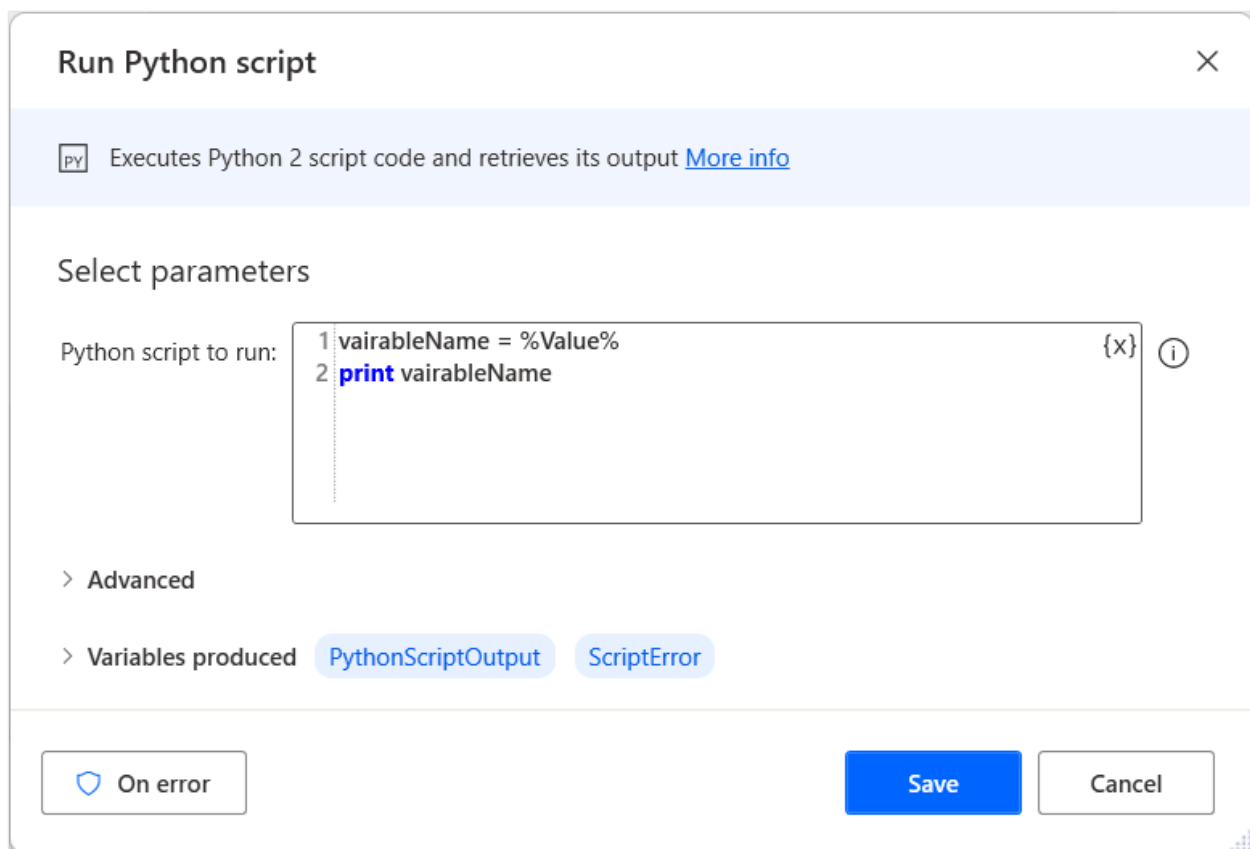
variable:



In addition, you can set whether it's an input to the .NET script (**In** option in Direction dropdown), an output of the script (**Out** option in Direction dropdown) or both (**In-Out** option in Direction dropdown).



To use Power Automate variables in scripting actions, use the percentage notation (%) and handle the variables the same way as hardcoded values.



## Run DOS command

Executes a DOS command or console application in invisible mode and retrieves its output upon completion.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
DOS command or application	No	<a href="#">File</a>		The name of DOS command or a console application, with arguments if applicable
Working folder	Yes	<a href="#">Folder</a>		The full path of the folder to work out

Argument	Optional	Accepts	Default Value	Description
				of, if applicable
Fail after timeout	Yes	Boolean value		Specify whether the DOS command or application will run indefinitely or fail after a set period of time
Timeout	No	Numeric value	10	The maximum number of seconds to wait for the script to complete (-1 for indefinitely)
Change code page	N/A	Boolean value	False	Specifies whether to change the session's current code page
Encoding	No	ASMO-708: Arabic (ASMO 708), big5: Chinese Traditional (Big5), cp1025: IBM EBCDIC (Cyrillic Serbian-Bulgarian), cp866: Cyrillic (DOS), cp875: IBM EBCDIC (Greek Modern), csISO2022JP: Japanese (JIS-Allow 1 byte Kana), DOS-720: Arabic (DOS), DOS-862: Hebrew (DOS), EUC-CN: Chinese Simplified (EUC), EUC-JP: Japanese (JIS 0208-1990 and 0212-1990), euc-jp: Japanese (EUC), euc-kr: Korean (EUC), GB18030: Chinese Simplified (GB18030), gb2312: Chinese Simplified (GB2312), hz-gb-2312: Chinese Simplified (HZ), IBM-Thai: IBM EBCDIC (Thai), IBM00858: OEM Multilingual Latin I, IBM00924: IBM Latin-1, IBM01047: IBM Latin-1, IBM01140: IBM EBCDIC (US-Canada-Euro), IBM01141:	utf-8: Unicode (UTF-8)	The encoding to use when reading the output

Argument	Optional	Accepts	Default Value	Description
		<p>IBM EBCDIC (Germany-Euro), IBM01142: IBM EBCDIC (Denmark-Norway-Euro), IBM01143: IBM EBCDIC (Finland-Sweden-Euro), IBM01144: IBM EBCDIC (Italy Euro), IBM01145: IBM EBCDIC (Spain-Euro), IBM01146: IBM EBCDIC (UK-Euro), IBM01147: IBM EBCDIC (France-Euro), IBM01148: IBM EBCDIC (International-Euro), IBM01149: IBM EBCDIC (Icelandic-Euro), IBM037: IBM EBCDIC (US-Canada), IBM1026: IBM EBCDIC (Turkish Latin-5), IBM273: IBM EBCDIC (Germany), IBM277: IBM EBCDIC (Denmark-Norway), IBM278: IBM EBCDIC (Finland-Sweden), IBM280: IBM EBCDIC (Italy), IBM284: IBM EBCDIC (Spain), IBM285: IBM EBCDIC (UK), IBM290: IBM EBCDIC (Japanese katakana), IBM297: IBM EBCDIC (France), IBM420: IBM EBCDIC (Arabic), IBM423: IBM EBCDIC (Greek), IBM424: IBM EBCDIC (Hebrew), IBM437: OEM United States, IBM500: IBM EBCDIC (International), ibm737: Greek (DOS), ibm775: Baltic (DOS), ibm850: Western European (DOS), ibm852: Central European (DOS), IBM855: OEM Cyrillic, ibm857: Turkish (DOS), IBM860: Portuguese (DOS), ibm861: Icelandic (DOS), IBM863: French Canadian (DOS), IBM864: Arabic (864), IBM865: Nordic (DOS), ibm869: Greek, Modern (DOS), IBM870: IBM EBCDIC (Multilingual Latin-2), IBM871: IBM EBCDIC (Icelandic), IBM880: IBM EBCDIC (Cyrillic Russian), IBM905: IBM EBCDIC (Turkish), iso-2022-jp: Japanese (JIS), iso-2022-jp: Japanese (JIS-Allow 1 byte Kana - SO/SI), iso-2022-kr: Korean (ISO), iso-8859-1: Western European (ISO), iso-8859-13: Estonian (ISO), iso-8859-15: Latin 9 (ISO), iso-8859-2: Central European (ISO), iso-8859-3: Latin 3 (ISO), iso-8859-4: Baltic (ISO), iso-8859-5: Cyrillic (ISO), iso-8859-6: Arabic (ISO), iso-8859-7: Greek (ISO), iso-8859-8: Hebrew (ISO-Visual), iso-8859-8-i: Hebrew (ISO-Logical), iso-8859-9: Turkish (ISO), Johab: Korean (Johab), koi8-r: Cyrillic (KOI8-R), koi8-u: Cyrillic (KOI8-U), ks_c_5601-1987: Korean, macintosh: Western European (Mac), shift_jis: Japanese (Shift-JIS), us-ascii: US-ASCII, utf-16: Unicode, utf-16BE: Unicode (Big-Endian), utf-</p>		



Argument	Optional	Accepts	Default Value	Description
		32: Unicode (UTF-32), utf-32BE: Unicode (UTF-32 Big-Endian), utf-7: Unicode (UTF-7), utf-8: Unicode (UTF-8), windows-1250: Central European (Windows), windows-1251: Cyrillic (Windows), Windows-1252: Western European (Windows), windows-1253: Greek (Windows), windows-1254: Turkish (Windows), windows-1255: Hebrew (Windows), windows-1256: Arabic (Windows), windows-1257: Baltic (Windows), windows-1258: Vietnamese (Windows), windows-874: Thai (Windows), x-Chinese-CNS: Chinese Traditional (CNS), x-Chinese-Eten: Chinese Traditional (Eten), x-cp20001: TCA Taiwan, x-cp20003: IBM5550 Taiwan, x-cp20004: TeleText Taiwan, x-cp20005: Wang Taiwan, x-cp20261: T.61, x-cp20269: ISO-6937, x-cp20936: Chinese Simplified (GB2312-80), x-cp20949: Korean Wansung, x-cp50227: Chinese Simplified (ISO-2022), x-EBCDIC-KoreanExtended: IBM EBCDIC (Korean Extended), x-Europa: Europa, x-IA5: Western European (IA5), x-IA5-German: German (IA5), x-IA5-Norwegian: Norwegian (IA5), x-IA5-Swedish: Swedish (IA5), x-iscii-as: ISCII Assamese, x-iscii-be: ISCII Bengali, x-iscii-de: ISCII Devanagari, x-iscii-gu: ISCII Gujarati, x-iscii-ka: ISCII Kannada, x-iscii-ma: ISCII Malayalam, x-iscii-or: ISCII Oriya, x-iscii-pa: ISCII Punjabi, x-iscii-ta: ISCII Tamil, x-iscii-te: ISCII Telugu, x-mac-arabic: Arabic (Mac), x-mac-ce: Central European (Mac), x-mac-chinesesimp: Chinese Simplified (Mac), x-mac-chinesetrad: Chinese Traditional (Mac), x-mac-croatian: Croatian (Mac), x-mac-cyrillic: Cyrillic (Mac), x-mac-greek: Greek (Mac), x-mac-hebrew: Hebrew (Mac), x-mac-icelandic: Icelandic (Mac), x-mac-japanese: Japanese (Mac), x-mac-korean: Korean (Mac), x-mac-romanian: Romanian (Mac), x-mac-thai: Thai (Mac), x-mac-turkish: Turkish (Mac), x-mac-ukrainian: Ukrainian (Mac)		

## Variables produced

[Expand table](#)

Argument	Type	Description
CommandOutput	Text value	The text output from the DOS command or application
CommandErrorOutput	Text value	The text describing the errors occurred (if any) during the execution of the DOS command or application
CommandExitCode	Numeric value	The command or application exit code. This value is numeric

## Exceptions

[Expand table](#)

Exception	Description
Can't execute command or console application	Indicates a problem executing the specified command or console application
Failed to run script in the allotted time	Indicates a problem running the provided script in the allotted time

## Run VBScript

Executes some custom VBScript code and retrieves its output into a variable.

You can use this action to include your own custom VBScript code in the desktop flow, while also having the ability to use variables therein, to generate dynamic VBScript content if needed.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
VBScript to run	Yes	Text value		The VBScript code to execute. Variables may be included within the script since they evaluate prior to the execution of the VBScript

Argument	Optional	Accepts	Default Value	Description
Fail after timeout	Yes	Boolean value	N/A	Specify whether the VBScript script will run indefinitely or fail after a set period of time
Timeout	No	Numeric value	10	The maximum number of seconds to wait for the script to complete (-1 for indefinitely)

## Variables produced

[Expand table](#)

Argument	Type	Description
VBScriptOutput	Text value	The script's output
ScriptError	Text value	The errors that may occur during the execution of the VBScript code

## Exceptions

[Expand table](#)

Exception	Description
Failed to run script in the allotted time	Indicates a problem running the provided script in the allotted time

## Run JavaScript

Executes some custom JavaScript code and retrieves its output into a variable.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
JavaScript to run	Yes	Text value		The JavaScript code to execute. Variables may be included within the script since they

Argument	Optional	Accepts	Default Value	Description
				evaluate prior to the JavaScript code's execution
Fail after timeout	Yes	Boolean value		Specify whether the JavaScript script will run indefinitely or fail after a set period of time
Timeout	No	Numeric value	10	The maximum number of seconds to wait for the script to complete (-1 for indefinitely)

## Variables produced

[Expand table](#)

Argument	Type	Description
JavascriptOutput	Text value	The script's output
ScriptError	Text value	The errors that may occur during the execution of the JavaScript code

## Exceptions

[Expand table](#)

Exception	Description
Failed to run script in the allotted time	Indicates a problem running the provided script in the allotted time

## Run PowerShell script

Executes some custom PowerShell script and retrieves its output into a variable.

You can use this action to include your own custom PowerShell code in the desktop flow, while also having the ability to use variables therein, to generate dynamic PowerShell content if needed.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
PowerShell code to run	Yes	Text value		The PowerShell code to execute. Variables may be included within the script since they evaluate prior to the execution of the PowerShell code
Fail after timeout	Yes	Boolean value		Specify whether the PowerShell script will run indefinitely or fail after a set period of time
Timeout	No	Numeric value	10	The maximum number of seconds to wait for the script to complete (-1 for indefinitely)

## Variables produced

 Expand table

Argument	Type	Description
PowershellOutput	Text value	The script's output
ScriptError	Text value	The errors that may occur during the execution of the PowerShell code

## Exceptions

 Expand table

Exception	Description
Failed to run PowerShell script	Indicates a problem running the provided PowerShell script
Failed to run script in the allotted time	Indicates a problem running the provided script in the allotted time

## Run Python script

Executes Python script code and retrieves its output.

# Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Python script to run	No	<a href="#">Text value</a>		The Python script code to execute
Python version	No	Python 2.7, Python 3.4	Python 2.7	Specify which version of Python to use when executing the script
Module folder paths	Yes	<a href="#">List of Folders</a>		The path(s) of folder(s) where external Python modules lie

# Variables produced

[Expand table](#)

Argument	Type	Description
PythonScriptOutput	<a href="#">Text value</a>	The script's output
ScriptError	<a href="#">Text value</a>	The errors that may occur during the execution of the Python script code

# Exceptions

[Expand table](#)

Exception	Description
Failed to run Python script	Indicates a problem running the provided Python script
Directory not found	Indicates that the directory wasn't found

# Run .NET script

Executes .NET (C#/VB.NET) script code and retrieves its output.

# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Language	N/A	C#/ VB.NET	C#	The language of the script
.NET script imports	Yes	<a href="#">Text value</a>		The .NET script imports to be included in the script
References to be loaded	Yes	<a href="#">Folder</a>		The root path where .NET dynamic link libraries (.dll files) references are located
Script parameters	Yes	Script Parameters as defined by the user		Setting the values of the parameters that are defined in the script
.NET code to run	No	<a href="#">Text value</a>		The .NET code to run

## Variables produced

This action might produce variables, depending on the configuration made by the user when using the **Script Parameters** window.

### Note

In the case the action is configured to produce output parameters (using the **Out** direction when configuring them), you should always ensure that the parameter inside the script is set to a value other than null. Otherwise, the script execution will result in an error since the output parameter has not been set.

## Exceptions

 Expand table

Exception	Description
Failed to run the .NET script	Indicates a problem running the provided .NET script

# File actions

Article • 10/24/2023

## 📘 Important

To prevent unauthorized access, Windows requires administrator rights to access protected files. To access these resources using the file actions, run Power Automate with administrator rights. For more information about running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).

Handling files and their content is essential for most automation scenarios. You can use the file actions to manage files, retrieve their properties, read and write data, and convert them to other types.

Most file actions require paths that specify the files you want to manipulate. These paths can be hard-coded values or [file datatype variables](#).

## 📌 Note

To provide many files as input, use a **list variable** with file items. A method to create a list of files is the **Get files in folder** action.


Similarly, you can populate a hard-coded value or a [folder datatype variable](#) to specify a destination folder in the actions that need one.




### Move file(s) ×

↕ Move one or more files into a destination folder [More info](#)

#### Select parameters

File(s) to move:   {x} ⓘ

Destination folder:   {x} ⓘ

If file exists:  ▾ ⓘ

> Variables produced MovedFiles

On error

Some file actions provide an extensive configuration, allowing you to automate virtually any scenario. For example, the **Rename file(s)** action includes options to set a new name or add, replace or remove a text string to the existing file name.

**Rename file(s)**
✕

📁 Change the name of one or more files [More info](#)

**Select parameters**

File to rename:  📁 {x} ⓘ

Rename scheme:  ⌵ ⓘ

Text to add:  {x} ⓘ

Add text:  ⌵ ⓘ

If file exists:  ⌵ ⓘ

> Variables produced RenamedFiles

🛡️ On error

Save

Cancel

To append text content or overwrite text files, deploy the **Write text to file** action. To read the content of a text file, use the **Read text from file** action.

Likewise, if you need to read or write content to CSV files, use the **Read from CSV file** and **Write to CSV file** actions. You can find an example desktop flow that handles CSV files in [Convert a CSV file into an Excel spreadsheet](#).

If you want to check if a file exists in a specific folder, use the **If file exists** action. This action is a conditional and allows you to run different blocks of code depending on whether the file exists. To find more information about conditionals, go to [Use conditionals](#).

## If file exists

Marks the beginning of a conditional block of actions depending on whether a file exists or not.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
If file	N/A	Exists, Doesn't exist	Exists	The state of the file to check
File path	No	<a href="#">File</a>		The full path to look for the file

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Wait for file

Suspend the execution of the automation until a file is created or deleted.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Wait for file to be	N/A	Created, Deleted	Created	Specifies whether to pause the flow on the creation or deletion of a certain file
File path	No	<a href="#">File</a>		The full path to look for the file

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Copy file(s)

Copy one or more files into a destination folder.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File(s) to copy	No	<a href="#">List of Files</a>		The file(s) to copy. This value can be a file path, or a variable containing a file, a list of files, a text path, or a list of text paths. Use the 'Get files in folder' action to populate a variable with a list of files.
Destination folder	No	<a href="#">Folder</a>		The destination folder for the copied files
If file exists	N/A	Do nothing, Overwrite	Do nothing	Specifies what to do if a file with the same name already exists in the destination folder

## Variables produced

Argument	Type	Description
CopiedFiles	<a href="#">List of Files</a>	The copied file(s) as a list of files

## Exceptions

Exception	Description
Source folder doesn't exist	Indicates that the source folder doesn't exist
Destination folder doesn't exist	Indicates that the destination folder doesn't exist
File not found	Indicates that the file doesn't exist
Can't copy file	Indicates a problem copying the file

## Move file(s)

Move one or more files into a destination folder.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File(s) to move	No	<a href="#">List of Files</a>		The file(s) to move. This value can be a file path, or a variable containing a file, a list of files, a textual path, or a list of text paths. Use the 'Get files in folder' action to populate a variable with a list of files.
Destination folder	No	<a href="#">Folder</a>		The destination folder for the moved files
If file exists	N/A	Do nothing, Overwrite	Do nothing	Specifies what to do if a file with the same name already exists in the destination folder

## Variables produced

Argument	Type	Description
MovedFiles	<a href="#">List of Files</a>	The moved file(s) as a list of files

## Exceptions

Exception	Description
Source folder doesn't exist	Indicates that the source folder doesn't exist
Destination folder doesn't exist	Indicates that the destination folder doesn't exist
File not found	Indicates that the file doesn't exist
Can't move file	Indicates a problem moving the file

## Delete file(s)

Delete one or more files.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File(s) to delete	No	<a href="#">List of Files</a>		The file(s) to delete. This value can be a file path, or a variable containing a file, a list of files, a text

Argument	Optional	Accepts	Default Value	Description
				path, or a list of text paths. Use the 'Get files in folder' to populate a variable with a list of files

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
File path doesn't exist	Indicates that the file path doesn't exist
File not found	Indicates that the file doesn't exist
Can't delete file	Indicates a problem deleting the file

## Rename file(s)

Change the name of one or more files.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File to rename	No	<a href="#">List of Files</a>		The file(s) to rename. This value can be a file path, or a variable containing a file, a list of files, a text path, or a list of text paths. Use the 'Get files in folder' action to populate a variable with a list of files.
Add number to	N/A	<a href="#">Boolean value</a>	True	Specifies whether to add the number to the existing file name(s) or a new name
Rename scheme	N/A	Set new name, Add text, Remove text, Replace text, Change extension, Add	Set new name	Specifies how to rename the file(s)

Argument	Optional	Accepts	Default Value	Description
		datetime, Make sequential		
New file name	No	Text value		The new name of the file(s)
New extension	Yes	Text value		The text to add as the new extension for the file(s)
New file name	No	Text value		The new name of the file(s)
Add number to	N/A	After name, Before name	After name	Specifies whether to add the number before or after the original name(s) or a new base name
Text to add	Yes	Text value		The text to add to the original file name(s)
Text to remove	Yes	Text value		The text to remove from the original file name(s). This rename scheme searches each file name, and removes the entered text anywhere in the name, each time it occurs.
Text to replace	No	Text value		The text to replace in the original file name(s). This rename scheme searches each file name, and replaces the entered text anywhere in the name, each time it occurs
Use custom datetime	N/A	Boolean value	False	Specifies whether to use a custom datetime
Datetime to add	N/A	Current datetime, Creation time, Last accessed, Last modified	Current datetime	Specifies what datetime value to add to the file name(s)
Keep extension	N/A	Boolean value	True	Specifies whether to include the previous extension with the file name(s). Disable this option to add the extension to the file(s) manually.

Argument	Optional	Accepts	Default Value	Description
Replace with	Yes	Text value		The text to replace the original text with
Start numbering at	No	Numeric value		The starting number value
Add text	N/A	After name, Before name	After name	Specifies whether to add the text before or after the original name(s)
Custom datetime	No	Datetime		The datetime to add to the file name(s)
Increment by	No	Numeric value		The number to increment the starting value by
Add datetime	N/A	After name, Before name	After name	Specifies whether to add the datetime before or after the original name(s)
Separator	N/A	Nothing, Space, Dash, Period, Underscore	Space	Specifies what to use to separate the original file name and the number added, including the option to not use a separator
Separator	N/A	Nothing, Space, Dash, Period, Underscore	Space	Specifies what to use to separate the original file name and the datetime value added, including the option to not use a separator
Use padding	N/A	Boolean value	False	Specifies whether to use padding
Datetime format	No	Text value	yyyyMMdd	The format of the datetime value to add to the file name, such as MM/dd/yyyy for date, and hh:mm:ss for time
Make each number at least	Yes	Numeric value	3	The minimum length for each number added
If file exists	N/A	Do nothing, Overwrite	Do nothing	Specifies what to do if a file with the same name already exists in the folder



## Variables produced

Argument	Type	Description
RenamedFiles	<a href="#">List of Files</a>	The renamed file(s) as a list of files

## Exceptions

Exception	Description
Directory not found	Indicates that the directory wasn't found
File not found	Indicates that the file doesn't exist
Can't rename file	Indicates a problem renaming the file

## Read text from file

Read the contents of a text file.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File path	No	<a href="#">File</a>		The file to read
Store content as	N/A	Single text value, List (each is a list item)	Single text value	Specifies how to store the text. Choose 'Single text value' to store the entire text as a single text value. Choose 'List' to store each line of the original text as a text item in a list.
Encoding	N/A	System default, ASCII, Unicode, Unicode (big-endian), UTF-8	UTF-8	The encoding to read the specified text from the text file with.

## Variables produced

Argument	Type	Description
FileContents	<a href="#">Text value</a>	The contents as a text

Argument	Type	Description
FileContents	List of <a href="#">Text values</a>	The contents as a list of texts

## Exceptions

Exception	Description
Directory not found	Indicates that the directory wasn't found
File not found	Indicates that the file doesn't exist
Failed to read from file	Indicates a problem reading from the file

## Write text to file

Write or appends text to a file.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File path	No	<a href="#">File</a>		The file to write the text. This value can be a file path, or a variable containing a file or a textual path.
Text to write	Yes	<a href="#">General value</a>		The text to write in the specified file
Append new line	N/A	<a href="#">Boolean value</a>	True	Specifies whether to append a new line at the end of the overall text to write to the file
If file exists	N/A	Overwrite existing content, Append content	Overwrite existing content	Specifies whether to overwrite the existing content, or to append to the end of the existing content. If the file doesn't exist, this action automatically creates it.
Encoding	N/A	System default, ASCII, Unicode, Unicode (big-endian), UTF-8, Unicode (without byte order)	Unicode	The encoding to use for the specified text to write into the text file

Argument	Optional	Accepts	Default Value	Description
		mask), UTF-8 (without byte order mask)		

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Failed to write text to file	Indicates a problem writing to the file
Invalid directory for file	Indicates that the directory is invalid

## Read from CSV file

Read a CSV file into a data table.

You can use the **Read from CSV file** action to create a datatable variable with the file's contents. You need to define the path to the CSV file and the encoding to use for reading it, while you can also trim any whitespaces from the extracted cells, handle the first line as column headers, and specify the columns separator.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File path	No	<a href="#">File</a>		The CSV file to read. This value can be a file path, or a variable containing a file or a textual path
Encoding	N/A	UTF-8, Unicode, Unicode (big-endian), UTF-8 (No byte order mark), Unicode (no byte order mark), System default, ASCII	UTF-8	The encoding to be used for reading the specified CSV file

Argument	Optional	Accepts	Default Value	Description
Trim fields	N/A	Boolean value	True	Specifies whether to automatically trim off the leading and trailing whitespaces of the extracted cells
First line contains column names	N/A	Boolean value	False	Specifies whether to use the first row of the CSV resource to set the column names of the resulting data table variant. Enable this option to avoid reading the names as data into the table. Subsequent actions may access the data held by the data table using column names (instead of column numbers).
Columns separator	N/A	Predefined, Custom, Fixed column widths	Predefined	Specifies whether to use a predefined columns separator, a custom one or fixed column widths
Separator	N/A	System default, Comma, Semicolon, Tab	System default	The column-separator to parse the CSV file
Custom separator	No	Text value		The custom column-separator to use for parsing the CSV resource specified
Fixed column widths	No	Text value		The fixed column-widths to use for parsing the CSV resource specified. Separate the widths using commas, spaces, tabs or newlines.

## Variables produced

Argument	Type	Description
CSVTable	Datatable	The contents of the CSV file as a data table

## Exceptions

Exception	Description
Read from CSV failed	Indicates a problem reading from the CSV file

# Write to CSV file

Write a data table, data row or list to a CSV file.

Use the **Write to CSV file** action to write a data table, data row or list variable to a target CSV file. In the **File path** parameter, specify the file path or variable containing a file or textual path where the data will be exported to.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Variable to write	No	<a href="#">General value</a>		The data table, data row variable or list variable to write into the target CSV file
File path	No	<a href="#">File</a>		The CSV file to export the variable to. This value can be a file path, or a variable containing a file or a textual path.
Encoding	N/A	UTF-8, Unicode, Unicode (big-endian), UTF-8 (No byte order mark), Unicode (no byte order mark), System default, ASCII	UTF-8	The encoding to use for writing to the specified CSV file
Include column names	N/A	<a href="#">Boolean value</a>	False	Specifies whether the column names of the variant specified should become the first row of the CSV file. This option takes effect if and only if the target CSV file either doesn't initially exist or exists but is otherwise empty of text.
If file exists	N/A	Overwrite existing content, Append content	Overwrite existing content	Specifies the desired behavior when the targeted CSV file already exists in the filesystem
Separator	N/A	System default, Comma, Semicolon, Tab	System default	The column separator to use in the specified CSV file

Argument	Optional	Accepts	Default Value	Description
Custom columns separator	No	Text value		The custom column separator to use in the CSV file
Use custom columns separator	N/A	Boolean value	False	Specifies whether to use a custom columns separator or a predefined one

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Write failed	Indicates a problem writing to the CSV file

## Get file path part

Retrieve one or more parts (directory, filename, extension, etc.) from a text that represents a file path.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File path	No	File		The file path to use as the source

## Variables produced

Argument	Type	Description
RootPath	File	The root path of the source file
Directory	Folder	The directory of the source file
FileName	Text value	The name of the source file
FileNameNoExtension	Text value	The file name (without the extension) of the source file

Argument	Type	Description
FileExtension	Text value	The extension (for example, .doc) of the source file

## Exceptions

Exception	Description
File path contains invalid characters	Indicates that the file path doesn't exist

## Get temporary file

Create a uniquely named, empty temporary file on disk, and get the file object (which is a representation, and can access the file and all its information).

## Input parameters

This action doesn't require any input.

## Variables produced

Argument	Type	Description
TempFile	File	The temporary file object

## Exceptions

Exception	Description
Failed to create temporary file	Indicates a problem creating a temporary file

## Convert file to Base64

Convert a file to Base64 encoded text.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
File path	No	File		The file path to read from

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

## Variables produced

Argument	Type	Description
Base64Text	Text value	The Base64 encoded text

## Exceptions

Exception	Description
File not found	Indicates that the file doesn't exist
Can't convert file to Base64	Indicates that the provided file can't be converted into Base64 encoded text

## Convert Base64 to file

Convert a Base64 encoded text to file.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Base64 encoded text	No	Text value		The Base64 encoded text
File path	No	File		The file to write to
If file exists	N/A	Do nothing, Overwrite	Do nothing	Specifies what to do if a file with the same name already exists in the destination folder

## Variables produced

This action doesn't produce any variables.

## Exceptions



Exception	Description
Invalid directory for file	Indicates that the directory is invalid
Can't convert Base64 to file	Indicates that the provided Base64 encoded text can't be converted into a file

## Convert file to binary data

Convert a file to binary data.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
File path	No	<a href="#">File</a>		The file to read from

### Variables produced

Argument	Type	Description
BinaryData	<a href="#">Text value</a>	The binary data to write

### Exceptions

Exception	Description
File not found	Indicates that the file doesn't exist
Can't convert file to binary data	Indicates that the provided file can't be converted to binary data

## Convert binary data to file

Convert binary data to file.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Binary data	No	<a href="#">Text value</a>		The binary data
File path	No	<a href="#">File</a>		The file to write to
If file exists	N/A	Do nothing, Overwrite	Do nothing	Specifies what to do if a file with the same name already exists in the destination folder

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Invalid directory for file	Indicates that the directory is invalid
Can't convert binary file to file	Indicates that the provided binary data can't be converted into a file

# Folder actions

Article • 10/20/2023

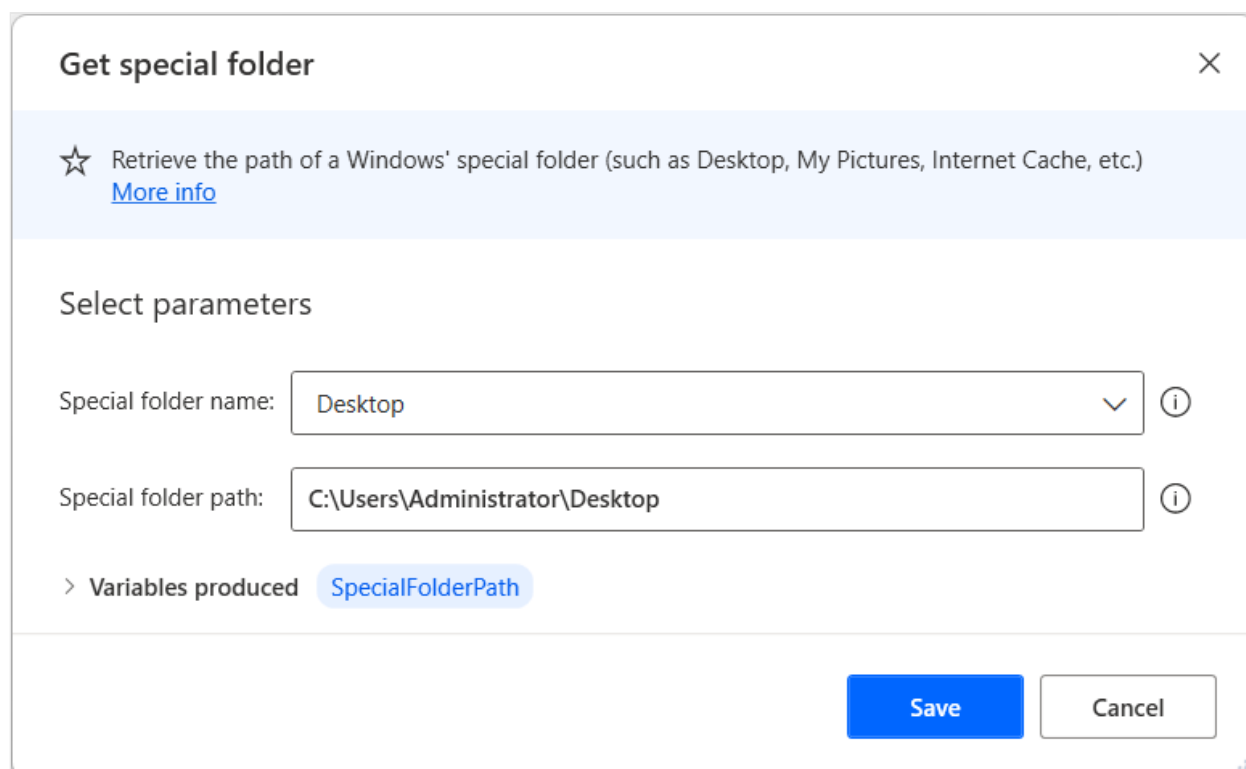
## 📘 Important

To prevent unauthorized access, Windows require administrator rights to access protected folders. To access these resources using the folder actions, run Power Automate with administrator rights. For more information about running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).

Power Automate folder actions enable you to manipulate and organize folders.

The **Get special folder** action retrieves the paths for commonly used directories that vary among users and machines. The following example retrieves the desktop directory and stores it in a variable.

You can now use the `%SpecialFolderPath%` variable any time it's necessary, regardless of the user who runs the flow or the computer on which it runs.



The screenshot shows the configuration window for the 'Get special folder' action. At the top, there is a title bar with the text 'Get special folder' and a close button (X). Below the title bar, there is a light blue header area containing a star icon, the text 'Retrieve the path of a Windows' special folder (such as Desktop, My Pictures, Internet Cache, etc.)', and a link for 'More info'. The main area is titled 'Select parameters' and contains two input fields: 'Special folder name:' with a dropdown menu set to 'Desktop' and an information icon (i), and 'Special folder path:' with a text box containing 'C:\Users\Administrator\Desktop' and an information icon (i). Below these fields, there is a section for 'Variables produced' with a chevron icon and a blue pill-shaped button labeled 'SpecialFolderPath'. At the bottom right, there are two buttons: a blue 'Save' button and a white 'Cancel' button with a grey border.

Create new folders with the **Create folder** action.

To get a list of a folder's contents, use the **Get subfolders in folder** action. This action retrieves a list of folders located within the specified folder. The following example retrieves all the subfolders of a specified special folder. In the **Advanced** section, you can

see that the action sorts the results by creation time in ascending order and name in descending order.

The screenshot shows a configuration dialog box titled "Get subfolders in folder" with a close button (X) in the top right corner. Below the title bar, there is a light blue header area containing a folder icon and the text "Retrieve the list of subfolders in a folder [More info](#)".

The main content area is titled "Select parameters" and contains several settings:

- Folder:** A text input field containing "%SpecialFolderPath%" with a folder icon and "{x}" on the right, and an information icon (i) on the far right.
- Folder filter:** A text input field containing "\*" with "{x}" on the right, and an information icon (i) on the far right.
- Include subfolders:** A blue toggle switch that is turned on, with an information icon (i) on the far right.
- Advanced:** A section header with a downward-pointing chevron.
- Fail upon denied access to any subfolder:** A blue toggle switch that is turned on, with an information icon (i) on the far right.
- Sort by:** A dropdown menu showing "Creation time" with a downward arrow, and an information icon (i) on the far right.
- Descending:** A blue toggle switch that is turned on, with an information icon (i) on the far right.
- Then by:** A dropdown menu showing "Name" with a downward arrow, and an information icon (i) on the far right.
- Descending:** A grey toggle switch that is turned off, with an information icon (i) on the far right.
- Then by:** A dropdown menu showing "No sort" with a downward arrow, and an information icon (i) on the far right.
- Descending:** A grey toggle switch that is turned off, with an information icon (i) on the far right.

At the bottom left, there is a section titled "> Variables produced" with a blue pill-shaped button labeled "Folders".

The bottom of the dialog features three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

You can also copy, move, rename, and delete or empty folders using the appropriate actions.

## If folder exists

Mark the beginning of a conditional block of actions depending on whether a folder exists or not.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
If folder	N/A	Exists, Doesn't exist	Exists	Choose the state of the folder to check
Folder path	No	<a href="#">Folder</a>		Enter or choose the full path of the folder, or a variable containing the folder, to check its state

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Get files in folder

Retrieve the list of files in a folder.

To retrieve all files in a specific folder, use the action **Get files in folder**. Specify the folder path in the **Folder** property and then use the \* character in the **File filter** property (included by default). In case you want to also include all files included in the subfolder inside the specified folder, enable the **Include subfolders** toggle. The retrieved filepaths are then stored in the output of the action.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Folder	No	<a href="#">Folder</a>		Enter or choose the full path of the folder, or a variable

Argument	Optional	Accepts	Default Value	Description
				containing the folder, to retrieve the list of files from
File filter	No	Text value	*	Choose a filter to limit the files retrieved. This parameter allows wild cards, for example, *.txt or document?.doc. To allow for multiple file filters, separate the choices with a semi-colon, for example, .txt;.exe.
Include subfolders	N/A	Boolean value	False	Specify whether to look into subfolders as well
Fail upon denied access to any subfolder	N/A	Boolean value	True	Specify whether to throw an error when trying to get files of a folder with no access rights or ignore those folders
Sort by	N/A	No sort, Full name, Root path, Directory, Name, Name without extension, Extension, Size, Creation time, Last accessed, Last modified, Is hidden, Is system, Is read-only, Is archive, Exists	No sort	Specify whether to sort the results and by which criterion
Descending	N/A	Boolean value	False	Specify whether to sort the items in descending or ascending order
Then by	N/A	No sort, Full name, Root path, Directory, Name, Name without extension, Extension, Size, Creation time, Last accessed, Last modified, Is hidden, Is system, Is read-only, Is archive, Exists	No sort	Specify whether to sort the results by a second criterion
Descending	N/A	Boolean value	False	Specify whether to sort the items in descending or ascending order

Argument	Optional	Accepts	Default Value	Description
Then by	N/A	No sort, Full name, Root path, Directory, Name, Name without extension, Extension, Size, Creation time, Last accessed, Last modified, Is hidden, Is system, Is read-only, Is archive, Exists	No sort	Specify whether to sort the results by a third criterion
Descending	N/A	<a href="#">Boolean value</a>	False	Specify whether to sort the items in descending or ascending order

## Variables produced

Argument	Type	Description
Files	<a href="#">List of Files</a>	The retrieved files as a list of file objects

## Exceptions

Exception	Description
Folder doesn't exist	Indicates that the folder wasn't found
Can't retrieve list of files	Indicates a problem retrieving the list of files

## Get subfolders in folder

Retrieve the list of subfolders in a folder.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Folder	No	<a href="#">Folder</a>		Enter or choose the full path of the folder, or a variable containing the folder, to

Argument	Optional	Accepts	Default Value	Description
				retrieve the list of subfolders from
Folder filter	No	Text value	*	Choose a filter to limit the subfolders retrieved. This parameter allows wild cards, for example, Doc* or Document?. To allow for multiple folder filters, separate the choices with a semi-colon, for example, Doc*;*.
Include subfolders	N/A	Boolean value	False	Specify whether to look into the subfolders and retrieve their subfolders (and so on) as well
Fail upon denied access to any subfolder	N/A	Boolean value	True	Specify whether to throw an error when trying to get subfolders of a folder with no access rights or ignore those folders
Sort by	N/A	No sort, Full name, Root path, Directory, Name, Name without extension, Extension, Size, Creation time, Last accessed, Last modified, Is hidden, Is system, Is read-only, Is archive, Exists	No sort	Specify whether to sort the results and by which criterion
Descending	N/A	Boolean value	False	Specify whether to sort the items in descending or ascending order
Then by	N/A	No sort, Full name, Root path, Directory, Name, Name without extension, Extension, Size, Creation time, Last accessed, Last modified, Is hidden, Is system, Is read-only, Is archive, Exists	No sort	Specify whether to sort the results by a second criterion
Descending	N/A	Boolean value	False	Specify whether to sort the items in descending or



Argument	Optional	Accepts	Default Value	Description
				ascending order
Then by	N/A	No sort, Full name, Root path, Directory, Name, Name without extension, Extension, Size, Creation time, Last accessed, Last modified, Is hidden, Is system, Is read-only, Is archive, Exists	No sort	Specify whether to sort the results by a third criterion
Descending	N/A	<a href="#">Boolean value</a>	False	Specify whether to sort the items in descending or ascending order

## Variables produced

Argument	Type	Description
Folders	<a href="#">List of Folders</a>	The retrieved subfolders as a list of folder objects

## Exceptions

Exception	Description
Folder doesn't exist	Indicates that the folder wasn't found
Can't retrieve list of subfolders	Indicates a problem retrieving the list of subfolders

## Create folder

Create a new folder.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Create new folder into	No	<a href="#">Folder</a>		Enter or choose the full path of the folder, or a variable containing the folder, to create a new folder in

Argument	Optional	Accepts	Default Value	Description
New folder name	No	Text value		Enter the text, or a text variable, to be the name of the new folder

## Variables produced

Argument	Type	Description
NewFolder	Folder	The created folder object (which is a representation and can access the folder and all its information)

## Exceptions

Exception	Description
Folder doesn't exist	Indicates that the folder wasn't found
Can't create folder	Indicates a problem creating the folder
New folder path and name are empty	Indicates that both the new folder path and folder name don't have value

## Delete folder

Delete an existing folder and its contents (files and subfolders).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Folder to delete	No	Folder		Enter or choose the full path of the folder, or a variable containing the folder, to delete. Remember that all contents of that folder and its subfolders are deleted too.

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Folder doesn't exist	Indicates that the folder wasn't found
Can't delete folder	Indicates a problem deleting the folder

## Empty folder

Delete all the contents of a folder (files and subfolders) without deleting the folder itself.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Folder to empty	No	<a href="#">Folder</a>		Enter or choose the full path of the folder, or a variable containing the folder, to delete its contents

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Folder doesn't exist	Indicates that the folder wasn't found
Can't delete folder's contents	Indicates a problem clearing the folder's contents

## Copy folder

Copy a folder into a destination folder.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Folder to copy	No	Folder		Enter or choose the full path of the folder, or a variable containing the folder, to copy. If the folder path ends with a \ only the contents of the folder (files + subfolders) are copied. Otherwise, the folder itself (along with its contents) is copied as a subfolder into the destination folder.
Destination folder	No	Folder		Enter or choose the full path of the folder, or a variable containing the folder, to be the destination folder
If folder exists	N/A	Do nothing, Overwrite	Do nothing	Specify whether to overwrite files or not copy them at all, if the destination folder already exists. If the folder exists, but the files have different names, the old files still remain in the folder.

## Variables produced

Argument	Type	Description
CopiedFolder	Folder	The copied folder object (which is a representation and can access the folder and all its information)

## Exceptions

Exception	Description
Folder doesn't exist	Indicates that the folder wasn't found
Destination folder doesn't exist	Indicates that the destination folder wasn't found
Can't copy folder	Indicates a problem copying the folder

## Move folder

Move an existing folder into a destination folder.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Folder to move	No	Folder		Enter or choose the full path of the folder, or a variable containing the folder, to move
Destination folder	No	Folder		Enter or choose the full path of the folder, or a variable containing the folder, to be the destination folder

## Variables produced

Argument	Type	Description
MovedFolder	Folder	The moved folder object (which is a representation and can access the folder and all its information)

## Exceptions

Exception	Description
Folder doesn't exist	Indicates that the folder wasn't found
Destination folder doesn't exist	Indicates that the destination folder wasn't found
Can't move folder	Indicates a problem moving the folder

## Rename folder

Change the name of a folder.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Folder to rename	No	Folder		Enter or choose the full path of the folder, or a variable containing the folder, to change its name
New folder name	No	Text value		Enter the text, or a text variable, to be the new folder name

## Variables produced

Argument	Type	Description
RenamedFolder	Folder	The renamed folder object (which is a representation and can access the folder and all its information)

## Exceptions

Exception	Description
Folder doesn't exist	Indicates that the folder wasn't found
Can't rename folder	Indicates a problem renaming the folder

## Get special folder

Retrieve the path of a Windows' special folder (such as Desktop, My Pictures, Internet Cache etc.).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Special folder name	N/A	Programs, Personal, Favorites, Startup, Recent, Send To, Start Menu, Music, Desktop, Templates, Application Data, Local Application Data, Internet Cache, Cookies, History, Common Application Data, System, Program Files, Pictures, Common Program Files	Desktop	Choose the name of the special folder (like My Documents or Desktop). This option is independent of path, to find the special folder on any computer regardless of path specifics.

## Variables produced

Argument	Type	Description
SpecialFolderPath	Folder	The special folder object (which is a representation and can access the folder and all its information)

# Exceptions

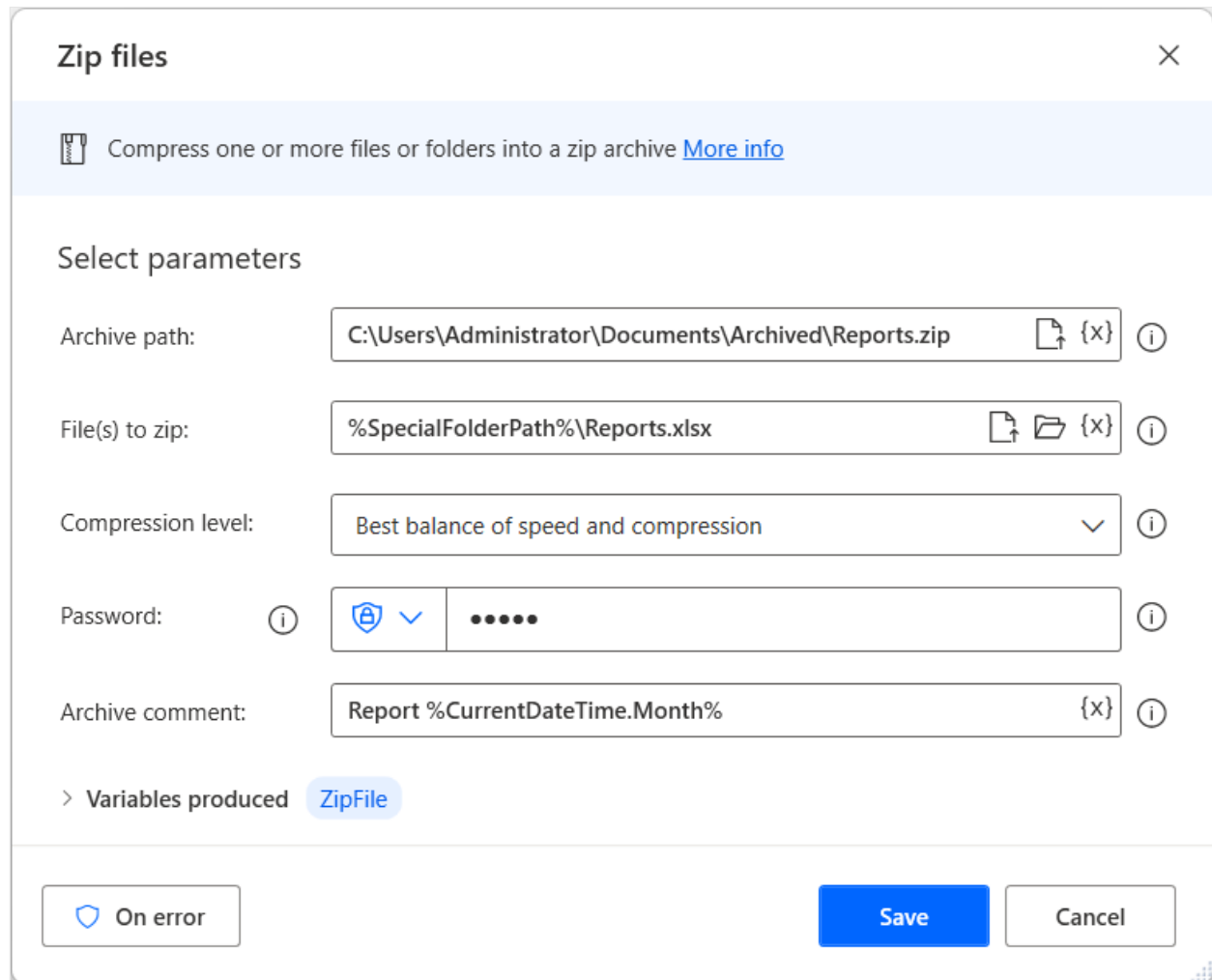
This action doesn't include any exceptions.

# Compression actions

Article • 12/16/2022

To compress (or zip) a file, use the **ZIP files** action and specify a path to archive. If the archive already exists, the action will add the selected files.

The following example uses a variable to specify the path to archive. **Best compression** ensures maximum file size reduction, and a password adds a layer of security to the archive.



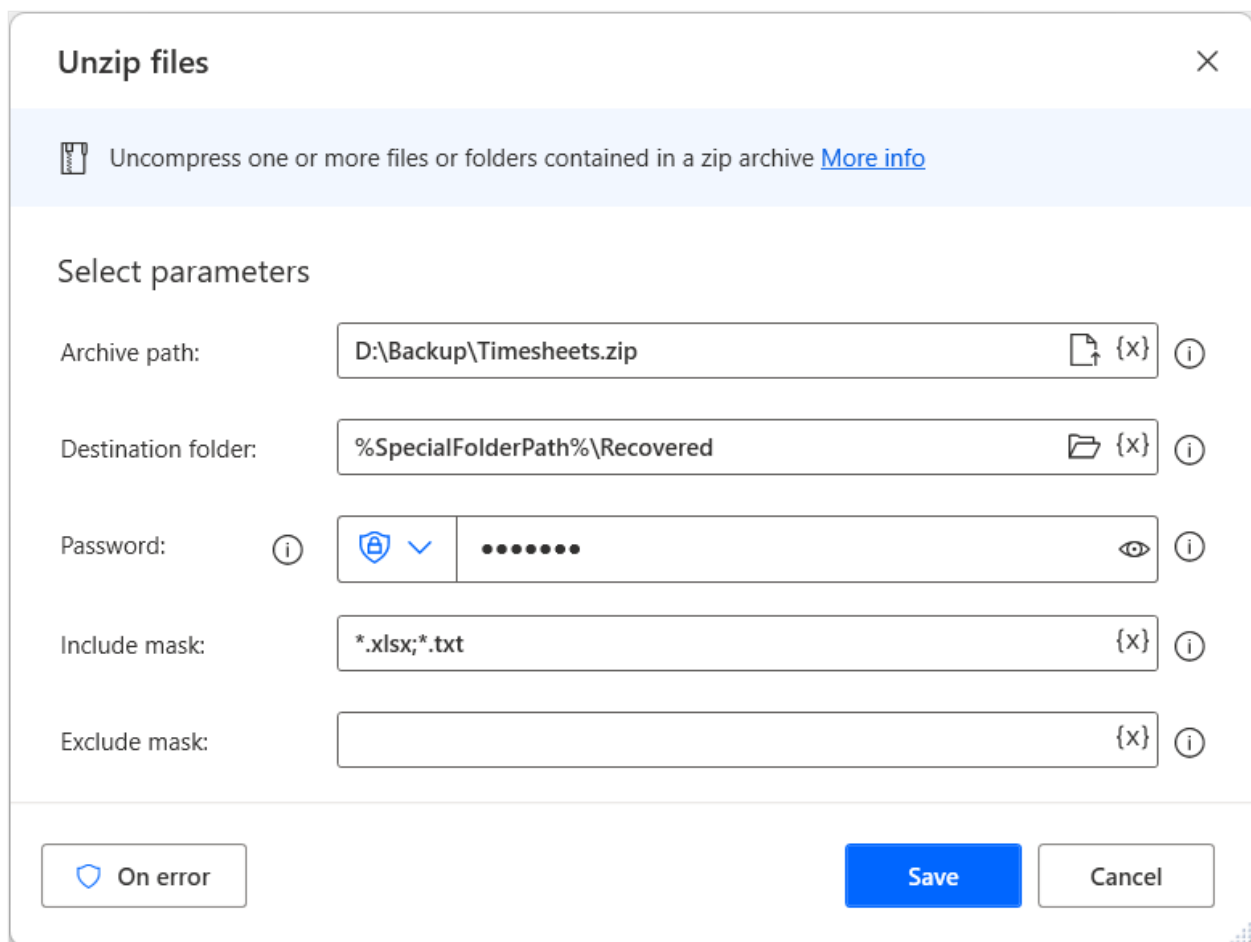
The screenshot shows a dialog box titled "Zip files" with a close button (X) in the top right corner. Below the title bar is a light blue header with a folder icon and the text "Compress one or more files or folders into a zip archive" followed by a "More info" link. The main area is titled "Select parameters" and contains several fields:

- Archive path:** A text box containing "C:\Users\Administrator\Documents\Archived\Reports.zip" with a file icon, a "{x}" placeholder, and an information icon (i).
- File(s) to zip:** A text box containing "%SpecialFolderPath%\Reports.xlsx" with a file icon, a folder icon, a "{x}" placeholder, and an information icon (i).
- Compression level:** A dropdown menu showing "Best balance of speed and compression" with a downward arrow and an information icon (i).
- Password:** A field with a shield icon, a dropdown arrow, a password mask (dots), and an information icon (i).
- Archive comment:** A text box containing "Report %CurrentDateTime.Month%" with a "{x}" placeholder and an information icon (i).

Below these fields is a section for "Variables produced" with a right-pointing arrow and a blue pill-shaped button labeled "ZipFile". At the bottom of the dialog are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

The **Unzip files** action works similarly, requiring a path to archive and a destination folder. The following example uses the **Include mask** option to only unzip files with the extensions **.txt** and **.xlsx**.





## ZIP files

Compress one or more files or folders into a ZIP archive.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Archive path	No	File		The full path of ZIP file to create. If the file already exists, this action adds the new zipped files and/or to the existing ZIP file. If the ZIP file already contains a file or folder with the same name, it overwrites it.
File(s) to zip	No	List of <code>FileSystemObject</code>		The full path of the file(s) or folder(s) to include in the ZIP file

Argument	Optional	Accepts	Default Value	Description
Compression level	N/A	None, Best speed, Best balance of speed and compression, Best compression	Best balance of speed and compression	The level of compression to use. The higher the compression the smaller the file, though it takes longer to create or access
Password	Yes	Direct encrypted input or <a href="#">Text value</a>		The password to use for protecting the ZIP. Leave this attribute blank to create a non password-protected ZIP
Archive comment	Yes	<a href="#">Text value</a>		The comment to include in the ZIP file as a file property

## Variables produced

Argument	Type	Description
ZipFile	<a href="#">File</a>	The ZIP file created by this action

## Exceptions

Exception	Description
File or folder doesn't exist	Indicates that the specified file or folder doesn't exist
File or folder name is invalid	Indicates that the file or folder name is invalid
Archive already exists but it isn't a valid ZIP archive	Indicates that the archive already exists but it isn't a valid ZIP archive
Failed to zip files	Indicates a problem zipping the files

## Unzip files

Uncompress one or more files or folders contained in a ZIP archive.

## Input parameters

---

Argument	Optional	Accepts	Default Value	Description
Archive path	No	File		The full path of a ZIP file to extract
Destination folder	No	Folder		The full path of the folder to extract the archive to. This action overwrites files in the folder with the same name as a file in the archive
Password	Yes	Direct encrypted input or Text value		The password, if any, that is used for this archive. If the ZIP file isn't password-protected, leave this blank
Include mask	Yes	Text value		The filter to limit the files extracted to the files entered here. This parameter allows wild cards, for example <code>.txt</code> or <code>document?.doc</code> (without the quotes). To allow multiple file filters, separate the choices with a semi-colon, for instance, <code>.txt;*.exe</code>
Exclude mask	Yes	Text value		The filter to limit the files extracted by excluding the file entered here. This parameter allows wild cards, for example, <code>.txt</code> or <code>document?.doc</code> (without the quotes). To allow multiple file filters, separate the choices with a semi-colon, for instance, <code>.txt;*.exe</code>

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't create destination folder	Indicates that the destination folder couldn't be created
Archive not found	Indicates that the archive doesn't exist
Archive isn't a valid ZIP file	Indicates that the archive isn't a valid ZIP file
Failed to unzip files	Indicates a problem unzipping the files

# UI automation actions

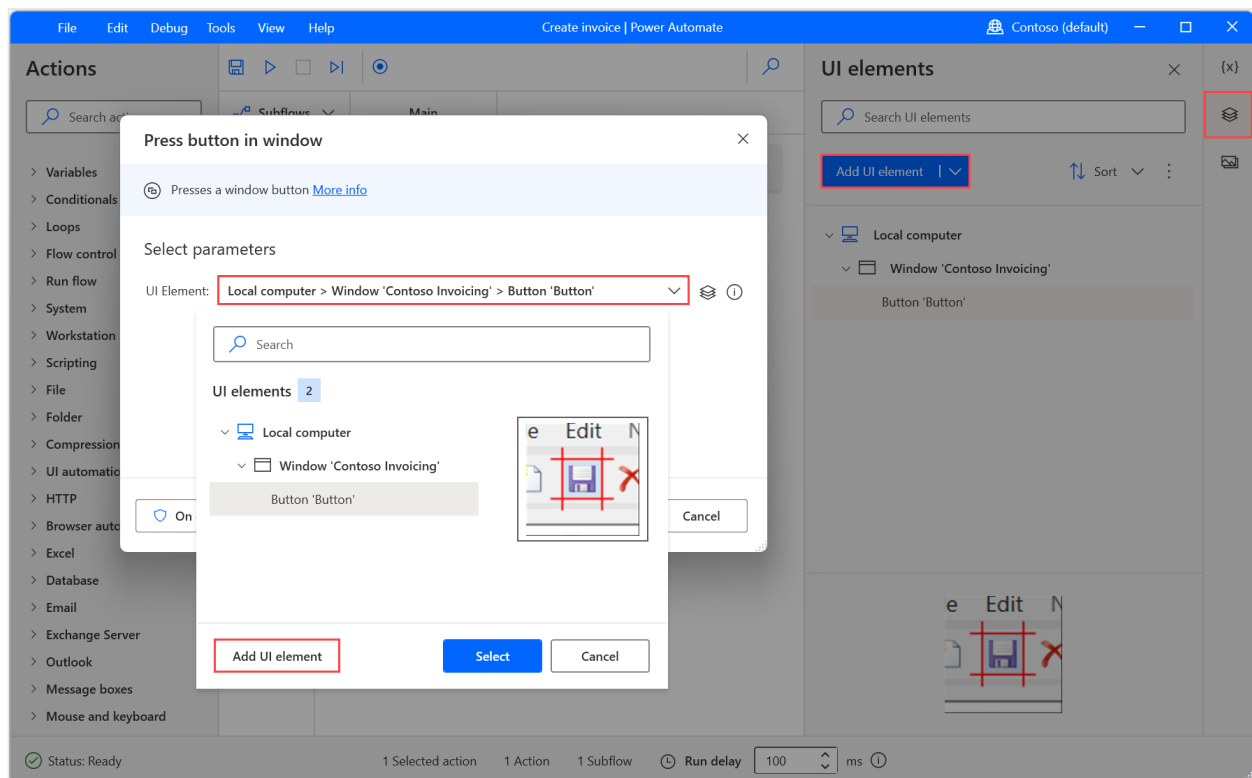
Article • 01/19/2024

## Important

To prevent unauthorized access, Power Automate needs to run with the same or higher privileges as the applications it automates. To use the UI automation actions (except for the **Use desktop** action) to interact with applications that run with elevated privileges, run Power Automate as administrator. To find more information regarding running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).

Power Automate provides various UI automation actions to enable users to interact with Windows and desktop applications. Some UI automation actions require you to set UI elements in their properties to indicate the element you want to handle.

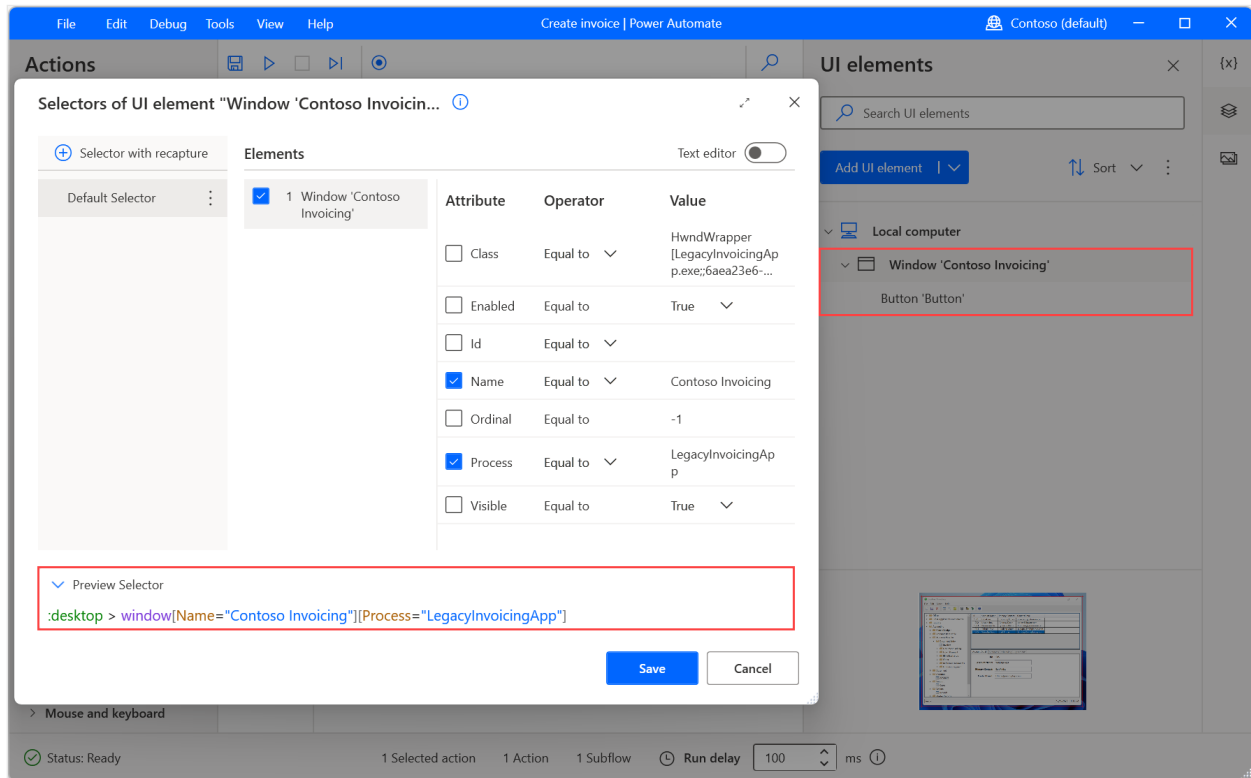
To add a new UI element, select **Add UI element** through the deployed UI automation action or the UI elements pane of the flow designer.



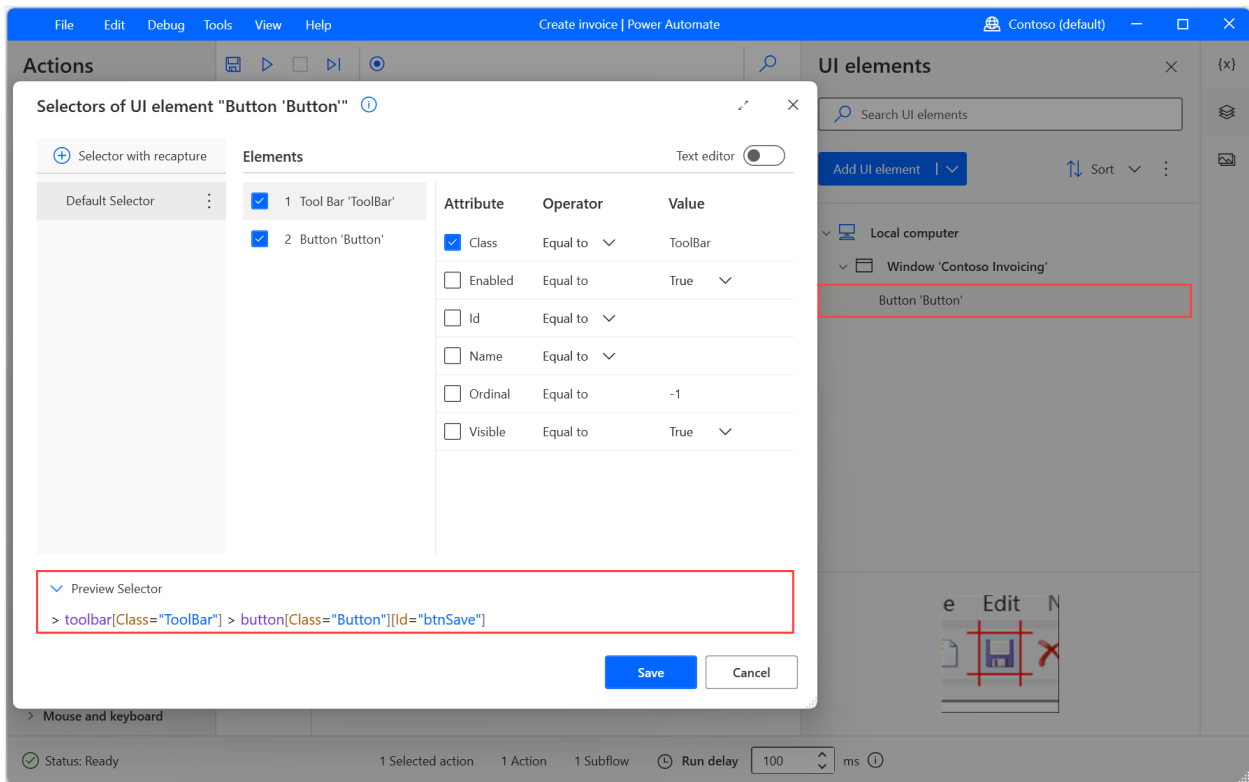
All UI elements consist of selectors that pinpoint the hierarchical structure of the components. Selectors use the > notation to indicate that each element is contained within the element on its left.

When you create a UI element of an application window, its selector always has a root element named **:desktop**.

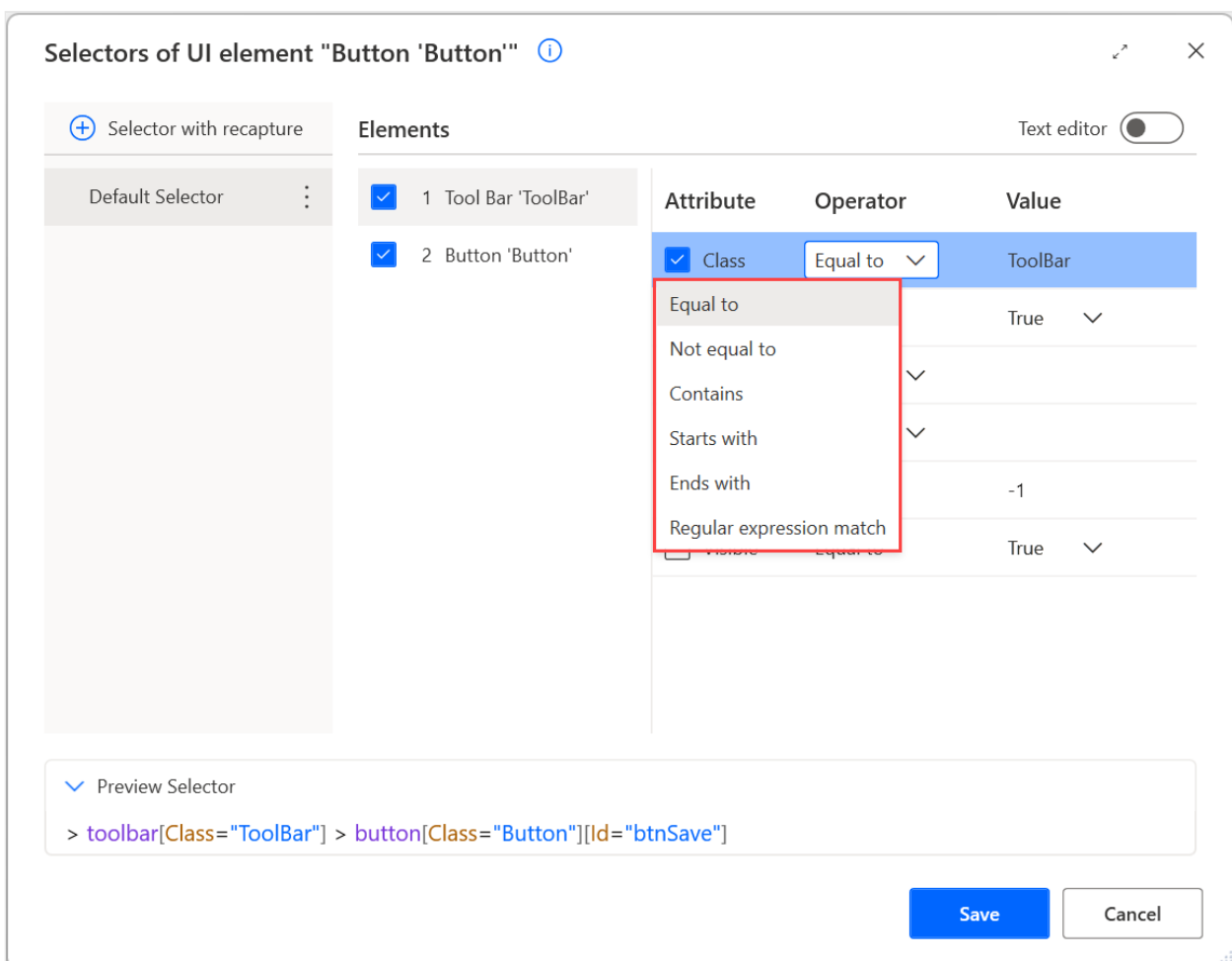
If you create a UI element that pinpoints a component inside an application window, two UI elements will be created automatically. The parent UI element pinpoints the application window, while the child shows the hierarchical structure of the specific component inside the window.



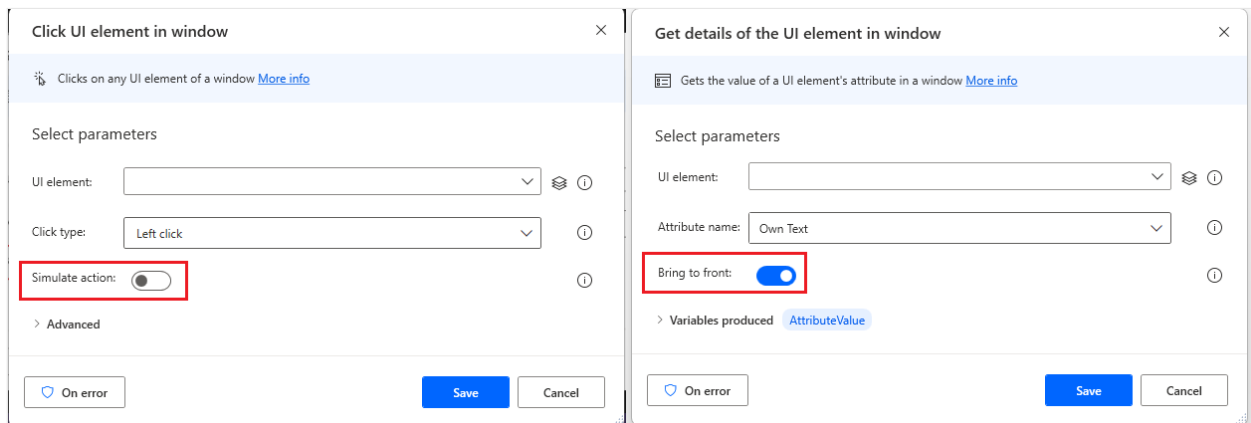
Although selectors are created automatically when adding UI elements, some particular scenarios need manually created selectors. When a custom selector is needed, you can edit an existing selector or build one from scratch.



To develop more dynamic flows, replace the **Equals to** operators with other operators or regular expressions. Additionally, if the value of a selector's attribute depends on the results of previous actions, use variables instead of hard-coded values.



For many actions of UI automation there are two modes for executing actions: physical and simulated. In physical mode, the tool takes control of the machine's mouse and keyboard to perform the action physically. In simulated mode, the action is performed programmatically without taking control of the mouse and keyboard and without requiring the UI element's screen to be brought to the foreground. It's important to note that the simulated option might not be applicable to every UI element. To perform an action by simulation, either enable the **Simulate action** parameter in some actions or disable the **Bring to front** parameter in other actions.



### ! Note

To find more information about developing UI automation flows and creating custom selectors, go to [Automate desktop flows](#) and [Build a custom selector](#), respectively.

## Get details of window

Gets a property of a window such as its title or its source text.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Window	No	<a href="#">UI element</a>		The window to get details from
Window property	N/A	Get window title, Get window text, Get window	Get window title	Choose which property of the window to extract

Argument	Optional	Accepts	Default Value	Description
		location and size, Get process name		
Bring to front	N/A	Boolean value	True	Specify whether the window containing the UI element will be brought to the front during execution. If this option is disabled, the action is executed in the background. Note that not all UI elements are compatible with having the option disabled. Additionally, if execution of the action requires scrolling, disabling this option might not extract all elements.

## Variables produced

[Expand table](#)

Argument	Type	Description
WindowProperty	<a href="#">General value</a>	The retrieved information of the window

## Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve property of window	Indicates a problem retrieving the window property

## Get details of a UI element in window

Gets the value of a UI element's attribute in a window.

## Input parameters

[Expand table](#)



Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The UI element to get details from
Attribute name	Yes	<a href="#">Text value</a>	Own Text	The attribute whose value will be retrieved
Bring to front	N/A	Boolean value	True	Specify whether the window containing the UI element will be brought to the front during execution. If this option is disabled, the action is executed in the background. Note that not all UI elements are compatible with having the option disabled. Additionally, if execution of the action requires scrolling, disabling this option might not extract all elements.

## Variables produced

[Expand table](#)

Argument	Type	Description
AttributeValue	<a href="#">Text value</a>	The value of the UI element's text

## Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve attribute of UI element	Indicates a problem retrieving the UI element's attribute

## Get selected checkboxes in window

Retrieves the names of the selected checkboxes in a checkbox group or the state of a specific checkbox.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The checkbox or checkbox group
Operation	N/A	Get names of selected checkboxes in group, Get state of checkbox	Get names of selected checkboxes in group	Specify whether to retrieve the state of multiple selected checkboxes or just one
Bring to front	N/A	Boolean value	True	Specify whether the window containing the UI element should be brought to the front during execution. If this option is disabled, the action will be executed in the background. Note that not all UI elements might be compatible with having the option disabled. Additionally, if execution of the action requires scrolling, disabling this option might not extract all elements.

## Variables produced

[Expand table](#)

Argument	Type	Description
IsChecked	<a href="#">Boolean value</a>	The state of the selected checkbox
SelectedCheckboxes	<a href="#">List of Text values</a>	The names of selected checkboxes inside the specified checkbox group

## Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve checkbox state(s)	Indicates a problem retrieving the specified checkbox state(s)

## Get selected radio button in window

Retrieves the names of the selected radio button in a radio button group or the state of a specific radio button.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The radio button or radio button group
Operation	N/A	Get selected radio button name in group, Get state of radio button	Get selected radio button name in group	Specify whether to retrieve the name of the radio button that's selected inside a group of radio buttons or just the state of a single radio button
Bring to front	N/A	Boolean value	True	Specify whether the window containing the UI element will be brought to the front during execution. If this option is disabled, the action is executed in the background. Note that not all UI elements are compatible with having the option disabled. Additionally, if execution of the action requires scrolling, disabling this option might not extract all elements.

## Variables produced

[Expand table](#)

Argument	Type	Description
IsSelected	<a href="#">Boolean value</a>	The state of the selected radio button
SelectedRadiobutton	<a href="#">Text value</a>	The selected radio button inside the specified radio group

## Exceptions


[Expand table](#)

Exception	Description
Failed to retrieve radio button state	Indicates a problem retrieving the specified radio button state

## Extract data from window

Extracts data from specific parts of a window in the form of single values, lists, or tables.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Window	No	<a href="#">UI element</a>		The window to extract data from
Store extracted data in	N/A	an Excel spreadsheet, A variable	an Excel spreadsheet	Specify where to store the extracted data
Bring to front	N/A	Boolean value	True	Specify whether the window containing the UI element will be brought to the front during execution. If this option is disabled, the action is executed in the background. Note that not all UI elements are compatible with having the option disabled. Additionally, if execution of the action requires scrolling, disabling this option might not extract all elements.

### Variables produced

 Expand table

Argument	Type	Description
ExcelInstance	<a href="#">Excel instance</a>	The Excel instance with the extracted data. Use this instance to manipulate the spreadsheet (or save and close it) by using the dedicated Excel actions.
DataFromWindow	<a href="#">General value</a>	The extracted data in the form of a datatable

# Exceptions

[Expand table](#)

Exception	Description
Extraction failed	Indicates a problem extracting data from the specified window

# Take screenshot of UI element

Takes a screenshot of a UI element in window.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The UI element in the window to capture as screenshot
Save mode	N/A	Clipboard, File	Clipboard	Specify whether to save the image into a file or store it into the clipboard
Image file path	No	<a href="#">File</a>		Set the full path for the file to be saved
File format	N/A	BMP, EMF, EXIF, GIF, JPG, PNG, TIFF, WMF	BMP	The file format of the image file

## Variables produced

[Expand table](#)

Argument	Type	Description
ImageFile	<a href="#">File</a>	The file path of the generated screenshot image file

# Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve UI element	Indicates a problem retrieving the UI element
Failed to save image	Indicates a problem saving the taken screenshot
Failed to take screenshot of UI element	Indicates a problem taking a screenshot of the UI element

## Focus text field in window

Sets the focus on a text box of a window and scrolls it into view.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text field	No	<a href="#">UI element</a>		The text box to focus

### Variables produced

This action doesn't produce any variables.

### Exceptions

[Expand table](#)

Exception	Description
Failed to set input focus in window text box	Indicates a problem setting the focus on the specified web page text field

## Populate text field in window

Fills a text box in a window with the specified text.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Text box	No	<a href="#">UI element</a>		The text box to populate
Text to fill in	No	Direct encrypted input or <a href="#">Text value</a>		The text to fill in the text field
Simulate action	N/A	Boolean value	False	Simulate the keystrokes programmatically when populating text to UI text field elements. This option doesn't require the UI element's screen to be focused, it will not automatically bring it to the foreground. Note this option can be applied only to left-click action and it might not be applicable to every UI element.
If field isn't empty	Yes	Replace text, Append text	Replace text	Specify whether to replace existing content, or to append.
Click before populating	Yes	Left-click, Double-click, No	Left-click	Specify whether a left mouse click is performed before populating the text field or not.

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Failed to write in textbox	Indicates a problem populating the specified text field

## Press button in window

Presses a window button.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The button to press

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to press button	Indicates a problem pressing the specified button

## Select radio button in window

Selects a radio button on a window.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Radio button	No	<a href="#">UI element</a>		The radio button to select

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)



Exception	Description
Failed to select radio button UI element	Indicates a problem selecting the specified radio button UI element

## Set checkbox state in window

Checks or unchecks a checkbox in a window form.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Checkbox	No	<a href="#">UI element</a>		The checkbox to set the state of
Set checkbox state to	N/A	Checked, Unchecked	Checked	Specify whether the checkbox will become checked or unchecked

### Variables produced

This action doesn't produce any variables.

### Exceptions

[Expand table](#)

Exception	Description
Failed to set checkbox state	Indicates a problem setting the specified checkbox state

## Set drop-down list value in window

Sets or clears the selected options for a drop-down list in a window form.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Drop-down list	No	<a href="#">UI element</a>		The drop-down list whose value to set
Operation	N/A	Clear selected options, Select options by name, Select options by index	Clear selected options	Specify whether you want to select a value by name or by ordinal position (1 2 3 ...) or clear the selected value of the drop-down list
Option names	No	<a href="#">List of Text values</a>		Enter an option or a list of options to be selected in the drop-down list. Multiple options make sense only when working with multi-selection lists. If the list is single-selection, then only the first option of the list specified will be used.
Use regular expressions	N/A	<a href="#">Boolean value</a>	False	Specify whether the option names values to interpret as a regular expression
Options indices	No	<a href="#">List of Numeric values</a>		Enter an index or a list of indices to be selected in the drop-down list. Multiple options make sense only when working with multi-selection lists. If the list is single-selection, then only the first option of the list specified will be used.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to select the specified options in the drop-down list	Indicates a problem selecting the specified options in the drop-down list

# Get window

Gets a running window, for automating desktop applications.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Get window	N/A	Specific window, Foreground window	Specific window	Specify whether to look using a selector or the foreground window
UI element	No	<a href="#">UI element</a>		The selector of the window to get
Bring window to front	N/A	<a href="#">Boolean value</a>	False	Specify whether to bring the window to the foreground automatically upon acquiring it
Fail if window isn't found	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait indefinitely for the window to appear or to fail if the window doesn't show up within a set time period
Timeout	No	<a href="#">Numeric value</a>		The timeout to wait in seconds

## Variables produced

[Expand table](#)

Argument	Type	Description
WindowTitle	<a href="#">Text value</a>	The title of the foreground window
AutomationWindow	<a href="#">Window instance</a>	The specific window instance for use with later UI Automation actions

## Exceptions

[Expand table](#)

Exception	Description
Failed to get window	Indicates a problem getting the window

## Focus window

Activates and brings to the foreground a specific window.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Find window mode	N/A	By window UI element, By window instance/handle, By title and/or class	By window UI element	Specify whether to look for the window using a UI element or a combination of window title/class
Window	No	<a href="#">UI element</a>		The window UI element
Window title	Yes	<a href="#">Text value</a>		The window title. Wildcards can be used, like '?' or '*'.
Window instance	No	<a href="#">Numeric value</a>		The instance or handle of the window to focus
Window class	Yes	<a href="#">Text value</a>		If there are two windows with the same title, window class might help differentiate between them. In this case, enter the class of the window to use.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Window wasn't found	Indicates that the specified window wasn't found
Can't focus window	Indicates a problem focusing the specified window
Can't perform window-related action in noninteractive mode	Indicates a problem performing window-related action in non-interactive mode

## Set window state

Restores, maximizes or minimizes a specific window.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Find window mode	N/A	By window UI element, By window instance/handle, By title and/or class	By window UI element	Specify whether to look for the window using a UI element or a combination of window title/class
Window	No	<a href="#">UI element</a>		The window UI element
Window title	Yes	<a href="#">Text value</a>		The window title. Wildcards can be used, like '?' or '*'.
Window instance	No	<a href="#">Numeric value</a>		The instance or handle of the window to set the state of
Window class	Yes	<a href="#">Text value</a>		If there are two windows with the same title, window class might help differentiate between them. In this case, enter the class of the window to use.
Window state	N/A	Restored, Maximized, Minimized	Restored	Choose in which state to display the window

### Variables produced

This action doesn't produce any variables.

# Exceptions

 Expand table

Exception	Description
Window wasn't found	Indicates that the specified window wasn't found
Can't set window state	Indicates a problem setting the window state of the specified window
Can't perform window-related action in noninteractive mode	Indicates a problem performing window-related action in non-interactive mode

## Set window visibility

Shows a hidden window or hides a visible window.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Find window mode	N/A	By window UI element, By window instance/handle, By title and/or class	By window UI element	Specify whether to look for the window using a UI element or a combination of window title/class
Window	No	<a href="#">UI element</a>		The window UI element
Window title	Yes	<a href="#">Text value</a>		The window title. Wildcards can be used, like '?' or '*'.
Window instance	No	<a href="#">Numeric value</a>		The instance or handle of the window to set the visibility of
Window class	Yes	<a href="#">Text value</a>		If there are two windows with the same title, window class might help differentiate between them. In this case, enter the class of the window to use.
Visibility	N/A	Visible, Hidden	Hidden	Choose in which state to set the window visibility to

## Variables produced

This action doesn't produce any variables.

## Exceptions


 Expand table

Exception	Description
Window wasn't found	Indicates that the specified window wasn't found
Can't set window visibility	Indicates a problem setting the visibility of the specified window
Can't perform window-related action in noninteractive mode	Indicates a problem performing window-related action in non-interactive mode

## Move window

Sets the position of a specific window.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Find window mode	N/A	By window UI element, By window instance/handle, By title and/or class	By window UI element	Specify whether to look for the Window using a UI element or a combination of window title/class
Window	No	<a href="#">UI element</a>		The window UI element
Window title	Yes	<a href="#">Text value</a>		The window title. Wildcards can be used, like '?' or '*'.
Window instance	No	<a href="#">Numeric value</a>		The instance or handle of the window to move
Window class	Yes	<a href="#">Text value</a>		If you have two windows with the same title, Window Class might help differentiate between them. In this case,

Argument	Optional	Accepts	Default Value	Description
				enter the class of the window to use.
Position X	No	<a href="#">Numeric value</a>		The X position of the window
Position Y	No	<a href="#">Numeric value</a>		The Y position of the window

## Variables produced

This action doesn't produce any variables.

## Exceptions

 [Expand table](#)

Exception	Description
Window wasn't found	Indicates that the specified window wasn't found
Can't move window	Indicates a problem moving the specified window
Can't perform window-related action in noninteractive mode	Indicates a problem performing window-related action in non-interactive mode

## Resize window

Sets the size of a specific window.

## Input parameters

 [Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Find window mode	N/A	By window UI element, By window instance/handle, By title and/or class	By window UI element	Specify whether to look for the window using a UI element or a combination of window title/class
Window	No	<a href="#">UI element</a>		The window UI element



Argument	Optional	Accepts	Default Value	Description
Window title	Yes	<a href="#">Text value</a>		The window title. Wildcards can be used, like '?' or '*'.
Window instance	No	<a href="#">Numeric value</a>		The instance or handle of the window to resize
Window class	Yes	<a href="#">Text value</a>		If there are two windows with the same title, window class might help differentiate between them. In this case, enter the class of the window to use
Width	No	<a href="#">Numeric value</a>		The new width, in pixels
Height	No	<a href="#">Numeric value</a>		The new height, in pixels

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Window wasn't found	Indicates that the specified window wasn't found
Can't resize window	Indicates a problem resizing the specified window
Can't perform window-related action in noninteractive mode	Indicates a problem performing window-related action in non-interactive mode

## Close window

Closes a specific window.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Find window mode	N/A	By window UI element, By window instance/handle, By title and/or class	By window UI element	Specify whether to look for the window using a UI element or a combination of window title/class
Window	No	<a href="#">UI element</a>		The window UI element
Window title	Yes	<a href="#">Text value</a>		The window title. Wildcards can be used, like '?' or '*'.
Window instance	No	<a href="#">Numeric value</a>		The instance or handle of the window to close
Window class	Yes	<a href="#">Text value</a>		If there are two windows with the same title, window class might help differentiate between them. In this case, enter the class of the window to use.

## Variables produced

This action doesn't produce any variables.

## Exceptions


 [Expand table](#)

Exception	Description
Window wasn't found	Indicates that the specified window wasn't found
Can't close window	Indicates a problem closing the specified window
Can't perform window-related action in noninteractive mode	Indicates a problem performing window-related action in non-interactive mode

## If window contains

Marks the beginning of a conditional block of actions depending on whether a specific piece of text or UI element exists in a window.

# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Check if window	N/A	Contains UI element, Doesn't contain UI element, Contains text, Doesn't contain text	Contains UI element	Check whether a specific text or UI element exists in a window
Check UI element state	N/A	<a href="#">Boolean value</a>	False	Check whether a specific UI element is enabled or disabled
Text	No	<a href="#">Text value</a>		The text to check for
UI element	No	<a href="#">UI element</a>		The UI element to check for
Window	No	<a href="#">UI element</a>		The window to check if the text exists on
State	N/A	Enabled, Disabled	Enabled	The UI element state to check for

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Wait for window content

Suspends the execution of the automation until a specific piece of text or UI element appears or disappears from a Window.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Wait until window	N/A	Contains UI element, Doesn't contain UI element, Contains text, Doesn't contain text	Contains UI element	Whether to wait for a specific text or UI element to appear in a window
Check UI element state	N/A	<a href="#">Boolean value</a>	False	Check whether a specific UI element is enabled or disabled
Text	No	<a href="#">Text value</a>		The text to check for
UI element	No	<a href="#">UI element</a>		The UI element to check for
Window	No	<a href="#">UI element</a>		The window to check if the text exists on
State	N/A	Enabled, Disabled	Enabled	The UI element state to check for

## Variables produced

This action doesn't produce any variables.

## Exceptions

 [Expand table](#)

Exception	Description
Wait for window content failed	Indicates that the wait operation failed

## If image

This action marks the beginning of a conditional block of actions depending on whether a selected image is found on the screen or not.

## Input parameters

 [Expand table](#)

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
If image	N/A	exists, doesn't exist	exists	Whether to check for the existence or absence of the selected image
Image	No	<a href="#">List of Images</a>		The image/s that the action will check if it/they exist
Search for image on	N/A	Entire screen, Foreground window only	Entire screen	Whether to look for the specified image in the foremost window only or the entire visible screen. Neither choice will find the image if it isn't clearly visible on the screen
Search mode	N/A	Search whole screen or foreground window, Search on specified subregion of screen or foreground window	Search whole screen or foreground window	Whether to scan the entire screen (or window) to find the supplied text or only a narrowed down subregion of it
Find all images in the list	N/A	<a href="#">Boolean value</a>	False	Check whether all images on the list exist or don't exist
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion to scan for the supplied text
X2	Yes	<a href="#">Numeric value</a>		The end X coordinate of the subregion to scan for the supplied text
Y1	Yes	<a href="#">Numeric value</a>		The start Y coordinate of the subregion to scan for the supplied text
Y2	Yes	<a href="#">Numeric value</a>		The end Y coordinate of the subregion to scan for the supplied text
Tolerance	Yes	<a href="#">Numeric value</a>	10	Specify how much the image(s) searched for can differ from the originally chosen image
Image matching	N/A	Basic, Advanced	Basic	Which image algorithm to use when searching for

Argument	Optional	Accepts	Default Value	Description
algorithm				image

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Can't check image in noninteractive mode	Indicates that an image can't be identified in non-interactive mode
Invalid subregion coordinates	Indicates that the coordinates of the given subregion were invalid

## Use desktop

Performs desktop and taskbar related operations.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The UI element to perform a click on
Click type	N/A	Left-click, Right-click, Double-click	Left-click	The kind of click to perform
Launch new application when left-clicking on the taskbar	N/A	<a href="#">Boolean value</a>	True	When this parameter is set to 'true', it ensures that a new window of an application will be created when left-clicking on its icon in the 'quick launch' bar, also known as the taskbar of Windows 7 or above. Uncheck this option to bring

Argument	Optional	Accepts	Default Value	Description
				an already running instance of the application to the foreground.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Taskbar operation failed	Indicates that the taskbar operation failed

## Select tab in window

Selects a tab from a group of tabs.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Tab	No	<a href="#">UI element</a>		The tab to select

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Selecting tab failed	Indicates a problem selecting the specified tab

# Wait for image

This action waits until a specific image appears on the screen or on the foreground window.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Wait for image to	N/A	Appear, Disappear	Appear	Check whether to wait for the image(s) to appear or disappear
Image to wait for	No	<a href="#">List of Images</a>		The image/s that the action will check if it/they exist
Search for image on	N/A	Entire screen, Foreground window only	Entire screen	Whether to look for the specified image in the foremost window only or the entire visible screen. Neither choice will find the image if it isn't clearly visible on the screen
Search mode	N/A	Search whole screen or foreground window, Search on specified subregion of screen or foreground window	Search whole screen or foreground window	Whether to scan the entire screen (or window) to find the supplied text or only a narrowed down subregion of it
Wait for all images	N/A	<a href="#">Boolean value</a>	False	Whether to wait for all the images on the list to appear(disappear), or just one of them
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion to scan for the supplied text
X2	Yes	<a href="#">Numeric value</a>		The end X coordinate of the subregion to scan for the supplied text
Y1	Yes	<a href="#">Numeric value</a>		The start Y coordinate of the subregion to scan for the



Argument	Optional	Accepts	Default Value	Description
				supplied text
Y2	Yes	<a href="#">Numeric value</a>		The end Y coordinate of the subregion to scan for the supplied text
Tolerance	Yes	<a href="#">Numeric value</a>	10	Specify how much the image(s) searched for can differ from the originally chosen image
Image matching algorithm	N/A	Basic, Advanced	Basic	Which image algorithm to use when searching for image
Fail with timeout error	N/A	<a href="#">Boolean value</a>	False	Specify whether you want the action to wait indefinitely or fail after a set time period

## Variables produced

[Expand table](#)

Argument	Type	Description
X	<a href="#">Numeric value</a>	The X coordinate of the point where the text was found on the screen. If the text has been search in the foreground window, this value is relative to the top left corner of the window.
Y	<a href="#">Numeric value</a>	The Y coordinate of the point where the text was found on the screen. If the text has been search in the foreground window, this value is relative to the top left corner of the window.

## Exceptions

[Expand table](#)

Exception	Description
Wait for image failed	Indicates that the wait operation failed
Can't check image in noninteractive mode	Indicates that an image can't be identified in non-interactive mode
Invalid subregion coordinates	Indicates that the coordinates of the given subregion

Exception	Description
	were invalid

## Hover mouse over UI element in window

Hover the mouse over any UI element on window.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		Select the UI element in window to hover

### Variables produced

This action doesn't produce any variables.

### Exceptions

[Expand table](#)

Exception	Description
Failed to hover over element	Indicates that the hover over the element failed

## Click UI element in window

Clicks on any UI element of a window.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The UI element to click on

Argument	Optional	Accepts	Default Value	Description
Click type	N/A	Left-click, Right-click, Double-click, Middle-click, Left button down, Left button up, Right button down, Right button up	Left-click	The kind of click to perform
Simulate action	N/A	Boolean value	False	Specify whether to simulate the move of the mouse cursor over the element prior to clicking. This option does not require the UI element's screen to be focused, it will not automatically bring it to the foreground. Note this option can be applied only to left-click action and it might not be applicable to every UI element.
Mouse position relative to UI element	N/A	Top left, Top center, Top right, Middle left, Middle center, Middle right, Bottom left, Bottom center, Bottom right	Middle center	Specify which section of the UI element the mouse will be moved to prior to clicking
Offset X	Yes	<a href="#">Text value</a>	0	Offset the mouse from the position by this many pixels to the right
Offset Y	Yes	<a href="#">Text value</a>	0	Offset the mouse from the position by this many pixels down

## Variables produced

This action doesn't produce any variables.

## Exceptions

 [Expand table](#)

Exception	Description
Click failed	Indicates that the click failed

## Select menu option in window

Selects an option in a menu of a window.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The menu option to select

### Variables produced

This action doesn't produce any variables.

### Exceptions

[Expand table](#)

Exception	Description
Failed to select option	Indicates a problem selecting the specified menu option

## Drag and drop UI element in window

Drags and drops a UI element of a window.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
UI element to	No	<a href="#">UI element</a>		The UI element to drag

Argument	Optional	Accepts	Default Value	Description
drag				
UI element to drop over	No	UI element		The UI element to drop over
Click type	N/A	Left-click, Right-click	Left-click	Specify which mouse button to use for clicking and holding down, while dragging the UI element over to its destination
Mouse down offset X	Yes	Text value	0	Offset the mouse-down click, that will be used to grab the UI element drag, by this many pixels to the right
Mouse down offset Y	Yes	Text value	0	Offset the mouse-down click, that will be used to grab the UI element to drag, by this many pixels downwards
Mouse down position relative to drag-target UI element	N/A	Top left, Top center, Top right, Middle left, Middle center, Middle right, Bottom left, Bottom center, Bottom right	Middle center	Specify which section of the UI element to drop the mouse onto prior to clicking
Mouse up offset X	Yes	Text value	0	Offset the mouse-up click, that will be used to grab the UI element to drag, by this many pixels to the right
Mouse up offset Y	Yes	Text value	0	Offset the mouse-up click, that will be used to grab the UI element to drag, by this many pixels downwards
Mouse up position relative to drop-target UI element	N/A	Top left, Top center, Top right, Middle left, Middle center, Middle right, Bottom left, Bottom center, Bottom right	Middle center	Specify which section of the UI element to drag the mouse onto after clicking

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
UI element to drag wasn't found	Indicates that the UI element to drag wasn't found
Drop target UI element wasn't found	Indicates that the drop target UI element wasn't found
Drag and drop failed	Indicates a problem during drag and drop of the specified UI element


## Expand/collapse tree node in window

Expands or collapses a node of a tree view residing in a window.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
UI element	No	<a href="#">UI element</a>		The tree node to expand/collapse
Folders path	Yes	<a href="#">Text value</a>		A forward slash separated path made out of folder names leading to the tree node to expand or collapse
Use regular expressions	N/A	<a href="#">Boolean value</a>	False	Specify whether each folder name in the path to interpret as a regular expression
Operation	N/A	Expand, Collapse	Expand	Specify whether to expand or collapse the tree node

 **Note**

Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to set tree node to the specified state	Indicates a problem setting the tree node to the specified state

## If window

This action marks the beginning of a conditional block of actions depending on whether a window is open or not or whether a window is the focused (foreground) window.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Get window	N/A	By window UI element, By window instance/handle, By title and/or class	By window UI element	Specify whether to look for the Window using a UI element or a combination of window title/class
Window title	Yes	<a href="#">Text value</a>		The window title. Wildcards can be used, like '?' or '*'.
Window	No	<a href="#">UI element</a>		The window UI element
Window instance	No	<a href="#">Numeric value</a>		The instance or handle of the window to check
Window class	Yes	<a href="#">Text value</a>		If there are two windows with the same title, window class might help differentiate

Argument	Optional	Accepts	Default Value	Description
				between them. In this case, enter the class of the window to be used.
Check if window	N/A	Is open, Isn't open, Is focused, Isn't focused	Is open	The state of the window to be checked

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

## Wait for window

Suspends the execution of the process until a specific window opens, closes, get or loses the focus.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Find window	N/A	By window UI element, By window instance/handle, By title and/or class	By window UI element	Specify whether to look for the window using a UI element or a combination of window title/class
Window title	Yes	<a href="#">Text value</a>		The window title. Wildcards can be used, like '?' or '*'.
Window	No	<a href="#">UI element</a>		The window UI element
Window instance	No	<a href="#">Numeric value</a>		The instance or handle of the window to check
Window class	Yes	<a href="#">Text value</a>		If there are two windows with the same title, window class might help differentiate



Argument	Optional	Accepts	Default Value	Description
				between them. In this case, enter the class of the window to be used
Wait for window to	N/A	Open, Close, Become focused, Lose focus	Open	Whether to wait for a specific window to open, close, become focused (i.e become the foreground window), or lose focus (i.e stop being the foreground window).
Focus window after it opens	N/A	Boolean value	False	Bring the window to the front after it opens, so later actions are directed at this window

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Can't focus window	Indicates a problem focusing the specified window
Wait for window failed	Indicates that the wait operation failed
Can't perform window-related action in noninteractive mode	Indicates a problem performing window-related action in non-interactive mode

# HTTP actions

Article • 09/15/2023


HTTP actions enable you to interact with APIs and send web requests that perform various operations, such as uploading and downloading data and files.

To send an API request, like POST, GET, PUT, or DELETE, use the **Invoke web service** action.

In the action's properties, you must populate the service's URL and the appropriate HTTP method. Additionally, you must choose the request and response content type, such as XML and JSON.

The **Custom headers** and **Request body** fields depend on the API, and you have to configure them as described in its documentation.

### Invoke web service ✕

 Invokes a web service and stores the response text [More info](#)

#### Select parameters

URL:  {x} ⓘ

Method:  ▾ ⓘ

Accept:  {x} ⓘ

Content type:  {x} ⓘ

Custom headers:  {x} ⓘ

Request body:  {x} ⓘ

Save response:  ▾ ⓘ

> **Advanced**

> **Variables produced** WebServiceResponseHeaders WebServiceResponse StatusCode

If the web server requires authentication, populate your credentials in the appropriate fields of the action's **Advanced** settings.

### Invoke web service ✕

🔗 Invokes a web service and stores the response text [More info](#)

▼ **Advanced**

Connection timeout:  {x} ⓘ

Follow redirection:  ⓘ

Clear cookies:  ⓘ

Fail on error status:  ⓘ

Encode request body:  ⓘ

User agent:  {x} ⓘ

Encoding:  ⓘ

Accept untrusted certificates:  ⓘ

**HTTP authentication:**  ⓘ

User name:  {x} ⓘ

Password: ⓘ  ⓘ

> **Variables produced** WebServiceResponseHeaders WebServiceResponse StatusCode

🛡️ On error
Save
Cancel

A variable named **WebServiceResponse** stores the results of the web service request. If the results are files, you can select to save them locally on your desktop.

To download text or files from the web, you can use the **Download from web action**. This action requires you to populate the URL of the web page or the file and select the appropriate HTTP method.

### Download from web ✕

↓ Downloads text or a file from the web and stores it [More info](#)

#### Select parameters

URL:  ⓘ

Method:  ▼ ⓘ

Save response:  ▼ ⓘ

> **Advanced**

> **Variables produced** WebPageText

If the web server requires authentication, populate your credentials in the appropriate fields of the action's **Advanced** settings.

### Download from web ✕

↓ Downloads text or a file from the web and stores it [More info](#)

▼ **Advanced**

Connection timeout:  {x} ⓘ

Follow redirection:  ⓘ

Clear cookies:  ⓘ

User agent:  {x} ⓘ

Encoding:  ⓘ

Accept untrusted certificates:  ⓘ

**Use credentials:**  ⓘ

User name:  {x} ⓘ

Password: ⓘ  ⓘ

> **Variables produced** WebPageText

A variable named **WebPageText** stores the downloaded text is stored. If you use this action to download files, you can select to save them locally on your desktop.

#### ⓘ Note

Apart from the HTTP actions, Power Automate enables users to interact with web application through the browser automation actions. To find more information about browser automation actions, go to **Browser automation**.

## Download from web

Downloads text or a file from the web and stores it.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
URL	No	<a href="#">Text value</a>		The web page or file's URL
Method	N/A	GET, POST	GET	Specify how to retrieve a website's information. GET should be used when all information needed is in the URL, and POST to enter more information (passwords, etc.)
Post parameters	No	<a href="#">Datatable</a>		The POST parameters in the form of a datatable with two columns
Save response	N/A	Get text into variable (for web pages), Save to disk (for files)	Get text into variable (for web pages)	Specify how the returned data will be saved
File name	N/A	Keep original file name (specify only destination folder), Specify full path (destination folder + custom file name)	Keep original file name (specify only destination folder)	Specify whether to keep the original file name of the downloaded file or specify a new name
Destination folder	No	<a href="#">Folder</a>		The folder where the file returned from the web server will be saved

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Destination file path	No	<a href="#">File</a>		The full path (folder plus filename) where the file returned by the web server will be stored
Connection timeout	Yes	<a href="#">Numeric value</a>	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before giving up
Follow redirection	N/A	<a href="#">Boolean value</a>	True	Specify whether to allow the web server to redirect you to another web page or website
Clear cookies	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear all cookies created by similar actions during this automation
User agent	Yes	<a href="#">Text value</a>	Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.8.1.21) Gecko/20100312 Firefox/3.6	Specify which browser identity to be seen as. Some web servers won't allow access unless a browser identity is chosen



Argument	Optional	Accepts	Default Value	Description
Encoding	N/A	Auto - detect, IBM037: IBM EBCDIC (US-Canada), IBM437: OEM United States, IBM500: IBM EBCDIC (International), ASMO-708: Arabic (ASMO 708), DOS-720: Arabic (DOS), ibm737: Greek (DOS), ibm775: Baltic (DOS), ibm850: Western European (DOS), ibm852: Central European (DOS), IBM855: OEM Cyrillic, ibm857: Turkish (DOS), IBM00858: OEM Multilingual Latin I, IBM860: Portuguese (DOS), ibm861: Icelandic (DOS), DOS-862: Hebrew (DOS), IBM863: French Canadian (DOS), IBM864: Arabic (864), IBM865: Nordic (DOS), cp866: Cyrillic (DOS), ibm869: Greek, Modern (DOS), IBM870: IBM EBCDIC (Multilingual Latin-2), windows-874: Thai (Windows), cp875: IBM EBCDIC (Greek Modern), shift_jis: Japanese (Shift-JIS), gb2312: Chinese Simplified (GB2312), ks_c_5601-1987: Korean, big5: Chinese Traditional (Big5), IBM1026: IBM EBCDIC (Turkish Latin-5), IBM01047: IBM Latin-1, IBM01140: IBM EBCDIC (US-Canada-Euro), IBM01141: IBM EBCDIC (Germany-Euro), IBM01142: IBM EBCDIC (Denmark-Norway-Euro), IBM01143: IBM EBCDIC (Finland-Sweden-Euro), IBM01144: IBM EBCDIC (Italy Euro), IBM01145: IBM EBCDIC (Spain-Euro), IBM01146: IBM EBCDIC (UK-Euro), IBM01147: IBM EBCDIC (France-Euro), IBM01148: IBM EBCDIC (International-Euro), IBM01149: IBM EBCDIC (Icelandic-Euro), utf-16: Unicode, utf-16BE: Unicode (Big-Endian), windows-1250: Central European (Windows), windows-1251: Cyrillic (Windows), Windows-1252: Western	Auto - detect	The encoding used for the web page. If the Auto-detect option is chosen, the encoding to be used will be specified by the web server

Argument	Optional	Accepts	Default Value	Description
		<p>European (Windows), windows-1253: Greek (Windows), windows-1254: Turkish (Windows), windows-1255: Hebrew (Windows), windows-1256: Arabic (Windows), windows-1257: Baltic (Windows), windows-1258: Vietnamese (Windows), Johab: Korean (Johab), macintosh: Western European (Mac), x-mac-japanese: Japanese (Mac), x-mac-chinesetrad: Chinese Traditional (Mac), x-mac-korean: Korean (Mac), x-mac-arabic: Arabic (Mac), x-mac-hebrew: Hebrew (Mac), x-mac-greek: Greek (Mac), x-mac-cyrillic: Cyrillic (Mac), x-mac-chinesesimp: Chinese Simplified (Mac), x-mac-romanian: Romanian (Mac), x-mac-ukrainian: Ukrainian (Mac), x-mac-thai: Thai (Mac), x-mac-ce: Central European (Mac), x-mac-icelandic: Icelandic (Mac), x-mac-turkish: Turkish (Mac), x-mac-croatian: Croatian (Mac), utf-32: Unicode (UTF-32), utf-32BE: Unicode (UTF-32 Big-Endian), x-Chinese-CNS: Chinese Traditional (CNS), x-cp20001: TCA Taiwan, x-Chinese-Eten: Chinese Traditional (Eten), x-cp20003: IBM5550 Taiwan, x-cp20004: TeleText Taiwan, x-cp20005: Wang Taiwan, x-IA5: Western European (IA5), x-IA5-German: German (IA5), x-IA5-Swedish: Swedish (IA5), x-IA5-Norwegian: Norwegian (IA5), us-ascii: US-ASCII, x-cp20261: T.61, x-cp20269: ISO-6937, IBM273: IBM EBCDIC (Germany), IBM277: IBM EBCDIC (Denmark-Norway), IBM278: IBM EBCDIC (Finland-Sweden), IBM280: IBM EBCDIC (Italy), IBM284: IBM EBCDIC (Spain), IBM285: IBM EBCDIC (UK), IBM290: IBM EBCDIC (Japanese katakana), IBM297: IBM EBCDIC</p>		

Argument	Optional	Accepts	Default Value	Description
		(France), IBM420: IBM EBCDIC (Arabic), IBM423: IBM EBCDIC (Greek), IBM424: IBM EBCDIC (Hebrew), x-EBCDIC- KoreanExtended: IBM EBCDIC (Korean Extended), IBM-Thai: IBM EBCDIC (Thai), koi8-r: Cyrillic (KOI8-R), IBM871: IBM EBCDIC (Icelandic), IBM880: IBM EBCDIC (Cyrillic Russian), IBM905: IBM EBCDIC (Turkish), IBM00924: IBM Latin-1, EUC-JP: Japanese (JIS 0208-1990 and 0212-1990), x- cp20936: Chinese Simplified (GB2312-80), x-cp20949: Korean Wansung, cp1025: IBM EBCDIC (Cyrillic Serbian-Bulgarian), koi8- u: Cyrillic (KOI8-U), iso-8859-1: Western European (ISO), iso- 8859-2: Central European (ISO), iso-8859-3: Latin 3 (ISO), iso- 8859-4: Baltic (ISO), iso-8859-5: Cyrillic (ISO), iso-8859-6: Arabic (ISO), iso-8859-7: Greek (ISO), iso- 8859-8: Hebrew (ISO-Visual), iso- 8859-9: Turkish (ISO), iso-8859- 13: Estonian (ISO), iso-8859-15: Latin 9 (ISO), x-Europa: Europa, iso-8859-8-i: Hebrew (ISO- Logical), iso-2022-jp: Japanese (JIS), csISO2022JP: Japanese (JIS- Allow 1 byte Kana), iso-2022-jp: Japanese (JIS-Allow 1 byte Kana - SO/SI), iso-2022-kr: Korean (ISO), x-cp50227: Chinese Simplified (ISO-2022), euc-jp: Japanese (EUC), EUC-CN: Chinese Simplified (EUC), euc-kr: Korean (EUC), hz- gb-2312: Chinese Simplified (HZ), GB18030: Chinese Simplified (GB18030), x-iscii-de: ISCII Devanagari, x-iscii-be: ISCII Bengali, x-iscii-ta: ISCII Tamil, x- iscii-te: ISCII Telugu, x-iscii-as: ISCII Assamese, x-iscii-or: ISCII Oriya, x-iscii-ka: ISCII Kannada, x- iscii-ma: ISCII Malayalam, x-iscii- gu: ISCII Gujarati, x-iscii-pa: ISCII		

Argument	Optional	Accepts	Default Value	Description
		Punjabi, utf-7: Unicode (UTF-7), utf-8: Unicode (UTF-8)		
Accept untrusted certificates	N/A	Boolean value	False	Specify whether untrusted certificates will be accepted
Use credentials	N/A	Boolean value	False	Specify whether the web server requires authentication. This property refers to HTTP authentication (that is, when the browser displays a popup window asking for user name and password)
User name	No	Text value		The user name for the web server
Password	No	Direct encrypted input or Text value		The password for the web server

## Variables produced

Argument	Type	Description
DownloadedFile	File	The downloaded file
WebPageText	Text value	The web page text

## Exceptions

Exception	Description
Directory doesn't exist	Indicates that a required directory doesn't exist

Exception	Description
Download from web error	Indicates a problem downloading from web

## Known issues

- NTLM Authentication is currently not supported for web requests in Power Automate for desktop.

## Invoke SOAP web service

Invokes a method from a SOAP web service.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Endpoint	No	Text value		The endpoint of the web service
Custom headers	Yes	Text value		The custom headers to be included in the request that will be sent to the web service
Request body	No	Text value		The body of the request that will be sent to the web service
Connection timeout	No	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server
Follow redirection	N/A	Boolean value	True	Specify whether to allow the web server to

Argument	Optional	Accepts	Default Value	Description
				redirect you to another web service
Clear cookies	N/A	Boolean value	False	Specify whether to clear all cookies previously created by similar actions during this flow
Fail on error status	N/A	Boolean value	False	Specify whether the responses of the invoked web service that denote errors will be processed as if they were normal responses (suppressing all exceptions) or will result in the related exceptions
User agent	No	Text value	Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.8.1.21) Gecko/20100312 Firefox/3.6	Specify which browser identity to be seen as. Some web servers won't allow access unless a browser identity is chosen
User agent	Yes	Text value	Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.8.1.21)	Specify which browser identity to be seen as. Some web servers won't allow

Argument	Optional	Accepts	Default Value	Description
			Gecko/20100312 Firefox/3.6	access unless a browser identity is chosen
Encoding	N/A	Auto - detect, IBM037: IBM EBCDIC (US-Canada), IBM437: OEM United States, IBM500: IBM EBCDIC (International), ASMO-708: Arabic (ASMO 708), DOS-720: Arabic (DOS), ibm737: Greek (DOS), ibm775: Baltic (DOS), ibm850: Western European (DOS), ibm852: Central European (DOS), IBM855: OEM Cyrillic, ibm857: Turkish (DOS), IBM00858: OEM Multilingual Latin I, IBM860: Portuguese (DOS), ibm861: Icelandic (DOS), DOS-862: Hebrew (DOS), IBM863: French Canadian (DOS), IBM864: Arabic (864), IBM865: Nordic (DOS), cp866: Cyrillic (DOS), ibm869: Greek, Modern (DOS), IBM870: IBM EBCDIC (Multilingual Latin-2), windows-874: Thai (Windows), cp875: IBM EBCDIC (Greek Modern), shift_jis: Japanese (Shift-JIS), gb2312: Chinese Simplified (GB2312), ks_c_5601-1987: Korean, big5: Chinese Traditional (Big5), IBM1026: IBM EBCDIC (Turkish Latin-5), IBM01047: IBM Latin-1, IBM01140: IBM EBCDIC (US-Canada-Euro), IBM01141: IBM EBCDIC (Germany-Euro), IBM01142: IBM EBCDIC (Denmark-Norway-Euro), IBM01143: IBM EBCDIC (Finland-Sweden-Euro), IBM01144: IBM EBCDIC (Italy Euro), IBM01145: IBM EBCDIC (Spain-Euro), IBM01146: IBM EBCDIC (UK-Euro), IBM01147: IBM EBCDIC (France-Euro),	Auto - detect	The encoding used for the web service response. If the auto-detect option is chosen, the encoding to be used will be specified by the web service

Argument	Optional	Accepts	Default Value	Description
		IBM01148: IBM EBCDIC (International-Euro), IBM01149: IBM EBCDIC (Icelandic-Euro), utf-16: Unicode, utf-16BE: Unicode (Big-Endian), windows-1250: Central European (Windows), windows- 1251: Cyrillic (Windows), Windows-1252: Western European (Windows), windows- 1253: Greek (Windows), windows-1254: Turkish (Windows), windows-1255: Hebrew (Windows), windows- 1256: Arabic (Windows), windows-1257: Baltic (Windows), windows-1258: Vietnamese (Windows), Johab: Korean (Johab), macintosh: Western European (Mac), x- mac-japanese: Japanese (Mac), x-mac-chinesetrad: Chinese Traditional (Mac), x-mac- korean: Korean (Mac), x-mac- arabic: Arabic (Mac), x-mac- hebrew: Hebrew (Mac), x-mac- greek: Greek (Mac), x-mac- cyrillic: Cyrillic (Mac), x-mac- chinesesimp: Chinese Simplified (Mac), x-mac- romanian: Romanian (Mac), x- mac-ukrainian: Ukrainian (Mac), x-mac-thai: Thai (Mac), x-mac- ce: Central European (Mac), x- mac-icelandic: Icelandic (Mac), x-mac-turkish: Turkish (Mac), x- mac-croatian: Croatian (Mac), utf-32: Unicode (UTF-32), utf- 32BE: Unicode (UTF-32 Big- Endian), x-Chinese-CNS: Chinese Traditional (CNS), x- cp20001: TCA Taiwan, x- Chinese-Eten: Chinese Traditional (Eten), x-cp20003: IBM5550 Taiwan, x-cp20004: TeleText Taiwan, x-cp20005: Wang Taiwan, x-IA5: Western European (IA5), x-IA5-German:		



Argument	Optional	Accepts	Default Value	Description
		<p>German (IA5), x-IA5-Swedish:  Swedish (IA5), x-IA5-  Norwegian: Norwegian (IA5),  us-ascii: US-ASCII, x-cp20261:  T.61, x-cp20269: ISO-6937,  IBM273: IBM EBCDIC  (Germany), IBM277: IBM  EBCDIC (Denmark-Norway),  IBM278: IBM EBCDIC (Finland-  Sweden), IBM280: IBM EBCDIC  (Italy), IBM284: IBM EBCDIC  (Spain), IBM285: IBM EBCDIC  (UK), IBM290: IBM EBCDIC  (Japanese katakana), IBM297:  IBM EBCDIC (France), IBM420:  IBM EBCDIC (Arabic), IBM423:  IBM EBCDIC (Greek), IBM424:  IBM EBCDIC (Hebrew), x-  EBCDIC-KoreanExtended: IBM  EBCDIC (Korean Extended),  IBM-Thai: IBM EBCDIC (Thai),  koi8-r: Cyrillic (KOI8-R),  IBM871: IBM EBCDIC  (Icelandic), IBM880: IBM  EBCDIC (Cyrillic Russian),  IBM905: IBM EBCDIC (Turkish),  IBM00924: IBM Latin-1, EUC-JP:  Japanese (JIS 0208-1990 and  0212-1990), x-cp20936:  Chinese Simplified (GB2312-  80), x-cp20949: Korean  Wansung, cp1025: IBM EBCDIC  (Cyrillic Serbian-Bulgarian),  koi8-u: Cyrillic (KOI8-U), iso-  8859-1: Western European  (ISO), iso-8859-2: Central  European (ISO), iso-8859-3:  Latin 3 (ISO), iso-8859-4: Baltic  (ISO), iso-8859-5: Cyrillic (ISO),  iso-8859-6: Arabic (ISO), iso-  8859-7: Greek (ISO), iso-8859-  8: Hebrew (ISO-Visual), iso-  8859-9: Turkish (ISO), iso-8859-  13: Estonian (ISO), iso-8859-15:  Latin 9 (ISO), x-Europa: Europa,  iso-8859-8-i: Hebrew (ISO-  Logical), iso-2022-jp: Japanese  (JIS), csISO2022JP: Japanese</p>		

Argument	Optional	Accepts	Default Value	Description
		(JIS-Allow 1 byte Kana), iso-2022-jp: Japanese (JIS-Allow 1 byte Kana - SO/SI), iso-2022-kr: Korean (ISO), x-cp50227: Chinese Simplified (ISO-2022), euc-jp: Japanese (EUC), EUC-CN: Chinese Simplified (EUC), euc-kr: Korean (EUC), hz-gb-2312: Chinese Simplified (HZ), GB18030: Chinese Simplified (GB18030), x-iscii-de: ISCII Devanagari, x-iscii-be: ISCII Bengali, x-iscii-ta: ISCII Tamil, x-iscii-te: ISCII Telugu, x-iscii-as: ISCII Assamese, x-iscii-or: ISCII Oriya, x-iscii-ka: ISCII Kannada, x-iscii-ma: ISCII Malayalam, x-iscii-gu: ISCII Gujarati, x-iscii-pa: ISCII Punjabi, utf-7: Unicode (UTF-7), utf-8: Unicode (UTF-8)		
Accept untrusted certificates	N/A	Boolean value	False	Specify whether untrusted certificates will be accepted
HTTP Authentication	N/A	Boolean value	False	Specify whether the web server requires HTTP authentication (that is, the browser displays a popup window asking for a username and password)
User name	No	Text value		The user name for the web server
Password	No	Direct encrypted input or Text value		The password for the web server

# Request Builder Parameters

Argument	Accepts	Description
WSDL	File	The Web Services Description Language (WSDL) document to build the request with
Service	Text value	The service to invoke
Port	Text value	The port to invoke the service
SOAP version	Text value	The version of the SOAP service
Operation	Text value	The operation to invoke the service
Request envelope	Text value	The envelope to send in the request to invoke the service

## Variables produced

Argument	Type	Description
SoapServiceResponseHeaders	List of Text values	The HTTP headers of the response
SoapServiceResponse	Text value	The web service response text
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Invoke SOAP service error	Indicates a problem invoking the SOAP service
Invalid header in custom headers	Indicates that some custom headers were invalid

## Known issues

- NTLM Authentication is currently not supported for web requests in Power Automate for desktop.

# Invoke web service

Invokes a web service by sending data and retrieves the response from the web service.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
URL	No	Text value		The web service's URL
Method	N/A	GET, POST, CONNECT, HEAD, PUT, DELETE, OPTIONS, TRACE, PATCH	GET	The HTTP method to be used to invoke the web service
Accept	Yes	Text value	application/xml	The acceptable content type for the response of the web service
Content type	Yes	Text value	application/xml	The content type of the request that will be sent to the web service
Custom headers	Yes	Text value		The custom headers to be included in the request that will be sent to the web service
Request body	Yes	Text value		The body of the request that will be sent to the web service
Save response	N/A	Get text into variable (for web pages), Save to disk (for files)	Get text into variable (for web pages)	Specify how the returned data will be saved
File name	N/A	Keep original file name (specify only destination folder), Specify full path	Keep original file name (specify	Specify whether to keep the

Argument	Optional	Accepts	Default Value	Description
		(destination folder + custom file name)	only destination folder)	original file name of the downloaded file or specify a new name
Destination folder	No	Folder		The folder where the file returned by the web service will be saved
Destination file path	No	File		The full path (folder plus filename) where the file returned by the web service will be stored
Connection timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before giving up
Follow redirection	N/A	Boolean value	True	Specify whether to allow the web server to redirect you to another web service
Clear cookies	N/A	Boolean value	False	Specify whether to clear all cookies created by similar actions during this automation

Argument	Optional	Accepts	Default Value	Description
				before this action
Fail on error status	N/A	Boolean value	False	Specify whether the responses of the invoked web service that denote errors will be processed as if they were normal responses (suppressing all exceptions) or will result in the related exceptions
Encode request body	N/A	Boolean value	True	Specify whether the body of request should be URL-encoded before invoking
User agent	Yes	Text value	Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.8.1.21) Gecko/20100312 Firefox/3.6	Specify which browser identity to be seen as. Some web servers won't allow access unless a browser identity is chosen
Encoding	N/A	Auto - detect, IBM037: IBM EBCDIC (US-Canada), IBM437: OEM United States, IBM500: IBM EBCDIC (International), ASMO-708: Arabic (ASMO 708), DOS-720: Arabic (DOS), ibm737: Greek (DOS), ibm775: Baltic (DOS), ibm850: Western	Auto - detect	The encoding used for the web service response. If the auto-detect option is chosen, the encoding to be

Argument	Optional	Accepts	Default Value	Description
		<p>European (DOS), ibm852: Central European (DOS), IBM855: OEM Cyrillic, ibm857: Turkish (DOS), IBM00858: OEM Multilingual Latin I, IBM860: Portuguese (DOS), ibm861: Icelandic (DOS), DOS-862: Hebrew (DOS), IBM863: French Canadian (DOS), IBM864: Arabic (864), IBM865: Nordic (DOS), cp866: Cyrillic (DOS), ibm869: Greek, Modern (DOS), IBM870: IBM EBCDIC (Multilingual Latin-2), windows-874: Thai (Windows), cp875: IBM EBCDIC (Greek Modern), shift_jis: Japanese (Shift-JIS), gb2312: Chinese Simplified (GB2312), ks_c_5601-1987: Korean, big5: Chinese Traditional (Big5), IBM1026: IBM EBCDIC (Turkish Latin-5), IBM01047: IBM Latin-1, IBM01140: IBM EBCDIC (US-Canada-Euro), IBM01141: IBM EBCDIC (Germany-Euro), IBM01142: IBM EBCDIC (Denmark-Norway-Euro), IBM01143: IBM EBCDIC (Finland-Sweden-Euro), IBM01144: IBM EBCDIC (Italy Euro), IBM01145: IBM EBCDIC (Spain-Euro), IBM01146: IBM EBCDIC (UK-Euro), IBM01147: IBM EBCDIC (France-Euro), IBM01148: IBM EBCDIC (International-Euro), IBM01149: IBM EBCDIC (Icelandic-Euro), utf-16: Unicode, utf-16BE: Unicode (Big-Endian), windows-1250: Central European (Windows), windows-1251: Cyrillic (Windows), Windows-1252: Western European (Windows), windows-1253: Greek (Windows), windows-1254: Turkish (Windows), windows-</p>		<p>used will be specified by the web service</p>

Argument	Optional	Accepts	Default Value	Description
		<p>1255: Hebrew (Windows), windows-1256: Arabic (Windows), windows-1257: Baltic (Windows), windows-1258: Vietnamese (Windows), Johab: Korean (Johab), macintosh: Western European (Mac), x-mac-japanese: Japanese (Mac), x-mac-chinesetrad: Chinese Traditional (Mac), x-mac-korean: Korean (Mac), x-mac-arabic: Arabic (Mac), x-mac-hebrew: Hebrew (Mac), x-mac-greek: Greek (Mac), x-mac-cyrillic: Cyrillic (Mac), x-mac-chinesesimp: Chinese Simplified (Mac), x-mac-romanian: Romanian (Mac), x-mac-ukrainian: Ukrainian (Mac), x-mac-thai: Thai (Mac), x-mac-ce: Central European (Mac), x-mac-icelandic: Icelandic (Mac), x-mac-turkish: Turkish (Mac), x-mac-croatian: Croatian (Mac), utf-32: Unicode (UTF-32), utf-32BE: Unicode (UTF-32 Big-Endian), x-Chinese-CNS: Chinese Traditional (CNS), x-cp20001: TCA Taiwan, x-Chinese-Eten: Chinese Traditional (Eten), x-cp20003: IBM5550 Taiwan, x-cp20004: TeleText Taiwan, x-cp20005: Wang Taiwan, x-IA5: Western European (IA5), x-IA5-German: German (IA5), x-IA5-Swedish: Swedish (IA5), x-IA5-Norwegian: Norwegian (IA5), us-ascii: US-ASCII, x-cp20261: T.61, x-cp20269: ISO-6937, IBM273: IBM EBCDIC (Germany), IBM277: IBM EBCDIC (Denmark-Norway), IBM278: IBM EBCDIC (Finland-Sweden), IBM280: IBM EBCDIC (Italy), IBM284: IBM EBCDIC (Spain), IBM285: IBM EBCDIC</p>		



Argument	Optional	Accepts	Default Value	Description
		(UK), IBM290: IBM EBCDIC (Japanese katakana), IBM297: IBM EBCDIC (France), IBM420: IBM EBCDIC (Arabic), IBM423: IBM EBCDIC (Greek), IBM424: IBM EBCDIC (Hebrew), x- EBCDIC-KoreanExtended: IBM EBCDIC (Korean Extended), IBM-Thai: IBM EBCDIC (Thai), koi8-r: Cyrillic (KOI8-R), IBM871: IBM EBCDIC (Icelandic), IBM880: IBM EBCDIC (Cyrillic Russian), IBM905: IBM EBCDIC (Turkish), IBM00924: IBM Latin-1, EUC- JP: Japanese (JIS 0208-1990 and 0212-1990), x-cp20936: Chinese Simplified (GB2312- 80), x-cp20949: Korean Wansung, cp1025: IBM EBCDIC (Cyrillic Serbian-Bulgarian), koi8-u: Cyrillic (KOI8-U), iso- 8859-1: Western European (ISO), iso-8859-2: Central European (ISO), iso-8859-3: Latin 3 (ISO), iso-8859-4: Baltic (ISO), iso-8859-5: Cyrillic (ISO), iso-8859-6: Arabic (ISO), iso- 8859-7: Greek (ISO), iso-8859- 8: Hebrew (ISO-Visual), iso- 8859-9: Turkish (ISO), iso- 8859-13: Estonian (ISO), iso- 8859-15: Latin 9 (ISO), x- Europa: Europa, iso-8859-8-i: Hebrew (ISO-Logical), iso- 2022-jp: Japanese (JIS), csISO2022JP: Japanese (JIS- Allow 1 byte Kana), iso-2022- jp: Japanese (JIS-Allow 1 byte Kana - SO/SI), iso-2022-kr: Korean (ISO), x-cp50227: Chinese Simplified (ISO-2022), euc-jp: Japanese (EUC), EUC- CN: Chinese Simplified (EUC), euc-kr: Korean (EUC), hz-gb- 2312: Chinese Simplified (HZ), GB18030: Chinese Simplified (GB18030), x-iscii-de: ISCII		

Argument	Optional	Accepts	Default Value	Description
		Devanagari, x-iscii-be: ISCII Bengali, x-iscii-ta: ISCII Tamil, x-iscii-te: ISCII Telugu, x-iscii-as: ISCII Assamese, x-iscii-or: ISCII Oriya, x-iscii-ka: ISCII Kannada, x-iscii-ma: ISCII Malayalam, x-iscii-gu: ISCII Gujarati, x-iscii-pa: ISCII Punjabi, utf-7: Unicode (UTF-7), utf-8: Unicode (UTF-8)		
Accept untrusted certificates	N/A	Boolean value	False	Specify whether untrusted certificates will be accepted
HTTP Authentication	N/A	Boolean value	False	Specify whether the web server requires authentication. This property refers to HTTP authentication (that is, when the browser displays a popup window asking for user name and password)
User name	No	Text value		The user name for the web server
Password	No	Direct encrypted input or Text value		The password for the web server

## Variables produced

Argument	Type	Description
WebServiceResponseHeaders	List of Text values	The HTTP headers of the response

Argument	Type	Description
DownloadedFile	File	The downloaded file
WebServiceResponse	Text value	The web service response text
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Invoke web service error	Indicates a problem invoking the web service
Directory doesn't exist	Indicates that a required directory doesn't exist
Invalid header in custom headers	Indicates that some custom headers were invalid

## Known issues

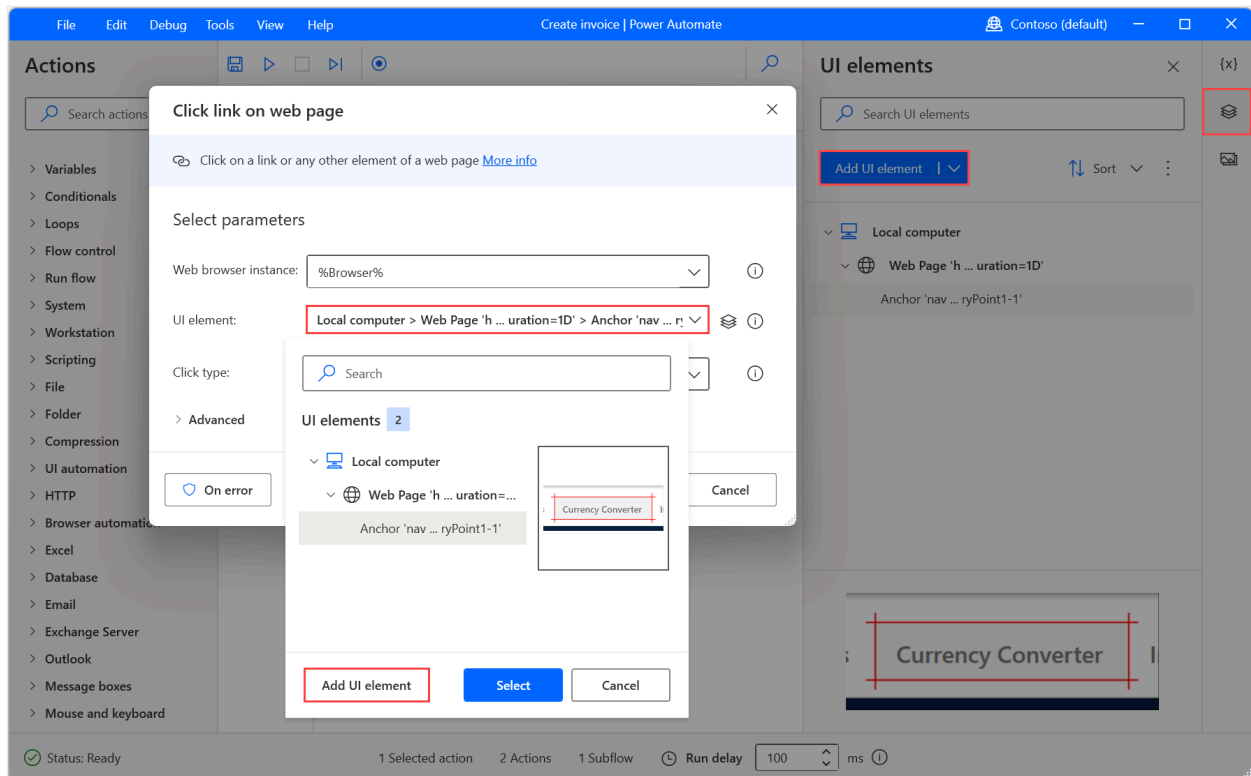
- NTLM Authentication is currently not supported for web requests in Power Automate for desktop.

# Browser automation actions

Article • 04/09/2024

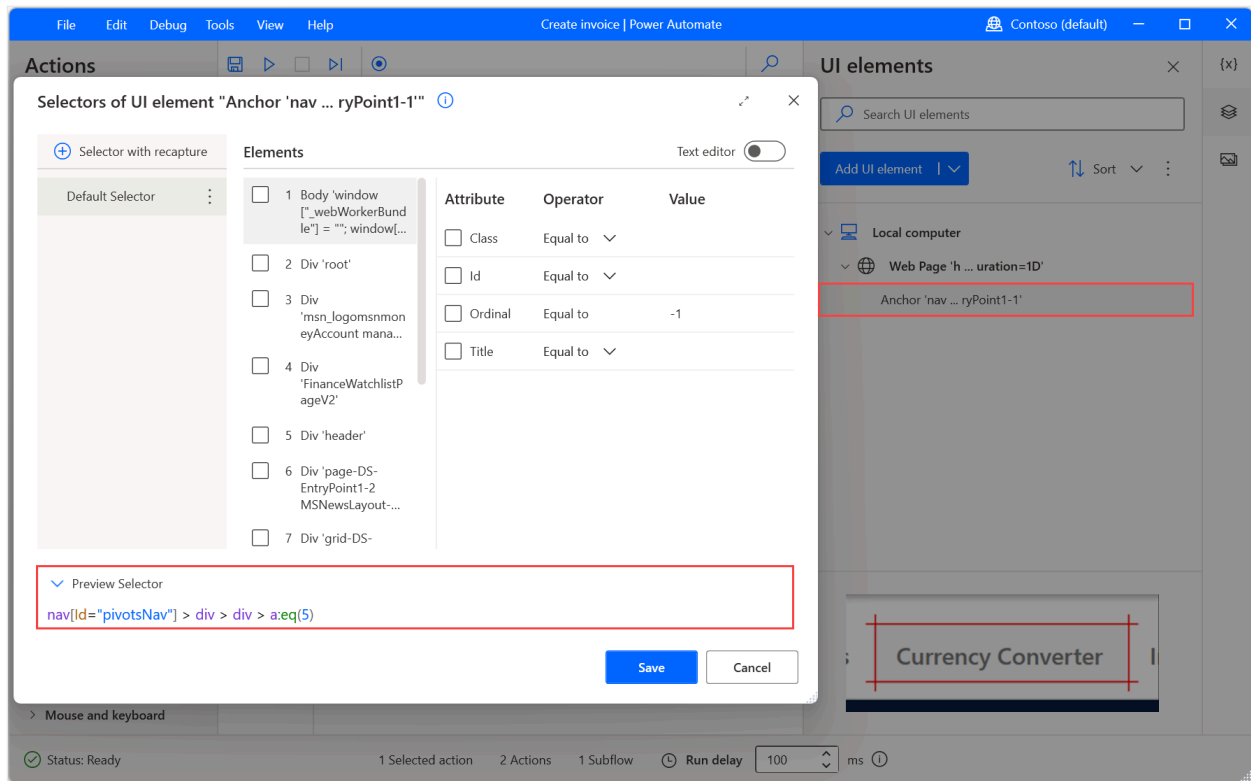
Browser automation actions enable users to interact with web applications and components through UI elements. Web UI elements, also called Web elements, describe uniquely the web components that the action is going to handle.

To add a new UI element, select **Add UI element** through the deployed browser automation action or the UI elements pane of the flow designer.

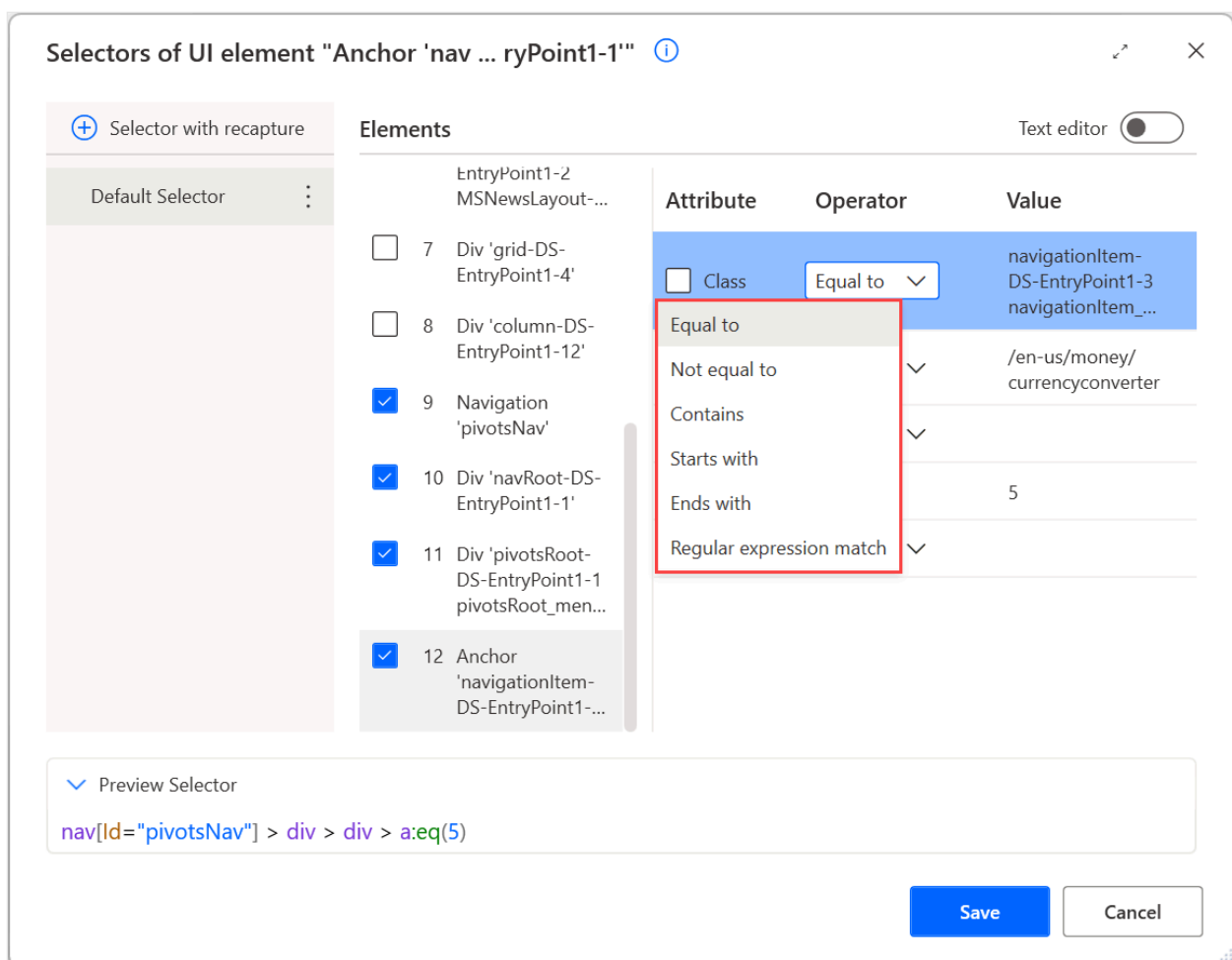


All web-related UI elements are specified by one or more CSS selectors - web selectors - that pinpoint the hierarchical structure of the component on the page. Selectors use the > notation to indicate that each element is contained within the element on its left.

Although web selectors are created automatically when adding UI elements, some particular scenarios need manually created selectors. When a custom web selector is needed, you can create your own by either editing an existing selector or building one from scratch.



To develop more dynamic web flows, replace the **Equals to** operators with other operators or regular expressions. Additionally, if the value of a web selector's attribute depends on the results of previous actions, use variables instead of hard-coded values.



### ⓘ Note

To find more information about developing web flows and creating custom web selectors for Web elements, go to [Automate web flows](#) and [Build a custom selector](#).

## Extract data from web page

Extract data from specific parts of a web page in the form of single values, lists, rows, or tables.

For more information on how to use this action, go to [Web data extraction](#).

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to extract data from
Extraction parameters	No	<a href="#">Datatable</a>		The parameters to use when extracting data. Depending on the extraction mode, this parameter accepts different data.
Max web pages to process	No	<a href="#">Numeric value</a>		The maximum number of web pages to process
Send physical click for next page	N/A	<a href="#">Boolean value</a>	False	Specify whether to physically move the mouse cursor over the page prior to clicking. A physical click is required for cases where emulated clicks to the page don't perform the intentional action on the element. As this option requires the browser window to be focused, it will automatically bring it to the foreground.

Argument	Optional	Accepts	Default Value	Description
Page CSS selector	No	<a href="#">Text value</a>		The page CSS selector
Extraction mode	N/A	Undefined, Single value, Handpicked values, List, Table, Entire HTML table	Single value	Specify what to extract from the web page
Use paging	N/A	<a href="#">Boolean value</a>	False	Specify whether to use paging
Get all web pages	N/A	<a href="#">Boolean value</a>	False	Specify whether to get all web pages
Process data upon extraction	N/A	<a href="#">Boolean value</a>	False	Specify whether to process extracted data to present them exactly as displayed in the webpage. Processing of extracted data includes displaying of the information nested in iframes and filtering through hidden or visible elements. For larger datasets, having this option enabled isn't recommended as it will increase the extraction time.
Timeout	Yes	<a href="#">Numeric value</a>	60	Set the time in seconds that you want to wait for the extraction to be completed before the action fails
Store data mode	N/A	Variable, Excel spreadsheet	Variable	Specify whether to store the extracted data in a variable or an Excel spreadsheet

## Variables produced

 [Expand table](#)

Argument	Type	Description
ExcelInstance	<a href="#">Excel instance</a>	The Excel instance with the extracted data. Use this instance to manipulate the spreadsheet (or save and close it) by using the dedicated Excel actions.
DataFromWebPage	<a href="#">Datatable</a>	The extracted data in the form of a single value, list, data row, or data table.

# Exceptions

[Expand table](#)

Exception	Description
Failed to extract data	Indicates a problem extracting data
Failed to launch Excel instance	Indicates a problem launching an Excel instance
Failed to write values to Excel	Indicates a problem writing the values to an Excel

# Get details of web page

Get a property of a web page, such as its title or its source text.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
Get	N/A	Web page description, Web page meta keywords, Web page title, Web page text, Web page source, Web browser's current URL address	Web page description	Select the information to retrieve from the web page

## Variables produced

[Expand table](#)

Argument	Type	Description
WebPageProperty	<a href="#">Text value</a>	The details retrieved from the web page

# Exceptions



[Expand table](#)

Exception	Description
Failed to get details of web page	Indicates a problem getting the details of the specified web page

## Get details of element on web page

Get the value of an element's attribute on a web page.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to get details from
Attribute name	No	<a href="#">Text value</a>	Own Text	Enter or select the attribute whose value to retrieve

### Variables produced

[Expand table](#)

Argument	Type	Description
AttributeValue	<a href="#">Text value</a>	The value of the web element's attribute

### Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve attribute of UI element on	Indicates a problem retrieving attribute of web

Exception	Description
web page	page element

## Take screenshot of web page

Take a screenshot of the web page (or an element of the web page) currently displayed in the browser and save the image into a file or to the clipboard.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
Capture	N/A	Entire web page, Specific element	Entire web page	Specify whether to capture the entire web page or only a specific element of it
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to capture
Save mode	N/A	Clipboard, File	Clipboard	Specify whether to save the image into a file or store it into the clipboard
Image file	No	<a href="#">File</a>		Set the full path for the file to save the image capture
File format	N/A	BMP, EMF, EXIF, GIF, JPG, PNG, TIFF, WMF	BMP	Select the format of the image file

### Variables produced

This action doesn't produce any variables.

### Exceptions

 Expand table

Exception	Description
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found
Failed to save file	Indicates a problem saving the specified file
Failed to save in the clipboard	Indicates a problem while saving to the clipboard
Failed to take screenshot	Indicates a problem taking a screenshot

## Focus text field on web page

Set the focus on an input element of a web page and scroll it into view.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to focus
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely before proceeding
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears

### Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found
Failed to set input focus on web page text field	Indicates a problem setting input focus on the specified web page text field

## Populate text field on web page

Fill a text field in a web page with the specified text.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the text field to populate
Text	No	Direct encrypted input or <a href="#">Text value</a>		Enter the text to fill in the text field
If field isn't empty	Yes	Replace text, Append text	Replace text	Specify whether to replace existing content, or to append.
Populate text using physical keystrokes	N/A	<a href="#">Boolean value</a>	False	Emulate using physical keystrokes when populating text to UI text field elements. Physical keystrokes are required for cases that emulated text population doesn't perform the intentional action on the element. As this option requires the

Argument	Optional	Accepts	Default Value	Description
				browser window to be focused, it will automatically bring it in the foreground.
Emulate typing	N/A	Boolean value	True	Specify whether to fill the text field at once by setting the value of the text box, or emulate a user typing by sending characters one by one. The latter method is slower, but required in some complex web pages.
Unfocus text box after filling it	N/A	Boolean value	False	Choose whether to unfocus the text box right after this action fills it with the specified text. If scraping autocompletion lists, this parameter should be set to <b>False</b> .
Wait for page to load	N/A	Boolean value	True	Specify whether to wait for the new web page to load completely after populating the text field
Timeout for webpage to load	No	Numeric value	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears after populating the text field
Dialog button to press	Yes	Text value	OK	Enter the dialog button to press if a pop-up dialog appears

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found

Exception	Description
Failed to write on text field	Indicates a problem writing to the specified text field

## Set check box state on web page

Check or uncheck a check box in a web form.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the check box to set the state of
Check box state	N/A	Checked, Unchecked	Checked	Select the check box state
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely after setting the check box state
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears after setting the check box state
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears

### Variables produced

This action doesn't produce any variables.

### Exceptions

 Expand table

Exception	Description
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found
Failed to set the state of the checkbox	Indicates a problem in setting the state of the specified check box

## Select radio button on web page

Select a radio button on the web page.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		The radio button to select
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely after selecting the radio button
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears after selecting the radio button
Dialog button to press	Yes	<a href="#">Text value</a>	OK	The dialog button to press if a pop-up dialog appears

### Variables produced

This action doesn't produce any variables.

# Exceptions

 Expand table

Exception	Description
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found
Failed to select radio button	Indicates a problem in selecting the specified radio button

## Set drop-down list value on web page

Set or clear the selected options for a drop-down list in a web form.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the drop-down list to set its value
Operation	N/A	Clear all options, Select options by name, Select options by index	Clear all options	Select whether to select a value or clear the selected value of the drop-down list
Option names	No	<a href="#">List of Text values</a>		Enter an option or a list of options to be selected in the drop-down list. Multiple options make sense only when working with multi-selection lists. If the list is single-selection, then only the first option of the list specified will be used.
Use regular expressions	N/A	<a href="#">Boolean value</a>	False	Specify whether the option names values to interpret as a regular expression



Argument	Optional	Accepts	Default Value	Description
Option indices	No	List of Numeric values		Enter an index or a list of indices to be selected in the drop-down list. Multiple options make sense only when working with multi-selection lists. If the list is single-selection, then only the first option of the list specified will be used.
Wait for page to load	N/A	Boolean value	True	Specify whether to wait for the new web page to load completely after setting the drop-down list value
Timeout for webpage load	No	Numeric value	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears after setting the drop-down list value
Dialog button to press	Yes	Text value	OK	Enter the dialog button to press if a pop-up dialog appears

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found
Failed to set the selected option	Indicates a problem setting the selected drop-down list option

## Press button on web page

Press a web page button.

# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the button to press
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely after pressing the button
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears after pressing the button
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found
Failed to click on web page button	Indicates a problem clicking the specified web page button

## If web page contains

Mark the beginning of a conditional block of actions, depending on whether a specific piece of text or element exists in a web page.

## Input parameters


 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
Check if web page	N/A	Contains element, Doesn't contain element, Contains text, Doesn't contain text	Contains element	Check whether a specific text or web page element exists in a web page
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to check for
Text	No	<a href="#">Text value</a>		Enter the text on web page to check for

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Failed to communicate with the browser	Indicates that an error with the browser occurred

## Wait for web page content

Suspend the flow until a specific piece of text or web page element appears or disappears from a web page.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
Wait for web page to	N/A	Contain element, Not contain element, Contain text, Not contain text	Contain element	Specify whether to wait for a specific text or web page element to appear or disappear in a web page
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to check for
Text	No	<a href="#">Text value</a>		Enter the text on web page to check for

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Wait for web page content failed	Indicates that the wait operation failed

## Launch new Internet Explorer

Launch a new instance or attach to a running instance of Internet Explorer for automating websites and web applications.

## Input parameters

[Expand table](#)

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Launch mode	N/A	Launch automation browser, Launch new Internet Explorer, Attach to running Internet Explorer	Launch automation browser	Specify whether to launch the automation browser or a new instance of Internet Explorer or attach to an existing one
Attach to Internet Explorer tab	N/A	By title, By URL, Use foreground window	By title	Specify whether to attach to an Internet Explorer tab by its title, URL, or attach to the active tab of Internet Explorer running as the foreground window
Initial URL	No	<a href="#">Text value</a>		Enter the URL of the web site to visit when the web browser is launched
Tab title	No	<a href="#">Text value</a>		Enter the title (or part of it) of the Internet Explorer tab to attach to
Tab URL	No	<a href="#">Text value</a>		Enter the URL (or part of it) of the Internet Explorer tab to attach to
Window state	N/A	Normal, Maximized, Minimized	Normal	Specify whether to launch the browser window in normal, minimized, or maximized state
Clear cache	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear the entire cache of the web browser right after launching it
Clear cookies	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear all stored cookies in the web browser right after launching it
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely before proceeding
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears while loading the initial web page

Argument	Optional	Accepts	Default Value	Description
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears
Custom user agent string	Yes	<a href="#">Text value</a>		Specify the custom user agent string for the runtime web helper. If this field remains empty, the runtime web helper uses by default the user agent string of Internet Explorer installed on the machine.

### ⓘ Note

The **Clear cache** and **Clear cookies** options only work as intended if **running in protected mode** is disabled in the **Internet options** menu.

## Variables produced

[Expand table](#)

Argument	Type	Description
InternetExplorer	<a href="#">Web browser instance</a>	The Internet Explorer instance to use with browser automation actions

## Exceptions

[Expand table](#)

Exception	Description
Failed to launch Internet Explorer	Indicates a problem launching Internet Explorer
Invalid URL	Indicates that the provided URL was invalid

## Launch new Firefox

Launch a new instance or attach to a running instance of Firefox for automating websites and web applications.

# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Launch mode	N/A	Launch new Instance, Attach to running instance	Launch new Instance	Specify whether to launch a new instance of Firefox or attach to an existing one
Attach to Firefox tab	N/A	By title, By URL, Use foreground window	By title	Specify whether to attach to a Firefox tab by its title, URL, or attach to the active tab of Firefox running as the foreground window
Initial URL	No	<a href="#">Text value</a>		Enter the URL of the web site to visit when the web browser is launched
Tab title	No	<a href="#">Text value</a>		Enter the title (or part of it) of the Firefox tab to attach to
Tab URL	No	<a href="#">Text value</a>		Enter the URL (or part of it) of the Firefox tab to attach to
Window state	N/A	Normal, Maximized, Minimized	Normal	Specify whether to launch the browser window in normal, minimized, or maximized state
Clear cache	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear the entire cache of the web browser right after launching it
Clear cookies	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear all stored cookies in the web browser right after launching it
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely before proceeding
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears while loading the initial web page

Argument	Optional	Accepts	Default Value	Description
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears
Timeout	No	<a href="#">Numeric value</a>	60	Set the time in seconds that you want to wait for the browser to be launched before the action fails
User data folder	N/A	Picture-in-Picture default, Browser default, Custom	Picture-in-Picture default	Specify the user data folder the browser uses when the flow runs in Picture-in-Picture. If Browser default is selected, the browser can't be opened on both the desktop and in Picture-in-Picture at the same time. <a href="#">Learn more</a>
User data folder path	No	<a href="#">Folder</a>		Specify the path of the user data folder the browser uses when the flow runs in Picture-in-Picture. <a href="#">Learn more</a>

## Variables produced

[Expand table](#)

Argument	Type	Description
Browser	<a href="#">Web browser instance</a>	The Firefox instance to use with browser automation actions

## Exceptions

[Expand table](#)

Exception	Description
Failed to launch Firefox	Indicates a problem launching Firefox
Invalid URL	Indicates that the provided URL was invalid

## Launch new Chrome

Launch a new instance or attach to a running instance of Chrome for automating websites and web applications.



# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Launch mode	N/A	Launch new Instance, Attach to running instance	Launch new Instance	Specify whether to launch a new instance of Chrome or attach to an existing one
Attach to Chrome tab	N/A	By title, By URL, Use foreground window	By title	Specify whether to attach to a Chrome tab by its title, URL, or attach to the active tab of Chrome running as the foreground window
Initial URL	No	<a href="#">Text value</a>		Enter the URL of the web site to visit when the web browser is launched
Tab title	No	<a href="#">Text value</a>		Enter the title (or part of it) of the Chrome tab to attach to
Tab URL	No	<a href="#">Text value</a>		Enter the URL (or part of it) of the Chrome tab to attach to
Window state	N/A	Normal, Maximized, Minimized	Normal	Specify whether to launch the browser window in normal, minimized, or maximized state
Clear cache	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear the entire cache of the web browser right after launching it
Clear cookies	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear all stored cookies in the web browser right after launching it
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely before proceeding
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears while loading the initial web page

Argument	Optional	Accepts	Default Value	Description
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears
Timeout	No	<a href="#">Numeric value</a>	60	Set the time in seconds that you want to wait for the browser to be opened before the action fails
User data folder	N/A	Picture-in-Picture default, Browser default, Custom	Picture-in-Picture default	Specify the user data folder the browser uses when the flow runs in Picture-in-Picture. If Browser default is selected, the browser can't be opened on both the desktop and in Picture-in-Picture at the same time. <a href="#">Learn more</a>
User data folder path	No	<a href="#">Folder</a>		Specify the path of the user data folder the browser will use when the flow runs in Picture-in-Picture. <a href="#">Learn more</a>

## Variables produced

[Expand table](#)

Argument	Type	Description
Browser	<a href="#">Web browser instance</a>	The Chrome instance to use with browser automation actions

## Exceptions

[Expand table](#)

Exception	Description
Failed to launch Chrome	Indicates a problem launching Chrome
Invalid URL	Indicates that the provided URL was invalid

## Launch new Microsoft Edge

Launch a new instance or attach to a running instance of Microsoft Edge for automating websites and web applications.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Launch mode	N/A	Launch new Instance, Attach to running instance	Launch new Instance	Specify whether to launch a new instance of Microsoft Edge or attach to an existing one
Attach to Microsoft Edge tab	N/A	By title, By URL, Use foreground window	By title	Specify whether to attach to a Microsoft Edge tab by its title, URL, or attach to the active tab of Microsoft Edge running as the foreground window
Initial URL	No	<a href="#">Text value</a>		Enter the URL of the web site to visit when the web browser is launched
Tab title	No	<a href="#">Text value</a>		Enter the title (or part of it) of the Microsoft Edge tab to attach to
Tab URL	No	<a href="#">Text value</a>		Enter the URL (or part of it) of the Microsoft Edge tab to attach to
Window state	N/A	Normal, Maximized, Minimized	Normal	Specify whether to launch the browser window in normal, minimized, or maximized state
Clear cache	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear the entire cache of the web browser right after launching it
Clear cookies	N/A	<a href="#">Boolean value</a>	False	Specify whether to clear all stored cookies in the web browser right after launching it
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely before proceeding
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error

Argument	Optional	Accepts	Default Value	Description
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears while loading the initial web page
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears
Timeout	No	<a href="#">Numeric value</a>	60	Set the time in seconds that you want to wait for the browser to be launched before the action fails
User data folder	N/A	Picture-in-Picture default, Browser default, Custom	Picture-in-Picture default	Specify the user data folder the browser uses when the flow runs in Picture-in-Picture. If Browser default is selected, the browser can't be opened on both the desktop and in Picture-in-Picture at the same time. <a href="#">Learn more</a>
User data folder path	No	<a href="#">Folder</a>		Specify the path of the user data folder the browser uses when the flow runs in Picture-in-Picture. <a href="#">Learn more</a>

## Variables produced

[Expand table](#)

Argument	Type	Description
Browser	<a href="#">Web browser instance</a>	The Microsoft Edge instance to use with browser automation actions

## Exceptions

[Expand table](#)

Exception	Description
Failed to launch Microsoft Edge	Indicates a problem launching Microsoft Edge
Invalid URL	Indicates that the provided URL was invalid

# Create new tab

Create a new tab and navigate to the given URL (supported in Microsoft Edge, Chrome, and Firefox).

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
URL to navigate to	No	<a href="#">Text value</a>		Enter the URL, or a variable containing the URL, to navigate to
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the new web page to load completely before proceeding
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears while loading the web page
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears

## Variables produced

 Expand table

Argument	Type	Description
NewBrowser	<a href="#">Web browser instance</a>	The new web browser instance to use with browser automation actions

## Exceptions

 Expand table

Exception	Description
Invalid URL	Indicates that the provided URL was invalid
Failed to create a new tab	Indicates a problem creating a new tab

## Go to web page

Navigate the web browser to a new page.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
Navigate	N/A	To URL, Back, Forward, Reload web page	To URL	Specify where to navigate to
URL	No	<a href="#">Text value</a>		Enter the URL to navigate to
Wait for page to load	N/A	<a href="#">Boolean value</a>	True	Specify whether to wait for the web page to load completely before proceeding
Timeout for webpage to load	No	<a href="#">Numeric value</a>	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears while loading the web page
Dialog button to press	Yes	<a href="#">Text value</a>	OK	Enter the dialog button to press if a pop-up dialog appears

### Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to navigate to web page	Indicates a problem navigating to the specified web page
Invalid URL	Indicates that the provided URL was invalid

## Click link on web page

Click on a link or any other element of a web page.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to click
Click type	N/A	Left click, Right click, Double click, Left button down, Left button up, Right button down, Right button up, Middle click	Left click	The kind of click to perform
Send physical click	N/A	<a href="#">Boolean value</a>	False	Specify whether to physically move the mouse cursor over the element prior to clicking. A physical click is required for cases where emulated clicks don't perform the intentional action on the element. As this option requires the browser window to be focused, it will

Argument	Optional	Accepts	Default Value	Description
				automatically bring it to the foreground.
Wait for page to load	N/A	Boolean value	True	Specify whether to wait for the new web page to load completely after clicking the link
Timeout for webpage to load	No	Numeric value	60	Set the time in seconds for page to load before the action throws an error
If a pop-up dialog appears	N/A	Close it, Press a button, Do nothing	Do nothing	Specify what to do if a pop-up dialog appears after clicking the link
Dialog button to press	Yes	Text value	OK	Enter the dialog button to press if a pop-up dialog appears

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found
Failed to click UI element	Indicates a problem clicking the specified element

## Click download link on web page

Click on a link in a web page that results in downloading a file.

## Input parameters

[Expand table](#)



Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to click
Destination folder	No	<a href="#">Folder</a>		Enter or choose the full path of the folder, or a variable containing the folder, to save the downloaded file to

## Variables produced

[Expand table](#)

Argument	Type	Description
DownloadedFile	<a href="#">File</a>	The file on the disk where the download is saved. This value is a filepath that consists of the download folder as specified above plus the name of the file as provided by the web server.


## Exceptions

[Expand table](#)

Exception	Description
Failed to download file	Indicates a problem downloading the specified file
Element with specified CSS selector not found	Indicates that a web page element with the specified CSS selector wasn't found
Failed to click UI element	Indicates a problem clicking the specified element
Failed to save file	Indicates a problem saving the specified file

## Run JavaScript function on web page

Run a JavaScript function on the web page and get the returned result.

 **Note**

The migration to the Manifest V3 browser extensions affects this action. To find more information about Manifest V3 and how it affect the **Run JavaScript function on web page** action, go to [Migration to Manifest V3](#).

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
JavaScript function	Yes	<a href="#">Text value</a>	<code>function ExecuteScript() { /*your code here, return something (optionally); */ }</code>	Enter the JavaScript function to run on the web page

## Variables produced

 Expand table

Argument	Type	Description
Result	<a href="#">Text value</a>	The result of the JavaScript function that ran

## Exceptions

 Expand table

Exception	Description
Failed to run JavaScript	Indicates a problem running JavaScript

# Hover mouse over element on web page

Hover the mouse over an element of a web page.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to work with
UI element	No	<a href="#">UI element</a>		Select the UI element on web page to hover
Move mouse to hover	No	<a href="#">Boolean value</a>	False	Specify whether to physically move the mouse cursor over the element in order to hover the UI element. A physical hover is required for cases where emulated hover doesn't perform the intentional action on the element. As this option requires the browser window to be focused, it automatically brings it to the foreground.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to hover over element	Indicates a problem hovering over the specified element

## Close web browser

Close a web browser window.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Web browser instance	No	<a href="#">Web browser instance</a>		Enter or choose the variable that contains the web browser instance to close

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

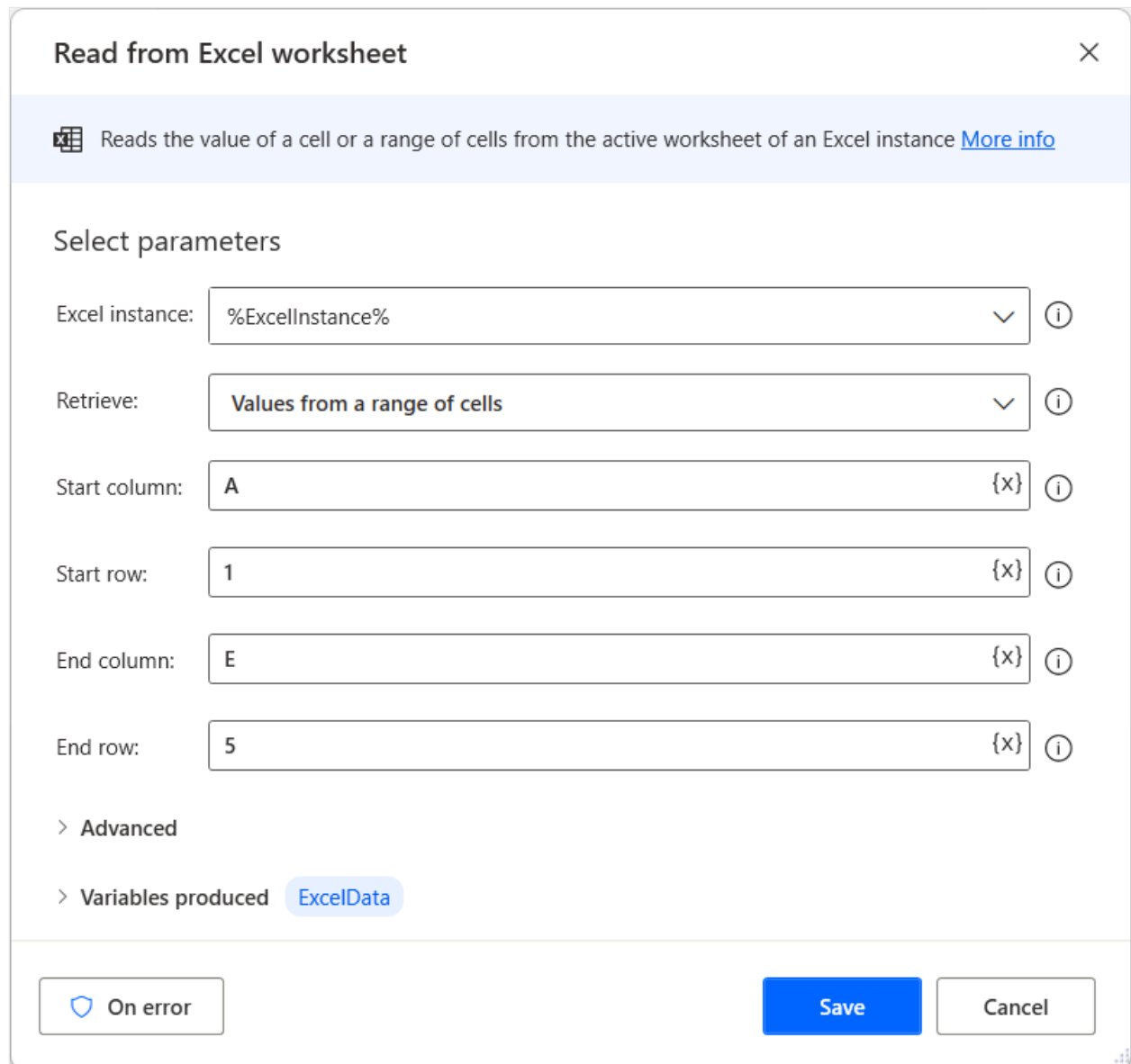
Exception	Description
Failed to close the web browser	Indicates a problem closing the web browser

# Excel actions

Article • 07/17/2024

After setting an Excel instance, either with the **Launch Excel** or the **Attach to running Excel** action, you can further handle your Excel worksheets.

To read and extract data from an Excel document, use the **Read from Excel worksheet** action. You can retrieve the value of a single cell or a data table. The following example reads the cells A1 through E5:



The screenshot shows a configuration window titled "Read from Excel worksheet" with a close button (X) in the top right corner. Below the title bar, there is a description: "Reads the value of a cell or a range of cells from the active worksheet of an Excel instance" followed by a "More info" link. The main section is titled "Select parameters" and contains several input fields:

- Excel instance:** A dropdown menu with the value "%ExcelInstance%" and an information icon (i).
- Retrieve:** A dropdown menu with the value "Values from a range of cells" and an information icon (i).
- Start column:** A text input field with the value "A" and a refresh icon (x).
- Start row:** A text input field with the value "1" and a refresh icon (x).
- End column:** A text input field with the value "E" and a refresh icon (x).
- End row:** A text input field with the value "5" and a refresh icon (x).

Below the input fields, there are two expandable sections:

- > Advanced**
- > Variables produced** with a blue pill-shaped button labeled "ExcelData".

At the bottom of the dialog, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

When the flow runs, the action stores the data in a data table variable:

**Variable value** ✕

**ExcelData** (Datatable)


#	Column1	Column2	Column3	Column4	Column5
0	Aberehet	Gebre Tsadik	Tigrinya	Female	ኣብርኅት ገብረ ዳዳቅ
1	Abreham	Wolday	Tigrinya	Male	ኣብርኅም ወልደይ
2	Hiwot	Gebre Gergis	Tigrinya	Female	ሂወት ገብረ ገርገስ
3	Ondrej	Novak	Slovak	Male	Ondrej Novák
4	Chaiyond	Thammanon	Thai	Male	ไชยยนต์ ธรรมานนท์

**Close**

To write data to an Excel spreadsheet, use the **Write to Excel worksheet** action. This action can write any static data or variable to a specified cell or multiple cells in an Excel worksheet.

The following example writes the previously mentioned data table to cell A51:

**Write to Excel worksheet** ✕

 Writes a value into a cell or a range of cells of an Excel instance [More info](#)

**Select parameters**

Excel instance:  ⓘ

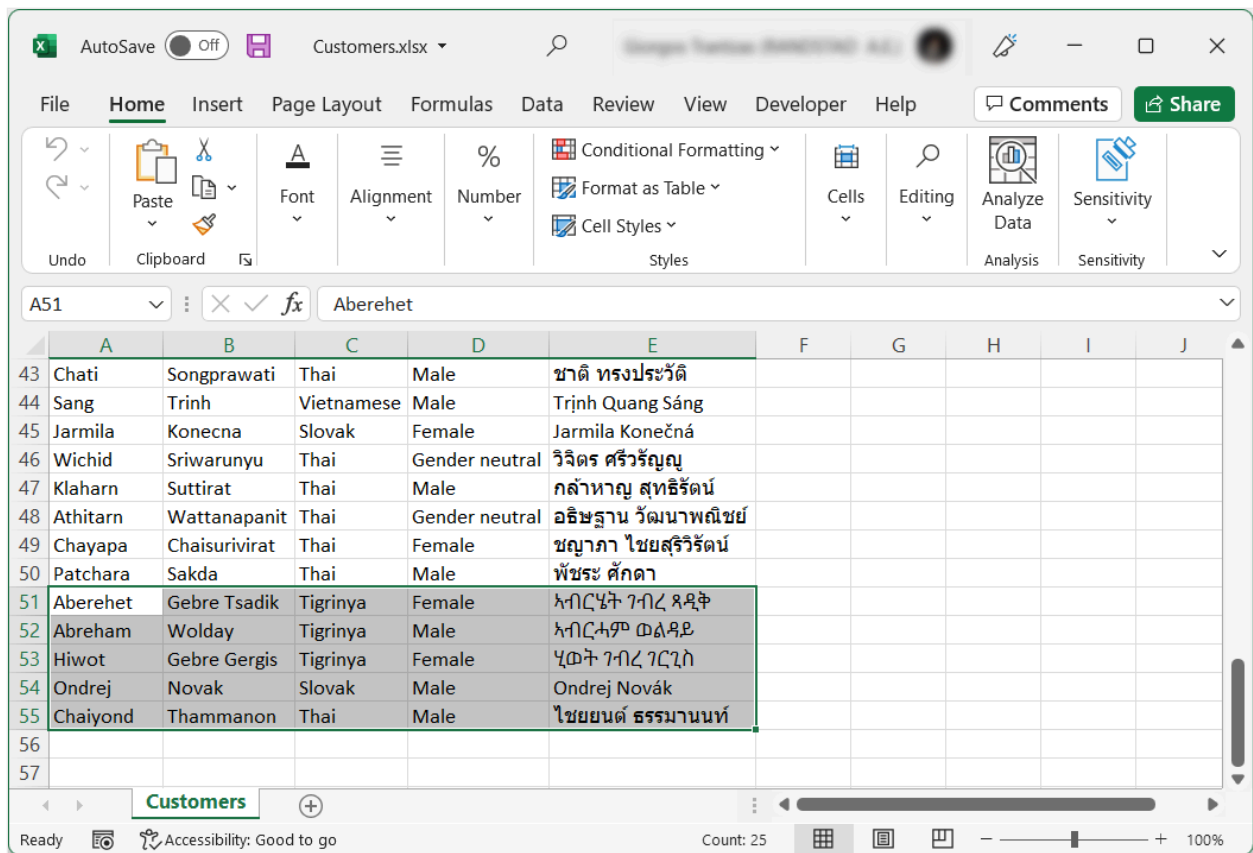
Value to write:  {x} ⓘ

Write mode:  ⓘ

Column:  {x} ⓘ

Row:  {x} ⓘ

Each cell in the data table populates the corresponding cell in the workbook. The result is that the A51 to E55 cell range is filled with the contents of the data table.



## Resize columns/rows in Excel worksheet

Resizes a selection of columns or rows in the active worksheet of an Excel instance.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify the Excel instance. This variable must have been previously specified in a Launch Excel action.
Resize target	N/A	Column, Row	Column	Specify whether to resize columns or rows
Selection range	N/A	Single, Range, All available	Single	Specify whether to select a single column/row, a range of columns/rows or all the available columns/rows in the active worksheet
Column	No	<a href="#">Text value</a>		The column's index number or letter. Column numbering starts from index 1.

Argument	Optional	Accepts	Default Value	Description
Start column	No	Text value		The index or letter of the first column. Column numbering starts from index 1.
End column	No	Text value		The index or letter of the last column. Column numbering starts from index 1.
Row	No	Numeric value		The row's index number. The numbering starts from 1.
Start row	No	Numeric value		The index or the first row. The numbering starts from 1.
End row	No	Numeric value		The index or the last row. The numbering starts from 1.
Resize type	N/A	Autofit, Custom size	Autofit	Specify whether to autofit selected columns/rows or set a custom size
Width	No	Numeric value		The width of the selected columns
Height	No	Numeric value		The height of the selected rows

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to resize columns/rows	Indicates a problem while resizing columns/rows

## Run Excel macro

Runs a specified macro on the document of an Excel instance.

## Input parameters



[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Macro	No	<a href="#">Text value</a>		The macro to run. The text should consist of the name of the macro, followed by any arguments (optional), all separated by semicolons.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to run macro	Indicates a problem running the specified macro

## Get active Excel worksheet

Retrieves an Excel document's active worksheet.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.

## Variables produced

[Expand table](#)

Argument	Type	Description
SheetName	<a href="#">Text value</a>	The name of the active worksheet
SheetIndex	<a href="#">Numeric value</a>	The index of the active worksheet

## Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve active worksheet	Indicates a problem retrieving the active worksheet

## Get all Excel worksheets

Retrieves all worksheet names of an Excel document.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify the Excel instance. This variable must have been previously specified in a Launch Excel action.

## Variables produced

[Expand table](#)

Argument	Type	Description
SheetNames	<a href="#">List of Text values</a>	The names of all worksheets

## Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve all worksheet names	Indicates a problem retrieving the names of the Excel worksheet

## Delete Excel worksheet

Deletes a specific worksheet from an Excel instance.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Delete worksheet with	N/A	Index, Name	Name	Whether to find the worksheet by name or index
Worksheet index	No	<a href="#">Numeric value</a>		The Index number of the worksheet to delete. The numbering starts from 1, meaning that the index of the first worksheet is 1, the second is 2, and so on.
Worksheet name	No	<a href="#">Text value</a>		The name of the worksheet to delete

### Variables produced

This action doesn't produce any variables.

### Exceptions

[Expand table](#)

Exception	Description
Can't find worksheet	Indicates that a worksheet with the specified name couldn't be found
Failed to delete worksheet	Indicates a problem deleting the specified worksheet

## Rename Excel worksheet

Renames a specific worksheet of an Excel instance.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify the Excel instance. This variable must have been previously specified in a Launch Excel action.
Rename worksheet with	N/A	Index, Name	Name	Specify whether to find the worksheet by name or index
Worksheet index	No	<a href="#">Numeric value</a>		The index of the worksheet to rename. The numbering starts from 1, meaning that the index of the first worksheet is 1, the second is 2, and so on.
Worksheet name	No	<a href="#">Text value</a>		The name of the worksheet to rename
Worksheet new name	No	<a href="#">Text value</a>		The new name of the worksheet

### Variables produced

This action doesn't produce any variables.

### Exceptions

[Expand table](#)

Exception	Description
Can't find worksheet	Indicates that a worksheet with the specified name couldn't be found
Failed to rename worksheet	Indicates a problem renaming the specified worksheet

## Copy Excel worksheet

Copies a worksheet from an Excel document and paste it to the Excel document of the same or different Excel instance.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must be specified in a Launch Excel action.
Copy worksheet with	N/A	Index, Name	Name	Specify whether to find the worksheet by name or index
Worksheet index	No	<a href="#">Numeric value</a>		The index of the worksheet to copy. The numbering starts from 1, meaning that the index of the first worksheet is 1, the second is 2, and so on.
Worksheet name	No	<a href="#">Text value</a>		The name of the worksheet to copy.
Target Excel instance	No	<a href="#">Excel instance</a>		The Excel instance of the target file. This variable must be specified in a Launch Excel action.
Worksheet new name	No	<a href="#">Text value</a>		The new name of the worksheet
Paste worksheet as	N/A	First worksheet, Last worksheet	First worksheet	Specify whether the copied Excel worksheet will be added before or after the existing worksheets

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Failed to copy worksheet	Indicates a problem when copying a worksheet in Excel
Can't copy worksheet with this name	Indicates a problem when trying to set the sheet name after copying

## Activate cell in Excel worksheet

Activate a cell in the active worksheet of an Excel instance, by providing column, row, and offset.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify the Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Activate	N/A	Absolutely specified cell, Relatively specified cell	Absolutely specified cell	Select whether to specify the cell to activate absolutely, or relatively, by using an offset distance being the number of cells between the currently activated reference cell and the actual cell activate.
Column	No	<a href="#">Text value</a>		The numeric value or letter of the cell column.
Direction	N/A	Left, Right, Above, Below	Left	Select offset direction. Select where to look for the cell to activate based

Argument	Optional	Accepts	Default Value	Description
				on the position of the currently active cell.
Offset from active cell	No	Numeric value		The distance in cells between the currently active cell and the desired cell. The numbering starts from 0.
Row	No	Numeric value		The numeric value of the cell row. The numbering starts from 1.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to activate cell	Indicates a problem activating an Excel cell

## Select cells in Excel worksheet

Selects a range of cells in the active worksheet of an Excel instance.

You have three options when it comes to retrieving a range of cells through Excel with the **Select cells in Excel worksheet** action. To begin you need a valid **Excel instance**, which you can create by using the **Launch Excel** action and providing the respective inputs.

- To select a **range of cells** by explicitly providing the coordinates of the range, select the option **Range of cells** in the **Select** property and then provide a range by inputting the number or letter of the cells defining its start and end in the following properties: **Start column**, **Start row**, **End column**, **End row**.
- To select a **range of cells**, relative to the currently active cell, first select the option **Range of cells relative to active cell** in the **Select** property. Then define the direction in the X and Y axis based on the position of the currently active cell, as well as the offset from the active cell in the two axes by modifying the properties **X-axis direction**, **X-axis offset**, **Y-axis direction** and **Y-axis offset**.

- To select a range of cells using the range's name, select the option **Names cells** in the property **Select**.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Select	N/A	Absolutely specified cell, Relatively specified cell	Absolutely specified cell	Specify whether to select an explicitly specified range of cells or a range of cells relative to the currently active cell.
X Axis Direction	N/A	Left, Right	Left	The X-axis offset direction. Where to look along the horizontal axis, based on currently activated cell's position.
Start column	No	<a href="#">Text value</a>		The index or letter of the first column.
X Offset	No	<a href="#">Numeric value</a>		The X-axis offset.
Start row	No	<a href="#">Numeric value</a>		The first row number. The numbering starts from 1.
End column	No	<a href="#">Text value</a>		The index or letter of the last column.
Y Axis Direction	N/A	Above, Below	Above	The Y-axis offset direction. Where to look along the vertical axis, based on the position of the currently active cell.
End row	No	<a href="#">Numeric value</a>		The last row number. The numbering starts from 1.
Y Offset	No	<a href="#">Numeric value</a>		The Y-axis offset.

## Variables produced



This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to select cells	Indicates a problem selecting the specified cells

## Get selected cell range from Excel worksheet

Retrieve the selected range of cells in a structure consisting of first column, first row, last column, and last row.

### Input parameters

[Expand table](#)


Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.

### Variables produced

[Expand table](#)

Argument	Type	Description
FirstColumnIndex	<a href="#">Numeric value</a>	The numeric value of the range's first column
FirstRowIndex	<a href="#">Numeric value</a>	The numeric value of the range's first row
LastColumnIndex	<a href="#">Numeric value</a>	The numeric value of the range's last column
LastRowIndex	<a href="#">Numeric value</a>	The numeric value of the range's last row

## Exceptions

 Expand table

Exception	Description
Failed to retrieve the selected range of cells	Indicates a problem retrieving the selected range of cells

## Copy cells from Excel worksheet

Copies a range of cells from the active worksheet of an Excel instance.

### Input parameters


 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Copy mode	N/A	Single Cell's Values, Values from a Range of Cells, Values from Selection	Single Cell's Values	Specify whether to copy a single cell, a range of cells or the current selection of cells
Start column	No	<a href="#">Text value</a>		The index or letter of the first column
Start row	No	<a href="#">Numeric value</a>		The index of the first row
End column	No	<a href="#">Text value</a>		The index or letter of the last column
End row	No	<a href="#">Numeric value</a>		The index of the last row

### Variables produced

This action doesn't produce any variables.

### Exceptions

 Expand table

Exception	Description
Failed to copy cells	Indicates a problem copying the cells from the Excel document

## Paste cells to Excel worksheet

Pastes a range of cells to the active worksheet of an Excel instance.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify the Excel instance. This variable must have been previously specified in a Launch Excel action.
Paste mode	N/A	On specified cell, On currently active cell	On specified cell	Specify whether to paste on a specified cell or the currently active cell
Column	No	<a href="#">Text value</a>		The index or letter of the cell column
Row	No	<a href="#">Numeric value</a>		The row number

### Variables produced

This action doesn't produce any variables.

### Exceptions

 Expand table

Exception	Description
Failed to paste cells	Indicates a problem pasting the specified cells

## Delete from Excel worksheet

Deletes a cell or a range of cells from the active worksheet of an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Retrieve	N/A	The value of a single cell, Values from a range of cells	The value of a single cell	Whether to delete a single cell or a table from a range of cells
Start column	No	<a href="#">Text value</a>		The cell column (single cell's value) or first column as a numeric value or a letter
Start row	No	<a href="#">Numeric value</a>		The cell row (single cell's value) or first row number
End column	No	<a href="#">Text value</a>		The last column as a numeric value or a letter
End row	No	<a href="#">Numeric value</a>		The last row number
Shift direction	N/A	Left, Up	Left	The shift direction

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to delete cells	Indicates a problem deleting the specified cells

# Insert row to Excel worksheet

Inserts a row above a selected row of an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Row index	No	<a href="#">Numeric value</a>		The index of the row to add a new row above. The numbering starts from 1.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Can't find row	Indicates that a row with the specified index couldn't be found
Failed to insert row	Indicates a problem inserting a row at the specified Excel instance

# Delete row from Excel worksheet

Deletes a selected row from an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance. This variable must have been previously specified in a Launch Excel action.
Delete row	No	<a href="#">Numeric value</a>		The Index number of the row to delete. The numbering starts from 1.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Can't find row	Indicates that a row with the specified index couldn't be found
Failed to delete row	Indicates a problem deleting the specified row

## Insert column to Excel worksheet

Inserts a column to the left of a selected column of an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Column	No	<a href="#">Text value</a>		The column's index number or letter. A new column will appear on the left side of the column indicated.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Can't find column	Indicates that a column with the specified name couldn't be found
Failed to insert column	Indicates a problem inserting a column at the specified Excel instance

## Delete column from Excel worksheet

Deletes a selected column from an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Delete column	No	<a href="#">Text value</a>		The index number or letter of the column to delete.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Can't find column	Indicates that a column with the specified name couldn't be found
Failed to delete column	Indicates a problem deleting the specified column

## Find and replace cells in Excel worksheet

Finds text and replaces it with another in the active worksheet of an Excel instance.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Search mode	N/A	Find, Find and replace	Find	The mode to search with
All matches	N/A	<a href="#">Boolean value</a>	False	Whether to find/replace text in all the matching cells found or in the first matching cell only
Text to find	No	<a href="#">Text value</a>		The text to find in the worksheet
Text to replace with	No	<a href="#">Text value</a>		The text used to replace the matching cells
Match case	N/A	<a href="#">Boolean value</a>	False	Whether to search for case-sensitive data
Match entire cell contents	N/A	<a href="#">Boolean value</a>	False	Whether to search for cells that contain just the specified text
Search by	N/A	Rows, Columns	Rows	The order in which to search for the text

### Variables produced

[Expand table](#)



Argument	Type	Description
FoundColumnIndex	<a href="#">Numeric value</a>	The index of the column found
FoundRowIndex	<a href="#">Numeric value</a>	The index of the row found
Cells	<a href="#">Datatable</a>	The list of cells matching the criteria

## Exceptions

[Expand table](#)

Exception	Description
Failed to find and/or replace text	Indicates a problem finding and/or replacing the specified text

# Get first free row on column from Excel worksheet

Retrieve the first free row, given the column of the active worksheet.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify the Excel instance. This variable must have been previously specified in a Launch Excel action.
Column	No	<a href="#">Text value</a>		The index or letter that identifies the column. Column numbering starts from index 1.

## Variables produced

[Expand table](#)

Argument	Type	Description
FirstFreeRowOnColumn	<a href="#">Numeric value</a>	The numeric value of the given column's first fully empty row

# Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve first free row	Indicates a problem retrieving the first free row of an Excel instance

## Read formula from Excel

Reads the formula inside a cell in Excel.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must be specified in a Launch Excel action.
Retrieve	N/A	The formula of a single cell, The formula of a named cell	The formula of a single cell	Specify whether to retrieve the formula from a specified cell or a named cell
Start column	No	<a href="#">Text value</a>		The cell column (single cell's value) or first column as a numeric value or a letter
Start row	No	<a href="#">Numeric value</a>		The cell row (single cell's value) or first row number
Name	No	<a href="#">Text value</a>		The name of cells

### Variables produced

[Expand table](#)

Argument	Type	Description
CellFormula	<a href="#">Text value</a>	The formula of a single cell

# Exceptions

[Expand table](#)

Exception	Description
Failed to read the formula from cell	Indicates a problem when reading the formula from a cell in Excel

## Get table range from Excel worksheet

Retrieves the range of a table in the active worksheet of an Excel instance.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must be specified in a Launch Excel action.
Table name	No	<a href="#">Text value</a>		Specify the name of the table in Excel.
Is pivot	N/A	<a href="#">Boolean value</a>	False	Determine whether the specified table is a pivot table.

### Variables produced

[Expand table](#)

Argument	Type	Description
FirstColumnIndex	<a href="#">Numeric value</a>	The numeric value of the table's first column
FirstRowIndex	<a href="#">Numeric value</a>	The numeric value of the table's first row
LastColumnIndex	<a href="#">Numeric value</a>	The numeric value of the table's last column
LastRowIndex	<a href="#">Numeric value</a>	The numeric value of the table's last row

# Exceptions

 Expand table

Exception	Description
Failed to get the range from table	Indicates a problem when getting the range from a table in Excel

## Auto fill cells in Excel worksheet

Auto fills a range with data, based on the data of another range, in the active worksheet of an Excel instance.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must be specified in a Launch Excel action.
Ranges format	N/A	Named cells, Specific ranges	Named cells	Specify how the ranges are referenced, either using named cells or absolute column/row indexes
Source cells name	No	<a href="#">Text value</a>		Name representing the source range for auto filling
Destination cells name	No	<a href="#">Text value</a>		Name representing the destination range to auto fill. The source range should begin from the same cell and should be included in the destination range
Start column	No	<a href="#">Text value</a>		The index or letter of the first column of both ranges
Start row	No	<a href="#">Numeric value</a>		The first row number of both ranges. The numbering starts from 1
Source end column	No	<a href="#">Text value</a>		The index or letter of the last column of the source range
Source end row	No	<a href="#">Numeric value</a>		The last row number of the source range. The numbering starts from 1

Argument	Optional	Accepts	Default Value	Description
Destination end column	No	Text value		The index or letter of the last column of the destination range
Destination end row	No	Numeric value		The last row number of the destination range. The numbering starts from 1

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to auto fill cells	Indicates a problem when auto filling cells in Excel

## Append cells in Excel worksheet

Appends a range of cells to the active worksheet of an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	Excel instance		The Excel instance to work with. This variable must be specified in a Launch Excel action.
Append mode	N/A	To active sheet, To named cells	To active sheet	Specify whether to append to a sheet or range of named cells
Name	No	Text value		The name of the range of cells
First row has headers	N/A	Boolean value	False	Indicates that the first row of the destination contains column headers

Argument	Optional	Accepts	Default Value	Description
Starting column	Yes	Text value		The starting column number or letter, where the data is appended beginning from the destination's first empty row. If the field is left empty, the first column of the specified destination is used instead.
Starting column header	Yes	Text value		The header of the starting column, where the data is appended beginning from the destination's first empty row. If the field is left empty, the first column of the specified destination is used instead.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to append cells	Indicates a problem when appending cells in Excel

## Lookup range in Excel worksheet

Finds and returns the result of Excel's LOOKUP function.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	Excel instance		The Excel instance to work with. This variable must be specified in a Launch Excel action.
Lookup value	No	Text value		The value to lookup in the specified range of cells.

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Ranges format	N/A	Named cells, Specific ranges	Named cells	Specify how the ranges are referenced, either using named cells or absolute column/row indexes.
Cells name	No	Text value		The name of the cells range to search for the lookup value.
Start column	No	Text value		The index or letter of the first column of the range to search for the lookup value.
Start row	No	Numeric value		The first row number of the range to search for the lookup value. The numbering starts from 1.
End column	No	Text value		The index or letter of the last column of the range to search for the lookup value.
End row	No	Numeric value		The last row number of the range to search for the lookup value. The numbering starts from 1.
Array form	N/A	Boolean value	False	The array form of LOOKUP looks in the first row or column of an array for the specified value and returns a value from the same position in the last row or column of the array. Use this form of LOOKUP when the values that you want to match are in the first row or column of the array. If this option remains disabled, the vector form of LOOKUP is used instead, which looks in a one-row or one-column range (known as a vector) for a value and returns a value from the same position in a second one-row or one-column range.
Cells name of results source	Yes	Text value		The name of the cells range from which the matching value is returned.
Start column of results source	No	Text value		The index or letter of the first column of the range from which the matching value is returned.
Start row of results source	No	Numeric value		The first row number of the range from which the matching value is returned. The numbering starts from 1.
End column of results	No	Text value		The index or letter of the last column of the range from which the matching value is

Argument	Optional	Accepts	Default Value	Description
source				returned.
End row of results source	No	Numeric value		The last row number of the range from which the matching value is returned. The numbering starts from 1.

## Variables produced

[Expand table](#)

Argument	Type	Description
LookupResult	Text value	The value returned by the LOOKUP function

## Exceptions

[Expand table](#)

Exception	Description
Failed to lookup	Indicates a problem when looking up a value in Excel

## Set color of cells in Excel worksheet

Fills the background of the selected cells with the specified color, in the active worksheet of an Excel instance.

You can define the color by entering a hexadecimal code, or you can choose from a selection of predefined color names provided in the list. Selecting the 'Transparent' option leaves the cells without any color fill.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	Excel instance		The Excel instance to work with. This variable must be specified in



Argument	Optional	Accepts	Default Value	Description
				a Launch Excel action.
Set color of	N/A	Single cell, Range of cells, Named cells	Single cell	Specify whether to set the background color of a single cell, a range of cells, or named cells.
Start column	No	<a href="#">Text value</a>		The index or letter of the cell column or range's first column.
Start row	No	<a href="#">Numeric value</a>		The cell row or the range's first row number. The numbering starts from 1.
End column	No	<a href="#">Text value</a>		The index or letter of the range's last column.
End row	No	<a href="#">Numeric value</a>		The range's last row number. The numbering starts from 1.
Cells name	No	<a href="#">Text value</a>		Name representing the range that is filled with the specified color.
Color format	N/A	Name, Hexadecimal value	Name	Select whether to specify a color by its name or its hexadecimal value.
Color name	No	<a href="#">Text value</a>		Select one of the system defined colors.
Color hexadecimal value	No	<a href="#">Text value</a>		Specify the hexadecimal (RGB) value of the color.

## Variables produced

This action doesn't produce any variables.

## Exceptions

 [Expand table](#)

Exception	Description
Failed to set color	Indicates a problem when setting the color of cells in Excel

# Launch Excel

Launches a new Excel instance or opens an Excel document.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Launch Excel	N/A	With a blank document, and open the following document	With a blank document	Specify whether to open a New Excel document, or an existing document
Document path	No	<a href="#">File</a>		The full path of the existing Excel document to open
Make instance visible	N/A	<a href="#">Boolean value</a>	True	Specify whether to make the Excel window visible or hidden
Nest under a new Excel process	N/A	<a href="#">Boolean value</a>	False	Specify whether the Excel spreadsheet should be under a unique Excel process. Macros and add-ins from other spreadsheets won't be accessible.
Password	Yes	Direct encrypted input or <a href="#">Text value</a>		The password on the Excel document, if it's password protected
Open as ReadOnly	N/A	<a href="#">Boolean value</a>	False	Specify whether to open the stored document in read-only mode or not
Load add-ins and macros	N/A	<a href="#">Boolean value</a>	False	Specify whether to load add-ins and macros into the new Excel instance

## Variables produced

 Expand table

Argument	Type	Description
ExcelInstance	<a href="#">Excel instance</a>	The specific Excel instance for use with later Excel actions. This allows the user to specify which of possibly several Excel spreadsheets to access

## Exceptions

[Expand table](#)

Exception	Description
Failed to launch Excel	Indicates a problem launching an Excel instance
Failed to open Excel document	Indicates a problem opening the specified Excel document

## Attach to running Excel

Attaches to an Excel document that's already open.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Document name	No	<a href="#">File</a>		The name or the path of the Excel document to attach to

## Variables produced

[Expand table](#)

Argument	Type	Description
ExcelInstance	<a href="#">Excel instance</a>	The Excel instance this action has attached to for use with later Excel actions

## Exceptions

 Expand table

Exception	Description
Specified Excel document not found	Indicates that the specified Excel document couldn't be found
Failed to attach to Excel document	Indicates a problem attaching to the Excel document

## Read from Excel worksheet

Reads the value of a cell or a range of cells from the active worksheet of an Excel instance.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Retrieve	N/A	The value of a single cell, Values from a range of cells, Values from selection, All available values from worksheet	The value of a single cell	Whether to retrieve the value of a single cell, a table from a range of cells or the entire worksheet
Start column	No	<a href="#">Text value</a>		The cell column (single cell's value) or first column as a numeric value or a letter
Start row	No	<a href="#">Numeric value</a>		The cell row (single cell's Value) or first row number
End column	No	<a href="#">Text value</a>		The last column as a numeric value or a letter
End row	No	<a href="#">Numeric value</a>		The last row number

Argument	Optional	Accepts	Default Value	Description
Get cell contents as text	N/A	<a href="#">Boolean value</a>	False	Specify whether to retrieve the content of the cells purely as text or as the closest matching type such as Date Time for dates, Numeric for numbers, and so on
First line of range contains column names	N/A	<a href="#">Boolean value</a>	False	Specify whether to consider the first row as column names. In this case, the names won't be read as data into the table and later actions can search the data by column names.

## Variables produced

[Expand table](#)

Argument	Type	Description
ExcelData	<a href="#">General value</a>	The value of the single cell
ExcelData	<a href="#">Datatable</a>	The value of the range of cells as a DataTable

## Exceptions

[Expand table](#)

Exception	Description
Failed to read cell values	Indicates a problem reading the value(s) of the specified Excel cells

## Get active cell on Excel worksheet

Get the active cell in the active worksheet of the Excel document.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.

## Variables produced

[Expand table](#)

Argument	Type	Description
ActiveCellColumnIndex	<a href="#">Numeric value</a>	The numeric value of the active cell's column
ActiveCellRowIndex	<a href="#">Numeric value</a>	The numeric value of the active cell's row

## Exceptions

[Expand table](#)

Exception	Description
Failed to get active cell	Indicates a problem getting the active cell

## Save Excel

Saves a previously launched Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to save. This variable must have been previously specified in a

Argument	Optional	Accepts	Default Value	Description
				Launch Excel action.
Save mode	N/A	Save document, Save document as	Save document	How to save the document of this instance
Document format	N/A	Default (From Extension), Excel Workbook (.xlsx), Excel Workbook Macro Enabled (.xlsm), Excel 97-2003 Workbook (.xls), Web Page (.htm, .html), Excel Template (.xltx), Excel Template Macro Enabled (.xltm), Excel 97-2003 Template (.xlt), Text (.txt), Unicode Text (.txt), Text Macintosh (.txt), Text DOS (.txt), XML Spreadsheet (.xml), Excel 95 (.xls), CSV (.csv), DIF (.dif), SYLK (.slk), Excel add-in (.xlam), Excel 97-2003 add-in (.xla), Strict Open XML Workbook (.xlsx), OpenDocument Spreadsheet (.ods), XML Data (.xml), Excel Binary Workbook (.xlsb)	Default (From Extension)	The format to save the document as
Document path	No	<a href="#">File</a>		The full path to save the document as

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to save Excel document	Indicates a problem saving the Excel document

## Write to Excel worksheet

Writes a value into a cell or a range of cells of an Excel instance.

# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Value to write	No	<a href="#">General value</a>		Enter the text, number, or variable to insert. If the variable contains a table, it will fill in cells to the right and below, writing over other cell data if need be and a list will fill in cells below.
Write mode	N/A	On specified cell, On currently active cell	On specified cell	Whether to write into a specified cell or the currently active cell
Column	No	<a href="#">Text value</a>		The column number or letter for the cell to write to
Row	No	<a href="#">Numeric value</a>		The row of the cell to write to. The numbering starts from 1, meaning that the index of the first worksheet is 1, the second is 2, and so on.

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Failed to write value to Excel	Indicates a problem writing the specified value to the Excel instance

## Close Excel



Closes an Excel instance.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to close. This variable must have been previously specified in a Launch Excel action.
Before closing Excel	N/A	Do not save document, Save document, Save document as	Don't save document	Whether and how to save the document of this instance before closing that instance
Document format	N/A	Default (From Extension), Excel Workbook (.xlsx), Excel Workbook Macro Enabled (.xlsm), Excel 97-2003 Workbook (.xls), Web Page (.htm, .html), Excel Template (.xltx), Excel Template Macro Enabled (.xltm), Excel 97-2003 Template (.xlt), Text (.txt), Unicode Text (.txt), Text Macintosh (.txt), Text DOS (.txt), XML Spreadsheet (.xml), Excel 95 (.xls), CSV (.csv), DIF (.dif), SYLK (.slk), Excel add-in (.xlam), Excel 97-2003 add-in (.xla), Strict Open XML Workbook (.xlsx), OpenDocument Spreadsheet (.ods), XML Data (.xml), Excel Binary Workbook (.xlsb)	Default (From Extension)	The format of the document
Document path	No	<a href="#">File</a>		The full path of the document

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to save Excel document	Indicates a problem saving the Excel document
Failed to close Excel instance	Indicates a problem closing the Excel instance

## Set active Excel worksheet

Activates a specific worksheet of an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify the Excel instance. This variable must have been previously specified in a Launch Excel action.
Activate worksheet with	N/A	Index, Name	Name	Specify whether to find the worksheet by name or index
Worksheet index	No	<a href="#">Numeric value</a>		The index number of the worksheet to activate. The numbering starts from 1, meaning that the index of the first worksheet is 1, the second is 2, and so on.
Worksheet name	No	<a href="#">Text value</a>		The name of the worksheet to activate

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Can't find worksheet	Indicates that a worksheet with the specified name couldn't be found
Failed to activate worksheet	Indicates a problem activating the specified worksheet

## Add new worksheet

Adds a new worksheet to the document of an Excel instance.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify the Excel instance. This variable must have been previously specified in a Launch Excel action.
New worksheet name	No	<a href="#">Text value</a>		Specify the name of the new worksheet
Add worksheet as	N/A	First worksheet, Last worksheet	First worksheet	Specify whether the new Excel worksheet will be added before or after the existing worksheets

### Variables produced

This action doesn't produce any variables.

### Exceptions

[Expand table](#)

Exception	Description
A worksheet with the same	Indicates that the worksheet couldn't be added because a

Exception	Description
name already exists	worksheet with the same name already exists
Failed to add worksheet	Indicates a problem adding the worksheet

## Get first free column/row from Excel worksheet

Retrieves the first free column and/or row of the active worksheet. This is useful for adding new data into a worksheet that already has data in it.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		Specify The Excel instance. This variable must have been previously specified in a Launch Excel action.

### Variables produced

[Expand table](#)

Argument	Type	Description
FirstFreeColumn	<a href="#">Numeric value</a>	The numeric value of the first fully empty column. For example, if column F is the first empty column, it will be stored as '6'.
FirstFreeRow	<a href="#">Numeric value</a>	The numeric value of the first fully empty row. For example, if row 7 is the first empty row, it will be stored as '7'.

### Exceptions

[Expand table](#)

Exception	Description
Failed to retrieve first free column/row	Indicates a problem retrieving the first free column/row of an Excel instance

# Get column name on Excel worksheet

Gets the name of the column.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Column number	No	<a href="#">Numeric value</a>		The column number

## Variables produced

[Expand table](#)

Argument	Type	Description
ColumnName	<a href="#">Text value</a>	The name of the column

## Exceptions

This action doesn't include any exceptions.

# Clear cells in Excel worksheet

Clears a range of cells or a named cell in the active worksheet of an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a <b>Launch Excel</b> action.
Clear	N/A	Range of cells, Range of cells relative to active cell,	Range of cells	Specify whether to select an explicitly specified range of cells, a range of cells relative to the

Argument	Optional	Accepts	Default Value	Description
		Named cells, Single cell		currently active cell, named cells, or a single cell.
X Axis Direction	N/A	Left, Right	Left	The X-axis offset direction. Where to look along the horizontal axis, based on currently activated cell's position.
Start column	No	<a href="#">Text value</a>		The index or letter of the first column.
X Offset	No	<a href="#">Numeric value</a>		The X-axis offset.
Start row	No	<a href="#">Numeric value</a>		The first row number. The numbering starts from 1.
End column	No	<a href="#">Text value</a>		The index or letter of the last column.
Y Axis Direction	N/A	Above, Below	Above	The Y-axis offset direction. Where to look along the vertical axis, based on the position of the currently active cell.
End row	No	<a href="#">Numeric value</a>		The last row number. The numbering starts from 1.
Y Offset	No	<a href="#">Numeric value</a>		The Y-axis offset.
Name	No	<a href="#">Text value</a>		The name of cells.
Column	No	<a href="#">Text value</a>		The index or letter of the column.
Row	No	<a href="#">Numeric value</a>		The row number. Enumeration starts from 1.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to clear cells	Indicates a problem occurred while trying to clear the specified cells in the Excel instance.

## Sort cells in Excel worksheet

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Sort column in	N/A	Active sheet, Table, Range	Active sheet	Specify whether the column to be sorted is part of a table, a specified range, either by name or absolute coordinates or if it's part of the general active worksheet.
Table name	No	<a href="#">Text value</a>		The name of the table.
Range	N/A	Named cells, Specific range	Named cells	Specify the range to be sorted, either using named cell or absolute column and row index.
Cells name	No	<a href="#">Text value</a>		Name representing the range.
Start column	No	<a href="#">Text value</a>		The index or letter of the first column.
Start row	No	<a href="#">Numeric value</a>		The first row number. The numbering starts from 1.
End column	No	<a href="#">Text value</a>		The index or letter of the last column.
End row	No	<a href="#">Numeric value</a>		The last row number. The numbering starts from 1.
Sort by	Yes	Sorting rules as defined by the user	N/A	Sorting rules to apply.
First row is header	Yes	<a href="#">Boolean value</a>		Indicates that the first row of the worksheet is a header.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to sort cells in worksheet	Indicates a problem sorting cells in the worksheet.

## Filter cells in Excel worksheet

**Filter cells in Excel worksheet** allows makers to create and apply a filter in the active sheet, table, or range on the values of a specified column. To filter multiple columns in an active sheet/table/range, multiple **Filter cells in Excel worksheet** actions must be used, each one applying the respective filter.

### Important

To apply multiple filters in a specific active sheet/table/range, make sure that all **Filter cells in Excel worksheet** actions used target the same source (active sheet/table/range).

When using the **Filter cells in Excel worksheet** in an active sheet/range with already existing/applied filters:

- If the targeted range is the same as the one the previous filters were applied on, all filters are applied.
- If the targeted range isn't the same as the range previous filters were applied on, previous filters are cleared, and only the latest filter is applied.
- If the targeted range is a table, all filters are applied.

## Input parameters

[Expand table](#)



Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Filter column in	N/A	Active sheet, Table, Range	Active sheet	Specify whether the column to be filtered is part of a table, a specified range, either by name or absolute coordinates or if it's part of the general active worksheet
Table name	No	<a href="#">Text value</a>		The name of the table.
Range	N/A	Named cells, Specific range	Named cells	Specify the range to be filtered, either using named cell or absolute column/row index
Cells name	No	<a href="#">Text value</a>		Name representing the range
Start column	No	<a href="#">Text value</a>		The index or letter of the first column.
Start row	No	<a href="#">Numeric value</a>		The first row number. The numbering starts from 1.
End column	No	<a href="#">Text value</a>		The index or letter of the last column.
End row	No	<a href="#">Numeric value</a>		The last row number. The numbering starts from 1.
Column to filter	No	<a href="#">Text value</a>		Name or index of the column to be filtered. If the column is part of a table use the header name.
Filters to apply	Yes	Filtering rules as defined by the user	N/A	Filtering rules applied to the defined column

## Variables produced

This action doesn't produce any variables.

## Exceptions

 [Expand table](#)

Exception	Description
Failed to apply filter on cells in worksheet	Indicates a problem applying the specified filter on cells in the worksheet

## Clear filters in Excel worksheet

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Clear filters in	N/A	Active sheet, Table	Active sheet	Specify whether to clear filters from the entire active worksheet or from a specific table.
Table name	No	<a href="#">Text value</a>		The name of the table.
Clear filters from specific column	Yes	<a href="#">Boolean value</a>		Clear filters from specific column.
Clear filter in column	No	<a href="#">Text value</a>		The column name to clear applied filter.

### Variables produced

This action doesn't produce any variables.

### Exceptions

[Expand table](#)

Exception	Description
Failed to clear filter on cells in worksheet	Indicates a problem applying the specified filter on cells in the worksheet

# Get empty cell

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Excel instance	No	<a href="#">Excel instance</a>		The Excel instance to work with. This variable must have been previously specified in a Launch Excel action.
Operation	N/A	First empty cell, First empty cell in column, First empty cell in row, All empty cells	First empty cell	Specify whether to search for the first empty cell, the first empty cell on column, the first empty cell on row, or all empty cells inside a specific range.
Search direction	N/A	By row, By column	By row	Specify whether to search by rows or columns to find the first empty cell inside a specific range.
Search in	N/A	Named cells, Specific range	Named cells	Search for empty cell in a named cell or a range defined by start column/row and end column/row.
Cells name	No	<a href="#">Text value</a>		Name representing the range.
Column	No	<a href="#">Text value</a>		Column.
Row	No	<a href="#">Numeric value</a>		Row.
Start column	No	<a href="#">Text value</a>		The index or letter of the first column.
Start row	No	<a href="#">Numeric value</a>		The first row number. The numbering starts from 1.
End column	No	<a href="#">Text value</a>		The index or letter of the last column.
End row	No	<a href="#">Numeric value</a>		The last row number. The numbering starts from 1.

## Variables produced

[Expand table](#)

Argument	Type	Description
EmptyCellColumnIndex	<a href="#">Numeric value</a>	The index of the column the first empty cell is found.
EmptyCellRowIndex	<a href="#">Numeric value</a>	The index of the row the first empty cell is found.
EmptyCells	<a href="#">Datatable</a>	The list of empty cells found.

## Exceptions

[Expand table](#)

Exception	Description
Get empty cells failed	Indicates a problem retrieving the empty cells from the worksheet.

## Known limitations

### Using Excel files synchronized through OneDrive or SharePoint

Interaction with Microsoft Excel files that are contained in folders synchronized in OneDrive or SharePoint might result in an erroneous flow. Power Automate for desktop utilizes COM objects for Excel interactions. OneDrive and SharePoint aren't fully compatible with Excel instances launched through COM.

For this reason, when you try to open an Excel file stored under a OneDrive or SharePoint directory, you might encounter a **file not found** error. To resolve this issue, use one of the following workarounds:

#### Workaround 1

- Make a local copy of the respective Excel file.
- Modify the local copy of the Excel file using Power Automate for desktop's Excel automation actions.
- Override the Excel file copy synchronized through OneDrive/ Sharepoint with the local copy that includes the latest changes.

#### Workaround 2

### ⓘ Note

This workaround can be used in general when the **Launch Excel** action fails to execute.

- Open a new Excel instance using the **Run application** action. Make sure that you provide enough wait time between actions, allowing the Excel process to load completely, including any add-ins.
- Use the action **Attach to Excel** to attach to the new process.

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Word actions

Article • 01/19/2024

The Word automation feature enables you to seamlessly interact with Word files stored either locally or in the cloud. To begin, you need to create a Word instance using either the 'Launch Word' or 'Attach to running Word' action. This instance serves as the input parameter for the rest of the actions in the group, allowing you to easily perform actions on the desired Word file.

Currently, the below actions are available:

- **Launch Word:** When this action is triggered in Power Automate for desktop, it opens a Word document and creates a Word instance that can be used in subsequent Word actions within the same desktop flow. The user can choose to open either a new, blank Word document or an existing one located on the local machine or in the cloud (through OneDrive or SharePoint). Depending on the action's configuration, the Word application can be launched visibly or invisibly, and the document can be opened in read-only mode. It's important to note that if the document is opened in read-only mode, it can't be edited either through Power Automate for desktop actions or manually.
- **Attach to running Word:** This action provides the capability to attach an existing Word document that's currently open and creates a Word instance that can be used in subsequent Word actions within the same desktop flow. The user has the option to insert a Word document that's already open on the same machine at the time of design through a drop-down menu, or select an existing Word document located on the local machine or in the cloud (through OneDrive or SharePoint).
- **Save Word:** This action enables the user to save a Word document in any format that currently the Word application supports. The default document format is 'Default (From Extension)' which means that the user must set the document format in the **Document path** parameter, such as set the value to *C:\TestWord.pdf* to save it as PDF.
- **Close Word:** This action closes a Word document and make the specific Word instance in Power Automate as inactive. The user can save the Word document before closing it in any format that currently the Word application supports. Note that the default document format is 'Default (From Extension)' which means that the user must set the document format in the 'Document path' parameter, such as set the value to *C:\TestWord.pdf* to save it as PDF.
- **Read from Word document:** This action enables users to retrieve content from a Word document and use it in a subsequent action of the flow. You have the flexibility to read the entire document, specific pages, or the content of a

bookmark. For pages, you can specify a specific page or a list of pages. For example, you can insert the value 2-5 in the respective **Pages** parameter to retrieve the content of pages two to five, for example pages 2, 3, 4, and 5, or insert the value 3,5,6,7 to retrieve the content of the respective pages or use a combination of both ways, such as 2-4,6,8,9. It's important to note that the Word document format can't be retrieved, and the output parameter is in plain text.

The screenshot shows a configuration dialog box titled "Read from Word document". At the top, there is a description: "Reads the text content from a document of a Word Instance" with a "More info" link. Below this, the "Select parameters" section contains two dropdown menus. The first is labeled "Word Instance:" and is currently empty. The second is labeled "Retrieve:" and is set to "Whole Document". A dropdown menu is open for the "Retrieve:" field, showing three options: "Whole Document" (which is highlighted), "Pages", and "Bookmark". To the left of this menu is a "Variables" section with a right-pointing arrow. At the bottom of the dialog, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

- **Find and replace words in Word document:** Users can apply a new functionality with this action, which is the ability to find and replace specific text within a Word document. Users have the option to replace only the first occurrence of the text or all matches. Additionally, the use of wildcards allows for dynamic text finding, with the wildcard being inserted in the **Text to find** input parameter. To further refine the search, configure the tool to match the case of the text or match whole words

only. These settings are available when the **Use wildcards** parameter is set to off.

The screenshot shows a dialog box titled "Find and replace words in Word document" with a close button (X) in the top right corner. Below the title bar is a light blue header with a document icon and the text "Finds text and replaces it with another in the active document of a Word instance. [More info](#)".

The main area is titled "Select parameters" and contains the following settings:

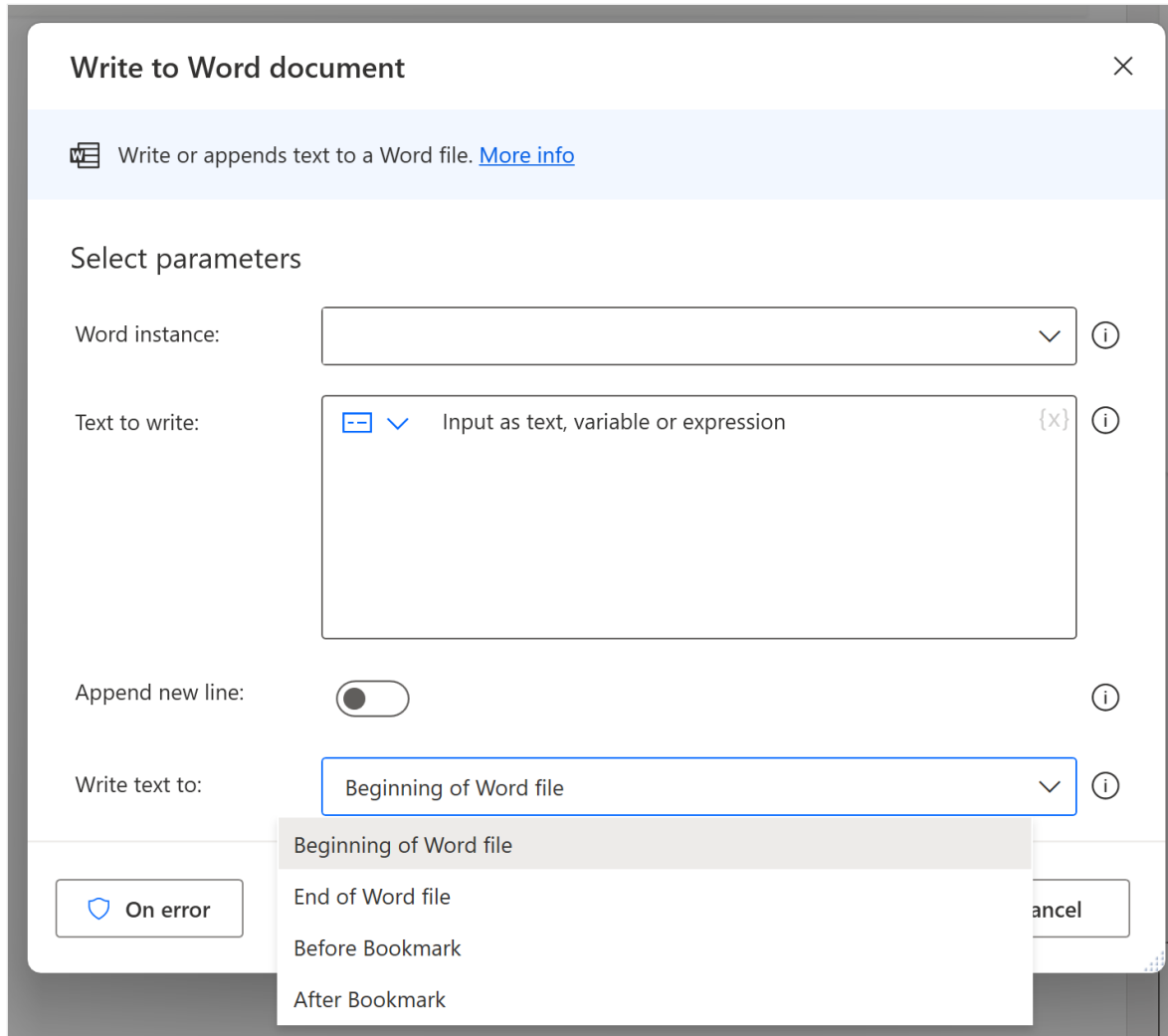
- Word Instance:** A dropdown menu with a downward arrow and an information icon (i).
- All Matches:** A toggle switch that is currently turned on, with an information icon (i).
- Text to find:** A text input field with a placeholder "{x}" and an information icon (i).
- Text to replace with:** A text input field with a placeholder "{x}" and an information icon (i).
- Use wildcards:** A toggle switch that is currently turned off, with an information icon (i).
- Match case:** A toggle switch that is currently turned off, with an information icon (i).
- Match whole words only:** A toggle switch that is currently turned off, with an information icon (i).

At the bottom of the dialog, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

- **Write to Word document:** This action enables users to insert text in specific positions within a Word document. This can be done at the beginning or end of the file, or before or after a specific bookmark. Additionally, users have the option to append a new line before the inserted text or not, depending on their

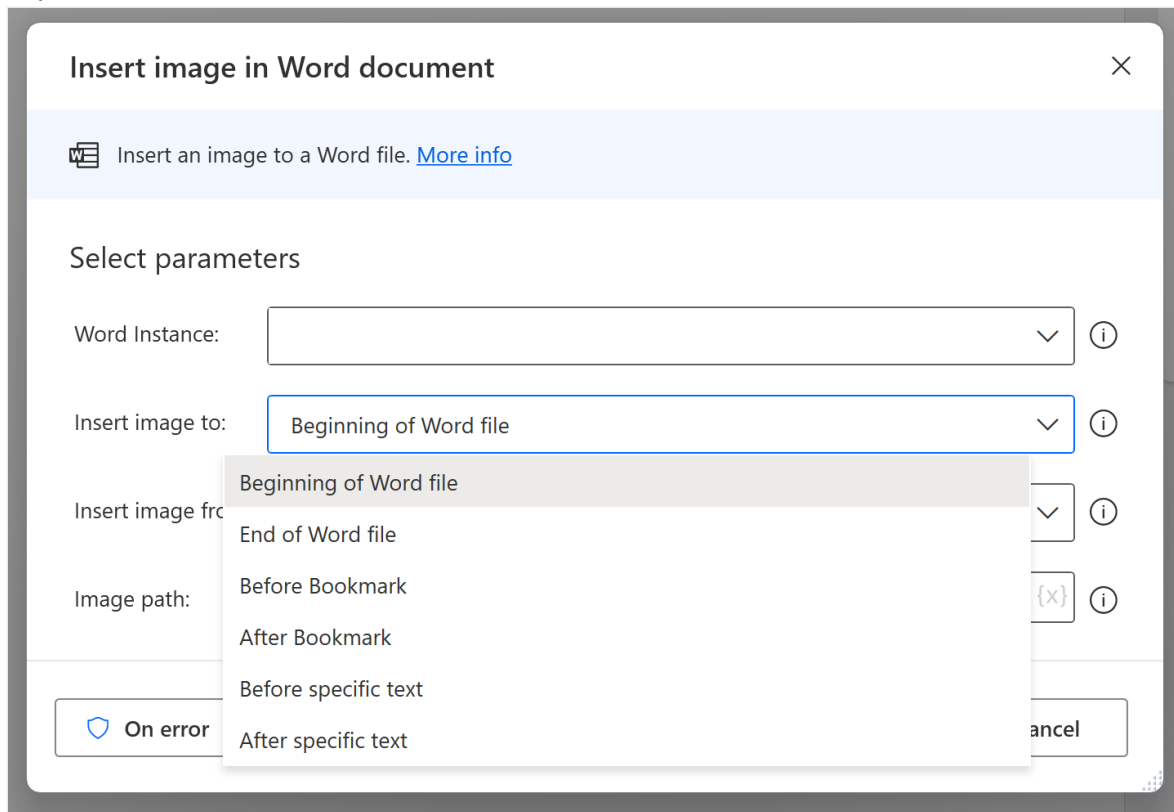


preferences.



- **Insert image in Word document:** This action allows users to insert images in specific positions within a Word document. This can be done at the beginning or end of the file, before or after a specific bookmark, or before or after specific text. Note that no spaces or new lines are added. Users have the option to retrieve the image either as a file stored in their local machine or as content from the

clipboard.



### ⓘ Note

Word actions in Power Automate for desktop are compatible with Microsoft Word 2013 or later versions.

## Launch Word

Opens a new Word instance or opens a Word document.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Launch Word	N/A	With a blank document, and open the following document	With a blank document	Specify whether to open a new Word document, or an existing one
Document path	No	File		The full path of the existing Word document to open

Argument	Optional	Accepts	Default Value	Description
Make instance visible	N/A	Boolean value	True	Specify whether to make the Word window visible or hide it
Open as ReadOnly	N/A	Boolean value	False	Specify whether to open the stored document in read-only mode or not
Read protection password	Yes	Direct encrypted input or Text value		The read protection password on the Word document, if it's password protected
Write protection password	Yes	Direct encrypted input or Text value		The write protection password on the Word document, if it's password protected

## Variables produced

[Expand table](#)

Argument	Type	Description
<code>WordInstance</code>	Word instance	The specific Word instance for use with later Word actions. This allows the user to specify which of possibly several Word documents to access

## Exceptions

[Expand table](#)

Exception	Description
Failed to launch Word	Indicates a problem launching a Word instance
The Word document was not found	Indicates that the specific Word document could not be found in the provided location
Failed to open existing Word document	Indicates a problem opening the specified Word document
Failed to launch Word application	Indicates that Word application could not be launched due to an internal error

Exception	Description
Word application is not installed	Indicates that Word application isn't installed on the specific machine

## Attach to running Word

Attaches to a Word document that's already open.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Document name	No	File		The name or the path of the Word document to attach to

### Variables produced

[Expand table](#)

Argument	Type	Description
<code>WordInstance</code>	Word instance	The Word instance this action has attached to for use with later Word actions

### Exceptions

[Expand table](#)

Exception	Description
Failed to attach to Word document	Indicates a problem attaching to the specified Word document
Specified Word document not found	Indicates that the specific Word document couldn't be found in the provided location
Failed to launch Word	Indicates that Word application couldn't be launched due to an internal error

# Save Word

Saves a previously launched Word instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Word instance	No	Word instance		The Word instance to save. This variable must have been previously specified in a <b>Launch Word</b> or <b>Attach to running Word</b> action.
Save mode	N/A	Save document, Save document as	Save document	How to save the document of this instance.
Document format	N/A	All available formats from Word app	Default (From Extension)	The format of the document.
Document path	No	File		The full path of the document. Insert the desired document file extension according to the selection in the <b>Document format</b> parameter.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to save Word	Indicates a problem saving the Word document
The Word instance or the Word document is not initialized	Indicates that Word instance or Word document specified in action isn't initialized

Exception	Description
The operation cannot be performed on a read-only document	Indicates that Word document can't be saved because it is opened as read-only

## Close Word

Closes a Word instance.

### Input parameters


 Expand table

Argument	Optional	Accepts	Default Value	Description
Word instance	No	Word instance		The Word instance to close. This variable must have been previously specified in a <b>Launch Word</b> or <b>Attach to running Word</b> action.
Before closing Word	N/A	Do not save document, Save document, Save document as	Don't save document	Specify whether and how to save the document of this instance before closing that instance.
Document format	N/A	All available formats from Word app	Default (From Extension)	The format of the document.
Document path	No	File		The full path of the document. Insert the desired document file extension according to the selection in the Document format parameter.

### Variables produced

This action doesn't produce any variables.

### Exceptions

 Expand table

Exception	Description
Failed to close Word	Indicates a problem closing the Word document
Failed to save Word	Indicates a problem saving the Word document
The operation cannot be performed on a read-only document	Indicates that Word document can't be saved because it is opened as read-only

## Read from Word document

Reads the text content from a document of a Word instance.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Word instance	No	Word instance	The Word instance to work with	This variable must have been previously specified in a <b>Launch Word</b> or <b>Attach to running Word</b> action
Retrieve	N/A	Whole document/Pages/Bookmark	Whole document	Whether to retrieve the content of the whole document, of specific pages, or a bookmark
Page	No	Numeric value	1	The pages of the Word document to be read. A range of pages or a list can be provided as 2-5, which will retrieve content from page 2 to page 5 or 2,3,7, retrieve content from 2,3,7 pages
Bookmark	No	Text value		The bookmark of the Word document to be read

### Variables produced

[Expand table](#)

Argument	Type	Description
WordData	Text value	The value of the retrieved content

## Exceptions

[Expand table](#)

Exception	Description
Failed to read the content from a Word document	Indicates a problem retrieving the content from the specified Word document
The Word instance or the Word document is not initialized	Indicates that Word instance or Word document specified in action isn't initialized

## Write to Word document

Write or append text to a Word file.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Word instance	No	Word instance	The Word instance to work with	This variable must have been previously specified in a <b>Launch Word</b> or <b>Attach to running Word</b> action
Text to write	Yes	General value	The text to write in the specified Word document	
Append new line	N/A	Boolean value	True	Specifies whether to append a new line at the start of the overall text to write to the document
Write text to	N/A	Beginning of Word file/End of Word	Beginning of Word file	Specifies the position of the Word document



Argument	Optional	Accepts	Default Value	Description
		file/Before of Bookmark/After of Bookmark		where the text will be appended
Bookmark	No	Text value	The target bookmark in the Word document where the text will be appended	This action appends text before or after of the specified bookmark in the Word document

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
The Word instance or the Word document is not initialized	Indicates that Word instance or Word document specified in action isn't initialized
The operation cannot be performed on a read-only document	Indicates that Word document can't be edited because it is opened as read-only
The write operation on the Word document instance failed	Indicates a problem writing content in the specified Word document

## Insert image in Word document

Insert an image to a Word file.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Word instance	No	Word instance	The Word instance to work with	This variable must have been previously specified in a <b>Launch Word</b> or <b>Attach to running Word</b> action

Argument	Optional	Accepts	Default Value	Description
Insert image to	N/A	Beginning of Word file/End of Word file/Before of Bookmark/After of Bookmark/Before specific text /After specific text	Beginning of Word file	Specifies the position of the Word document that image will be appended
Insert image from	N/A	File/Clipboard	File	The location of the image to be inserted in the specified Word document
Image path	No	File		The full path of the image to be inserted
Text to find	No	Text value	The text to find in the Word document for inserting image	Image will be appended before or after any occurrence of the specified text
Bookmark	No	Text value	The target bookmark in the Word document where the image will be appended	

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
The Word instance or the Word document is not initialized	Indicates that Word instance or Word document specified in action isn't initialized
The operation cannot be performed on a read-only document	Indicates that Word document can't be edited because it is opened as read-only
Failed to insert image	Indicates a problem inserting the image in the specified Word document

# Find and replace words in Word document

Finds text and replaces it with another in the active worksheet of an Excel instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Word instance	No	Word instance	The Word instance to work with	This variable must have been previously specified in a <b>Launch Word</b> or <b>Attach to running Word</b> action
All matches	N/A	Boolean value	False	Whether to find/ and replace text in all the matching occurrences found or in the first matching occurrence only
Text to find	No	Text value	The text to find in the worksheet	
Text to replace with	No	Text value		The text used to replace the matching cells
Use wildcards	N/A	Boolean value	False	Whether to use wildcards for the text to find
Match case	N/A	Boolean value	False	Whether to search for case-sensitive data
Match whole words only	N/A	Boolean value	False	Whether to search for words that are the same as the specified text

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to replace text in Word document	Indicates a problem replacing the specified text with the provided input

Exception	Description
The Word instance or the Word document is not initialized	Indicates that Word instance or Word document specified in action isn't initialized
The operation cannot be performed on a read-only document	Indicates that Word document can't be edited because it is opened as read-only

## Known limitations

### Using Word files synchronized through OneDrive or SharePoint

Interaction with Microsoft Word files that are contained in folders synchronized in OneDrive or SharePoint might result in an erroneous flow. Power Automate for desktop utilizes COM objects for Word interactions. OneDrive and SharePoint aren't fully compatible with Word instances launched through COM.


For this reason, when you try to open a Word file stored in a OneDrive or SharePoint directory, you might encounter a **file not found** error. To resolve this issue, use one of the following workarounds:

#### Workaround 1

- Make a local copy of the respective Word file.
- Modify the local copy of the Word file using Power Automate for desktop Word automation actions.
- Override the Word file copy synchronized through OneDrive or Sharepoint with the local copy that includes the latest changes.

#### Workaround 2

- Open a new Word instance using the **Run application** action. Make sure that you provide enough wait time between actions, allowing the Word process to load completely, including any add-ins.
- Use the action **Attach to running Word** to attach to the new process.

 **Note**

This workaround can be used in general when the **Launch Word** action fails to execute.

# AI Builder actions (preview)

Article • 10/19/2023

The AI Builder group contains the **Create text with GPT (preview)** action that creates text using the GPT language model.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality.
- These features are available before an official release so that customers can get early access and provide feedback.

Further strengthening our commitment to [responsible AI](#) we're introducing some updates related to the utilization of **Create text with GPT (preview)** action in the Power Automate for desktop October 2023 update. Specifically:

- A **Display input dialog** action or **Display message** action must accompany each use of the **Create text with GPT** action
- The **Display input dialog** action or **Display message** action must contain the response from the **Create text with GPT** action in its body so it is clearly presented to the user

Make sure that flows that utilize the **Create text with GPT (preview)** action check those two points. If either of those steps is omitted, the respective flow(s) will result in an error.


Also note the following:

- This capability is in process of rolling out, and may not be available in your region yet.
- This capability may be subject to usage limits or capacity throttling.
- The GPT model might make mistakes or have biases and other undesirable content. Therefore, to ensure that the AI-generated content is accurate, appropriate, and free from bias, always have humans review it.
- This capability is under gated access. Apply for consideration to take part in the trial. To apply, go to [Limited preview request](#).

After deploying the action, select **Create instructions** to open the instructions wizard. The wizard allows you to create instructions using existing templates or start from blank.

Learn more about the Text generation model (preview) in [the Text generation model overview \(preview\)](#).

### Create text with GPT (preview) ✕

 Get a response from GPT. [More info](#)

Select parameters

Instructions:  {x} i

i AI-generated content can have mistakes. Make sure it's accurate and appropriate before using it. [Read preview terms](#)

**Create instructions**

> Variables produced PredictV2Response PredictV2TextResponse

On error Save Cancel

#### i Important

It's mandatory that you add either a **Display input dialog** or **Display message** action and pass either of the generated outputs of the **Create text with GPT (preview)** action (**PredictV2Response**, **PredictV2TextResponse**) in its body. This will require a human review of the generated messages. If either of those steps is omitted, the respective flow(s) will result in an error.

Example approach: Add a Display message action with Yes - No buttons to require a human review of the generated content. An error appears when this action doesn't exist. Learn more about the Display message action in [Message boxes actions](#).

**Display message**
✕

🗨️ Displays a message box [More info](#)

**Select parameters**

Message box title:  {x} ⓘ

Message to display: 

Review the following AI-generated text: {x} ⓘ  
%PredictV2TextResponse%

Message box icon:  ⌵ ⓘ

Message box buttons:  ⌵ ⓘ

Default button:  ⌵ ⓘ

Keep message box always on top:  ⓘ

Close message box automatically:  ⓘ

> Variables produced ButtonPressed

🛡️ On error

Save

Cancel

## Create text with GPT (preview)

Get a response generated by GPT.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Instructions	No	Text value		Provide instructions for the GPT model to perform a task



## Variables produced

Argument	Type	Description
PredictV2Response	<a href="#">Connector object</a>	
PredictV2TextResponse	<a href="#">Text</a>	

## Exceptions

Exception	Description
Endpoint failure	Indicates an endpoint failure

# Database actions

Article • 12/08/2023

To connect to a database, use the **Open SQL connection** action. A connection string specifies all information necessary to connect to a database, such as the driver, the database, server names, and the username and password.

The following connection string connects to an Excel database:

```
Connection

Provider=Microsoft.ACE.OLEDB.12.0;Data
Source=C:\myFolder\myExcelFile.xlsx;Extended Properties="Excel 12.0
Xml;HDR=YES";
```

The following connection string connects to an Access database:

```
Connection

Provider=Microsoft.ACE.OLEDB.12.0;Data
Source=C:\myFolder\myAccessFile.accdb; Persist Security Info=False;
```

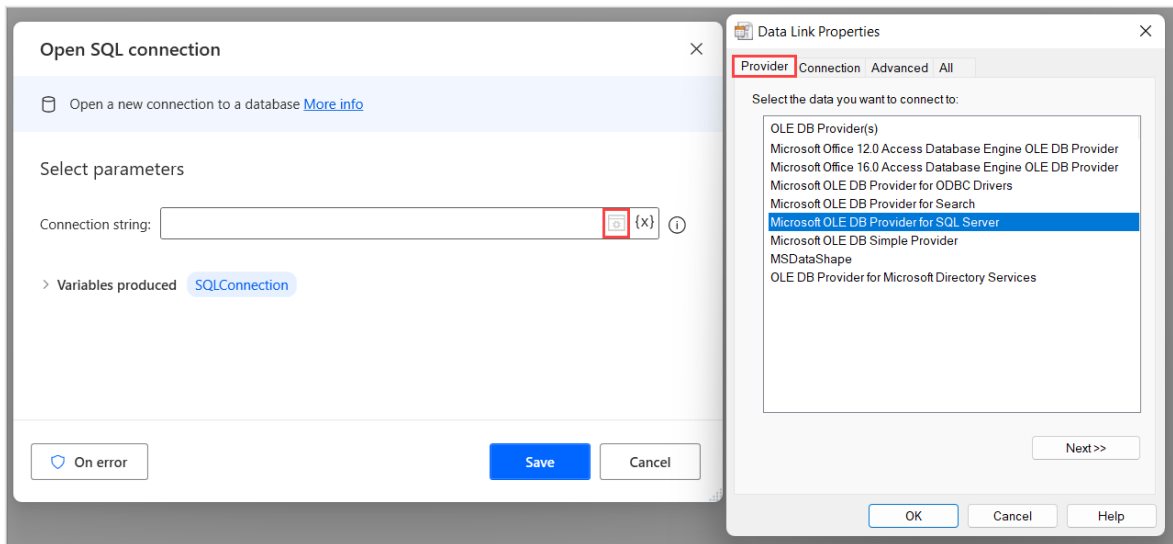
## ⓘ Note

Power Automate for desktop is a 64-bit application, only 64-bit installed drivers are available for selection in the **Open SQL connection** action.

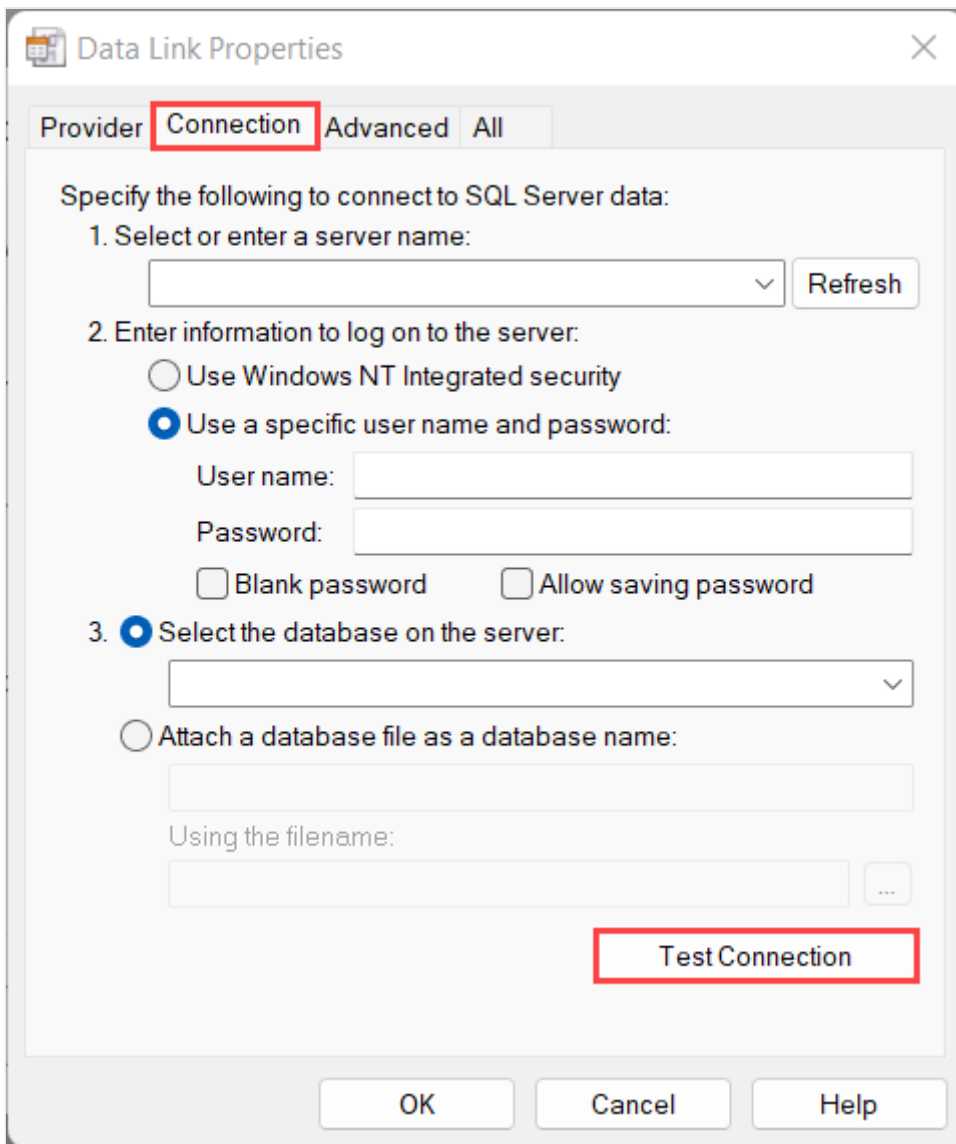
## Configure a connection string manually

To manually build a connection string:

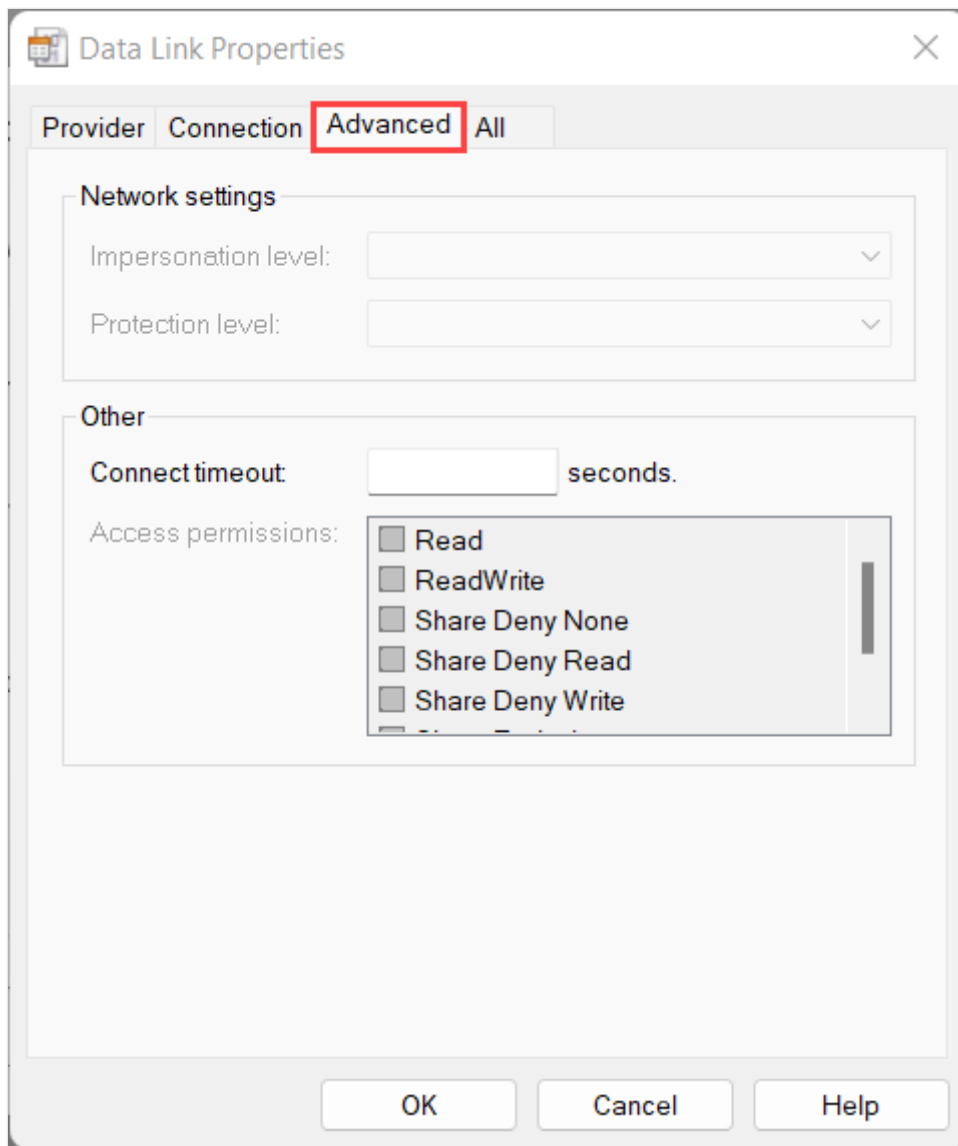
1. Select **Build connections string** to open the **Data Link Properties** dialog. The data link tool helps you compose the required connection string step by step.
2. Once you access the wizard, select the correct driver for the database under **Provider**.



3. Next, under the **Connection** tab, enter the remaining details such as the server name, the username, password, and database name. Select **Test Connection** to test that the connection string connects successfully.



4. Specify a connection timeout and other network settings in the **Advanced** tab.



## Open SQL connection

Open a new connection to a database.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Connection string	No	Text value		The connection string to use to connect to the database

## Variables produced

 Expand table

Argument	Type	Description
SqlConnection	<a href="#">SQL connection</a>	A handle for the new SQL connection

## Exceptions

 Expand table

Exception	Description
Can't connect to data source	Indicates a problem connecting to the data source
Invalid connection string	Indicates that the specified connection string is invalid

## Execute SQL statement

Connect to a database and execute a SQL statement.

To execute an SQL query, use the **Execute SQL statement** action. Begin by providing a valid connection to the respective database. Select the desired option in the **Get connection by** property. You can either provide an **SQL connection variable** (you can create one by using the **Open SQL connection** action) or by providing the **Connection string**. Then input the SQL query you want to execute in the **SQL statement** property. You can also modify the timeout seconds of the action or leave the default option (30 seconds).

## Natural language to script powered by copilot (preview)

[This topic is prerelease documentation and is subject to change.]

Natural language to script is a new copilot capability added in Power Automate for desktop. It lets you quickly generate scripts used in the execute SQL statement action by providing a description in natural language.

 **Important**

 **Important**

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality.
- These features are available before an official release so that customers can get early access and provide feedback.

## Availability by region

Currently, natural language to script in Power Automate for desktop is only available in environments located in the United States.

## Availability by account type

Currently, natural language to script in Power Automate for desktop is only available for users with a work or school account.


### ⓘ Note

If your environment is in the region where this feature is available and you still can't experience the copilot in Power Automate for desktop experience, contact your tenant administrator. They might have turned off the copilot functionality.

## How to generate scripts using copilot and natural language

To generate SQL code in the execute SQL statement select **Generate script with Copilot**.

### Execute SQL statement ✕

 Connect to a database and execute an SQL statement [More info](#)

#### Select parameters


Get connection by:  ⓘ

SQL connection:  {x} ⓘ

SQL statement:


1

{x} ⓘ

 **Generate script with Copilot**

Timeout:  {x} ⓘ


> Variables produced QueryResult

 On error

Save

Cancel

The create prompt screen opens where you type your natural language prompt.

 **Generate script with Copilot** PREVIEW ×


**Prompt \***

Describe what the SQL script should do. For example: "Select all the customers that have ordered a product in the past three days and sort the results by the customers' last name. The generated SQL script should be in ANSI SQL syntax."

0/200

**Generate**

**Resources**

 [See documentation](#)

Make sure AI-generated content is accurate and appropriate before using. [Read preview terms](#)

**Use this script** **Cancel**

To create a SQL script, write your prompt and select **Generate**. If you need to re-create it, you can change the prompt and select **Regenerate**. Otherwise, select **Use this script** to go back to the main action window, where you can modify your prompt and add any necessary variables.



## Generate script with Copilot PREVIEW

Prompt \*



Select all the Customers who have at least three invoices of over 100 USD in the past 90 days. The results should include the customer name, address and telephone number, sorted by their name.


192/200

Regenerate

Suggested script

```
1 -- This code has been generated by AI. Original prompt:
2 -- Select all the Customers who have at least three invoices of over 100 USD in
   the past 90 days. The results should include the customer name, address and
   telephone number, sorted by their name.
3 SELECT
4     c.customer_name,
5     c.address,
6     c.telephone_number
7 FROM
8     Customers c
9 WHERE
10    c.customer_id IN (
11        SELECT
12            i.customer_id
13        FROM
14            Invoices i
```

Resources AI-generated content may be incorrect  

 See documentation

Make sure AI-generated content is accurate and appropriate before using. [Read preview terms](#) Use this script Cancel

### Important

Make sure that you always review the content generated by the AI model.

## Help us improve this feature

Send feedback by selecting the thumb up or thumb down icon underneath the AI-generated content. Once you do, a feedback dialog appears, which you can use to

submit feedback to Microsoft.

**Submit feedback to Microsoft** ×

What did you like?

Give as much detail as you can, but do not include any private or sensitive information.

By pressing Submit, your feedback will be used to improve Microsoft products and services. IT admins for your organization will be able to view and manage your feedback data. [Privacy statement](#).

**Submit** Cancel

#### ⓘ Note

If you can't see the dialog, your tenant admin might have turned it off. More information: [Disabling the user feedback functionality](#)

## Disabling the user feedback functionality

As a tenant admin you can prevent your users from sending feedback to Microsoft by disabling the `disableSurveyFeedback` tenant setting. Find more information about viewing and setting tenant settings here:

- [List tenant settings \(preview\)](#)
- [Set TenantSettings](#)

## Data subject rights requests on user feedback

Tenant administrators can view, export, and delete the feedback provided by their users by signing in to the [Microsoft 365 admin center](#), and then selecting **Health** > **Product feedback**.

## AI with Power Automate resources

- [FAQ for Generating scripts with natural language](#)
- [Responsible AI FAQs for Power Automate](#)

- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Get connection by	N/A	Connection string, [SQL connection variable]	SQL connection variable	Specifies whether to create a new connection from a given connection string or select an already open connection
SQL connection	No	<a href="#">SQL connection</a>		The handle for the new SQL connection
Connection string	No	<a href="#">Text value</a>		The connection string to use to connect to the database
SQL statement	No	<a href="#">Text value</a>		The SQL statement to execute to the database
Timeout	Yes	<a href="#">Numeric value</a>	30	The maximum amount of time to wait for a result from the database

## Variables produced

[Expand table](#)

Argument	Type	Description
QueryResult	<a href="#">Datatable</a>	The result from the database in the form of a data table, with rows and columns

## Exceptions

[Expand table](#)

Exception	Description
Can't connect to data source	Indicates a problem connecting to the data source
Invalid connection string	Indicates that the specified connection string is invalid

Exception	Description
Error in SQL statement	Indicates there's an error in the given SQL statement

## Close SQL connection

Close an open connection to a database.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
SQL connection	No	<a href="#">SQL connection</a>		The handle for the new SQL connection

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# Email actions

Article • 12/16/2022

Before deploying any email action, you have to configure the server that will handle the requests. The **Retrieve email messages** and **Process email messages** actions require an IMAP server, while the **Send email** action requires an SMTP server.

Common IMAP ports:

- 143 (non-encrypted and TLS)
- 993 (secure IMAP)

Common IMAP servers:

- imap-mail.outlook.com (Outlook.com)
- outlook.office365.com (Office365.com)
- imap.mail.yahoo.com (Yahoo mail)
- imap.gmail.com (Google mail)

Common SMTP ports:

- 25 (non-encrypted)
- 587 (non-encrypted and TLS)
- 465 (SSL)

Common SMTP servers:

- smtp-mail.outlook.com (Outlook.com)
- smtp.office365.com (Office365.com)
- smtp.mail.yahoo.com (Yahoo mail)
- smtp.gmail.com (Google mail)

## Retrieve email messages ✕

✉ Retrieves email messages from an IMAP server [More info](#)

### Select parameters

> IMAP Server

IMAP server:  {x} ⓘ

Port:  {x} ⓘ

Enable SSL:  ⓘ

User name:  {x} ⓘ

Password: ⓘ  ⓘ

Accept untrusted certificates:  ⓘ

> Email Filters

> Variables produced **RetrievedEmails**

To retrieve emails that meet specific criteria, use the **Retrieve email messages** action. The following example retrieves only unread messages from the inbox.

The filter further specifies that the email should be from **b.friday**, the subject should contain **Report**, and the body should contain **Tuesday**. The action will save locally all attachments that match the specified criteria.

## Retrieve email messages ✕

✉ Retrieves email messages from an IMAP server [More info](#)

> IMAP Server

▼ Email Filters

Mail folder:	INBOX <span style="float: right;">{x} ⓘ</span>
Retrieve:	Unread email messages only <span style="float: right;">▼ ⓘ</span>
Mark as read:	<input checked="" type="checkbox"/> ⓘ
"From" field contains:	b.friday@wingtiptoy.com <span style="float: right;">{x} ⓘ</span>
"To" field contains:	<span style="float: right;">{x} ⓘ</span>
"Subject" contains:	Report <span style="float: right;">{x} ⓘ</span>
'Body' contains:	Tuesday <span style="float: right;">{x} ⓘ</span>
Save attachments:	Save attachments <span style="float: right;">▼ ⓘ</span>
Save attachments into:	C:\Users\Administrator\Temp <span style="float: right;">📁 {x} ⓘ</span>

> Variables produced RetrievedEmails

🛡️ On error

Save

Cancel

Manage your emails with the **Process email messages** action that requires the variable created by the **Retrieve email messages** action. You can select whether to move, delete, or mark email messages as read/unread.

The following **Send email** action below sends an email from **N. Varga** to **B. Friday**, with **invoicing** in the BCC field. The subject and body contain the **%ReportID%** variable, while the attachment is a file that the flow has processed before.

**Send email**
✕

✉ Creates and sends a new email message [More info](#)

**Select parameters**

From:  {x} ⓘ

Sender display name:  {x} ⓘ

To:  {x} ⓘ

CC:  {x} ⓘ

BCC:  {x} ⓘ

Subject:  {x} ⓘ

Body:  {x} ⓘ

Body Is HTML:  ⓘ

Attachment(s):  {x} ⓘ

> SMTP Server

On error

Save

Cancel

## Retrieve email messages

Retrieves email messages from an IMAP server.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------



Argument	Optional	Accepts	Default Value	Description
IMAP server	No	Text value		The IMAP server address (e.g. imap.gmail.com)
Port	Yes	Numeric value	993	The port to use for the IMAP server. Usually this port is 993
Enable SSL	N/A	Boolean value	True	Specify whether to use a secure connection to communicate with the IMAP Server
User name	No	Text value		The username of the email account to access
Password	No	Direct encrypted input or Text value		The password of the email account to access
Accept untrusted certificates	N/A	Boolean value	False	Specify whether untrusted certificates will be accepted
Mail folder	No	Text value		The name of the IMAP mail-folder (also known as 'mailBox') to retrieve messages from
Retrieve	N/A	All email messages, Unread email messages only, Read email messages only	All email messages	Specify whether to retrieve all messages in the folder or only the unread ones
Mark As read	N/A	Boolean value	True	Specify whether to mark as read the retrieved messages or leave them as is
"From" field contains	Yes	Text value		The full email address of the sender whose messages will be retrieved. Leave this attribute blank to retrieve all messages regardless of the sender
"To" field contains	Yes	Text value		The full email address(es) of the recipient(s) (separated by space if more than one) for the messages that will be retrieved. Leave this attribute blank to retrieve all messages regardless of the recipient(s)

Argument	Optional	Accepts	Default Value	Description
"Subject" contains	Yes	<a href="#">Text value</a>		The key phrase to find within the email subject. Leave this attribute blank to retrieve all emails regardless of their subject
'Body' contains	Yes	<a href="#">Text value</a>		The key phrase to find within the email body. Leave this attribute blank to retrieve all emails regardless of their content
Save attachments	N/A	Save attachments, Do not save attachments	Do not save attachments	Specify whether to save the attachments of the emails retrieved or not
Save attachments into	No	<a href="#">Folder</a>		The folder to save the attachments

## Variables produced

Argument	Type	Description
RetrievedEmails	<a href="#">List of Mail Messages</a>	The retrieved emails for later processing as a list of mail message objects

## Exceptions

Exception	Description
Failed to connect to IMAP server	Indicates that there was a problem connecting to the IMAP server
Failed to authenticate to the IMAP server	Indicates a problem authenticating to the specified IMAP server
Specified mail-folder doesn't exist	Indicates that the specified mail folder wasn't found
Failed to save attachments	Indicates a problem saving the attachments
Failed to retrieve emails	Indicates a problem retrieving the emails

## Process email messages

Moves, deletes or marks as unread an email (or a list of emails) retrieved by a Retrieve emails action.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
IMAP server	No	Text value		The IMAP server address (e.g. imap.gmail.com)
Port	Yes	Numeric value	993	The port to use for the IMAP server. Usually this port is 993
Enable SSL	N/A	Boolean value	True	Specify whether to use a secure connection to communicate with the IMAP server
Username	No	Text value		The username of the email account to access
Password	No	Direct encrypted input or Text value		The password of the email account to access
Accept Untrusted Certificates	N/A	Boolean value	False	Specify whether untrusted certificates will be accepted
Email(s) to process	No	List of Mail Messages		The email or list of emails to process. This parameter should contain a variable populated by a Retrieve emails action
Operation	N/A	Delete emails from server, Mark emails as unread, Move emails to mail folder, Mark emails as unread and move to mail folder	Move emails to mail folder	The operation you want to perform on the specified email messages
Mail folder	No	Text value		The name of the mail folder to which the emails will be moved

## Variables produced

This action doesn't produce any variables.

# Exceptions

Exception	Description
Failed to connect to IMAP server	Indicates that there was a problem connecting to the IMAP server
Specified mail-folder doesn't exist	Indicates that the specified mail folder wasn't found
Failed to process emails	Indicates a problem with processing the specified emails

# Send email

Creates and sends a new email message.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
SMTP server	No	Text value		The SMTP server address
Server port	Yes	Numeric value	25	The port to use for the server. Usually this port is 25
Enable SSL	N/A	Boolean value	False	Specify whether or not to communicate with the server through a secure connection
SMTP Server needs authentication	N/A	Boolean value	False	Specify whether the server requires authentication
User name	No	Text value		The username of the email account to access
Password	No	Direct encrypted input or Text value		The password of the email account to access
Accept untrusted certificates	N/A	Boolean value	False	Specify whether untrusted certificates will be accepted
From	No	Text value		The sender's email address
Sender display name	Yes	Text value		The sender's display name

Argument	Optional	Accepts	Default Value	Description
To	No	Text value		The email(s) of the recipient(s). If more than one email is entered, the list of addresses should be separated by semi-colons
CC	Yes	Text value		The email(s) of the Cc recipient(s). If more than one email is entered, the list of addresses should be separated by semi-colons
BCC	Yes	Text value		The email(s) of the BCC (hidden) recipient(s). If more than one email is entered, the list of addresses should be separated by semi-colons
Subject	Yes	Text value		The subject of the email
Body	Yes	Text value		The body of the email
Body Is HTML	N/A	Boolean value	False	Specify whether the body of the email will be interpreted as HTML coding
Attachment(s)	Yes	List of Files		The full path of any attachment(s), or a file or a list of files. Multiple files should be enclosed in double quotes ("") and separated by a space character

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Invalid email address	Indicates that the specified email address is invalid
Failed to send email	Indicates a problem sending the email
Attachment not found	Indicates that the specified attachment(s) weren't found

# Exchange Server actions

Article • 10/24/2023

## Warning

This group of actions is intended for Exchange Server automation scenarios. To automate Exchange Online, use the corresponding Office 365 cloud connectors in cloud flows.

The Exchange Server actions enable you to connect to an Exchange server and manage your correspondence.

Exchange Server actions require a connection to an Exchange server that you can establish using the **Connect to Exchange server** action.

The following example contains a manually populated server address rather than using auto-discovery. The credentials are set to **user defined**, so the domain, username, and password are manually entered. A set timeout in the **Advanced** section allows the action to return an error if a connection hasn't been established within the specified time frame.

**Connect to Exchange server**
✕

Open a new connection to an Exchange server [More info](#)

**Select parameters**

Exchange server version:  ⓘ

Connection type:  ⓘ

Server address:  {x} ⓘ

Credentials:  ⓘ

Domain:  {x} ⓘ

Username:  {x} ⓘ

Password: ⓘ  ⓘ

▼ **Advanced**

Timeout:  {x} ⓘ

> Variables produced ExchangeConnection

On error

Save

Cancel

To retrieve emails from an exchange server, use the **Retrieve Exchange email messages** action. The following example retrieves email messages from a custom folder named **Receipts**. The filters contain variables that have been previously defined in the desktop flow. The action will save all attachments locally to the specified folder.

**Retrieve Exchange email messages**
✕

Retrieve email messages from the specified Exchange server [More info](#)

**Select parameters**

Exchange connection:	%ExchangeConnection%	▼ ⓘ
Mailbox type:	Personal	▼ ⓘ
Retrieve email messages from custom folder:	<input checked="" type="checkbox"/>	
Mail folder:	Receipts	{x} ⓘ
Retrieve:	All email messages	▼ ⓘ
Mark as read:	<input checked="" type="checkbox"/>	
From contains:	%EmailAddress%	{x} ⓘ
To contains:		{x} ⓘ
Subject contains:	%ReceiptID%	{x} ⓘ
Body contains:	Product ID: %ProductID%	{x} ⓘ
Attachments:	Save attachments	▼ ⓘ
Save attachments into:	C:\Users\Administrator\Documents	📁 {x} ⓘ

> Variables produced RetrievedEmails

🛡️ On error

Save

Cancel

The **Process Exchange email messages** action processes email messages retrieved by the **Retrieve Exchange email messages** action. Use this action to move, delete, or mark email messages as read.

## Connect to Exchange server



Open a new connection to an Exchange server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Exchange server version	N/A	Exchange 2010, Exchange 2010 SP1, Exchange 2010 SP2, Exchange 2013, Exchange 2013 SP1	Exchange 2013 SP1	The version of the Exchange server
Connection type	N/A	Auto discovery, Exchange server address	Auto discovery	Specifies how to connect to the Exchange server
Server address	No	<a href="#">Text value</a>		The Exchange server address
Email address	No	<a href="#">Text value</a>		The Exchange account email address
Credentials	N/A	Exchange default, User defined	Exchange default	Specifies the way to provide the user's Exchange credentials
Domain	Yes	<a href="#">Text value</a>		The Exchange account domain. To extract the account domain from the username, left this field empty
Username	No	<a href="#">Text value</a>		The Exchange account username
Password	No	Direct encrypted input or <a href="#">Text value</a>		The Exchange account password
Timeout	Yes	<a href="#">Numeric value</a>	30	The time in seconds to wait for the connection to be established before the action fails

## Variables produced

Argument	Type	Description
ExchangeConnection	<a href="#">Exchange connection</a>	The specific Exchange connection for use with later Exchange actions

## Exceptions

Exception	Description
Failed to connect to the Exchange server	Indicates a problem connecting to the Exchange server

## Retrieve Exchange email messages

Retrieve email messages from the specified Exchange server.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Exchange connection	No	<a href="#">Exchange connection</a>		The Exchange connection. Create an Exchange connection with the 'Connect to Exchange server' action
Mailbox type	N/A	Personal, Shared	Personal	The type of the mailbox to retrieve email messages from
Shared mailbox address	No	<a href="#">Text value</a>		The address of the shared mailbox to retrieve email messages from
Retrieve email messages from custom folder	N/A	<a href="#">Boolean value</a>	False	Specifies whether to retrieve email messages from a custom folder or a predefined Exchange folder
Exchange folder	N/A	Inbox, Deleted items, Drafts, Outbox, Sent items, Junk email	Inbox	A predefined Exchange folder to retrieve email messages from
Mail folder	No	<a href="#">Text value</a>	Inbox	The name or path (e.g. folder1\folder2) of the mail-folder to retrieve email messages from

Argument	Optional	Accepts	Default Value	Description
Retrieve	N/A	All email messages, Unread email messages only, Read email messages only	Unread email messages only	Specifies whether to retrieve all email messages in the folder or only the unread ones
Mark as read	N/A	Boolean value	True	Specifies whether to mark as read the retrieved email messages or leave them as is
From contains	Yes	Text value		The full email address of the sender to retrieve messages from. Leave this attribute blank to retrieve all messages regardless of the sender
To contains	Yes	Text value		The full email address(es) of the recipient(s) (separated by space if more than one) for the email messages to retrieve. Leave this attribute blank to retrieve all email messages regardless of the recipient(s)
Subject contains	Yes	Text value		The key phrase to find within the email subject. Leave this attribute blank to retrieve all email messages regardless of their subject
Body contains	Yes	Text value		The key phrase to find within the email body. Leave this attribute blank to retrieve all email messages regardless of their content
Attachments	N/A	Save attachments, Do not save attachments	Do not save attachments	Specifies whether to save the attachments of the email messages retrieved or not
Save attachments into	No	Folder		The folder to save the attachments into

## Variables produced

Argument	Type	Description
RetrievedEmails	List of <a href="#">Exchange mail messages</a>	The retrieved email messages for later processing as a list of Exchange mail messages objects

## Exceptions

Exception	Description
Failed to save attachments	Indicates a problem saving the attachments
Specified mail-folder doesn't exist	Indicates that the specified mail folder doesn't exist
Failed to retrieve email messages	Indicates a problem retrieving the email messages

## Send Exchange email message

Create and send a new email message.

The **Send Exchange email message** action creates and sends a new email message upon connecting to an Exchange server. Before adding this action, add the **Connect to Exchange server** action to set up a connection to your Exchange server first. The output of this action is the %ExchangeConnection% variable that should be used as input to the **Send Exchange email message** action.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Exchange connection	No	<a href="#">Exchange connection</a>		The Exchange connection. Create an Exchange connection with the 'Connect to Exchange server' action
From	No	<a href="#">Text value</a>		The sender's email address
Sender display name	Yes	<a href="#">Text value</a>		The sender's display name
To	No	<a href="#">Text value</a>		The email(s) of the recipient(s). To enter more than one email, separate the list of addresses by semi-colons
CC	Yes	<a href="#">Text value</a>		The email(s) of the CC recipient(s). To enter more than one email, separate

Argument	Optional	Accepts	Default Value	Description
				the list of addresses by semi-colons
BCC	Yes	Text value		The email(s) of the BCC (hidden) recipient(s). To enter more than one email, separate the list of addresses by semi-colons
Subject	Yes	Text value		The subject of the email
Body	Yes	Text value		The text of the body
Body is HTML	N/A	Boolean value	False	Specifies whether to interpret the body of the email as HTML coding
Attachment(s)	Yes	List of Files		The full path of any attachment(s). Enclose multiple files in double quotes (") and separate them by a space character

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Attachment not found	Indicates that the specified attachment(s) don't exist
Failed to send email	Indicates a problem sending the email

## Process Exchange email messages

Move, delete or mark as unread an email message (or a list of email messages).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Exchange connection	No	Exchange connection		The Exchange connection. Create an Exchange connection with the

Argument	Optional	Accepts	Default Value	Description
				'Connect to Exchange server' action
Email message(s) to process	No	List of Exchange mail messages		The email message(s) to process. Use a variable populated by a 'Retrieve Exchange email messages' action
Operation	N/A	Delete email messages from server, Mark email messages as unread, Move email messages to mail folder	Move email messages to mail folder	Specifies which operation to perform on the specified email messages
Mailbox type	N/A	Personal, Shared	Personal	The type of the mailbox to retrieve email messages from
Shared mailbox address	No	Text value		The address of the shared mailbox to retrieve email messages from
Move to custom folder	N/A	Boolean value	False	Specifies whether to move email messages to a custom folder or a predefined Exchange folder
Exchange folder	N/A	Inbox, Deleted items, Drafts, Outbox, Sent items, Junk email	Inbox	A predefined Exchange folder to move email messages from
Mail folder	No	Text value	Inbox	The name or path (e.g. folder1\folder2) of the mail-folder to move email messages to

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Specified mail-folder doesn't exist	Indicates that the specified mail folder doesn't exist

**Exception**

Failed to process email messages

**Description**

Indicates a problem processing the specified email messages

# Outlook actions

Article • 01/11/2024

For machines with an installation of Outlook, you can manage your mailboxes with the Outlook actions.

![[IMPORTANT]] Outlook automation actions don't support the [new Outlook for Windows](#) application. Make sure you are using the **Outlook** desktop application.

After creating an Outlook instance with the **Launch Outlook** action, use the **Retrieve email messages from Outlook** action to get the messages from a specified account and mail folder.

## Important

When you filter the retrieved results by modifying the **From contains** or **To contains** argument in the **Retrieve email messages from Outlook** action, using email addresses in plain display format (SMTP) won't yield any data if the email addresses are stored in x.500 format.

The following example retrieves all the email messages from the folder **Tickets**, a subfolder of the Inbox. The specified filters limit the results to messages from a specific sender that contain particular words in their subject and body.



## Retrieve email messages from Outlook ✕

Retrieve email messages from an Outlook account [More info](#)

### Select parameters

Outlook instance:	%OutlookInstance%	v	i
Account:	bart.friday@wingtiptoy.com	{x}	i
Mail folder:	Inbox\Folders\Tickets	{x}	i
Retrieve:	All email messages	v	i
Mark as read:	<input checked="" type="checkbox"/>		i
From contains:	a.dixon@litware.com	{x}	i
To contains:		{x}	i
Subject contains:	%TicketID%	{x}	i
Body contains:	attached	{x}	i
Attachments:	Save attachments	v	i
Save attachments into:	C:\Users\Administrator\Documents\Tickets	📁 {x}	i

> Variables produced RetrievedEmails

🛡️ On error

Save

Cancel

The **Process email messages in Outlook** action processes email messages retrieved by the **Retrieve email messages from Outlook** action. To use this action, you must provide an Outlook instance, an account, and a variable with retrieved emails. Then, you can select whether to move, delete or mark as read the selected messages.

Store Outlook email messages locally using the **Save Outlook email messages** action. Specify an Outlook instance, an account, a variable with the messages to save, and the format and location for the created files.

To close an open Outlook instance, use the **Close Outlook** action.

## Launch Outlook

Launch Outlook and create a new Outlook instance.

### Input parameters

This action doesn't require any input.

### Variables produced

[Expand table](#)

Argument	Type	Description
OutlookInstance	<a href="#">Outlook instance</a>	The specific Outlook instance for use with later Outlook actions

### Exceptions

[Expand table](#)

Exception	Description
Failed to launch Outlook	Indicates a problem launching Outlook

## Retrieve email messages from Outlook

Retrieve email messages from an Outlook account.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Outlook instance	No	<a href="#">Outlook instance</a>		The Outlook instance to work with. Specify this variable in a 'Launch Outlook' action

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Account	No	Text value		The name of the Outlook account (data file name) to work with
Mail folder	No	Text value		The name of the folder to retrieve messages from. Enter the full folder path for subfolders (ex: Inbox\Work)
Retrieve	N/A	All email messages, Unread email messages only, Read email messages only	All email messages	Specifies whether to retrieve all messages in the folder or only the unread ones
Mark as read	N/A	Boolean value	True	Specifies whether to mark as read all the unread messages retrieved
From contains	Yes	Text value		The full email address of the sender whose messages to retrieve. Leave this attribute blank to retrieve all messages regardless of the sender
To contains	Yes	Text value		The full email address(es) of the recipient(s) (separated by space or semicolon if more than one) for the messages to retrieve. Leave this attribute blank to retrieve all messages regardless of the recipient(s)
Subject contains	Yes	Text value		The key phrase to find within the email subject. Leave this attribute blank to retrieve all email messages regardless of their subject
Body contains	Yes	Text value		The key phrase to find within the email body. Leave this attribute blank to retrieve all email messages regardless of their content
Attachments	N/A	Save attachments, Don't save	Don't save attachments	Specifies whether to save the attachments of the email

Argument	Optional	Accepts	Default Value	Description
		attachments		messages retrieved or not
Save attachments into	No	Folder		The path to save the attachments of the retrieved emails into

## Variables produced

[Expand table](#)

Argument	Type	Description
RetrievedEmails	List of Outlook mail messages	The retrieved email messages for later processing. The variable contain a list of Outlook message objects

## Exceptions

[Expand table](#)

Exception	Description
Failed to find Outlook account	Indicates that the specified Outlook account doesn't exist
Mail-folder specified not valid in Outlook	Indicates that the specified mail folder isn't valid
Directory for saving attachments not found	Indicates that the directory to save the attachments into doesn't exist
Failed to retrieve email messages from Outlook	Indicates a problem retrieving the email messages from Outlook

## Send email through Outlook

Create and send a new email message through Outlook.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Outlook instance	No	<a href="#">Outlook instance</a>		The Outlook instance to work with. Specify this variable in a 'Launch Outlook' action
Account	No	<a href="#">Text value</a>		The name of the Outlook account (data file name) to work with
Send email from	N/A	Account, Other mailbox	Account	Specifies whether to send the email using the specified account or a different one, for example from a shared mailbox
Send from	No	<a href="#">Text value</a>		The name of the Outlook account to send the email from; for example, a shared mailbox.
To	No	<a href="#">Text value</a>		The email address(es) of the recipient(s). To enter more than one email address, separate the list of addresses by spaces or semicolons
CC	Yes	<a href="#">Text value</a>		The email address(es) of the CC recipient(s). To enter more than one email address, separate the list of addresses by spaces or semicolons
BCC	Yes	<a href="#">Text value</a>		The email address(es) of the BCC (hidden) recipient(s). To enter more than one email address, separate the list of addresses by spaces or semicolons
Subject	Yes	<a href="#">Text value</a>		The subject of the email
Body	Yes	<a href="#">Text value</a>		The text of the body
Body is HTML	N/A	<a href="#">Boolean value</a>	False	Specifies whether to interpret the body of the email as HTML coding
Attachment(s)	Yes	<a href="#">List of Files</a>		The full path of any attachment(s). Enclose multiple files in double quotes (") and separate them by a space character

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to find Outlook account	Indicates that the specified Outlook account doesn't exist. Power Automate doesn't throw this error for the email addresses populated in the <b>Send from</b> input parameter
Failed to send email	Indicates a problem sending the email
Attachment not found	Indicates that the specified attachment(s) don't exist

## Process email messages in Outlook

Move or deletes an email (or a list of email messages) retrieved by a 'Retrieve emails from Outlook' action.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Outlook instance	No	<a href="#">Outlook instance</a>		The Outlook instance to work with. Specify this variable in a 'Launch Outlook' action
Account	No	<a href="#">Text value</a>		The name of the Outlook account (data file name) to work with
Email messages to process	No	<a href="#">List of Outlook mail messages</a>		The email message(s) to process. Use a variable populated by a 'Retrieve email messages from Outlook' action
Operation	N/A	Delete email messages, Move email messages to mail folder, Mark as unread	Move email messages to mail folder	Specifies which operation to perform on the specified email messages

Argument	Optional	Accepts	Default Value	Description
Mail folder	No	<a href="#">Text value</a>		The name of the folder to retrieve messages from. Enter the full folder path for subfolders (for example, Inbox\Work)

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to find Outlook account	Indicates that the specified Outlook account doesn't exist
Specified mail-folder doesn't exist	Indicates that the specified mail folder doesn't exist
Failed to process email messages in Outlook	Indicates a problem processing the specified email messages in Outlook

## Save Outlook email messages

Save Outlook email messages given an account.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Outlook instance	No	<a href="#">Outlook instance</a>		The Outlook instance to work with. Specify this variable in a 'Launch Outlook' action
Account	No	<a href="#">Text value</a>		The name of the Outlook account (data file name) to

Argument	Optional	Accepts	Default Value	Description
				work with
Email message(s) to save	No	<a href="#">List of Outlook mail messages</a>		The email message(s) to save. Use a variable populated by a 'Retrieve email messages from Outlook' action
Save format	N/A	Text only (.txt), Outlook template (.oft), Outlook message format (.msg), Outlook message format - Unicode (.msg), HTML (.html), MHT files (.mht)	Outlook message format (*.msg)	Specifies the format to save the messages
File name	N/A	Default, Custom	Default	Specifies whether to save the messages using the default name (subject) or provide another
Save as	No	<a href="#">Text value</a>		Specifies the custom name for messages' name, which differs from message to message by an automatically added suffix
Save email message(s) to	No	<a href="#">Folder</a>		The folder to save the messages to

## Variables produced

 [Expand table](#)

Argument	Type	Description
StoredMessagesFiles	<a href="#">List of Text values</a>	The file paths of the saved email messages for later processing

## Exceptions

 [Expand table](#)



Exception	Description
Failed to find Outlook account	Indicates that the specified Outlook account doesn't exist
Directory not found	Indicates that the specified email message(s) couldn't be saved because the directory doesn't exist
Email message is deleted or moved to another folder	Indicates that the specified email message(s) couldn't be saved because they're moved or deleted
Failed to save email message(s)	Indicates a problem saving the specified email message(s)

## Respond to Outlook mail message

Respond to an Outlook message, by replying, replying to all or forwarding it.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Outlook instance	No	<a href="#">Outlook instance</a>		The Outlook instance to work with. Specify this variable in a 'Launch Outlook' action
Account	No	<a href="#">Text value</a>		The name of the Outlook account (data file name) to work with
Mail message	No	<a href="#">Outlook mail message</a>		The mail message to act upon. Use a variable populated by a 'Retrieve email messages from Outlook' action
Response action	N/A	Reply, Reply all, Forward	Reply	Specifies whether to reply (to sender or all) with a message or forward the received message
To	No	<a href="#">Text value</a>		The email address(es) of the recipient(s). To enter more than one email address, separate the list of addresses by spaces or semicolons
CC	Yes	<a href="#">Text value</a>		The email address(es) of the CC recipient(s). To enter more than one email address, separate the list of addresses by spaces or semicolons

Argument	Optional	Accepts	Default Value	Description
BCC	Yes	<a href="#">Text value</a>		The email address(es) of the BCC (hidden) recipient(s). To enter more than one email address, separate the list of addresses by spaces or semicolons
Body	Yes	<a href="#">Text value</a>		The text of the body
Attachment(s)	Yes	<a href="#">List of Files</a>		The full path of any attachment(s). Enclose multiple files in double quotes ("") and separate them by a space character

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Failed to find Outlook account	Indicates that the specified Outlook account doesn't exist
Failed to send email	Indicates a problem sending the email
Attachment not found	Indicates that the specified attachment(s) don't exist

## Close Outlook

Close a previously launched Outlook instance.

## Input parameters


[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Outlook instance	No	<a href="#">Outlook instance</a>		The Outlook instance to work with. This variable is specified in a 'Launch Outlook' action

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Failed to close Outlook instance	Indicates a problem closing the Outlook instance

# Message boxes actions

Article • 10/23/2023

You can use message boxes in your desktop flows to interact with users, request input, and provide an output.

To display a message to the user while a flow runs, use the **Display message** action. You must specify the title of the message box, its content, the icon and the buttons in the box to be displayed. Moreover, you might set a default button to be preselected as well as to indicate if the message box should always be on top of all other windows on your machine and whether the message box is to be closed automatically after a certain amount of time.

The example here displays a message box that informs the user that parsing is complete and asks whether to parse another file. The message box displays a question icon and always is on top of other windows. The **ButtonPressed** variable will store the user's selection.

### Display message ✕

🗨 Displays a message box [More info](#)

**Select parameters**

Message box title:  {x} ⓘ

Message to display: 

%FileName% parsing is finished. Do you want to parse a new file?

{x} ⓘ

Message box icon:  ⌵ ⓘ

Message box buttons:  ⌵ ⓘ

Default button:  ⌵ ⓘ

Keep message box always on top:  ⓘ

Close message box automatically:  ⓘ

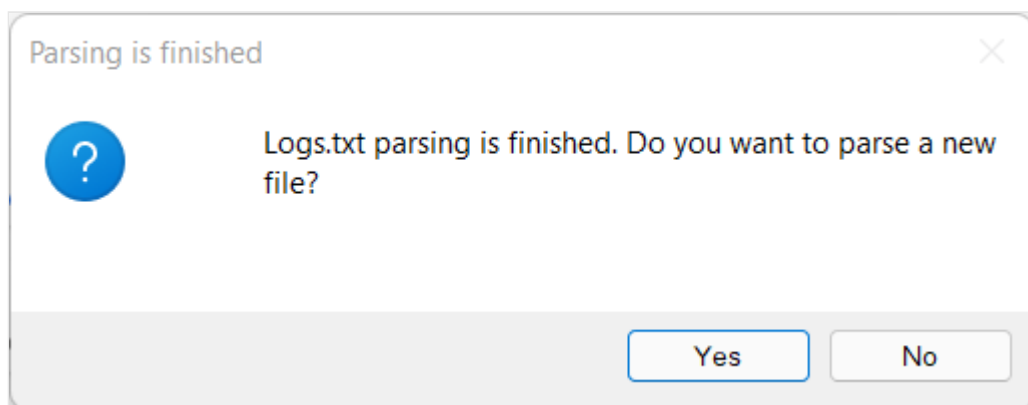
> Variables produced ButtonPressed

🛡 On error

Save

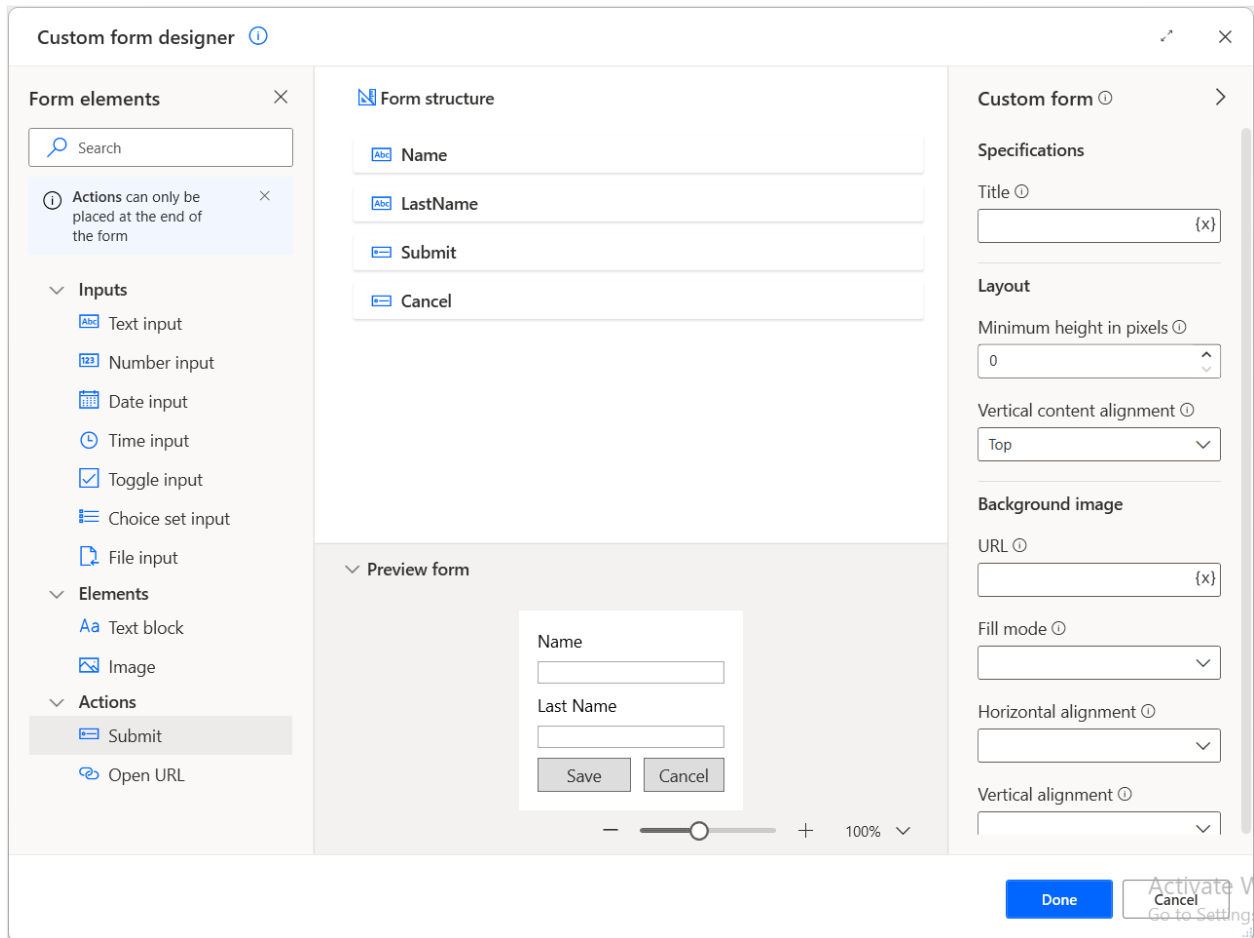
Cancel

The created message box should look like the following example:



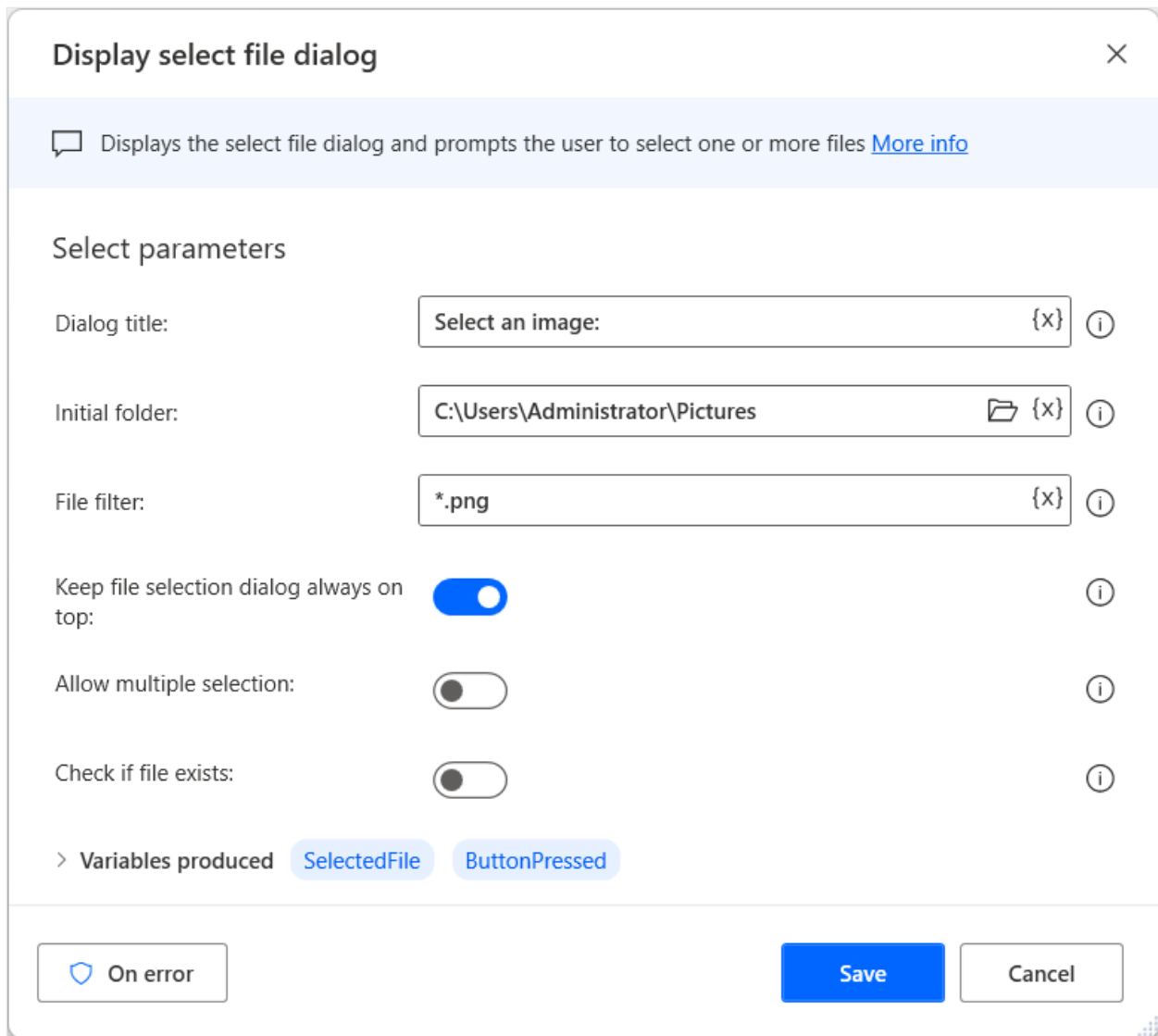
In addition to this, you might create a custom form for displaying a message as part of your flow with the use of the **Display custom form** action. A custom form accepts

multiple elements, and you can create a custom form that contains various input types and buttons. More information: [Create custom forms](#).

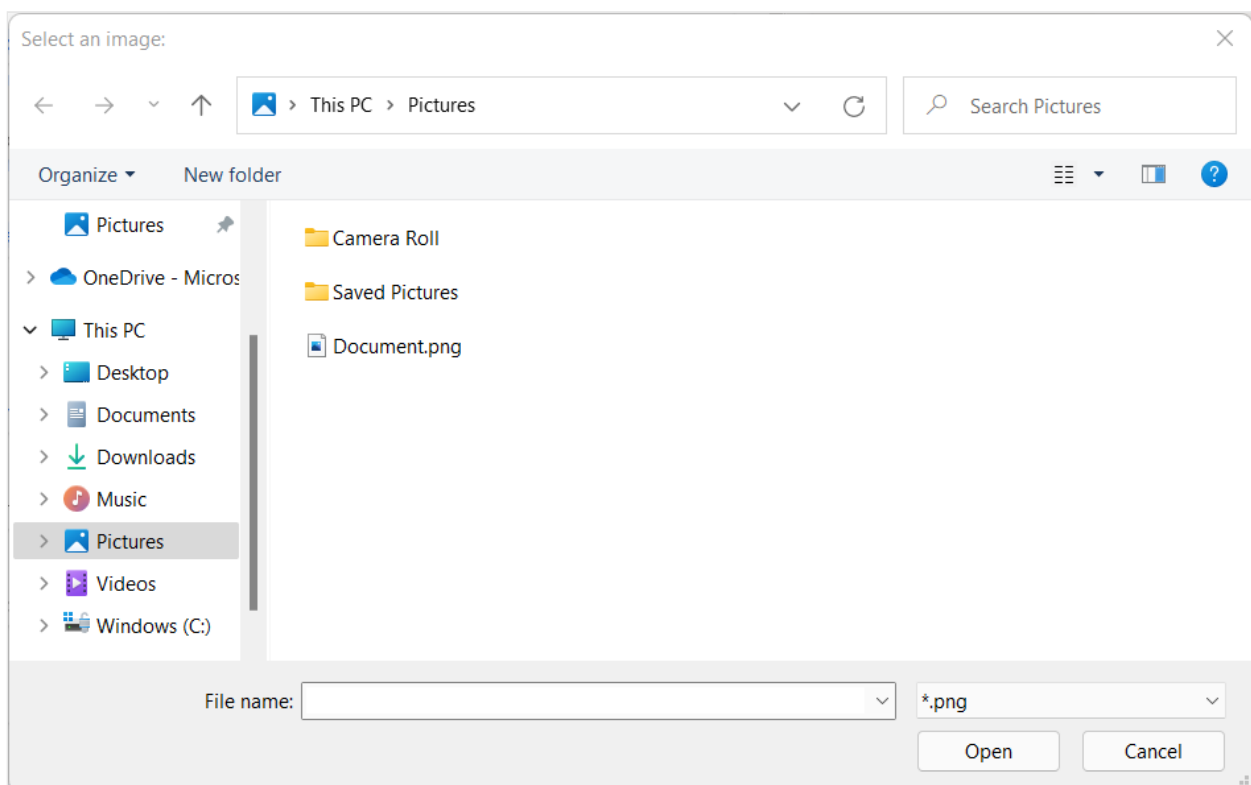


To request input data using a dialog, deploy the **Display input dialog** action. This action requires a title for the dialog and a message as a prompt for the user. Optionally, you can set a default value and an input type (single line, multiline, or password).

Use the **Display select file dialog** action to prompt users to browse for a file. The following example prompts you to select an image file. A variable specifies the initial folder, and the file filter limits the available selections to specific file extensions.



The created file dialog should look like the following example. You can see the specified filter in the bottom right corner of the dialog.



# Display message

Displays a message box.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Message box title	Yes	Text value		The text to use as the message box title
Message to display	Yes	Text value		The text to display as the actual message
Message box icon	N/A	None, Information, Question, Warning, Error	None	The icon to display with the message box
Message box buttons	N/A	OK, OK - Cancel, Yes - No, Yes - No - Cancel, Abort - Retry - Ignore, Retry - Cancel	OK	The buttons to display on the message box
Default button	N/A	First button, Second button, Third button	First button	The button to highlight by default. If the user presses <b>Enter</b> , this button will be pressed
Keep message box always on top	N/A	Boolean value	False	Specify whether the message box should always remain on top of all other windows
Close message box automatically	N/A	Boolean value	False	Specify whether the message box closes automatically after a preset time, as if the default button was pressed. Otherwise, the flow will wait until a button is pressed by the user
Timeout	Yes	Numeric value	3	The seconds to pause the automation while waiting for input, until continuing automatically

## Variables produced



Argument	Type	Description
ButtonPressed	Text value	The text of the button pressed

## Exceptions

Exception	Description
Failed to display message box	Indicates a problem displaying the message dialog
Can't display message box in noninteractive mode	Indicates a problem displaying the message dialog in non-interactive mode

## Display input dialog

Displays a dialog box that prompts the user to enter text.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Input dialog title	Yes	Text value		The dialog title
Input dialog message	Yes	Text value		The dialog message
Default value	Yes	Text value		Specify the text to display by default. If the user wishes to change this text, they can type over it. Otherwise, the default text will be used
Input type	N/A	Single line, Password, Multiline	Single line	The format for the input text. Choose Single line - password to hide the text or multiline so that a larger display box makes visible more than one line of text
Keep input dialog always on top	N/A	Boolean value	False	Specify whether the input dialog should always remain on top of all other windows

### Variables produced

Argument	Type	Description
UserInput	Text value	The text entered by the user, or the default text
ButtonPressed	Text value	The text of the button pressed. The user will automatically be given the choice of OK or Cancel

## Exceptions

Exception	Description
Failed to display input dialog	Indicates a problem displaying the input dialog
Can't display input dialog in non-interactive mode	Indicates a problem displaying the input dialog in non-interactive mode

## Display select date dialog

Displays a dialog box that prompts the user to enter a date or date range.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Dialog title	Yes	Text value		The dialog title
Dialog message	Yes	Text value		The dialog message
Dialog type	N/A	Single date, Date range (two Dates)	Single date	Whether the user will enter a single date or two dates as the endpoints of a range of dates
Prompt for	N/A	Date only, Date and time	Date only	Specify whether the user will enter the date only or the date and time
Default value	Yes	Datetime		The default value for the date
Default value for second date	Yes	Datetime		The default value for the end date in a range
Keep date selection dialog always on top	N/A	Boolean value	False	Specify whether the date selection dialog should always

Argument	Optional	Accepts	Default Value	Description
				remain on top of all other windows

## Variables produced

Argument	Type	Description
SelectedDate	<a href="#">Datetime</a>	The date entered by the user or the default date
SecondSelectedDate	<a href="#">Datetime</a>	The second date entered by the user or that default date
ButtonPressed	<a href="#">Text value</a>	The text of the button pressed by the user. The user will automatically be given the choice of OK or Cancel

## Exceptions

Exception	Description
Failed to display select date dialog	Indicates a problem displaying the select date dialog
Can't display select date dialog in non interactive mode	Indicates a problem displaying the input dialog in non-interactive mode

## Display select from list dialog

Displays a dialog box with options that lets the user select from a list.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Dialog title	Yes	<a href="#">Text value</a>		The dialog title
Dialog message	Yes	<a href="#">Text value</a>		The dialog message
List to choose from	No	<a href="#">General value</a>		The list to display as a drop-down menu for the user to choose from

Argument	Optional	Accepts	Default Value	Description
Keep select dialog always on top	N/A	Boolean value	False	Specify whether the select dialog should always remain on top of all other windows
Limit to list	N/A	Boolean value	True	Whether to allow the user to enter their own answer outside of the list being displayed
Allow empty selection	N/A	Boolean value	False	Allow the user to not select anything, creating an empty selected item output
Allow multiple selections	N/A	Boolean value	False	Allow the user to select more than one choice. The selected item and selected index variables will hold a list of items
Preselect items starting with a + sign	N/A	Boolean value	False	Specify whether the items with a prepended '+' sign will appear automatically preselected

## Variables produced

Argument	Type	Description
SelectedItem	Text value	The item selected from the list as text
SelectedItems	List of Text values	The items selected from the list as a list of text
SelectedIndex	Numeric value	The index number of the item selected from the list. You can use the item number instead of the full text of your choice
SelectedIndexes	List of Numeric values	The index number of the items selected from the list. This parameter allows you to use the item number instead of the full text of your choice
ButtonPressed	Text value	The name of the button pressed by the user (OK or Cancel)

## Exceptions

Exception	Description
Failed to display select dialog	Indicates a problem displaying the select dialog
Can't display select dialog in noninteractive mode	Indicates a problem displaying the input dialog in non-interactive mode

# Display select file dialog

Displays the select file dialog and prompts the user to select one or more files.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Dialog title	Yes	Text value		The dialog title
Initial folder	Yes	Folder		The initial folder to open when browsing for a file. This folder is where the select file dialog action will start the user looking for the file(s)
File filter	Yes	Text value		A filter to limit the files retrieved. This parameter allows wild cards, for example ".txt" or "document?.doc" (without the quotes). To allow the user to choose from multiple file filters, separate the choices with a semi-colon, for example ".txt;*.exe"
Keep file selection dialog always on top	N/A	Boolean value	False	Whether the file selection dialog should always remain on top of all other windows
Allow multiple selections	N/A	Boolean value	False	Whether the user will be able to select more than one file or not
Check if file exists	N/A	Boolean value	False	Whether only files that already exist will be accepted

## Variables produced

Argument	Type	Description
SelectedFile	File	The file that will be selected through the dialog
SelectedFiles	List of Files	The file(s) selected
ButtonPressed	Text value	The text of the button pressed. The user will automatically be given the choice of Open or Cancel

# Exceptions

Exception	Description
Failed to display select file dialog	Indicates a problem displaying the select file dialog
Can't display select file dialog in noninteractive mode	Indicates a problem displaying the input dialog in non-interactive mode

## Display select folder dialog

Displays the select folder dialog and prompts the user to select a folder.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Dialog description	Yes	Text value		The description of the select folder dialog For example, "Please select the folder into which you wish to copy the files"
Initial folder	Yes	Folder		The initial folder to open. This folder will be the default folder unless the user picks a new one
Keep folder selection dialog always on top	N/A	Boolean value	False	Whether the folder selection dialog should always remain on top of all other windows

### Variables produced

Argument	Type	Description
SelectedFolder	Folder	The selected folder
ButtonPressed	Text value	The text of the button pressed. The user will automatically be given the choice of OK or Cancel

### Exceptions

Exception	Description
Failed to display select folder dialog	Indicates a problem displaying the select folder dialog
Can't display select folder dialog in noninteractive mode	Indicates a problem displaying the input dialog in non-interactive mode

## Display custom form

Display a customized form that can include multiple types of elements, like text, number or file inputs etc.

### Input parameters

Input parameters are configured through the [custom form designer](#).

### Variables produced

Argument	Type	Description
CustomFormData	<a href="#">Custom object</a>	A custom object containing the user's input
ButtonPressed	<a href="#">Text value</a>	The ID of the button pressed

### Exceptions

Exception	Description
Failed to display custom form	Indicates a problem displaying the custom form

# Mouse and keyboard actions

Article • 12/16/2022


Simulate keyboard activity with the **Send Keys** action. To insert special keys, such as the arrow keys and Caps Lock, and modifiers, such as Shift and Control, select **Insert special key**.

The following examples add a signature to an email message, starting with two line breaks. Then, the action sends **Ctrl + A** and **Ctrl + C** to select and copy the text to the clipboard.

## ⓘ Note

To use a key as a modifier, use the curly brackets notation for both keys.

### Send keys

 Sends keys to the application that is currently active [More info](#)

Select parameters

Send keys to:  ⓘ

Text to send:  ⓘ

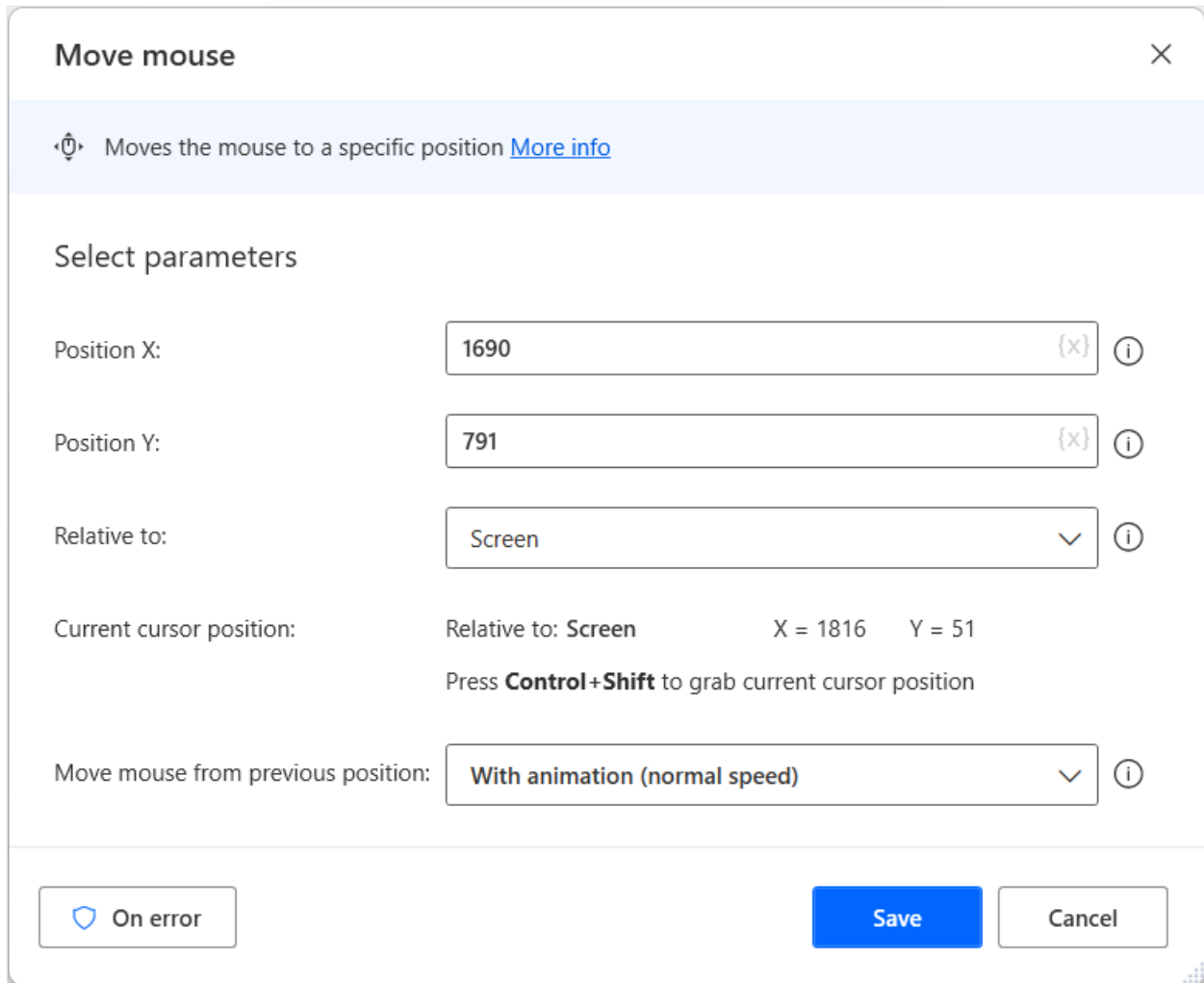
`{Return}{Return}Kind regards,{Return}Norbert Verga  
{Control}{{A}}{Control}{{C}}`

Delay between keystrokes:  ⓘ

Send Text as hardware keys:



To simulate mouse movements, use the **Move mouse** action. The following example moves the mouse manually to specific coordinates at normal speed.



The image shows a dialog box titled "Move mouse" with a close button (X) in the top right corner. Below the title bar, there is a description: "Moves the mouse to a specific position" followed by a link to "More info".


The main section is titled "Select parameters" and contains the following fields:

- Position X:** A text input field containing the value "1690". To the right of the field is a small icon of a mouse cursor and an information icon (i).
- Position Y:** A text input field containing the value "791". To the right of the field is a small icon of a mouse cursor and an information icon (i).
- Relative to:** A dropdown menu with "Screen" selected. To the right is an information icon (i).
- Current cursor position:** This section displays "Relative to: Screen" and "X = 1816 Y = 51". Below this, it says "Press **Control+Shift** to grab current cursor position".
- Move mouse from previous position:** A dropdown menu with "With animation (normal speed)" selected. To the right is an information icon (i).

At the bottom of the dialog, there are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".



Move the mouse to a specific image on the screen with the **Move mouse to image** action. The following example moves the cursor to the first occurrence of the search icon and left-clicks it.


## Move mouse to image ✕


 Moves the mouse over an image found on screen or on the foreground window [More info](#)


### Select parameters


Image to move mouse to


 Recycle Bin 

 Select image(s)

Mouse movement style:  

Occurrence:  

Send a click after moving mouse:  

Click type:  

> **Advanced**

> Variables produced X Y

In the **Advanced** section of the action, you can see that the action waits 30 seconds for the image to appear in the foreground window, and the mouse will point to the center of the image.

## Move mouse to image ✕

Moves the mouse over an image found on screen or on the foreground window [More info](#)

▼ **Advanced**

Wait for image to appear:  (i)

Fail timeout:  (i)

Seconds before click:  (i)

Image matching algorithm:  (i)

Mouse position relative to image: 

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<span>(i)</span>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

(i)

Offset X:  (x) (i)

Offset Y:  (x) (i)

Tolerance:  (i)

Search for image on:  (i)

Search mode:  (i)

> Variables produced X Y

## Block Input

Blocks user mouse and keyboard input, so that the flow can perform mouse and keyboard actions without interference from the user.

### (i) Important

Because of its critical functionality, the **Block input** action requires elevated rights to run. Therefore, before using the action, ensure that Power Automate runs with administrator rights. To find more information regarding running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Block it	N/A	Boolean value	True	Specify whether to block or unblock mouse and keyboard input

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't block/unblock user input in non interactive mode	Indicates a problem blocking/unblocking input in non-interactive mode
Failed to block/unblock input	Indicates a problem blocking/unblocking input

## Get mouse position

Retrieves the current position of the mouse cursor on the screen in pixel coordinates.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Relative to	N/A	Screen, Foreground window	Screen	Specify whether to retrieve the mouse position in screen coordinates or relative to the top left corner of the active window

## Variables produced

Argument	Type	Description
MousePosX	Numeric value	The horizontal (X) value of the mouse position
MousePosY	Numeric value	The vertical (Y) value of the mouse position

## Exceptions

Exception	Description
Can't retrieve the mouse position in non interactive mode	Indicates a problem retrieving the mouse cursor position in non-interactive mode

## Move mouse

Moves the mouse to a specific position.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Position X	No	<a href="#">Numeric value</a>		The horizontal (X) value of the position to send the mouse to
Position Y	No	<a href="#">Numeric value</a>		The vertical (Y) value of the position to send the mouse to
Relative to	N/A	Screen, Active window, Current mouse position	Screen	Specify whether the new mouse position will be relative to the top left corner of the screen, the foremost window, or the current mouse position
Move mouse from previous position	N/A	Instant, With animation (low speed), With animation (normal speed), With animation (high speed)	Instant	Specify how to move the mouse

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't move mouse in non interactive mode	Indicates a problem moving the mouse in non-interactive mode

Exception	Description
Failed to move mouse	Indicates a problem moving the mouse

## Move mouse to image

Moves the mouse over an image found on screen or on the foreground window.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Image to move mouse to	No	<a href="#">List of Images</a>		The list of Images to move the mouse to
Mouse movement style	N/A	Instant, With animation (low speed), With animation (normal speed), With animation (high speed)	Instant	Specify the style of movement in which the mouse will move from its previous position to the beginning of the recorded route (or to its final position)
Occurrence	Yes	<a href="#">Numeric value</a>	1	The occurrence of the image found to move the mouse to
Send a click after moving mouse	N/A	<a href="#">Boolean value</a>	False	Specify whether to send a click after the mouse is positioned over the image
Click type	N/A	Left click, Right click, Double click, Middle click, Left button down, Left button up, Right button down, Right button up	Left click	The mouse click to send to the image
Wait for image to appear	N/A	<a href="#">Boolean value</a>	True	Choose whether you want the action to wait if the image isn't found on the screen or foreground window
Fail timeout	Yes	<a href="#">Numeric value</a>	0	The fail timeout in seconds

Argument	Optional	Accepts	Default Value	Description
Seconds before click	Yes	Numeric value	0	The number of seconds to wait before sending the click
Image matching algorithm	N/A	Basic, Advanced	Basic	Which image algorithm to use when searching for image
Mouse position relative to image	N/A	top left corner, top center, top right corner, middle left part, center, middle right part, bottom left corner, bottom center, bottom right corner	center	The section of the image the mouse will be moved to
Offset X	No	Text value	0	The pixels to offset the mouse from the position to the right
Offset Y	No	Text value	0	The pixels to offset the mouse from the position down
Tolerance	Yes	Numeric value	10	Specify how much the specified image can differ from the originally chosen image
Search for image on	N/A	Entire screen, Foreground window only	Entire screen	Specify whether to search for the specified Image in the foremost window only, or the entire visible screen. Neither choice will find the image if it isn't clearly visible on the screen
Search mode	N/A	Search whole screen or foreground window, Search on specified subregion of screen or foreground window	Search whole screen or foreground window	Specify whether to scan the entire screen (or window) to find the supplied image or only a subregion of it
X1	Yes	Numeric value		The starting X of the subregion to search in
Y1	Yes	Numeric value		The starting Y of the subregion to search in

Argument	Optional	Accepts	Default Value	Description
X2	Yes	<a href="#">Numeric value</a>		The ending X of the subregion to search in
Y2	Yes	<a href="#">Numeric value</a>		The ending Y of the subregion to search in

## Variables produced

Argument	Type	Description
X	<a href="#">Numeric value</a>	The X coordinate of the point where the image is found on the screen. If the image is being searched for on the foreground window, the coordinate returned is relative to the top left corner of the window
Y	<a href="#">Numeric value</a>	The Y coordinate of the point where the image is found on the screen. If the image is being searched for on the foreground window, the coordinate returned is relative to the top left corner of the window

## Exceptions

Exception	Description
Image not found on screen	Indicates that the specified image wasn't found on the screen
Can't move mouse in non interactive mode	Indicates a problem moving the mouse in non-interactive mode
Failed to move mouse	Indicates a problem moving the mouse
Invalid subregion coordinates	Indicates that the coordinates of the given subregion were invalid
Not enough Image occurrences found on screen	Indicates that not enough occurrences of the specified Image were found on the screen

## Move mouse to text on screen (OCR)

Moves the mouse over a text found on the screen or on the foreground window using OCR.

## Input parameters

---



<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
OCR engine type	No	OCR engine variable, Tesseract engine	OCR engine variable	The OCR engine type to use. Select a preconfigured OCR engine or set up a new one.
OCR engine variable	No	<a href="#">OCREngineObject</a>		The OCR engine to search for the text with
Text to find	No	<a href="#">Text value</a>		The text to move the mouse over
Is regular expression	N/A	<a href="#">Boolean value</a>	False	Whether to use a regular expression to look for the text on screen
Occurrence	Yes	<a href="#">Numeric value</a>	1	A positive number that will be used as the occurrence of the input text on screen
Search for text on	N/A	Entire screen, Foreground window only	Entire screen	Whether to look for the specified text in the foremost window only or the entire visible screen. Neither choice will find the text if it isn't clearly visible on the screen
Search mode	N/A	Whole of specified source, Specific subregion only, Subregion relative to image	Whole of specified source	Whether to scan the entire screen (or window) to find the supplied text or only a narrow subregion of it

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Image(s)	No	<a href="#">List of Images</a>		The image(s) specifying the subregion (relative to the top left corner of the image) to scan for the supplied text
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion to scan for the supplied text
Tolerance	Yes	<a href="#">Numeric value</a>	10	Specify how much the image(s) searched for can differ from the originally chosen image
Y1	Yes	<a href="#">Numeric value</a>		The start Y coordinate of the subregion to scan for the supplied text
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion relative to the specified image to scan for the supplied text
X2	Yes	<a href="#">Numeric value</a>		The end X coordinate of the subregion to scan for the supplied text

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Y1	Yes	<a href="#">Numeric value</a>		The start Y coordinate of the subregion relative to the specified image to scan for the supplied text
Y2	Yes	<a href="#">Numeric value</a>		The end Y coordinate of the subregion to scan for the supplied text
X2	Yes	<a href="#">Numeric value</a>		The end X coordinate of the subregion relative to the specified image to scan for the supplied text
Y2	Yes	<a href="#">Numeric value</a>		The end Y coordinate of the subregion relative to the specified image to scan for the supplied text
Move mouse from previous position	N/A	Instant, With animation (low speed), With animation (normal speed), With animation (high speed)	Instant	The style of movement in which the mouse will move from its previous position to its final position
Windows OCR language	N/A	Chinese (Simplified), Chinese (Traditional), Czech, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian (Cyrillic), Serbian (Latin), Slovak, Spanish, Swedish, Turkish	English	The language of the text that the Windows OCR engine detects

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Use other language	N/A	Boolean value	False	Specifies whether to use a language not given in the 'Tesseract language' field
Tesseract language	N/A	English, German, Spanish, French, Italian	English	The language of the text that the Tesseract engine detects
Language abbreviation	No	Text value		The Tesseract abbreviation of the language to use. For example, if the data is 'eng.traineddata', set this parameter to 'eng'
Language data path	No	Text value		The path of the folder that holds the specified language's Tesseract data
Image width multiplier	No	Numeric value	1	The width multiplier of the image
Image height multiplier	No	Numeric value	1	The height multiplier of the image
Wait for text to appear	N/A	Boolean value	False	Specify whether to wait if the text isn't found on the screen or foreground window
Fail if text doesn't appear within	Yes	Numeric value	10	The number of seconds to wait for the supplied text to appear

Argument	Optional	Accepts	Default Value	Description
Send a click after moving mouse	N/A	<a href="#">Boolean value</a>	False	Specify whether to send a click after the mouse is positioned over the text
Click type	N/A	Left click, Right click, Double click, Middle click, Left button down, Left button up, Right button down, Right button up	Left click	The mouse click type to send to the text
Wait before clicking for	Yes	<a href="#">Numeric value</a>	1	The number of seconds to wait before clicking
Mouse position relative to text	N/A	Top left, Top center, Top right, Middle left, Middle center, Middle right, Bottom left, Bottom center, Bottom right	Middle center	Specify which section of the text the mouse will be moved to
Offset X	No	<a href="#">Text value</a>	0	Offset the mouse from the position by this many pixels to the right
Offset Y	No	<a href="#">Text value</a>	0	Offset the mouse from the position by this many pixels down
Image matching algorithm	N/A	Basic, Advanced	Basic	Which image algorithm to use when searching for image

### ⓘ Note

Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

## Variables produced

Argument	Type	Description
LocationOfTextFoundX	Numeric value	The X coordinate of the point where the text is found on the screen. If the text is searched for in the foreground window, this coordinate is relative to the top left corner of the window
LocationOfTextFoundY	Numeric value	The Y coordinate of the point where the text is found on the screen. If the text is searched for in the foreground window, this coordinate is relative to the top left corner of the window
WidthOfTextFound	Numeric value	The width of the area the text was found on
HeightOfTextFound	Numeric value	The width of the area the text was found on

## Exceptions

Exception	Description
Text not found on screen	Indicates that the specified text couldn't be found on the screen
Can't move mouse in non interactive mode	Indicates a problem moving the mouse in non-interactive mode
Failed to move mouse	Indicates a problem moving the mouse
Invalid subregion coordinates	Indicates that the coordinates of the given subregion were invalid
Failed to create the OCR engine	Indicates an error occurred while trying to create the OCR engine
Data path folder doesn't exist	Indicates that the folder specified for the language data doesn't exist
The selected Windows language pack isn't installed on the machine	Indicates that the selected Windows language pack hasn't been installed on the machine
OCR engine isn't alive	Indicates that the OCR engine isn't alive

## Send mouse click

Sends a mouse click event.

 **Important**

To prevent unauthorized access, Power Automate needs to run with the same or higher privileges as the applications it automates. To use the **Send mouse click** action to interact with applications that run with elevated privileges, run Power Automate as administrator. You can find more information regarding running Power Automate as an administrator in [Run Power Automate with elevated rights](#).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Mouse event to send	N/A	Left click, Right click, Double click, Middle click, Left button down, Left button up, Right button down, Right button up	Left click	Specify what form of mouse event to send
Wait	Yes	<a href="#">Numeric value</a>	0	The time to delay before sending the mouse event in 1/1000 of a second
Move mouse	N/A	<a href="#">Boolean value</a>	False	Move mouse
X	No	<a href="#">Numeric value</a>		The horizontal (X) position of the mouse in pixel coordinates
Y	No	<a href="#">Numeric value</a>		The vertical (Y) position of the mouse in pixel coordinates
Relative to	N/A	Screen, Active window, Current mouse position	Screen	Specify whether the new mouse position will be relative to the top left corner of the screen, the foremost window, or the current mouse position
Mouse movement style	N/A	Instant, With animation (low speed), With animation (normal speed), With animation (high speed)	Instant	The style of movement in which the mouse will move from its previous position to the beginning of the recorded route (or to its final position)

## Variables produced

This action doesn't produce any variables.

# Exceptions

Exception	Description
Can't send mouse click in non interactive mode	Indicates a problem sending a mouse click in non-interactive mode
Mouse click out of screen bounds	Indicates that the mouse click was out of the screen bounds
Failed to send mouse click	Indicates a problem sending a mouse click

## Send keys

Sends keys to the application that is currently active.

### Important

To prevent unauthorized access, Power Automate needs to run with the same or higher privileges as the applications it automates. To use the **Send keys** action to interact with applications that run with elevated privileges, run Power Automate as administrator. To find more information regarding running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Send keys to	N/A	Foreground window, By UI element, By window instance/handle, By title and/or class	Foreground window	Specify whether to send the keys to the foreground window or to a UI element or to a window instance or a combination of window title/class
Text to send	No	Direct encrypted input or <a href="#">Text value</a>		The text to send to the application
Delay between keystrokes	Yes	<a href="#">Numeric value</a>	10	Specify the delay in milliseconds between sending keystrokes to avoid input errors



Argument	Optional	Accepts	Default Value	Description
Send Text as hardware keys	N/A	Boolean value	False	Emulate the actual keystrokes on keyboard when sending whole Text

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't send keystrokes in non interactive mode	Indicates a problem sending keystrokes in non-interactive mode
Text to send doesn't represent valid keystrokes	Indicates that the text given doesn't represent valid keystrokes
There isn't an active application to send keystrokes to	Indicates that there isn't an active application to send keystrokes to
Failed to send keystrokes	Indicates a problem sending keystrokes

### ⓘ Note

To simulate a physical key being pressed inside a **Send keys** action, use the curly brackets {} notation. To use a key as a modifier, use the curly brackets {} notation for both keys. The **Send keys** action accepts the **Virtual-Key Codes**.

## Valid keys

Category	Keys
Buttons	LButton, RButton, Cancel, MButton, XButton1, XButton2
Keyboard Control	Back, Tab, LineFeed, Clear, Enter, Return, ShiftKey, ControlKey, Menu, Pause, CapsLock, Capital, Escape, Space, Prior, PageUp, PageDown, Next, End, Home, Left, Up, Right, Down, Select, Print, Execute, Snapshot, PrintScreen, Insert, Delete, Help

Category	Keys
Buttons	HangulMode, HanguelMode, KanaMode, JunjaMode, FinalMode, KanjiMode, HanjaMode
IME keys	IMEConvert, IMENonconvert, IMEAccept, IMEAcept, IMEModeChange
Browser keys	BrowserSearch, BrowserFavorites, BrowserHome
Volume keys	VolumeMute, VolumeDown, VolumeUp
Media keys	MediaNextTrack, MediaPreviousTrack, MediaStop, MediaPlayPause
Buttons	LaunchMail, SelectMedia, LaunchApplication1, LaunchApplication2
OEM keys	OemSemicolon, Oem1, Oemplus, Oemcomma, OemMinus, OemPeriod, Oem2, OemQuestion, Oem3, Oemtilde, Oem4, OemOpenBrackets, OemPipe, Oem5, OemCloseBrackets, Oem6, OemQuotes, Oem7, Oem8, Oem102, OemBackslash, OemClear
Buttons	ProcessKey, Packet, Attn, Crsel, Exsel, EraseEof, Play, Zoom, NoName, Pa1
Buttons	KeyCodem, Shift, Control, Alt, Modifiers
D keys	D0, D1, D2, D3, D4, D5, D6, D7, D8, D9
Letters	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
Windows keys	LWin, RWin, Apps, Sleep
NumPad keys	NumPad0, NumPad1, NumPad2, NumPad3, NumPad4, NumPad5, NumPad6, NumPad7, NumPad8, NumPad9
Calculation keys	Multiply, Add, Separator, Subtract, Decimal, Divide
Function keys	F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24
Buttons	NumLock, Scroll, LShiftKey, RShiftKey, LControlKey, RControlKey, LMenu, RMenu, BrowserBack, BrowserForward, BrowserRefresh, BrowserStop

## Press/release key

Presses (and holds) or releases one or more modifier keys (Alt, Control, or Shift).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Action to perform	N/A	Press, Release	Press	Specify whether to press or release keys with this action
Control	N/A	Boolean value	False	Specify whether the Ctrl key will be pressed/released or not
Alt	N/A	Boolean value	False	Specify whether the Alt key will be pressed/released or not
Shift	N/A	Boolean value	False	Specify whether the Shift key will be pressed/released or not
Win	N/A	Boolean value	False	Specify whether the Windows key will be pressed/released or not

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't press or release key in non-interactive mode	Indicates a problem pressing or releasing the key in non-interactive mode

## Set key state

Sets the state (on or off) for the keys Caps Lock, Num Lock or Scroll Lock

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Key	N/A	Caps Lock, Num Lock, Scroll Lock	Caps Lock	Specify the key to set

Argument	Optional	Accepts	Default Value	Description
State	N/A	Off, On	On	Whether to set the key state to on or off

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't set key state in non interactive mode	Indicates a problem setting the key state in non interactive mode

## Wait for mouse

Suspends the execution of the flow until the mouse pointer changes, usually to or from the 'wait cursor' or hourglass.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Wait for mouse pointer to	N/A	Become, Become not	Become	Choose what action of the mouse cursor to wait for.
Mouse pointer	N/A	Arrow, App starting, Cross, Hand, Help, IBeam, Wait cursor	Arrow	Specify the mouse pointer state.

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# Get keyboard identifier

Retrieves the active keyboard identifier from the machine's registry.

## Input parameters

This action doesn't require any input.

## Variables produced

Argument	Type	Description
KeyboardLayoutId	Numeric value	The registry key of the active keyboard identifier

## Exceptions

Exception	Description
Keyboard identifier wasn't found	Indicates an error while retrieving the keyboard identifier

# Wait for shortcut key

Pause the flow run until a specific shortcut key is pressed. Shortcut keys must contain at least one key or a key and one of (ctrl, alt, shift). Multiple shortcut keys can be defined.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Shortcut keys	N/A	Keys combination	Ctrl + A	Specify the shortcut keys to wait for. Shortcut keys must contain exactly one key or a key and a combination of (ctrl, alt, shift). To add more than one shortcut key, select 'New shortcut key'
Continue flow run on timeout	N/A	Boolean value	False	Specify whether the flow run will continue anyway when the set period of time waiting for the shortcut key expires

Argument	Optional	Accepts	Default Value	Description
Continue after	Yes	Numeric value	10	The time in seconds before continuing the flow run

## Variables produced

Argument	Type	Description
IndexOfShortcutKeyPressed	Numeric value	The index of the shortcut key if the shortcut keys are in a list format.

## Exceptions

Exception	Description
Shortcut key failed to register	Indicates that a shortcut key failed to register.

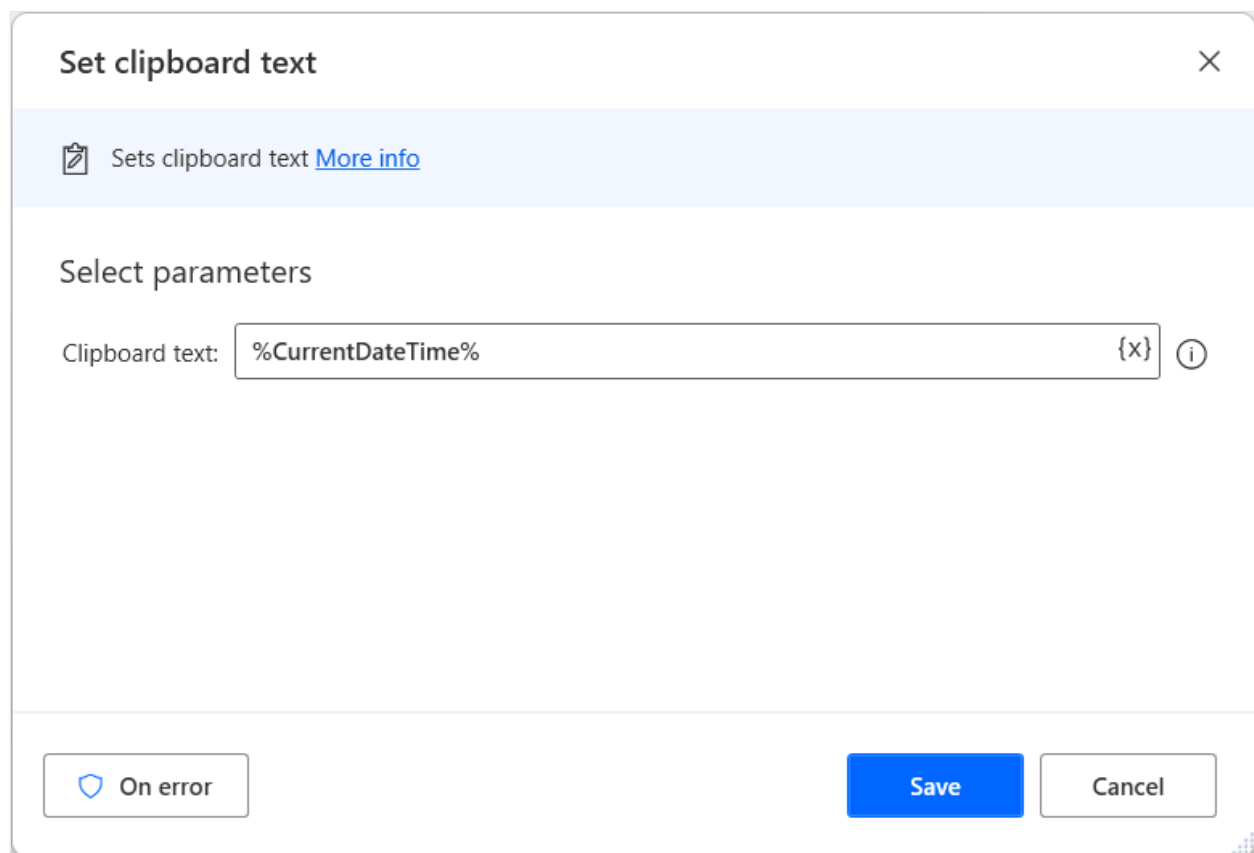
# Clipboard actions

Article • 12/16/2022

Use the Clipboard actions to manipulate or extract the contents of your machine's clipboard.

To retrieve the contents of the clipboard and store them in a variable, use the **Get clipboard text** action.

To change the text of the clipboard, use the **Set clipboard text** action. The following example uses a variable to set the current date and time on the clipboard.



The screenshot shows a configuration dialog for the 'Set clipboard text' action. The dialog has a title bar with the text 'Set clipboard text' and a close button (X). Below the title bar, there is a description: 'Sets clipboard text' followed by a link to 'More info'. The main section is titled 'Select parameters' and contains a text input field labeled 'Clipboard text:' with the value '%CurrentDateTime%'. To the right of the input field is a placeholder '{x}' and an information icon (i). At the bottom of the dialog, there are three buttons: 'On error' (with a shield icon), 'Save' (in blue), and 'Cancel'.

To clear the clipboard, use the **Clear clipboard contents** action.

## Get clipboard text

Gets clipboard text.

## Input parameters

This action doesn't require any input.

## Variables produced

Argument	Type	Description
ClipboardText	Text value	The text stored in the clipboard

## Exceptions

Exception	Description
Can't retrieve clipboard contents	Indicates a problem retrieving clipboard contents

## Set clipboard Text

Sets clipboard text.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Clipboard text	No	Text value		The text to set to the clipboard

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't set clipboard contents	Indicates a problem setting clipboard contents

## Clear clipboard contents

Clears clipboard contents.

## Input parameters

This action doesn't require any input.



## **Variables produced**

This action doesn't produce any variables.

## **Exceptions**

This action doesn't include any exceptions.

# Text actions

Article • 01/19/2024

Text actions enable you to handle, manipulate, and convert text values in your desktop flows.

To merge a list of text values and create a single value, use the **Join text** action. The action requires you to specify the list and a delimiter.

To split a single text value into a list, deploy the **Split text** action, and specify the text value and the delimiters to separate the list items.

To replace a subtext in a text, use the **Replace text** action. The following example replaces the text **Product Characteristics** with **Characteristics**.

The screenshot shows the 'Replace text' configuration window. At the top, there is a title bar with 'Replace text' and a close button. Below the title bar is a light blue header with a small icon and the text: 'Replaces all occurrences of a specified subtext with another text. It can also be used with regular expressions [More info](#)'. The main area is titled 'Select parameters' and contains several fields and controls:

- Text to parse:** A text box containing '%FileContents%' with a '{x}' icon and an information icon.
- Text to find:** A text box containing 'Product Characteristics' with a '{x}' icon and an information icon.
- Use regular expressions for find and replace:** A toggle switch that is currently turned off, with an information icon.
- Ignore case:** A toggle switch that is currently turned off, with an information icon.
- Replace with:** A text box containing 'Characteristics' with a '{x}' icon and an information icon.
- Activate escape sequences:** A toggle switch that is currently turned off, with an information icon.

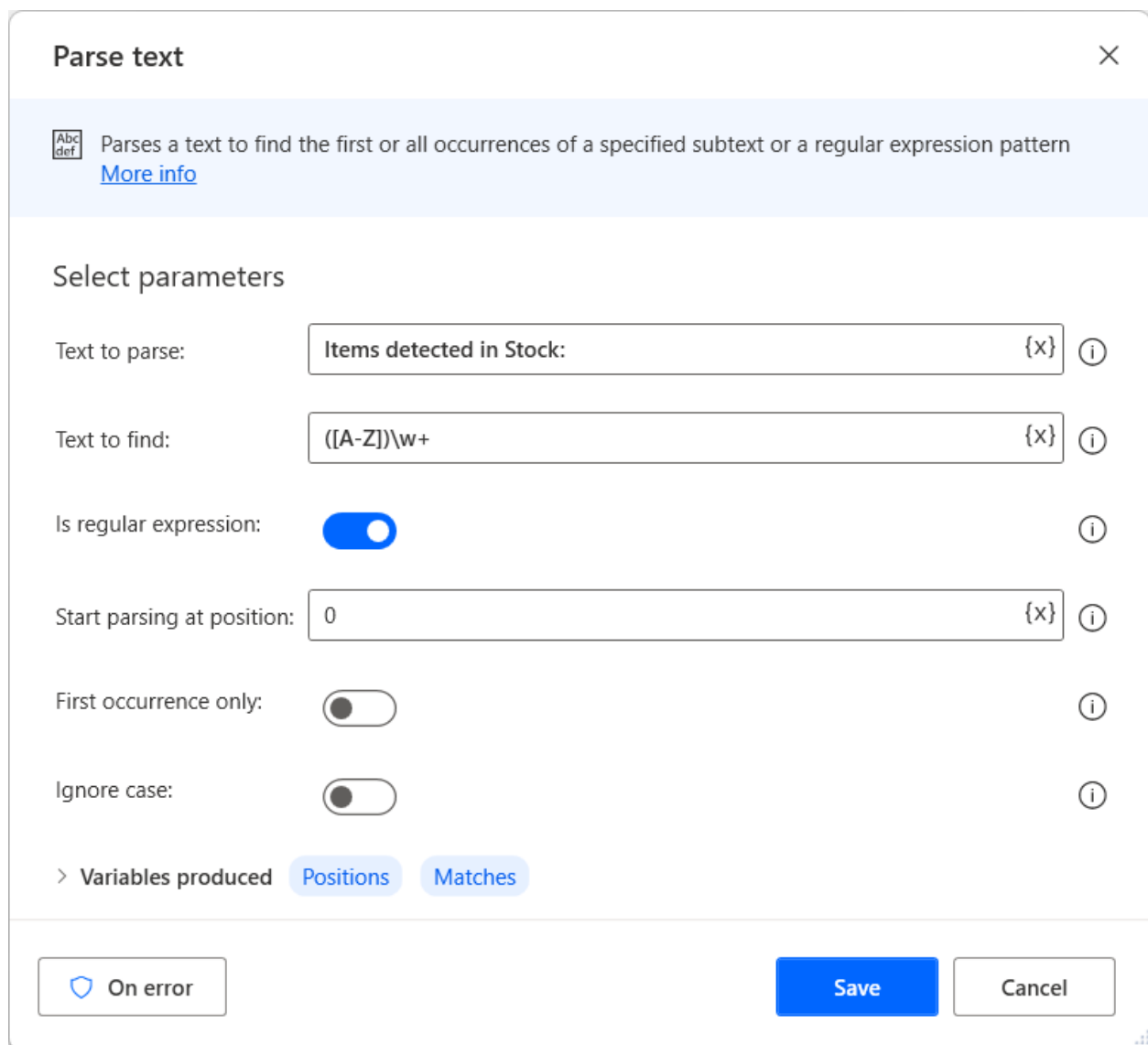
At the bottom left, there is a section for 'Variables produced' with a blue pill-shaped button labeled 'Replaced'. At the bottom right, there are two buttons: a blue 'Save' button and a white 'Cancel' button with a grey border.

Search a text value inside another text with the **Parse text** action.


Some text actions allow you to use regular expressions. For example, you can enable **Is regular expression** in the **Parse text** action to search for a text specified by a regular expression. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

Additionally, you can disable **First occurrence only** to make the action return a list with the positions of all the matched texts.

The following example searches all the words in **Items detected in Stock** starting with a capital letter. The produced list named **Matches** stores the values **Items** and **Stock**. The **Positions** list stores the positions in which the values were found (1 and 18).



**Parse text** ×

 Parses a text to find the first or all occurrences of a specified subtext or a regular expression pattern  
[More info](#)

Select parameters

Text to parse:

Text to find:

Is regular expression:  ⓘ

Start parsing at position:

First occurrence only:  ⓘ


Ignore case:  ⓘ

> Variables produced **Positions** Matches

Besides searching in texts, Power Automate enables you to crop text values from texts using the **Crop text** action. You can define the text to crop using flags that are the first occurring given character or string markers. You can crop values before, after, or between the specified text flag(s).

The **CroppedText** variable stores the cropped text, while you can use the **IsFlagFound** variable to check if the action found the set flags.

### Crop text ✕

 Retrieves a text value that occurs before, after or between the specified text flag(s) in a given text  
[More info](#)

Select parameters

Original text:  {x} ⓘ

Mode:  ▼ ⓘ

Start flag:  {x} ⓘ

Ignore case:  ⓘ

> Variables produced CroppedText IsFlagFound

To ensure that numbers are stored as numerical values, use the **Convert text to number** action. To perform the reverse conversion, use **Convert number to text**.

Similarly, you can use the **Convert text to datetime** and **Convert datetime to text** actions to ensure that dates are correctly formatted.

## Use the Recognize entities in text action

Desktop flows enable you to extract various entities from texts in natural language, such as numbers, dates, and measurement units, through the **Recognize entities in text** action.

### Recognize entities in text ✕

Recognizes entities in text, such as numbers, units, date/time and others expressed in natural language across multiple languages [More info](#)

**Select parameters**

Text to recognize from:  ⓘ

Entity type:  ⓘ

Language:  ⓘ

> Variables produced RecognizedEntities



The **Recognize entities in text** action gets a text or a variable containing text and returns a data table containing the results. Each entity returns different results based on its structure, but all the data tables contain an **Original text** field that stores the entity part of the input text.

The following table displays various examples of entities that the **Recognize entities in text** action can recognize.


[Expand table](#)

Entity	Input text	Returned values
Date time	I'll go back 04th Jan 2019	<b>Value:</b> 1/4/2019 12:00:00 AM <b>Original text:</b> 04th Jan 2019
Date time	Schedule a meeting tonight at 7pm	<b>Value:</b> 9/30/2021 7:00:00 PM <b>Original text:</b> tonight at 7pm
Dimension	You weight 200 lbs	<b>Value:</b> 200 <b>Unit:</b> Pound <b>Original text:</b> 200 lbs
Dimension	A twister roared through an area about 10 miles long there	<b>Value:</b> 10 <b>Unit:</b> Mile

<b>Entity</b>	<b>Input text</b>	<b>Returned values</b>
		<b>Original text:</b> ten miles
Temperature	The temperature outside is 40 deg celsius	<b>Value:</b> 40 <b>Unit:</b> C <b>Original text:</b> 40 deg celsius
Currency	Net interest income sank 27 percent in the quarter to /\$ 254 million	<b>Value:</b> 254000000 <b>Unit:</b> Dollar <b>Original text:</b> \$ 254 million
Number range	This number is larger than 20 and less or equal than 35	<b>From:</b> 20 <b>To:</b> 35 <b>Original text:</b> larger than 20 and less or equal than 35
Number range	From 5 to 10	<b>From:</b> 5 <b>To:</b> 10 <b>Original text:</b> From 5 to 10
Number range	Less than 4.565	<b>From:</b> 0 <b>To:</b> 4.565 <b>Original text:</b> Less than 4.565
Number	A dozen	<b>Value:</b> 12 <b>Original text:</b> A dozen
Number	Two thirds	<b>Value:</b> 0.666666666666667 <b>Original text:</b> Two thirds
Ordinal	I like the first two books	<b>Value:</b> 1 <b>Original text:</b> first
Ordinal	Eleventh	<b>Value:</b> 11 <b>Original text:</b> Eleventh
Percentage	100 percent	<b>Value:</b> 100 <b>Original text:</b> 100 percent
Phone number	Tel: +1 209-555-0100	<b>Value:</b> +1 209-555-0100 <b>Original text:</b> +1 209-555-0100
Email	felix@contoso.com	<b>Value:</b> felix@contoso.com <b>Original text:</b> felix@contoso.com
IP address	My PC IP address is 1.1.1.1	<b>Value:</b> 1.1.1.1 <b>Original text:</b> 1.1.1.1
Mention	@Alice	<b>Value:</b> @Alice <b>Original text:</b> @Alice

Entity	Input text	Returned values
Hashtag	#News	Value: #News Original text: #News
URL	www.microsoft.com	Value: <a href="http://www.microsoft.com">www.microsoft.com</a>  Original text: <a href="http://www.microsoft.com">www.microsoft.com</a> 
GUID	123e4567-e89b-12d3-a456-426655440000	Value: 123e4567-e89b-12d3-a456-426655440000 Original text: 123e4567-e89b-12d3-a456-426655440000
Quoted text	Enter the value in the "value" field	Value: "value" Original text: "value"


### Note

The **Recognize entities in text** action supports 14 different languages. However, some entities may not be available for specific languages. To find more information about language restrictions, go to [Microsoft Recognizers Text - Supported entities across cultures](#) .

## Append line to text

Appends a new line of text to a text value.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Original text	No	<a href="#">Text value</a>		The original text
Line to append	Yes	<a href="#">Text value</a>		The text to add on as a new line

### Variables produced

 Expand table

Argument	Type	Description
Result	<a href="#">Text value</a>	The new text

## Exceptions

This action doesn't include any exceptions.

## Get subtext

Retrieve a subtext from a text value.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Original text	No	<a href="#">Text value</a>		The text to retrieve a section of text from
Start index	N/A	Start of text, Character position	Character position	Specify how to find the starting point for text retrieval
Character position	No	<a href="#">Numeric value</a>		The position of the first character to retrieve. This value is a zero-based index, counting from zero for the first character
Length	N/A	End of text, Number of chars	Number of chars	Specify whether the subtext continues to the end of the text, or includes only a certain number of characters
Number of chars	No	<a href="#">Numeric value</a>		The number of characters to retrieve

## Variables produced

[Expand table](#)



Argument	Type	Description
Subtext	<a href="#">Text value</a>	The retrieved subtext

## Exceptions

[Expand table](#)

Exception	Description
Start index or length are out of range	Indicates that the start index or length are out of range

## Crop text

Retrieves a text value that occurs before, after or between the specified text flag(s) in a given text.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Original text	No	<a href="#">Text value</a>		The text to retrieve a section of text from
Mode	N/A	Get text before the specified flag, Get text after the specified flag, Get text between the two specified flags	Get text before the specified flag	Specify whether to retrieve the text before, after, or between flags.
Start flag	No	<a href="#">Text value</a>		The retrieved text will be after this flag. The flag can be any character or text
End flag	No	<a href="#">Text value</a>		The retrieved text will be before this flag. The flag can be any character or text
Ignore case	N/A	<a href="#">Boolean value</a>	False	Specify whether to find the flags using case-

Argument	Optional	Accepts	Default Value	Description
				sensitive or case-insensitive matching

## Variables produced

[Expand table](#)

Argument	Type	Description
CroppedText	Text value	The new cropped text
IsFlagFound	Boolean value	Indicates if flag(s) found or not

## Exceptions

This action doesn't include any exceptions.

## Pad text

Creates a fixed length text by adding characters to the left or to the right of an existing text.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to pad	Yes	Text value		The text to lengthen
Pad	N/A	Left, Right	Left	Specify whether to add characters to the left or right of the existing text
Text for padding	Yes	Text value		The character or text that will be added to lengthen the original text
Total length	Yes	Numeric value	10	The total character length of the final padded text. The text for padding will be repeatedly added until the final text is of the specified length

## Variables produced

[Expand table](#)

Argument	Type	Description
PaddedText	<a href="#">Text value</a>	The new, padded text

## Exceptions

This action doesn't include any exceptions.

## Trim text

Removes all occurrences of white space characters (such as space, tab, or new line) from the beginning and/or end of an existing text.

The **Trim text** action receives a text value as an input and produces a text output according to the **What to trim** parameter. The available options of the **What to trim** parameter are the following:

- whitespace characters from the beginning
- whitespace characters from the end
- whitespace characters from the beginning and end

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to trim	Yes	<a href="#">Text value</a>		Text to trim
What to trim	N/A	whitespace characters from the beginning, whitespace characters from the end, whitespace characters from the beginning and end	whitespace characters from the beginning and end	Specify where white space characters will be removed from

## Variables produced

[Expand table](#)

Argument	Type	Description
TrimmedText	<a href="#">Text value</a>	The new trimmed text

## Exceptions

This action doesn't include any exceptions.

## Reverse text

Reverses the order of letters in a text string.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to reverse	No	<a href="#">Text value</a>		The text to reverse

## Variables produced

[Expand table](#)

Argument	Type	Description
ReversedText	<a href="#">Text value</a>	The new reversed text

## Exceptions

This action doesn't include any exceptions.

## Change text case

Changes the casing of a text to uppercase, lowercase, title case or sentence case.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to convert	Yes	<a href="#">Text value</a>		The text to convert
Convert to	N/A	Upper case, Lower case, Title case, Sentence case	Upper case	Specify the text case style to use

## Variables produced

[Expand table](#)

Argument	Type	Description
TextWithNewCase	<a href="#">Text value</a>	The new converted text

## Exceptions

This action doesn't include any exceptions.

## Convert text to number

Converts a text representation of a number to a variable that contains a numeric value.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to convert	No	<a href="#">Text value</a>		A text variable containing only a number, to convert to a numeric value variable. Spaces are ignored, but non-number text throws an exception

## Variables produced

[Expand table](#)

Argument	Type	Description
TextAsNumber	<a href="#">Numeric value</a>	The new numeric value

## Exceptions

[Expand table](#)

Exception	Description
Provided text value can't be converted into a valid number	Indicates that the provided text value can't be converted into a valid number

## Convert number to text

Converts a number to text using a specified format.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Number to convert	No	<a href="#">Numeric value</a>		A numeric value to convert to text
Decimal places	Yes	<a href="#">Numeric value</a>	2	The number of decimal places that will be included before truncation. Zeros can also be added to the end to pad the text in this way
Use thousands separator	N/A	<a href="#">Boolean value</a>	True	Specify whether or not to use punctuation as a 1000 separator

### Variables produced

[Expand table](#)

Argument	Type	Description
FormattedNumber	<a href="#">Text value</a>	The formatted number as text

## Exceptions

This action doesn't include any exceptions.

## Convert text to datetime

Converts a text representation of a date and/or time value to a datetime value.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to convert	No	<a href="#">Text value</a>		The text to convert to a datetime value. This text must be in a recognizably datetime value format
Date is represented in custom format	N/A	<a href="#">Boolean value</a>	False	Specify whether the text to convert contains a representation of the date and time in a nonstandard, nonrecognizable format
Custom format	No	<a href="#">Text value</a>		The format in which the date is stored in the text. A custom format can be expressed as, for example, yyyyMMdd for date and hhmmss for time

### Variables produced

[Expand table](#)

Argument	Type	Description
TextAsDateTime	<a href="#">Datetime</a>	The datetime value

## Exceptions

[Expand table](#)

Exception	Description
Provided text value can't be converted into a valid datetime	Indicates that the provided text value can't be converted into a valid datetime

## Convert datetime to text

Converts a datetime value to text using a specified custom format.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Datetime to convert	No	<a href="#">Datetime</a>		The datetime value to convert to text
Format to use	N/A	Standard, Custom	Standard	Specify whether to use a standard datetime format, or create a custom one
Custom Format	No	<a href="#">Text value</a>		The custom format to display the datetime value in. A datetime can be expressed as, for example, MM/dd/yyyy for date and hh:mm:ss for time
Standard format	N/A	Short date, Long date, Short time, Long time, Full datetime (short time), Full datetime (long time), General datetime (short time), General datetime (long time), Sortable datetime	Short date	The standard datetime format the action uses to display the datetime value

### Variables produced

 Expand table



Argument	Type	Description
FormattedDateTime	Text value	The formatted datetime as a text value

## Exceptions

This action doesn't include any exceptions.

## Create random text

Generates a text of specified length consisting of random characters. This action can be useful for generating passwords.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Use uppercase letters (A-Z)	N/A	Boolean value	True	Specify whether uppercase characters will be included in the generated text
Use lowercase letters (a-z)	N/A	Boolean value	True	Specify whether lowercase characters will be included in the generated text
Use digits (0-9)	N/A	Boolean value	True	Specify whether digits will be included in the generated text
Use symbols ( , . < > ? ! + - _ # \$ ^ )	N/A	Boolean value	True	Specify whether symbols will be included in the generated text
Minimum length	Yes	Numeric value	6	The minimum length of the random text. For a certain length of text, set the minimum and maximum values to that number
Maximum length	Yes	Numeric value	10	The maximum length of the random text. For a certain length of text, set the minimum and maximum values to that number

## Variables produced

 Expand table

Argument	Type	Description
RandomText	Text value	The generated random text

## Exceptions

This action doesn't include any exceptions.

## Join text

Converts a list into a text value by separating its items with a specified delimiter.

To join all contents of a list into a single text value, use the **Join text** action. Begin by specifying the respective list to use in the **Specify list to join** property. You can choose the delimiters to separate the list items in the joined text by making the respective choice in the **Delimiter to separate list items** property dropdown list:

- **None** creates a single, joined literal by combining all the items in the list without separating them with a delimiter.
- **Standard** allows you to set the delimiter as a space, tab, or new line by selecting the respective option in the **Standard delimiter** property dropdown list. You can also choose how many times the delimiter is presented between each list item by modifying the **Times** property.
- **Custom** allows you to set your own delimiter.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Specify the list to join	No	List of Text values		The list to convert to text
Delimiter to separate list items	N/A	None, Standard, Custom	None	Specify whether to use no delimiter, a standard delimiter or a custom one
Custom delimiter	No	Text value		The character(s) to use as delimiter

Argument	Optional	Accepts	Default Value	Description
Standard delimiter	N/A	Space, Tab, New line	Space	Specify the delimiter to use
Times	Yes	<a href="#">Numeric value</a>	1	Specify how many times to use the specified delimiter

## Variables produced

[Expand table](#)

Argument	Type	Description
JoinedText	<a href="#">Text value</a>	The new delimited text

## Exceptions

This action doesn't include any exceptions.

## Split text

Creates a list containing the substrings of a text that are separated by a specified delimiter or a regular expression.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
The text to split	No	<a href="#">Text value</a>		The text to split
Delimiter type	N/A	Standard, Custom	Standard	Whether the used delimiter is of a standard or custom format
Custom delimiter	No	<a href="#">Text value</a>		The character(s) that were used as a delimiter
Standard delimiter	N/A	Space, Tab, New line	Space	The delimiter used

Argument	Optional	Accepts	Default Value	Description
Times	Yes	<a href="#">Numeric value</a>	1	Specify how many times the delimiter is used
Is regular expression	N/A	<a href="#">Boolean value</a>	False	Specify whether the delimiter will be a regular expression. A regular expression creates a range of possibilities for the delimiter. For example, '\d' means that the delimiter could be any digit

### ⓘ Note

Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

## Variables produced

[Expand table](#)

Argument	Type	Description
TextList	<a href="#">List of Text values</a>	The new list

## Exceptions

[Expand table](#)

Exception	Description
Provided regular expression is invalid	Indicates that the provided regular expression is invalid

## Parse text

Parses a text to find the first or all occurrences of a specified subtext or a regular expression pattern.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to Parse	No	Text value		The text to parse
Text to Find	No	Text value		The subtext or a regular expression to search for
Is regular expression	N/A	Boolean value	False	Specify whether the subtext is a regular expression. For example \d means that the subtext could be any digit
Start Parsing at Position	No	Numeric value		The position to start looking for the 'Text to Find'. The first position is zero, so use 0 to start from the beginning
First occurrence only	N/A	Boolean value	True	Specify whether to find the first occurrence only, or each occurrence of the 'Text to find'
Ignore case	N/A	Boolean value	False	Specify whether to find the specified text using case-sensitive or case-insensitive matching

### ⓘ Note

Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

## Variables produced

 Expand table

Argument	Type	Description
Position	Numeric value	The position of the 'Text to find' into the 'Text to parse'. If the text isn't found within the original text, this variable will hold the value -1
Positions	List of Numeric values	The positions of the 'Text to find' into the 'Text to parse'. If the text isn't found within the original text, this variable will hold the value -1
Match	Text value	The result that matches the given regular expression
Matches	List of Text values	The results that match the given regular expression

# Exceptions

 Expand table

Exception	Description
Provided regular expression is invalid	Indicates that the provided regular expression is invalid


## Replace text

Replaces all occurrences of a specified subtext with another text. It can also be used with regular expressions.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Text to parse	No	Text value		The text to parse
Text to find	No	Text value		The subtext or a regular expression to search for
Use regular expressions for find and replace	N/A	Boolean value	False	Specify whether the subtexts are regular expressions. A regular expression creates a range of possibilities for the subtext. For example, '\d' means that the subtext could be any digit
Ignore case	N/A	Boolean value	False	Specify whether to find the subtext to replace using case-sensitive or case-insensitive matching
Replace with	No	Text value		The text or a regular expression to replace found text
Activate escape sequences	N/A	Boolean value	False	Specify whether to use special sequences. For example, '\t' in the replacement text will be interpreted as a tab

 Note

Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

## Variables produced

[Expand table](#)

Argument	Type	Description
Replaced	<a href="#">Text value</a>	The new updated text

## Exceptions

This action doesn't include any exceptions.

## Escape text for regular expression

Escapes a minimal set of characters (, \*, +, ?, |, {, [, (, ^, \$, ., #, and white space) by replacing them with their escape codes.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to escape	No	<a href="#">Text value</a>		The text to escape

## Variables produced

[Expand table](#)

Argument	Type	Description
EscapedText	<a href="#">Text value</a>	The escaped text

## Exceptions

This action doesn't include any exceptions.

# Recognize entities in text

Recognizes entities in text, such as numbers, units, data/time and others expressed in natural language across multiple languages.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Text to recognize from	No	<a href="#">Text value</a>		The text to recognize entities from
Entity type	N/A	Date time, Dimension, Temperature, Currency, Number range, Number, Ordinal, Percentage, Phone number, Email, IP address, Mention, Hashtag, URL, GUID, Quoted text	Date time	The type of entity to recognize (, Date time, Email, URL etc.)
Language	N/A	English, Chinese (Simplified), Spanish, Spanish (Mexico), Portuguese, French, German, Italian, Japanese, Dutch, Korean, Swedish, Turkish, Hindi	English	Specify the language of the text

## Variables produced

[Expand table](#)

Argument	Type	Description
RecognizedEntities	<a href="#">Datatable</a>	The recognized entities

## Exceptions

This action doesn't include any exceptions.

## Create HTML content

Generates rich HTML content and stores it in a variable.



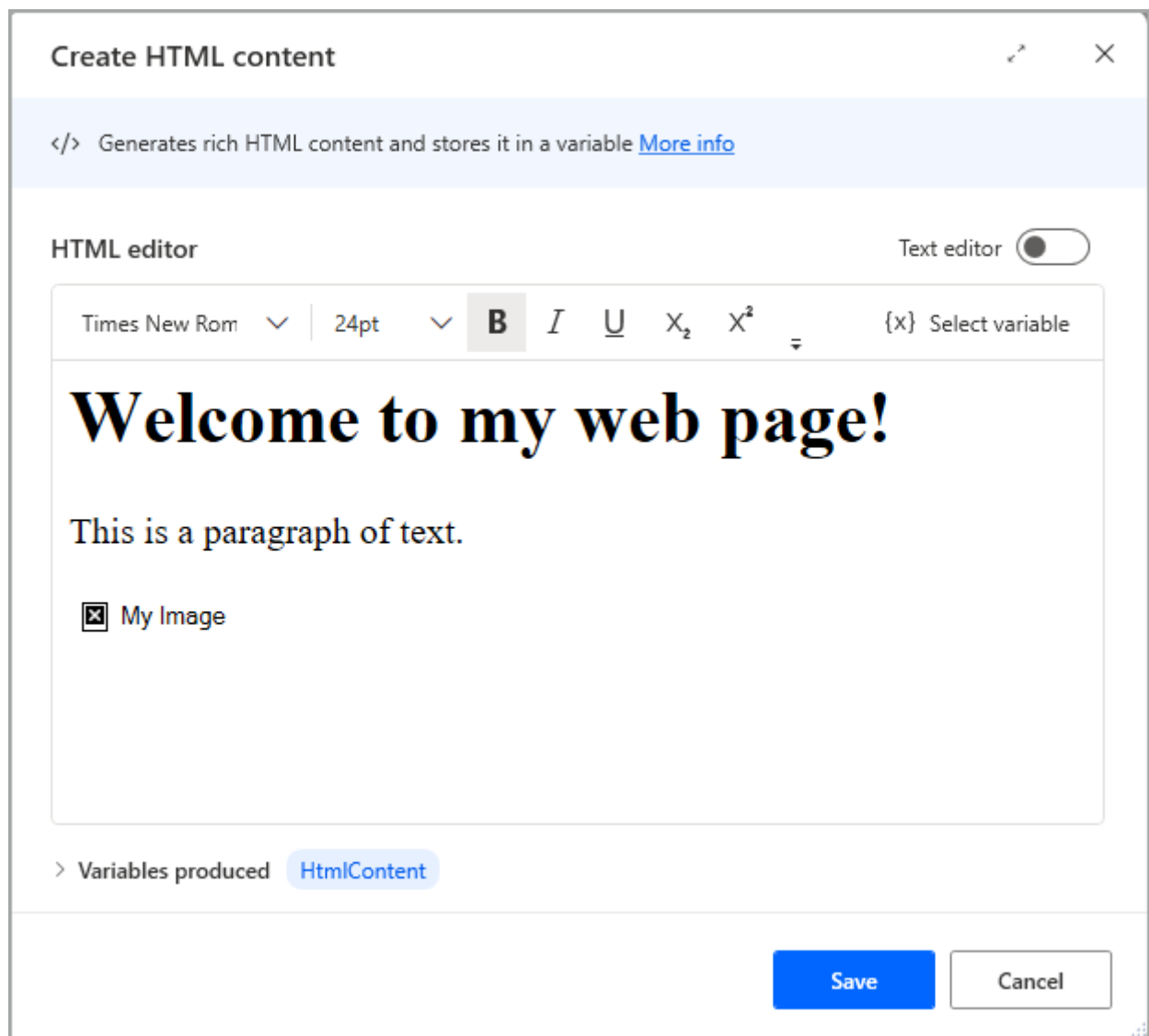
This action allows users to create HTML content in a formatted and intuitive way, which is stored in a text variable. This variable can then be used in following actions, where HTML format is needed.

This functionality primarily serves the email sending actions 'Send email', 'Send Exchange email message', and 'Send email message through Outlook' regarding their 'Body' input parameter. Specifically, the produced variable can be used as is in the 'Body' parameter of an email sending action that follows later in the flow, while the **Body is HTML** option is enabled.

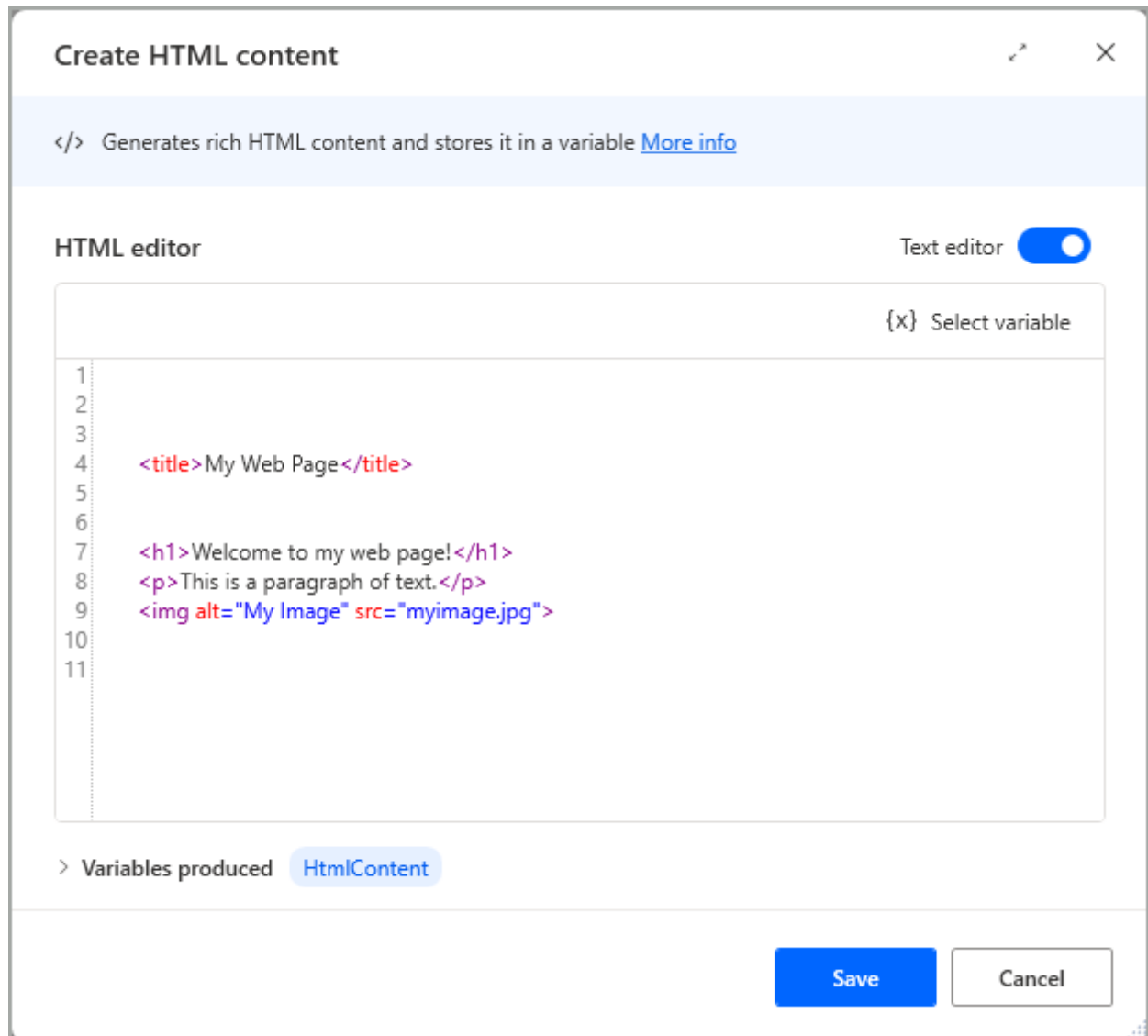
## Input parameters

Input parameters are configured through the embedded HTML editor.

The initial view of the HTML editor allows out-of-the-box editing on the rendered HTML content, providing a set of formatting options through a toolbar found at the top, including the ability to insert links, images (via local paths or URLs) and tables, and even variables for dynamic content.



Enabling the **Text editor** option switches to the view where HTML language can be used including the corresponding element tags.



The `<head>` and `<body>` elements aren't needed in the text editor for the HTML content to be rendered.

## Variables produced

[Expand table](#)

Argument	Type	Description
HtmlContent	Text value	The HTML code

## Exceptions

This action doesn't include any exceptions.

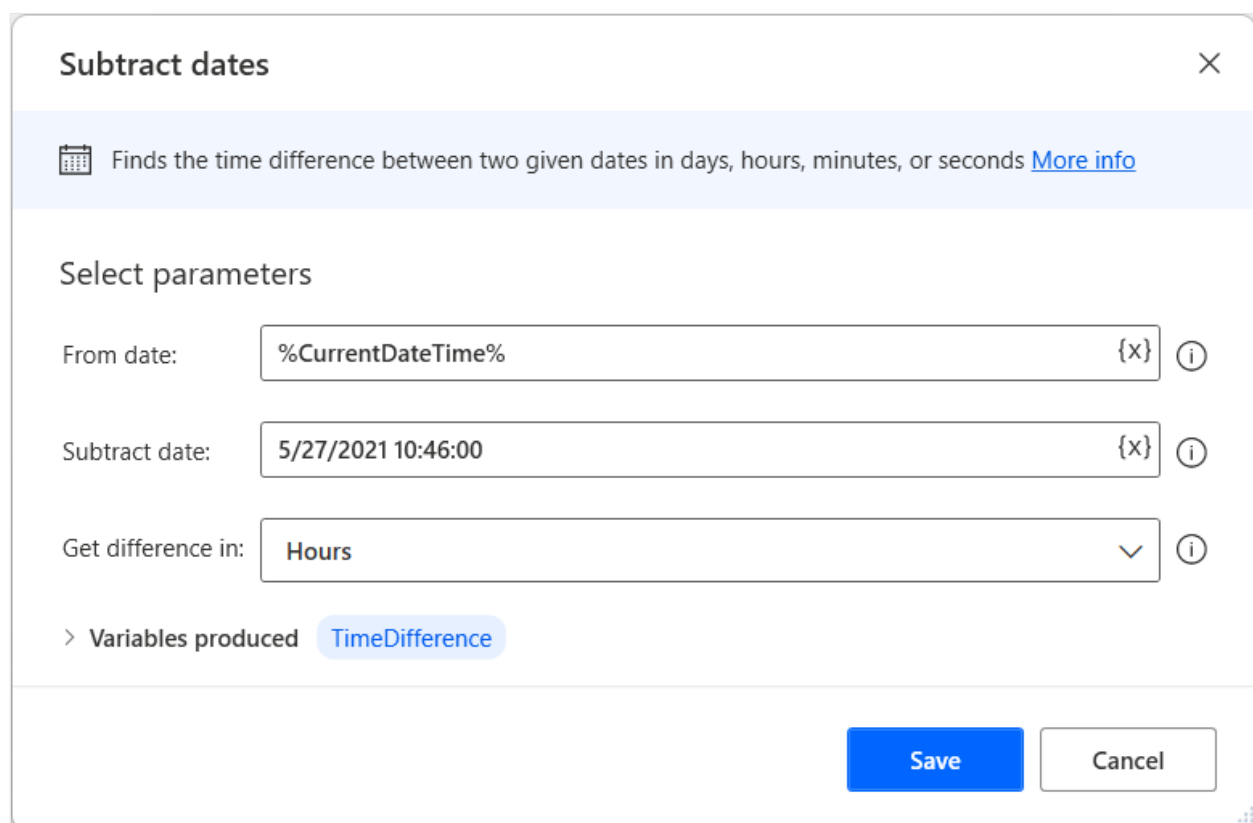
# Date time actions

Article • 11/14/2023

Use the **Get current date and time** action to retrieve the current date and time (or date only, if selected) and store it in a variable. The date format depends on the Windows configuration. To find more information about the syntax of date and time values, go to [Variable data types](#).

To add various time units to date variables, deploy the **Add to datetime** action.

To calculate the difference between two dates, use the **Subtract dates** action. You can retrieve the difference in seconds, minutes, hours, or days.



The screenshot shows the configuration window for the 'Subtract dates' action. The window title is 'Subtract dates' with a close button (X) in the top right corner. Below the title bar is a description: 'Finds the time difference between two given dates in days, hours, minutes, or seconds' followed by a 'More info' link. The 'Select parameters' section contains three input fields: 'From date:' with the value '%CurrentDateTime%' and a clear button '{x}' and an info icon 'i'; 'Subtract date:' with the value '5/27/2021 10:46:00' and a clear button '{x}' and an info icon 'i'; and 'Get difference in:' with a dropdown menu showing 'Hours' and a downward arrow and an info icon 'i'. Below the parameters is a section for 'Variables produced' with a right-pointing arrow and a pill-shaped button labeled 'TimeDifference'. At the bottom right are 'Save' and 'Cancel' buttons.

## Add to datetime

Adds (or subtracts) a specific number of seconds, minutes, hours or days to a datetime value.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Datetime	No	<a href="#">Datetime</a>		The datetime value to alter
Add	No	<a href="#">Numeric value</a>		The numeric value to add. To subtract a time, the value should be negative. For example, add -7 days here to go back one week
Time unit	N/A	Seconds, Minutes, Hours, Days, Months, Years	Seconds	The time unit the time to add represents

## Variables produced

Argument	Type	Description
ResultedDate	<a href="#">Datetime</a>	The new, altered datetime value

## Exceptions

This action doesn't include any exceptions.

## Subtract dates

Finds the time difference between two given dates in days, hours, minutes, or seconds.

To subtract a given date from another one use the **Subtract dates** action. Input a valid date in the **From date** property to use as a base to subtract the other date from. Then populate the **Subtract date** property to calculate the difference. Make sure to use a valid `Datetime` type of variable here (to create one use the **Get current date and time** action).

You can specify how the returned difference should be represented (in days/ hours/ minutes/ seconds) by selecting the respective option in the **Get difference in** property.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
From date	No	<a href="#">Datetime</a>		The datetime to subtract the first datetime from. This will be the base

Argument	Optional	Accepts	Default Value	Description
				datetime, so generally put the later date/time in this attribute
Subtract date	No	Datetime		The datetime to subtract
Get difference in	N/A	Seconds, Minutes, Hours, Days	Days	The unit of time to express the difference in

## Variables produced

Argument	Type	Description
TimeDifference	Numeric value	The difference in time as a numeric value

## Exceptions

This action doesn't include any exceptions.

## Get current date and time

Retrieves the current date or the current date and time.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Retrieve	N/A	Current date and time, Current date only	Current date and time	Specify whether to get the date and time, or just the date. If the latter is chosen, the time value will be stored as midnight (0:00:00)
Time zone	N/A	System time zone, Specific time zone (to be deprecated), Windows time zone, Custom input	System time zone	Specify whether to use the system's time zone or select a specific one or set up a time zone manually

Argument	Optional	Accepts	Default Value	Description
Country/region	No	<a href="#">Text value</a>	Europe/Bucharest	The country/region to get the time of or add a numeric value as the hours that will be added in the UTC time zone
Windows time zone	No	Available <a href="#">Windows time zones</a>	(UTC) Coordinated Universal Time	Specify the country/region to obtain the time zone from
Input Type	No	Offset, Windows time zone	Offset	Choose whether to set the offset via a numeric value or by providing a Windows format time zone
Offset	No	<a href="#">Numeric value</a>	N/A	Specify the number of hours the offset is going to be. Time format is UTC.
Time zone	No	<a href="#">Text value</a>	N/A	Specify the time zone (Windows time zone)

## Variables produced

Argument	Type	Description
CurrentDateTime	<a href="#">Datetime</a>	The current datetime value

## Exceptions

Exception	Description
Failed to get current date and time	Indicates that there was a problem retrieving the current date and time
Specified country/region not found	Indicates that the specified country or region wasn't found

# PDF actions

Article • 10/31/2023

PDF actions enable you to extract images, text, and tables from PDF files, and arrange pages to create new documents.

To extract text from a PDF file, use the **Extract text from PDF** action. The following example extracts text from a specific range of pages of a password-protected file. The password is specified in the **Advanced** settings.

To extract texts arranged in a tabular form, enable **Optimize for structured data** to improve the results' format and accuracy.

**Extract text from PDF** [Close]

PDF icon Extract text from a PDF file [More info](#)

Select parameters

PDF file: C:\Users\Administrator\Documents\Catalog.pdf [File icon] {x} [Info]

Page(s) to extract: Range [Dropdown arrow] [Info]

From page number: 3 {x} [Info]

To page number: 6 {x} [Info]

▼ **Advanced**

Password: [Info] [Lock icon] [Dropdown arrow] [Masked password] [Info]

Optimize for structured data: [Toggle switch] [Info]

> Variables produced **ExtractedPDFText**

[On error] [Save] [Cancel]

To extract tables from a PDF file, deploy the **Extract tables from PDF** action, select the file, and specify the pages to extract from.

The action produces the **ExtractedPDFTables** variable that contains a list of PDF table info. To find information about this type of list, go to [Advanced data types](#).

### ⓘ Note

- The **Extract tables from PDF** action doesn't use Optical Character Recognition (OCR), so you can't extract non-copyable text from scanned PDFs.
- The library behind the action occasionally extracts additional PDF data that aren't tables. This functionality minimizes the risk of accidentally omitting a real table.

### Extract tables from PDF

PDF Extract tables from a PDF file [More info](#)

Select parameters

PDF file:  ⓘ

Page(s) to extract:  ⓘ

Advanced

Password: ⓘ  ⓘ

Merge tables that cross page margins:  ⓘ

First line contains column names:  ⓘ

> Variables produced **ExtractedPDFTables**

Apart from extracting information from PDF files, you can create a new PDF document from an existing file using the **Extract PDF file pages to new PDF file** action.

The following example selects a combination of specific pages and a range of pages.



**Extract PDF file pages to new PDF file**
✕

Extract pages from a PDF file to a new PDF file [More info](#)

**Select parameters**

PDF file:  📄 {x} ⓘ

Page selection:  {x} ⓘ

Extracted PDF file path:  📄 {x} ⓘ

If file exists:  ⌵ ⓘ

▼ **Advanced**

Password: ⓘ  ⓘ

> Variables produced ExtractedPDF

🛡️ On error

Save

Cancel

## Extract text from PDF

You can extract text from a PDF file by using the "Extract text from PDF" action. In the action properties you can define the source PDF file and the pages that text should be extracted from. Under the advanced action properties you can define a password in case the PDF file is protected and if the engine should optimize for structured data or not.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
PDF file	No	<a href="#">File</a>		The PDF file to extract text from. Enter a file path, a variable containing a file or a text path
Page(s) to extract	N/A	All, Single, Range	All	Specifies how many pages to extract: All pages, a single page or a range of pages

Argument	Optional	Accepts	Default Value	Description
Single page number	No	Numeric value		The number of the single page to extract text from
From page number	No	Numeric value		The first page number from the range of pages to extract text from
To page number	No	Numeric value		The last page number from the range of pages to extract text from
Password	Yes	Direct encrypted input or Text value		The password of the PDF file. Leave this blank if the PDF isn't password protected
Optimize for structured data	N/A	Boolean value	False	Specify whether to detect formatted layout in the document and extract text accordingly

## Variables produced

Argument	Type	Description
ExtractedPDFText	Text value	The extracted text

## Exceptions

Exception	Description
PDF file doesn't exist	File doesn't exist on the given path
Invalid password	The given password is invalid
Failed to extract text	Error while trying to extract text

## Extract tables from PDF

You can extract tables that are contained in a PDF file by using the **Extract tables from PDF** action. In the action properties you can define the PDF file and the range of pages that the tables will be extracted from. Under the advanced action properties you can define a password in case a the PDF file is protected, define if the table has headers or not, and finally if tables that cross page margins should be merged or not.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
PDF file	No	<a href="#">File</a>		The PDF file to extract tables from. Enter a file path, a variable containing a file or a text path
Page(s) to extract	N/A	All, Single, Range	All	Specifies how many pages to extract tables from: all pages, a single page or a range of pages
Single page number	No	<a href="#">Numeric value</a>		The number of the single page to extract tables from
From page number	No	<a href="#">Numeric value</a>		The first page number from the range of pages to extract tables from
To page number	No	<a href="#">Numeric value</a>		The last page number from the range of pages to extract tables from
Password	Yes	Direct encrypted input or <a href="#">Text value</a>		The password of the PDF file. Leave this blank if the PDF isn't password protected
Merge tables that cross page margins	N/A	<a href="#">Boolean value</a>	True	Specifies whether to merge tables that cross page margins in the specified page range
First line contains column names	N/A	<a href="#">Boolean value</a>	True	Specifies whether the first line of table contains column names

## Variables produced

Argument	Type	Description
ExtractedPDFTables	<a href="#">List of PDF table info</a>	The extracted tables with their info as a list

## Exceptions

Exception	Description
PDF file doesn't exist	File doesn't exist on the given path

Exception	Description
Invalid password	The given password is invalid
Failed to extract tables	Error while trying to extract tables

## Extract images from PDF

To extract images from a PDF file you can use the **Extract images from PDF** action. In the action parameters you can define the PDF file and the pages to extract images from, the naming convention of the extracted images and the target location of the saved images. You can also define a password if the PDF file is protected under the advanced settings.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
PDF file	No	<a href="#">File</a>		The PDF file to extract images from. Enter a file path, a variable containing a file or a text path
Password	Yes	Direct encrypted input or <a href="#">Text value</a>		The password of the PDF file. Leave this blank if the PDF isn't password protected
Page(s) to extract	N/A	All, Single, Range	All	Specifies how many pages to extract: All pages, a single page or a range of pages
Single page number	No	<a href="#">Numeric value</a>		The number of the single page to extract images from
From page number	No	<a href="#">Numeric value</a>		The first page number from the range of pages to extract images from
To page number	No	<a href="#">Numeric value</a>		The last page number from the range of pages to extract images from
Image(s) name	No	<a href="#">Text value</a>		How the name of the image(s) starts. Extracted image(s) name example: GivenName_1, GivenName_2
Save image(s) to	No	<a href="#">Folder</a>		The folder to save the extracted images as png files

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Invalid password	The given password is invalid
Failed to extract images	Indicates that an error occurred while extracting images from the given pages of the PDF
Folder doesn't exist	Indicates that the folder doesn't exist
PDF file doesn't exist	File doesn't exist on the given path

## Extract PDF file pages to new PDF file

You can create a new PDF file by extracting pages from an existing PDF file by using the **PDF file pages to a new PDF file** action. In the action parameters you can define the PDF file to extract the pages from, the page(s) to be extracted, the location of the new PDF file and what should happen if a file with the same name and extension already exists. Finally, under the advanced properties you can define a password in case the source PDF is protected.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
PDF file	No	<a href="#">File</a>		The PDF file to extract pages from. Enter a file path, a variable containing a file or a text path
Password	Yes	Direct encrypted input or <a href="#">Text value</a>		The password of the PDF file. Leave this blank if the PDF isn't password protected
Page selection	No	<a href="#">Text value</a>		The index numbers of the pages to keep (for example, 1,3,17-24)
Extracted PDF path	No	<a href="#">File</a>		The path to store the extracted PDF file

Argument	Optional	Accepts	Default Value	Description
If file exists	N/A	Overwrite, Don't overwrite, Add sequential suffix	Add sequential suffix	Specifies what to do in case the output PDF file already exists

## Variables produced

Argument	Type	Description
ExtractedPDF	<a href="#">File</a>	The new PDF file

## Exceptions

Exception	Description
Invalid password	The given password is invalid
PDF file doesn't exist	File doesn't exist on the given path
Page out of bounds	Indicates that one or more pages are out of bounds of the PDF file
Invalid page selection	Indicates that the given pages aren't valid for the PDF file
Failed to extract new PDF	Indicates that an error occurred while trying to extract new PDF

## Merge PDF files

Merges multiple PDF files into a new one.

You can use the **Merge PDF files** action to take two or more PDF files and merge them into a single file. The files to be merged can be provided either in the form of a list, or enclosed in double quotes and separated by a delimiter. You can also provide passwords for the PDF files, in case they are password-protected.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
PDF files	No	<a href="#">List of Files</a>		The files to merge. Enclose multiple files in double quotes ("") and

Argument	Optional	Accepts	Default Value	Description
				separate them by a delimiter, or use a list of files
Merged PDF path	No	File		The path to store the merged PDF
If file exists	N/A	Overwrite, Don't overwrite, Add sequential suffix	Add sequential suffix	Specifies what to do in case the destination file already exists
Passwords	Yes	Direct encrypted input or Text value		The delimited passwords. The order should be the same as the order of the input PDFs. Leave this blank if the PDFs aren't password protected
Delimiter	No	Text value	,	A custom password delimiter. This delimiter shouldn't be part of any of the passwords

## Variables produced

Argument	Type	Description
MergedPDF	File	The merged PDF file

## Exceptions

Exception	Description
PDF file doesn't exist	File doesn't exist on the given path
Invalid password	The given password is invalid
Failed to merge PDF files	Indicates that an error occurred while merging the files

# CMD session actions

Article • 12/16/2022

Use the **Open CMD session** action to commence a command prompt session. Specify the working folder, and optionally change the code page in the **Advanced** section. All CMD session actions require the produced CMD session variable.

To run a command, deploy the **Write to CMD session** action, specify a command, and select to send **Enter**. The following example creates a new folder in the current working directory.

**Write to CMD session** [X]

Execute a command on an open CMD session [More info](#)

Select parameters

CMD session: [%CmdSession%] ⓘ

Command: mkdir "Secure Files" {x} ⓘ

Send <Enter> after command:  ⓘ

On error **Save** Cancel

To ensure that a specific output appears on the command prompt before proceeding with subsequent actions, use the **Wait for text on CMD session** action. Specify the text to expect or enter a regular expression and enable the appropriate option for regular expressions.



**Wait for text on CMD session**
✕

ⓘ Wait for a specific text on a previously opened CMD session [More info](#)

**Select parameters**

CMD session:  ⓘ

Text to wait:  {x} ⓘ

Is regular expression:  ⓘ

Ignore case:  ⓘ

> **Advanced**

ⓘ On error

Save

Cancel

When all the CMD tasks are complete, use the **Close CMD session** action to terminate the CMD session.

## Open CMD session

Open a new CMD session.

### ⓘ Important

To prevent unauthorized access, Windows require administrator rights to access protected folders. To use a protected folder as a working folder in the **Open CMD session** action, run Power Automate with administrator rights. To find more information regarding running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

Argument	Optional	Accepts	Default Value	Description
Working folder	Yes	Folder		The full path of the folder to start the CMD session, if applicable
Change code page	N/A	Boolean value	False	Specifies whether to change the session's current code page
Encoding	No	ASMO-708 : Arabic (ASMO 708), big5 : Chinese Traditional (Big5), cp1025 : IBM EBCDIC (Cyrillic Serbian-Bulgarian), cp866 : Cyrillic (DOS), cp875 : IBM EBCDIC (Greek Modern), csISO2022JP : Japanese (JIS-Allow 1 byte Kana), DOS-720 : Arabic (DOS), DOS-862 : Hebrew (DOS), EUC-CN : Chinese Simplified (EUC), EUC-JP : Japanese (JIS 0208-1990 and 0212-1990), euc-jp : Japanese (EUC), euc-kr : Korean (EUC), GB18030 : Chinese Simplified (GB18030), gb2312 : Chinese Simplified (GB2312), hz-gb-2312 : Chinese Simplified (HZ), IBM-Thai : IBM EBCDIC (Thai), IBM00858 : OEM Multilingual Latin I, IBM00924 : IBM Latin-1, IBM01047 : IBM Latin-1, IBM01140 : IBM EBCDIC (US-Canada-Euro), IBM01141 : IBM EBCDIC (Germany-Euro), IBM01142 : IBM EBCDIC (Denmark-Norway-Euro), IBM01143 : IBM EBCDIC (Finland-Sweden-Euro), IBM01144 : IBM EBCDIC (Italy-Euro), IBM01145 : IBM EBCDIC (Spain-Euro), IBM01146 : IBM EBCDIC (UK-Euro), IBM01147 : IBM EBCDIC (France-Euro), IBM01148 : IBM EBCDIC (International-Euro), IBM01149 : IBM EBCDIC (Icelandic-Euro), IBM037 : IBM EBCDIC (US-Canada), IBM1026 : IBM EBCDIC (Turkish Latin-5), IBM273 : IBM EBCDIC (Germany), IBM277 : IBM EBCDIC (Denmark-Norway), IBM278 : IBM EBCDIC (Finland-Sweden), IBM280 : IBM EBCDIC (Italy), IBM284 : IBM EBCDIC (Spain), IBM285 : IBM EBCDIC (UK), IBM290 : IBM EBCDIC (Japanese katakana), IBM297 : IBM	utf-8 : Unicode (UTF-8)	The encoding to use when reading the output

Argument	Optional	Accepts	Default Value	Description
		<p>EBCDIC (France), IBM420 : IBM EBCDIC (Arabic), IBM423 : IBM EBCDIC (Greek), IBM424 : IBM EBCDIC (Hebrew), IBM437 : OEM United States, IBM500 : IBM EBCDIC (International), ibm737 : Greek (DOS), ibm775 : Baltic (DOS), ibm850 : Western European (DOS), ibm852 : Central European (DOS), IBM855 : OEM Cyrillic, ibm857 : Turkish (DOS), IBM860 : Portuguese (DOS), ibm861 : Icelandic (DOS), IBM863 : French Canadian (DOS), IBM864 : Arabic (864), IBM865 : Nordic (DOS), ibm869 : Greek, Modern (DOS), IBM870 : IBM EBCDIC (Multilingual Latin-2), IBM871 : IBM EBCDIC (Icelandic), IBM880 : IBM EBCDIC (Cyrillic Russian), IBM905 : IBM EBCDIC (Turkish), iso-2022-jp : Japanese (JIS), iso-2022-jp : Japanese (JIS-Allow 1 byte Kana - SO/SI), iso-2022-kr : Korean (ISO), iso-8859-1 : Western European (ISO), iso-8859-13 : Estonian (ISO), iso-8859-15 : Latin 9 (ISO), iso-8859-2 : Central European (ISO), iso-8859-3 : Latin 3 (ISO), iso-8859-4 : Baltic (ISO), iso-8859-5 : Cyrillic (ISO), iso-8859-6 : Arabic (ISO), iso-8859-7 : Greek (ISO), iso-8859-8 : Hebrew (ISO-Visual), iso-8859-8-i : Hebrew (ISO-Logical), iso-8859-9 : Turkish (ISO), Johab : Korean (Johab), koi8-r : Cyrillic (KOI8-R), koi8-u : Cyrillic (KOI8-U), ks_c_5601-1987 : Korean, macintosh : Western European (Mac), shift_jis : Japanese (Shift-JIS), us-ascii : US-ASCII, utf-16 : Unicode, utf-16BE : Unicode (Big-Endian), utf-32 : Unicode (UTF-32), utf-32BE : Unicode (UTF-32 Big-Endian), utf-7 : Unicode (UTF-7), utf-8 : Unicode (UTF-8), windows-1250 : Central European (Windows), windows-1251 : Cyrillic (Windows), Windows-1252 : Western European (Windows), windows-1253 : Greek (Windows), windows-1254 : Turkish (Windows), windows-1255 : Hebrew (Windows), windows-1256 : Arabic (Windows), windows-1257 : Baltic (Windows), windows-1258 : Vietnamese (Windows), windows-874 : Thai (Windows), x-Chinese-CNS : Chinese Traditional (CNS), x-Chinese-Eten : Chinese Traditional (Eten), x-cp20001 : TCA Taiwan, x-cp20003 : IBM5550 Taiwan, x-cp20004 : TeleText Taiwan, x-cp20005 : Wang Taiwan, x-cp20261 : T.61, x-cp20269 : ISO-</p>		

Argument	Optional	Accepts	Default Value	Description
		6937, x-cp20936 : Chinese Simplified (GB2312-80), x-cp20949 : Korean Wansung, x-cp50227 : Chinese Simplified (ISO-2022), x-EBCDIC-KoreanExtended : IBM EBCDIC (Korean Extended), x-Europa : Europa, x-IA5 : Western European (IA5), x-IA5-German : German (IA5), x-IA5-Norwegian : Norwegian (IA5), x-IA5-Swedish : Swedish (IA5), x-iscii-as : ISCII Assamese, x-iscii-be : ISCII Bengali, x-iscii-de : ISCII Devanagari, x-iscii-gu : ISCII Gujarati, x-iscii-ka : ISCII Kannada, x-iscii-ma : ISCII Malayalam, x-iscii-or : ISCII Oriya, x-iscii-pa : ISCII Punjabi, x-iscii-ta : ISCII Tamil, x-iscii-te : ISCII Telugu, x-mac-arabic : Arabic (Mac), x-mac-ce : Central European (Mac), x-mac-chinesesimp : Chinese Simplified (Mac), x-mac-chinesetrad : Chinese Traditional (Mac), x-mac-croatian : Croatian (Mac), x-mac-cyrillic : Cyrillic (Mac), x-mac-greek : Greek (Mac), x-mac-hebrew : Hebrew (Mac), x-mac-icelandic : Icelandic (Mac), x-mac-japanese : Japanese (Mac), x-mac-korean : Korean (Mac), x-mac-romanian : Romanian (Mac), x-mac-thai : Thai (Mac), x-mac-turkish : Turkish (Mac), x-mac-ukrainian : Ukrainian (Mac)		

## Variables produced

Argument	Type	Description
CmdSession	<a href="#">CMD session</a>	The CMD session for use with later CMD actions

## Exceptions

Exception	Description
Can't start command session	Indicates a problem initiating a CMD session
Working directory doesn't exist	Indicates that an error occurred trying to locate the working directory

## Read from CMD session

Read the output of a CMD session.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
CMD session	No	<a href="#">CMD session</a>		A previously opened CMD session
Separate output from error	N/A	<a href="#">Boolean value</a>	False	Specifies whether to store the standard output and the standard error into different variables or combined into one

## Variables produced

Argument	Type	Description
CmdOutput	<a href="#">Text value</a>	The CMD session's standard output
CmdError	<a href="#">Text value</a>	The CMD session's standard error

## Exceptions

Exception	Description
CMD session is closed	Indicates that the CMD session specified is closed

## Write to CMD session

Execute a command on an open CMD session.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
CMD session	No	<a href="#">CMD session</a>		A previously opened CMD session variable
Command	No	<a href="#">Text value</a>		The name of the command to execute

---

Argument	Optional	Accepts	Default Value	Description
Send Enter after command	N/A	Boolean value	True	Specifies whether to send an Enter the command

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Can't write to CMD session	Indicates an error writing to a CMD session
CMD session is closed	Indicates that the CMD session specified is closed

## Wait for text on CMD session

Wait for a specific text on a previously opened CMD session.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
CMD session	No	CMD session		An open CMD session variable
Text to wait	No	Text value		The text or regular expression to wait to appear on standard output or on standard error
Is regular expression	N/A	Boolean value	False	Specifies whether to wait for a regular expression instead of plain text
Ignore case	N/A	Boolean value	True	Specifies whether the text to wait should match with standard output or standard error without taking into account the case of the text
Timeout	Yes	Numeric value	0	Specifies whether to wait indefinitely for the text to appear or to fail if the text doesn't show up within a set time period

### ⓘ Note

Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
CMD session is closed	Indicates that the CMD session specified is closed
Timeout occurred while waiting for text	Indicates that the specified timeout period has elapsed before the text appeared in the command session

## Close CMD session

Close a previously opened CMD session.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
CMD session	No	<a href="#">CMD session</a>		The CMD session to close. Specify this variable in an open CMD session action

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# Terminal emulation actions

Article • 06/02/2023

Power Automate provides integration with terminal emulators through the **Terminal emulation** actions. These actions enable you to handle terminals and mainframes, and perform operations such as moving the cursor, setting and getting text, and sending keys.

Before deploying any terminal actions, use the **Open terminal session** action to open a new connection with the installed provider.

## 📘 Important

Before trying to connect to a terminal session, make sure that the actual terminal session is already open on your machine.

If you've installed Micro Focus Reflection on your machine, choose the respective option in the **Provider** parameter of the action and populate the required configuration.

**Open terminal session** [X]

➤ Open a new terminal session [More info](#)

Select parameters

Provider:  ⓘ

Installation path:  ⓘ

Configuration:  ⓘ

Profile:  ⓘ

Attach to running session:  ⓘ

> Variables produced **TerminalSession**



If you've installed another provider, select **HLLAPI** that works with most terminal emulation providers.

Depending on the provider you're using, select the appropriate HLLAPI DLL file located in its installation folder. In the following list, you can see the HLLAPI DLL file names of some popular terminal emulation providers:

- RocketSoftware BlueZone: **ehlapi64.dll**
- IBM Personal Communications: **EHLAPI32.dll**
- MicroFocus Rumba: **System/ehlapi32.Dll**
- Cybelesoft zScope: **zHllap32.dll**

**Open terminal session** [X]

➤ Open a new terminal session [More info](#)

Select parameters

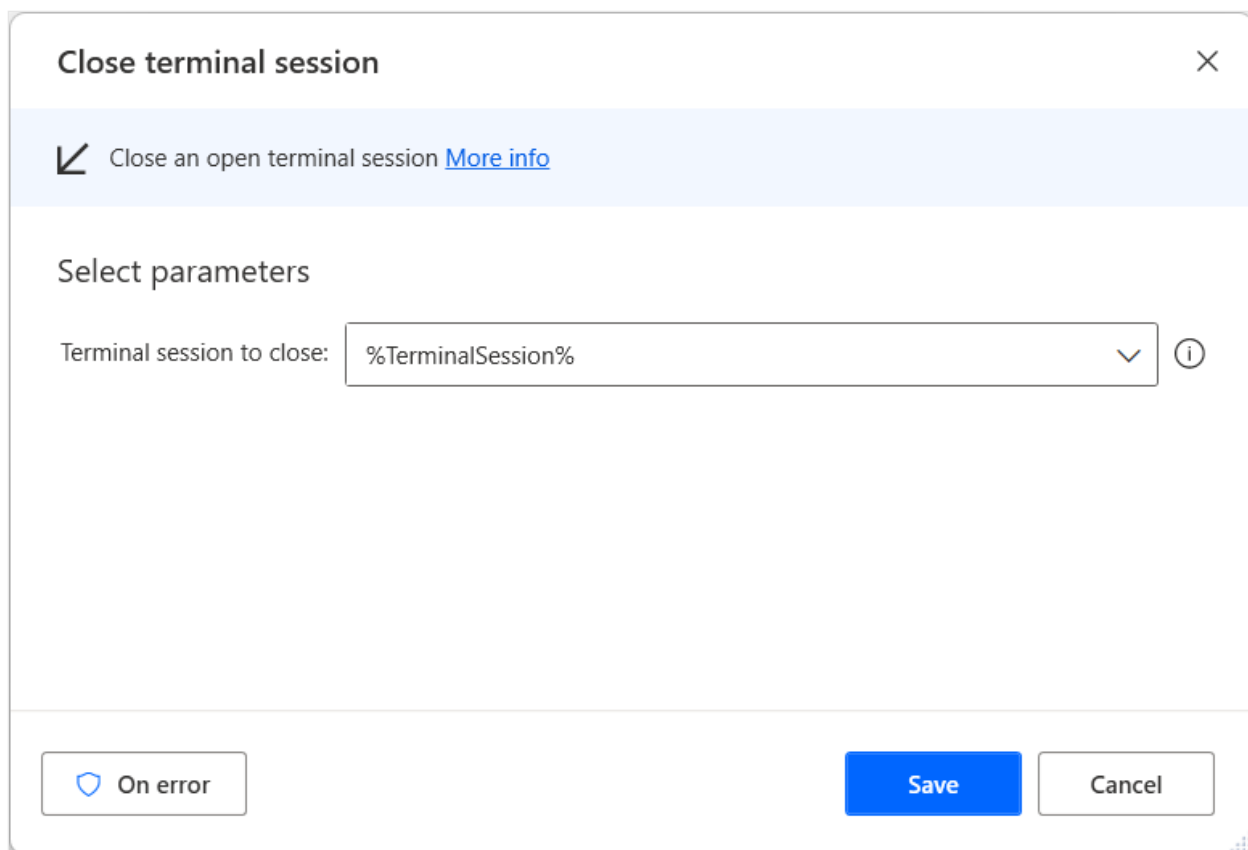
Provider:  ⓘ

HLLAPI DLL path:  ⓘ

Session name:  ⓘ

> Variables produced **TerminalSession**

After opening a terminal session and completing all the wanted operations, terminate the connection using the **Close terminal session** action. If you don't close the connection, some providers won't let you connect again to the already open session without restarting the software or the connection.



## Open terminal session

Open a new terminal session.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Provider	N/A	Micro focus reflection, HLLAPI	Micro focus reflection	The terminal emulation to use
HLLAPI DLL path	No	<a href="#">File</a>		The HLLAPI DLL of the provider. RocketSoftware BlueZone default name: 'ehlapi64.dll'. IBM Personal Communications default name: 'EHLAPI32.dll'. MicroFocus Rumba default path: 'System/ehlapi32.Dll'. Cybelesoft zScope default name: 'zHllap32.dll'. Any other provider that offers an HLLAPI DLL in its installation folder.
Installation path	No	<a href="#">Folder</a>		The installation path of the provider's application on the user's file system

Argument	Optional	Accepts	Default Value	Description
Configuration	N/A	Existing profile, Specify connection	Existing profile	Choose 'Existing profile' to select a file containing a preconfigured terminal emulation connection. Choose 'Specify connection' to specify the type of the connection, the host address and the port.
Session name	No	Text value		The session name to connect to. The HLLAPI short name, and it's a unique identifier for the host session. It can be found in the Terminal emulator's configuration settings.
Host type	N/A	IBM 3270, IBM 5250	IBM 3270	The host type of the connection
Profile	No	File		The file that contains the preconfigured connection
Host address	No	Text value		The host's address to connect to
Port	No	Numeric value		The port to be used for this connection
Attach to running session	N/A	Boolean value	False	Specifies whether to attach to a currently open/running terminal session

## Variables produced

Argument	Type	Description
TerminalSession	Terminal session	The specific terminal session for use with later terminal emulation commands

## Exceptions

Exception	Description
Error communicating with the emulator	Indicates a problem connecting to the emulator
Profile error	Profile error

## Close terminal session

Close an open terminal session.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Terminal session to close	No	<a href="#">Terminal session</a>		The previously opened terminal session

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Error communicating with the emulator	Indicates a problem connecting to the emulator

## Move cursor on terminal session

Move the terminal's cursor on the specified position.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Terminal session	No	<a href="#">Terminal session</a>		The terminal session to work with
Row	No	<a href="#">Numeric value</a>		The vertical position of the cursor on the screen
Column	No	<a href="#">Numeric value</a>		The horizontal position of the cursor on the screen

## Variables produced

This action doesn't produce any variables.

# Exceptions

Exception	Description
Screen position out of bounds	Indicates that the screen position is out of bounds
Position commands aren't supported by the emulator	Indicates that position commands used aren't supported by the emulator
Operation is unavailable for this session type	Indicates that the operation is unavailable for this session type
Error communicating with the emulator	Indicates a problem connecting to the emulator

## Get text from terminal session

Get text from a terminal session.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Terminal session	No	<a href="#">Terminal session</a>		The terminal session to work with
Get text from	N/A	Field, Entire screen, Cursor position, Specific position	Field	The location to get the text from
Get field by	N/A	Label, Index, Position	Label	Specifies how to look for the field
Label	No	<a href="#">Text value</a>		The label of the field to look for
Index	No	<a href="#">Numeric value</a>		The index of the field to look for
Text length	No	<a href="#">Numeric value</a>		The length of the text to receive
Row	No	<a href="#">Numeric value</a>		The vertical position of the field on the screen
Column	No	<a href="#">Numeric value</a>		The horizontal position of the field on the screen

## Variables produced

Argument	Type	Description
TerminalText	<a href="#">Text value</a>	The text retrieved from the terminal session

## Exceptions

Exception	Description
Error communicating with the emulator	Indicates a problem connecting to the emulator
Field index out of bounds	Indicates that the field index is out of bounds
Field label not found	Indicates that the field label doesn't exist
Screen position out of bounds	Indicates that the screen position is out of bounds
No field found at the given position	Indicates that no field exists at the given position
Terminal screen is unformatted	Indicates that the terminal screen is unformatted
Position commands aren't supported by the emulator	Indicates that position commands used aren't supported by the emulator
Operation is unavailable for this session type	Indicates that the operation is unavailable for this session type

## Set text on terminal session

Set text on a terminal session.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Terminal session	No	<a href="#">Terminal session</a>		The terminal session to work with
Text	No	Direct encrypted input or <a href="#">Text value</a>		The text to set on the specified location

Argument	Optional	Accepts	Default Value	Description
Set text	N/A	Cursor position, Field	Field	The location to set the text to
Get field by	N/A	Label, Index, Position	Label	Specifies the way by which to look for the field
Label	No	<a href="#">Text value</a>		The label of the field to look for
Index	No	<a href="#">Numeric value</a>		The index of the field on the screen
Row	No	<a href="#">Numeric value</a>		The vertical position of the field on the screen
Column	No	<a href="#">Numeric value</a>		The horizontal position of the field on the screen
Treat @ character as literal	N/A	<a href="#">Boolean value</a>	False	Check this box to send the '@' character literally. Leave this option disabled to sent it as a special character

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Error communicating with the emulator	Indicates a problem connecting to the emulator
Field index out of bounds	Indicates that the field index is out of bounds
Field label not found	Indicates that the field label doesn't exist
Screen position out of bounds	Indicates that the screen position is out of bounds
No field found at the given position	Indicates that no field exists at the given position
Terminal screen is unformatted	Indicates that the terminal screen is unformatted
Position commands aren't supported by the emulator	Indicates that position commands used aren't supported by the emulator
Operation is unavailable for this session type	Indicates that the operation is unavailable for this session type

Exception	Description
Input text was rejected	Indicates that the input text was rejected

## Send key to terminal session

Send a control key to a terminal session.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Terminal session	No	<a href="#">Terminal session</a>		The terminal session to work with
Control key	N/A	Transmit, Alt cursor, Attention, Backspace, Back tab, Block toggle, Break, Cancel, Center, Clear, Clear comm, Clear display, Clear line, Clear page, Clear partition, Comma, Command line, Command window, Compose, Ctrl+F1, Ctrl+F2, Ctrl+F3, Ctrl+F4, Ctrl+F5, Ctrl+F6, Ctrl+F7, Ctrl+F8, Ctrl+F9, Ctrl+F10, Ctrl+F11, Ctrl+F12, Ctrl+Shift+F1, Ctrl+Shift+F2, Ctrl+Shift+F3, Ctrl+Shift+F4, Ctrl+Shift+F5, Ctrl+Shift+F6, Ctrl+Shift+F7, Ctrl+Shift+F8, Ctrl+Shift+F9, Ctrl+Shift+F10, Ctrl+Shift+F11, Ctrl+Shift+F12, Cursor blink, Cursor select, Decimal, Delete, Delete char, Delete line, Delete word, Destructive back space, Disconnect, Do, Down, Down double, Dup, Duplicate, Edit script, Key end, End of field, Erase EOF, Erase EOL, Erase EOP, Erase input, Escape, ExtGr, F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36, F37, F38, F39, F40, F41, F42, F43, F44, F45, F46, F47, F48, Field delimiter, Field exit, Field mark, Field minus, Field plus, Find, Hard reset, Help, Hex, Hex 00, Hex 01, Hex 02, Hex 03, Hex 04, Hex 05, Hex 06, Hex 07, Hex 08, Hex 09, Hex 0A, Hex 0B, Hex 0C, Hex 0D, Hex 0E, Hex 0F, Hex 10, Hex 11, Hex 12, Hex 13, Hex 14, Hex 15, Hex 16, Hex 17, Hex 18, Hex 19, Hex 1A, Hex	Transmit	The key to submit to the session



Argument	Optional	Accepts	Default Value	Description
		1B, Hex 1C, Hex 1D, Hex 1E, Hex 1F, Hex 7F, Hold, Hold clear, Hold set, Home, Home down, Home up, Insert, Insert char, Insert here, Insert line, Insert mode, Invalid key, KeyPad0, KeyPad1, KeyPad2, KeyPad3, KeyPad4, KeyPad5, KeyPad6, KeyPad7, KeyPad8, KeyPad9, Left, Left double, Line feed, Minus, Monitor toggle, New line, Next page, Next screen, Next word, Nul, NumLock, PA1, PA2, PA3, Page, Page down, Page up, Pan left, Pan right, Partition jump, PF1, PF2, PF3, PF4, Plus Cr, Previous word, PrevPage, PrevScreen, Print, Print line, Print Msg, Prent screen, Remove, Replace, Reset, Return, Reserve field, Right, Right double, Roll down, Roll up, Rile line, Run script, Scroll down, Scroll left, Scroll right, Scroll up, Select, Send, Send answer back, Send delete, Send line, Send Msg, Shift+Backspace, Shift+Delete, Shift+Down, Shift+F1, Shift+F2, Shift+F3, Shift+F4, Shift+F5, Shift+F6, Shift+F7, Shift+F8, Shift+F9, Shift+F10, Shift+F11, Shift+F12, Shift+F13, Shift+F14, Shift+F15, Shift F16, Shift+F17, Shift+F18, Shift+F19, Shift+F20, Shift+Home, Shift+Insert, Shift+Left, Shift+Print screen, Shift+Right, Shift+Up, Soft reset, System request, Tab, Tek zoom, Term next page, Term prev page, Test, Text assist begin bold, Text assist begin of line, Text assist begin underline, Text assist bottom of page, Text assist carrier return, Text assist center, Text assist end bold, Text assist end of line, Text assist half index down, Text assist half index up, Text assist insert symbols, Text assist next stop, Text assist next text column, Text assist page end, Text assist required space, Text assist required tab, Text assist stop, Text assist text tab advance, Text assist top of page, Text assist word underline, Trace Toggle, Udk 10, Udk 6, Udk 7, Udk 8, Udk 9, Udk 11, Udk 12, Udk 13, Udk 14, Udk 15, Udk 16, Udk 17, Udk 18, Udk 19, Udk 20, Up, Up double		

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Error communicating with the emulator	Indicates a problem connecting to the emulator
Key not supported	Indicates that the key isn't supported

## Wait for text on terminal session

Wait for a specific text to appear on a terminal session.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Terminal session	No	<a href="#">Terminal session</a>		The previously opened terminal session
Text to wait for	No	<a href="#">Text value</a>		The text or regular expression to wait to appear on the terminal screen or on a specified field
Regular expression	N/A	<a href="#">Boolean value</a>	False	Specifies whether to wait for a regular expression instead of plain text
Wait for text location	N/A	Screen, Field	Screen	The location to wait for the text to appear on
Get field by	N/A	Label, Index, Position	Label	Specifies the way by which to look for the field
Label	No	<a href="#">Text value</a>		The label of the field to look for
Index	No	<a href="#">Numeric value</a>		The index of the field to look for
Row	No	<a href="#">Numeric value</a>		The vertical position of the field on the screen
Column	No	<a href="#">Numeric value</a>		The horizontal position of the field on the screen

Argument	Optional	Accepts	Default Value	Description
Timeout	Yes	Numeric value	0	The maximum amount of time to wait

### ⓘ Note

Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Error communicating with the emulator	Indicates a problem connecting to the emulator
Field index out of bounds	Indicates that the field index is out of bounds
Field label not found	Indicates that the field label doesn't exist
Screen position out of bounds	Indicates that the screen position is out of bounds
No field found at the given position	Indicates that no field exists at the given position
Terminal screen is unformatted	Indicates that the terminal screen is unformatted
Position commands aren't supported by the emulator	Indicates that position commands used aren't supported by the emulator
Operation is unavailable for this session type	Indicates that the operation is unavailable for this session type
Timeout expired	Indicates that the timeout has been expired

## Search for text on terminal session

Search for all occurrences of a specific text on a terminal session

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Terminal session	No	<a href="#">Terminal session</a>		The previously opened terminal session
Text to search for	No	<a href="#">Text value</a>		The text or regular expression to search for on the terminal screen
Regular expression	N/A	<a href="#">Boolean value</a>	False	Specifies whether to search for a regular expression instead of plain text
Column size	No	<a href="#">Numeric value</a>	80	The number of the columns on the terminal screen

### ⓘ Note

Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).

## Variables produced

Argument	Type	Description
FindResults	<a href="#">Datatable</a>	The search results retrieved from the terminal session screen

## Exceptions

Exception	Description
Error communicating with the emulator	Indicates a problem connecting to the emulator
Text not found	Indicates that the text searching for was not found
Invalid regex expression	Indicates that the Regular Expression used is invalid

# OCR actions


Article • 12/16/2022

Power Automate enables users to read, extract, and manage data within files through optical character recognition (OCR).

To create an OCR engine and extract text from images and documents, use the **Extract text with OCR** action. The following example extracts text from the entire specified image.

### Extract text with OCR ✕


*i* The 'OCR engine variable' as an engine type is going to be deprecated. Make sure you update your flows using alternative OCR engine types.

 Extract text from a given source using the specified OCR engine [More info](#)

#### Select parameters

OCR engine type:  *i*

OCR source:  *i*

Image file path:   *{x}* *i*

Search mode:  *i*

▼ **OCR engine settings**

Windows OCR language:  *i*

Image width multiplier:  *{x}* *i*

Image height multiplier:  *{x}* *i*

> **Variables produced** OcrText

All OCR actions can create a new OCR engine variable or use an existing one. You can use existing OCR engine variables in any action that offers OCR capabilities.

Power Automate supports the Windows OCR and Tesseract engines. To configure the selected OCR engine, navigate to the **OCR engine settings** of the appropriate action. The available options include the language and the image width and height multipliers.

#### ⓘ Note

- All the available OCR engines are pre-installed in Power Automate and work locally without connecting to the cloud. However, you may need to download language packs or data files to extract texts in specific languages.
- Image multipliers increase the image size to make searching and text extraction more effective. Setting values greater than three may lead to erroneous results.

## Use the Windows OCR engine

The default OCR engine in Power Automate is the Windows OCR engine. To extract texts using the Windows OCR engine, you must install the appropriate language pack for the language you want to extract.

If the appropriate language pack isn't installed, Power Automate throws an error, prompting you to install it. To find more information regarding downloading and installing language packs, go to [Language packs for Windows](#) <sup>↗</sup>.

After installing the appropriate language pack, extend the **OCR engine settings** of the OCR action and select the language you want. The Windows OCR engine supports 25 languages, including Chinese (Simplified and Traditional), Czech, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian (Cyrillic and Latin), Slovak, Spanish, Swedish, and Turkish.

## Use the Tesseract OCR engine

#### ⓘ Note

To make use of the Tesseract OCR engine, make sure the machine's CPU supports AVX2 instruction set.

Apart from the Windows OCR engine, Power Automate supports the Tesseract engine. This engine can extract text in five languages without further configuration: English, German, Spanish, French, and Italian.

To extract text in a language outside the mentioned list, enable the **Use other languages** option in the **OCR engine settings** of the OCR action. When this option is enabled, the action displays two more parameters: **Language abbreviation** and **Language data path**.

The **Language abbreviation** field indicates to the engine which language to look for during OCR. The **Language data path** field contains the language data files (.traineddata) used to train the OCR engine. You can find the language data files for all the available languages in [this GitHub repository](#) <sup>↗</sup>.

You can also use the Tesseract engine to extract text from multilingual documents. To find more information regarding extracting text from multilingual documents, go to [Perform OCR on multilingual documents](#).

## If text on screen (OCR)

Marks the beginning of a conditional block of actions depending on whether a given text appears on the screen or not, using OCR.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
If text	N/A	Exists, Doesn't exist	Exists	Specifies whether to check if the text exists or not on the given source to analyze
OCR engine type	No	Windows OCR engine, Tesseract engine, OCR engine variable	OCR engine variable	The OCR engine type to use. Select a preconfigured OCR engine or set up a new one.
OCR engine variable	No	<a href="#">OCREngineObject</a>		The engine to use for the OCR operation

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Text to find	No	<a href="#">Text value</a>		The text to search for in the specified source
Is regular expression	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use a regular expression to find the specified text
Search for text on	N/A	Entire screen, Foreground window	Entire screen	Specifies whether to search for the specified text on the entire visible screen or just the foreground window
Search mode	N/A	Whole of specified source, Specific subregion only, Subregion relative to image	Whole of specified source	Specifies whether to scan the entire screen (or window) or a narrowed down subregion of it
Image(s)	No	<a href="#">List of Images</a>		The image(s) specifying the subregion (relative to the top left corner of the image) to scan for the supplied text
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion to scan for the supplied text



<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Tolerance	Yes	<a href="#">Numeric value</a>	10	Specifies how much the image(s) searched for can differ from the originally chosen image
Y1	Yes	<a href="#">Numeric value</a>		The start Y coordinate of the subregion to scan for the supplied text
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion relative to the specified image to scan for the supplied text
X2	Yes	<a href="#">Numeric value</a>		The end X coordinate of the subregion to scan for the supplied text
Y1	Yes	<a href="#">Numeric value</a>		The start Y coordinate of the subregion relative to the specified image to scan for the supplied text
Y2	Yes	<a href="#">Numeric value</a>		The end Y coordinate of the subregion to scan for the supplied text

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
X2	Yes	<a href="#">Numeric value</a>		The end X coordinate of the subregion relative to the specified image to scan for the supplied text
Y2	Yes	<a href="#">Numeric value</a>		The end Y coordinate of the subregion relative to the specified image to scan for the supplied text
Windows OCR language	N/A	Chinese (Simplified), Chinese (Traditional), Czech, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian (Cyrillic), Serbian (Latin), Slovak, Spanish, Swedish, Turkish	English	The language of the text that the Windows OCR engine detects
Use other language	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use a language not given in the 'Tesseract language' field
Tesseract language	N/A	English, German, Spanish, French, Italian	English	The language of the text that the Tesseract engine detects
Language abbreviation	No	<a href="#">Text value</a>		The Tesseract abbreviation of the language to use. For example, if the data is 'eng.traineddata', set this parameter to 'eng'

Argument	Optional	Accepts	Default Value	Description
Language data path	No	<a href="#">Text value</a>		The path of the folder that holds the specified language's Tesseract data
Image width multiplier	No	<a href="#">Numeric value</a>	1	The width multiplier of the image
Image height multiplier	No	<a href="#">Numeric value</a>	1	The height multiplier of the image
Image matching algorithm	N/A	Basic, Advanced	Basic	Which image algorithm to use when searching for image

#### ⓘ Note

- Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).
- The **OCR engine variable** option is planned for deprecation.

## Variables produced

Argument	Type	Description
LocationOfTextFoundX	<a href="#">Numeric value</a>	The X coordinate of the point where the text appears on the screen. If the search is performed in the foreground window, the coordinate returned is relative to the top left corner of the window
LocationOfTextFoundY	<a href="#">Numeric value</a>	The X coordinate of the point where the text appears on the screen. If the search is performed in the foreground window, the coordinate returned is relative to the top left corner of the window

## Exceptions

Exception	Description
Can't check if text exists in non-interactive mode	Indicates that it isn't possible to check for the text on the screen when in non-interactive mode
Invalid subregion coordinates	Indicates that the specified subregion coordinates are invalid
Failed to analyze text with OCR	Indicates an error occurred while trying to analyze the text using OCR
Failed to create the OCR engine	Indicates an error occurred while trying to create the OCR engine
Data path folder doesn't exist	Indicates that the folder specified for the language data doesn't exist
The selected Windows language pack isn't installed on the machine	Indicates that the selected Windows language pack hasn't been installed on the machine
OCR engine not alive	Indicates that the OCR engine isn't alive

## Wait for text on screen (OCR)

Wait until a specific text appears/disappears on the screen, on the foreground window, or relative to an image on the screen or foreground window using OCR.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Wait for text to	N/A	Appear, Disappear	Appear	Specifies whether to wait for the text to appear or disappear
OCR engine type	No	Windows OCR engine, Tesseract engine, OCR engine variable	OCR engine variable	The OCR engine type to use. Select a preconfigured OCR engine or set up a new one.

Argument	Optional	Accepts	Default Value	Description
OCR engine variable	No	<a href="#">OCREngineObject</a>		The engine to use for the OCR operation
Text to find	No	<a href="#">Text value</a>		The text to search for in the specified source
Is regular expression	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use a regular expression to find the specified text
Search for text on	N/A	Entire screen, Foreground window	Entire screen	Specifies whether to search for the specified text on the entire visible screen or just the foreground window
Search mode	N/A	Whole of specified source, Specific subregion only, Subregion relative to image	Whole of specified source	Specifies whether to scan the entire screen (or window) or a narrowed down subregion of it
Image(s)	No	<a href="#">List of Images</a>		The image(s) specifying the subregion (relative to the top left corner of the image) to scan for the supplied text
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion to scan for the supplied text

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Tolerance	Yes	<a href="#">Numeric value</a>	10	Specifies how much the image(s) searched for can differ from the originally chosen image
Y1	Yes	<a href="#">Numeric value</a>		The start Y coordinate of the subregion to scan for the supplied text
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion relative to the specified image to scan for the supplied text
X2	Yes	<a href="#">Numeric value</a>		The end X coordinate of the subregion to scan for the supplied text
Y1	Yes	<a href="#">Numeric value</a>		The start Y coordinate of the subregion relative to the specified image to scan for the supplied text
Y2	Yes	<a href="#">Numeric value</a>		The end Y coordinate of the subregion to scan for the supplied text

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
X2	Yes	<a href="#">Numeric value</a>		The end X coordinate of the subregion relative to the specified image to scan for the supplied text
Y2	Yes	<a href="#">Numeric value</a>		The end Y coordinate of the subregion relative to the specified image to scan for the supplied text
Windows OCR language	N/A	Chinese (Simplified), Chinese (Traditional), Czech, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian (Cyrillic), Serbian (Latin), Slovak, Spanish, Swedish, Turkish	English	The language of the text that the Windows OCR engine detects
Use other language	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use a language not given in the 'Tesseract language' field
Tesseract language	N/A	English, German, Spanish, French, Italian	English	The language of the text that the Tesseract engine detects
Language abbreviation	No	<a href="#">Text value</a>		The Tesseract abbreviation of the language to use. For example, if the data is 'eng.traineddata', set this parameter to 'eng'

Argument	Optional	Accepts	Default Value	Description
Language data path	No	<a href="#">Text value</a>		The path of the folder that holds the specified language's Tesseract data
Image width multiplier	No	<a href="#">Numeric value</a>	1	The width multiplier of the image
Image height multiplier	No	<a href="#">Numeric value</a>	1	The height multiplier of the image
Image matching algorithm	N/A	Basic, Advanced	Basic	Which image algorithm to use when searching for image
Fail with timeout error	N/A	<a href="#">Boolean value</a>	False	Specify whether you want the action to wait indefinitely or fail after a set time period

### ⓘ Note

- Power Automate's regular expression engine is .NET. To find more information about regular expressions, go to [Regular Expression Language - Quick Reference](#).
- The **OCR engine variable** option is planned for deprecation.

## Variables produced

Argument	Type	Description
LocationOfTextFoundX	<a href="#">Numeric value</a>	The X coordinate of the point where the text appears on the screen. If the search is performed in the foreground window, the coordinate returned is relative to the top left corner of the window



Argument	Type	Description
LocationOfTextFoundY	Numeric value	The X coordinate of the point where the text appears on the screen. If the search is performed in the foreground window, the coordinate returned is relative to the top left corner of the window

## Exceptions

Exception	Description
Can't check if text exists in non-interactive mode	Indicates that it isn't possible to check for the text on the screen when in non-interactive mode
Invalid subregion coordinates	Indicates that the specified subregion coordinates are invalid
Failed to analyze text with OCR	Indicates an error occurred while trying to analyze the text using OCR
Failed to create the OCR engine	Indicates an error occurred while trying to create the OCR engine
Data path folder doesn't exist	Indicates that the folder specified for the language data doesn't exist
The selected Windows language pack isn't installed on the machine	Indicates that the selected Windows language pack hasn't been installed on the machine
OCR engine not alive	Indicates that the OCR engine isn't alive
Timeout error	Indicates that the action failed after a set time period

## Extract text with OCR

Extract text from a given source using the given OCR engine.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
OCR engine	No	Windows OCR engine, Tesseract engine, OCR engine variable	OCR engine variable	The OCR engine type to use. Select a preconfigured OCR engine or set up a new one
OCR engine variable	No	<a href="#">OCREngineObject</a>		The engine to use for the OCR operation
OCR source	N/A	Screen, Foreground window, Image on disk	Screen	The source of the image to perform the OCR operation on
Image file path	No	<a href="#">File</a>		The path of the image to perform the OCR operation on
Search mode	N/A	Whole of specified source, Specific subregion only, Subregion relative to image	Whole of specified source	The selected mode for the OCR operation
Image	No	<a href="#">List of Images</a>		The image to use for narrowing down the scan to a subregion that is relative to the specified image
Tolerance	Yes	<a href="#">Numeric value</a>	10	Specifies how much the image can differ from the originally chosen image
X1	Yes	<a href="#">Numeric value</a>		The start X coordinate of the subregion to narrow down the scan

Argument	Optional	Accepts	Default Value	Description
X2	Yes	Numeric value		The end X coordinate of the subregion to narrow down the scan
Y1	Yes	Numeric value		The start Y coordinate of the subregion to narrow down the scan
Y2	Yes	Numeric value		The end Y coordinate of the subregion to narrow down the scan
Windows OCR language	N/A	Chinese (Simplified), Chinese (Traditional), Czech, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian (Cyrillic), Serbian (Latin), Slovak, Spanish, Swedish, Turkish	English	The language of the text that the Windows OCR engine detects
Use other language	N/A	Boolean value	False	Specifies whether to use a language not given in the 'Tesseract language' field
Tesseract language	N/A	English, German, Spanish, French, Italian	English	The language of the text that the Tesseract engine detects

Argument	Optional	Accepts	Default Value	Description
Language abbreviation	No	Text value		The Tesseract abbreviation of the language to use. For example, if the data is 'eng.traineddata', set this parameter to 'eng'
Language data path	No	Text value		The path of the folder that holds the specified language's Tesseract data
Image width multiplier	No	Numeric value	1	The width multiplier of the image
Image height multiplier	No	Numeric value	1	The height multiplier of the image
Wait for image to appear	N/A	Boolean value	True	Specifies whether to wait or not for the image to appear on the screen or foreground window
Timeout	No	Numeric value	5	Specifies the time to wait for the operation to complete before the action fails
Image matching algorithm	N/A	Basic, Advanced	Basic	Which image algorithm to use when searching for image

### ⓘ Note

The **OCR engine variable** option is planned for deprecation.

---

## Variables produced

Argument	Type	Description
OcrText	<a href="#">Text value</a>	The result after the text extraction

## Exceptions

Exception	Description
Failed to extract text with OCR	Indicates an error occurred while trying to extract text with OCR from the given source
Image file not found	Indicates that the file doesn't exist on the given path
Landmark image not found	Indicates that the landmark image doesn't exist
Can't get text from screen in non-interactive mode	Indicates that it isn't possible to get text from screen when in non-interactive mode
Failed to create the OCR engine	Indicates an error occurred while trying to create the OCR engine
Data path folder doesn't exist	Indicates that the folder specified for the language data doesn't exist
The selected Windows language pack isn't installed on the machine	Indicates that the selected Windows language pack hasn't been installed on the machine
OCR engine not alive	Indicates that the OCR engine isn't alive

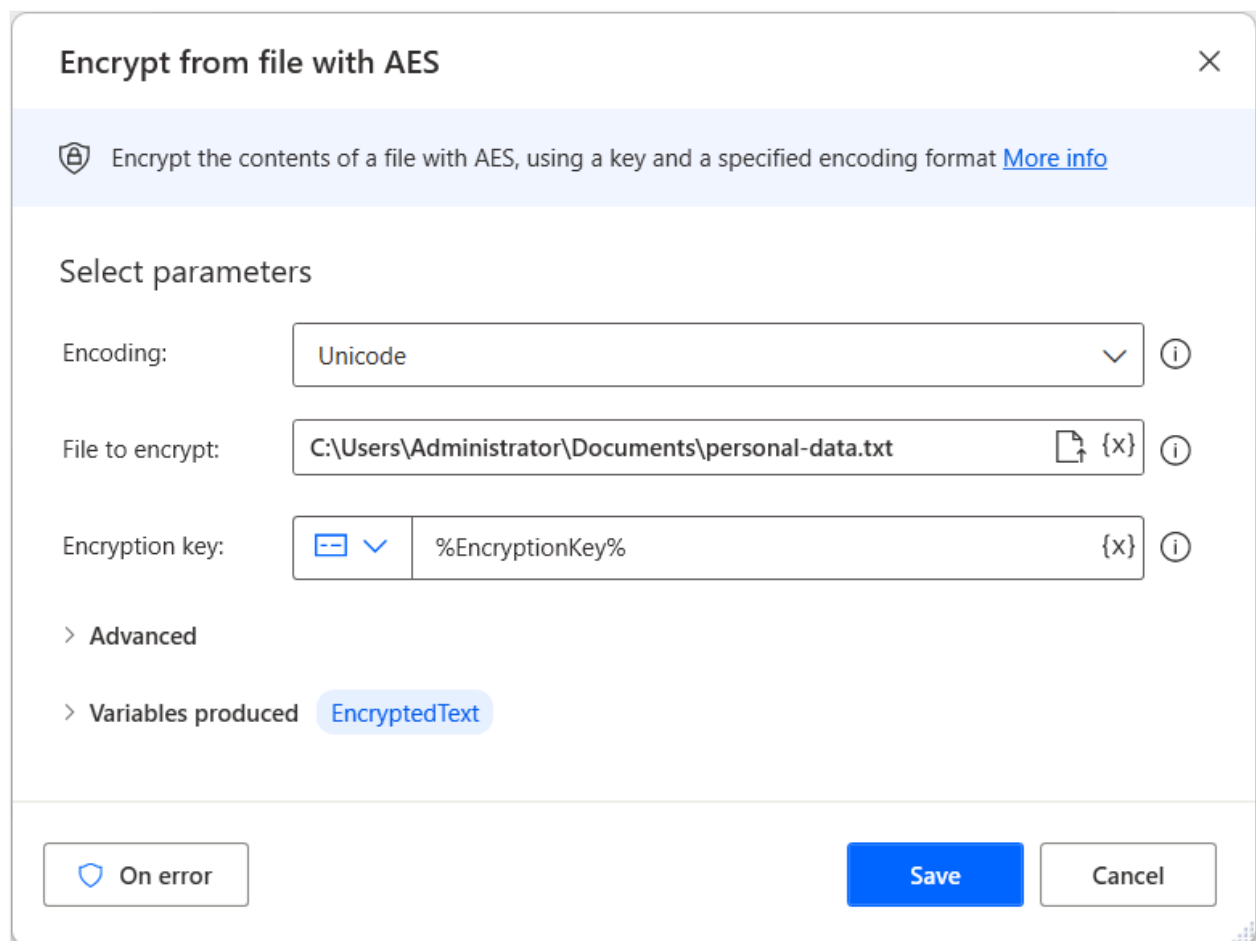
# Cryptography actions

Article • 07/09/2024

**Cryptography** actions enable you to encrypt and decrypt plain text and text from files providing a key and an encoding format.

The **Encrypt text with AES** action encrypts a text using the AES algorithm and a user-specified encryption key. You can provide the encryption key directly or through a variable.


To encrypt the text of a file directly, use the **Encrypt from file with AES** action. This action works similarly to the **Encrypt text with AES** action but requires a source file instead of a text value.



The screenshot shows a configuration dialog box titled "Encrypt from file with AES". At the top, there is a description: "Encrypt the contents of a file with AES, using a key and a specified encoding format [More info](#)". Below this, the "Select parameters" section includes three main fields: "Encoding" set to "Unicode", "File to encrypt" set to "C:\Users\Administrator\Documents\personal-data.txt", and "Encryption key" set to "%EncryptionKey%". There are expandable sections for "Advanced" and "Variables produced" (showing "EncryptedText"). At the bottom, there are buttons for "On error", "Save", and "Cancel".

To decrypt a text, use the **Decrypt text with AES**, and enter the encrypted text and the encryption key previously used to encrypt it. To decrypt and store a text in a file, deploy the **Decrypt to file with AES** and specify a destination path.

## Decrypt to file with AES ✕

 Decrypt a string to a file with AES based on a specified key and an encoding format [More info](#)

### Select parameters

Encoding:  ⓘ

Text to decrypt:  {x} ⓘ

Decryption key:  {x} ⓘ

Decrypt to file:  {x} ⓘ

If file exists:  ⓘ

> **Advanced**

> **Variables produced** DecryptedFile

Apart from encryption and decryption, the **Cryptography** group of actions provides actions to hash values with and without a key. Like the encryption actions, you can hash values from files using the **Hash from file** and **Hash from file with key** actions.

**Hash text with key**
✕

Hash a string with a key, using a specified algorithm and an encoding format [More info](#)

**Select parameters**

Hash algorithm:  ⓘ

Encoding:  ⓘ

Text to hash:  {x} ⓘ

Hash key:  ⓘ

> Variables produced HashedText

ⓘ On error

Save

Cancel

### ⓘ Important

Passwords entered in designated fields only work on the machine where they were initially set. This is due to the machine-specific encryption used for direct password inputs. If the flow is opened on a different machine, these passwords will not be valid and will need to be re-entered.

## Encrypt text with AES

Encrypt a string with AES, using a key and a specified encoding format.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Encoding	N/A	System default, ASCII, Unicode,	Unicode	The encoding of the text to encrypt



Argument	Optional	Accepts	Default Value	Description
		Big-endian Unicode, UTF-8		
Text to encrypt	No	Text value		The text to encrypt
Encryption key	No	Direct encrypted input or Text value		The encryption key to use
Padding	N/A	None, PKCS7, Zeros, ANSIX923, ISO10126	PKCS7	The padding to use for the selected encryption algorithm
Key size	N/A	128 bits, 192 bits, 256 bits	256 bits	The size of the key in bits to use for the encryption
Use salt	N/A	Boolean value	False	Specifies whether to use salt for encryption. When this option is enabled, the randomly generated salt becomes an output in the form of a base64 string.
Use initialization vector	N/A	Boolean value	False	Specifies whether to use an initialization vector. When this option is enabled, the randomly generated initialization vector becomes an output in the form of a base64 string

## Variables produced

 Expand table

Argument	Type	Description
EncryptedText	Text value	The encrypted text for later processing
Salt	Text value	The randomly generated salt value for later processing
InitializationVector	Text value	The randomly generated initialization vector value for later processing

## Exceptions

[Expand table](#)

Exception	Description
Failed to encrypt text	Indicates that an error occurred during encryption

## Decrypt text with AES

Decrypt a string with AES based on a specified key and an encoding format.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Encoding	N/A	System default, ASCII, Unicode, Big-endian Unicode, UTF-8	Unicode	The encoding for the decrypted text
Text to decrypt	No	<a href="#">Text value</a>		The text to decrypt in the form of a base64 string
Decryption key	No	Direct encrypted input or <a href="#">Text value</a>		The decryption key to use
Padding	N/A	None, PKCS7, Zeros, ANSIX923, ISO10126	PKCS7	The padding to use for the selected decryption algorithm
Key size	N/A	128 bits, 192 bits, 256 bits	256 bits	The size of the key in bits to use for the decryption
Use salt	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use salt for the decryption
Salt	No	<a href="#">Text value</a>		The salt to use for decryption in the form of a base64 string
Use initialization vector	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use an initialization vector
Initialization vector	No	<a href="#">Text value</a>		The initialization vector to use for decryption in the form of a base64 string

## Variables produced

[Expand table](#)

Argument	Type	Description
DecryptedText	<a href="#">Text value</a>	The decrypted text for later processing

## Exceptions

[Expand table](#)

Exception	Description
Failed to decrypt text	Indicates that an error occurred during decryption

## Encrypt from file with AES

Encrypt the contents of a file with AES, using a key and a specified encoding format.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Encoding	N/A	System default, ASCII, Unicode, Big-endian Unicode, UTF-8	Unicode	The encoding of the file to encrypt
File to encrypt	No	<a href="#">File</a>		The text file that stores the contents to encrypt
Encryption key	No	Direct encrypted input or <a href="#">Text value</a>		The encryption key to use
Padding	N/A	None, PKCS7, Zeros, ANSIX923, ISO10126	PKCS7	The padding to use for the selected encryption algorithm
Key size	N/A	128 bits, 192 bits, 256 bits	256 bits	The size of the key in bits to use for the encryption

Argument	Optional	Accepts	Default Value	Description
Use salt	N/A	Boolean value	False	Specifies whether to use salt for encryption. When this option is enabled, the randomly generated salt becomes an output in the form of a base64 string.
Use initialization vector	N/A	Boolean value	False	Specifies whether to use an initialization vector. When this option is enabled, the randomly generated initialization vector becomes an output in the form of a base64 string

## Variables produced

[Expand table](#)

Argument	Type	Description
EncryptedText	Text value	The text of the encrypted file for later processing
Salt	Text value	The randomly generated salt value for later processing
InitializationVector	Text value	The randomly generated initialization vector value for later processing

## Exceptions


[Expand table](#)

Exception	Description
File not found	Indicates that the file doesn't exist
Failed to encrypt the contents of the file	Indicates that an error occurred while encrypting the contents of the file

## Decrypt to file with AES

Decrypt a string to a file with AES based on a specified key and an encoding format.

# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Encoding	N/A	System default, ASCII, Unicode, Big-endian Unicode, UTF-8	Unicode	The encoding of the text to decrypt
Text to decrypt	No	<a href="#">Text value</a>		The text to decrypt in the form of a base64 string
Decryption key	No	Direct encrypted input or <a href="#">Text value</a>		The decryption key to use
Decrypt to file	No	<a href="#">File</a>		The file to save the decrypted text into
If file exists	N/A	Overwrite, Don't decrypt to file, Add sequential suffix	Add sequential suffix	Specifies what to do in case the destination file already exists
Padding	N/A	None, PKCS7, Zeros, ANSIX923, ISO10126	PKCS7	The padding to use for the selected decryption algorithm
Key size	N/A	128 bits, 192 bits, 256 bits	256 bits	The size of the key in bits to use for decryption
Use salt	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use salt for decryption
Salt	No	<a href="#">Text value</a>		The salt to use for decryption in the form of a base64 string
Use initialization vector	N/A	<a href="#">Boolean value</a>	False	Specifies whether to use an initialization vector. Enter the initialization vector in the form of a base64 string
Initialization vector	No	<a href="#">Text value</a>		The initialization vector to use for decryption

## Variables produced

[Expand table](#)

Argument	Type	Description
DecryptedFile	<a href="#">File</a>	The decrypted file for later processing

## Exceptions

[Expand table](#)

Exception	Description
Failed to decrypt and store the contents to a file	Indicates that an error occurred while decrypting or storing the contents to the specified file

## Hash text

Hash a string, using a specified algorithm and an encoding format.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Hash algorithm	N/A	SHA256, SHA384, SHA512	SHA256	The algorithm to use for hashing
Encoding	N/A	System default, ASCII, Unicode, Big-endian Unicode, UTF-8	Unicode	The encoding of the text to hash
Text to hash	No	<a href="#">Text value</a>		The text to hash

## Variables produced

[Expand table](#)

Argument	Type	Description
HashedText	<a href="#">Text value</a>	The hashed text for later processing

# Exceptions

[Expand table](#)

Exception	Description
Failed to hash text	Indicates that an error occurred during hashing

# Hash from file

Hash the contents of a file, using a specified algorithm and an encoding format.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Hash algorithm	N/A	SHA256, SHA384, SHA512	SHA256	The algorithm to use for hashing
Encoding	N/A	System default, ASCII, Unicode, Big-endian Unicode, UTF-8	Unicode	The encoding of the file to hash
File to hash	No	<a href="#">File</a>		The file to hash the contents of

## Variables produced

[Expand table](#)

Argument	Type	Description
HashedText	<a href="#">Text value</a>	The hashed text for later processing

# Exceptions

[Expand table](#)

Exception	Description
File not found	Indicates that the file doesn't exist

Exception	Description
Failed to hash the file	Indicates that an error occurred while hashing the contents of the file

## Hash text with key

Hash a string with a key, using a specified algorithm and an encoding format.

### Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Hash algorithm	N/A	HMAC SHA256, HMAC SHA384, HMAC SHA512	HMAC SHA256	The algorithm to use for hashing
Encoding	N/A	System default, ASCII, Unicode, Big-endian Unicode, UTF-8	Unicode	The encoding of the text to hash
Text to hash	No	<a href="#">Text value</a>		The text to hash
Hash key	No	Direct encrypted input or <a href="#">Text value</a>		The key to hash the text with

### Variables produced

[Expand table](#)

Argument	Type	Description
HashedText	<a href="#">Text value</a>	The hashed text for later processing

### Exceptions

[Expand table](#)

Exception	Description
Failed to hash text with key	Indicates that an error occurred during hashing with key



# Hash from file with key

Hash the contents of a file with a key, using a specified algorithm and an encoding format.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Hash algorithm	N/A	HMAC SHA256, HMAC SHA384, HMAC SHA512	HMAC SHA256	The algorithm to use for hashing
Encoding	N/A	System default, ASCII, Unicode, Big-endian Unicode, UTF-8	Unicode	The encoding of the file to hash
File to hash	No	<a href="#">File</a>		The file to hash the contents of
Hash key	No	Direct encrypted input or <a href="#">Text value</a>		The hash key to hash the text with

## Variables produced

[Expand table](#)

Argument	Type	Description
HashedText	<a href="#">Text value</a>	The hashed text for later processing

## Exceptions

[Expand table](#)

Exception	Description
File not found	Indicates that the file doesn't exist
Failed to hash the file with key	Indicates that an error occurred while hashing the contents of the file with the specified key

---

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗

# Windows services actions

Article • 12/16/2022

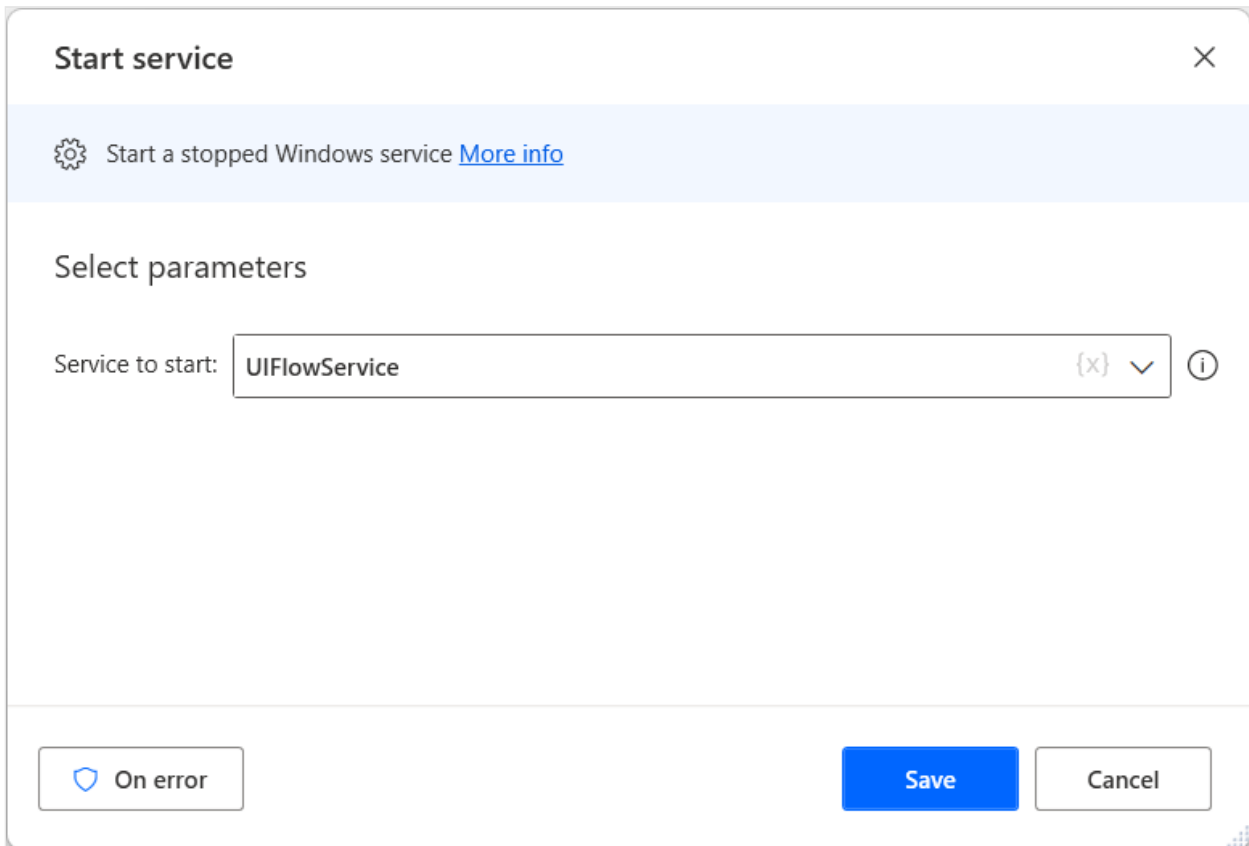
## Important

To prevent unauthorized access, Windows require administrator rights to manage services. To handle services using the Windows services actions, run Power Automate with administrator rights. To find more information regarding running Power Automate as an administrator, go to [Run Power Automate with elevated rights](#).


Power Automate allows you to handle Windows services via the available Windows services actions. With these actions, you can maintain complete control of the operating system and limit the running services.

These actions allow desktop flows to start, stop, pause, and resume Windows services. To use any action of this group, you need to enter only the service name.


The following example starts the **UIFlowService** service.




**Start service** ×

 Start a stopped Windows service [More info](#)

Select parameters

Service to start:  {x} ▾ 

 On error Save Cancel

## Warning

Windows services are essential to the smooth operation of the operating system. Managing Windows services incorrectly could adversely affect your machine.

## If service

Marks the beginning of a conditional block of actions depending on whether a service is running, paused, stopped or installed on the computer.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
If service	N/A	Is stopped, Is installed, Isn't installed, Is running, Is paused	Is running	The state of the service to check
Service name	No	<a href="#">Text value</a>		The name of the service to check

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
Service not found	Indicates that the service can't be found
Can't retrieve status for service	Indicates that there's a problem retrieving the status of the service

## Wait for service

Suspend the execution of the automation until a service is running, paused or stopped on the computer.

### Input parameters

---

Argument	Optional	Accepts	Default Value	Description
Wait for service to	N/A	Stop, Start, Pause	Start	Specifies whether the flow pauses until a certain service starts, stops or pauses
Service name	No	Text value		The name of the service to check

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Service not found	Indicates that the service can't be found
Can't retrieve status for service	Indicates that there's a problem retrieving the status of the service

## Start service

Start a stopped Windows service.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Service to start	No	Text value		The name of the service to start

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Service not found	Indicates that the service can't be found

Exception	Description
Service is already running	Indicates that the service is already running
Can't start service	Indicates that there's a problem starting the service

## Stop service

Stop a running Windows service.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Service to stop	No	Text value		The name of the service to stop

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
Service not found	Indicates that the service can't be found
Service isn't running	Indicates that the service isn't running
Can't stop service	Indicates that there's a problem stopping the service

## Pause service

Pause a running Windows service.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Service to pause	No	Text value		The name of the service to pause

### Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Service not found	Indicates that the service can't be found
Service isn't running	Indicates that the service isn't running
Can't pause service	Indicates that there's a problem pausing the service

## Resume service

Resume a paused Windows service.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Service to resume	No	<a href="#">Text value</a>		The name of the service to resume

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Service not found	Indicates that the service can't be found
Service isn't running	Indicates that the service isn't running
Can't resume service	Indicates that there's a problem resuming the service

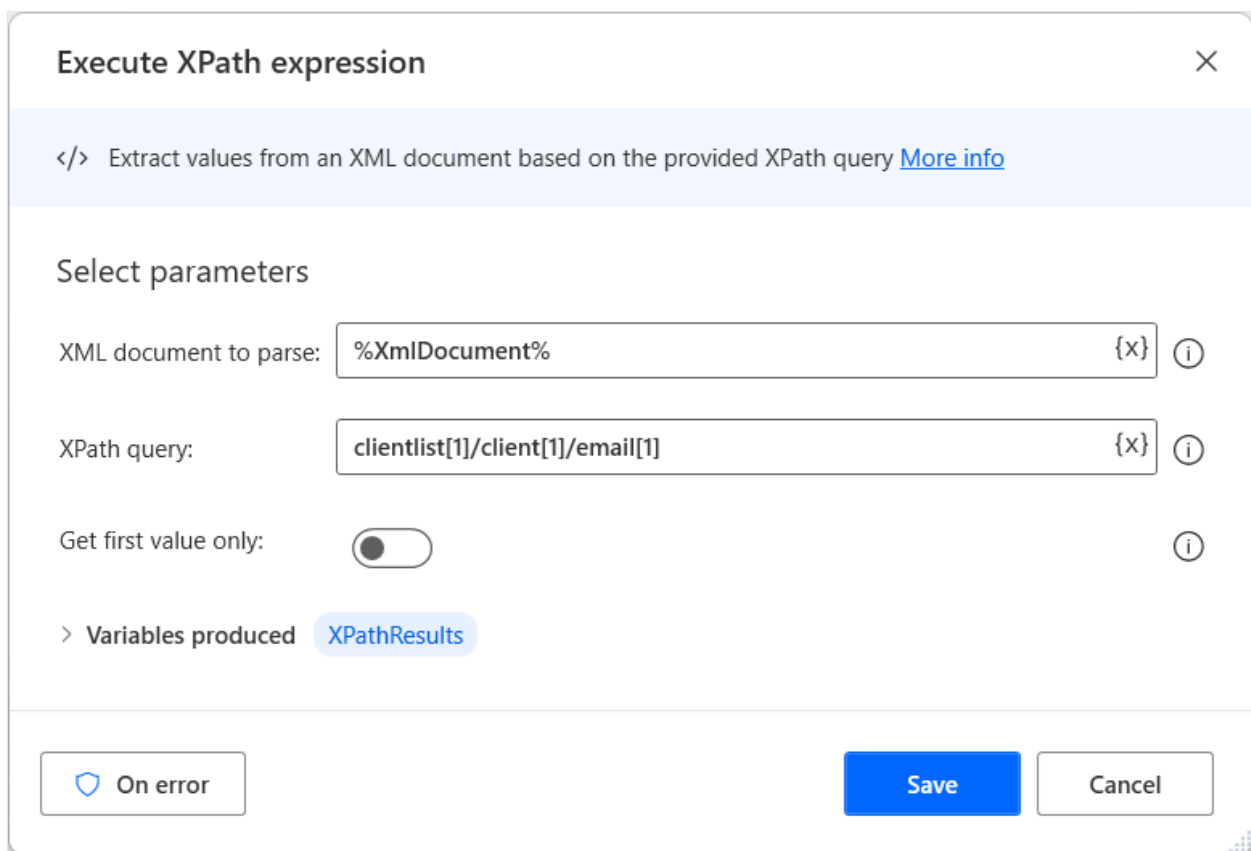
# XML actions

Article • 12/16/2022

Power Automate provides the capability to use desktop flows to manage XML attributes and elements.

To read an XML file, use the **Read XML from file** action. Specify the path or browse for the file, and select one of the encoding options.

After selecting a file, use the **Execute XPath expression** action to run an Xpath query. The following example uses a produced variable from the **Read XML from file** action to specify the document.



The screenshot shows the 'Execute XPath expression' dialog box. At the top, there is a title bar with the text 'Execute XPath expression' and a close button (X). Below the title bar, there is a light blue header area with the text '</> Extract values from an XML document based on the provided XPath query [More info](#)'. The main area is titled 'Select parameters' and contains three input fields: 'XML document to parse:' with the value '%XmlDocument%' and a '{x}' icon; 'XPath query:' with the value 'clientlist[1]/client[1]/email[1]' and a '{x}' icon; and 'Get first value only:' with a toggle switch that is currently turned off. Below these fields, there is a section for 'Variables produced' with a blue pill-shaped button labeled 'XPathResults'. At the bottom of the dialog, there are three buttons: 'On error' (with a shield icon), 'Save' (in blue), and 'Cancel'.

To retrieve an attribute from an XML file, use the **Get XML attribute** action. In the following example, **status** is an attribute of **client**, which is an element of **clientlist**. The value will be obtained as a text value.



**Get XML element attribute**
✕

</> Get the value of an attribute of an XML element [More info](#)

**Select parameters**

XML document:  ⓘ

XPath query:  {x} ⓘ

Attribute name:  {x} ⓘ

Get value as:  ⓘ

> Variables produced XmlAttributeValue

ⓘ On error

Save

Cancel

Similarly, to retrieve element values, use the **Get XML element value** action. You can manage elements and attributes using the respective action to get, set or remove XML attributes or elements.

## Read XML from file

Read the contents of an XML file into a variable.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
File path	No	<a href="#">File</a>		The file that contains the XML document to read
Encoding	N/A	System default, ASCII, Unicode, Unicode big endian, UTF-8	System default	The encoding used for the specified file

### Variables produced

Argument	Type	Description
XmlDocument	<a href="#">XML node</a>	The variable that holds the read XML document

## Exceptions

Exception	Description
Directory not found	Indicates that the directory doesn't exist
File not found	Indicates that the file doesn't exist
Failed to read from file	Indicates a problem reading from file
File doesn't contain a valid XML document	Indicates that the file doesn't contain a valid XML document

## Write XML to file

Write the contents of an XML node variable into a file.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
File path	No	<a href="#">File</a>		The file to write the XML document into
XML to write	No	<a href="#">Text value</a>		The XML node or document to write into the file
Encoding	N/A	System default, ASCII, Unicode, Unicode big endian, UTF-8	System default	The encoding used for the specified file
Format XML	N/A	<a href="#">Boolean value</a>	True	Specifies whether to format the XML
Indentation per level	Yes	<a href="#">Numeric value</a>	2	Specifies by how many spaces to indent each level of the XML

### Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Invalid directory specified	Indicates that the specified directory is invalid
Failed to write XML to file	Indicates a problem writing XML to file

## Execute XPath expression

Extract values from an XML document based on the provided XPath query.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
XML document to parse	No	Text value		The XML as text or a previously defined variable that contains the XML document to parse
XPath query	No	Text value		The XPath expression to execute against the XML document
Get first value only	N/A	Boolean value	False	Specifies whether to retrieve a single value (the first value only) or all the values that match the provided XPath expression

### Variables produced

Argument	Type	Description
XPathResult	XML node	The extracted node(s) as an XML node
XPathResults	List of XML nodes	The extracted node(s) as a list of XML nodes

## Exceptions

Exception	Description
Invalid XML document provided	Indicates that the XML document provided is invalid

Exception	Description
Invalid XPath expression provided	Indicates that the XPath expression provided is invalid

## Get XML element attribute

Get the value of an attribute of an XML element.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
XML document	No	<a href="#">XML node</a>		The XML document or XML element to retrieve its attribute
XPath query	Yes	<a href="#">Text value</a>		The XPath expression to locate the subelement and retrieve its attribute
Attribute name	No	<a href="#">Text value</a>		The name of the attribute to retrieve its value
Get value as	N/A	Text value, Numeric value, Datetime value, Boolean value	Text value	Specifies the data type for the attribute value

### Variables produced

Argument	Type	Description
XmlAttributeValue	<a href="#">Boolean value</a>	The retrieved value of the XML attribute
XmlAttributeValue	<a href="#">Datetime</a>	The retrieved value of the XML attribute
XmlAttributeValue	<a href="#">Numeric value</a>	The retrieved value of the XML attribute
XmlAttributeValue	<a href="#">Text value</a>	The retrieved value of the XML attribute

### Exceptions

Exception	Description
Invalid XPath expression provided	Indicates that the XPath expression provided is invalid

Exception	Description
XPath expression returns no element	Indicates that the XPath expression returns no element
Attribute not found in element	Indicates that the attribute doesn't exist in the element
Failed to convert attribute value to the requested data type	Indicates a problem converting the attribute value to the requested data type

## Set XML element attribute

Set the value of an attribute of an XML element.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
XML document	No	<a href="#">XML node</a>		The XML document or XML element to set its attribute
XPath query	Yes	<a href="#">Text value</a>		The XPath expression to locate the subelement and set its attribute
Attribute name	No	<a href="#">Text value</a>		The name of the attribute to set its value
Attribute value	No	<a href="#">Text value</a>		The new value for the attribute

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
Invalid XPath expression provided	Indicates that the XPath expression provided is invalid
XPath expression returns no element	Indicates that the XPath expression returns no element
Failed to set XML attribute	Indicates a problem setting the XML attribute

# Remove XML element attribute

Remove an attribute from an XML element.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
XML document	No	<a href="#">XML node</a>		The XML document or XML element to remove its attribute
XPath query	Yes	<a href="#">Text value</a>		The XPath expression to locate the subelement and remove its attribute
Attribute name	No	<a href="#">Text value</a>		The name of the attribute to remove

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Invalid XPath expression provided	Indicates that the XPath expression provided is invalid
XPath expression returns no element	Indicates that the XPath expression returns no element
Attribute not found in element	Indicates that the attribute doesn't exist in the element
Failed to remove XML attribute	Indicates a problem removing the XML attribute

# Get XML element value

Get the value of an XML element.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

Argument	Optional	Accepts	Default Value	Description
XML document	No	<a href="#">XML node</a>		The XML document or XML element to retrieve its value
XPath query	Yes	<a href="#">Text value</a>		The XPath expression to locate the subelement and retrieve its value
Get value as	N/A	Text value, Numeric value, Datetime value, Boolean value	Text value	Specifies the data type for the XML element value

## Variables produced

Argument	Type	Description
XmlElementValue	<a href="#">Boolean value</a>	The XML element value
XmlElementValue	<a href="#">Datetime</a>	The XML element value
XmlElementValue	<a href="#">Numeric value</a>	The XML element value
XmlElementValue	<a href="#">Text value</a>	The XML element value

## Exceptions

Exception	Description
Invalid XPath expression provided	Indicates that the XPath expression provided is invalid
XPath expression returns no element	Indicates that the XPath expression returns no element
Failed to convert element value to the requested data type	Indicates a problem converting the element value to the requested data type

## Set XML element value

Set the value of an XML element.

## Input parameters

---

Argument	Optional	Accepts	Default Value	Description
XML document	No	XML node		The XML document or XML element to retrieve its value
XPath query	Yes	Text value		The XPath expression to locate the subelement and retrieve its value
XML element value	No	Text value		The new value for the XML element

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Invalid XPath expression provided	Indicates that the XPath expression provided is invalid
XPath expression returns no element	Indicates that the XPath expression returns no element
Failed to set element value	Indicates a problem setting the element value

## Insert XML element

Insert a new XML element into an XML document.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
XML document	No	XML node		The XML document to insert the new XML element
XPath query	No	Text value		The XPath expression to locate the parent XML element and insert the new element into it
XML element to insert	No	XML node		The new XML element to insert into the XML document



## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Invalid XPath expression provided	Indicates that the XPath expression provided is invalid
XPath expression returns no element	Indicates that the XPath expression returns no element
Failed to insert XML element	Indicates a problem inserting the XML element

## Remove XML element

Remove one or more XML elements from an XML document.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
XML document	No	<a href="#">XML node</a>		The XML document that contains the XML element(s) to remove
XPath query	No	<a href="#">Text value</a>		The XPath expression to locate the element(s) to remove

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Invalid XPath expression provided	Indicates that the XPath expression provided is invalid
Failed to remove XML element	Indicates a problem removing the XML element

# FTP

Article • 12/16/2022

Use the FTP action group to upload and download files and manipulate directories on FTP servers.

To establish an FTP connection, use the **Open FTP connection** action. The following example has a specified host, port, and credentials. Additionally, the set timeout makes the action fail if the connection isn't established on time.

The screenshot shows a configuration window titled "Open FTP connection" with a close button (X) in the top right corner. Below the title bar is a light blue informational banner with a right-pointing arrow icon and the text: "This action establishes a specific connection to a remote FTP server, and stores that connection as a variable for later use. [More info](#)".

The main area is titled "Select parameters" and contains the following fields:

- Host:** A text input field containing "ftp.constoso.com" with a clear button (X) and an information icon (i).
- Port:** A text input field containing "21" with a clear button (X) and an information icon (i).
- Active mode:** A toggle switch currently turned off, with an information icon (i) to its right.
- Username:** A text input field containing "nvarga" with a clear button (X) and an information icon (i).
- Password:** A password input field with a shield icon and a dropdown arrow on the left, a clear button (X) on the right, and an information icon (i). The password is masked with dots.
- Timeout:** A text input field containing "10" with a clear button (X) and an information icon (i).

Below the parameters is a section labeled "> Variables produced" with a blue pill-shaped button containing the text "FTPConnection".

At the bottom of the dialog are three buttons: "On error" (with a shield icon), "Save" (in blue), and "Cancel".

Download files using the **Download file(s) from FTP** action. The following example shows the connection variable in use and the selected destination folder. The remote file has also been specified and set to overwrite existing files in the same location.

**Download file(s) from FTP**
✕

Downloads one or more files from an FTP server [More info](#)

**Select parameters**

FTP connection:  ⓘ

Download into folder:  ⓘ

File(s) to download:  ⓘ

Transfer type:  ⓘ

If file exists:  ⓘ

ⓘ On error

Save

Cancel

Upload files using the **Upload file(s) to FTP** action and specifying the file and the remote location.

## Open FTP connection

This action establishes a specific connection to a remote FTP server, and stores that connection as a variable for later use.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Host	No	Text value		Enter the FTP server address here.
Port	Yes	Numeric value	21	Enter the FTP server port here.
Active mode	N/A	Boolean value	False	Specify the mode of the connection
Username	No	Text value		Specify the username of the FTP account to use

Argument	Optional	Accepts	Default Value	Description
Password	Yes	Direct encrypted input or <a href="#">Text value</a>		Specify the password of the FTP account to use
Timeout	Yes	<a href="#">Numeric value</a>	10	Set the time in seconds that you want to wait for the connection to be established before the action fails

## Variables produced

Argument	Type	Description
FTPConnection	<a href="#">FTP connection</a>	The FTP connection

## Exceptions

Exception	Description
Login failure error	Indicated that the login failed
Connection error	Indicates that there's a problem with the connection

## List FTP directory

This action returns the subdirectories and files contained in the current directory of an FTP connection.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Connection	No	<a href="#">FTP connection</a>		The FTP connection
Path	Yes	<a href="#">Text value</a>		The path that you want to list.

## Variables produced

Argument	Type	Description
----------	------	-------------

Argument	Type	Description
Directories	<a href="#">List of FTP directories</a>	The listed directories
Files	<a href="#">List of FTP files</a>	The listed files

## Exceptions

Exception	Description
Listing error	Indicates that the listing of the folder couldn't be performed
Not connected error	Indicates that there's no open connection with the FTP server
Directory doesn't exist error	Indicates that the directory couldn't be found

## Open secure FTP connection

This action establishes a specific secure connection to a remote FTP server, and stores that connection as a variable for later use.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Host	No	<a href="#">Text value</a>		Enter the FTP server address here.
Port	Yes	<a href="#">Numeric value</a>	22	Enter the FTP server port here.
Active mode	N/A	<a href="#">Boolean value</a>	True	Specify the mode of the connection
Secure FTP Protocol	N/A	SFTP, FTPS explicit, FTPS implicit	SFTP	Choose the FTP protocol you wish to use to encrypt your connection
Authentication method	N/A	Username and password, Private key, Private key and passphrase	Username and password	Choose the method you wish to use to authenticate yourself on the FTP server
User name	No	<a href="#">Text value</a>		Specify the username of the FTP account to use

Argument	Optional	Accepts	Default Value	Description
Password	Yes	Direct encrypted input or <a href="#">Text value</a>		Specify the password of the FTP account you wish to use
Path to private key	No	<a href="#">Text value</a>		Enter the file path to the private-key to be used for authentication
Private key pass phrase	Yes	Direct encrypted input or <a href="#">Text value</a>		Enter a variable containing the private-key pass phrase here
Timeout	Yes	<a href="#">Numeric value</a>	10	Set the time in seconds that you want to wait for the connection to be established before the action fails

## Variables produced

Argument	Type	Description
SftpConnection	<a href="#">FTP connection</a>	SFTP connection

## Exceptions

Exception	Description
Login failure error	Indicated that the login failed
Connection error	Indicates that there's a problem with the connection

## Close connection

This action closes an open FTP connection.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Connection	No	<a href="#">FTP connection</a>		The FTP connection

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Not connected error	Indicates that there's no open connection with the FTP server

## Change working directory

This action sets the current working directory for an FTP connection.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Connection	No	<a href="#">FTP connection</a>		The FTP connection
Set working directory to	No	<a href="#">Text value</a>		Set the path to be set as the working directory

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Not connected error	Indicates that there's no open connection with the FTP server
Directory doesn't exist error	Indicates that the directory couldn't be found
Can't change working directory error	Indicates that it isn't possible to change the working directory

## Download file(s) from FTP

Downloads one or more files from an FTP server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
Download into folder	No	<a href="#">Folder</a>		The folder to be the destination of the file(s) that will be downloaded
File(s) to download	No	<a href="#">List of FTP files</a>		The file(s) to download
Transfer type	N/A	Auto, Binary, ASCII	Auto	Enter ASCII or binary to specify the method for downloading a single file. If the file type is uncertain, or more than one is downloaded, choose Auto to follow the transfer rules specified in options
If file exists	N/A	Overwrite, Do not download, Download with unique name	Overwrite	Specify what to do if the file already exists. Overwrite writes over the original file so you can't access it anymore, and download with unique name adds an underscore and a sequential number to the end

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Not connected error	Indicates that there's no open connection with the FTP server
Remote file doesn't exist error	Indicates that the file doesn't exist on the FTP server
Directory doesn't exist error	Indicates that the directory couldn't be found
FTP connection aborted error	Indicates that the FTP connection was aborted
Can't download file error	Indicates that it wasn't possible to download the file



# Download folder(s) from FTP

Downloads one or more folders from an FTP server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
Folder(s) to download	No	<a href="#">List of FTP directories</a>		The name of the folder path(s), or FTP folder(s) to download
Download into local folder	No	<a href="#">Folder</a>		The full path of the destination of the FTP folder(s) you're downloading

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Not connected error	Indicates that there's no open connection with the FTP server
Remote directory doesn't exist error	Indicates that the directory doesn't exist on the FTP server
Directory doesn't exist error	Indicates that the directory couldn't be found
FTP connection aborted error	Indicates that the FTP connection was aborted
Can't download directory error	Indicates that it wasn't possible to download the directory

# Upload File(s) to FTP

Uploads one or more files to an FTP server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
File(s) to upload	No	<a href="#">List of Files</a>		The file(s) to upload
Remote location	Yes	<a href="#">Text value</a>		The location where the files should be uploaded
Transfer type	N/A	Auto, Binary, ASCII	Auto	Enter ASCII or binary to specify the method for downloading a single file. If you're not sure what type the file will be, or if you're downloading more than one, choose Auto to follow the transfer rules specified in Options
If file exists	N/A	Overwrite, Do not download, Download with unique name	Overwrite	Specify what to do if the file already exists. Overwrite writes over the original file so you can't access it anymore, and Download with Unique Name adds an underscore and a sequential number to the end

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Not connected error	Indicates that there's no open connection with the FTP server
File not found error	Indicates that the file wasn't found
FTP connection aborted error	Indicates that the FTP connection was aborted
Upload file error	Indicates that the file couldn't be uploaded

## Upload folder(s) to FTP

Uploads one or more folders to an FTP server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
Folder(s) to upload	No	<a href="#">List of Folders</a>		The folder(s) to upload. The folders being uploaded shouldn't already exist within the active directory of the FTP server
Remote location	No	<a href="#">Text value</a>		The location where the folders should be uploaded

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Not connected error	Indicates that there's no open connection with the FTP server
Remote directory doesn't exist error	Indicates that the directory doesn't exist on the FTP server
FTP connection aborted error	Indicates that the FTP connection was aborted
Upload directory error	Indicates that the directory couldn't be uploaded

## Delete FTP file

Deletes one or more files from an FTP server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
Files to delete	No	<a href="#">List of FTP files</a>		The files to delete

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Not connected error	Indicates that there's no open connection with the FTP server
File not found error	Indicates that the file wasn't found
Can't delete file error	Indicates that the deletion of the file wasn't possible

## Rename FTP File

Renames a file that resides on an FTP server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
File to rename	No	<a href="#">FTP file</a>		The file to rename
New file name	No	<a href="#">Text value</a>		The new name for the file. If you enter a name with a path, the file will also be moved to that location. If the location doesn't exist, it will throw an exception

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Not connected error	Indicates that there's no open connection with the FTP server
Can't rename file error	Indicates that it wasn't possible to rename the file
File not found error	Indicates that the file wasn't found

## Create FTP directory

Creates a directory on an FTP server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
New directory	No	<a href="#">FTP directory</a>		The new directory. If a path is specified, all of the new folders leading to the new directory will be created

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Access denied error	Indicates that this account doesn't have access for an operation
File exists error	Indicates that the file already exists

Exception	Description
Create directory error	Indicates that it wasn't possible creating the directory
Directory doesn't exist error	Indicates that the directory couldn't be found
Not connected error	Indicates that there's no open connection with the FTP server

## Delete FTP directory

Deletes a directory from an FTP server.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
Directory to delete	No	<a href="#">FTP directory</a>		The folder to be deleted. Everything in the folder will be deleted as well

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
Delete directory error	Indicates that it wasn't possible to delete the directory
Remote directory doesn't exist error	Indicates that the directory doesn't exist on the FTP server
Working directory change error	Indicates that the working directory couldn't be changed
Not connected error	Indicates that there's no open connection with the FTP server

## Invoke FTP command

Invokes the given literal FTP command on the server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	FTP connection		The FTP connection to work with. This variable must have been previously specified in an open FTP connection action
FTP command	No	Text value		The command to run along with any arguments. For example, you could run FEAT, or CHMOD here
Valid reply code(s)	Yes	Text value		The code(s) that could be returned by the command, separated by semi-colon. If the FTP command returns a code that wasn't entered here, this action will throw an exception. Only applies over simple FTP or FTPS connections

## Variables produced

Argument	Type	Description
ReplyCode	Text value	The actual code that was returned. Only applies over simple FTP or FTPS connections
ReplyText	Text value	The text returned by the FTP server

## Exceptions

Exception	Description
Invoke command error	Indicates that an error occurred while invoking an FTP command
Not connected error	Indicates that there's no open connection with the FTP server

## Synchronize directories

Synchronize the files and subdirectories of a given Folder with a given remote FTP directory.

# Input parameters

Argument	Optional	Accepts	Default Value	Description
FTP connection	No	<a href="#">FTP connection</a>		The FTP connection to work with. This variable must have been previously specified in an Open FTP connection action
Synchronization direction	N/A	Remote -> local (Download), Local -> remote (Upload)	Remote -> local (Download)	Direction of the Synchronization method. Whether the local folder will be synchronized to the remote directory (DOWNLOAD) or the remote directory will be synchronized to the local folder (UPLOAD)
Files to sync	N/A	All files, Only files matching the file filter, Only files not matching the file filter	All files	Choose whether you want to synchronize all files, or you want to use a file filter to include or exclude a specific set of files
File filter	No	<a href="#">Text value</a>	*	File-name pattern that controls which files will be included or excluded. This option allows wildcards such as ".txt", "document?.doc". <i>The option also allows for multiple filters by using coma as a separator, ".txt,* .pdf,document?"</i>
Local folder	No	<a href="#">Folder</a>		Name of the local folder to be synchronized
FTP directory	Yes	<a href="#">FTP directory</a>	/	Name of the FTP directory to be synchronized
Delete if source is absent	N/A	<a href="#">Boolean value</a>	False	This option will delete a file or folder that exists in the target directory and not the source.
Include subdirectories	N/A	<a href="#">Boolean value</a>	True	This option will include subdirectories in the synchronization process.



Argument	Optional	Accepts	Default Value	Description
Time difference in hours	Yes	Numeric value	0	Time difference in hours of the remote server in case it operates on a different Time Zone.
Time difference in minutes	Yes	Numeric value	0	Time difference in Minutes of the remote server in case it operates on a different Time Zone.
Time difference ahead	N/A	Boolean value	True	Specify whether the server's time zone is ahead or not.

## Variables produced

Argument	Type	Description
FtpFilesAdded	List of FTP files	List of FTP files that initially existed in the source and after the synchronization process were added to the target.
FtpFilesModified	List of FTP files	List of FTP files that initially existed in both the source and the target and after the synchronization process were added to the target.
FtpFilesDeleted	List of FTP files	List of FTP files that initially existed in the target directory and after the synchronization process were deleted.
FilesAdded	List of Files	List of files that initially existed in the source and after the synchronization process were added to the target.
FilesModified	List of Files	List of files that initially existed in both the source and the target and after the synchronization process were added to the target.
FilesDeleted	List of Files	List of files that initially existed in the target directory and after the synchronization process were deleted.

## Exceptions

Exception	Description
Listing error	Indicates that the listing of the folder couldn't be performed
Not connected error	Indicates that there's no open connection with the FTP server
File not found error	Indicates that the file wasn't found

<b>Exception</b>	<b>Description</b>
FTP connection aborted error	Indicates that the FTP connection was aborted
Upload file error	Indicates that the file couldn't be uploaded
Remote file doesn't exist error	Indicates that the file doesn't exist on the FTP server
Can't download file error	Indicates that it wasn't possible to download the file
Delete directory error	Indicates that it wasn't possible to delete the directory
Synchronization failed error	Indicates that the synchronization process failed due to an unexpected error.

# CyberArk actions

Article • 05/30/2024

CyberArk offers an identity security platform that secures human and machine identities from end-to-end. Power Automate enables you to retrieve credentials from CyberArk through the **Get password from CyberArk** action.

## 📌 Note

To retrieve credentials from CyberArk, Power Automate issues web requests to CyberArk's Central Credential Provider web service (AIMWebService).

To find the required information to populate the action, see the following instructions:

- **Application ID:** To find the application ID, open CyberArk Password Vault on a web browser and navigate to the **Applications** tab. Select **Components**, open the **Private Ark** application, and then select the desired **Vault**. You can add **Owners** here.
- **Safe:** Populate the name of the safe displayed in PrivateArk Client.
- **Folder and Object:** Select a safe in PrivateArk Client, and populate the folder name displayed on the left pane and the object name displayed in the main list.

**Get password from CyberArk**
✕

🔗 Get a password from CyberArk without a certificate [More info](#)

**Select parameters**

Server address:  ⓘ

Application ID:  ⓘ

Safe:  ⓘ

Folder:  ⓘ

Object:  ⓘ

Extra data:  ⓘ

Accept untrusted certificates:  ⓘ

Certificate location:  ⌵ ⓘ

> **Advanced**

> **Variables produced** JSONResponse CyberArkPassword

🛡️ On error

Save

Cancel

# Get password from CyberArk

Retrieves a password for a specific application from CyberArk.

## Input parameters

[🔗 Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Server address	No	Text value		The base URI for the web request to connect. For example,

Argument	Optional	Accepts	Default Value	Description
				<code>https://yourservice.skytap.com:111</code>
Application ID	No	Text value		<p>The application ID to use for the web request.</p> <p>To find the application ID, open CyberArk Password Vault on a web browser and navigate to the <b>Applications</b> tab. Select <b>Components</b>, open the <b>Private Ark</b> application, and then select the desired Vault. You can add Owners here.</p>
Safe	No	Text value		The safe on CyberArk in which the application belongs
Folder	No	Text value		The folder necessary for the web request query
Object	No	Text value		The object necessary for the web request query
Extra data	Yes	Text value		The extra data (if any) for the web request's query
Accept untrusted certificates	N/A	Boolean value	False	Specifies whether to accept untrusted certificates
Certificate location	N/A	Don't use certificate, Load certificate from Windows Store, Load certificate from file	Don't use certificate	Specifies how to load (if needed) the certificate for the request
Use only valid certificates	N/A	Boolean value	False	Specifies whether to load only valid certificates from the store
Store certificate path	No	Text value		<p>The path of the certificate in the certificate store. The certificate is represented by its serial number. The path should use the following format:</p> <p>(local path to certificate)/(certificate serial)</p>

Argument	Optional	Accepts	Default Value	Description
Certificates path	No	<a href="#">File</a>		The path of the certificate.
Certificate password	No	Direct encrypted input or <a href="#">Text value</a>		The password for the certificate file
Timeout	Yes	<a href="#">Numeric value</a>	30	The waiting time (in seconds) to get results from CyberArk

## Variables produced

[Expand table](#)

Argument	Type	Description
JSONResponse	<a href="#">Custom object</a>	The API response result
CyberArkPassword	Encrypted value	The password retrieved from CyberArk

## Exceptions

[Expand table](#)

Exception	Description
Failed to send web request	Indicates a problem sending the web request
Timeout expired	Indicates that the request timed out
Error response from web request	Indicates that the web request returned an error response

## Known issues

- NTLM Authentication is currently not supported for web requests in Power Automate for desktop.

## Feedback

Was this page helpful?



[Provide product feedback](#) ↗

# Active Directory actions

Article • 12/16/2022

Active Directory actions require a connection to an Active Directory server. Establish the connection using the **Connect to server** action and an LDAP path. The LDAP path specifies the domain controllers and should have the following format:

LDAP

```
LDAP://DC=contoso,DC=demo
```

If you work with groups, objects, or users, you need to specify also their location. The **Location** field specifies the container and the domain controller, and should have the following format:

LDAP

```
CN=Users,DC=contoso,DC=demo
```

After getting all the distinguished names using the **dsquery user** command, enter the distinguished name in the following format. For this example, the username is **nvarga**.

LDAP

```
CN=nvarga,CN=Users,DC=contoso,DC=demo
```

If the container name contains a comma, you should enclose the name within double quotes. For example **CN=Varga, Norbert** should be:

LDAP

```
CN="Varga, Norbert",DC=contoso,DC=com
```

## Create group

Creates a group in the Active Directory.

## Input parameters

---



Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Group name	No	<a href="#">Text value</a>		The name of the newly created group
Location	Yes	<a href="#">Text value</a>		The location that the group will be created in
Description	Yes	<a href="#">Text value</a>		The description for the group
Group scope	N/A	Local, Global, Universal	Global	The scope of the group in the Active Directory
Group type	N/A	Security, Distribution	Security	The type of the group

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object already exists	Indicates that an object with the specified name already exists in the Active Directory
Active Directory error	General Active Directory error

## Get group info

Gets information about a group from the Active Directory server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry

## Variables produced

Argument	Type	Description
GroupInfo	<a href="#">Group info</a>	The group's info

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Active Directory error	General Active Directory error

## Get group members

Gets the members of a group in the Active Directory.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry

## Variables produced

Argument	Type	Description
GroupMembers	<a href="#">List of Group members</a>	The variable that holds the members of the group

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Active Directory error	General Active Directory error

## Modify group

Modifies a group in the Active Directory.

## Input parameters

---

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry
Operation	N/A	Rename group, Delete group, Add user, Remove user	Rename group	Select the operation to perform
New name	No	<a href="#">Text value</a>		The new name for the group
User distinguished name	No	<a href="#">Text value</a>		Specify the user's distinguished name

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Object already exists	Indicates that an object with the specified name already exists in the Active Directory
Active Directory error	General Active Directory error

## Example

The following example uses the **Modify group** action to add the user **nvarga** to the **RPATest** Active Directory group.

**Modify group** [X]

Modifies a group in the Active Directory [More info](#)

Select parameters

Parent directory entry: %ParentDirectoryEntry% ⓘ

Distinguished name: CN=RPATest,CN=Users,DC=contoso,DC=demo {x} ⓘ

Operation: Add user ⓘ

User distinguished name: CN=nvarga,CN=Users,DC=contoso,DC=demo {x} ⓘ

## Create object

Creates an object in the Active Directory.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Location	Yes	<a href="#">Text value</a>		The location that the group will be created in
Object type	N/A	Computer, Organizational unit	Computer	The type of the object
Object name	No	<a href="#">Text value</a>		The name of the newly created object

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object already exists	Indicates that an object with the specified name already exists in the Active Directory
Invalid attribute syntax	Indicates that a given attribute is invalid
Active Directory error	General Active Directory error

## Delete object

Deletes an object in the Active Directory.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Active Directory error	General Active Directory error

## Move object

Moves an object in the Active Directory.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry
Move to location	No	<a href="#">Text value</a>		The location for the object to be moved to

## Variables produced

This action doesn't produce any variables.

## Exceptions

---

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Active Directory error	General Active Directory error
Location can't be empty	Indicates that an Active Directory object location is empty

## Rename object

Renames an object in the Active Directory.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry
New name	No	<a href="#">Text value</a>		Type the new name for the group

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
-----------	-------------



Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Object already exists	Indicates that an object with the specified name already exists in the Active Directory
Active Directory error	General Active Directory error

## Create user

Creates a user in the Active Directory.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Location	Yes	<a href="#">Text value</a>		The location that the group will be created in
First name	No	<a href="#">Text value</a>		The first name of the user
Initials	Yes	<a href="#">Text value</a>		The initials of the user
Last name	Yes	<a href="#">Text value</a>		The last name of the user
Username	No	<a href="#">Text value</a>		The username of the user
Password	No	Direct encrypted input or <a href="#">Text value</a>		The password of the user

Argument	Optional	Accepts	Default Value	Description
Password never expires	N/A	Boolean value	False	Specify whether the password of the user will expire
Disabled account	N/A	Boolean value	False	Specify whether the account will be disabled

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object already exists	Indicates that an object with the specified name already exists in the Active Directory
Couldn't set or update password	Indicates a problem setting or updating the user's password
Active Directory error	General Active Directory error

## Example

The following example creates a new user. The user's actual name is **Norbert Varga**, and the username is **nvarga**. The presented configurations create the user in the **Users** container and specify the extra controllers **contoso** and **demo**.

**Create user**
✕

🏠 Creates a user in the Active Directory [More info](#)

**Select parameters**

Parent directory entry:  ⓘ

Location:  {x} ⓘ

First name:  {x} ⓘ

Initials:  {x} ⓘ

Last name:  {x} ⓘ

Username:  {x} ⓘ

Password: ⓘ  ⓘ

Password never expires:  ⓘ

Disabled account:  ⓘ

🛡️ On error

Save

Cancel

## Get user info

Gets a user's information in the Active Directory.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry

## Variables produced

Argument	Type	Description
UserInfo	<a href="#">User info</a>	The user's info

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Active Directory error	General Active Directory error

## Modify user

Modify a user in the Active Directory.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry
Operation	N/A	Enable/disable user, Rename user, Delete user, Reset password	Enable/disable user	Select the operation to be performed

Argument	Optional	Accepts	Default Value	Description
Enable user	N/A	Boolean value	False	Enable or disable the user
New name	No	Text value		Type the new name for the group
New password	No	Direct encrypted input or Text value		Type the new password for the group

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Object already exists	Indicates that an object with the specified name already exists in the Active Directory
Invalid attribute syntax	Indicates that a given attribute is invalid
Active Directory error	General Active Directory error
Couldn't set or update password	Indicates a problem setting or updating the user's password

## Unlock user

Unlocks an Active Directory user.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Active Directory error	General Active Directory error

## Update user info

Updates a user's information in the Active Directory.

## Input parameters

---

<b>Argument</b>	<b>Optional</b>	<b>Accepts</b>	<b>Default Value</b>	<b>Description</b>
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server
Distinguished name	No	<a href="#">Text value</a>		The distinguished name of the Active Directory entry
Display name	Yes	<a href="#">Text value</a>		The display name of the user
First name	Yes	<a href="#">Text value</a>		The first name of the user
Initials	Yes	<a href="#">Text value</a>		The initials of the user
Last name	Yes	<a href="#">Text value</a>		The last name of the user
Title	Yes	<a href="#">Text value</a>		The title of the user
The email of the user	Yes	<a href="#">Text value</a>		The email of the user
The company of the user	Yes	<a href="#">Text value</a>		The company of the user
Telephone number	Yes	<a href="#">Text value</a>		The telephone number of the user
Extension	Yes	<a href="#">Text value</a>		The extension of the user

Argument	Optional	Accepts	Default Value	Description
City	Yes	Text value		The city of the user
Postal code	Yes	Text value		The postal code of the user
State	Yes	Text value		The state of the user
Country	N/A	Afghanistan, Åland Islands, Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antarctica, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, State of Bolivia Plurinational, Bonaire, Bosnia and Herzegovina, Botswana, Bouvet Island, Brazil, British Indian Ocean Territory, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Cayman Islands, Central African Republic, Chad, Chile, China, Christmas Island, Cocos (Keeling) Islands, Colombia, Comoros, Congo, Democratic Republic of the Congo, Cook Islands, Costa Rica, Côte d'Ivoire, Croatia, Cuba, Curaçao, Cyprus, Czech Republic, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Falkland Islands (Malvinas), Faroe Islands, Fiji, Finland, France, French Guiana, French Polynesia, French Southern Territories, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Greenland, Grenada, Guadeloupe, Guam, Guatemala, Guernsey, Guinea, Guinea-Bissau, Guyana, Haiti, Heard Island and McDonald Islands, Holy See, Honduras, Hong Kong Special Administrative Region, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Iraq, Ireland, Isle of Man, Israel, Italy, Jamaica, Japan, Jersey, Jordan, Kazakhstan, Kenya, Kiribati, Democratic Peoples Republic of Korea, Republic of Korea,	None	The country of the user as a two-letter code (ISO 3166-1 alpha-2)



Argument	Optional	Accepts	Default Value	Description
		Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Latvia, Lebanon, Lesotho, Liberia, Libya, Liechtenstein, Lithuania, Luxembourg, Macao Special Administrative Region, North Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Martinique, Mauritania, Mauritius, Mayotte, Mexico, Micronesia, Moldova, Monaco, Mongolia, Montenegro, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Netherlands, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, Niue, Norfolk Island, Northern Mariana Islands, Norway, Oman, Pakistan, Palau, Palestine, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Pitcairn, Poland, Portugal, Puerto Rico, Qatar, Réunion, Romania, Russia, Rwanda, Saint Barthélemy, Saint Helena, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French part), Saint Pierre and Miquelon, Saint Vincent and the Grenadines, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Sint Maarten (Dutch part), Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, South Georgia and the South Sandwich Islands, South Sudan, Spain, Sri Lanka, Sudan, Suriname, Svalbard and Jan Mayen, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Taiwan, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Türkiye, Turkmenistan, Turks and Caicos Islands, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, United States Minor Outlying Islands, Uruguay, Uzbekistan, Vanuatu, Bolivarian Republic of Venezuela, Vietnam, Virgin Islands (British), Virgin Islands (U.S.), Wallis and Futuna, Yemen, Zambia, Zimbabwe, None		

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Invalid operation	Indicates an invalid operation error
The server isn't operational	Indicates that the Active Directory server isn't operational
Unauthorized access	Indicates that an authorization error occurred
Active Directory entry not found	Indicates that the Active Directory entry given isn't found on the Active Directory server
Object doesn't exist on server	Indicates that the object doesn't exist in the Active Directory server
Couldn't set or update password	Indicates a problem setting or updating the user's password
Active Directory error	General Active Directory error

## Connect to server

Connects to an Active Directory server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
LDAP path	No	<a href="#">Text value</a>		The LDAP path of the Active Directory server

Argument	Optional	Accepts	Default Value	Description
Use authentication	N/A	Boolean value	False	Specify whether authentication is needed to connect to the server
Username	No	Text value		The user's username
Password	No	Direct encrypted input or Text value		The user's password
Authentication type	N/A	None, Secure, Encryption, Secure sockets layer, Read-only server, Anonymous, Fast bind, Signing, Sealing, Delegation, Server bind	Secure	Specify the type of authentication to be used

## Variables produced

Argument	Type	Description
ParentDirectoryEntry	Active Directory entry	The parent of the Active Directory entry for use with later Active Directory actions

## Exceptions

Exception	Description
Authentication error	Indicates an error with the user's authentication
Unauthorized access	Indicates that an authorization error occurred
The server isn't operational	Indicates that the Active Directory server isn't operational
Invalid operation	Indicates an invalid operation error
Active Directory error	General Active Directory error

## Close connection

Closes the connection with the Active Directory server.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Parent directory entry	No	<a href="#">Active Directory entry</a>		The parent entry of the Active Directory server

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# AWS actions

Article • 12/16/2022

## 📘 Important

You need an active AWS subscription to deploy AWS actions in your desktop flows.

Power Automate enables users to handle EC2 instances, volumes, and snapshots through the AWS group of actions.

Before deploying any AWS action, create a new EC2 session using the **Create EC2 session** action.

To use a credentials file for authentication, disable **Access keys** and populate **Profile name** and **Profile location**. If you don't want to reference a profile name explicitly, choose **default** in **Profile name** to use the default profile.

**Create EC2 session** [X]

Create an EC2 client to automate EC2 web services [More info](#)

Select parameters

Access keys:  ⓘ


Profile name:  {x} ⓘ

Profile location:  {x} ⓘ

> Variables produced **Ec2Client**

Alternatively, enable **Access keys** and populate the access key ID, the secret access key, and the region constraint specifying the endpoint.

### Create EC2 session ✕

 Create an EC2 client to automate EC2 web services [More info](#)

#### Select parameters

Access keys:  ⓘ

Access key ID:  ⓘ


Secret: ⓘ  ⓘ

Region endpoint:  ⓘ

> Variables produced Ec2Client

After creating the session and deploying all the needed AWS actions, use the **End EC2 session** action to terminate the EC2 session.

### End EC2 session ✕

 Dispose an open EC2 client [More info](#)

#### Select parameters

EC2 client:  ⓘ

## Start EC2 instance

Start EC2 instance(s).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Instance IDs	No	<a href="#">List of Text values</a>		The instance IDs to start

## Variables produced

Argument	Type	Description
StartingEc2Instances	<a href="#">List of Instance state changes</a>	The returned information for the started instances

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Invalid instance ID	Indicates that either the specified instance ID is malformed, or that the specified instance doesn't exist
Insufficient capacity	Indicates that there isn't enough capacity to fulfill the request
Amazon service request failed	Indicates that the request to AWS failed

## Stop EC2 instance

Stop EC2 instance(s).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client

Argument	Optional	Accepts	Default Value	Description
Instance IDs	No	List of Text values		The instance IDs to stop
Force stop	N/A	Boolean value	False	Specifies whether to force the instances to stop. The instances don't have an opportunity to flush file system caches or file system metadata
Hibernation:	N/A	Boolean value	False	Specifies whether to hibernate the instance, if it was enabled for hibernation at launch. If the instance can't hibernate successfully, a normal shutdown occurs

## Variables produced

Argument	Type	Description
StoppingEc2Instances	List of Instance state changes	The returned information for the stopped instances

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Unsupported operation	Indicates that an unsupported operation was requested. For example, an instance that is instance store-backed can't be stopped
Invalid instance ID	Indicates that either the specified instance ID is malformed, or that the specified instance doesn't exist
Amazon service request failed	Indicates that the request to AWS failed

## Reboot EC2 instance

Reboot EC2 instance(s).



## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Instance IDs	No	<a href="#">List of Text values</a>		The instance IDs to reboot

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Unsupported operation	Indicates that an unsupported operation was requested. For example, an instance that is instance store-backed can't be stopped
Invalid instance ID	Indicates that either the specified instance ID is malformed, or that the specified instance doesn't exist
Incorrect state for the request	Indicates that the resource is in an incorrect state for the request. This exception can occur if there's an attempt to attach a volume that is still being created (ensure that the volume is 'available') or detach a volume that isn't attached
Amazon service request failed	Indicates that the request to AWS failed

## Get available EC2 instances

Get information for the relevant EC2 instances.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Availability zone	Yes	<a href="#">Text value</a>		Specifies the availability zone, a region code followed by a letter identifier
Instance state	N/A	Pending, All, Unknown, Running, Shutting down, Terminated, Stopping, Stopped	All	The state of the instance (pending, running, shutting down, terminated, stopping, stopped)

## Variables produced

Argument	Type	Description
Ec2InstancesInfo	<a href="#">List of EC2 instances info</a>	The list of the EC2 instances

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Amazon service request failed	Indicates that the request to AWS failed

## Describe instances

Returns all the information for the specified EC2 instance(s).

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Instance IDs	Yes	<a href="#">List of Text values</a>		The instance IDs to describe

Argument	Optional	Accepts	Default Value	Description
Availability zone	Yes	<a href="#">Text value</a>		Specifies the availability zone, a region code followed by a letter identifier
Instance state	N/A	Pending, All, Unknown, Running, Shutting down, Terminated, Stopping, Stopped	All	The current state of the instance

## Variables produced

Argument	Type	Description
Ec2Instances	<a href="#">List of EC2 instances</a>	The retrieved instance(s) with all the relevant information

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Invalid instance ID	Indicates that either the specified instance ID is malformed, or that the specified instance doesn't exist
Amazon service request failed	Indicates that the request to AWS failed

## Create snapshot

Create a snapshot of an EBS volume and stores it in Amazon S3.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Volume ID	No	<a href="#">Text value</a>		The ID of the EBS volume

Argument	Optional	Accepts	Default Value	Description
Name	Yes	Text value		The name of the snapshot
Description	Yes	Text value		A description for the snapshot
Purpose	Yes	Text value		The purpose of the snapshot

## Variables produced

Argument	Type	Description
Snapshot	EBS snapshot	The created snapshot

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Invalid volume	Indicates that either the volume ID isn't valid, or the specified volume doesn't exist
or the volume isn't in the same availability zone as the specified instance	
Resource's limit is exceeded	Indicates that the limit for the specified resource is reached
Amazon service request failed	Indicates that the request to AWS failed

## Describe snapshots

Describes the specified EBS snapshots available.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	EC2 client		The EC2 client

Argument	Optional	Accepts	Default Value	Description
Describe snapshots mode	N/A	All snapshots, Snapshots by ID, Snapshots by owner ID, Snapshots by restorable user ID, Snapshots by custom filter	All snapshots	Specifies whether to get all snapshots of the defined region or filter snapshots by their ID, owner, or user by which they're restorable
Snapshot IDs	Yes	<a href="#">List of Text values</a>		The snapshot IDs to describe
Owner IDs	Yes	<a href="#">List of Text values</a>		The owner IDs who own the snapshots
Restorable by user IDs	Yes	<a href="#">List of Text values</a>		The IDs of the AWS accounts that can create volumes from the snapshot

## Variables produced

Argument	Type	Description
EBSSnapshots	<a href="#">List of EBS snapshots</a>	The retrieved snapshot(s) with all the relevant information

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Invalid snapshot ID	Indicates that either the specified snapshot ID is invalid, or that the specified snapshot doesn't exist
Invalid user ID	Indicates that the specified user or owner isn't valid
Amazon service request failed	Indicates that the request to AWS failed

## Delete snapshot

Delete the specified snapshot.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Snapshot ID	No	<a href="#">Text value</a>		The ID of the EBS snapshot to delete

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Invalid snapshot ID	Indicates that either the specified snapshot ID is invalid, or that the specified snapshot doesn't exist
The resource is in use	Indicates that the operation can't be completed because the resource is in use
Amazon service request failed	Indicates that the request to AWS failed

## Create volume

Create an EBS volume.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Name	Yes	<a href="#">Text value</a>		The desired name for the volume
Purpose	Yes	<a href="#">Text value</a>		The purpose of the volume, if any

Argument	Optional	Accepts	Default Value	Description
Availability zone	No	Text value		Specifies the availability zone, a region code followed by a letter identifier
From snapshot	N/A	Boolean value	False	Specifies whether to create the volume from a specified snapshot
Snapshot ID	No	Text value		The snapshot from to create the volume from
Volume size	No	Text value		The size of the volume in GBs
Size	Yes	Text value		The size must be equal to or larger than the snapshot size
Encrypted	N/A	Boolean value	False	Specifies whether to encrypt the volume
Volume type	N/A	Gp2, Standard, Io1, Sc1, St1	Gp2	The type of the volume

## Variables produced

Argument	Type	Description
Volume	EBS volume	The created volume

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Invalid parameter	Indicates that a parameter specified in the request isn't valid, unsupported, or can't be used
Invalid zone	Indicates that the specified availability zone doesn't exist, or isn't available to use
Resource's limit is exceeded	Indicates that the limit for the specified resource is reached
Volume type isn't supported in the specified zone	Indicates that the specified availability zone doesn't support provisioned IOPS SSD volumes

Exception	Description
Amazon service request failed	Indicates that the request to AWS failed

## Attach volume

Attach an EBS volume to an EC2 instance.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Volume ID	No	<a href="#">Text value</a>		The ID of the EBS volume
Instance ID	No	<a href="#">Text value</a>		The ID of the instance
Device name	No	<a href="#">Text value</a>		The name of the device

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Unsupported operation	Indicates that an unsupported operation was requested. For example, an instance that is instance store-backed can't be stopped
Invalid parameter	Indicates that a parameter specified in the request isn't valid, unsupported, or can't be used
Invalid volume	Indicates that either the volume ID isn't valid, or the specified volume doesn't exist
	or the volume isn't in the same availability zone as the specified instance



Exception	Description
The resource is in use	Indicates that the operation can't be completed because the resource is in use
Amazon service request failed	Indicates that the request to AWS failed

## Detach volume

Detach an EBS volume from an EC2 instance.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	EC2 client		The EC2 client
Volume ID	No	Text value		The ID of the EBS volume
Instance ID	Yes	Text value		The ID of the instance
Device name	Yes	Text value		The name of the device
Force detachment	N/A	Boolean value	False	Specifies whether to force detachment, if the previous detachment attempt didn't occur cleanly

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested

Exception	Description
Unsupported operation	Indicates that an unsupported operation was requested. For example, an instance that is instance store-backed can't be stopped
Invalid parameter	Indicates that a parameter specified in the request isn't valid, unsupported, or can't be used
Invalid attempt to detach	Indicates an attempt to detach a volume from an instance to which it isn't attached
Incorrect state for the request	Indicates that the resource is in an incorrect state for the request. This exception can occur if there's an attempt to attach a volume that is still being created (ensure that the volume is 'available') or detach a volume that isn't attached
Amazon service request failed	Indicates that the request to AWS failed

## Describe volumes

Describe the specified EBS volumes.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Describe volumes mode	N/A	All volumes, Volumes of the specified instance, Volumes with the specified IDs	All volumes	Specifies whether to describe all volumes, volumes specified by ID or volumes of an instance
Volume IDs	No	<a href="#">List of Text values</a>		The volume IDs to describe
Instance ID	No	<a href="#">Text value</a>		The ID of the instance that the volume is attached to

### Variables produced

Argument	Type	Description
----------	------	-------------

Argument	Type	Description
EBSVolumes	<a href="#">List of EBS volumes</a>	The retrieved EBS volumes with all the relevant information

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated
Unauthorized operation	Indicates that an unauthorized operation was requested
Invalid parameter	Indicates that a parameter specified in the request isn't valid, unsupported, or can't be used
Amazon service request failed	Indicates that the request to AWS failed

## Delete volume

Delete the specified EBS volume.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client
Volume ID	No	<a href="#">Text value</a>		The ID of the EBS volume to delete

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Authentication failed	Indicates that the provided credentials couldn't be validated

Exception	Description
Unauthorized operation	Indicates that an unauthorized operation was requested
Invalid parameter	Indicates that a parameter specified in the request isn't valid, unsupported, or can't be used
Invalid volume	Indicates that either the volume ID isn't valid, or the specified volume doesn't exist or the volume isn't in the same availability zone as the specified instance
Incorrect state for the request	Indicates that the resource is in an incorrect state for the request. This exception can occur if there's an attempt to attach a volume that is still being created (ensure that the volume is 'available') or detach a volume that isn't attached
The resource is in use	Indicates that the operation can't be completed because the resource is in use
Amazon service request failed	Indicates that the request to AWS failed

## Create EC2 session

Create an EC2 client to automate EC2 web services.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Access keys	N/A	Boolean value	False	Specifies whether to use access key ID and secret access key in order to create the EC2 session
Access key ID	No	Text value		The AWS access key ID
Secret	No	Direct encrypted input or Text value		The AWS secret access key
Region endpoint	No	Text value		The region constant to use that determines the endpoint to use
Profile name	No	Text value	default	The name of the profile to use

Argument	Optional	Accepts	Default Value	Description
Profile location	Yes	<a href="#">Text value</a>		The location of the credentials file that contains the profile to use

## Variables produced

Argument	Type	Description
Ec2Client	<a href="#">EC2 client</a>	The EC2 client

## Exceptions

Exception	Description
Profile doesn't exist	Indicates that the specified profile doesn't exist
Invalid profile	Indicates that the specified profile isn't correctly configured
Create session failed	Indicates that the creation of EC2 client failed

## End EC2 session

Dispose an open EC2 client.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
EC2 client	No	<a href="#">EC2 client</a>		The EC2 client

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# Azure actions

Article • 12/16/2022

## 📘 Important

You need an active Azure subscription to deploy Azure actions in your desktop flows.

Power Automate allows you to manage Azure virtual machines through the Azure group of actions. To implement Azure functionality in your desktop flows, create a new Azure session using the **Create session** action.

This action requires you to enter the **Client ID**, an authentication key for the specific application, and the respective password. Additionally, enter the **Tenant ID** that is the Azure Active Directory in which you've created the application.

Lastly, populate the appropriate **Subscription ID**. The subscription ID is a GUID that uniquely identifies your subscription to Azure services.

**Create session** ×

▲ Creates an Azure session using service principal [More info](#)

Select parameters

Client ID:  {x} ⓘ

Client secret: ⓘ  ⓘ

Tenant ID:  {x} ⓘ

Subscription ID:  {x} ⓘ

> Variables produced **AzureClient**

After creating the session and deploying all the needed Azure actions, use the **End session** action to terminate the Azure session.

**End session**
✕

▲ Ends an Azure session [More info](#)

Select parameters

Azure client :  ▼ ⓘ

Save
Cancel

## Get resource groups

Gets the resource groups based on the specified criteria.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Resource group name	Yes	<a href="#">Text value</a>		The name of the resource group

### Variables produced

Argument	Type	Description
ResourceGroups	<a href="#">List of Azure resource groups</a>	The retrieved resource groups

### Exceptions

Exception	Description
Failed to get the resource groups with the specified criteria	Indicates that getting the resource groups with the specified criteria failed

# Create resource group

Creates a new resource group.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Resource group name	No	<a href="#">Text value</a>		The name of the resource group
Location	No	<a href="#">Text value</a>		The location where the new disk will be created

## Variables produced

Argument	Type	Description
ResourceGroup	<a href="#">Azure resource group</a>	The created resource group

## Exceptions

Exception	Description
Resource group already exists	Indicates that the resource group already exists and can't be created
Failed to create resource group	Indicates that creating the resource group failed

# Delete resource group

Deletes the specified resource group and all the contained resources.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------



Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Resource group name	No	<a href="#">Text value</a>		The name of the resource group

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Failed to delete the resource group	Indicates that deleting the resource group failed

## Get disks

Gets the disks based on the specified criteria.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Retrieve disks	N/A	All, With the specified resource group, With the specified name in all resource groups, With specific name in the specified resource group	All	Specify which disks to retrieve
Resource group	No	<a href="#">Text value</a>		The resource group where the disks reside

Argument	Optional	Accepts	Default Value	Description
Disk name	No	Text value		The name of the disk

## Variables produced

Argument	Type	Description
Disks	List of <a href="#">Azure managed disks</a>	The retrieved disks with all the related information

## Exceptions

Exception	Description
Disk wasn't found	Indicates that the disk with the specified criteria doesn't exist
Resource group wasn't found	Indicates that the specified resource group wasn't found
Failed to get the disks with the specified criteria	Indicates that getting the disks with the specified criteria failed

## Attach disk

Attaches an existing disk to the virtual machine with the specified name and resource group.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Virtual machine name	No	Text value		The VM where the disk will be attached
VM resource group	No	Text value		The resource group of the VM

Argument	Optional	Accepts	Default Value	Description
Disk is managed	N/A	Boolean value	True	Specify whether the disk to attach is managed
Disk name	No	Text value		The name of the disk to attach
Disk's resource group	No	Text value		The resource group of the disk
Storage account	No	Text value		The storage account where VHD file is located
Container	No	Text value		The container that holds the VHD file
VHD file	No	Text value		The name of the VHD file

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
VM wasn't found	Indicates that the specified VM wasn't found
Disk wasn't found	Indicates that the disk with the specified criteria doesn't exist
Both unmanaged and managed disk can't exist together in a VM	Indicates that the attachment failed because both unmanaged and managed disk can't exist together in a VM
Failed to attach the disk	Indicates that the disk attachment failed

## Detach disk

Detaches the disk from the virtual machine with the specified name and resource group.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Virtual machine name	No	<a href="#">Text value</a>		The VM from where the disk will be detached
Virtual machine's resource group	No	<a href="#">Text value</a>		The resource group of the VM
Disk name	No	<a href="#">Text value</a>		The name of the disk to detach
Disk is managed	N/A	<a href="#">Boolean value</a>	True	Specify whether the disk to detach is managed

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
VM wasn't found	Indicates that the specified VM wasn't found
Failed to detach because the disk isn't attached to the specified VM	Indicates that the detachment failed because the disk isn't attached to the specified VM
Failed to detach disk	Indicates that detaching the disk failed

## Create managed disk

Creates a managed disk with the specified settings.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure

Argument	Optional	Accepts	Default Value	Description
Disk name	No	Text value		The name of the managed disk to create
Resource group option	N/A	Use existing, Create new	Use existing	Specify whether a new resource group will be created or an existing one will be used
Resource group name	No	Text value		The resource group of the disk
Location	No	Text value		The location where the new disk is created
Source type	N/A	None, Snapshot, Storage blob	None	Specifies whether to create an empty disk or use the snapshot of another disk or use a blob in a storage account
Snapshot name	No	Text value		The managed snapshot to use as a source
Snapshot's resource group	No	Text value		The resource group of the snapshot
Blob URL	No	Text value		The URL of the blob
Disk size in GB	No	Numeric value		Size of the disk in GB
Storage account type	N/A	Standard HDD, Premium SSD, Standard SSD, Ultra disk SSD	Standard HDD	The disk type
Storage account name	No	Text value		The name of the storage account where VHD file is stored
Availability zone	Yes	Text value		The availability zone for the managed disk

## Variables produced

Argument	Type	Description
----------	------	-------------

Argument	Type	Description
ManagedDisk	<a href="#">Azure managed disk</a>	The created managed disk

## Exceptions

Exception	Description
Resource group already exists	Indicates that the resource group already exists and can't be created
Resource group wasn't found	Indicates that the specified resource group wasn't found
The resource with the specified name already exists	Indicates that the resource with the specified name already exists
Snapshot wasn't found	Indicates that the specified snapshot wasn't found
Failed to create disk	Indicates that creating the disk failed

## Delete disk

Deletes the managed disk with the specified name and resource group.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Disk name	No	<a href="#">Text value</a>		The name of the managed disk to delete
Resource group	No	<a href="#">Text value</a>		The resource group of the disk

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
Disk wasn't found	Indicates that the disk with the specified criteria doesn't exist
Failed to delete the disk because it's attached to a VM	Indicates a problem deleting the disk because it's attached to a VM
Failed to delete disk	Indicates that deleting the disk failed

## Get snapshots

Gets the snapshots based on the specified criteria.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Retrieve snapshots	N/A	All, With the specified resource group, With the specified name in all resource groups, With specific name in the specified resource group	All	Specify which snapshots to retrieve
Resource group	No	<a href="#">Text value</a>		The resource group where the snapshots reside
Snapshot name	No	<a href="#">Text value</a>		The name of the snapshot

### Variables produced

Argument	Type	Description
Snapshots	<a href="#">List of Azure snapshots</a>	The retrieved snapshots with all the related information

# Exceptions

Exception	Description
Snapshot wasn't found	Indicates that the specified snapshot wasn't found
Resource group wasn't found	Indicates that the specified resource group wasn't found
Failed to get the snapshots with the specified criteria	Indicates that getting the snapshots with the specified criteria failed

## Create snapshot

Creates a snapshot from the specified disk.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Snapshot name	No	<a href="#">Text value</a>		The name of the snapshot to create
Resource group option	N/A	Use existing, Create new	Use existing	Specifies whether a new resource group will be created or an existing one will be used
Resource group	No	<a href="#">Text value</a>		The resource group where the snapshot will be created
Location	No	<a href="#">Text value</a>		The location where the new disk will be created
Source disk	No	<a href="#">Text value</a>		The name of the managed disk that will be used as source data
Source disk's resource group	No	<a href="#">Text value</a>		The resource group of the managed disk that will be used as source data

### Variables produced

Argument	Type	Description
----------	------	-------------



Argument	Type	Description
Snapshot	<a href="#">Azure snapshot</a>	The created snapshot

## Exceptions

Exception	Description
Resource group already exists	Indicates that the resource group already exists and can't be created
Resource group wasn't found	Indicates that the specified resource group wasn't found
The resource with the specified name already exists	Indicates that the resource with the specified name already exists
Disk wasn't found	Indicates that the disk with the specified criteria doesn't exist
Failed to create snapshot	Indicates that creating the snapshot failed

## Delete snapshot

Deletes the snapshot with the specified name and resource group.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Snapshot name	No	<a href="#">Text value</a>		The name of the snapshot to delete
Resource group	No	<a href="#">Text value</a>		The resource group of the snapshot

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
-----------	-------------

Exception	Description
Snapshot wasn't found	Indicates that the specified snapshot wasn't found
Failed to delete snapshot	Indicates that deleting the snapshot failed

## Get virtual machines

Gets the basic information for the virtual machines.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Resource group	Yes	<a href="#">Text value</a>		The resource group of the virtual machine
Status	N/A	Running, Deallocating, Deallocated, Starting, Stopped, Stopping, Unknown, Any	Any	The status of the virtual machine

### Variables produced

Argument	Type	Description
VirtualMachinesInfo	<a href="#">List of Azure virtual machine info</a>	The retrieved virtual machines with basic information

### Exceptions

Exception	Description
Resource group wasn't found	Indicates that the specified resource group wasn't found
Failed to get the VMs with basic information	Indicates that getting the VMs with basic information failed

# Describe virtual machine

Gets all the information for the virtual machine(s) based on the specified criteria.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Describe virtual machines	N/A	All, With the specified resource group, With the specified name in all resource groups, With specific name in the specified resource group	All	Specify which virtual machines to describe
Resource group	No	<a href="#">Text value</a>		The resource group of the virtual machine
Virtual machine name	No	<a href="#">Text value</a>		The name of the virtual machine
Status	N/A	Running, Deallocating, Deallocated, Starting, Stopped, Stopping, Unknown, Any	Any	The status of the virtual machine

## Variables produced

Argument	Type	Description
VirtualMachines	<a href="#">List of Azure virtual machines</a>	The retrieved virtual machines with all the related information

## Exceptions

---

Exception	Description
VM wasn't found	Indicates that the specified VM wasn't found
Resource group wasn't found	Indicates that the specified resource group wasn't found
Failed to get basic information of the VM(s)	Indicates that getting basic information of the VM(s) failed

## Start virtual machine

Starts the virtual machine.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Virtual machine name	No	<a href="#">Text value</a>		The name of the virtual machine
Resource group	No	<a href="#">Text value</a>		The resource group of the virtual machine

### Variables produced

This action doesn't produce any variables.

### Exceptions

Exception	Description
VM wasn't found	Indicates that the specified VM wasn't found
Failed to start the VM	Indicates that an error occurred while trying to start the VM

## Stop virtual machine

Stops the virtual machine and delocates the related hardware (CPU and memory) and network resources.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Virtual machine name	No	<a href="#">Text value</a>		The name of the virtual machine
Resource group	No	<a href="#">Text value</a>		The resource group of the virtual machine

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
VM wasn't found	Indicates that the specified VM wasn't found
Failed to stop the VM	Indicates that an error occurred while trying to stop the VM

## Shut down virtual machine

Shuts down the operating system of a virtual machine.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Virtual machine name	No	<a href="#">Text value</a>		The name of the virtual machine

Argument	Optional	Accepts	Default Value	Description
Resource group	No	<a href="#">Text value</a>		The resource group of the virtual machine

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
VM wasn't found	Indicates that the specified VM wasn't found
Failed to shut down the VM	Indicates an error occurred while trying to shut down the VM

## Restart virtual machine

Restarts a virtual machine.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure
Virtual machine name	No	<a href="#">Text value</a>		The name of the virtual machine
Resource group	No	<a href="#">Text value</a>		The resource group of the virtual machine

## Variables produced

This action doesn't produce any variables.

## Exceptions

Exception	Description
VM wasn't found	Indicates that the specified VM wasn't found
Failed to restart the VM	Indicates that an error occurred while trying to restart the VM

## Create session

Creates an Azure session.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Client ID	No	Text value		The client ID of the application, also known as application ID, which identifies the application that is using the token
Client secret	No	Direct encrypted input or Text value		The secret for the client ID
Tenant ID	No	Text value		The directory ID of the Azure Active Directory
Subscription ID	Yes	Text value		The Azure subscription ID. If not provided, the default subscription will be used

### Variables produced

Argument	Type	Description
AzureClient	Azure client	The created Azure client

### Exceptions

Exception	Description
Failed to create Azure client	Indicates that creating the Azure client failed

## Get subscriptions

Gets subscriptions that the current account can access.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure

## Variables produced

Argument	Type	Description
Subscriptions	<a href="#">List of Azure subscriptions</a>	The retrieved subscriptions with all the related information

## Exceptions

Exception	Description
Failed to get the subscriptions with the specified criteria	Indicates that getting the subscriptions with the specified criteria failed

## End session

Ends an Azure session.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Azure client	No	<a href="#">Azure client</a>		The client used to connect to Azure

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.



# Cognitive actions

Article • 12/16/2022

The cognitive actions have been segregated into three new categories.

- [Google cognitive](#)
- [IBM cognitive](#)
- [Microsoft cognitive](#)

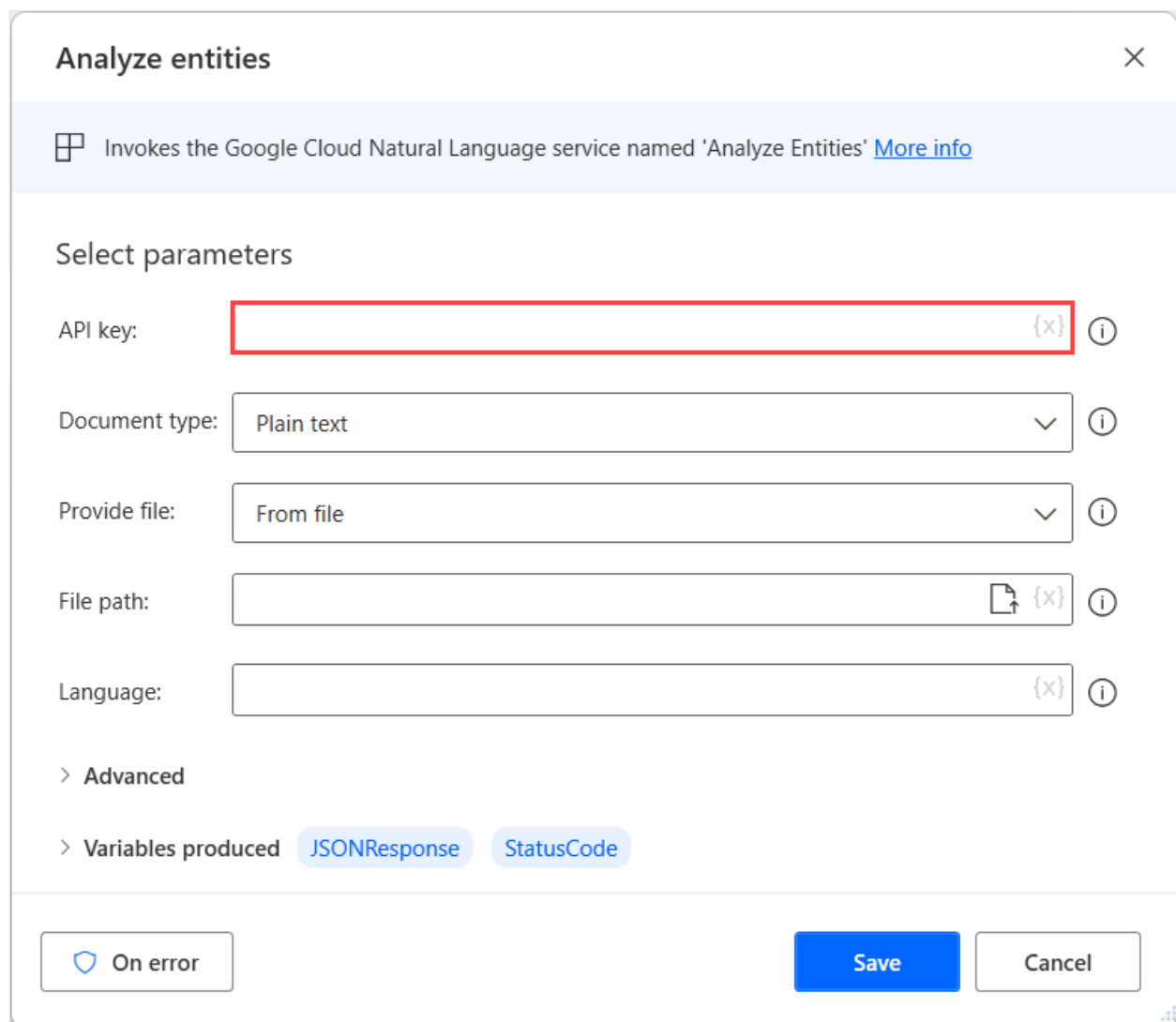
# Google cognitive actions

Article • 12/16/2022

Google cognitive services allow you to process unstructured data through machine learning and simplify complicated tasks like text analysis and computer vision.

You can implement this functionality in your desktop flows using the Google cognitive group of actions.

All Google cognitive actions require an API key that authorizes you to use the respective services. You can manage your API keys in the **APIs & services** section of the Cloud Console.



The screenshot shows the configuration interface for the 'Analyze entities' action. At the top, there is a title bar with the text 'Analyze entities' and a close button (X). Below the title bar, a light blue banner contains a grid icon, the text 'Invokes the Google Cloud Natural Language service named 'Analyze Entities'', and a 'More info' link. The main area is titled 'Select parameters' and contains several input fields: 'API key' (with a red border and a clear button {x}), 'Document type' (a dropdown menu set to 'Plain text'), 'Provide file' (a dropdown menu set to 'From file'), 'File path' (with a file icon and a clear button {x}), and 'Language' (with a clear button {x}). Each field has an information icon (i) to its right. Below the parameters, there are two expandable sections: '> Advanced' and '> Variables produced', which shows 'JSONResponse' and 'StatusCode' as produced variables. At the bottom, there is an 'On error' button with a shield icon, a blue 'Save' button, and a 'Cancel' button.

## Analyze sentiment

Invokes the Google Cloud Natural Language service named 'Analyze Sentiment'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The Google Cloud API key to be used for this API call
Document type	N/A	Plain text, HTML	Plain text	The type of document to transmit
Provide document	N/A	From file, From GCS	From file	Specify whether the document will be provided by a full path or a Google Cloud Storage URI
File path	No	File		The full path (folder plus filename) of the document to transmit
GCS Content URI	No	Text value		The URI of the image residing on Google Cloud Storage
Language	Yes	Text value		The language of the text
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request

## Analyze entities

Invokes the Google Cloud Natural Language service named 'Analyze Entities'.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	<a href="#">Text value</a>		The Google Cloud API key to be used for this API call
Document type	N/A	Plain text, HTML	Plain text	The type of the document to transmit
Provide file	N/A	From file, From GCS	From file	Specify whether the document will be provided by a full path or a Google Cloud Storage URI
File path	No	<a href="#">File</a>		The full path (folder plus filename) of the document to transmit
GCS URL	No	<a href="#">Text value</a>		The URI of the document residing on Google Cloud Storage
Language	Yes	<a href="#">Text value</a>		The language of the text
Timeout	Yes	<a href="#">Numeric value</a>	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

### Variables produced

Argument	Type	Description
JSONResponse	<a href="#">Custom object</a>	The API response results
StatusCode	<a href="#">Numeric value</a>	The status code returned

# Exceptions

Exception	Description
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services
Request timeout expired	Indicates that the timeout expired while performing the request

# Analyze syntax

Invokes the Google Cloud Natural Language service named 'Analyze Syntax'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	<a href="#">Text value</a>		The Google Cloud API key to be used for this API call
Document type	N/A	Plain text, HTML	Plain text	The type of document to transmit
Provide document	N/A	From file, From GCS	From file	Specify whether the document will be provided by a full path or a Google Cloud Storage URI
File path	No	<a href="#">File</a>		The full path (folder plus filename) of the document to transmit
GCS Content URI	No	<a href="#">Text value</a>		The URI of the image residing on Google Cloud Storage
Language	Yes	<a href="#">Text value</a>		The language of the text
Timeout	Yes	<a href="#">Numeric value</a>	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services
Request timeout expired	Indicates that the timeout expired while performing the request

## Label detection

Invokes the Google Cloud Vision service named 'Label Detection'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The Google Cloud API key to be used for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a Google Cloud Storage URI
Image file	No	File		The full path (folder plus filename) of the image file to transmit
GCS Image URI	No	Text value		The URI of the image residing on Google Cloud Storage
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services
Request timeout expired	Indicates that the timeout expired while performing the request

## Landmark detection

Invokes the Google Cloud Vision service named 'Landmark Detection'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The Google Cloud API key to be used for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a Google Cloud Storage URI
Image file path	No	File		The full path (folder plus filename) of the image file to transmit
GCS Image URI	No	Text value		The URI of the image residing on Google Cloud Storage
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

---

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services
Request timeout expired	Indicates that the timeout expired while performing the request

## Text Detection

Invokes the Google Cloud Vision service named 'Text Detection'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The Google Cloud API key to be used for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a Google Cloud Storage URI
Image file	No	File		The full path (folder plus filename) of the image file to transmit
GCS Image URI	No	Text value		The URI of the image residing on Google Cloud Storage
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

---



Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services
Request timeout expired	Indicates that the timeout expired while performing the request

## Logo detection

Invokes the Google Cloud Vision service named 'Logo Detection'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The Google Cloud API key to be used for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a Google Cloud Storage URI
Image file	No	File		The full path (folder plus filename) of the image file to transmit
GCS Image URI	No	Text value		The URI of the image residing on Google Cloud Storage
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services
Request timeout expired	Indicates that the timeout expired while performing the request

## Image properties detection

Invokes the Google Cloud Vision service named 'Image Properties Detection'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The Google Cloud API key to be used for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a Google Cloud Storage URI
Image file	No	File		The full path (folder plus filename) of the image file to transmit
GCS Image URI	No	Text value		The URI of the image residing on Google Cloud Storage
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

---

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services
Request timeout expired	Indicates that the timeout expired while performing the request

## Safe search detection

Invokes the Google Cloud Vision service named 'Safe Search Detection'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The Google Cloud API key to be used for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a Google Cloud Storage URI
Image file	No	File		The full path (folder plus filename) of the image file to transmit
GCS Image URI	No	Text value		The URI of the image residing on Google Cloud Storage
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

<b>Argument</b>	<b>Type</b>	<b>Description</b>
JSONResponse	<a href="#">Custom object</a>	The API response results
StatusCode	<a href="#">Numeric value</a>	The status code returned

## Exceptions

<b>Exception</b>	<b>Description</b>
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services
Request timeout expired	Indicates that the timeout expired while performing the request

# IBM cognitive actions

Article • 12/16/2022

IBM cognitive services are machine learning algorithms that use artificial intelligence to perform complex operations, such as language tone analysis and visual recognition.

Desktop flows enable you to use these services through the IBM cognitive actions.

All IBM cognitive actions require an API key that you can create and manage through the IBM Cloud console. Additionally, they require the release date of the used API and the service endpoint location.

### Translate

Invokes the IBM service named 'Translate' [More info](#)

Select parameters

API key:  ⓘ

Version date:  ⓘ

Service endpoint location:  ⓘ

Instance ID:  ⓘ

Translate mode:  ⓘ

Model ID:  ⓘ

Text:  ⓘ

> **Advanced**

> Variables produced JSONResponse StatusCode

## Convert document

Invokes the IBM service named 'Convert Document'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Username	No	Text value		The username to be used for this call
Password	No	Direct encrypted input or Text value		The password to use for this call
Version date	No	Text value		The release date of the API to use
File path	No	File		The path to the file to analyze
Mime type	N/A	text/html, text/xhtml+xml, application/pdf, application/msword, application/vnd.openxmlformats-officedocument.wordprocessingml.document	text/html	The MIME type of the file
Conversion target	N/A	Answer units, Normalized HTML, Normalized text	Answer units	The output format of the conversion
Answer units	Yes	Text value		The heading levels as a comma-separated string

Argument	Optional	Accepts	Default Value	Description
Timeout	Yes	<a href="#">Numeric value</a>	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	<a href="#">Custom object</a>	The results of the API call
StatusCode	<a href="#">Numeric value</a>	The status code of the API call

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Translate

Invokes the IBM service named 'Translate'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
----------	----------	---------	---------------	-------------

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The API key to use for this call
Version date	No	Text value		The release date of the API to use
Service endpoint location	N/A	US South, US East, Europe, Australia, Japan, UK, Korea	US East	The account's service location. Can be seen through IBM "Manage" in the resources section
Instance ID	No	Text value		The Instance ID of the service.
Translate mode	N/A	Model ID, Source and target	Model ID	Specify the mode to be used for this call
Model ID	No	Text value		The unique model_id of the translation model that will be used to translate the text
Source	No	Text value		The source language of the text
Target	No	Text value		The translation target language in 2 or 5 letter language code
Text	No	List of Text values		The text to send or list of words to be separately translated
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The results of the API call
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
-----------	-------------



Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Identify language

Invokes the IBM service named 'Identify Language'.

### Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The API key to use for this call
Version date	No	Text value		The release date of the API to use
Service endpoint location	N/A	US South, US East, Europe, Australia, Japan, UK, Korea	US East	The account's service location. Can be seen through IBM "Manage" in the resources section
Instance ID	No	Text value		The Instance ID of the service.
Text	No	Text value		The text to analyze
Content type	Yes	Text value	text/plain	The format of the requested values
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

### Variables produced

Argument	Type	Description
JSONResponse	Custom object	The results of the API call
StatusCode	Numeric value	The status code of the API call

# Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

# Analyze tone

Invokes the IBM service named 'Analyze Tone'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The API key to use for this call
Version date	No	Text value		The release date of the API to use
Service endpoint location	N/A	US South, US East, Europe, Australia, Japan, UK, Korea	US East	The account's service location. Can be seen through IBM "Manage" in the resources section
Instance ID	No	Text value		The Instance ID of the service.
Provide text	N/A	From text, From file	From text	Specify how the text to be analyzed will be provided
Text	No	Text value		The text to analyze
File path	No	File		The path to the file to analyze
Content type	N/A	text/plain, text/html, application/json	text/plain	The content type of the text that will be sent
Tones	Yes	Text value		The tone with which the results will be filtered (optional)
Sentences	Yes	Text value		Specify whether to remove the sentence analysis

Argument	Optional	Accepts	Default Value	Description
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The results of the API call
StatusCode	Numeric value	The status code of the API call

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Classify Image

Invokes the IBM service named 'Classify Image'.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
API key	No	Text value		The API key to use for this call
Version date	No	Text value		The release date of the API to use
Service endpoint location	N/A	US South, Europe, Korea	US South	The account's service location. Can be seen through IBM "Manage" in the resources section

Argument	Optional	Accepts	Default Value	Description
Instance ID	No	Text value		The Instance ID of the service.
Provide image	N/A	From file, From GCS	From file	Specify how the image will be provided
Image file path	No	File		The path to the image to be analyzed
Image URL	No	Text value		The URL of the image to be analyzed
Owners	Yes	Text value	me	The classifiers to be used as a comma separated list
Classifier IDs	Yes	Text value	default	The classifier IDs to be used as a comma separated list
Threshold	Yes	Text value		The minimum score a class must have to be displayed in the response as a floating value
Language	Yes	Text value		The language of the output
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The results of the API call
StatusCode	Numeric value	The status code of the API call

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

# Microsoft cognitive actions

Article • 11/08/2023

Azure Cognitive Services enables you to accelerate decision-making using artificial intelligence without requiring machine learning expertise.

## Important

Azure is retiring **Azure Cognitive Services Text Analytics v2.x on 29 February 2024** [↗](#). This library is used by the **Microsoft Cognitive Text Analytics actions**. After February 29, 2024 those actions will no longer be supported in desktop flows and will not be operational.

Desktop flows provide a wide variety of Microsoft cognitive actions that allow you to integrate this functionality into your desktop flows. Text analysis, computer vision, and spell-checking are all tasks that Microsoft cognitive actions can perform.

All Microsoft cognitive actions require a subscription key that validates your subscription for a service or group of services. The keys are available in the Azure portal for each resource you've created.

**Spell check**
✕

■ ■ ■ Invokes the Microsoft Cognitive service named 'Bing Spell Check' [More info](#)

Select parameters

Subscription key:  ⓘ

Text:  ⓘ

Mode:  ⓘ

Mkt:  ⓘ

> **Advanced**

> Variables produced JSONResponse StatusCode

⛔ On error

Save

Cancel

## Spell check

Invokes the Microsoft Cognitive service named 'Bing Spell Check.'

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Subscription key	No	Text value		The subscription key to use for this API call
Text	No	List of Text values		The text or the list of texts to send
Mode	Yes	Text value		Specify the spell-check mode
Mkt	Yes	Text value		For proof mode, the only supported language codes are: en-us, es-es, pt-br. For spell mode, all language codes are supported

Argument	Optional	Accepts	Default Value	Description
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Analyze image

Invokes the Microsoft Cognitive service named 'Analyze Image.'

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Server location	N/A	West US, West US 2, East US, East US 2, West Central US, South Central US, West Europe, North Europe, Southeast Asia, East Asia, Australia East, Brazil South, Canada Central, Central India, UK South, Japan East	West US	The server location to be used for this API call

Argument	Optional	Accepts	Default Value	Description
Subscription key	No	Text value		The subscription key to use for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a URL address
Image file	No	File		The full path (folder plus filename) of the image file to transmit
Image URL	No	Text value		The URL address of an image
Visual features	Yes	Text value		A text value indicating what visual feature types to return. Multiple values should be comma-separated. For example: categories, tags, description
Details	Yes	Text value		A text value indicating which domain-specific details to return. Multiple values should be comma-separated
Language	Yes	Text value		A text value indicating which language to return. The service will return recognition results in the specified language
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results



Argument	Type	Description
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Describe image

Invokes the Microsoft Cognitive service named 'Describe Image.'

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Server location	N/A	West US, West US 2, East US, East US 2, West Central US, South Central US, West Europe, North Europe, Southeast Asia, East Asia, Australia East, Brazil South, Canada Central, Central India, UK South, Japan East	West US	The server location to be used for this API call
Subscription key	No	Text value		The subscription key to use for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a URL address
Image file	No	File		The full path (folder plus filename) of the image file to transmit
Image URL	No	Text value		The URL address of an image

Argument	Optional	Accepts	Default Value	Description
Max candidates	Yes	Text value		The maximum number of candidate descriptions to be returned. The default is 1
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## OCR

Invokes the Microsoft Cognitive service named 'OCR.'

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Server location	N/A	West US, West US 2, East US, East US 2, West Central US,	West US	The server location to be used for this API call

Argument	Optional	Accepts	Default Value	Description
		South Central US, West Europe, North Europe, Southeast Asia, East Asia, Australia East, Brazil South, Canada Central, Central India, UK South, Japan East		
Subscription key	No	Text value		The subscription key to use for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a URL address
Image file	No	File		The full path (folder plus filename) of the image file to transmit
Image URL	No	Text value		The URL address of an image
Language	Yes	Text value		The BCP-47 language code of the text to detect in the image
Detect orientation	Yes	Text value		Specify whether to detect the text orientation in the image
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Tag image

Invokes the Microsoft Cognitive service named 'Tag Image.'

### Input parameters

Argument	Optional	Accepts	Default Value	Description
Server location	N/A	West US, West US 2, East US, East US 2, West Central US, South Central US, West Europe, North Europe, Southeast Asia, East Asia, Australia East, Brazil South, Canada Central, Central India, UK South, Japan East	West US	The server location to be used for this API call
Subscription key	No	<a href="#">Text value</a>		The subscription key to use for this API call
Provide image	N/A	From file, From GCS	From file	Specify whether the image will be provided by a full path or a URL address
Image file	No	<a href="#">File</a>		The full path (folder plus filename) of the image file to transmit
Image URL	No	<a href="#">Text value</a>		The URL address of an image
Timeout	Yes	<a href="#">Numeric value</a>	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Detect language

Invokes the Microsoft Cognitive service named 'Text Analytics - Detect Language.'

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Server location	N/A	West US, West US 2, East US, East US 2, West Central US, South Central US, West Europe, North Europe, Southeast Asia, East Asia, Australia East, Brazil South, Canada Central, Central India, UK South, Japan East	West US	The server location to be used for this API call
Subscription key	No	Text value		The subscription key to use for this API call
Text	No	Text value		The text to analyze
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Key phrases

Invokes the Microsoft Cognitive service named 'Text Analytics - Key Phrases.'

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Server location	N/A	West US, West US 2, East US, East US 2, West Central US, South Central US, West Europe, North Europe, Southeast Asia, East Asia, Australia East, Brazil South, Canada Central, Central India, UK South, Japan East	West US	The server location to be used for this API call
Subscription key	No	Text value		The subscription key to use for this API call
Text	No	List of Text values		The text or the list of texts to analyze
Language	Yes	Text value		The language of the text(s)
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should

Argument	Optional	Accepts	Default Value	Description
				wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services

## Sentiment

Invokes the Microsoft Cognitive service named 'Text Analytics - Sentiment.'

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Server location	N/A	West US, West US 2, East US, East US 2, West Central US, South Central US, West Europe, North Europe, Southeast Asia, East Asia, Australia East, Brazil South, Canada Central, Central India, UK South, Japan East	West US	The server location to be used for this API call
Subscription key	No	Text value		The subscription key to use for this API call

Argument	Optional	Accepts	Default Value	Description
Text	No	List of Text values		Text
Language	Yes	Text value		The two letter ISO 639-1 representation of the language of the text(s)
Timeout	Yes	Numeric value	30	The time (in seconds) that the agent should wait for a connection to be established with the server, before it fails

## Variables produced

Argument	Type	Description
JSONResponse	Custom object	The API response results
StatusCode	Numeric value	The status code returned

## Exceptions

Exception	Description
Request timeout expired	Indicates that the timeout expired while performing the request
Failed to Invoke cognitive services	Indicates a problem while trying to invoke Cognitive Services



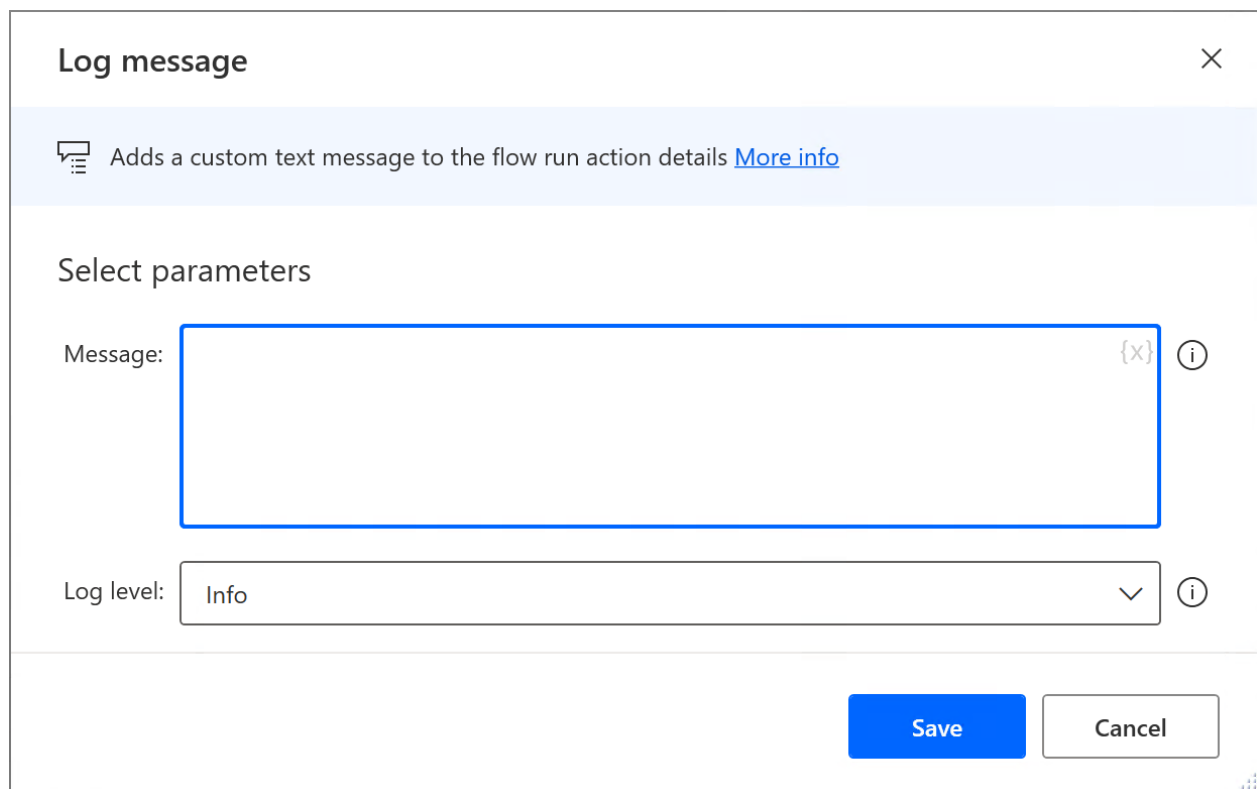
# Log message action

Article • 08/02/2023

The **Log message** action enables you to log a custom text message with a severity level of Info, Warning or Error in the flow run action details.

## 📘 Important

The Log message action in Power Automate for desktop is a premium feature, which requires a [Power Automate subscription](#).



The screenshot shows the 'Log message' configuration dialog. At the top, there is a title bar with 'Log message' and a close button. Below the title bar, there is a description: 'Adds a custom text message to the flow run action details' with a 'More info' link. The main area is titled 'Select parameters' and contains two fields: 'Message:' with a large text input box and a character count '{x}' and an information icon; and 'Log level:' with a dropdown menu set to 'Info' and an information icon. At the bottom right, there are 'Save' and 'Cancel' buttons.

At runtime, all action logs are uploaded to the Power Automate service, and are visible in the [flow run action details](#) view of the Power Automate portal.

## 📌 Note

- The text message should contain a maximum of 128 characters.
- Action logs are not uploaded to the Power Automate service when the flow is executed through the Power Automate for desktop designer.

## Log message

Adds a custom text message to the flow run action details.

## Input parameters

Argument	Optional	Accepts	Default Value	Description
Message	No	<a href="#">Text value</a>		The message to log
Log level	N/A	Info, Warning, Error	Info	The severity level of the message

## Variables produced

This action doesn't produce any variables.

## Exceptions

This action doesn't include any exceptions.

# SharePoint

Article • 05/24/2024

The SharePoint group of actions allows the utilization of the [SharePoint connector](#) from within desktop flows, alleviating the need to create a cloud flow in order to use its actions. This connector is the same as the one used across Power Automate cloud flows, Power Apps, and Logic Apps. It uses the same parameters and returns the same type of data.

## Prerequisites and limitations

- You need an Attended RPA license.
- In addition to implementing data loss prevention policies (DLP) for SharePoint cloud actions, administrators can disable the SharePoint actions by modifying the [appropriate registry setting](#).

## Getting started with SharePoint actions in desktop flows

This section presents examples on how to use SharePoint actions in your desktop flows.

### How to download the content of a SharePoint folder

#### Important

Before replicating the following steps, ensure that you are familiar with [lists](#), [custom objects](#), [loops](#), [conditionals](#), and the [percentage notation](#).

1. Ensure that you installed the [latest version of Power Automate for desktop](#).
2. Create a new desktop flow.
3. If the identifier of the target folder is unknown, use the **Get folder metadata using path** SharePoint action to retrieve it. This action requires the folder's path and produces a custom object containing the folder's metadata. You can access the identifier using the `Id` property.

### Get folder metadata using path (Preview) ✕

Gets information about the folder. Uses a folder path to pick the folder. [More info](#)

---

Select parameters  Connection references

Site Address:  {x} ▾ ⓘ

Folder Path:   {x} ⓘ

> **Advanced**

> Variables produced GetFolderMetadataByPathResponse

On error

Save

Cancel

4. Deploy the **List folder** SharePoint action and populate the appropriate SharePoint URL and the previously retrieved identifier. The produced list contains custom objects representing items in the target folder.

### List folder (Preview) ✕

Returns files contained in a SharePoint folder. [More info](#)

---

Select parameters  Connection references

Site Address:  {x} ▾ ⓘ

File Identifier:   {x} ⓘ

> **Advanced**

> Variables produced ListFolderResponse

On error

Save

Cancel

5. After retrieving the list, use a **For each** loop to iterate through the objects inside it.

### For each ✕

Iterates over items in a list, data table or data row, allowing a block of actions to be executed repeatedly [More info](#)

**Select parameters**

Value to iterate:  {x} ⓘ

Store into: CurrentItem {x}

Save
Cancel

6. If the items in the target folder are only files, use the Get file content using path action, and the **Path** property inside the block to retrieve the current file's contents.

### Get file content using path (Preview) ✕

Gets file contents using the file path. [More info](#)

**Select parameters**  Connection references

Site Address:  {x} ▾ ⓘ

File Path:   {x} ⓘ

> **Advanced**

> **Variables produced** GetFileContentByPathResponse

On error
Save
Cancel

7. Then, deploy the **Convert binary data to file** action to store the retrieved data in a local file. You can use the **Name** property to name the new file with the same name as the original SharePoint file.

### Convert binary data to file ✕

Convert binary data to file [More info](#)

Select parameters

Binary data:  ⓘ

File path:  ⓘ

If file exists:  ⓘ

The previous steps cover the case where the target folder contains only files. However, if the folder contains subfolders with files inside them, modify your desktop flow accordingly:

1. Add an **If** condition inside the previously deployed loop to check whether the currently selected item is a folder. To perform this check, use the **IsFolder** property of the current item.

### If ✕

Marks the beginning of a block of actions that is run if the condition specified in this statement is met [More info](#)

Select parameters

First operand:  ⓘ

Operator:  ⓘ

Second operand:  ⓘ

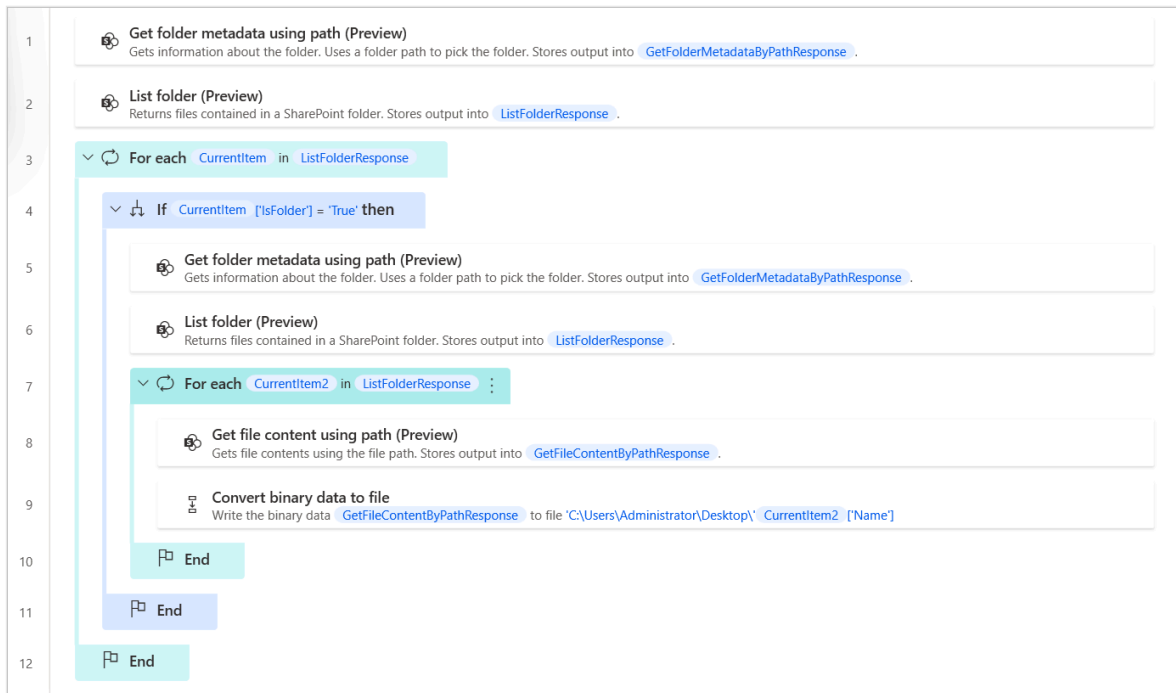
2. Inside the if-block, use the **Get folder metadata using path** action to get the identifier of the currently selected folder. The folder path is the same as the one you used at the beginning of the flow, plus the folder's name. You can access the folder using the **Name** property of the current item.

The screenshot shows the configuration window for the 'Get folder metadata using path' action. The title bar reads 'Get folder metadata using path (Preview)'. Below the title, there is a description: 'Gets information about the folder. Uses a folder path to pick the folder. [More info](#)'. The 'Select parameters' section contains two input fields: 'Site Address' with the value 'https://contoso.sharepoint.com/sites/sitename' and 'Folder Path' with the value '/Shared Documents/Reports/%CurrentItem['Name']%'. There are also 'Advanced' and 'Variables produced' sections. The 'Variables produced' section shows 'GetFolderMetadataByPathResponse'. At the bottom, there are buttons for 'On error', 'Save', and 'Cancel'.

3. As you did before, deploy the **List folder** SharePoint action and populate the appropriate SharePoint URL and the previously retrieved identifier.

The screenshot shows the configuration window for the 'List folder' action. The title bar reads 'List folder (Preview)'. Below the title, there is a description: 'Returns files contained in a SharePoint folder. [More info](#)'. The 'Select parameters' section contains two input fields: 'Site Address' with the value 'https://contoso.sharepoint.com/sites/sitename' and 'File Identifier' with the value '%GetFolderMetadataByPathResponse['Id']%'. There are also 'Advanced' and 'Variables produced' sections. The 'Variables produced' section shows 'ListFolderResponse'. At the bottom, there are buttons for 'On error', 'Save', and 'Cancel'.

4. Deploy a **For each** loop to iterate through the files inside the selected subfolder, and move and modify the previously deployed **Get file content using path** and **Convert binary data to file** actions to retrieve and save locally the contents of each file.



If you want to download files of specific subfolders, modify the previously deployed conditional to check the desired condition. For example, the following condition checks whether the current item's name is any other than 2022.

#### ⓘ Note

Although you could use a new nested **If** action, combining the checks in only one conditional makes the desktop flow less complicated and easier to read.



**If**
✕

↴ Marks the beginning of a block of actions that is run if the condition specified in this statement is met  
[More info](#)

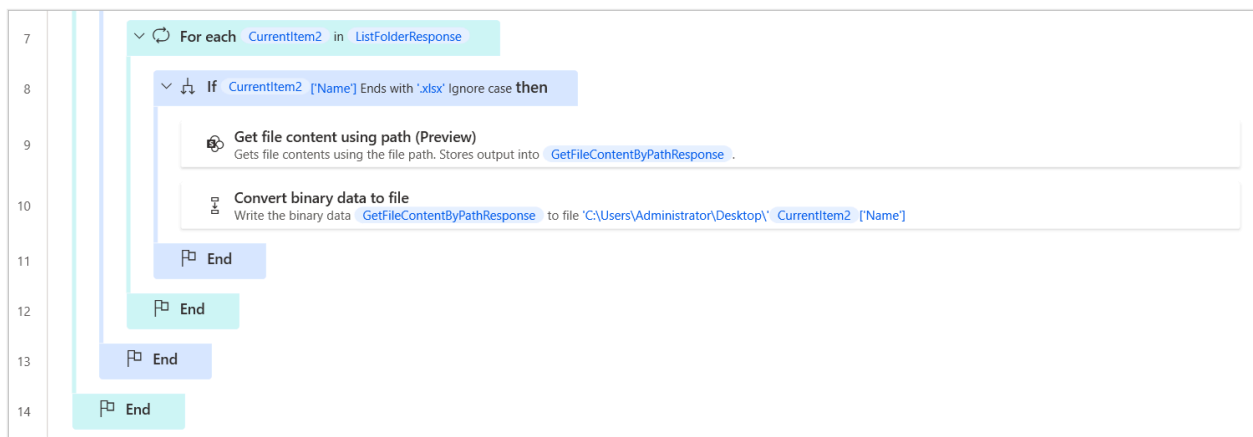
**Select parameters**

First operand:  {x} ⓘ

Operator:  ▼ ⓘ

Second operand:  {x} ⓘ

If you want to download only files of a specific type, add a conditional before retrieving the file contents to check whether the file name ends with a particular extension.



## How to upload a local file to SharePoint

1. Ensure that you installed the [latest version of Power Automate for desktop](#).
2. Create a new desktop flow.
3. Deploy the **Convert file to binary data** action and select the desired file on your local drive. The action stores the converted file in the **BinaryData** variable.

**Convert file to binary data** ✕

Convert a file to binary data [More info](#)

Select parameters

File path:

> Variables produced BinaryData


On error Save Cancel

4. Find the **SharePoint** group of actions in the flow designer and deploy the **Create file** action in the workspace.
5. Select an existing connection reference and fill in the required parameters. Here's an example about how to fill the fields:

**Important**

Don't forget to add the appropriate file extension after the file name.

### Create file (Preview) ✕

 Uploads a file to a SharePoint site. Make sure to pick an existing library. [More info](#)

Select parameters 🔗 Connection references

Site Address:  {x} ▾ ⓘ

Folder Path:  📁 {x} ⓘ

File Name:  {x} ⓘ

File Content:  {x} ⓘ

> Advanced

> Variables produced CreateFileResponse

## Feedback

Was this page helpful?

[Provide product feedback](#) ↗

# Office 365 Outlook

Article • 05/24/2024

The Office 365 Outlook group of actions allows the utilization of the [Office 365 Outlook connector](#) from within desktop flows, alleviating the need to create a cloud flow in order to use its actions. This connector is the same as the one used across Power Automate cloud flows, Power Apps, and Logic Apps. It uses the same parameters and returns the same type of data.

## Prerequisites and limitations

- You need an Attended RPA license.
- On top of Data loss prevention policies (DLP) for Office 365 Outlook, machine administrators can disable the Office 365 Outlook actions by modifying the [appropriate registry setting](#).

## Send an email with attachments


This section presents an example of how to send an email with attachments in your desktop flows, using Office 365 Outlook actions.

### ⓘ Note



In order to include file attachments in your emails, you need to convert those files using the **Convert file to binary data** action. Then use the variable containing the binary data in the **Send and Email(v2)** action, when adding a file attachment.

Convert the file to attach as binary data using the Convert file to binary data action.

### Convert file to binary data ✕

 Convert a file to binary data [More info](#)

#### Select parameters

File path:   {x} 

> Variables produced BinaryData

Open the **Send an Email(v2)** action from Office 365 Outlook group of actions. Within the **Advanced** section, next to the **Attachments** parameter, select **Edit**.

### Send an email (V2) ↗ ×

 This operation sends an email message. [More info](#)

 Connection references

To:  ⓘ

Subject:  ⓘ

Body:  ⓘ

**Advanced**

From (Send as):  ⓘ

CC:  ⓘ

BCC:  ⓘ

Attachments:  **Edit** ⓘ

Sensitivity:  ⓘ

Reply To:  ⓘ

Importance:  ⓘ

Timeout:  ⓘ

 On error **Save** Cancel

## Add a fixed number of attachments

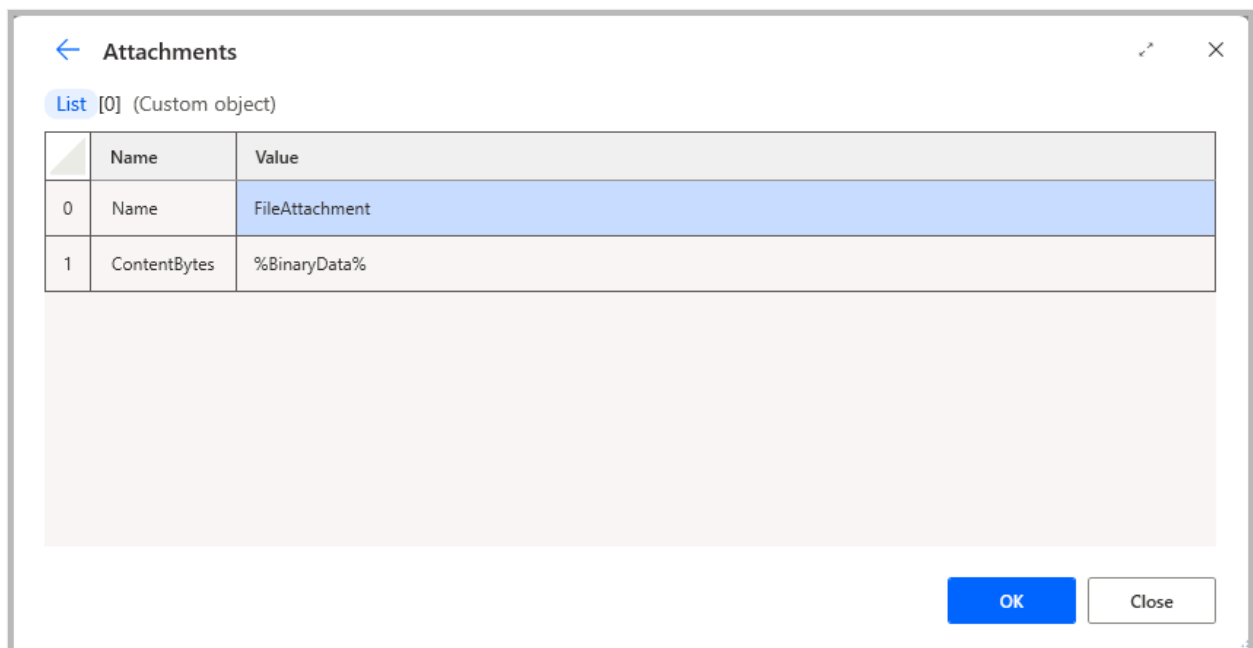
In the **Attachments** window, there's already an item existing in the list. Select **More** to configure it to contain the desired attachment.



Modify the **Name** property with the name of the file to be attached. Update **ContentBytes** to reference the binary data representing the file.

#### ⓘ Note

Notice how the `%BinaryData%` variable is utilized in the attachment entry in the **ContentBytes** property.




You can add more attachments by selecting the plus button.




When all the files to be attached are finalized, select **Save** to close the **Attachments** window and return to the Send an Email(v2) action configuration.



### Send an email (V2) ✎ ✕

 This operation sends an email message. [More info](#)

 Connection references

To:  ⓘ

Subject:  ⓘ

Body:  ⓘ

▼ **Advanced**

From (Send as):  ⓘ

CC:  ⓘ

BCC:  ⓘ

Attachments:

Sensitivity:  ▼ ⓘ

Reply To:  ⓘ

Importance:  ▼ ⓘ

Timeout:  ⓘ

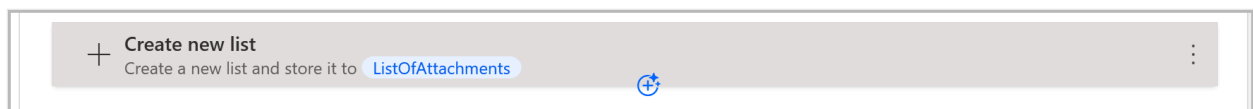
## Add a dynamic number of attachments

When you aren't aware of the total number of file attachments you want to include in an email, use the following approach:

- Create a new list. This list contains the attachments to be sent.
- A custom object must be used to represent each file attachment. Each custom object must have the two properties comprising an attachment, 'Name' and 'ContentBytes'.
- Once the list is complete, you must pass it as an input to the **Attachments** property of the **Office 365 Outlook** action.

## Example

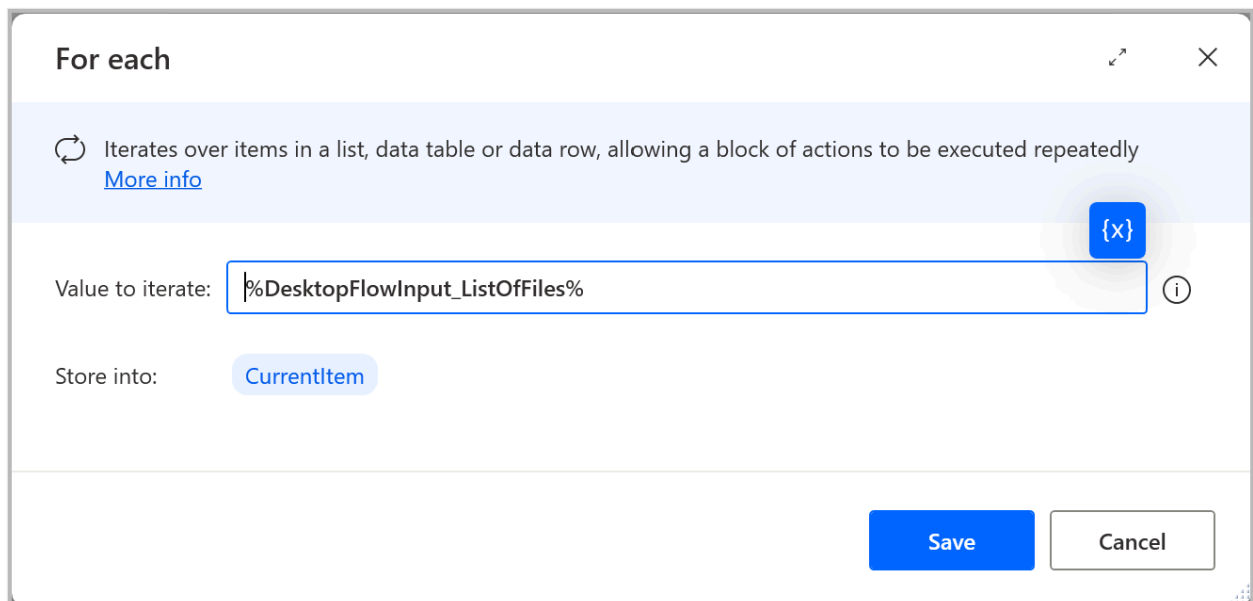
Your desktop flow receives a list containing a dynamic number of filepaths as an input. You want to attach those files to an email. You begin by creating a new list to store the files to be sent.



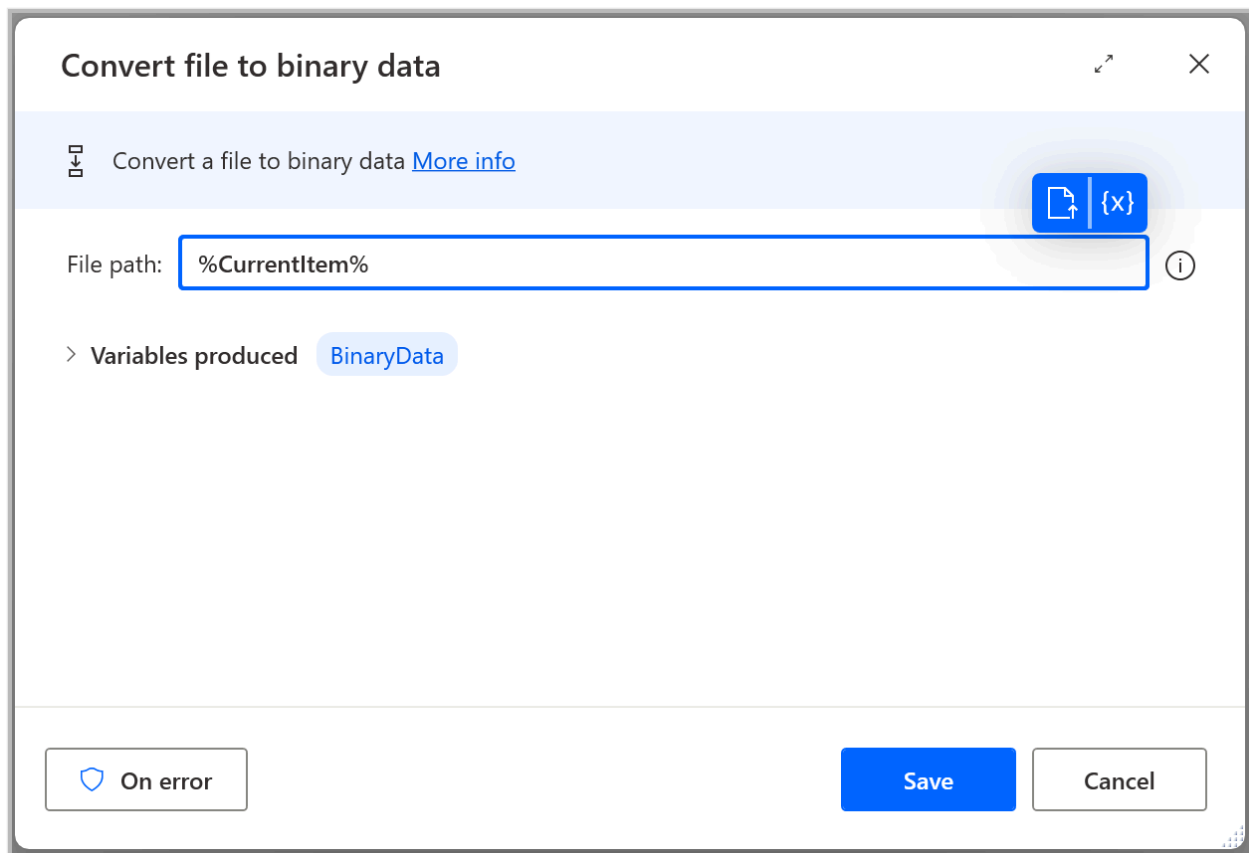
### ⓘ Note

You need to loop through the inputted list containing the filepaths, convert them to binary data, and add the custom object representing each file to the attachments list.

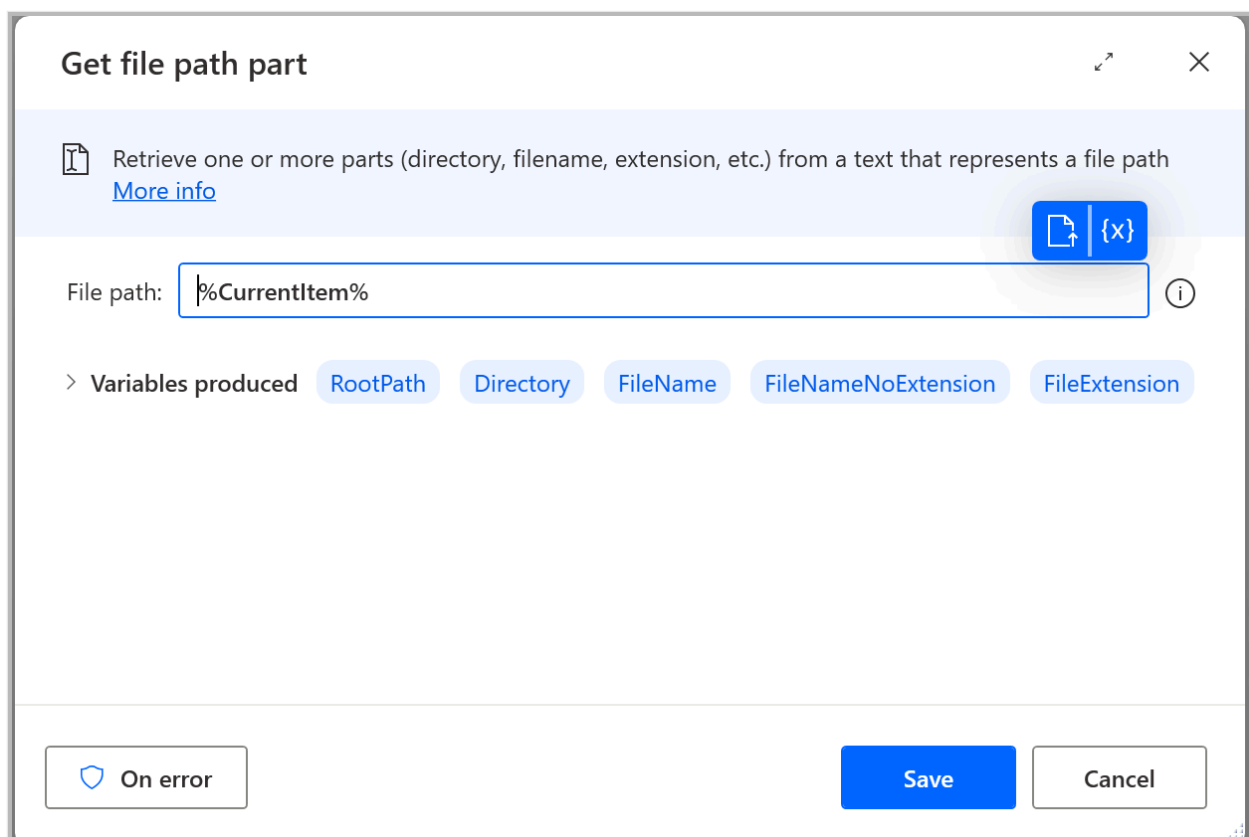
Add a **For each** action to loop through the desktop flow input list. During each loop, the current item is a filepath, pointing to the actual file.



To use it with cloud connector actions, convert the current file to binary data.



The name of the file is needed for the respective property representing it. Use the **Get file path part** action to retrieve the name of the current file.



Then add the custom object representing the file in the list of file attachments. To do that, use the **Add item to list** action. In the **Item** property, reference the custom object using the following syntax:

robin

```
{'Name': %variable holding the file name%, 'ContentBytes': %variable  
containing the binary data%}
```

**Add item to list** ✕

Append a new item to a list [More info](#)

Add item:  ⓘ

Into list:  ⓘ

**Save** **Cancel**

Finally pass the list of file attachments as an input to the **Attachments** property of the **Send an email (V2)** action.

## Send an email (V2)



 This operation sends an email message. [More info](#)

 Connection references

To:  

Subject:  

Body:  

### Advanced

From (Send as):  

CC:  

BCC:  

Attachments:   

Sensitivity:   

Reply To:  

Importance:   

Timeout:  

 On error

Save

Cancel

Your action layout should be similar to the following example:

**+ Create new list**  
Create a new list and store it to `ListOfAttachments`

**∨ ↻ For each** `CurrentItem` in `DesktopFlowInput_ListOfFiles`

**📄 Convert file to binary data**  
Get the binary data of file `CurrentItem` and store it into `BinaryData`

**📄 Get file path part**  
Get any of the root path and store it into `RootPath`, directory into `Directory`, file name into `FileName`, file name without extension into `FileNameNoExtension` and extension into `FileExtension`

**+= Add item to list**  
Add item '{Name: ' `FileName` ', 'ContentBytes: ' `BinaryData` '}' to list `ListOfAttachments`

**🏠 End**

**✉ Send an email (V2)**  
This operation sends an email message. ⋮

[+](#)

## Feedback

Was this page helpful?

[Provide product feedback](#)

# Work queues actions

Article • 07/08/2024

**Work Queues** in Power Automate can be used to store process-relevant data and provide a way to decouple complex processes and automations, allowing them to communicate asynchronously.

Work queues can play a crucial role in improving the efficiency, scalability, and resiliency of automations and help prioritize work. Work queues allow you to complete highest-priority items first, regardless of whether they're processed by digital workers, human workers, or through integrations.

## ⓘ Note

- Production-level support for the first set of work queue-related actions requires Power Automate desktop version **2.37** or later.
- Work queue actions in Power Automate for desktop is a premium feature, which requires a [Power Automate subscription](#) <sup>↗</sup>.
- Currently only *Process work queue items* and *Update work queue item* actions can be classified and allowed or restricted through data loss prevention (DLP) policies, with other actions following soon. Note that cloud flow-based usage of work queues can't be restricted by DLP policies.

## Process work queue items

The **Process work queue items** action indicates to the queue orchestrator that the machine is ready to process one or more work queue items. The user context requesting a new item needs to have sufficient privileges on the work queue and work queue items table in order to process work queues.

**Process work queue items**
✕

📄 Indicates to the orchestrator that the machine is ready to process one or more work queue items, if available [More info](#)

### Select parameters

Work queue:  {x} ⓘ

> Variables produced WorkQueueItem

🛡️ On error

Save

Cancel
⊕

The **work queue** referenced in the previous action is used by the queue orchestrator to determine the next available items in that work queue that are in **Queued** state. As the desktop flow steps through the actions within the Process work queue items loop that this action renders, you can call on the value by utilizing the variable you have designated for the action along with the property `.Value`. In this case, you could call the value of the work queue item using the variable `%WorkQueueItem.Value%`

## Processworkqueueitemaction

The Process work queue item action action requires the following arguments.

### Input Parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Work queue	No	Text		The work queue ID of the work queue that contains items to process

### Variables produced



 Expand table

Argument	Type	Description
WorkQueueItem	No	Information stored in the work queue item being processed

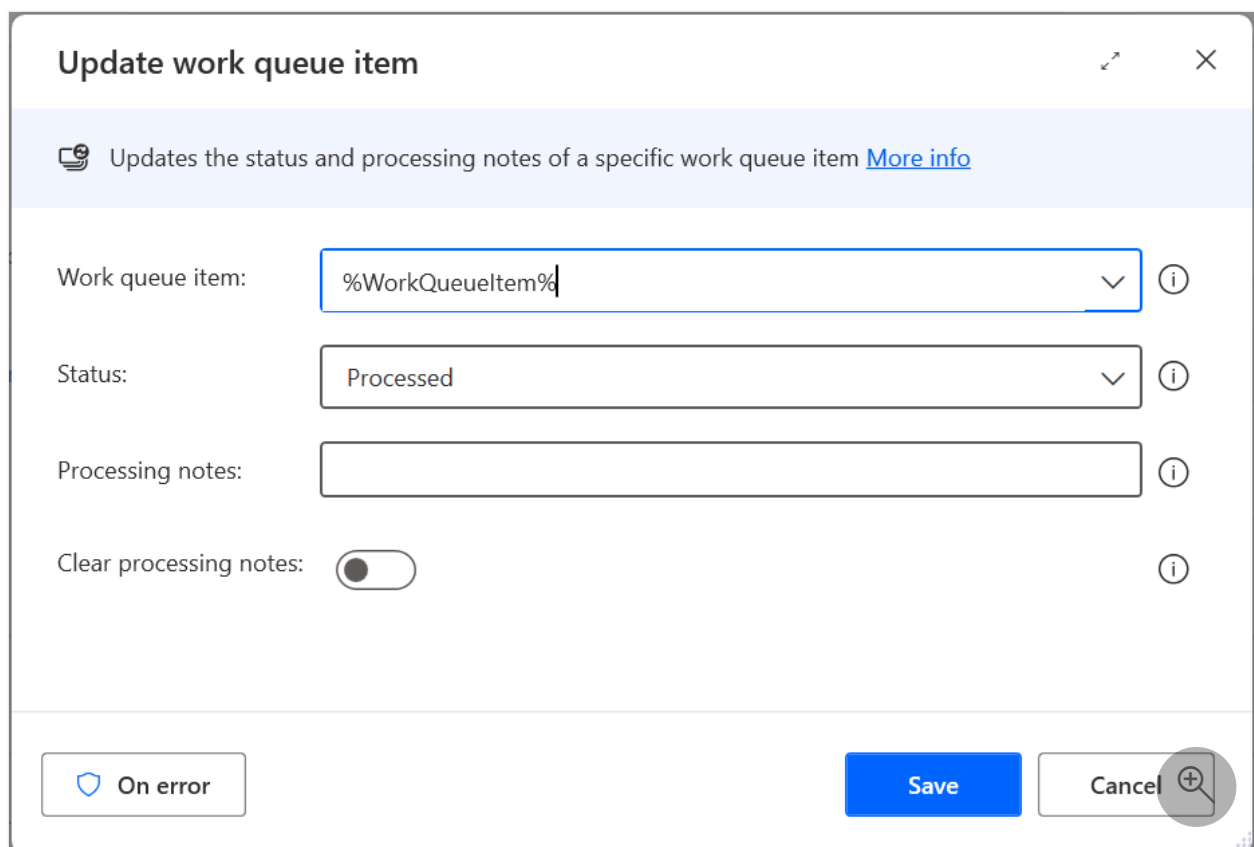
## Exceptions

 Expand table

Exception	Description
Work queue not found	The value entered into the work queue parameter is invalid
Failed to process work queue	Bad request - error in query syntax

## Update work queue item

The **Update work queue item** action allows users to change the status and processing results of the selected work queue item.



**Update work queue item**

Updates the status and processing notes of a specific work queue item [More info](#)

Work queue item: %WorkQueueItem%

Status: Processed

Processing notes:

Clear processing notes:

### Updateworkqueueitemaction

The **Update work queue item** action requires the following arguments.

 Expand table

Argument	Optional	Accepts	Default Value	Description
Work queue item	No	Text		Work queue item variable that has been previously returned by the queue orchestrator
Status	No	Processed, Generic Exception	Processed	Update the work queue item being processed using a status from the list of options.
Processing notes	Yes	Text		Custom processing notes or value to append to the queue item being processed.
Clear processing notes	Yes	Boolean	False	When enabled, hides and clears the processing notes field on this screen and removes any processing notes from the database that have been previously captured for this item.

## Exceptions

 Expand table

Argument	Description
Work queue item not found	The work queue item being processed has either been deleted or no longer belongs to the queue that it was called from.
Work queue item on hold	The work queue item being processed contains a status of <code>on hold</code> in the queue orchestrator and can no longer be updated.
Failed to update work queue item	The work queue item being updated has encountered an unexpected error. Check the error message for more details.

## Add work queue item

The **Add work queue item** action allows users to populate work queue items into a work queue, which has been set up in the flow portal.

**Add work queue item**
↗ ×

📎 Add a work queue item into a work queue [More info](#)

Work queue

%WorkQueueId%

ⓘ

Status:

Queued

ⓘ

Priority:

Normal

ⓘ

Name:

ⓘ

Input:

ⓘ

Expires:

ⓘ

Processing notes:

ⓘ

Has unique id or reference:

ⓘ

> Variables produced NewWorkQueueItem

🛡️ On error

Save

Cancel
+

## Addworkqueueitem action

The Add work queue item action requires the following arguments.

### Input Parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Work queue	No	Text value		The work queue item to add the item into

Argument	Optional	Accepts	Default Value	Description
Priority	No	High, Normal, Low	Normal	The priority to set the work queue item to
Name	No	Text value, Numeric value		Custom name or ID for the new work queue item
Input	No	Text value, Numeric value		The data, which belongs to the value column to be processed
Expires	Yes	Datetime		The datetime value set to expire the queue item, otherwise adopts the default value if one is set for the queue
Processing notes	Yes	Text value, Numeric value		Custom processing notes to be added to the new queue item
Has unique id or reference	Yes	Text value, Numeric value		When enabled, a value should be provided that is unique within this queue. If left empty, a unique value in the format of <code>system-&lt;GUID&gt;</code> is automatically provided by the system

## Variables produced

[Expand table](#)

Argument	Type	Description
WorkQueueItem	No	Information stored for the work queue item being added

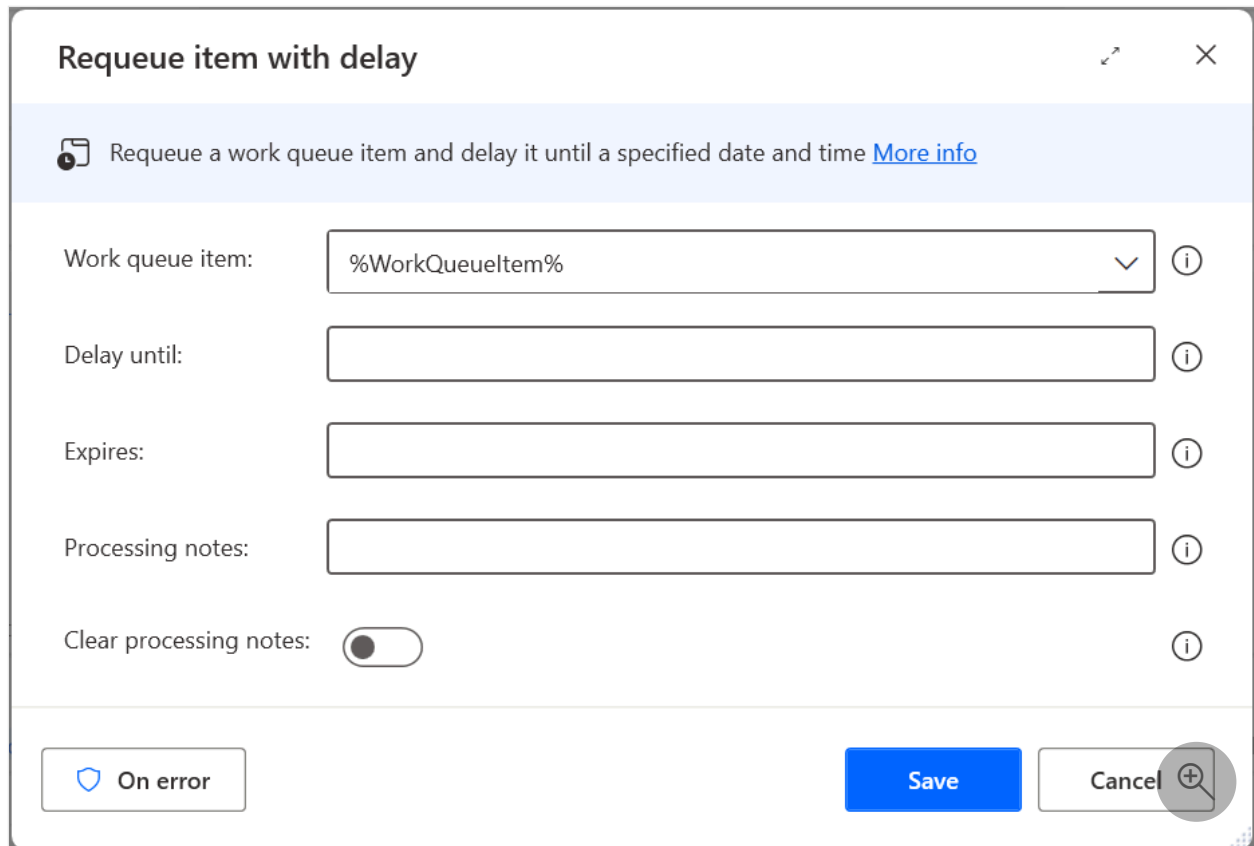
## Exceptions

[Expand table](#)

Argument	Description
Work queue not found	The value entered into the work queue parameter is invalid
Failed to add item into work queue	The work queue item couldn't be added into the work queue. Bad request - error in query syntax

# Requeue item with delay

The **Requeue item with delay** action allows users to readd a queue item being processed in the desktop flow, back into its originating queue. In addition, the queued item can be held and released until a defined time.



## Requeue work queue item action

The **Requeue item with delay** action requires the following arguments.

### Input Parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Work queue item	No	Work queue item		The work queue item to add the item into
Delay until	No	Datetime value	Normal	The datetime value applied to delay the queue item until
Expires	Yes	Datetime value		Custom expiration time for the item being requeued

Argument	Optional	Accepts	Default Value	Description
Processing notes	Yes	Text value, Numeric value		Custom processing notes to be added to the new queue item
Clear processing notes	Yes	Boolean	False	When enabled, hides and clears the processing notes field on this screen and removes any processing notes from the database that have been previously captured for this item

## Exceptions

[Expand table](#)

Argument	Description
Work queue not found	The value entered into the work queue parameter is invalid
Work queue item not found	The queue item value is invalid
Failed to requeue work queue item	The work queue item couldn't be added into the work queue. Bad request - error in query syntax

## Update work queue item processing notes

The **Update work queue item processing notes** action allows users to update or clear processing notes of the selected work queue item without changing its state or any other property.

**Update work queue item processing notes**
↗ ×

📖 Updates the processing notes of a specific work queue item [More info](#)

Work queue item:

%WorkQueueItem%
▼
i

Processing notes:

i

Clear processing notes:

i

🛡️ On error

Save

Cancel
+

## updateprocessingnotesaction

The Update work queue item processing notes action action requires the following arguments.

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Work queue item	No	Text		Work queue item variable that's been previously returned by the queue orchestrator
Processing notes	Yes	Text		Custom processing result or value to append to the queue item processed
Clear processing notes	Yes	Boolean	False	When enabled, hides and clears the processing notes field on this screen and removes any processing notes from the database that were previously captured for this item

## Exceptions

[Expand table](#)

Argument	Description
Work queue not found	The work queue associated with the item has either been deleted or is no longer accessible
Work queue item not found	The work queue item is invalid
Failed to append the processing results	The work queue item being updated has encountered an unexpected error. Check the error message for more details.

## Related information

- [Work queue overview](#)
  - [Manage work queues](#)
  - [Bulk-import work queue data](#)
  - [Trigger work queues](#)
  - [Process work queues](#)
- 

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 




# Custom actions

Article • 07/26/2024

Custom actions developed by your organization and uploaded to the respective environments can be included in desktop flows and utilized like actions that belong in the standard library of automation actions.

## Important

- Custom actions in Power Automate for desktop is a premium feature which requires a [Power Automate subscription](#) .
- This feature requires Power Automate for desktop v2.32 or later.

Custom actions exist at the environment level. As a best practice, use a "dev—test—prod" model when developing custom actions.

## Related information

- [Assets library](#)
- [Upload custom actions](#)
- [Use custom actions](#)

---

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Cloud Connectors as Power Automate for desktop actions

Article • 05/24/2024







## Important

There are some known connector action issues in older versions of Power Automate for Desktop (versions older than v2.44). If you're using Power Automate for desktop version 2.43 or earlier, you might experience issues where connector actions don't load correctly in desktop flows such as:

- connector actions missing from the designer's action panel
- "unknown action" errors in desktop flows linked to connector actions
- incorrect console initiated executions (local runs) due to cloud connector actions

To resolve this issue, update Power Automate for desktop to the latest available version.

For patched versions of previous releases, refer to the following list:

- [2.43](#) 
- [2.42](#) 
- [2.41](#) 
- [2.40](#) 
- [2.39](#) 
- [2.38](#) 

[Cloud Connectors available for Power Automate](#) are gradually introduced for desktop flows as well.

## Prerequisites and limitations

- You need an Attended RPA license.
- Specific endpoints must be included in the allowlist for desktop flows containing cloud connector actions to work properly. More information: [Desktop flow services required for runtime](#)

- For **Office 365 Outlook** actions, if you're using an EWS application access policy, ensure that the following user-agents are allowed (on top of the user agents listed [here](#)) for successful desktop flow execution: PowerAutomateLocal/, *PowerAutomateCloud/*
- Dynamic output schema isn't fully supported for cloud connector actions in desktop flows. Refrain from using variables in the respective dropdown fields (Site address/ List name/ Select file etc.) while configuring a cloud connector action.
- Sharing desktop flows with cloud connector actions isn't currently supported. Co-owners aren't able to run such desktop flows unless they overwrite the connection references with their own. Users with read access are unable to run such flows.
- To enable attended or unattended runs (cloud-initiated runs), make sure your desktop flow uses the [Power Automate v2 schema](#) and all connection references are marked as embedded.
- Connection reference embedding is only available for co-owners. Users (run-only) can execute flows shared with them only via Power Automate for desktop's console using their own connections.
- Desktop flows with embedded connection references don't currently support application lifecycle management (ALM) capabilities.
- [Microsoft Dataverse \(preview\)](#) has the following limitations:
  - The connector is currently available only for desktop flows in the public cloud.
  - The following actions are currently supported in desktop flows:
    - [Add a new row to selected environment](#)
    - [Delete a row from selected environment](#)
    - [Download a file or an image from selected environment](#)
    - [Get a row by ID from selected environment](#)
    - [List rows from selected environment](#)
    - [Perform a bound action in selected environment](#)
    - [Perform an unbound action in selected environment](#)
    - [Relate rows in selected environment](#)
    - [Unrelate rows in selected environment](#)
    - [Update a row in selected environment](#)
    - [Upload a file or an image to selected environment](#)

## Use files in cloud connector actions

To pass a file as an input to a cloud connector action, you must first convert it to binary data, using the [Convert file to binary data](#) action.

Cloud connector actions that create or retrieve files actually produce binary data representing the respective files. To access the actual file, make sure to use the [Convert binary data to file](#) action first.

# Embed connection references on a desktop flow (preview)

[This topic is prerelease documentation and is subject to change.]

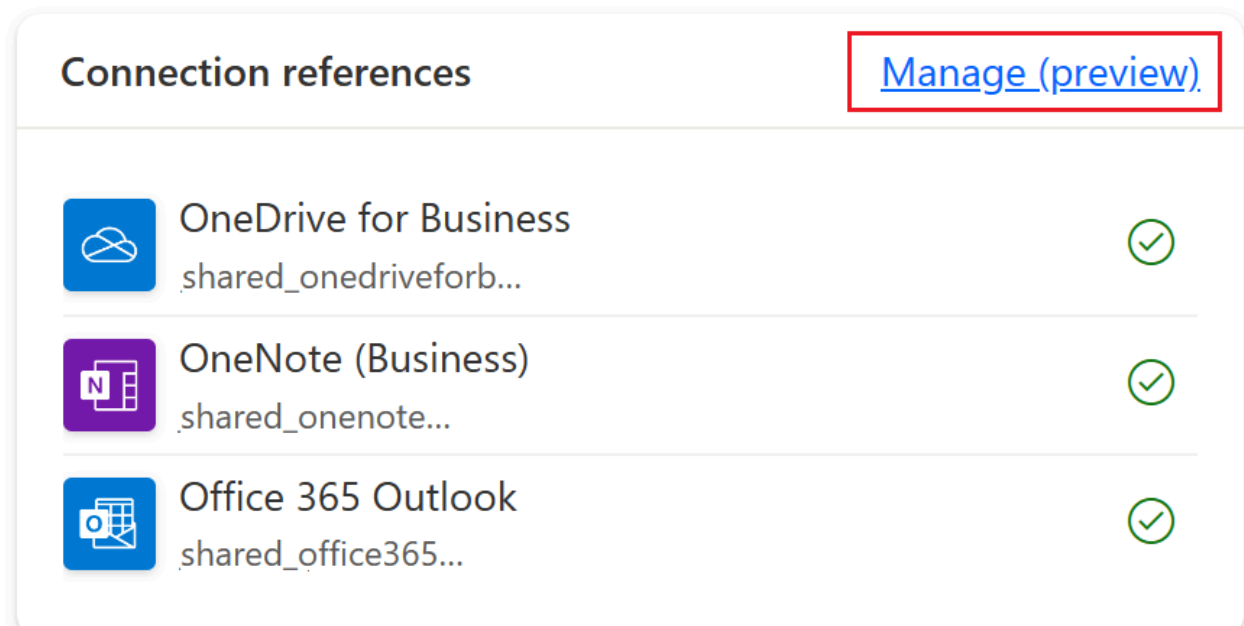
With connection reference embedding, you can provide other co-owners access to your connection references and their underlying resources. You do this process only in the scope of the respective shared desktop flow.







## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

To embed a connection reference to a flow, you have access to as a co-owner:

- Select the desktop flow in Power Automate (make.powerautomate.com), and then select **Details**.
- In the **Connection references** section, select **Manage**.



Connection references		<a href="#">Manage (preview)</a>
	OneDrive for Business _shared_onedriveforb...	
	OneNote (Business) _shared_onenote...	
	Office 365 Outlook _shared_office365...	

- In the **Connection references** screen all of the connection references used in a flow are displayed.
- Set the **Embed in desktop flow** option to **Yes** to enable it.

ⓘ To enable cloud-initiated executions make sure that all connection references are marked as embedded. Connection reference embedding is only available for co-owners. Users (run-only) can execute this flow only via Power Automate for desktop's console where they will be required to bring their own connection(s).

Desktop flows > Embedded-CREF > Connection references (preview)

Connector ↑ ↓	Connection reference display name ↓	Connection refere... ↓	Connection ↓	Owner ↓	Embedded in deskto...
Office 365 Outlook	shared_office365	shared_office365	@desktopfl...	✓ # PA	<input checked="" type="checkbox"/> No
OneDrive for Business	shared_onedriveforbusiness	shared_onedrivefo...	@desktopfl...	✓ # PA	<input type="checkbox"/> No
OneNote (Business)	shared_onenote	shared_onenote_f...	@desktopfl...	✓ # PA	<input type="checkbox"/> No

After you confirm your selection, the connection reference is embedded in the desktop flow.

### ⓘ Note

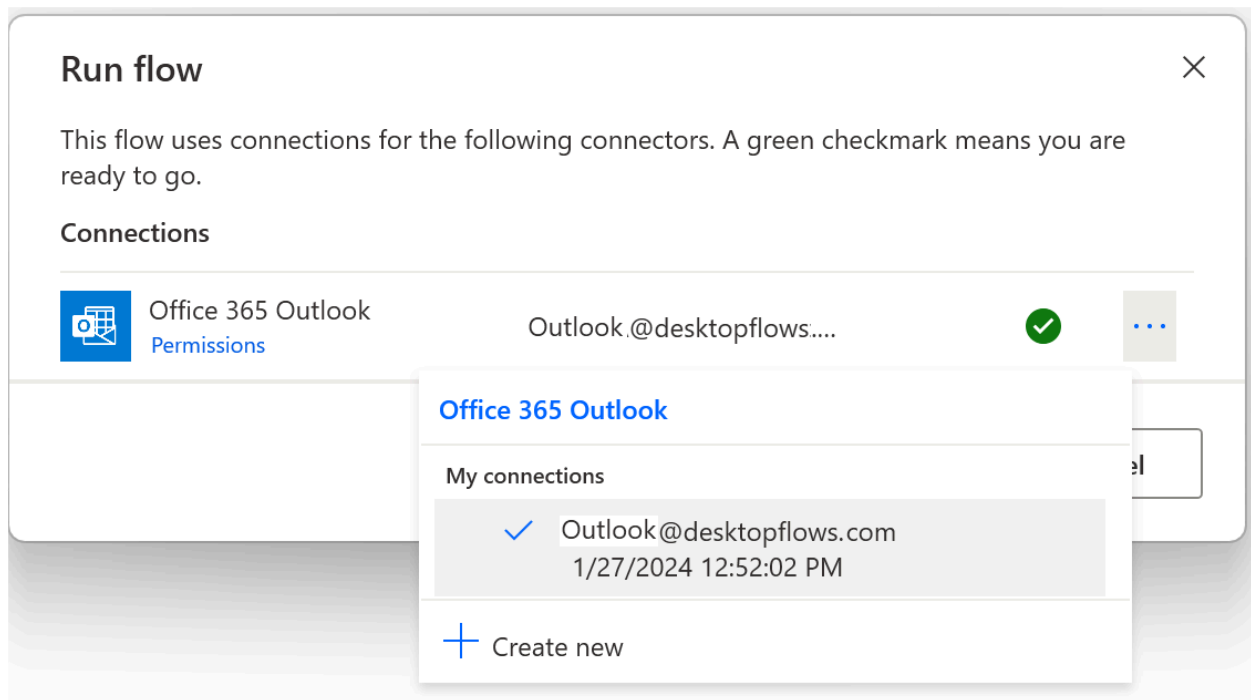
You can only embed or remove connection references that you own. Connection references added by other co-owners can only be managed by them.

### ⓘ Important

To enable attended or unattended runs (cloud-initiated runs), make sure that your desktop flow uses the Power Automate v2 schema and all connection references are marked as embedded.

## Bring your own connection

All co-owners and run-only users are required to bring your own connection (BYOC) during console executions for connection references that aren't embedded.



### ⓘ Note

BYOC is available for both co-owners and run-only makers. BYOC is only available for console initiated flow executions.

## List of Cloud Connectors

Here's a list of in Cloud Connectors in Power Automate for desktop currently available:

- [Microsoft Dataverse \(preview\)](#)
- [SharePoint](#)
- [Excel Online \(Business\)](#)
- [Microsoft Forms](#)
- [Microsoft Teams](#)
- [Office 365 Outlook](#)
- [OneDrive](#)
- [OneDrive for work or school](#)
- [OneNote \(Business\)](#)
- [RSS](#)
- [Word Online \(Business\)](#)

---

## Feedback

Was this page helpful?



[Provide product feedback](#) ↗

# SAP automation actions

Article • 07/10/2024

Our group of actions for SAP automation provides a set of tools to help streamline and automate your SAP workflows. With these actions, you can easily launch the SAP GUI app, create new sessions, select menu items, start and end transactions, and more.

With the actions of the SAP automation group, you can easily interact with SAP UI elements by clicking on them, filling in text fields, and extracting their data. Just enter the SAP UI element ID attribute value. If you don't know the ID value, you can use the Power Automate for desktop UI element picker to capture the required SAP element and retrieve its ID value. When you capture an SAP UI element in this way, only the element's ID value is recovered, and no UI element is added to the desktop flow's UI element repository.

Our SAP automation actions can also be integrated seamlessly with other actions available in Power Automate for desktop, including the UI automation group of actions. This group of actions allows you to capture all SAP GUI UI elements and add them to the desktop flow's UI element repository. By combining our SAP GUI automation actions with the UI automation group of actions, you can create powerful RPA workflows that automate even the most complex SAP processes.

## ⓘ Note

Power Automate for desktop supports automation with SAP GUI version 750 or later.

## Launch SAP

Open the SAP GUI application and connect to an SAP system.

For connection mode:

- The server description option allows you to connect with an SAP system through the SAP name or IP address. To do this, you need the necessary login credentials and access permissions. The server description is a human-readable name or description of the SAP system.
- The server connection string option allows you to connect with an SAP system through a connection string. The server connection string typically includes the server 's name or IP address, the instance number, and the system ID. The server



connection string is a specific format for identifying and connecting to an SAP system.

For multiple logon options:

- Terminate this logon option terminates the specific action's login.
- Continue this logon and end any other logons option replaces the existing SAP instance with the specific logon.
- Continue this logon without ending any other logons in the system option creates a new SAP session.

#### ⓘ Note

SAP GUI doesn't allow more than six active connections (sessions) to an SAP system.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
Connection mode	N/A	Server description and server connection string	Server description	Specify how to connect to the SAP GUI server.
Login mode	N/A	Manual login and single sign-on (SSO)	Manual login	Specify how to log in to the SAP GUI server, either log in to the server by manually entering your username and password or using single sign-on (SSO).
Server description	Yes	<a href="#">Text value</a>		Specifies SAP system name or IP address for connection.
Connection string	Yes	<a href="#">Text value</a>		Specifies the connection string for the SAP GUI server. The connection string is a unique identifier that specifies the server's name, system number, and other connection details.
Client	No	<a href="#">Text value</a>		Specifies the SAP client number for connection.

Argument	Optional	Accepts	Default Value	Description
Username	No	Text value		Specifies the SAP user ID for login.
Password	Yes	Text value		Specifies the SAP user password for login.
Language	No	Text value		Specifies the SAP login language for the user interface.
Multiple logon options	No	Terminate this logon, continue this logon and end any other logons, Continue this logon without ending any other logons in the system	Terminate this logon	Multiple logon options specify how the SAP system behaves when the user tries to log in when they're already logged in.

## Variables produced

[Expand table](#)

Argument	Type	Description
<code>SAPInstance</code>	SAP instance	The SAP instance to use with SAP automation actions. The SAP instance refers to the specific SAP window.
<code>CurrentSAPLoginTerminated</code>	Boolean value	Whether the SAP login being performed with the specific action is terminated or not.
<code>OtherSAPLoginTerminated</code>	Boolean value	Whether the other SAP logins are terminated or not.

## Exceptions

[Expand table](#)

Exception	Description
SAP GUI login action fails	Indicates a problem logging in to an SAP GUI system.

## Attach

Attach the running SAP GUI application to an SAP instance.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
Attach mode	No	Foreground or last activated, Window title	Window title	Specifies the mode for attaching the SAP instance to a window. If Foreground or last activated option is selected, the SAP instance is attached to the SAP session in the foreground. If there's no SAP session in the foreground, it attaches to the last SAP session that was launched and isn't closed yet.
Window title	Yes	Text		Specifies the title of the SAP window to which the instance is attached. The window title can be selected from the drop-down list of existing SAP sessions or entered manually.

## Variables produced

[Expand table](#)

Argument	Type	Description
<code>SAPInstance</code>	SAP instance	The SAP instance to use with SAP automation actions. The SAP instance refers to the specific SAP window.

## Exceptions

[Expand table](#)

Exception	Description
Attach to SAP error	Indicates a problem attaching to an SAP instance.

## Create new SAP session

Creates a new SAP session based on the same SAP instance.

### ⓘ Note

SAP GUI doesn't allow more than six active connections (sessions) to an SAP system.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
<code>SAPInstance</code>	No	SAP instance	Select the variable that holds the SAP instance you want to work with. This variable should be defined in a previous SAP login action.	

## Variables produced

[Expand table](#)

Argument	Type	Description
<code>SAPInstance</code>	SAP instance	The SAP instance to use with SAP automation actions. The SAP instance refers to the specific SAP window.

## Exceptions


[Expand table](#)

Exception	Description
Create new SAP session action fails	Indicates a problem creating a new SAP session.

## Select SAP menu item

Select an SAP menu item in the window tool bar. Enter the name of the item in the respective input parameter manually, in the same language as the SAP GUI screen is being displayed.

# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
SAPInstance	No	SAP instance	Select the variable that holds the SAP instance you want to work with. This variable should be defined in a previous SAP login action.	
Menu item name	No	Text value		The name of the menu item in the toolbar to be selected, such as 'Save'. Insert the name of the menu item as it's displayed in the machine's SAP installation.

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
Select SAP menu item action fails	Indicates a problem selecting a menu item.

## Close SAP connection

Close the SAP connection of the selected SAP instance. Note that all instances related to the specific connection will be terminated.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
SAPInstance	No	SAP instance		Select the variable that holds the SAP instance you want to work with. This variable should be defined in a previous SAP login action.

## Variables produced

This action doesn't produce any variables.

## Exceptions

[Expand table](#)

Exception	Description
Close SAP session action fails	Indicates a problem closing an SAP session.

## Start SAP transaction

Opens a specific transaction code in existing session.

## Input parameters

[Expand table](#)

Argument	Optional	Accepts	Default Value	Description
SAPInstance	No	SAP instance		Select the variable that holds the SAP instance you want to work with. This variable should be defined in a previous SAP login action.
Transaction code	No	Text value		The transaction code that you desire to execute.

## Variables produced

This action doesn't produce any variables.

# Exceptions

 Expand table

Exception	Description
Start SAP transaction action fails	Indicates a problem starting an SAP transaction.

## End SAP transaction

Closes the SAP transaction in a specific SAP instance and returns to the SAP easy access menu. An SAP transaction must be started before for the specific SAP session.

## Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
<code>SAPInstance</code>	No	SAP instance		Select the variable that holds the SAP instance you want to work with. This variable should be defined in a previous SAP login action.

## Variables produced

This action doesn't produce any variables.

## Exceptions

 Expand table

Exception	Description
End SAP transaction action fails	Indicates a problem ending an SAP transaction.

## Click SAP UI element

Interacts through click action on any UI element of an SAP window.

# Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
SAPInstance	No	SAP instance		Select the variable that holds the SAP instance you want to work with. This variable should be defined in a previous SAP login action.
Element type	No	Basic SAP element, Checkbox, Label, Drop-down list	Basic SAP element	Select the SAP element type that you need to interact with. The 'Click SAP element' option performs a click action on any SAP element as buttons, radio buttons, tabs, text fields, trees.
SAP element ID	No	Numeric		The SAP element's ID. This parameter determines the UI element in SAP that action interacts with. You can use the below button for indication the SAP UI element in the SAP screen or insert the value manually.
Set SAP checkbox state to	Yes	Checked, Unchecked	Checked	Specify whether the checkbox becomes checked or unchecked.
SAP element ID	No	Numeric		The SAP element's ID. This parameter determines the UI element in SAP that action interacts with. You can use the below button for indication the SAP UI element in the SAP screen or insert the value manually.
SAP label operation	Yes	Expand, Collapse, Choose	Expand	Specify whether to expand or collapse the SAP label.
Drop-down option value	Yes	<a href="#">Text value</a>		Specify the drop-down option is selected.

## Variables produced

This action doesn't produce any variables.



# Exceptions

 Expand table

Exception	Description
Click Sap GUI Element error	Indicates that the click failed.

## Get details of SAP UI element

Gets the value of an SAP UI element's attribute in an SAP window.

### Input parameters

 Expand table


Argument	Optional	Accepts	Default Value	Description
<code>SAPInstance</code>	No	SAP instance		Select the variable that holds the SAP instance you want to work with. This variable should be defined in a previous SAP login action.
SAP element ID	No	Numeric		The SAP element's ID. This parameter determines the UI element in SAP that action interacts with. You can use the below button for indication the SAP UI element in the SAP screen or insert the value manually.
Attribute name	No	<a href="#">Text value</a>	Own text	The attribute whose value is retrieved.

### Variables produced

 Expand table

Argument	Type	Description
AttributeValue	<a href="#">Text value</a>	The value of the SAP UI element's attribute.

## Exceptions

 Expand table

Exception	Description
Get SAP element detail error	Indicates a problem retrieving the UI element's attribute.

## Populate SAP text field in element

Fills a text box in an SAP window with the specified text.

### Input parameters

 Expand table

Argument	Optional	Accepts	Default Value	Description
<code>SAPInstance</code>	No	SAP instance		Select the variable that holds the SAP instance you want to work with. This variable should be defined in a previous SAP login action.
SAP element ID	No	Numeric		The SAP element's ID. This parameter determines the UI element in SAP that action interacts with. You can use the below button for indication the SAP UI element in the SAP screen or insert the value manually.
Text to fill in	No	Direct encrypted input or <a href="#">Text value</a>		The text to fill in the SAP text field
If field isn't empty	Yes	Replace text, Append text	Replace text	Specify whether to replace existing content, or to append.

### Variables produced

This action doesn't produce any variables.

### Exceptions

 Expand table

Exception	Description
Populate Sap Text Field Value error	Indicates a problem populating the specified SAP text field.

---

## Feedback

Was this page helpful?



[Provide product feedback](#) 

# Troubleshoot desktop flows

Article • 04/09/2024

To open the Power Automate troubleshoot tool:

1. Launch **Power Automate machine runtime**
2. Select **Troubleshoot**
3. Select **Launch Troubleshoot tool**

## ⓘ Note

You need to have admin privileges to open the troubleshoot tool from Power Automate machine runtime.

## Resolve failed connection between Power Automate components

See ["Communication error" and the connection between Power Automate components fails](#)

## Change the on-premises Service account

The Power Automate service (**UIFlowService**) communicates with Power Automate cloud services for machine registration and running desktop flows.

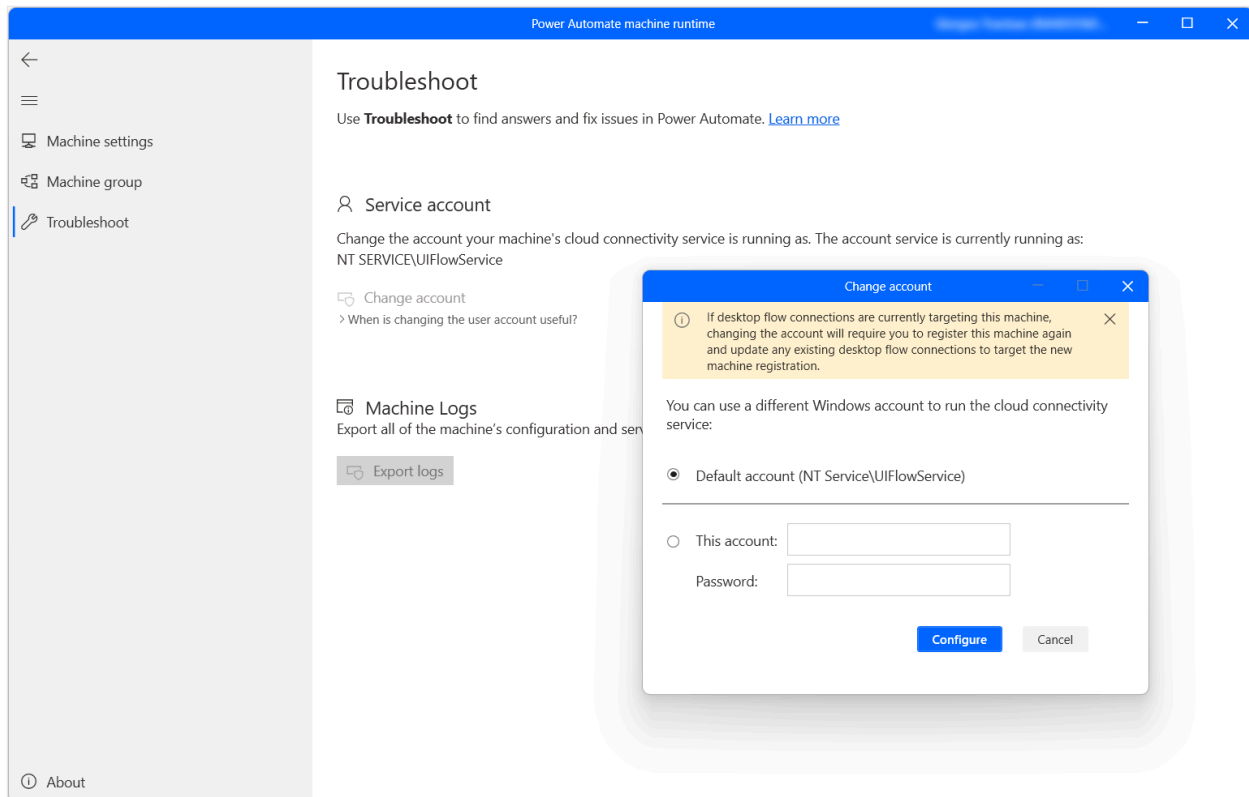
By default, it runs as a virtual account created by the Power Automate installer called **NT SERVICE\UIFlowService**.

Most on-premises environments don't require changing the default configuration. However, you may run into errors registering machines or running flows for the following reasons:

- Your network doesn't allow requests made by the **NT SERVICE\UIFlowService** virtual account to reach Power Automate cloud services.
- Your machine or group policy disallows the **Log on as a service** privilege for the **NT SERVICE\UIFlowService** account.

In either of these cases, you can ask your domain or network administrator to grant **NT SERVICE\UIFlowService** the appropriate privileges. Alternatively, you can replicate the following steps to change the account with which the Power Automate service runs:

1. Launch the Machine runtime application and select the **Troubleshoot** tab.
2. Select **Change account**.
3. Select **This account**.
4. Provide the new account, for example: **DOMAIN\AlexJohnson**.
5. Provide the password of this account and select **Configure**.



Changing the service account can also be accomplished by using a command line tool that ships with Power Automate called "**TroubleshootingTool.Console.exe**". This tool is useful when scripting the upgrade of Power Automate to a more recent version, as upgrading will reset the UIFlowService to run against the default virtual account.

You can find TroubleshootingTool.Console.exe in the directory where you installed Power Automate, typically "%programfiles(x86)%\Power Automate Desktop". To change the service account, do the following:

1. Open a command prompt as an administrator and navigate to the tool.
2. Create a temporary file with the account password as the only content inside (e.g. temp.txt)
3. Type the following: `TroubleshootingTool.Console.exe ChangeUIFlowServiceAccount <accountname> < <pathToTemporaryFile>`
4. Delete the temporary file

Example:

```
TroubleshootingTool.Console.exe ChangeUIFlowServiceAccount mydomain\myuser <
tempfilethatcontainspassword.txt
```

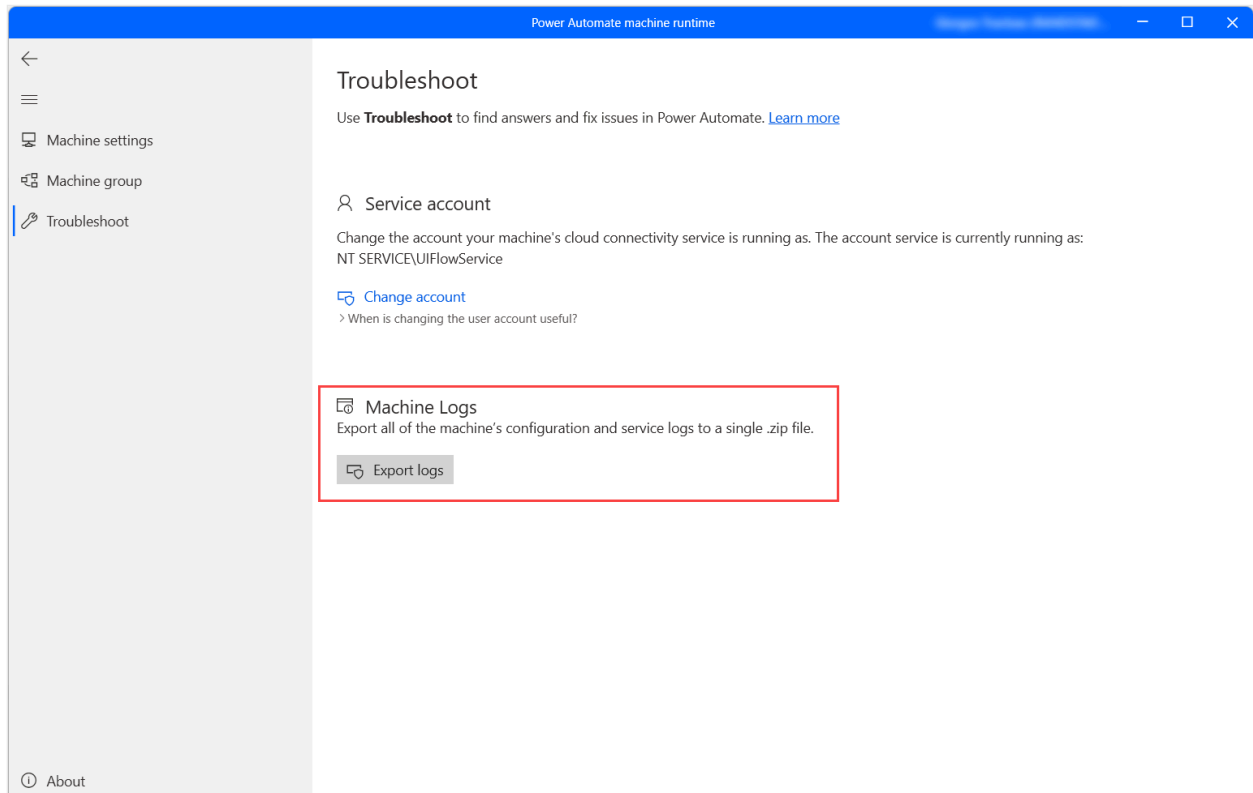
The tool also provides other functionality such as getting the name of the account that the service is currently running as, resetting it to run as the default virtual account, or simply restarting the service. For more information on all supported commands, simply run the TroubleshootingTool.Console.exe with no arguments.

## Troubleshoot desktop flow runs

If your desktop flow run fails, go to [Errors when running attended or unattended desktop flows](#) and find mitigation steps for different error codes.

## Collect machine logs

There are several logs you can collect for the machine's configuration and service logs. To do so, select **Exports logs** link in the Troubleshoot tool.



This file is saved to the desktop as a zip file.

## Resolve Power Automate agent for virtual desktops issues

If you encounter errors while launching the Power Automate agent for virtual desktops, perform the following steps:

1. Close the RDP or Citrix session.
2. Ensure you've installed the correct version of Power Automate for desktop.
3. Connect again to the RDP or Citrix virtual desktop.
4. Restart the Power Automate agent for virtual desktops.

If the agent for virtual desktops can't communicate with Power Automate for desktop, the agent will be closed. If you're sure that a correct Power Automate for desktop version is installed, one that supports UI automation in virtual desktops, try the following remediation steps:

1. Open PowerShell
2. Navigate to the appropriate directory using the following command:

```
PowerShell
```

```
cd "C:\Program Files (x86)\Power Automate Desktop\RDP\DVCPugin\x64"
```

3. Run the following two commands:

```
PowerShell
```

```
regsvr32 /u  
.\Microsoft.Flow.RPA.Desktop.UIAutomation.RDP.DVC.Plugin.dll
```

```
PowerShell
```

```
regsvr32 .\Microsoft.Flow.RPA.Desktop.UIAutomation.RDP.DVC.Plugin.dll
```

## Troubleshoot hosted machines

See [Troubleshoot hosted machines in Power Automate for desktop](#)

## Get self-help or ask help from support

If you need help, use our self-help options, or ask for help from support.

### Self help

1. Go to the [Power Automate support site](#).
2. Go to the **Self Help** category, and select one of the available self-help options.

# Ask for help from support

1. Go to the [Power Automate support site](#).
2. Select **Contact support** under the **Ask for help** category.
3. Enter **Desktop flows** in **Problem type**, and populate the other fields with information about your issue.
4. Select **See solutions**.

## Important

The following statement is subject to change.

We offer full support for all Power Automate for desktop product versions released within a year from the latest public product release. For product releases prior to a year back from the latest release, only issues of severity level **Critical** and **Severity A** are supported. Product fixes are always added to the latest version.

To find more information about severity levels, go to [Support overview](#). To see the currently supported releases, go to [Released versions for Power Automate for desktop](#).

## See also

[Power Automate Troubleshooting](#)



# Process migrator for Softomotive products (preview)

Article • 02/07/2024

[This topic is prerelease documentation and is subject to change.]

## Important

- Effective November 3 2023, the Process migrator for Softomotive products (preview) will be deprecated. "Deprecated" means we intend to remove the feature or capability from a future release. The feature or capability will continue to work until it is officially removed. This deprecation notification can span a few months or years. After removal, the feature or capability will no longer work. This notice is to allow you sufficient time to plan, migrate and update your code before the feature or capability is removed.
- You may migrate your flows to Power Automate until the deprecation date of the Process migrator for Softomotive products.

Process migrator for Softomotive products (preview) enables users to convert automations into desktop flows for use in Power Automate.

This migration utility redefines automations to their equivalent Power Automate desktop flow action definitions where such parity exists.

Some actions have been deprecated because they don't fit into the Power Platform ecosystem. However, workarounds should be applicable to overcome what appears to be missing functionality.

## Prerequisites

For Process migrator for Softomotive products (preview) to be able to install and function as expected, the following Prerequisites are needed:

- The latest publicly available version of Power Automate for desktop installed
- Access to a Power Automate environment. Follow the get started documentation if you haven't already provisioned an environment

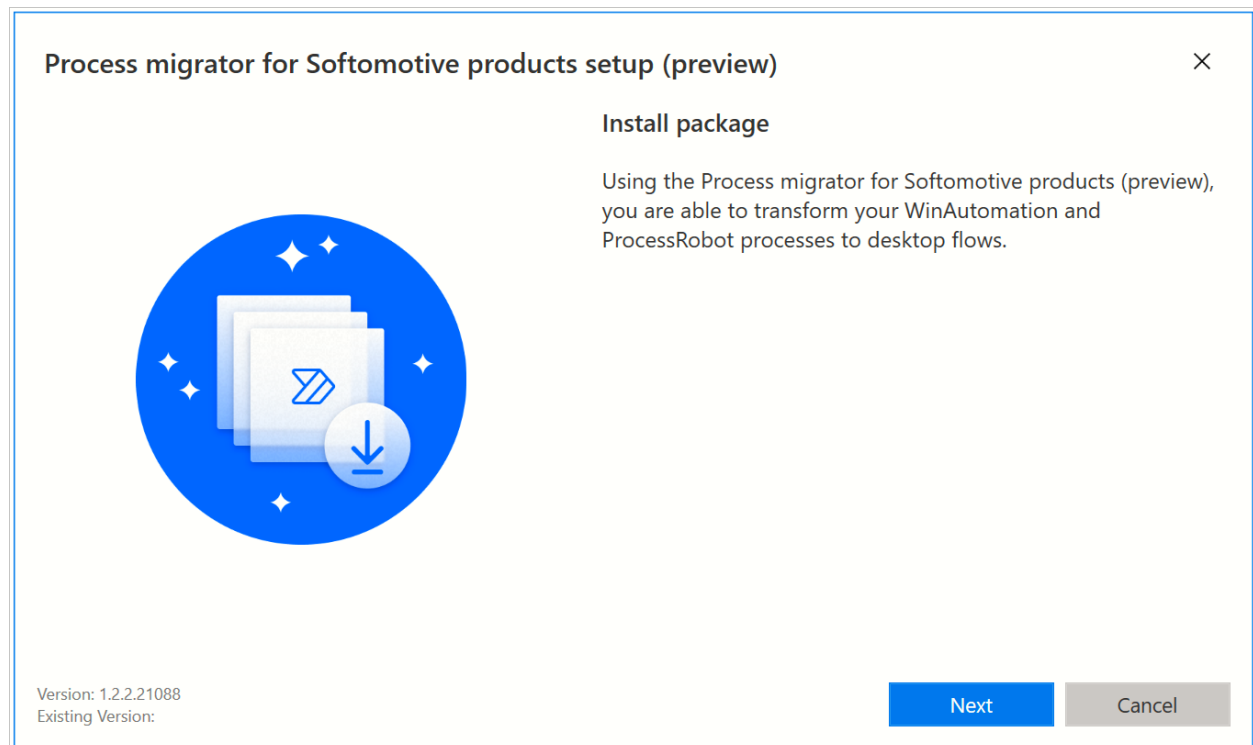
# Installing Process migrator for Softomotive products (preview)

After successfully [downloading the setup file](#) of the Process migrator for Softomotive products (preview), run it to install it on your machine.

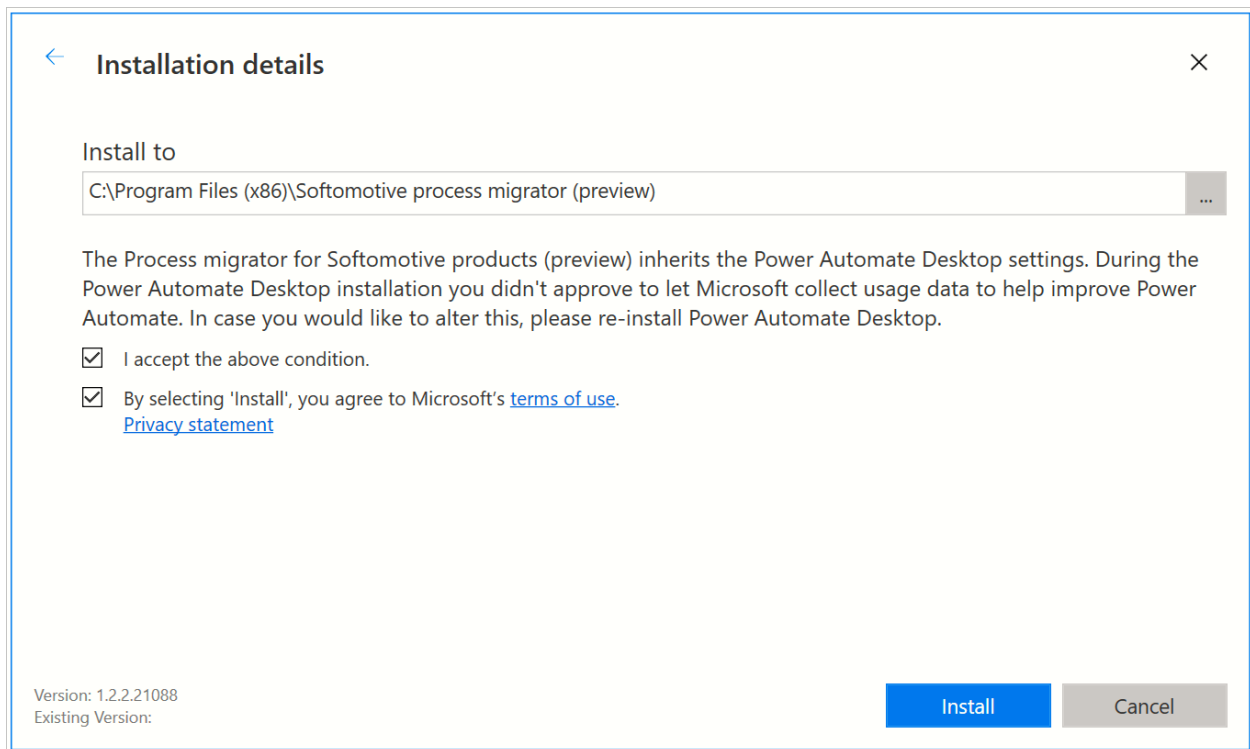
## ⓘ Note

- Make sure you are performing a clean installation of Process migrator for Softomotive products (preview). Also, the migrator will only function as intended when migrating into an environment with V1 schema enabled. If the environment you are attempting to migrate into has V2 schema enabled, the migration utility will not function as intended. If you require an environment with V1 schema enabled, please contact your Power Platform administrator.

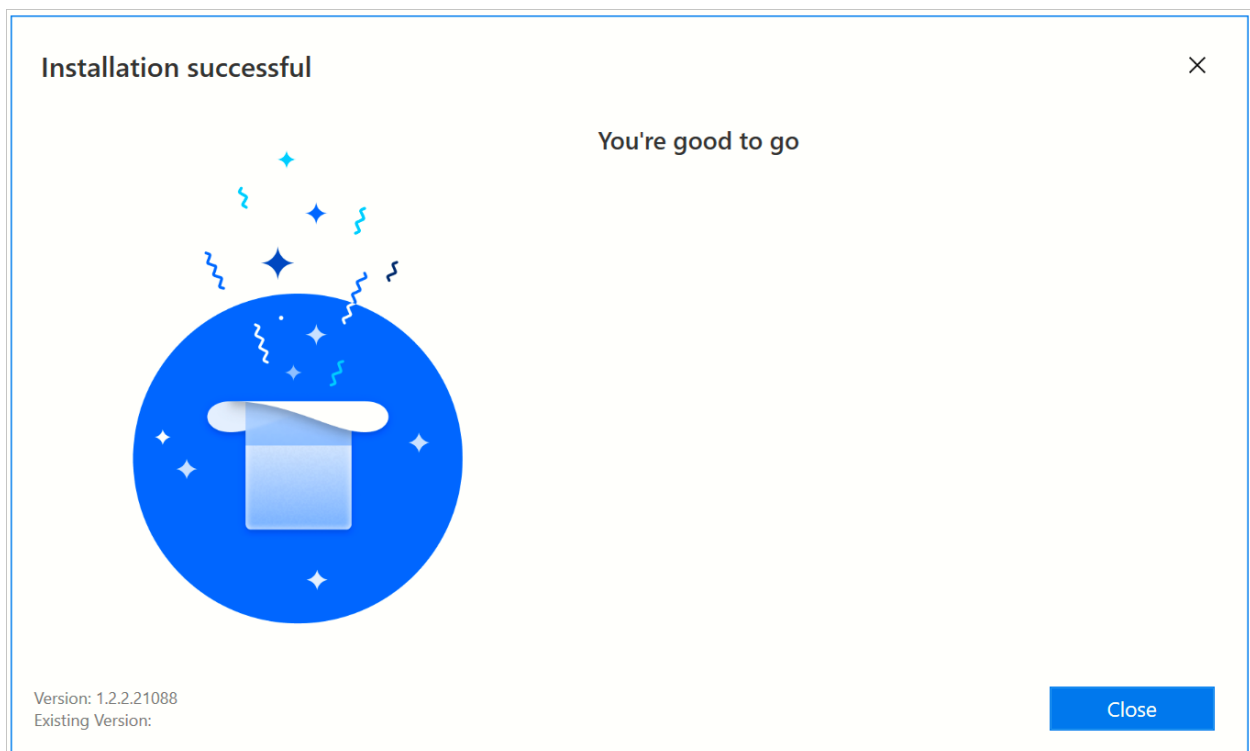
- Uninstall any previous installations of the application.
- Remove any previous installation residue (empty installation folders etc.)
- Install the latest version of the application.



In the displayed dialog, select an installation path and accept Microsoft's terms of use.

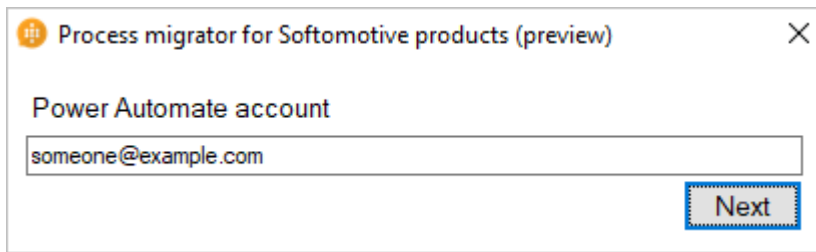


Now, you can run the Process migrator for Softomotive products (preview).

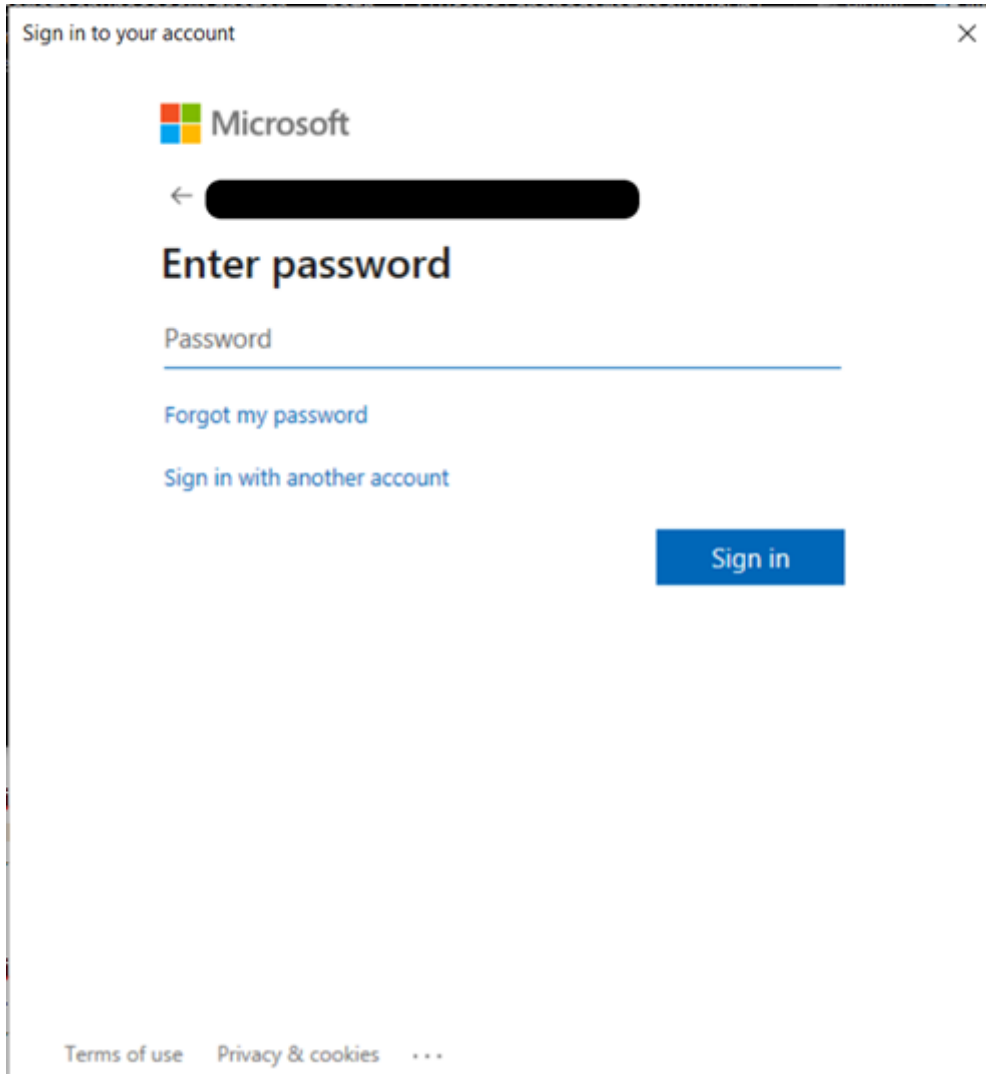


## Running Process migrator for Softomotive products (preview)

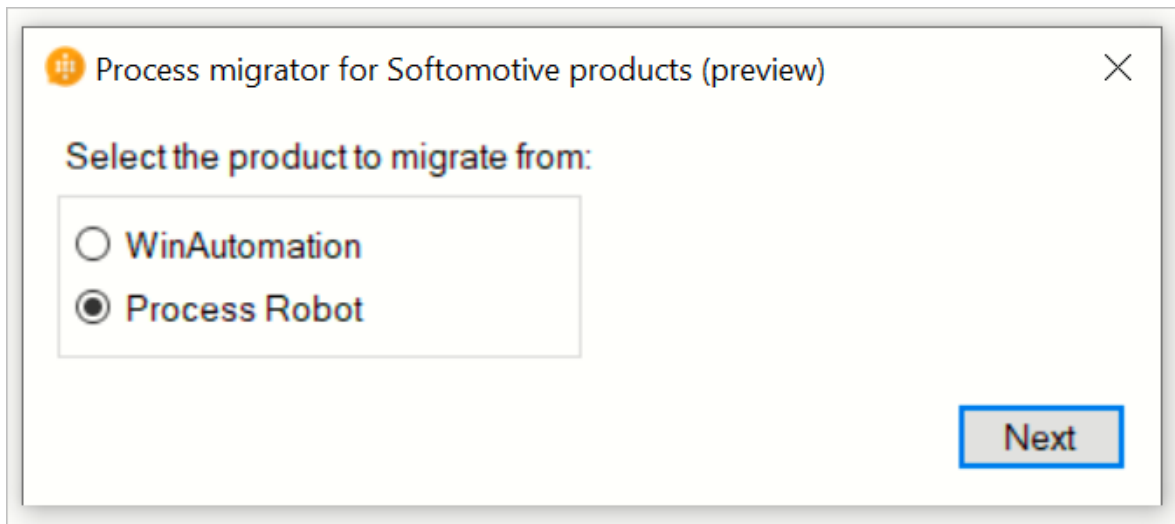
1. After launching Process migrator for Softomotive products (preview), you'll be prompted to populate your Power Automate account.



The application might prompt you to connect to the account you use to access your environments in order to save the migrated processes as desktop flows.

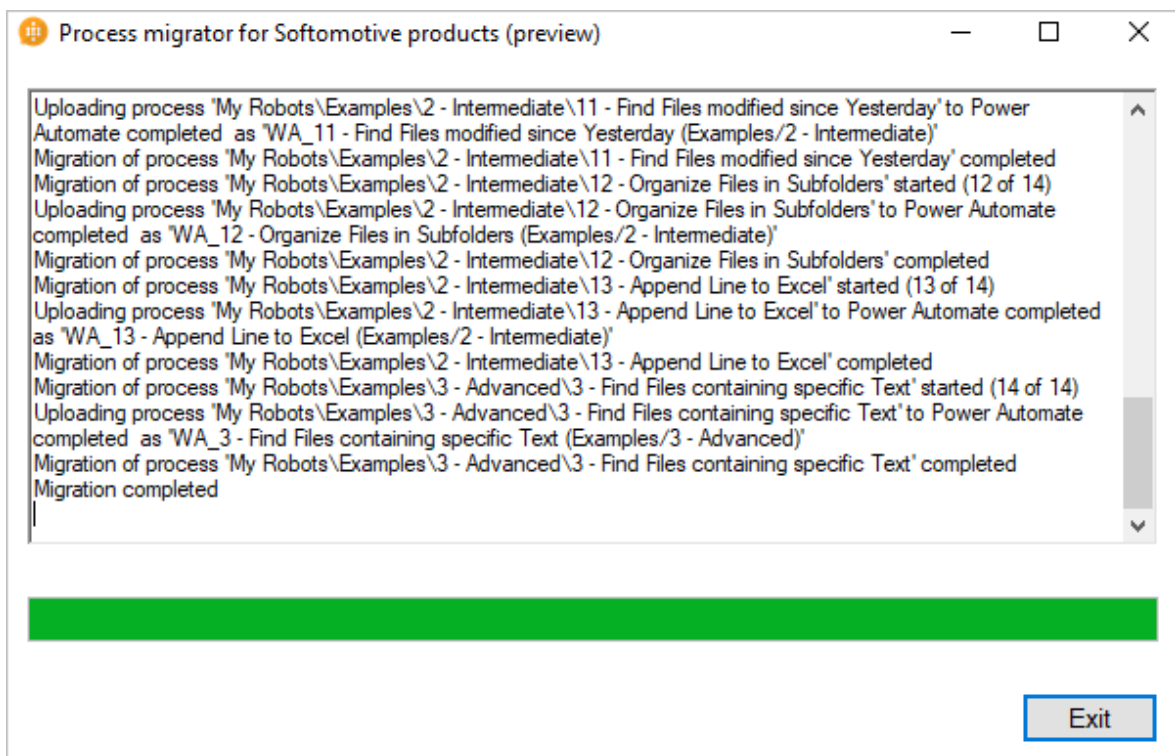


2. Select the Softomotive product from which you want to migrate processes.



## Completing migration and accessing the migrated processes

1. During the migration, a dialog will display information about the current state of the migration and a progress bar.



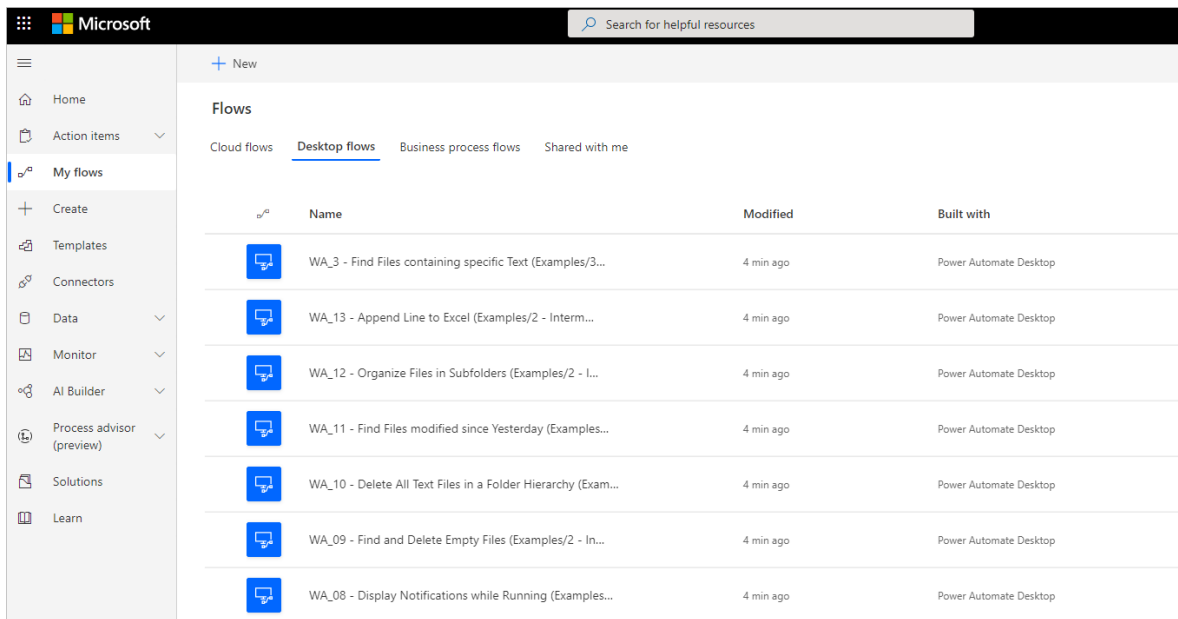
2. When the migration is completed, an autogenerated log file will be displayed showing the migrated processes.

```

Migration_20201215_153556 - Notepad
File Edit Format View Help
2020-12-15 15:36:30.293 +02:00 [INF] Migration started
2020-12-15 15:36:35.023 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate01 - Paste to Text File' successfully migrated as 'WA_01 - Paste to Text File(1)
2020-12-15 15:36:36.178 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate02 - Count Lines of Text File' successfully migrated as 'WA_02 - Count Lines of 1
2020-12-15 15:36:37.825 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate03 - Sort Lines of a Text File' successfully migrated as 'WA_03 - Sort Lines of a
2020-12-15 15:36:39.765 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate04 - Create New Folder with DateTime' successfully migrated as 'WA_04 - Create Ne
2020-12-15 15:36:41.003 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate05 - Rename Multiple Files' successfully migrated as 'WA_05 - Rename Multiple Fil
2020-12-15 15:36:42.126 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate06 - Concatenate Text Files' successfully migrated as 'WA_06 - Concatenate Text f
2020-12-15 15:36:43.415 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate07 - Days of your Life' successfully migrated as 'WA_07 - Days of your Life (Exam
2020-12-15 15:36:44.671 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate08 - Display Notifications while Running' was migrated with issues as 'WA_08 - Di
2020-12-15 15:36:45.895 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate09 - Find and Delete Empty Files' successfully migrated as 'WA_09 - Find and Dele
2020-12-15 15:36:47.045 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate10 - Delete All Text Files in a Folder Hierarchy' successfully migrated as 'WA_10
2020-12-15 15:36:48.240 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate11 - Find Files modified since Yesterday' successfully migrated as 'WA_11 - Find
2020-12-15 15:36:49.652 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate12 - Organize Files in Subfolders' successfully migrated as 'WA_12 - Organize Fil
2020-12-15 15:36:51.081 +02:00 [INF] Process 'My Robots\Examples\2 - Intermediate13 - Append Line to Excel' successfully migrated as 'WA_13 - Append Line to Excel
2020-12-15 15:36:52.893 +02:00 [INF] Process 'My Robots\Examples\3 - Advanced\3 - Find Files containing specific Text' successfully migrated as 'WA_3 - Find Files
2020-12-15 15:36:52.893 +02:00 [INF] Migration completed

```

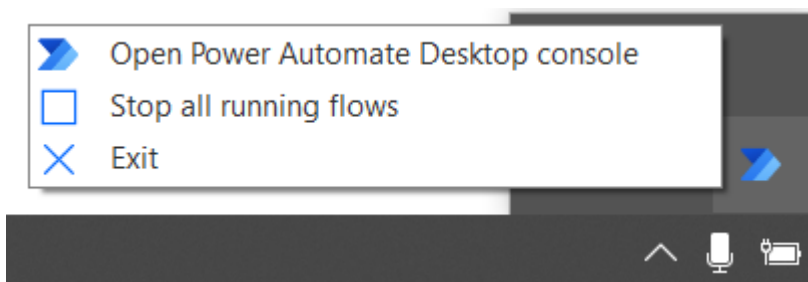
3. You can access the exported logs at **C:\Users{username}\AppData\Local\Microsoft\Process migrator for Softomotive products\Logs**



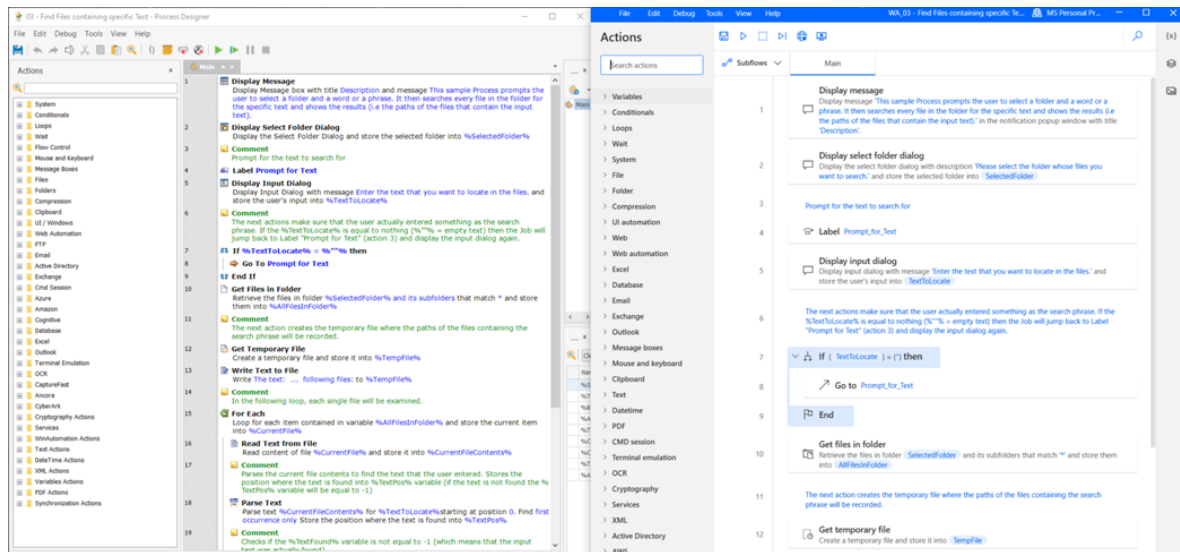
**Note**

For the migrated desktop flows to be visible, some time is required. To instantly view the migrated desktop flows in Power Automate:

- Sign out and sign in again in Power Automate, or
- Restart the Power Automate service by exiting the service and re-running Power Automate.



#### 4. Now, you can modify the migrated processes (now desktop flows) through Power Automate.



#### 💡 Tip

Running the Process migrator for Softomotive products (preview) will be paused once an encrypted process has been encountered, waiting for the password to be inserted by the user. It's advised to group processes based on whether they are encrypted or not. This way, unencrypted processes will be migrated without supervision and the encrypted ones will have the required user attendance.

# Overview of RPA templates and Dynamics 365

Article • 12/16/2022

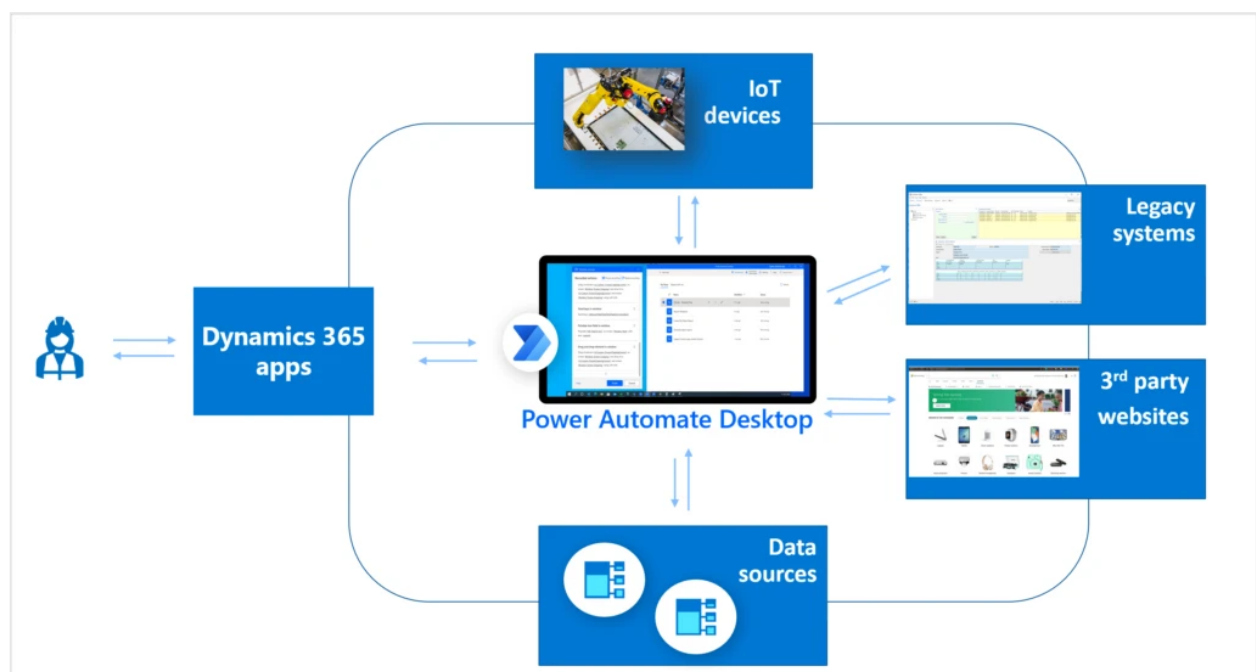
For many businesses, success increasingly depends on having the agility to innovate and adapt to rapid change, responding to customer needs, competitive pressure, and industry trends. However, achieving all these tasks can be difficult when employees spend time on time-consuming work, such as repetitive tasks and complex processes.

Considering the above, we're dedicated to helping organizations automate manual business processes across legacy and modern applications, so you can focus on what's most important for your business and customers.

We're introducing enhanced workplace automation capabilities for Microsoft Dynamics 365—a set of prebuilt RPA solution templates that seamlessly integrate with selected Dynamics 365 applications.

Initially available for Dynamics 365 Customer Service, Dynamics 365 Supply Chain Management, and Dynamics 365 Finance, the prebuilt automation templates enable teams to rapidly automate common business scenarios, freeing time from day-to-day manual, repetitive, and error-prone tasks.

Developers can further extend any of those solutions using custom actions, custom connectors, Microsoft Azure services, and APIs to take full advantage of Microsoft's cloud and data ecosystem.





# Save time across customer service, finance, and supply chain roles

Explore some of the ways that RPA can help streamline processes and save valuable time across the workforce.

## Dynamics 365 Customer Service: Helping call center agents rapidly validate customer credentials

Most contact centers require agents to validate or authenticate customer identities before proceeding with the service engagement. By enhancing Dynamics 365 Customer Service with RPA, agents can automate steps of the validation process, streamlining call times and helping agents to troubleshoot and solve customer issues faster.

## Dynamics 365 Supply Chain Management: Streamline ordering of replacement parts for manufacturing line equipment

We've heard from manufacturing customers about the need to improve the process of ordering replacement parts for equipment on the factory floor. Often, technicians who identify defective parts on the manufacturing line need to write down part numbers and place orders into the tracking system one by one. This approach is an inefficient and error-prone process. Integrating RPA processes into Dynamics 365 Supply Chain Management allows technicians to scan and enter part details and submit orders on the spot, saving time and effort. Since Power Automate natively integrates with Azure IoT connectors, this solution can be easily extended to use the Azure IoT management system.

[Watch a video](#) to learn more about the new capabilities included in the latest update to Dynamics 365 Supply Chain Management.

## Dynamics 365 Finance: Streamline the creation of end-of-billing cycle reports

At the end of billing cycles, finance workers often generate many different end-of-cycle reports for every account. Traditionally, this task is a manual, time-consuming, and error-

prone process. Dynamics 365 Finance helps streamline many of these processes. By integrating RPA capabilities in Power Automate, finance teams can now automate many processes more efficiently, allowing finance professionals to focus on more critical strategic tasks. These capabilities also improve the accuracy demanded by increasingly restrictive financial audit regulations.

## Next steps

Take the first step to enable your customer service, supply chain, and finance teams to automate processes in Dynamics 365. Get a free Power Automate RPA trial license, install Power Automate for desktop, and then import the three solutions mentioned above into your environment to set it up.

# Create orders on Dynamics 365 Supply Chain Management

Article • 02/24/2023

[Dynamics 365](#) empowers your organization to deliver operational excellence and delight every customer. To make your use of Dynamics 365 even more productive and save users time and errors, we're releasing free automation solutions that let Dynamics 365 customers automate common tasks.

This article outlines the steps administrators need to allow users to automate quality order creation for Dynamics 365 [Supply Chain Management](#) and focus on higher-priority activities that require their unique creativity.

## Prerequisites

Before starting, you must prepare your environment with adequate licenses and software setup. This section provides step-by-step instructions about how to get the grounds ready.

## Software

You'll need to:

- [Install Power Automate](#). Power Automate will carry out the steps in Dynamics 365 as if a human were doing it in front of their computer.
- Sign out of the Dynamics 365 app you wish to automate.
- Get the appropriate security role for the automation to run.

## Sign out of the Dynamics 365 app you wish to automate

To accomplish the full automation, sign out of the application before running the automation for the first time. You need to do this step if you switch between automation and your account.

## Get the appropriate security role set up for the account running the automation

You need to decide which work account will run the automation. It can be a dedicated account created by your admin in Azure Active Directory or the account of an existing

employee. Check that the chosen account has the appropriate security roles to access the surfaces you're automating.

We recommend the following security roles:

Application	Security role	Link to documentation
Power Platform	Environment admin or environment maker (if the environment already has Dataverse and unattended license needed)	
Dynamic 365 Supply Chain Management		

## Licenses

If you already use Power Automate, PowerApps and Dynamics 365 applications on a day-to-day basis, you can skip this section and go to [Install the Dynamics 365 RPA solutions](#).

Otherwise, you need at least a trial license for these three products. This section shows you how to acquire these trial licenses.

### Get a trial license for Power Automate

Power Automate can automate processes by doing what a human would do on a keyboard and screen.

There are two ways to automate processes:

1. Attended mode: someone is sitting in front of their computer and watching the process run as if they were doing it manually.
2. Unattended mode: the process runs in the background on remote machines that users don't see.

To run attended, users need to acquire the **Power Automate per-user license with RPA**. To run unattended, users need to have acquired two licenses: **Power Automate per-user license with RPA** and the **Power Automate unattended add-on**.

To get a trial license for **Power Automate per-user license with RPA**:

1. Go to the Power Automate portal, navigate to **My Flows > Desktop flows**.
2. Select **Start free trial now**

Alternatively, launch Power Automate for desktop and select **Start trial** on the console on the **Premium features** dialog.

To add a trial license for **Power Automate unattended add-on**:

1. As an admin, you can get an RPA unattended add-on and assign it to your environment. To find more information about the RPA unattended add-on, go to [Power Automate sign-up Q&A in your organization](#)

## Get a trial license for Power Apps

Follow the instructions in [Explore Power Apps for free for 30 days](#) to get a trial license for Power Apps.

## Get a trial license for the Dynamics 365 applications you wish to automate

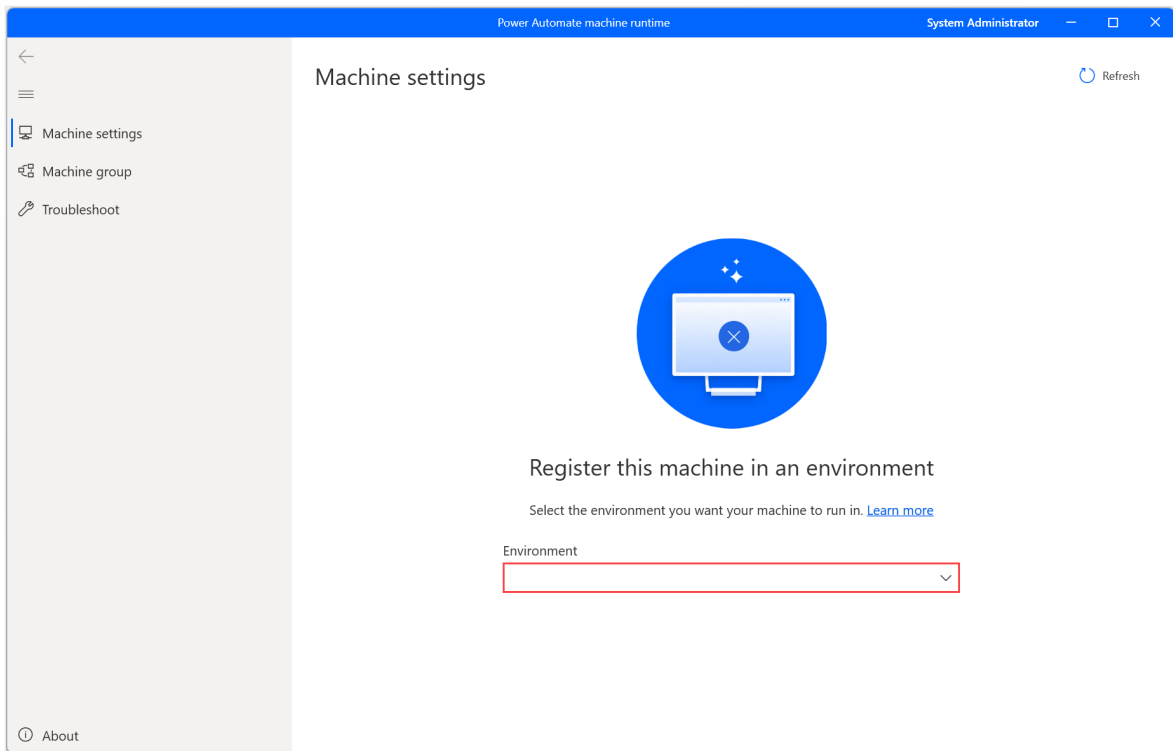
To get started with Dynamics 365 Supply Chain Management and automate the quality order creation process, see [Discover how Dynamics 365 Supply Chain Management can transform the way you do business](#) <sup>↗</sup>.

## Setup steps

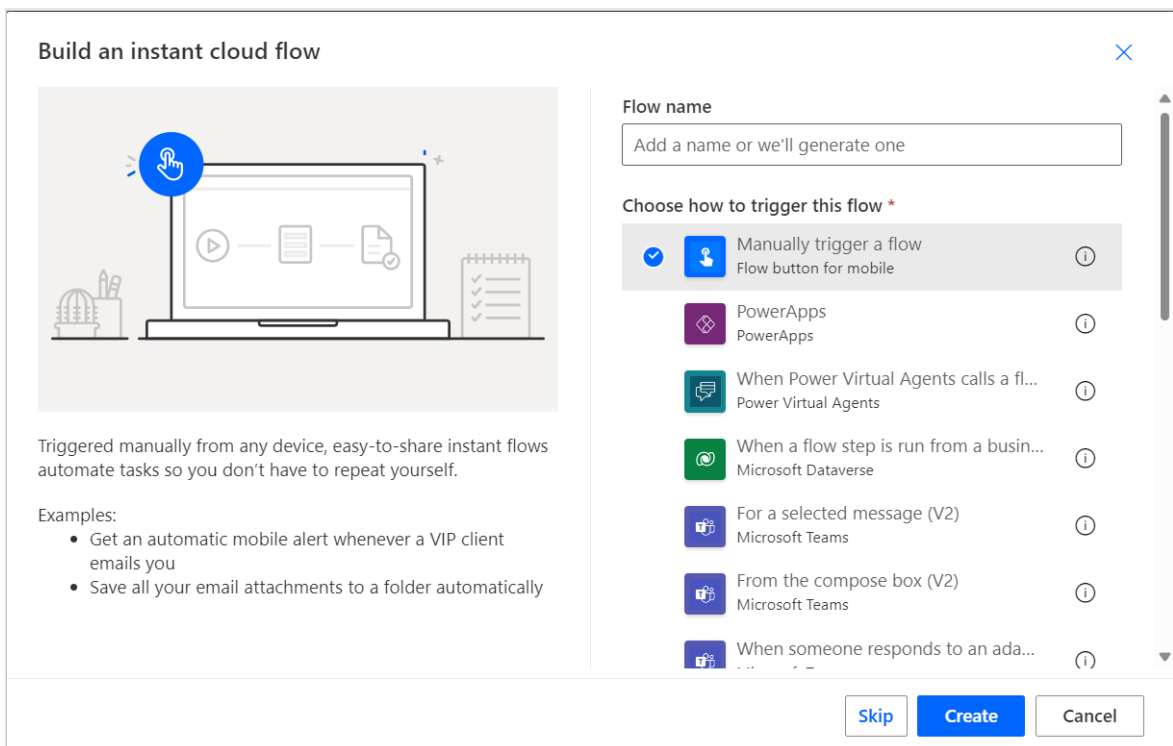
Now that prerequisites are set, you are on your way to get the free solutions that automate your processes.

## Install Power Automate for desktop

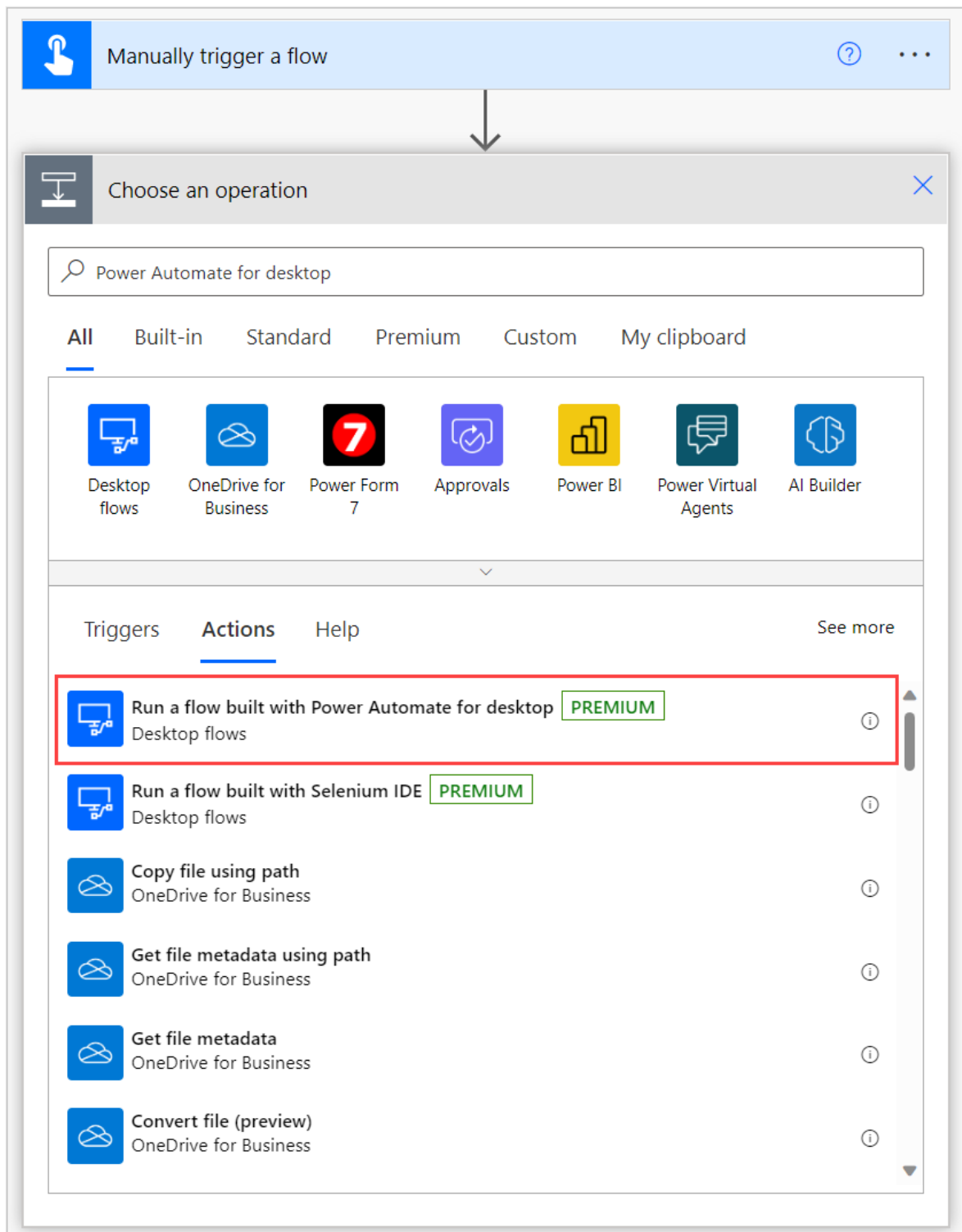
1. Download and install Power Automate on the machine that will run the automation. You can find more information about Power Automate installation in [Install Power Automate](#).
2. Switch the Power Automate machine settings to the environment in which you'll install the solution.



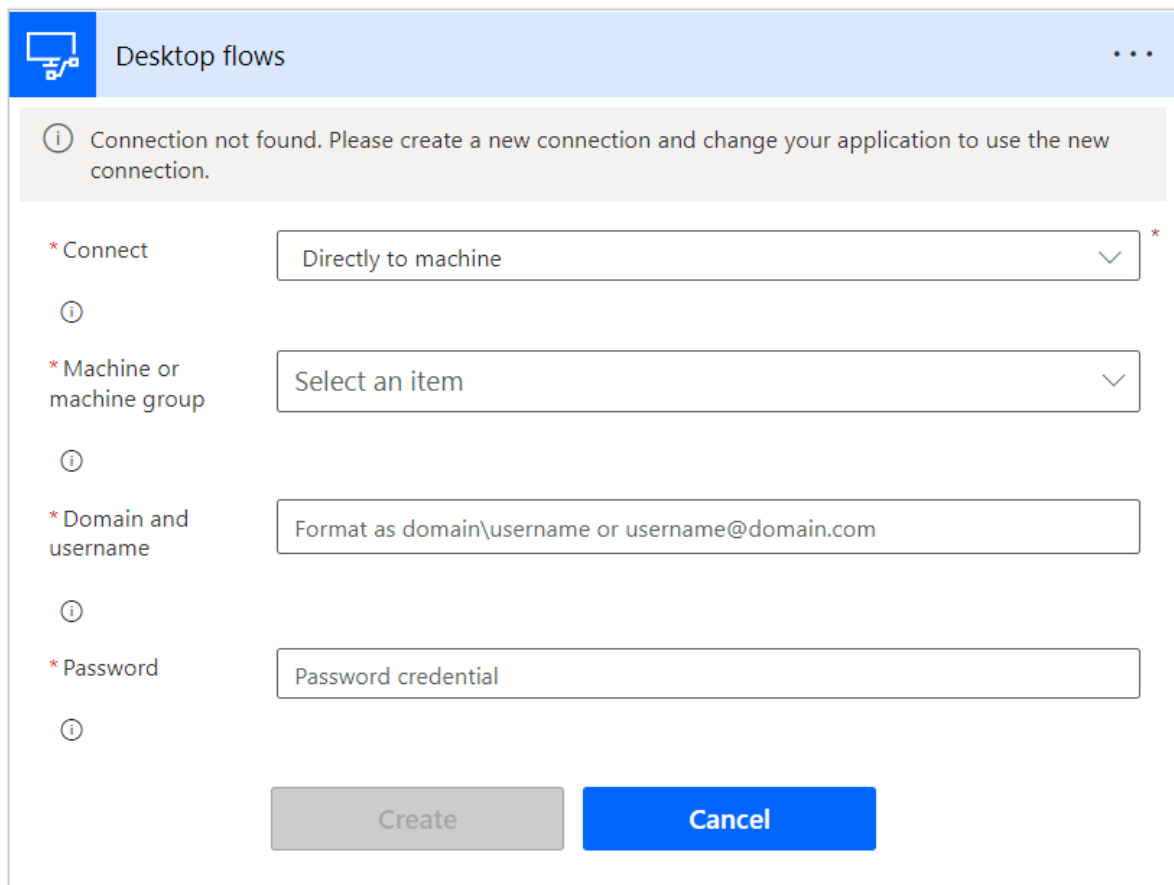
3. Sign in to the [Power Automate portal](#) to create a cloud flow with manual trigger.



4. Add the appropriate action to run desktop flows.



5. Select **Directly to machine** in the **Connect** field. Then, select the machine name on which you've installed Power Automate, and enter the machine credential (the username and password you use to sign in to the machine). To find more information about direct connectivity, see [Manage machines](#).



Desktop flows

Connection not found. Please create a new connection and change your application to use the new connection.

\* Connect

\* Machine or machine group

\* Domain and username

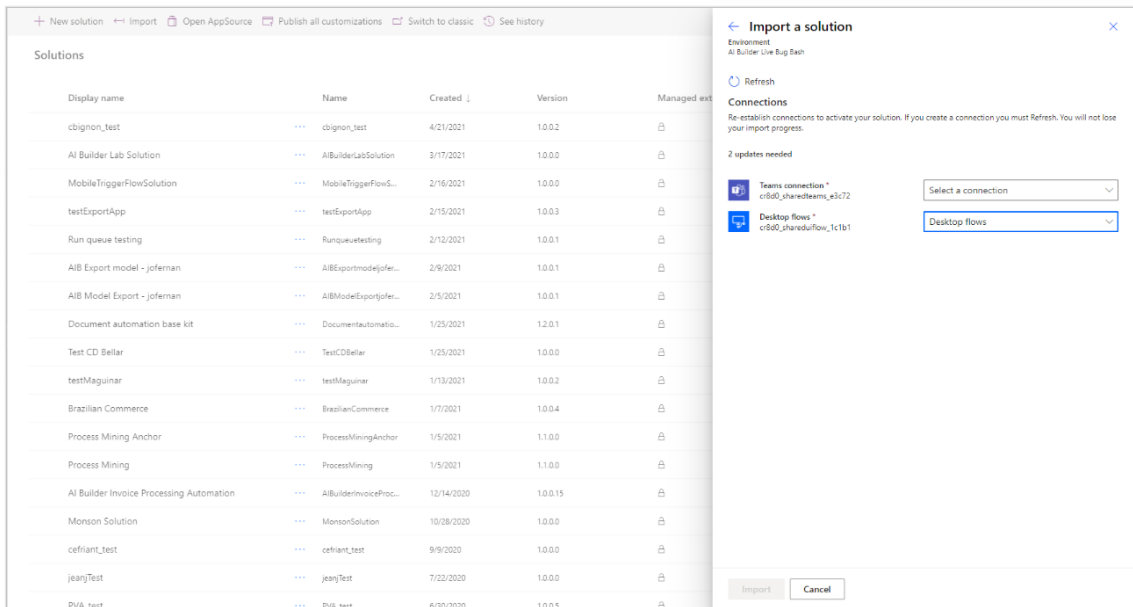
\* Password

Create Cancel

## Install the Dynamics 365 RPA solution

1. [Download](#) the Dynamics 365 automation solution and save it on your machine.
2. Import the Dynamics 365 automation solution in the environment of your choice:
  - a. Go to <https://powerautomate.microsoft.com> and sign in using your work account.
  - b. Select the environment in which you wish to work.
  - c. In the vertical menu on the left of your screen, select **Solutions**.
  - d. In the main bar, select **Import** then **Browse**.
  - e. Navigate to the solution file you previously downloaded and double-click on it.
  - f. Select **Next**.
3. Configure the connections needed to be used by the solution in the environment:
  - a. For each connector the solution uses, either select an existing connection or create a new one using your Microsoft account and credentials of your choice.





b. Go back to the tab in which you initiate the above step and select **Refresh**.

c. Select **Import**. The solution explorer shows you a message informing you that the solution is being imported. This step may take a few minutes.

4. Enter the parameters that the solution should use to run the process:

a. From the solutions explorer, select the appropriate solution to open it.

b. In this step, you'll see some rows with the value **Environment Variable** in the **Type** column. Add values for each of these.

c. Select each environment variable, and under **Current Value**, select **Add New Value** to put in your parameter.

<b>Environment variable name</b>	<b>Description</b>
QOrder Parameter - SCM Portal URL	URL for the SCM environment including parameters for company and form for the InventQualityOrderTable. For example: <code>https://hxoshmyfoodus9o1mf.sandbox.operations.int.dynamics.com/?cmp=USMF&amp;mi=InventQualityOrderTable</code>
SCM SignIn User	The user account to sign in to Dynamics 365 SCM. For example: <code>helloworld@contoso.com</code>
QOrder Parameter - Site	The name of the site to use for filling in the quality order creation form.

<b>Environment variable name</b>	<b>Description</b>
QOrder Parameter – Test Group	Configure the Test group for the quality order creation
QOrder Parameter - Warehouse	Configure the Warehouse for the quality order creation

The screenshot shows the 'Solutions > QOrder for Dynamics 365 Supply Chain Management' environment. A table lists various components, with 'QOrder Parameter - Warehouse' selected. The right-hand panel shows the configuration for this parameter:

- Display name \***: QOrder Parameter - Warehouse
- Name \***: cr6ce\_QOrderParamWarehouse
- Description**: Configure the Warehouse for the quality ord...
- Data Type \***: Text
- Default Value**: 11
- Current Value**: (Empty field)

5. Turn on the cloud flow in the solution:
  - a. In the solution, select the ... menu for the **QOrder - CloudFlow** cloud flow.
  - b. Select **Turn On**
  
6. Put in the encrypted credentials to be used by the solution to sign in to Dynamics 365:
  - a. From the solution explorer, select the line item called **QOrder – Desktop Flow**
  - b. Select **Edit**, then **Launch App**. This step will launch Power Automate for desktop.
  - c. Under the **Subflows** dropdown, select **LoginSCM**.
  - d. In the **LoginSCM** subflow, open the properties of the action 8.
  - e. Fill in the **Text** field with the password of the account to use during automation.

**Populate text field on web page**
✕

ABC Fill a text field in a web page with the specified text [More info](#)

**Select parameters**

Web browser instance:  ⓘ

UI element:  ⓘ

Text: ⓘ  ⓘ

> **Advanced**

7. Share each component of the solution (app, connection, flow, desktop flow) to other users in your company as run only user.

8. Have the user launch the **QOrder-Application** Power App from their phone and start using it.

## Known issues

Known issue	Workaround
If you acquire the adequate licenses for Power Automate and Power Apps after you install the solution, the flow or app will be turned off.	After you acquire the licenses, go back to the solution explorer, select the ... menu for the app or flow, and then select <b>Turn On</b> .

# Use RPA with Dynamics 365 Finance

Article • 02/24/2023

[Dynamics 365](#) empowers your organization to deliver operational excellence and delight every customer. To make your use of Dynamics 365 even more productive and save users time and errors, we're releasing free automation solutions that let Dynamics 365 customers automate common tasks.

This article outlines the steps you need to automate end of cycle reporting in [Dynamics 365 Finance](#) and focus on higher-priority activities that require your unique creativity.

## Prerequisites

Before starting, you must prepare your environment with adequate licenses and software setup. This section provides step-by-step instructions about how to get the grounds ready.

## Software

You'll need to:

- [Install Power Automate](#). Power Automate will carry out the steps in Dynamics 365 as if a human were doing it in front of their computer.
- Set the appropriate file download configuration in Microsoft Edge to have complete automation.
- Sign out of the Dynamics 365 app you wish to automate.
- Get the appropriate security role for the automation to run.

## Set the appropriate file download configuration on Microsoft Edge

Microsoft Edge has two ways of downloading files from the internet onto your desktop:

1. It downloads directly on your machine, and saves the file in the destination folder specified in the Microsoft Edge settings.
2. It asks for the user's permissions before downloading a file, waits for the user to accept the download, and then downloads and saves the file in the destination folder specified in the Microsoft Edge settings.

To make this process fully automated and not require a human in front of the computer for it to work, you need Microsoft Edge to download files using the first mechanism.

1. Launch Microsoft Edge on your machine.
2. Open the browser settings.
3. In the vertical menu in the left of your screen, select **Downloads**.
4. Disable the toggle **Ask me what to do with each download**.
5. Close your browser.

## Sign out of the Dynamics 365 app

To accomplish the full automation, sign out of the application before running the automation for the first time. You need to do this step if you switch between automation and your account.

## Get the appropriate security role set up for the account running the automation

You need to decide which work account will run the automation. It can be a dedicated account created by your admin in Azure Active Directory or the account of an existing employee. Check that the chosen account has the appropriate security roles to access the surfaces you're automating. To find more information about security roles, go to [Managing security roles in Dynamics 365](#).

We recommend the following security roles:

Application	Security role	Link to documentation
Power Platform	Environment admin or environment maker (if the environment already has Dataverse and unattended license needed)	
Dynamics 365 Supply Chain Management		

## Licenses

If you already use Power Automate, PowerApps and Dynamics 365 applications on a day-to-day basis, you can skip this section and go to [Install the Dynamics 365 RPA solutions](#).

Otherwise, you need at least a trial license for these three products. This section shows you how to acquire these trial licenses.

## Get a trial license for Power Automate

Power Automate can automate processes by doing what a human would do on a keyboard and screen.

There are two ways to automate processes:

1. Attended mode: someone is sitting in front of their computer and watching the process run as if they were doing it manually.
2. Unattended mode: the process runs in the background on remote machines that users don't see.

To run attended, users need to acquire the **Power Automate per-user license with RPA**. To run unattended, users need to have acquired two licenses: **Power Automate per-user license with RPA** and the **Power Automate unattended add-on**.

To get a trial license for **Power Automate per-user license with RPA**:


1. Go to the Power Automate portal, navigate to **My Flows > Desktop flows**.
2. Select **Start free trial now**

Alternatively, launch Power Automate for desktop and select **Start trial** on the console on the **Premium features** dialog.

To add a trial license for **Power Automate unattended add-on**:

1. As an admin, you can get an RPA unattended add-on and assign it to your environment. To find more information about the RPA unattended add-on, go to [Power Automate sign-up Q&A in your organization](#)

## Get a trial license for the Dynamics 365 applications you wish to automate

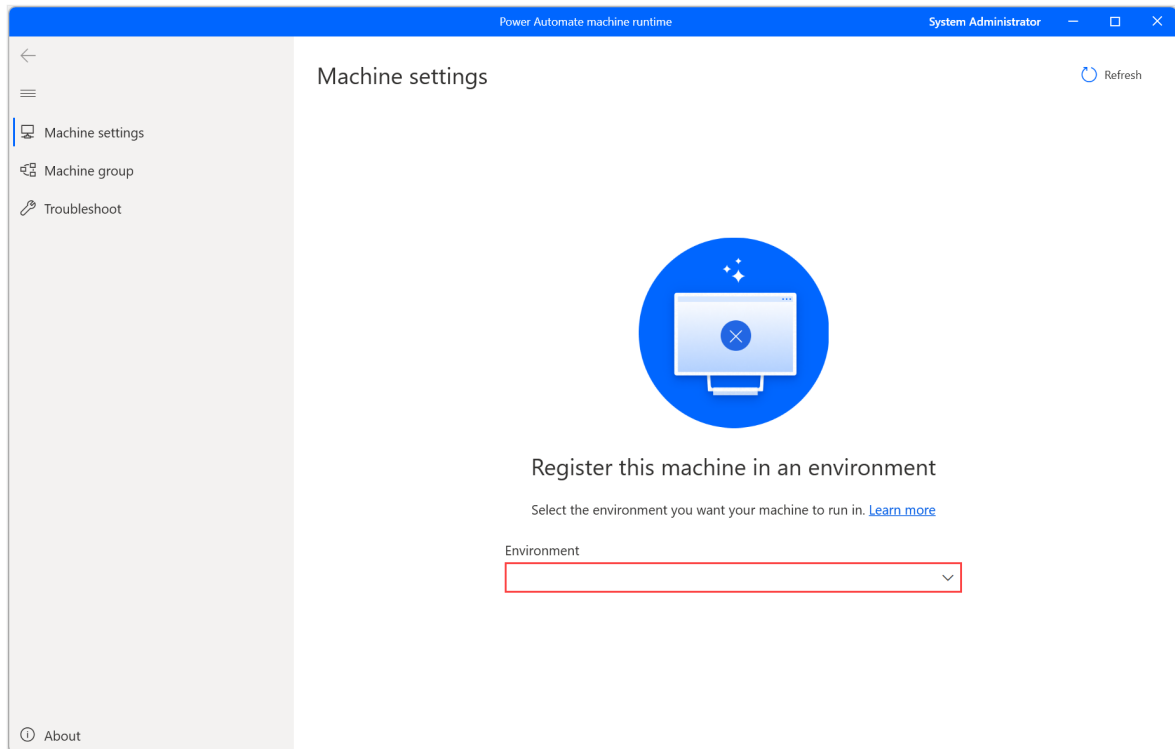
To get started with Dynamics 365 Finance and automate the end-of-cycle reporting process, go to [Discover how Dynamics 365 Finance can transform the way you do business](#) .

## Setup steps

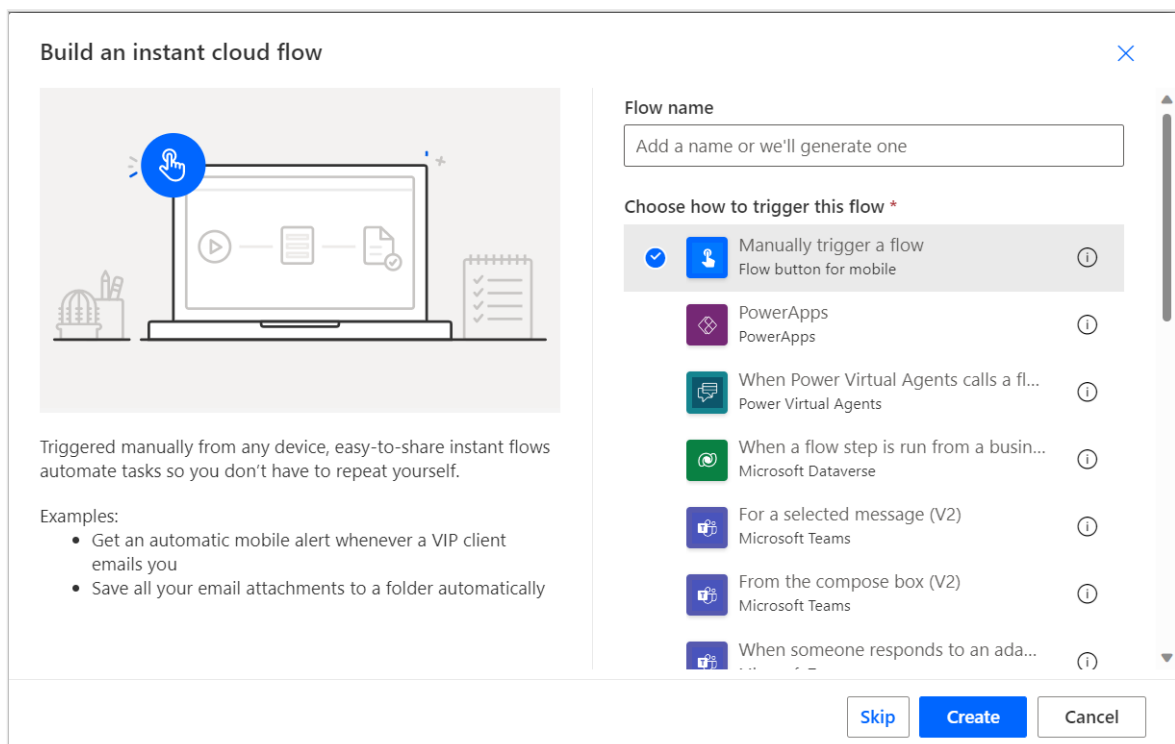
Now that prerequisites are set, you are on your way to get the free solutions that automate your processes.

## Install Power Automate

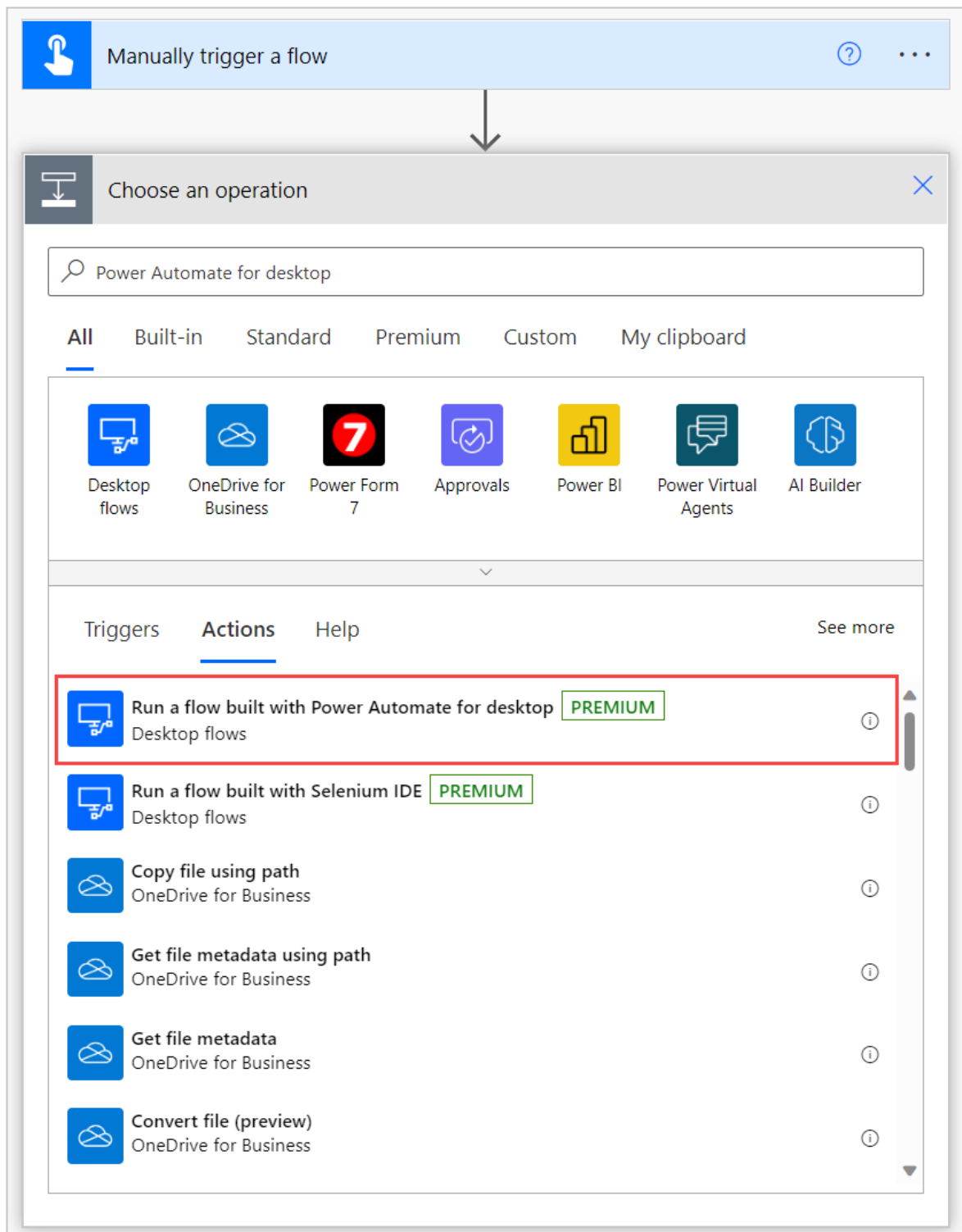
1. Download and install Power Automate on the machine that will run the automation. You can find more information about Power Automate installation in [Install Power Automate](#).
2. Switch the Power Automate machine settings to the environment in which you'll install the solution.



3. Sign in to the [Power Automate portal](#) to create a cloud flow with manual trigger.

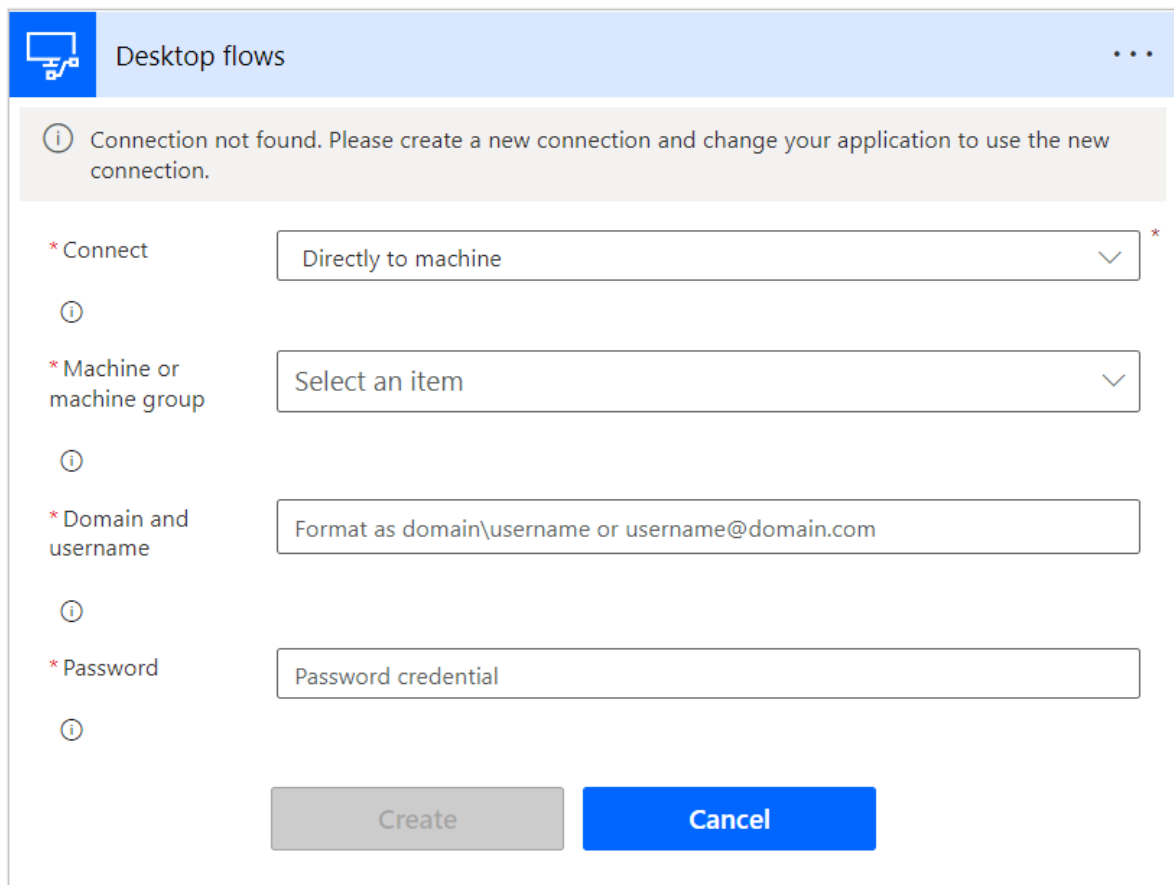


4. Add the appropriate action to run desktop flows.



5. Select **Directly to machine** in the **Connect** field. Then, select the machine name on which you've installed Power Automate, and enter the machine credential (the username and password you use to sign in to the machine). To find more information about direct connectivity, see [Manage machines](#).





Desktop flows

Connection not found. Please create a new connection and change your application to use the new connection.

\* Connect

\* Machine or machine group

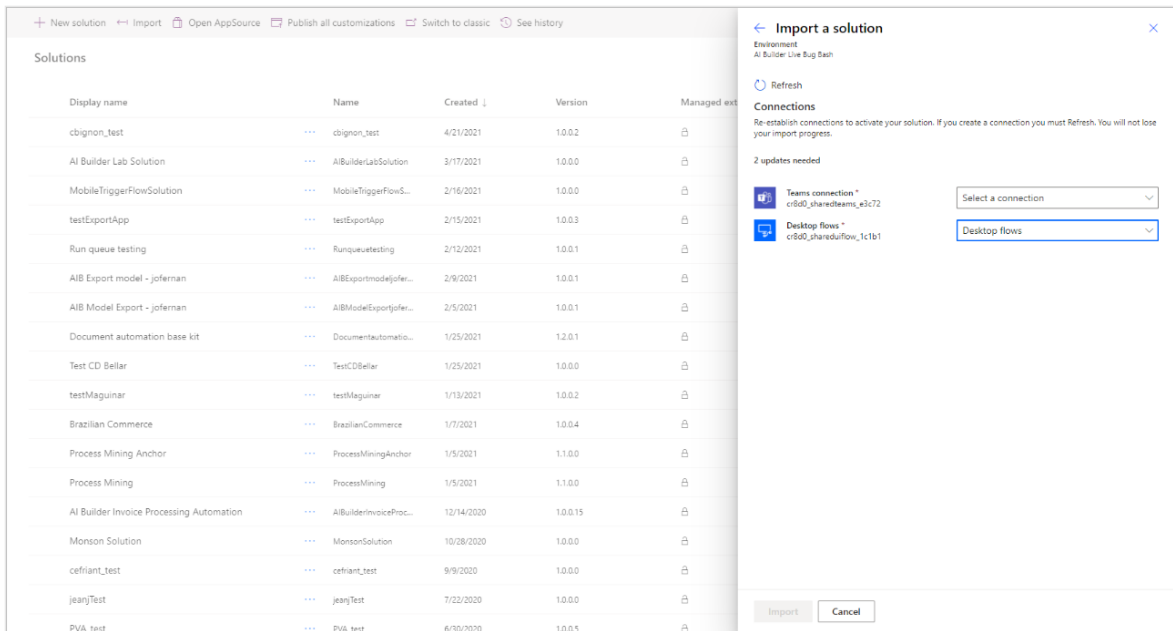
\* Domain and username

\* Password

Create Cancel

## Install the Dynamics 365 RPA solution

1. [Download](<https://aka.ms/D365FinanceEndCycleReportingRPASolution>) the Dynamics 365 Finance automation solution and save it on your machine.
2. Import the Dynamics 365 automation solution in the environment of your choice:
  - a. Go to <https://powerautomate.microsoft.com> and sign in using your work account.
  - b. Select the environment in which you wish to work.
  - c. In the vertical menu on the left of your screen, select **Solutions**.
  - d. In the main bar, select **Import** then **Browse**.
  - e. Navigate to the solution file you previously downloaded and double-click on it.
  - f. Select **Next**.
3. Configure the connections needed to be used by the solution in the environment:
  - a. For each connector the solution uses, either select an existing connection or create a new one using your Microsoft account and credentials of your choice.



- a. Go back to the tab in which you initiate the above step and select **Refresh**.
- b. Select **Import**. The solution explorer shows you a message informing you that the solution is being imported. This step may take a few minutes.

4. Enter the parameters that the solution should use to run the process:

- a. From the solutions explorer, select the appropriate solution to open it.
- b. In this step, you'll see some rows with the value **Environment Variable** in the **Type** column. Add values for each of these.
- c. Select each environment variable, and under **Current Value**, select **Add New Value** to put in your parameter.

<b>Environment variable name</b>	<b>Description</b>
D365CompanyName	The name of the company to use in your Dynamics 365 organization. It's located at the top right corner of your screen.
D365FinanceSite	The URL to your Dynamics 365 Finance website. It goes until dynamics.com
D365SiteUserName	The email address of the user account the automation should run under.

5. Turn on the cloud flow in the solution:

- a. In the solution, select the ... menu for the **Report Reconciliation** cloud flow.
- b. Select **Turn On**

6. Put in the encrypted credentials to be used by the solution to sign in to Dynamics 365:
  - a. From the solution explorer, select the line item called **Report Validation**
  - b. Select **Edit**, then **Launch App**. This step will launch Power Automate for desktop.
  - c. Under the **Subflows** dropdown, select **login\_to\_FnO**.
  - d. In the **login\_to\_FnO** subflow, open the properties of the action 11.
  - e. Fill in the **Text** field with the password of the account to use during automation.

**Populate text field on web page** [Close]

Fill a text field in a web page with the specified text [More info](#)

Select parameters

Web browser instance: [ %Browser% ] [Info]

UI element: [ Local computer > appmask[\'Web Page \'h ... OrderTable\' ] [Layers] [Info]

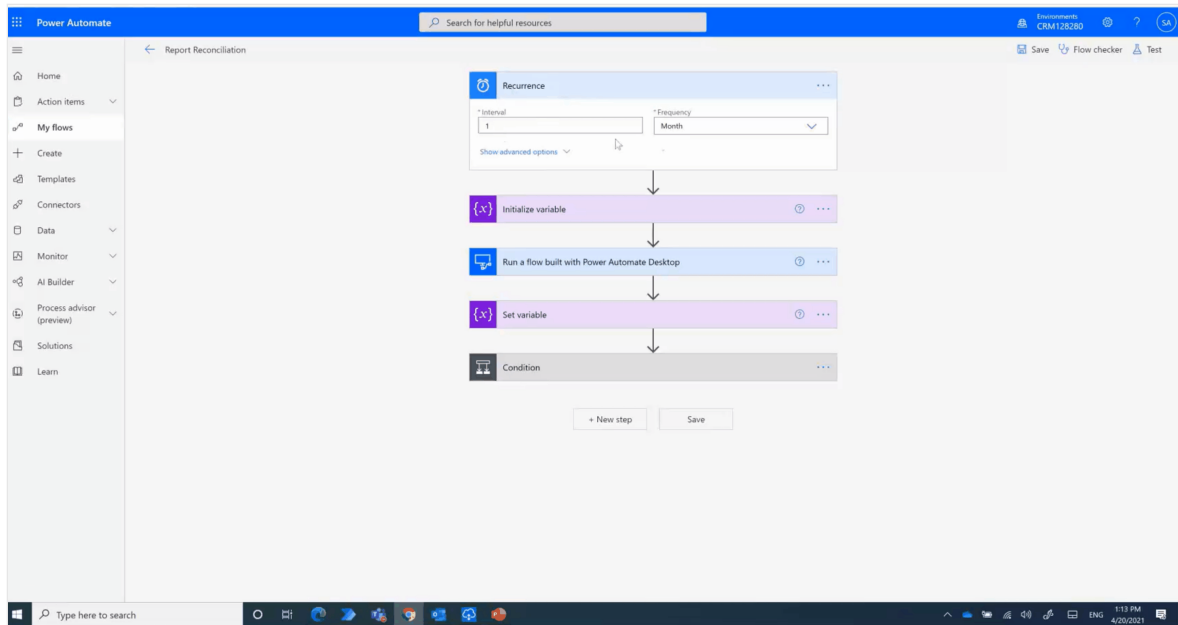
Text: [ Direct encrypted text input ] [Info]

[Info] [Shield] [v] Direct encrypted text input  
•••••

> Advanced

[On error] [Save] [Cancel]

7. Now, test your flows. The demo below shows how the end-to-end scenario works. You should get a Teams message when the running is complete.



You can customize the desktop flow or cloud flow to create custom reports for your own scenarios. If you choose to run the automation unattended, you can switch the run mode from cloud flow.

## Known issues

Known issue	Workaround
The cloud flow doesn't run after selecting <b>Play</b> in the flow designer	Go back to the solution explorer, select the ... menu for the app or flow, and then select <b>Turn On</b> .

# Use RPA with Dynamics 365 Customer Service

Article • 02/24/2023

[Dynamics 365](#) empowers your organization to deliver operational excellence and delight every customer. To make your use of Dynamics 365 even more productive and save users time and errors, we're releasing free automation solutions that let Dynamics 365 customers automate common tasks.

This article outlines the steps you need to automate end of cycle reporting in [Dynamics 365 Customer Service](#) and focus on higher-priority activities that require your unique creativity.

## Prerequisites

Before starting, you must prepare your environment with adequate licenses and software setup. This section provides step-by-step instructions about how to get the grounds ready.

## Software

- Install Dynamics 365 for Customer Service.
- [Install Power Automate](#). Power Automate will carry out the steps in Dynamics 365 as if a human were doing it in front of their computer.
- The Contoso CRM app from Microsoft. This app showcases how RPA works. You can use it as an example to build your own RPA action.

### Important

Ensure you [get the appropriate security roles](#) for the account that runs your automation. This account can be a dedicated one created by your admin in Azure Active Directory or an employee's account.

Use the following recommended security roles:

Application	Security role	Link to documentation
-------------	---------------	-----------------------

Application	Security role	Link to documentation
Power Platform	Option 1: Environment admin Option 2: Environment maker (if the environment already has Dataverse and unattended license needed)	
Dynamics 365 for Customer Service	D365 Customer Service administrator	<a href="#">Enable users for Customer Service and assign roles</a>

## Licenses

1. Get a trial license for Power Automate, if you don't have a paid license. The license you need depends on the mode in which your automations run.

Power Automate support two modes to automate processes.

- **Attended mode:** someone is sitting in front of their computer and watching the process run as if they were doing it manually. To run attended, users need to acquire the **Power Automate per-user license with RPA**.
- **Unattended mode:** the process runs in the background on remote machines that users don't see. To run unattended, users need to have acquired two licenses: **Power Automate per-user license with RPA** and the **Power Automate unattended add-on**.

To get a trial license for **Power Automate per-user license with RPA**:

- a. Go to the Power Automate portal, navigate to **My Flows > Desktop flows**.
- b. Select **Start free trial now**

Alternatively, launch Power Automate for desktop and select **Start trial** on the console on the **Premium features** dialog.

To add a trial license for **Power Automate unattended add-on**:

- a. As an admin, you can get an RPA unattended add-on and assign it to your environment. To find more information about the RPA unattended add-on, go to [Power Automate sign-up Q&A in your organization](#)

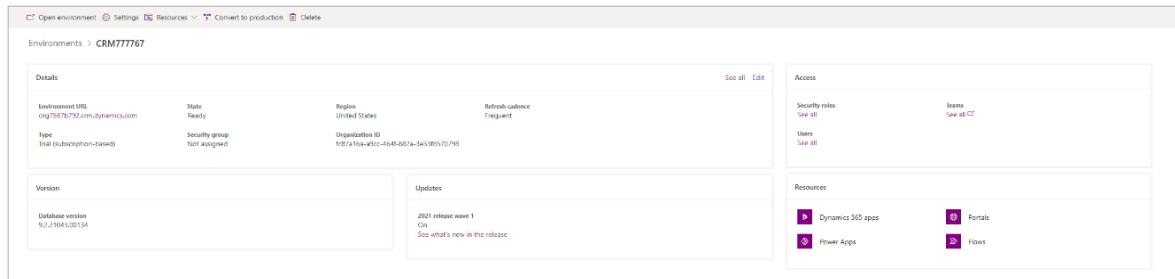
2. Get a trial license for the [Dynamics 365 for Customer Service app](#) <sup>↗</sup>.

## Set up your device

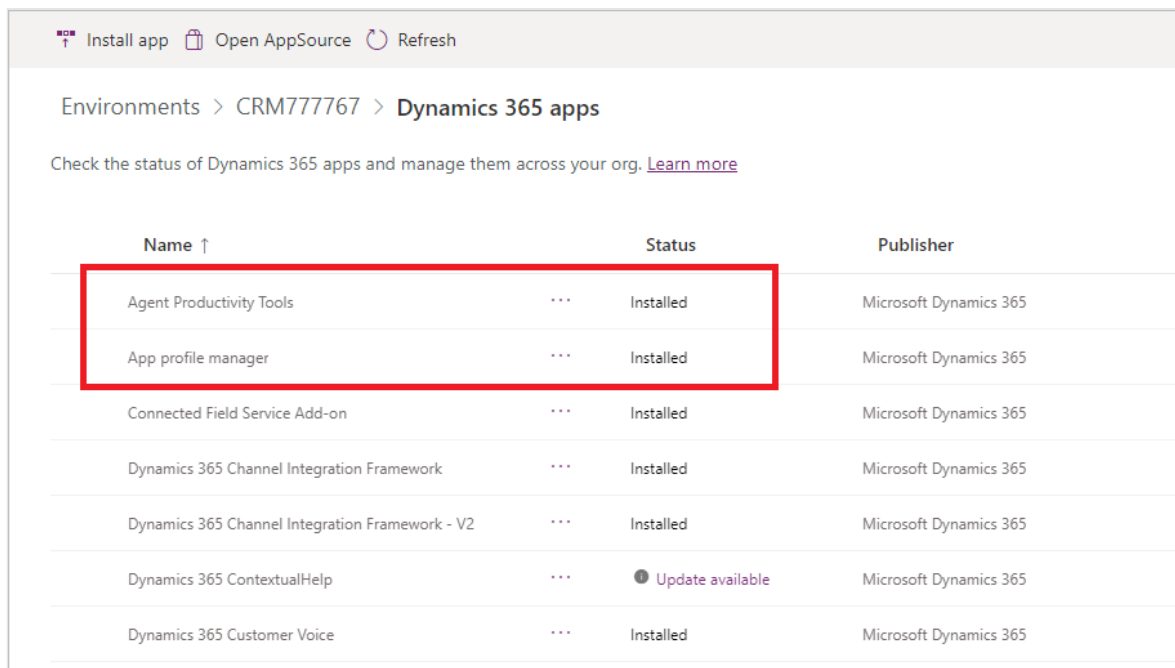
Now that prerequisites are set, you are on your way to get the free solutions that automate your processes.

## Get the latest updates for your environment

1. Go to [Power Platform admin center](#), select the environment in which you're interested, and then select **Dynamics 365 apps**.



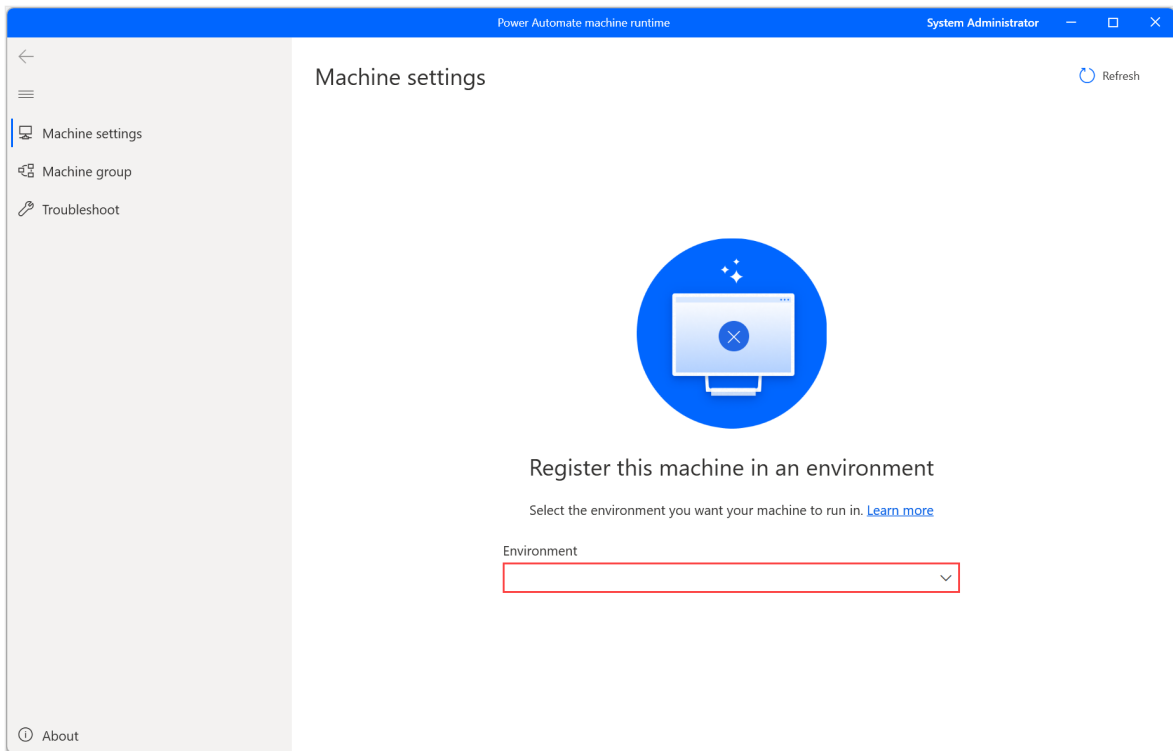
2. Confirm that the **Agent Productivity Tools** and **App profile manager** are updated.



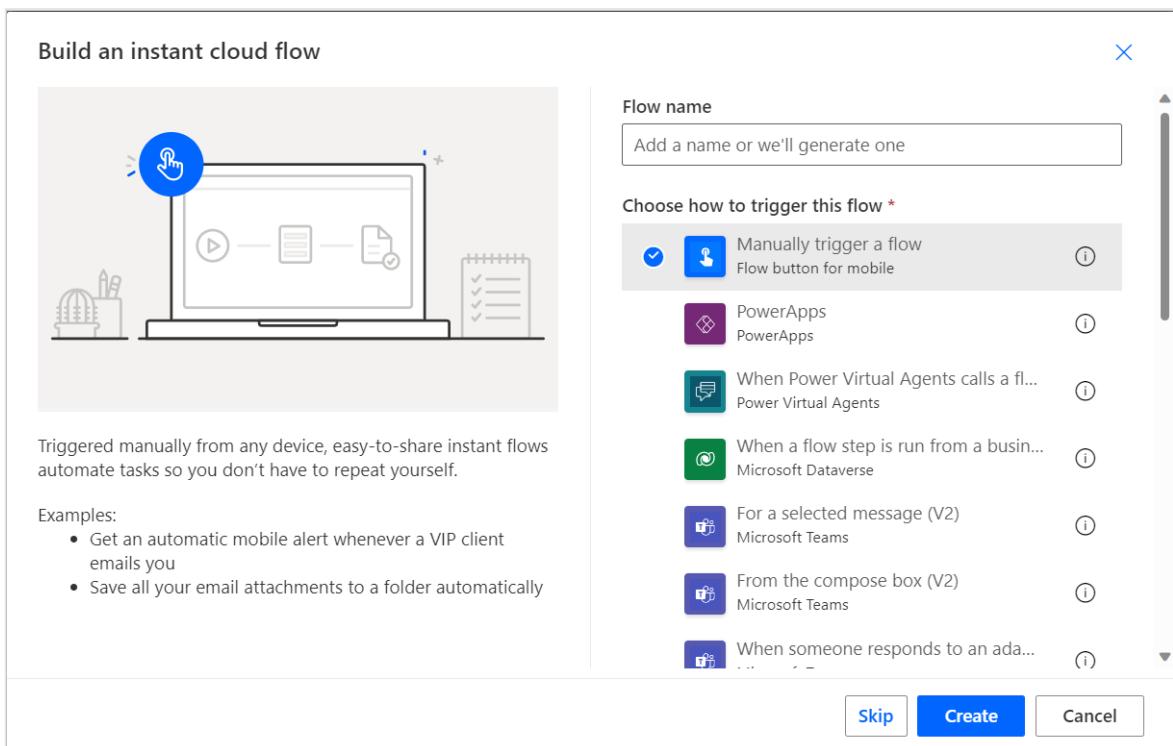
3. If you see **Update available** for **Agent Productivity Tools** and **App profile manager**, select **Update available**.

## Install and configure Power Automate

1. Download and install Power Automate on the machine that will run the automation. You can find more information about Power Automate installation in [Install Power Automate](#).
2. Switch the Power Automate machine settings to the environment in which you'll install the solution.

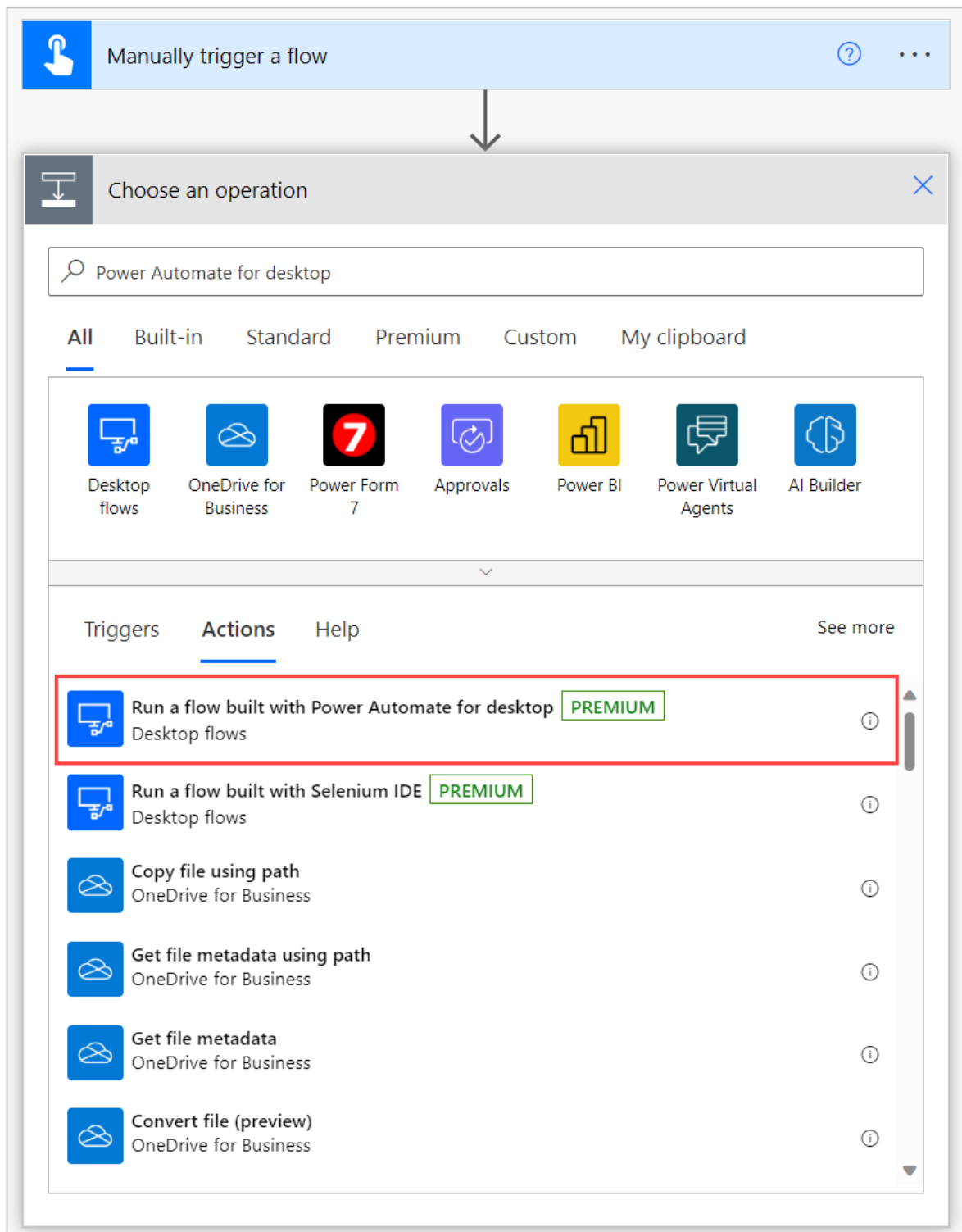


3. Sign in to the [Power Automate portal](#) to create a cloud flow with manual trigger.



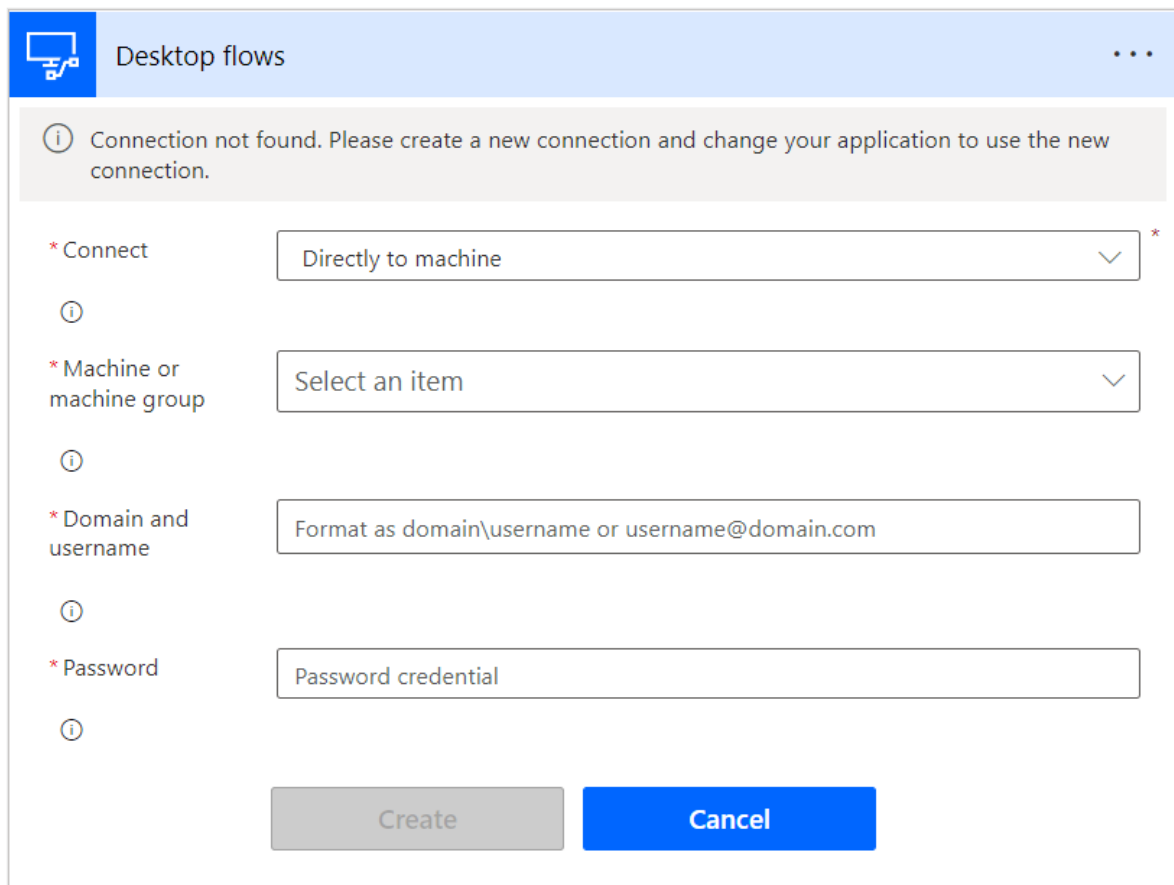
4. Add the appropriate action to run desktop flows.





5. Select [Directly to machine](#) from the list.

6. Select **Directly to machine** in the **Connect** field. Then, select the machine name on which you've installed Power Automate, and enter the machine credential (the username and password you use to sign in to the machine). To find more information about direct connectivity, see [Manage machines](#).



Desktop flows

Connection not found. Please create a new connection and change your application to use the new connection.

\* Connect Directly to machine \*

\* Machine or machine group Select an item

\* Domain and username Format as domain\username or username@domain.com

\* Password Password credential

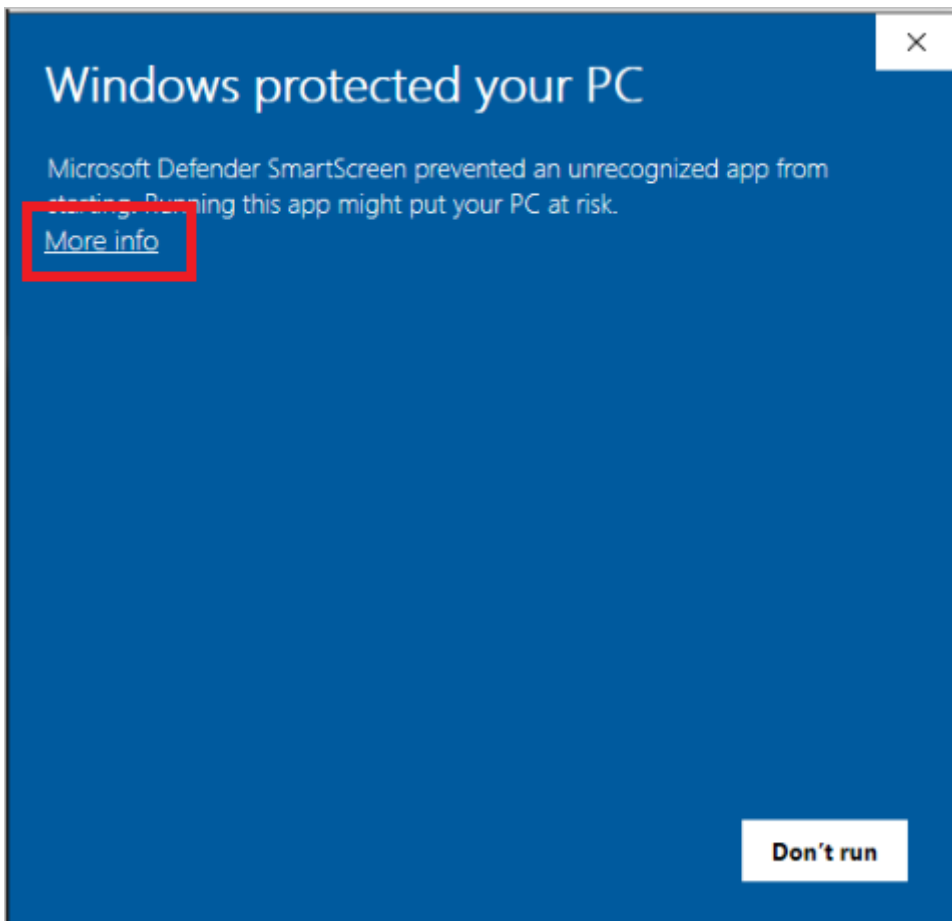
Create Cancel

## Install and configure Contoso CRM app

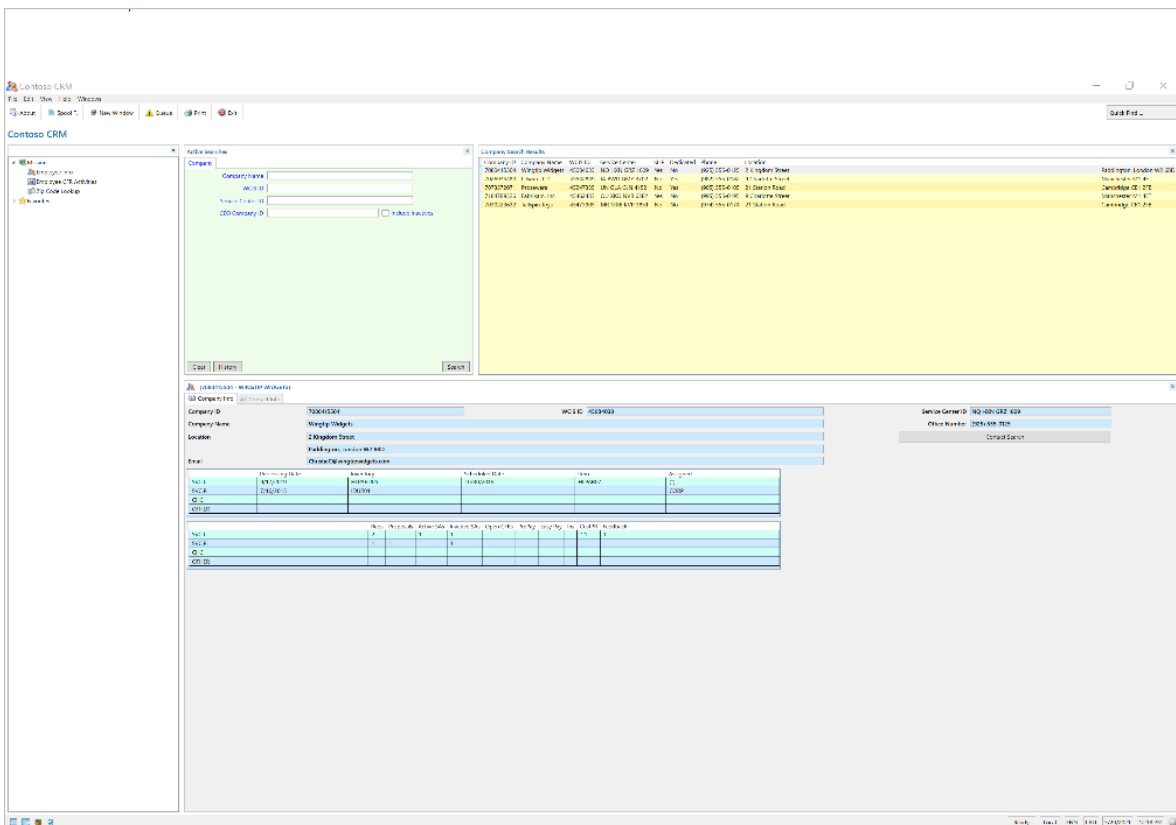
1. Download the [Contoso CRM app package](#) on the machine where the automation runs.
2. Run **setup.exe** from the extracted package.

The Contoso app shows you how the end-to-end automation scenario works so that you can follow the example to create your own automation.

Select **More info** > **Run anyway** on the **Windows protected your PC** screen that appears during the installation.

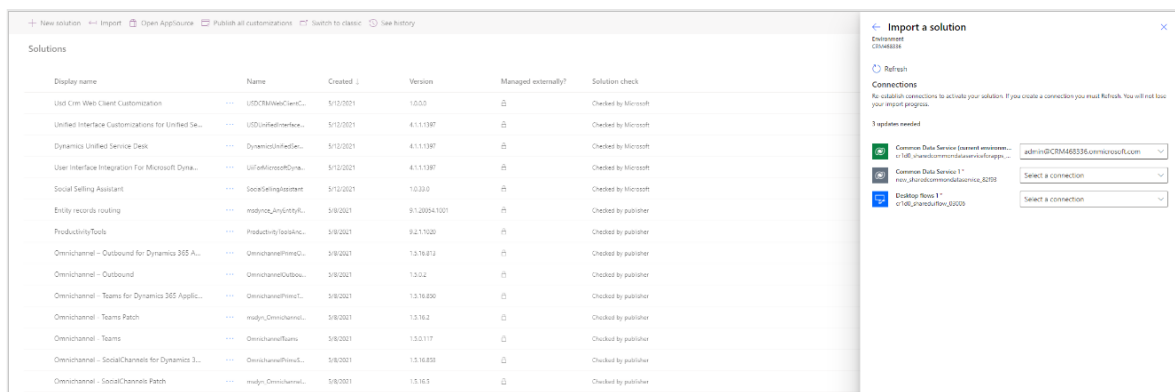


3. When the installation is complete, run the Contoso CRM app from the Windows Start menu.

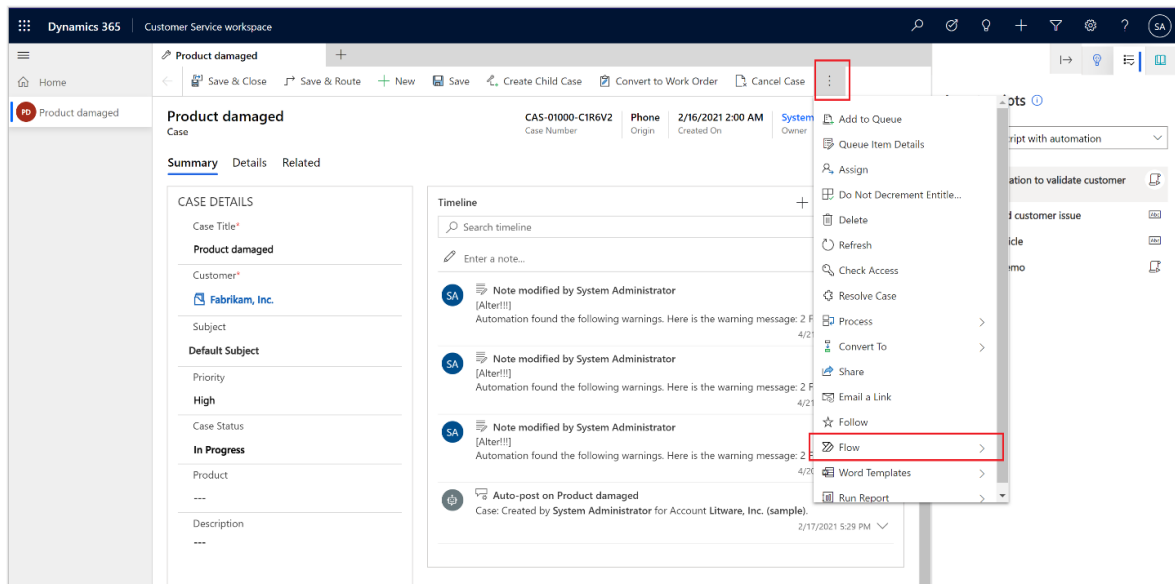


**Install the Dynamics 365 RPA solution**

1. [Download](#) the automation solution and save it on your machine.
2. Import the Dynamics 365 automation solution in the environment of your choice:
  - a. Go to <https://powerautomate.microsoft.com> and sign in using your work account.
  - b. Select the environment in which you wish to work.
  - c. In the vertical menu on the left of your screen, select **Solutions**.
  - d. In the main bar, select **Import** then **Browse**.
  - e. Navigate to the solution file you previously downloaded and double-click on it.
  - f. Select **Next**.
3. Configure the connections needed to be used by the solution in the environment:
  - a. For each connector the solution uses, either select an existing connection or create a new one using your Microsoft account and credentials of your choice.
  - b. For the **Desktop connection** domain/username and password, ensure you use the machine's Windows credentials.



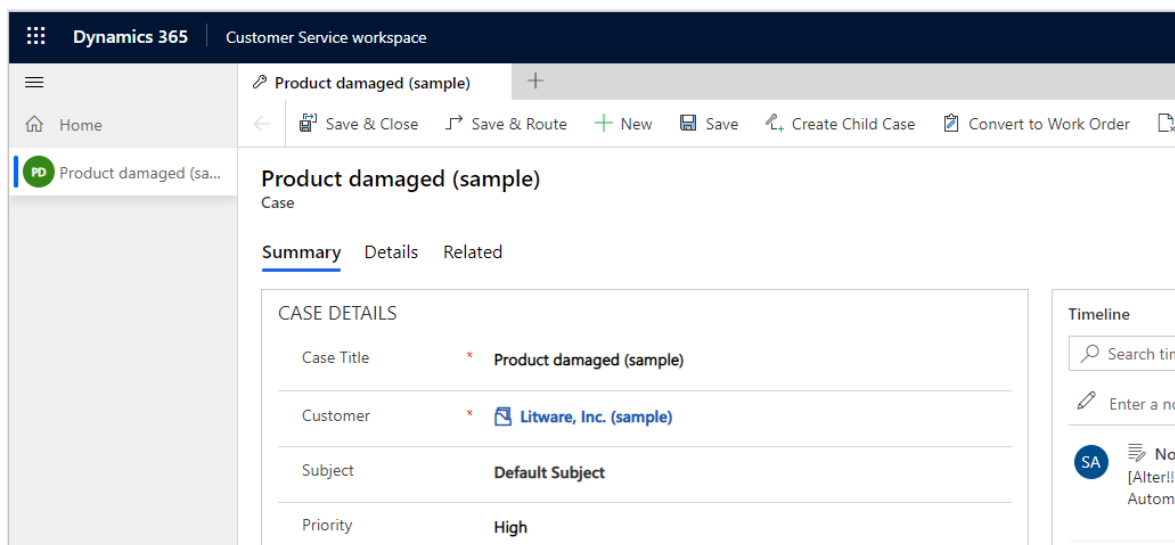
4. Go back to the tab in which you initiate the above step and select **Refresh**.
5. Select **Import**. The solution explorer shows you a message informing you that the solution is being imported. This step may take a few minutes.
6. Open **Case entity session – default template** (or your current case entity session template), open **Agent scripts** tab, and then add **Case agent script with automation**. To find more information about session templates, go to [Manage session templates](#).
7. From the Dynamics 365 Customer Service app, sign in to Power Automate.
  - a. From the case you're working on, select the ... menu > **Flow**.



8. Select **Login to Flow**.

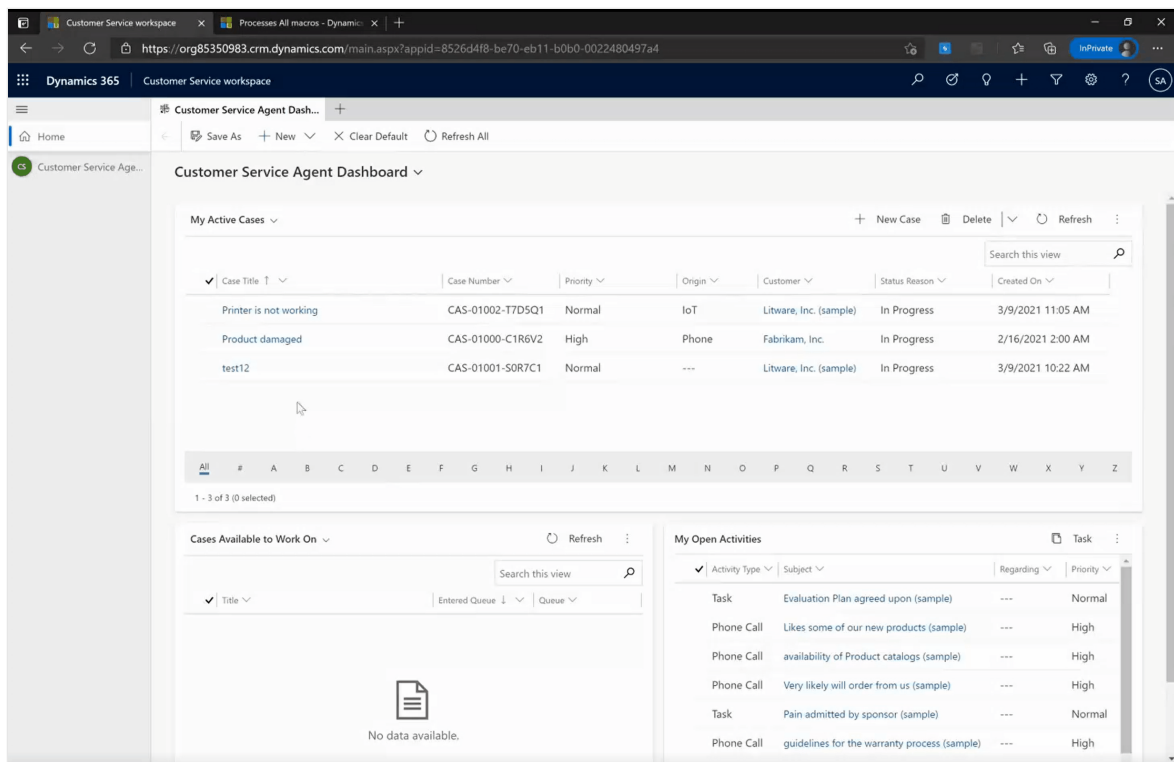
9. Authenticate using your Dynamics 365 account.

10. Now open one of your cases using **Shift + Left Click** to launch the productivity tools panel.



11. From the **Agent Script** session in the productivity panel, you can see several agent script steps. The first step is **Run Automation to validate Customer**. Select the **Run** button and confirm it runs.

12. The automation starts on the machine where you have installed Power Automate. You can watch how the automation uses the case data, opens the Contoso CRM app, and then finishes the lookup automatically. After the automation runs, refresh the timeline to view the logs regarding the run result. Here's a demo on how it runs.



## Customize the automation solution

1. Now, you can start customizing the automation to meet your unique requirements. To do this, open Power Automate and select **Edit** on the **Legacy Contoso App Contact Lookup** desktop flow. You can save a copy to work on your customizations or work on the template directly.
2. Notice that there are multiple child flows. Each child flow uses the keyboard or the mouse to interact with the Contoso CRM app. You need to update the steps to interact with your legacy app.
3. After testing the desktop flow, you can save it. Now, open the cloud flow in <https://powerautomate.microsoft.com/manage/solutions> from within the solution tab -> **Customer Service RPA solution**.

Display name	Name	Type	Managed...	Modified	Owner	Status
Automate csw profile	Automate csw profile	App profile		1 mo ago	System Adminis	Off
Automation to validate customer info	Automation to validate customer info	Cloud flow		3 wk ago	System Adminis	On
Automation_case_session_template	Automation_case_session_template	Session Templats		1 mo ago	System Adminis	Off
Case agent script with automation	Case agent script with automation	Agent script		1 mo ago	System Adminis	Off
Common Data Service (current environment) 1	Common Data Service (current environment) 1	Connection Refe		1 mo ago	System Adminis	Off
Common Data Service 1	Common Data Service 1	Connection Refe		1 mo ago	System Adminis	Off
Desktop flows 1	Desktop flows 1	Connection Refe		1 mo ago	System Adminis	Off
Find KB article	Find KB article	Agent script step		1 mo ago	System Adminis	Off
Legacy Contoso app contact lookup	Legacy Contoso app contact lookup	Desktop flow		1 mo ago	System Adminis	Off
Macro_Validate_Customer	Macro_Validate_Customer	Desktop flow		3 wk ago	System Adminis	On
Run automation to validate customer	Run automation to validate customer	Agent script step		1 mo ago	System Adminis	Off
Understand customer issue	Understand customer issue	Agent script step		1 mo ago	System Adminis	Off

- Open the cloud flow named **Automation to validate customer info** and expand each action to review. In the **Desktop flow** action, you can switch to use any desktop flow and input/output parameters. To find more information about triggering desktop flows from cloud flows, go to [Trigger desktop flows from cloud flows](#).
- Save the cloud flow. Go back to Dynamics 365 portal and trigger the agent script action to test. You'll see your customization automation running.
- Once you finished testing, you can share the cloud flow with everyone in the organization with run-only mode and switch it to run in [unattended mode](#). This way every agent will be able to reuse the same automation. License wise, the cloud flow should be put under a [per flow plan](#).

## Troubleshooting and known issues

Known issue	Workaround
Can't see the productivity tools panel in the Dynamics 365 customer service.	Productivity tools aren't available on the home session. You need to create a new session (Shift-click on case link) to see it. Productivity tools runtime initialization is async, so wait 1 – 2 seconds on home session before creating new sessions.
Agent can't see the flow	At the first time, every agent needs to sign in to the flow from the Dynamics 365 widget.
During installation, users get prompted multiple times to confirm the installation.	Confirm with <b>yes I am sure to install</b> every time prompted

<b>Known issue</b>	<b>Workaround</b>
The agent script isn't added to the current session template automatically after importing the demo solution.	Add manually the agent script to the case session template.



# Business process flows overview

Article • 03/10/2023

You can help ensure that people enter data consistently and follow the same steps every time they work with a customer by creating a business process flow. For example, you might want to create a business process flow to have everyone handle customer service requests the same way, or to require that people get approval for an invoice before submitting an order. Business process flows use the same underlying technology as other processes, but the capabilities that they provide are very different from other features that use processes. To learn how to create or edit a business process flow, go to [Create a business process flow](#).

[Watch a short video about business process flows.](#)

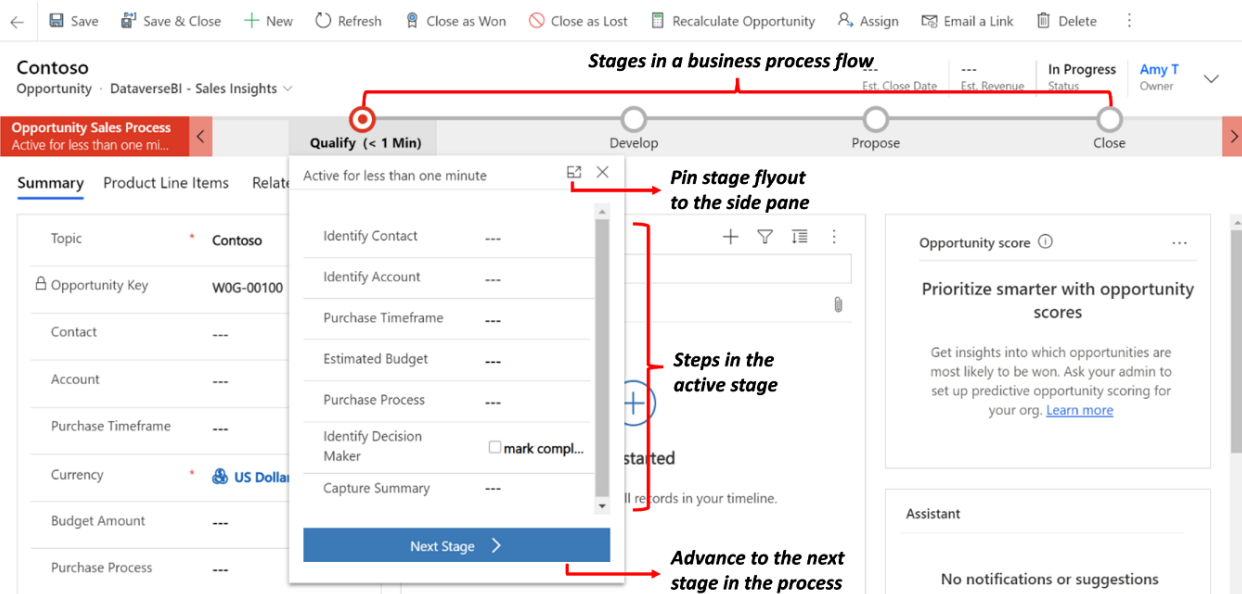
## Why business process flows are used

Business process flows provide a guide for people to get work done. They provide a streamlined user experience that leads people through the processes their organization has defined for interactions that need to be advanced to a conclusion of some kind. This user experience can be tailored so that people with different security roles can have an experience that best suits the work they do.

Use business process flows to define a set of steps for people to follow to take them to a desired outcome. These steps provide a visual indicator that tells people where they are in the business process. Business process flows reduce the need for training because new users don't have to focus on which table they should be using. They can let the process guide them. You can configure business process flows to support common sales methodologies that can help your sales groups achieve better results. For service groups, business process flows can help new staff get up-to-speed more quickly and avoid mistakes that could result in unsatisfied customers.

## What business process flows can do

With business process flows, you define a set of *stages* and *steps* that are then displayed in a control at the top of the form.



Each stage contains a group of steps. Each step represents a column where data can be entered. You can advance to the next stage by using the **Next Stage** button. In the unified interface, you can work with a business process flow stage inside the stage flyout or you can pin it to the side pane. Business process flows doesn't support expanding the stage flyout to the side pane on mobile devices.

You can make a step *required* so that people must enter data for a corresponding column before they can proceed to the next stage. This is commonly called "stage-gating". If you are adding a business-required or system-required column to a business process flow stage, we recommend that you add this column to your form as well.

Business process flows appear relatively simple compared to other types of processes because they don't provide any conditional business logic or automation beyond providing the streamlined experience for data entry and controlling entry into stages. However, when you combine them with other processes and customizations, they can play an important role in saving people time, reducing training costs, and increasing user adoption.

### ⓘ Note

If any stage, including the current stage, has required columns (except hidden columns), you must fill in the columns on those stages *before* you save the form or move to a new stage. Disabled columns will still block stage navigation if they are empty and required.

## Business process flows integrated with other customizations

When you or your user enters data using business process flows, the data changes are also applied to form columns so that any automation provided by business rules or form scripts can be applied immediately. Steps can be added that set values for columns that are not present in the form and these columns will be added to the `Xrm.Page` object model used for form scripts. Any workflows that are initiated by changes to columns included in a business process flow will be applied when the data in the form is saved. If the automation is applied by a real-time workflow, the changes will be immediately visible to the user when the data in the form is refreshed after the row is saved.

Although the business process flow control in the form does not provide any direct client-side programmability, changes applied by business rules or form scripts are automatically applied to business process flow controls. If you hide a column in a form, that column will also be hidden in the business process flow control. If you set a value by using business rules or form scripts, that value will be set within the business process flow.

## Concurrent process flows

Concurrent business process flows let customizers configure multiple business processes and associate them with the same starting row. Users can switch between multiple business processes running concurrently, and resume their work at the stage in the process that they were on.

## System business process flows

The following business process flows are included. To understand how business process flows work, review these system business process flows:

- Lead to Opportunity Sales Process
- Opportunity Sales Process
- Phone to Case Process

## Multiple tables in business process flows

You can use a business process flow for a single table or span multiple tables. For example, you may have a process that begins with an opportunity, then continues to a quote, an order, and then an invoice, before finally returning to close the opportunity.

You can design business process flows that tie together the rows for up to five different tables into a single process so that people using the app can focus on the flow of their

process rather than on which table they are working in. They can more easily navigate between related table rows.

## **Multiple business process flows are available per table**

Not every user in an organization may follow the same process and different conditions may require that a different process be applied. You can have up to 10 active business process flows per table to provide appropriate processes for different situations.

## **Control which business process flow will be applied**

You can associate business process flows with security roles so that only people with those security roles can see or use them. You can also set the order of the business process flows so that you can control which business process flow will be set by default. This works in the same way that multiple forms for a table are defined.

When someone creates a new table row, the list of available active business process definition is filtered by the user's security role. The first activated business process definition available for the user's security role according to the process order list is the one applied by default. If more than one active business process definitions is available, users can load another from the Switch Process dialog. Whenever processes are switched, the one currently rendered goes to the background and is replaced by the selected one, but it maintains its state and can be switched back. Each row can have multiple process instances associated (each for a different business process flow definition, up to a total of 10). On form load, only one business process flow is rendered. When any user applies a different process, that process may only load by default for that particular user.

To make sure a business process is loaded by default for all user (behavior equivalent to "pinning" the process), a custom Client API script (web resource) can be added on form load that specifically loads an existing business process instance based on the business process definition ID.

## **Business process flow considerations**

You can define business process flows only for those tables that support them. You also need to be aware of the limits for the number of processes, stages, and steps that can be added.

## Business process flows that call a workflow

You can call on-demand workflows from inside a business process flow. You can configure this from the new business process flow designer by dragging a workflow component to a process stage or to the Global Workflows section. For more information about using workflows in business process flows, see [Blog: Business process flow automation in Dynamics 365](#).

When you include a workflow that you want to trigger on Stage Exit of a stage in your business process flow, and that stage is the last stage in the flow, the designer gives the impression that the workflow will be triggered when that stage is completed. However, the workflow won't be triggered because a stage transition does not take place. You won't receive a warning or error preventing you from including the workflow on the stage. When a user interacts with the business process flow, finishing or abandoning the process does not result in a stage transition, and therefore the workflow is not triggered. Consider the following examples:

- You create a business process flow with two stages, S1 connects to S2, with a workflow on stage S2 and set the trigger to **Stage Exit**.
- You create a business process flow with three stages, S1 connect to S2, then S2 branches to S3. You include a workflow on S2 and set the trigger to **Stage Exit**.

The workflow won't trigger in either case. To work around this issue, you can add a Global Workflow and add the workflow you want to trigger to it so that the workflow is triggered for the business process rather than a stage of the process. You can set the trigger for a Global workflow to Process Abandoned or Process Completed to cause the workflow to trigger when a user abandons or completes the business process.

## Tables that can use business process flows

All custom tables can use business process flows. The following standard tables can also use business process flows:

- Account
- Appointment
- Campaign
- Campaign Activity
- Campaign Response
- Competitor
- Contact
- Email

- Entitlement
- Fax
- Case
- Invoice
- Lead
- Letter
- Marketing List
- Opportunity
- Phone Call
- Product
- Price List Item
- Quote
- Recurring Appointment
- Sales Literature
- Social Activity
- Order
- User
- Task
- Team

To enable a custom table for business process flows, select the **Business process flows (columns will be created)** check box in the table definition. Note that you can't undo this action.

#### ⓘ Note

If you navigate to the business process flow stage that contains the **Social Activity** table and choose the **Next Stage** button, you'll see the **Create** option. When you choose **Create**, the **Social Activity** form loads. However, because **Social Activity** isn't valid for **Create** from the app user interface, you won't be able to save the form and you'll see the error message: "Unexpected error."

## Maximum number of processes, stages, and steps

To ensure acceptable performance and the usability of the user interface, there are some limitations you need to be aware of when you plan to use business process flows:

- There can be no more than 10 activated business process flow processes per table.
- Each process can contain no more than 30 stages.

- Multi-table processes can contain no more than five tables.

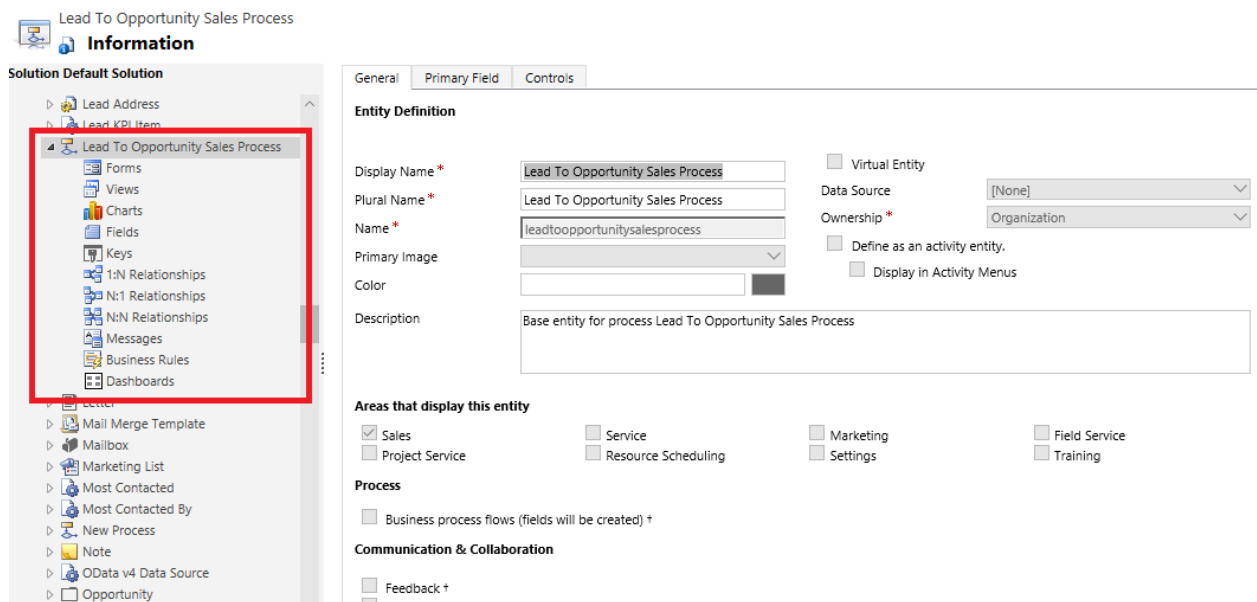
# Business process flow table customization support

Introduced in the Dynamics 365 (online), version 9.0 update, business process flow tables can appear in the system so that table row data can be made available in grids, views, charts, and dashboards.

## Use business process flow table rows with grids, views, charts, and dashboards

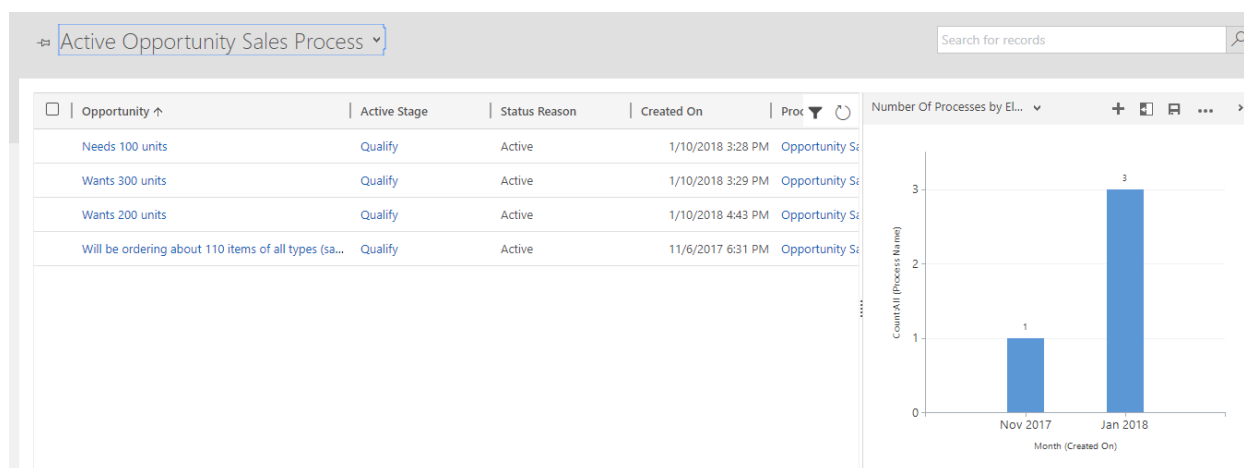
With business processes flows available as a table, you can now use advanced finds, views, charts, and dashboards sourced from business process flow data for a given table, such as a lead or opportunity. System administrators and customizers can create custom business process flow grids, views, charts, and dashboards similar to those created with any other table.

Business process flows, such as **Lead To Opportunity Sales Process**, appear as a customizable table in solution explorer.



To access a default business process flow view, open solution explorer, expand **Tables** > expand the process that you want, such as **Lead To Opportunity Sales Process**, select **Views**, and then select the view that you want.

Several default views are available that you can view as a chart, such as the **Active Opportunity Sales Process** view.



## Interact with the business process flow table from a workflow

You can also interact with business process flow tables from a workflow. For example, you can create a workflow for the Business Process Flow table row to change the Active Stage when a column on the Opportunity table row is updated. For more information about how to do this, see [Automate business process flow stages using workflows](#).

## Run business process flows offline

You can use business process flows offline if the following conditions are met:

- The business process flow is used from a Power Apps app.
- The Power Apps app is enabled for offline use.
- The business process flow has a single table.

Specifically, the three commands that are available for a business process flow when the Power Apps app is offline are:

- Next stage
- Previous stage
- Set Active stage

## Lookup column in a business process flow stage

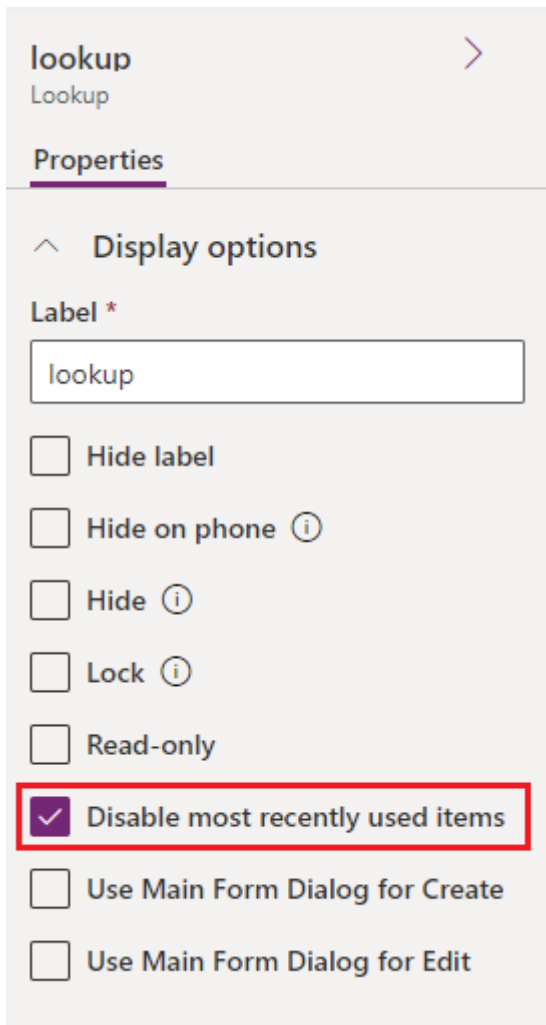
Recent rows are visible in a lookup column in the unified interface. To prevent the most recently used items from showing up in the lookup, follow these steps:

1. Sign in to [Power Apps](#).

To learn more about using the Power Apps interface, go to [Get started with Power Apps](#).



2. Select the correct environment from the top right.
3. On the left navigation pane, select **More > Tables**.
4. Search for your table and select your business process flow table.
5. In the **Data Expressions** group, select **Forms**.
6. On the **Forms** screen, select **Information**.
7. Select your lookup data step from the **Tree view**, and then check **Disable most recently used items**.



The screenshot shows the 'lookup' properties dialog box. The 'Display options' section is expanded, showing a list of checkboxes. The 'Disable most recently used items' checkbox is checked and highlighted with a red box.

lookup  
Lookup

**Properties**

^ Display options

Label \*

lookup

Hide label

Hide on phone ⓘ

Hide ⓘ

Lock ⓘ

Read-only

**Disable most recently used items**

Use Main Form Dialog for Create

Use Main Form Dialog for Edit

8. Save and then publish.


## Limitations of using business process flow tables

- Currently, you can't create custom forms for tables based on a business process flow.
- If a solution includes a business process flow table, the business process flow table must be manually added to the solution before you export it. Otherwise, the

business process flow table won't be included in the solution package. To learn more, go to [create and edit tables](#).

- Adding the process table to a model-driven app may result in limited functionality. To learn more, go to [creating and editing business process flows](#).
- Business process flows will show the name of the BPF instance, which is set at the time that the BPF instance is created. This means if the name in the BPF definition changes, new BPF instances will display the updated name, but older BPF instances will display the original name. It also means localized BPF definition names aren't displayed.

## See also

- [Get started with Power Apps](#)
- [Get started with Power Apps](#)
- [Whitepaper: Process Enablement with Dynamics 365](#) 

# Tutorial: Create a business process flow

Article • 02/22/2023

## Important

As of August 2022, you can no longer create or manage business process flows from Power Automate outside of the solution explorer. Business process flows and instances continue to be supported through the solution explorer, Power Apps, and Dataverse table views.

This article shows you how to create a business process flow with [Power Apps](#). To learn more about the benefits of using business process flows, go to [Business process flows overview](#). For information on how to create mobile task flows, go to [Create a mobile task flow](#).

When a user starts a business process flow, the stages and steps of the process display in the process bar at the top of a form.

The screenshot displays a business process flow interface. At the top, a process bar shows stages: **Qualify (< 1 Min)**, **Develop**, **Propose**, and **Close**. A **Next Stage >** button is located below the 'Qualify' stage. A flyout menu is open for the 'Qualify' stage, listing steps: **Identify Contact**, **Identify Account**, **Purchase Timeframe**, **Estimated Budget**, **Purchase Process**, **Identify Decision Maker** (with a 'mark compl...' checkbox), and **Capture Summary**. A plus sign icon in the flyout is annotated with 'Steps in the active stage'. A red arrow points from the 'Next Stage' button to the text 'Advance to the next stage in the process'. Another red arrow points from the flyout menu to the text 'Pin stage flyout to the side pane'. The background shows a form with fields for 'Topic', 'Opportunity Key', 'Contact', 'Account', 'Purchase Timeframe', 'Currency', 'Budget Amount', and 'Purchase Process'.

## Tip

After you create a business process flow definition, you can control who can create, read, update, or delete the business process flow instance. For example, for service-related processes, you could provide full access for customer service reps to change the business process flow instance, but provide read-only access to the instance for sales reps so that they can monitor post-sales activities for their customers. To set

security for a business process flow definition that you create, select **Enable Security Roles** on the action bar.

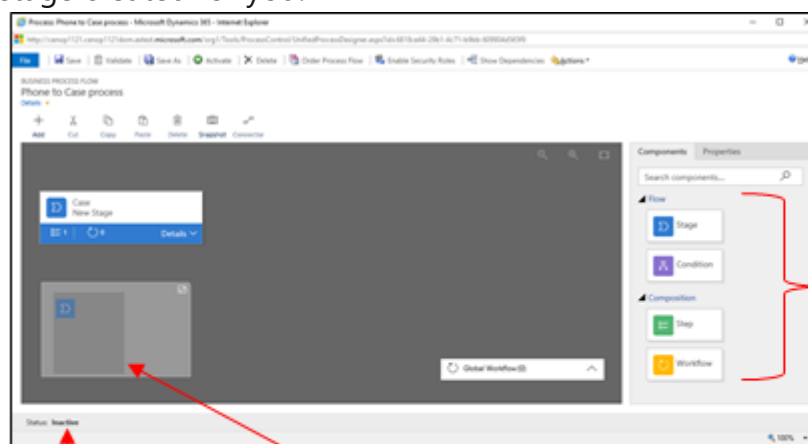
## Prerequisites

- To create business process flows, you need a Power Apps or Power Automate **per user license**, or a [Dynamics 365 license plan](#) that includes business process flow use rights.
- A table with which the business process flow will be associated. If the business process flow isn't related to an existing table, [create a new table](#) before you create the flow.

## Create a business process flow

1. In [Power Apps](#) or [Power Automate](#), select **Solutions** from the navigation bar on the left.
2. Select or create a [solution](#) to use for the business process flow.
3. Within the solution, select **New > Automation > Process > Business process flow**.
  - a. Give your flow a **Display name** and **Name (LogicalName)**.
  - c. Select the table from which the flow will be used.
  - d. Select **Create**.

The new business process flow is created. You can now edit it with a first single stage created for you.



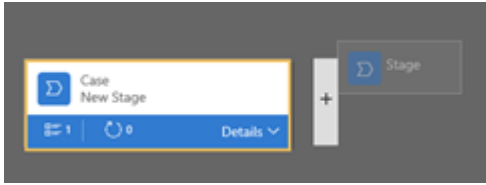
This process hasn't been activated yet.

Use the mini-map to see the whole process or to navigate quickly to a part of the process.

Drag components to the design window, and set properties to create a business process flow.

4. **Add stages.** If your users will progress from one business stage to another in the process:

- a. Drag a **Stage** component from the **Components** tab and drop it on a + sign in the designer.



- b. To set the properties for a stage, select the stage, and then set the properties in the **Properties** tab on the right side of the screen:

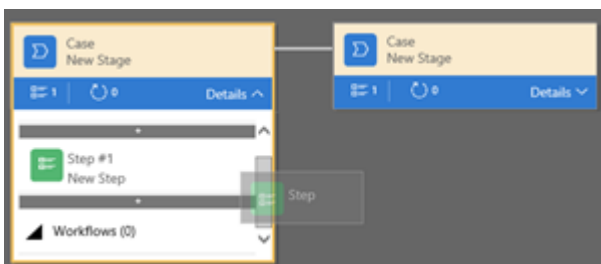
- Enter a display name.
- If desired, select a category for the stage. The category (such as **Qualify** or **Develop**), appears as a chevron in the process bar.



- When you're done changing properties, select the **Apply** button.

5. **Add steps to a stage.** To see the steps in a stage, select **Details** in the lower-right corner of the stage. To add more steps:

- a. Drag the **Step** component to the stage from the **Components** tab.



- b. Select the step, and then set properties in the **Properties** tab:

- i. Enter a display name for the step.
- ii. If you want users to enter data to complete a step, select the appropriate column from the drop-down list.
- iii. Select **Required** if people must fill in the column to complete the step before moving to the next stage of the process.
- iv. Select **Apply** when you're done.

ⓘ **Note**

- If you set a two-option boolean column as **Required**, users can't continue unless the column value is **Yes**. The user is required to mark the column as completed before moving to the next stage.
- If either **Yes** or **No** are acceptable column values, then you should make the column a choice instead of a two-option boolean column.

6. **Add a branch (condition) to the process.** To add a branching condition:

- a. Drag the **Condition** component from the **Components** tab to a + sign between two stages.



- b. Select the condition, and then set properties in the **Properties** tab. For more information on branching properties, go to [Enhance business process flows with branching](#). When you're finished setting properties for the condition, select **Apply**.

7. **Add a workflow.** To invoke a workflow:

- a. Drag a **Workflow** component from the **Components** tab to a stage or to the **Global Workflow** item in the designer. Which one you add it to depends on the following:

- **Drag it to a stage** when you want to trigger the workflow on entry or exit of the stage. The workflow component must be based on the same primary table as the stage.
- **Drag it to the Global Workflow item** when you want to trigger the workflow when the process is activated or when the process is archived (when the status changes to **Completed** or **Abandoned**). The workflow component must be based on the same primary table as the process.

- b. Select the workflow, and then set properties in the **Properties** tab:

- i. Enter a display name.
- ii. Select when the workflow should be triggered.
- iii. Search for an existing on-demand active workflow that matches the stage table or create a new workflow by selecting **New**.
- iv. Select **Apply** when you're done.

For more information on workflows, go to [Workflow processes](#).

8. To validate the business process flow, select **Validate** on the action bar.
9. To save the process as a draft while you continue to work on it, select **Save** in the action bar.

**Important**

As long as a process is a draft, people won't be able to use it.

10. To activate the process and make it available to your team, select **Activate** on the action bar.
11. To provide control over who can create, read, update, or delete the business process flow instance, select **Edit Security Roles** on the command bar of the designer. For example, for service-related processes, you could provide full access for customer service reps to change the business process flow instance, but provide read-only access to the instance for sales reps so they can monitor post-sales activities for their customers.

In the **Security Roles** screen, select the name of a role to open the security role information page. Select the Business Process Flows tab, and then assign appropriate privileges on the business process flow for a security role.

**Note**

The System Administrator and System Customizer security roles have access to new business process flows by default.

**Security Role: Common Data Service User**

Entity	Create	Read	Write	Delete	Append	Append To	Assign	Share
Expired Process	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>		
Idea to Project Business Process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
My BPF	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
New Process	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>		
Challenge Management Process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
Translation Process	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>		

Specify privileges by selecting the appropriate radio buttons, and click Save. For more information about privileges, go to [Business process flow privileges](#).

Next, don't forget to assign the security role to appropriate users in your organization.

## 💡 Tip

Here are a few tips to keep in mind as you work on your task flow in the designer window:

- To take a snapshot of everything in the business process flow window, select **Snapshot** on the action bar. This is useful, for example, if you want to share and get comments on the process from a team member.
- Use the mini-map to navigate quickly to different parts of the process. This is useful when you have a complicated process that scrolls off the screen.
- To add a description for the business process, select **Details** under the process name in the left corner of the business process flow window. You can use up to 2,000 characters.

## Edit a business process flow

To edit a business process flow, open the solution explorer, select **Processes**, and then select the **Business Process Flow** from the list of processes that you want to edit.

When you select the name of the business process flow you want to edit from the list of processes, it opens in the designer, where you can make any updates you want. Expand **Details** under the name of the process to rename it or add a description, and view additional information.

The screenshot shows the 'Opportunity Sales Process' details in the Business Process Flow designer. The interface includes a title bar with 'BUSINESS PROCESS FLOW' and 'Opportunity Sales Process', and a 'Details' dropdown menu. The main area contains several input fields: 'Process Name' (Opportunity Sales Process), 'Owner' (SYSTEM), 'Name' (opportunitiesalesprocess), 'Description' (This is the default process flow for working on an opportunity.), 'Primary Entity' (Opportunity), and 'Category' (Business Process Flow).

Property	Value
Process Name	Opportunity Sales Process
Owner	SYSTEM
Name	opportunitiesalesprocess
Description	This is the default process flow for working on an opportunity.
Primary Entity	Opportunity
Category	Business Process Flow

## Other things to know about business process flows

### Edit Stages

Business process flows can have up to 30 stages.

You can add or change the following properties of a stage:



- **Stage Name**
- **Table.** You can change the table for any stage except the first one.
- **Stage Category.** A category lets you group stages by a type of action. It is useful for reports that will group rows by the stage they are in. The options for the stage category come from the Stage Category global choice. You can add additional options to this global choice and change the labels of existing options if you want. You can also delete these options if you wish, but we recommend that you keep the existing options. You won't be able to add the exact same option back if you delete it. If you don't want them to be used, change the label to "Do not use".
- **Relationship.** Enter a relationship when the preceding stage in the process is based on a different table. For the stage currently being defined, choose **Select relationships** to identify a relationship to use when moving between the two stages. It is recommended you select a relationship for the following benefits:
  - Relationships often have column maps defined that automatically carry over data between rows, minimizing data entry.
  - When you select **Next Stage** on the process bar for a row, any rows that use the relationship will be listed in the process flow, thereby promoting reuse of rows in the process. In addition, you can use workflows to automate creation of rows so that the user simply selects it instead of creating one to further streamline the process.

### **Edit Steps**

Each stage can have up to 30 steps.

### **Add branch**

To learn about adding a branch to a stage, go to [Enhance business process flows with branching](#).

To make a business process flow available for people to use, you must order the process flow, enable security roles, and activate it.

### **Set Process Flow Order**

When you have more than one business process flow for a table (row type), you'll need to set which process is automatically assigned to new rows. In the command bar, select **Order Process Flow**. For new rows or rows that do not already have a process flow associated with them, the first business process flow that a user has access to is the one that will be used.

## Enable Security Roles

Users have access to a business process flow depending on the privilege defined on the business process flow in the security role assigned to the user.

By default, only the **System Administrator** and **System Customizer** security roles can view a new business process flow.

To specify privileges on a business process flow, open the business process flow for edit, and then select **Edit Security Roles** on the command bar of the business process flow designer. See step 13 under [Create a business process flow](#) listed earlier in this topic.

## Activate

Before anyone can use the business process flow, you must activate it. In the command bar, select **Activate**. After you confirm the activation, the business process flow is ready to use. If a business process flow has errors, you will not be able to activate it until the errors are corrected.

# Add an on-demand action to a business process flow

The Dynamics 365 (online), version 9.0 update introduces a business process flow feature: business process flow automation with Action Steps. You can add a button to a business process flow that will trigger an action or workflow.

## Add on-demand workflows or actions using an Action Step

Suppose that, as part of the opportunity qualification process, the Contoso organization requires all opportunities to be reviewed by a designated reviewer. Subsequently, the Contoso organization created an action that:

- Creates a task row that is assigned to the opportunity reviewer.
- Appends "Ready for review" to the opportunity topic. Additionally, Contoso needs to be able to run these actions on demand. To integrate these tasks into the opportunity qualification process, the actions must appear on the opportunity business process flow. To enable this functionality, select **As a Business Process**

## Flow action step.

Process: Ready for review

Working on solution: Default Solution

Information

Common

- Information
- Audit History

Process Sessions

- Process Sessions

General Administration Notes

Hide Process Properties

Process Name \* Ready for review

Unique Name \* new\_Readyforreview

Activate As Process

Entity Opportunity

Category Action

Enable rollback

Available to Run

As a Business Process Flow action step

Workflow Log Retention

Keep logs for workflow jobs that encountered errors

Hide Process Arguments

Name	Type	Required	Direction
NewArgument	String	Optional	Input

Name \*

Type \* Boolean

Entity

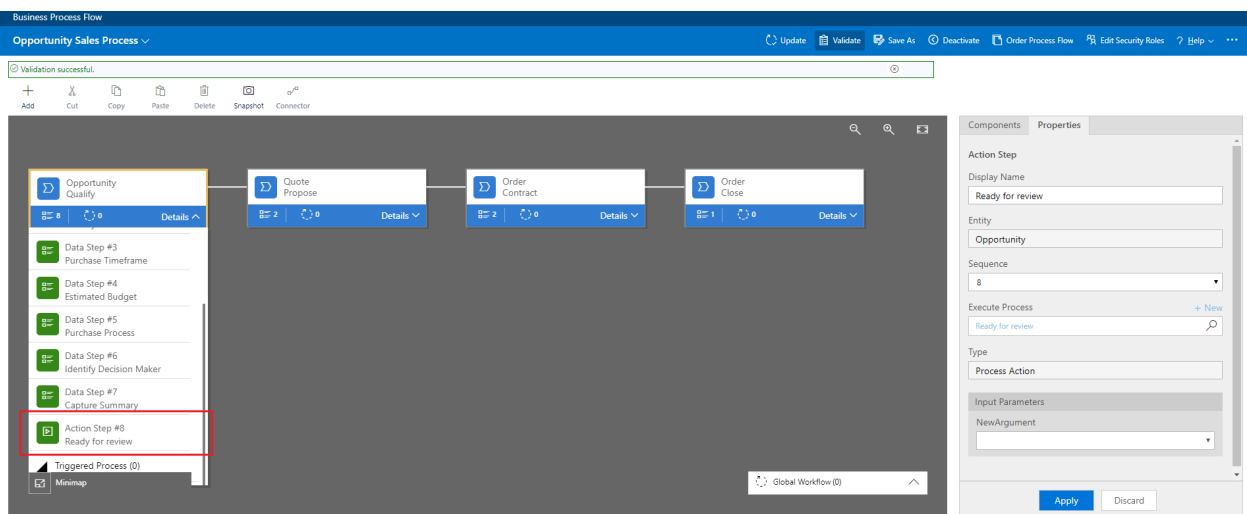
Required

Direction  Input  Output

Description

- Create a task for the opportunity reviewer  
Create: Task [View properties](#)
- Append opportunity topic with "Ready for review"  
Update: Opportunity [View properties](#)

Next, the Action Step is added to Contoso's opportunity business process flow. Then the process flow is validated and updated.



Now, members of Contoso's salesforce can kick-off the action from the **Opportunity Qualify** business process step, on demand, by selecting **Execute**.

The screenshot shows a CRM interface for an opportunity titled "Wants 200 units". At the top, there's a progress bar with stages: "Qualify (Active for 23 hours)", "Propose", "Contract", and "Close". Below this, a list of steps is shown with checkboxes and actions: "Identify Contact" (checked, "click to enter"), "Identify Account" (checked, "click to enter"), "Purchase Timeframe" (checked, "click to enter"), "Estimated Budget" (\$100,000.00, "click to enter"), "Purchase Process" (checked, "click to enter"), and "Identify Decision Maker" (checked, "mark complete"). The "Propose" step is highlighted with a red box, showing "Ready for review" and "Execute" buttons. Below the progress bar, there's a "Summary" section with fields for Topic, Contact, Account, Purchase Timeframe, Currency, Budget Amount, Purchase Process, and Description. To the right, there's a "Relationship Assistant" section with a "Let's Go!" button and a "POSTS" section with an "Enter post here" field and a "POST" button. At the bottom right, there's a "STAKEHOLDERS" table with columns for Name and Role, showing "Rene Valdes (sample)" as a Stakeholder.

## **i** Important

- To be able to execute an action or workflow on demand, the business process flow must include an Action Step. If the Action Step runs a workflow, the workflow must be configured to run on demand.
- The table associated with the action or workflow must be the same as the table associated with the business process flow.

## Limitation of using Action Steps in a business process flow

- Actions are not available as Action Steps if the input or output parameters are Table, EntityCollection, or OptionSet (Choice) types. Actions with more than one EntityReference output parameter or any number of EntityReference input parameters are not available as Action Steps. Actions not associated with a primary table (global action) are not available as Action Steps.

## The action center

When you need to see the list of business process flows in which you're involved, check out the unified action center.


# Approvals

Received Sent History

Request	Received
Approve vacay request	Oct 2, 07:30 PM (1 d ago)
New email to Deon in your inbox	Oct 2, 07:27 PM (1 d ago)

## Business process flows

Active Inactive



**Nothing needs your attention right now**

In the unified action center, you will see all business processes in which you're assigned at least one Microsoft Dataverse table row that the process uses. For example, if a business process uses the **Lead** and **Opportunity** tables in Dataverse, you will see all instances of this process where either the Lead or the Opportunity row is assigned to you.

View all instances that are currently being worked under the **Active** tab. From this tab, you can view the following details:

- The name of the process.
- The current stage for each process.
- The owner of the Dataverse row associated with the active stage.
- The time since the instance was created.

Select an instance to open it in a new tab, or select it to copy a link, share a link via email, abandon, or delete the instance.

## Next steps

- [Business process flows overview](#)
- [Enhance business process flows with branching](#)
- [Overview of approvals](#)
- [Detailed steps for adding an instant flow to a business process flow](#)

# Create instant flows in business process flows

Article • 12/16/2022

You can run an **instant flow** to automate repetitive tasks, generate documents, track approvals, and more, from inside a stage in a business process.

## Add an instant flow as a step in a business process

Let's assume you sell printers and you use the **Lead to Opportunity Sales Process** to close deals. As part of this process, you'd like to have the team lead review and approve proposals that the sales team puts together in an earlier stage of the business process flow before sharing it with the customer.

To do this, you'll need to do two things:

1. Build an instant flow that requests review and approval of the proposal from the team.
2. Add the instant flow as a step in the **Lead to Opportunity Sales Process**.

### Tip

Only **solution-aware flows** can be added as a step in a business process.

## Build an instant flow

1. In Power Automate, select **Solutions** in the navigation menu.
2. Select **Default Solution** from the list of solutions that appears.
3. Select the + **New** menu, and then select **Flow** from the list that appears.
4. Search for, and then select the **Microsoft Dataverse** connector.
5. Search for, and then select the **When a row is selected** trigger from the list of **Microsoft Dataverse** triggers.
6. Set **Environment** to **Default**, and then set **Table Name** to **Lead to Opportunity Sales Process**.

7. Add a text input column for the user to enter the link to the proposal.

When a record is selected

\* Environment: Default

\* Entity Name: Lead To Opportunity Sales Process

Proposal: Provide a link to your proposal here

+ Add an input

We'll need information from the business process flow instance to help provide context for the approval request so follow these steps to do this.

8. Add the **Parse JSON** action.

9. Set **Content** to **table** by selecting it from the list of dynamic values for the **When a row is selected** trigger.

10. Paste the following content into the **Schema** column.

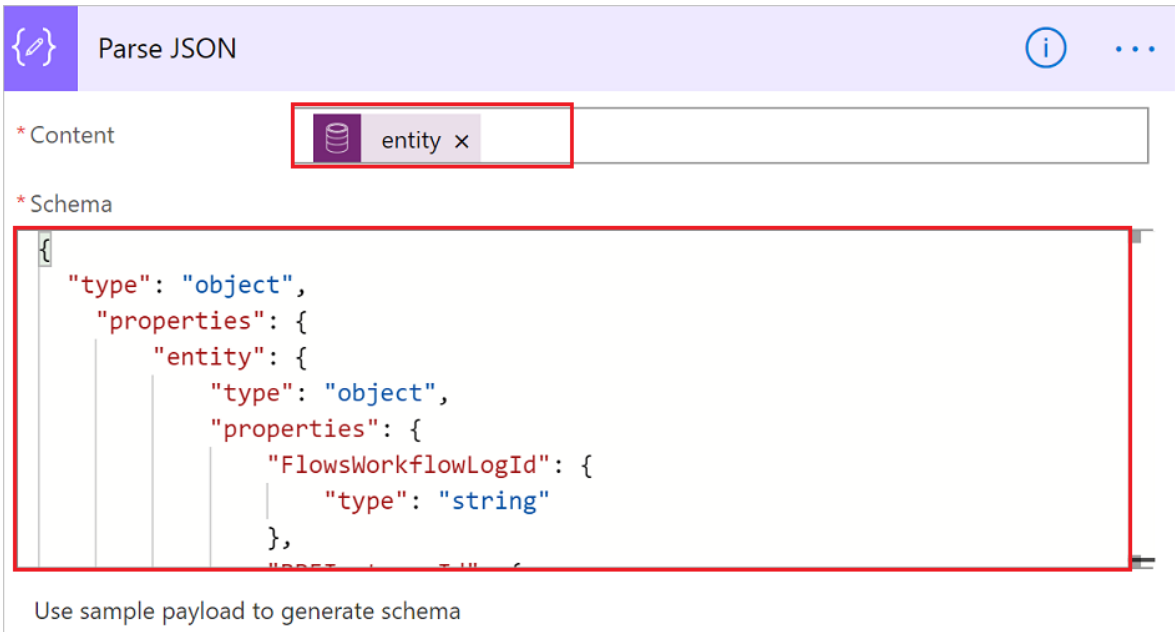
```
JSON

{
  "type": "object",
  "properties": {
    "entity": {
      "type": "object",
      "properties": {
        "FlowsWorkflowLogId": {
          "type": "string"
        },
        "BPFInstanceId": {
          "type": "string"
        },
        "BPFInstanceEntityName": {
          "type": "string"
        },
        "BPFDefinitionId": {
          "type": "string"
        },
        "BPFDefinitionEntityName": {
          "type": "string"
        },
        "StepId": {
          "type": "string"
        },
        "BPFDefinitionName": {
```



```
        "type": "string"
    },
    "BPFInstanceName": {
        "type": "string"
    },
    "BPFFlowStageLocalizedName": {
        "type": "string"
    },
    "BPFFlowStageEntityName": {
        "type": "string"
    },
    "BPFFlowStageEntityCollectionName": {
        "type": "string"
    },
    "BPFFlowStageTableRowID": {
        "type": "string"
    },
    "BPFActiveStageId": {
        "type": "string"
    },
    "BPFActiveStageEntityName": {
        "type": "string"
    },
    "BPFActiveStageLocalizedName": {
        "type": "string"
    }
}
}
}
}
```

Things should look like this now:



11. Add the **Get row by ID** action from the **Microsoft Dataverse** connector.

12. Set Table Name to Lead to Opportunity Sales Process, and Row ID to BPFFlowStageTableRowID.

Get record

\* Environment (Current)

\* Entity Name Lead to Opportunity Sales Processes

\* Item identifier BPFFlowStageEntityRecordId

Add dynamic content

Now that we have the data, define the approval process by adding the **Start and wait for an approval (V2)** action, and then filling in the relevant information. Learn more about [approvals](#) if you are not familiar.

**Tip**

- Use the dynamic content picker to add columns from the **Get row by ID** action to add relevant information to the approval request so that approvers can easily know what the request is about.
- To provide further context regarding the active stage that the business process is in, add the **BPFActiveStageLocalizedName** column from the list of dynamic values.

Your **Start and wait for an approval (V2)** card might look similar to this one:

Start and wait for an approval

\* Approval type Approve/Reject - First to respond

\* Title Please review and approve this proposal

\* Assigned to <email\_addresses\_of\_the\_approvers>

Details BPFActiveStageLocalizedName has a new proposal for your review. Select the link below to get started reviewing it.

Item link Proposal

Item link description Describe the link to the item

Show advanced options

Add dynamic content

13. Finally, save the flow and then turn it on.

## Add this flow as a step in the Lead to Opportunity Sales Process.

Now that you've created the instant flow, all that's needed is for you to add it to your business process flow.

1. Open the **Lead to Opportunity Sales Process** in the business process flow designer.
2. Drag and drop the **Flow Step (Preview)** from the list of **Components** onto the **Propose** stage.
3. Next, select the search icon in the **Select a Flow** column to list all flows that you can added to a business process flow.
4. Select a cloud flow from the list, and then save your changes by selecting the **Apply** button at the bottom of the properties pane.
5. Finally, select the **Update** button to make this business process flow with its new instant flow step available to your users.

## Flow step considerations

The status of your flow step might be **Processing** even after your flow successfully ran to completion, if you are not writing to the process log. In order to mark a cloud flow step as completed, add the **Update a row** action of the Microsoft Dataverse connector under the **If yes** path. Set the **Table** to **Process Logs**. Then set **Row ID** to **FlowsWorkflowLogId** by picking it from the list of dynamic values. Finally, set **Status Value** to **Succeeded** by selecting it from the dropdown.

### ⓘ Note

The user requires read access to the **System Jobs** table in Dataverse for the status to change from *Processing* to *Completed*.

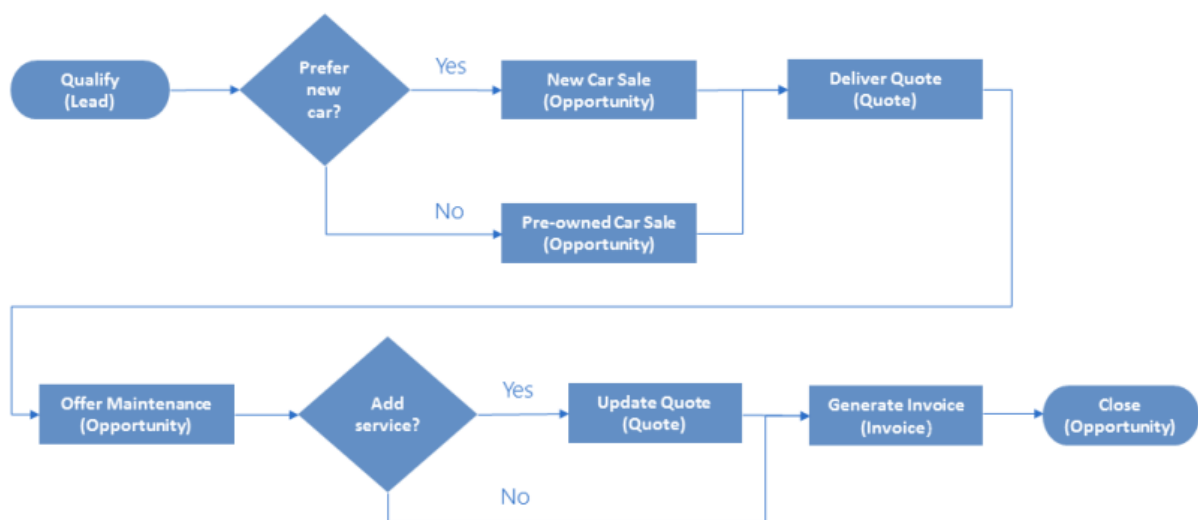
# Tutorial: Enhance business process flows with branching

Article • 05/05/2023

Business process flows guide you through various stages of sales, marketing, or service processes toward completion. In simple cases, a linear business process flow is a good option. However, in more complex scenarios, you can enhance a business process flow with branching. If you have the create permissions on business process flows, you'll be able to create business process flow with multiple branches by using the **If-Else** logic. The branching condition can be formed of multiple logical expressions that use a combination of **AND** or **OR** operators. The branch selection is done automatically, in real time, based on rules defined during the process definition. For example, in selling cars, you can configure a single business process flow, which after a common qualification stage splits into two separate branches on the basis of a rule (Does the customer prefer a new car or pre-owned car, is their budget above or below \$20,000, and so on. ), one branch, for selling new cars and another branch, for selling pre-owned cars. For more information about Business process flows, see [Business process flows overview](#).

The following diagram shows a business process flow with branches.

## Car sales process



## What you need to know when designing business process flows with branches

Take notice of the following information when you design the business process flow with the branches:

- A process can span across a maximum of five unique tables.
- You can use a maximum of 30 stages per process and a maximum of 30 steps per stage.
- Each branch can be no more than five levels deep.
- Branching rule must be based on the steps in the stage that immediately precedes it.
- You can combine multiple conditions in a rule by using the **AND** operator or the **OR** operator, but not both operators.
- When you define a process flow, you can optionally select a table relationship. This relationship must be a 1:N (One-to-Many) table relationship.
- More than one active process can run concurrently on the same data row.
- You can rearrange tiles (Stages, Steps, Conditions etc.) on the process flow using drag and drop.
- When merging branches, all peer branches must merge to a single stage. The peer branches must all either merge to a single stage, or each peer branch must end the process. A peer branch can't merge with other branches and at the same time end the process.
- Client API changes can't trigger evaluation of branching condition, as branching relies on Business rules.
- For forms in model-driven apps, interacting with future stages triggers their conditions and business rules. However, if the active stage remains the same, those rules won't be run again when the form reloads. Only rules in the active stage are run on form load.

#### ⓘ Note

- A table used in the process can be revisited multiple times (multiple closed table loops).
- A process can go back to the previous stage regardless of a table type. For example, if the active stage is **Deliver Quote** on a quote row, process users

can move the active stage back to the **Propose** stage on an opportunity row.

In another example, suppose a process is currently in the **Present Proposal** stage in your process flow: **Qualify Lead** > **Identify Needs** > **Create Proposal** > **Present Proposal** > **Close**. If the proposal presented to the customer requires more research to identify customer needs, users can simply select the **Identify Needs** stage of your process and choose **Set Active**.

## Example: Car selling process flow with two branches

Let's look at the example of the business process flow with two branches, for selling new and pre-owned cars.

First, we'll create a new process named **Car Sales Process**.

1. [Open solution explorer](#) and then in the left navigation pane select **Processes**.
2. Select **New** to create a new process.
3. Specify the **Category** as **Business Process Flow** and for the primary **Entity** choose **Lead**.
4. Add the first stage to the process called **Qualify** and add steps **Purchase Time frame** and **Car Preference**.
5. After the common **Qualify** stage, we split the process into to two separate branches, by using the **Condition** tile.
  - a. Configure the condition tile with rules that meet your business requirements
  - b. To add the first branch for a stage, add a Stage tile on the "Yes" path of the condition tile
  - c. To add the second branch that is executed when condition isn't satisfied, add another Stage tile on the "No" path of the condition tile

### Tip

You can add another condition on the "no" path of an existing condition tile to create more complex branching.

Process: Car sales process - Microsoft Dynamics 365 - Google Chrome  
https://trial1705.crm.dynamics.com/Tools/ProcessControl/UnifiedProcessDesigner.aspx?id=%7b2fE8A0CD-F9A5-403B-8047-54825FE3D680%7d

File Save Validate Save As Activate Delete Order Process Flow Edit Security Roles Show Dependencies Actions

BUSINESS PROCESS FLOW  
Car sales process  
Details

Add Cut Copy Paste Delete Snapshot Connector

Lead Qualify  
Condition "If 'Car Preference' equals 'New'"  
Opportunity New Car Sale  
Opportunity Pre-owned Car Sale  
Quote Deliver Quote

Steps (2)  
Step #1 Purchase Timeframe  
Step #2 Car preference

Workflows (0)

Global Workflow (0)

Components Properties

Condition  
Display Name  
If "Car Preference" equals "New Car"

Rules  
Rule 1  
Field: Car preference  
Operator: Equals  
Type: Value  
Value:  New car  Pre-owned car

Condition Expression (Text View)  
(Car preference Equals (New car))

Apply Discard

Status: Inactive

If the **Car preference = New**, the process branches out to the **New Car Sales** stage, otherwise, it jumps to the **Pre-Owned Car Sales** stage, in the second branch, as shown below.

Process: Car sales process - Microsoft Dynamics 365 - Google Chrome  
https://trial1705.crm.dynamics.com/Tools/ProcessControl/UnifiedProcessDesigner.aspx?id=%7b2fE8A0CD-F9A5-403B-8047-54825FE3D680%7d

File Save Validate Save As Activate Delete Order Process Flow Edit Security Roles Show Dependencies Actions

BUSINESS PROCESS FLOW  
Car sales process  
Details

Add Cut Copy Paste Delete Snapshot Connector

Lead Qualify  
Condition "If 'Car Preference' equals 'New'"  
Opportunity New Car Sale  
Quote Deliver Quote

Steps (6)  
Step #1 Make and Model  
Step #2 Color  
Step #3 Trim and options selected?  
Step #4 Trade in?  
Step #5 All paperwork present  
Step #6 Schedule trade-in evaluation

Workflows (0)

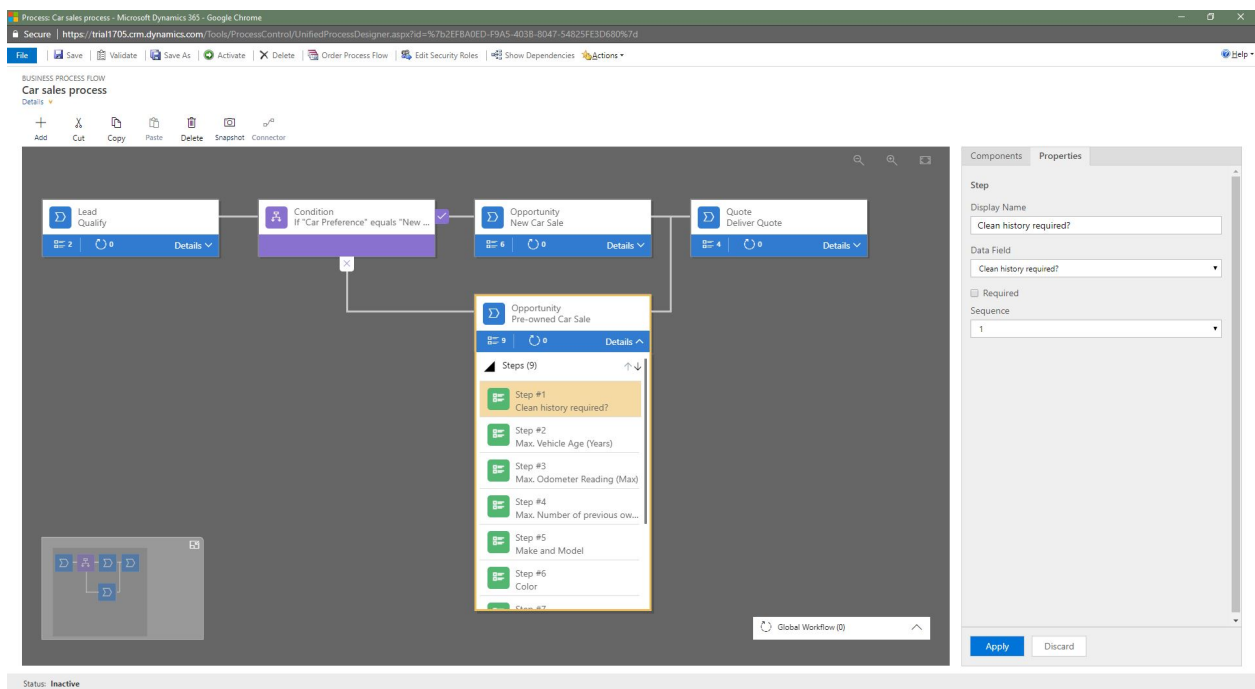
Global Workflow (0)

Components Properties

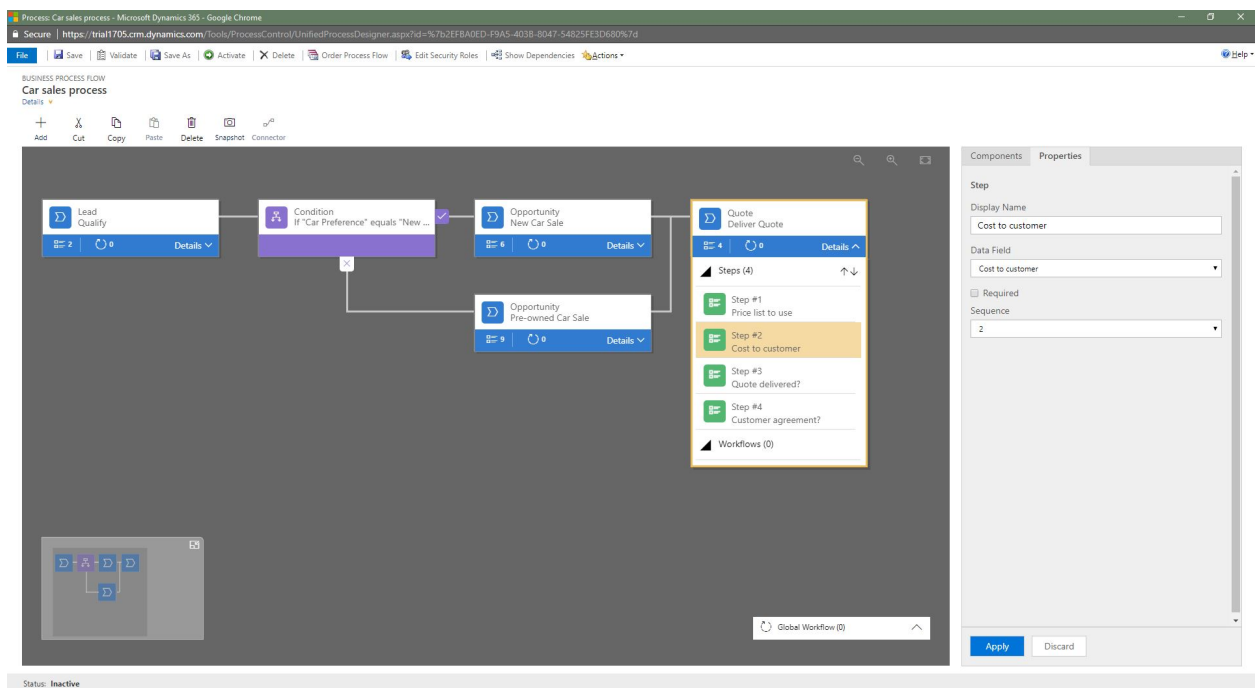
Step  
Display Name  
Make and Model  
Data Field  
Make and Model  
Required Sequence  
1

Apply Discard

Status: Inactive



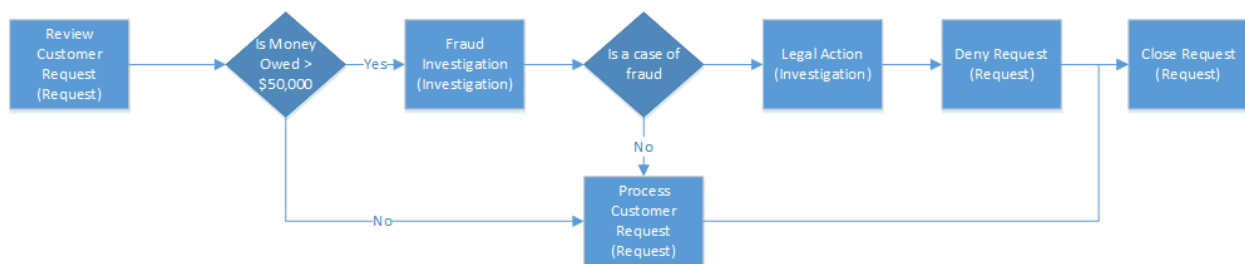
After completing all the steps in the **New Car Sales** stage or **Pre-Owned Car Sales** stage, the process returns back to the main flow, with the **Deliver Quote** stage.



## Prevent information disclosure

Consider a business process flow with branches for processing a loan request at a bank, as shown below. The custom tables used in the stages are shown in parenthesis.



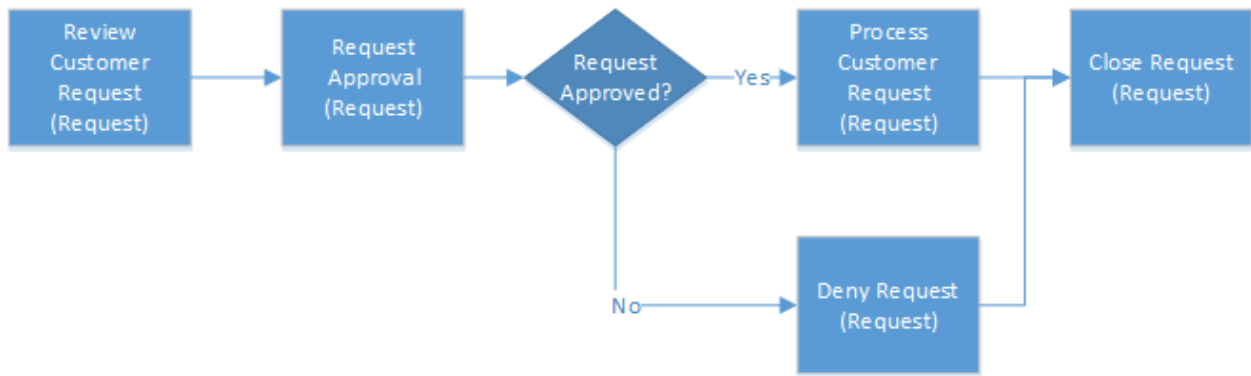


In this scenario, the bank loan officer needs access to the Request row, but the loan officer shouldn't have any visibility into the investigation of the request. At first glance, it looks that we can easily do this by assigning the loan officer a security role that specifies no access to the Investigation table. But, let's look at the example in more detail and see if this is really true.

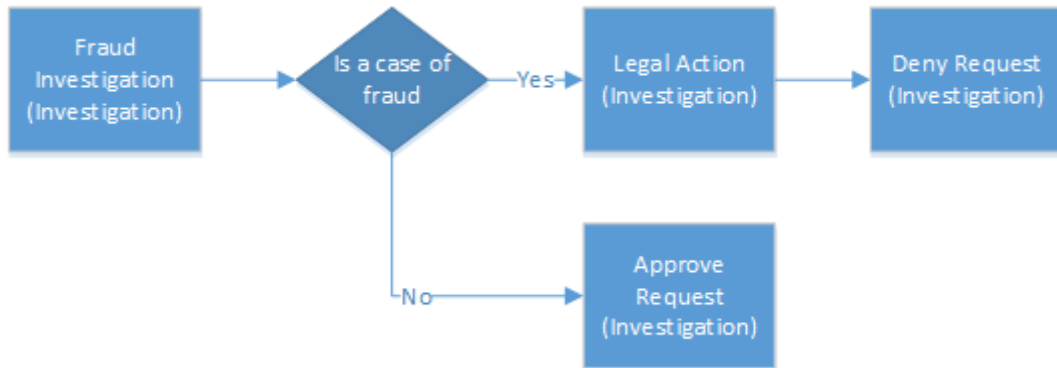
Let's say that a customer puts in the loan request for over \$60,000 to the bank. The loan officer reviews the request in the first stage. If the branching rule that checks if the amount owed to the bank will exceed \$50,000 is satisfied, the next stage in the process is to investigate if the request is fraudulent. If it's determined that this is indeed a case of fraud, the process moves on to taking a legal action against the requestor. The loan officer shouldn't have visibility into the two investigative stages as the officer doesn't have access to the Investigation table.

However, if the loan officer opens the Request row, all would be able to see the entire end-to-end process. Not only will the loan officer be able to see the fraud investigation stage, but they'll also be able to identify the outcome of the investigation by having been able to see the Legal Action stage in the process. Also, the officer will be able to preview the steps in the investigative stages by choosing the stage. While the loan officer won't be able to see the data or the step completion status, they'll be able to identify the potential actions that were taken against the submitter of the request during the investigation and legal action stages.

In this process flow, the loan officer will be able to see the Fraud Investigation and Legal Action stages, which constitutes an improper information disclosure. We recommend paying special attention to the information that may become disclosed due to branching. In our example, split the process into two separate processes, one for the request processing and another one for the fraud investigation, to prevent the information disclosure. The process for the loan officer will look like this:



The process for the investigation will be self-contained and include the following stages:



You'll need to provide a workflow to synchronize the Approve/Deny decision from the Investigation row to the Request row.

## Next steps

[Create a business process flow](#)

[Create custom business logic with processes](#)

# Add an on-demand workflow to a business process flow

Article • 03/10/2023

You can trigger on-demand workflows from inside a business process flow. For example, you can add an on-demand workflow to a business process flow so that an activity, such as a task or email, is created whenever a stage is completed.

A workflow becomes activated based on where you drop the workflow onto the business process flow designer.

- On-demand stage processes. When the workflow is dropped onto a business process flow stage, the workflow is triggered on entry or exit of the stage.
- On-demand global processes. When the workflow is dropped onto the **Global Workflows** area, the workflow is triggered on process activation or process archival (when the status transitions to an applied, completed, reactivated, or abandoned state).

Notice the following requirements when you add a workflow to a business process flow.


- For workflows added to a stage: You can only use active, on-demand workflows created for the same table of the stage where you add the workflow.
- For global workflows: You can only use active, on-demand workflows created for the primary table of the business process flow.

## Add an on-demand workflow to a business process flow stage

You add an on-demand workflow from the business process flow designer by dragging the workflow component to a process stage or to the global workflows section.

On the [PowerApps](#) site, select **Model-driven** (lower left of the navigation pane).

Open the business process flow designer. You can do this in one of two ways.

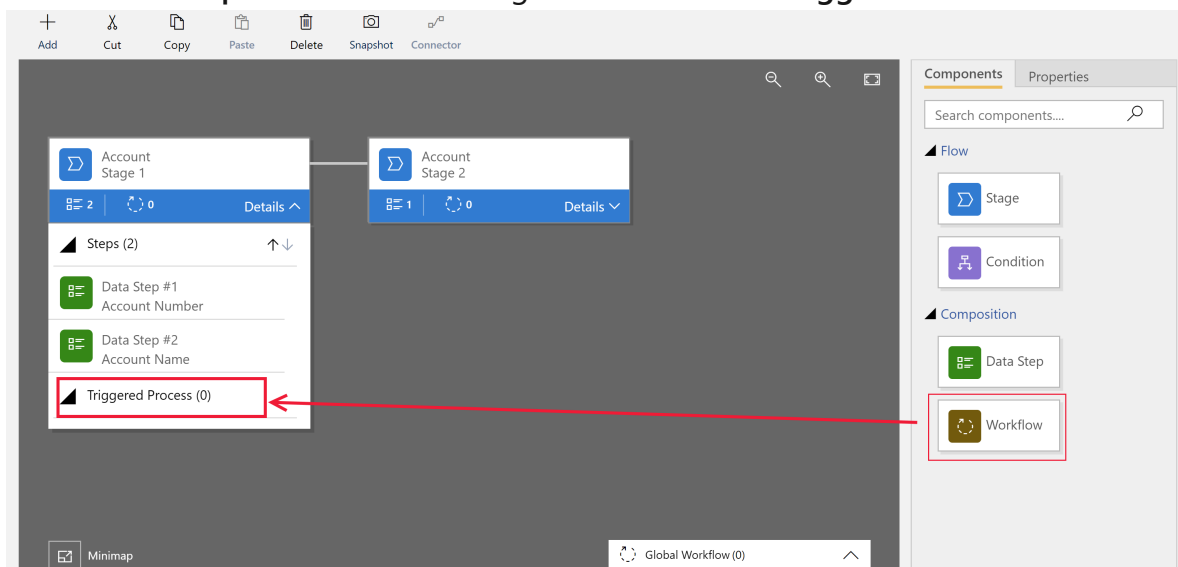
- If the business process flow is already added to an app, go to **Apps**, next to the app you want select ..., and then select **Edit**. In the app designer, select the business process flow, and then select .
- Otherwise, open [solution explorer](#), in the left navigation pane select **Processes**, and then select the business process flow that you want.

Decide whether you want the on-demand workflow to be triggered by one of the following business process flow events.

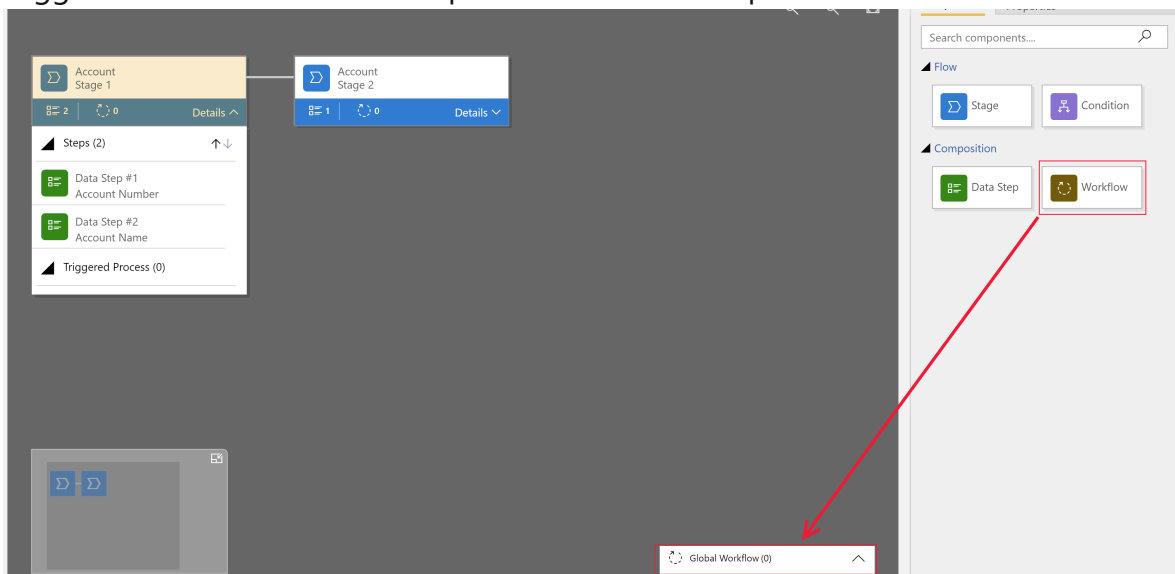
- On-demand stage processes. Triggers the workflow on entry or on exit of the stage.
- On-demand global processes. Triggers the workflow either on process activation or process archival (when the status transitions to an applied, completed, reactivated, or abandoned state).

In the example below, an on-demand workflow named **My on demand workflow** is added to **Stage 1** of the business process flow.

1. Expand stage 1 to reveal the **Triggered Process** section.
2. Select the **Components** tab and drag **Workflow** to the **Triggered Process** section.

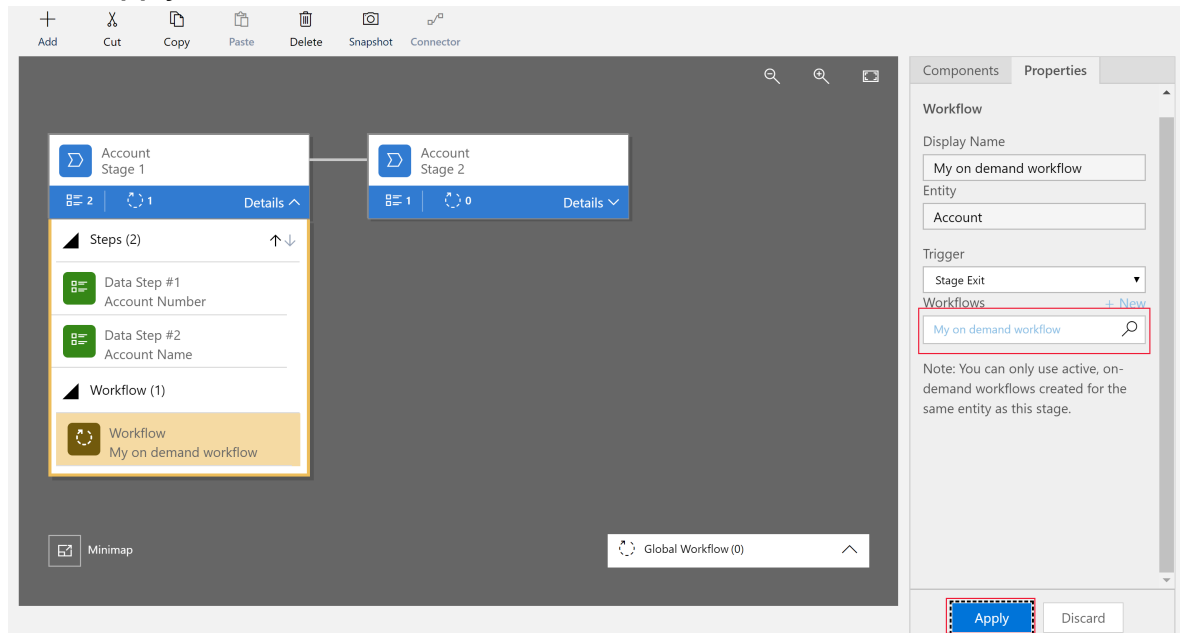


Alternatively, you can drag **Workflow** to the **Global Workflows** section, which triggers the workflow either on process activation or process archival.

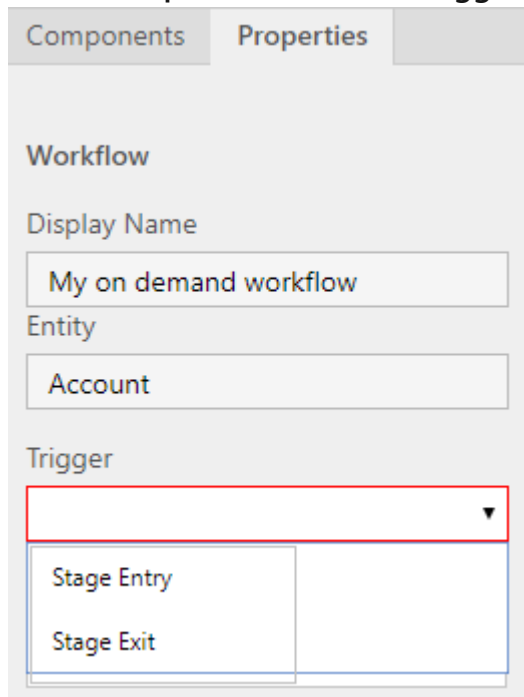


3. In the search box of the **Properties** tab, enter and search the name of the on-demand workflow you want to add to the business process flow stage, and then

select **Apply**.



4. On the **Properties** tab under **Trigger** select either **Stage Entry** or **Stage Exit**.



Alternatively, when you drop the workflow onto the **Global Workflows** section, the trigger options are **Process applied**, **Process reactivated**, **Process abandoned**, and **Process completed**.

5. Select **Update** on the business process flow designer toolbar.

## See also

- [Use Workflow processes to automate processes that don't require user interaction](#)
- [Tutorial: Create a business process flow to standardize processes](#)
- [Business process flow automation in Dynamics 365](#)



# Best practices in using business process flow columns

Article • 02/22/2023

Legacy process-related columns in tables is deprecated. Here are some best practices for using the *Active Stage* (activestageid) column on the business process flow table.

## Reporting on the active stage of a business process flow

Let's say that you'd like to get a view of your sales pipeline by reporting on the active stage that the **Lead to Opportunity Sales Process** is on.

Previously, to report on business processes by stage, one might define a view on each related table of the business process flow and then report on the *Active Stage* (activestageid) column.

With the deprecation of the *Active Stage* (activestageid) column on related tables, there are two ways to report on business process flows.

### Option 1: Views and charts on business process flow table\*\*(Recommended)\*\*

In versions 9.0 and higher, each business process flow creates its own Dataverse table, usually with the same name as the business process flow. To report on the business process flow, select the table for the business process flow you want to report on, and then create views and charts, just as you did before.

In our example, follow these steps to go to the **Lead to Opportunity Sales Process** table:

1. Sign in to [Power Apps](#).

To learn more about using the Power Apps interface, go to [Get started with Power Apps](#).

2. On the left navigation pane, select **More > Tables**.

3. Set the filter to **All**.

4. Search for, and then select the **Lead to Opportunity Sales Process** table.

Here, you can define views and charts just as you do on any other table.

5. On the **Data experiences** tile, select **Views** or **Charts**.

An advantage of this approach is that you can use a single view or chart to report on business process flows that span multiple tables.

As the business process flow table is no different from any other custom table in Dataverse, you can add custom columns to the table to track any additional information you need.

## Option 2: copy active stage to a related table

Alternatively, to continue reporting off the related table, create a cloud flow to copy the *Active Stage* (activestageid) column from the business process flow table into a custom column on the related Dataverse tables.

Here are a few things to keep in mind when you use this approach:

1. It's possible to have more than one business process flow running on a single table. With this approach, it's best to have one custom column that stores the active stage for each business process flow that runs on the table. This approach ensures the integrity of the reporting.
2. As reporting is driven from the related table, it's not possible to create a single view that reports on business process flows that span multiple tables.

## Using the active stage to run logic

Here are some cases in which you might want to run logic that's based on the active stage:

### Using the active stage to run client-side logic

As you use the business process, there are many things that you might want to do automatically. For instance:

- Change the active business process flow based on newly available information on the form or business process flow.
- Move the active stage to the next or previous stage, based on values the users entered for steps or form columns.



- Hide or show form tabs and columns based on the selected stage.
- Show informative messages and run calculations based on the active business process flows, the active or selected stage, or events such as moving the active stage.

#### Tip

For scenarios like these, use the supported set of **client APIs** for business process flows.

## Using the active stage to run server-side logic

There might be cases where automation based on the business process flow needs to be done server side. For instance:

- Send an email to a user if the **Qualify** the stage of the **Opportunity Sales Process** is active for longer than 15 days.
- Automatically create a set of activities relevant to the active stage of the **Opportunity Sales Process** each time it changes.
- Automatically finish the **Opportunity Sales Process** when the phone call activity for closing completes.

#### Tip

Use classic Dataverse workflows or flows you define on the table for the business process flow.

To build a classic Dataverse workflow that creates activities for internal solution reviews and to follow up with the customer in the **Propose** stage of the **Opportunity Sales Process**:

1. Create it on the **Opportunity Sales Process** table and set it to run each time the **Active Stage** column of the table changes.
2. Define a condition to check if the **Active Stage** column equals **Propose**.
3. Create an appointment and phone call row for the internal review of the solution and the customer call to review the solution respectively.

PowerApps

File Save and Close Activate Convert to a real-time workflow Show Dependencies Solution Layers Actions Help

Process: Close stage followup Working on solution: Default Solution

Information

Common

- Information
- Audit History

Process Sessions

- Process Sessions

General Administration Notes

Hide Process Properties

Process Name \* Propose stage activities

Entity Opportunity Sales Process

Activate As Process

Category Workflow

Options for Automatic Processes

Scope Organization

Start when:

- Process is applied
- Process status changes
- Process is assigned
- Process changes
- Process is deleted

Workflow Job Retention

- Automatically delete completed workflow jobs (to save disk space)

Add Step Insert Delete this step.

Type a step description here.

If Opportunity Sales Process:Active Stage equals [Propose], then:

- Schedule internal review of proposal
- Create: Appointment
- Schedule call with customer to share solutions
- Create: Phone Call

Status: Draft

See also

[Get started with Power Apps](#)

# Overview of process mining and task mining in Power Automate

Article • 11/01/2023

Process mining and task mining in Power Automate allow you to gain a better understanding of your business processes so you can optimize them.

## Process mining

The process mining capability in Power Automate is better suited for discovery of inefficiencies in organization-wide processes. It enables you to gain a deep understanding of your processes using event log files that you can get from your system of recording (apps you use in your processes). The process mining capability displays maps of your processes with data and metrics to recognize performance issues. Example processes suitable for the process mining capability include *accounts receivable* and *order-to-cash*.

The process mining capability can be a key driver in making intelligent, day-to-day improvements on every level. You can discover and model processes for which you have data readily available, giving you an X-ray visualization of what goes on in your organization. In addition, you can standardize, optimize, and improve operations, while staying informed about progress towards defined key process indicators.

## Task mining

The task mining capability in Power Automate is better suited to discover tasks happening on the desktop. It enables you to zoom-in to specific desktop tasks you might have discovered during your process mining analysis. You can understand how your company performs its process tasks through monitoring recorded user actions and collecting data from these actions. You gain insights from this data that lets you know how processes are performed, find common mistakes while performing tasks, and identify tasks that can be automated.

## When to use the process mining capability

Here are some reasons to help you decide to use the process mining capability.

- See the actual steps needed to perform your organization's operation process and remove any guesswork.

- Save time and money by optimizing processes.
- Detect noncompliant processes and/or tasks.
- Discover automation opportunities.
- Compare processes.
- Find mistakes.
- Understand where and why problems occur.

Explore the topics in the documentation for the [process mining](#) and [task mining](#) capabilities in Power Automate for the following:

- Business scenarios
- Understand where and why problems occur.

## When to use the task mining capability

Here are some reasons to help you decide to use the task mining capability.

- Understand what employees actually do while performing each task on their desktops.
- Identify and eliminate unnecessary actions in process tasks.
- Identify the most common actions through user interactions.
- Ensure compliance and perform audit.
- Automate tasks that would accelerate processes and reduce human errors.

## What you'll find in this documentation

Explore topics in [process mining](#) and [task mining](#) in this documentation for the following:

- Business scenarios
- Tutorials
- Guided procedures
- Videos

## Licensing

Process mining is licensed as part of Microsoft Power Automate. There are three Power Automate licenses that are related to process mining and a Power BI license is required for Power BI report customization.

### Power Automate trial license

For a limited time of *90 days*, the Power Automate trial license offers:

- **Task mining capabilities:** Enable you to analyze a recorded process and view the analytics report. You can invite others to contribute recordings to the process for richer insights.
- **Process mining capabilities:** Enable you to create a process, connect to an event log using data flows, analyze a process from data, view the analytics report on the web, and perform advanced analytics on the desktop application. The trial offers limited process mining capacity of *100 MB* per process. Therefore, to process more data, we highly recommend that you purchase the **Power Automate Premium** license and the **Power Automate Process Mining add-on**.

To learn more, go [Power Automate Process Mining add-on](#) in this article.

## Power Automate Premium license

The **Power Automate Premium** license is a per-user license with the following offerings:

- **Task mining capabilities:** Enable you to analyze a recorded process and view the analytics report. You can invite others to contribute recordings to the process for richer insights.
- **Process mining capabilities:** Enable you to create a process, connect to an event log using data flows, analyze a process from data, view the analytics report in the web, and perform advanced analytics in the desktop application. Each *Power Automate Premium* license adds *50 MB* of process mining capacity to a tenant wide capacity pool up to a total of *100 GB*. When you reach *100 GB*, you need to purchase the **Power Automate Process Mining add-on** to process additional data.

To learn more, go [Power Automate Process Mining add-on](#) in this article.

- Additional *250 MB* of Dataverse database capacity.
- Additional *2 GB* of Dataverse file capacity.

## Power Automate Process Mining add-on

The **Process Mining add-on** is a tenant wide license that is available for the Power Automate Premium license. It offers:

- Additional *100 GB* of process mining capacity to the capacity pool, from which users with the Power Automate Premium license can consume.

- Additional *2 GB* of Dataverse database capacity.
- Additional *1 TB* of Dataverse file capacity.

Get Power Automate pricing details at [Power Automate pricing](#). For inquiries about add-on capability licensing, contact [Microsoft Process and Task Mining Questions](#).

## Power BI license

To customize your report, you need to link the process to your own Power BI workspace, and a **Power BI Premium** license. To learn more about Power BI licensing, go to [Power BI pricing](#).

## Preview

Some features are in preview, denoted by the preview tag. For process templates that are still in preview, licenses and trials aren't needed.

## Dataverse capacity

Depending on the size of the process data you import, you might run out of Dataverse storage capacity. If this happens, ask your admin about purchasing more storage capacity, or delete existing processes to free up storage. The process data we store uses mostly file capacity.

To learn more about Dataverse storage capacity, go to [New Microsoft Dataverse storage capacity](#).

## Prerequisites

Before you start using the process mining capability, make sure you have the following prerequisites:

- The required licenses or trials depending on the capabilities you want access to.
- A Microsoft Power Platform environment with a Microsoft Dataverse database.
  - To learn how to create an environment, go to [Create and manage environments in the Power Platform admin center](#).
  - To learn how to add a database to an environment, go to [Add a Microsoft Dataverse database](#).

- Adequate roles are assigned for users who want to use the process mining capability. The **Environment Maker** is required to create, share, and contribute to processes. Go to [Security and privacy](#) to learn more.

Additional considerations for specific capabilities:

- For the Power Automate Process Mining desktop app, download and install [Power Automate Process Mining desktop app](#).
- To customize your report, you need to [set up your Power BI workspace](#) and [register the process mining service principal in Microsoft Entra ID](#).
- For task mining, download and install [Power Automate for desktop](#).

# Overview of process mining

Article • 06/06/2024

Process mining is a research area and technology that helps businesses understand their real processes, how they're operated, and identify opportunities for improvement, automation, and digitalization.

The process mining capability in Power Automate works with the existing Microsoft platform and ecosystem to provide end-to-end solutions and enable faster business decisions. By extracting event data from your system of records, it visualizes the processes happening in your organization, allowing you to customize your process mining reports, compare processes, determine the root cause of inefficiencies, and monitor KPIs.

Overall, the process mining capability is a valuable tool for businesses seeking to improve their operational efficiency and make informed decisions.

## Benefits of the process mining capability

The business value of the process mining capability lies in its ability to help organizations gain insights into their operational processes and identify areas for improvement. By analyzing event data from various sources, the process mining capability provides a clear view of how processes are actually being executed in practice. This helps businesses to:

- **Improve operational efficiency:** Process mining can help identify bottlenecks and inefficiencies in processes, allowing organizations to streamline their operations and improve productivity.
- **Enhance customer experience:** By identifying process pain points and eliminating them, organizations can improve the customer experience and increase satisfaction.
- **Optimize resources:** Process mining enables businesses to identify opportunities for automation, reducing the need for manual intervention and allowing resources to be allocated more effectively.
- **Ensure compliance:** Process mining can help organizations to identify noncompliant processes and take corrective action to avoid legal and financial risks.
- **Improve supply chain management processes:** Create processes that help warehouse and operations managers gain insights into the material flow in the warehouse. This can help improve the performance of the warehouse. To learn



more, go to [Analyze warehouse material movement through process mining \(preview\)](#).

- **Receive personal recommendations:** Get personal recommendations for automation opportunities based on your Microsoft 365 usage. Process Mining intelligently creates automation recommendations based on your Microsoft 365 role title, email, and calendar invites to help get your started on your automation journey. The prompts created through intelligent recommendations allow you to use the natural language to flow feature in Power Automate to create an automation personal to you.

## Business examples

Overall, process mining provides valuable insights that can help organizations improve their operations, enhance customer satisfaction, and stay competitive in a rapidly changing business landscape.

- **Telecommunications**
  - Streamline the activation process to reduce wait times.
  - Simplify business operations to reduce costs and complexity.
  - Manage high-volume content analytics.
- **Financial services**
  - Accelerate the time to value for small and medium-sized businesses.
  - Ensure compliance by keeping up with regulatory changes and mitigating risks.
  - Address competition from fintech challengers.
- **Manufacturing**
  - Address supply chain disruptions to ensure timely delivery of products.
  - Adopt new automations to improve efficiency and productivity.
- **Automotive**
  - Accelerate transformation to mobility providers to stay competitive in the market.
  - Identify inefficiencies in production processes, such as long cycle times and frequent downtime.
  - Identify and address quality issues early, reducing the likelihood of costly recalls or warranty claims.
- **Customer service desk**
  - Identify opportunities for standardization to reduce rework and eliminate pending cases.

- Analyze reasons for returns and improve customer satisfaction by monitoring performance.

These areas represent key challenges and opportunities for businesses to improve their operations, stay competitive, and meet the needs of their customers.

## Components

Following are the main components for the process mining capability:

- [Data requirements](#)
- [Transform and map data](#)
- [Troubleshoot issues \(if necessary\)](#)
- [Use KPIs and visualizations for analytics](#)
- [Edit and refresh processes](#)
- [Share processes](#)

## See also

[FAQ for Process Mining's Microsoft 365 personal recommendations](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Tutorial: Get started with the process mining capability

Article • 07/03/2024

This tutorial allows you to experience the process mining capability with sample data. In this tutorial, you create a process, import data, and then analyze it.

## ⓘ Note

If you don't see all of the features described in this article and are using your default environment, create a new environment and retry.

## Download the sample data

For the process mining tutorial, download the sample event log CSV file:

- [English version](#) ↗
- [French version](#) ↗

The sample data in this tutorial is for illustration only and is fictitious. No real association is intended or inferred.

## Create a process

### ⓘ Note

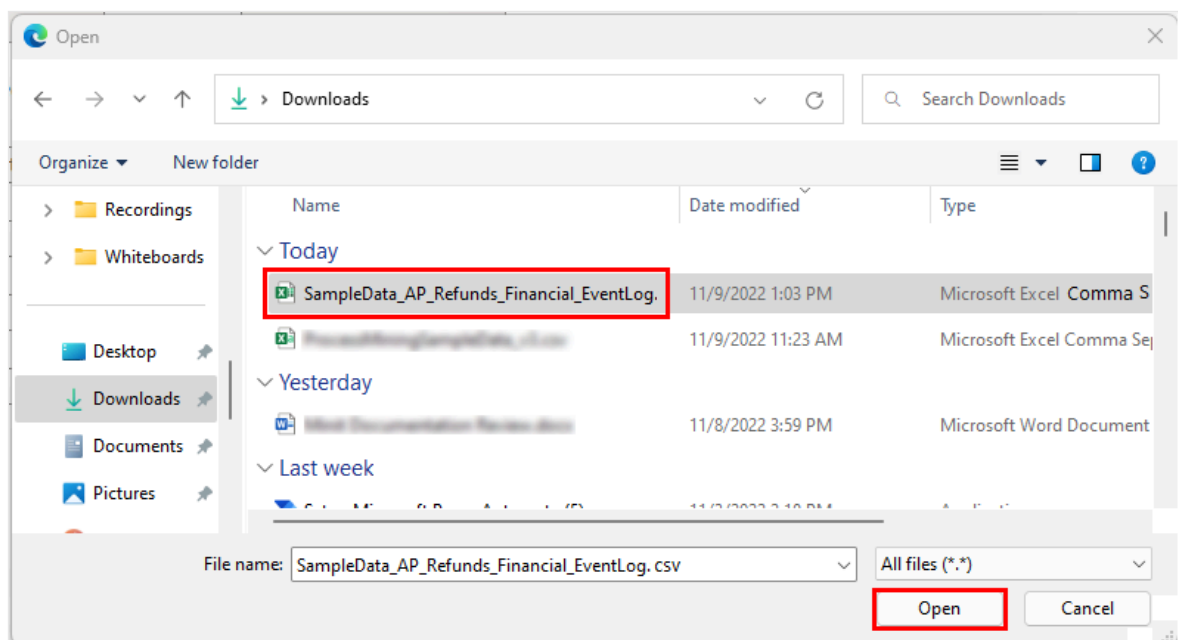
If you encounter an error message while attempting to create and analyze a process, it may be due to a missing security role. To resolve this, please contact the administrator of your environment and request that they assign you the **Environment Maker** security role.

1. Sign in to [Power Automate](#) ↗.
2. Select your environment.
3. On the navigation pane to the left, select **Process mining**.
4. In the **Create new process** section, select **Start here**.

5. In the **Create a new process** screen, enter a process name, and then select **Import data**.
6. (Optional) Enter a description for your process.
7. Select **Continue**.
8. (Optional) Select a Power BI workspace to attach your process to and give your report a name.
9. Select **Continue**.

## Import data


1. In the **Choose a data source** screen, select **Text/CSV**.
2. Under the **Connection settings** heading, select **Upload file (Preview)**.
3. Select **Browse**.
4. Find and select **SampleData\_AP\_Refunds\_Financial\_EventLog.csv**, which you downloaded previously.
5. Select **Open**.



6. If you're asked to authenticate, select **Sign in** and follow the prompts.
7. Select **Next**.
8. When you see the power query, which allows you to transform your data, select **Next**.

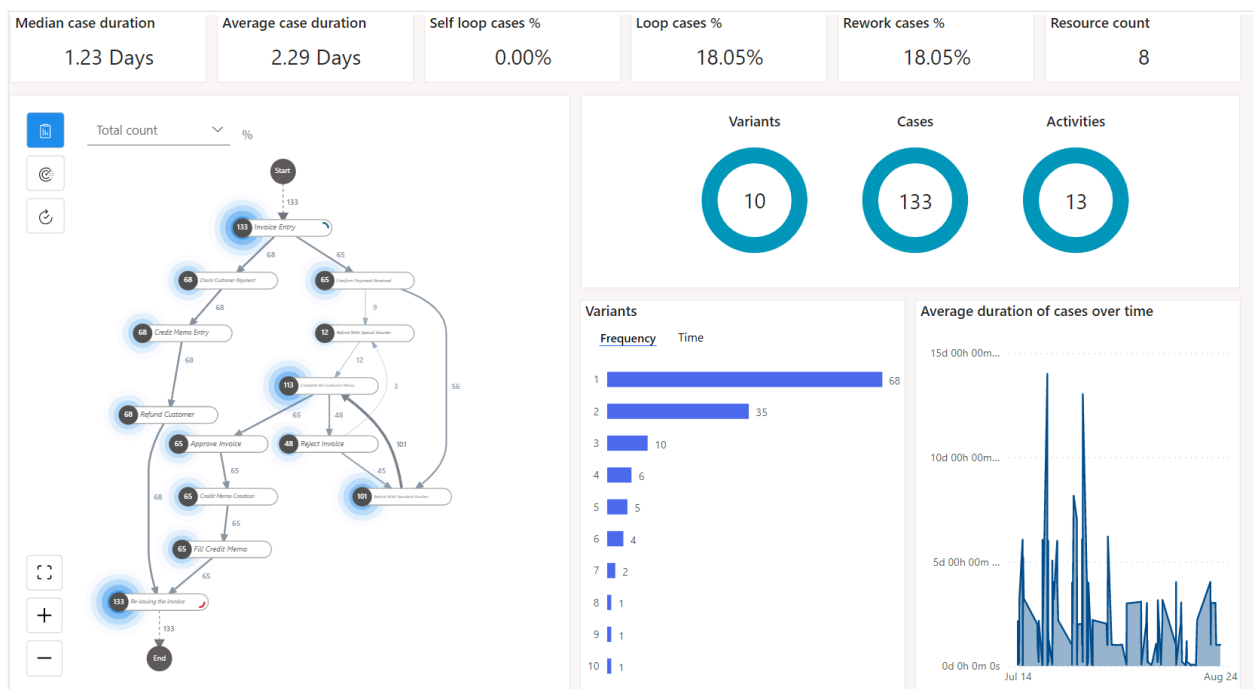
9. Match the **Attribute Name** from sample data to the **Attribute Type** as appropriate. In this sample, the data attributes you'll change are **InvoiceValue**, **Resource**, **StartTimestamp**, **EndTimestamp**, **Caseld**, and **ActivityName**.

When you finish, the attribute mapping should look like the following screenshot.

Attribute name	Attribute type	Attribute data type 
Location	Event Level Attribute <input type="checkbox"/>	Text
Role	Event Level Attribute <input type="checkbox"/>	Text
VendorID	Event Level Attribute <input type="checkbox"/>	Text
InvoiceValue	Financial per Case <input type="checkbox"/>	Numeric
Resource	Resource <input type="checkbox"/>	Text
StartTimestamp	Event Start <input type="checkbox"/>	Date/Time
EndTimestamp	Event End <input type="checkbox"/>	Date/Time
Caseld	Case ID <input type="checkbox"/>	Numeric
ActivityName	Activity <input type="checkbox"/>	Text

10. Select **Save and analyze**. The analysis might take a few minutes to run.

When the analysis process is complete, you see a process map and a dashboard with other insights about your process. On the dashboard, you can view many metrics that can help you analyze your process. To learn how to analyze the process map and metrics, go to [Visualize and gain insights from processes in the process mining capability](#).



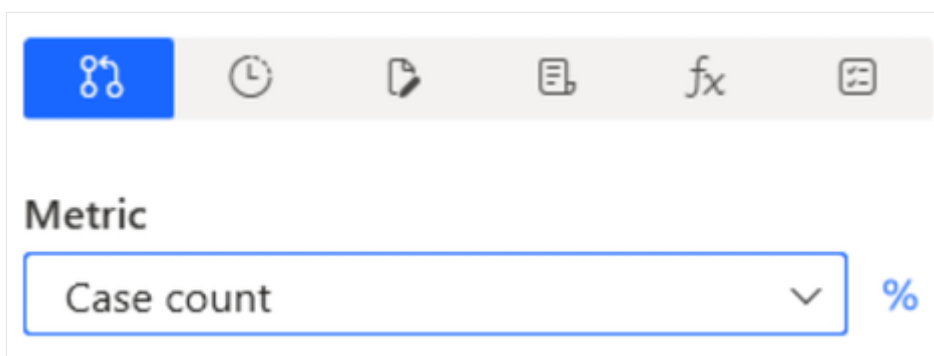
## Analyze a process

Let's take the analysis of our process beyond KPIs. We use the Power Automate Process Mining desktop app, where you can edit and analyze your processes created in the process mining capability.

1. From the command bar of the analytics report page, select **Download Process Mining app** to download it.
2. On the toolbar, select the environment from the top right.
3. Search for the process you created with the process mining capability in Power Automate (**AP Refunds Process**).
4. Select **Default** to display the default view.

You're ready to use the advanced capabilities of the Process Mining desktop app.

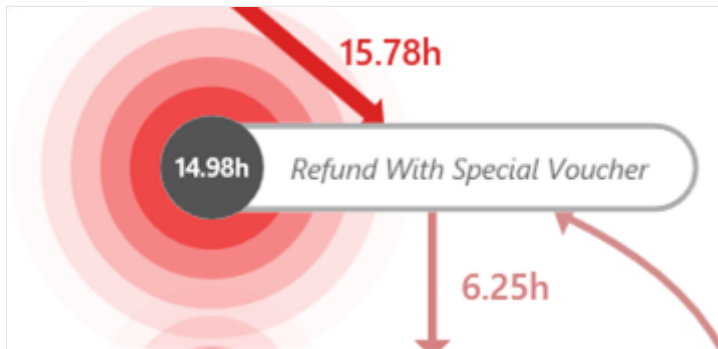
5. On the **Customize** panel toolbar, select **Frequency** (the first icon), and then select **Case count** in the **Metric** dropdown menu.



The process map displays the number of cases of the process that include the activity specified at each node.

6. On the **Customize** panel, select the clock icon, and then select **Mean duration** from the dropdown menu.

Notice that the **Refund with special voucher** step has a long mean duration compared to other steps.

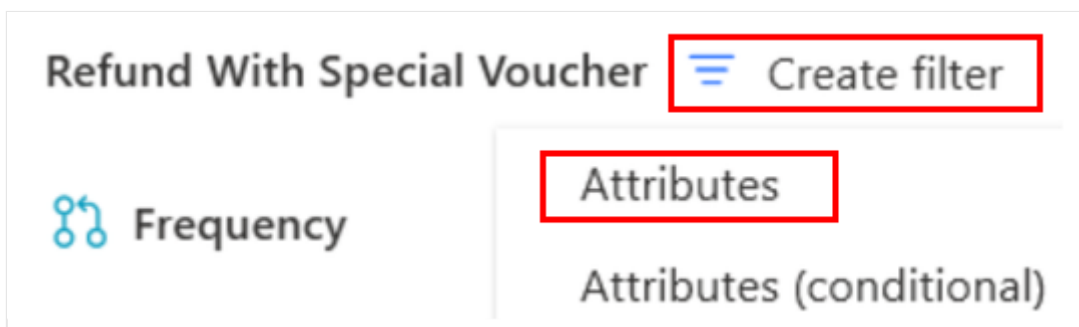


7. On the **Customize** panel, select **Finance** (the piece of paper icon), and then select **Mean** from the **Metric** dropdown menu.

Notice that the same **Refund With Special Voucher** step involves only \$631.11 in invoice value, which is less than half of most of the other steps.



8. This step might be a good candidate for extra investigation, so select this step's node.
9. On the **Customization** panel, select **Create filter** > **Attributes**.



## Compare paths with different views

We want to compare the paths that have this **Refund With Special Voucher** step with the paths that don't have this step, but instead have another step called **Refund With Standard Voucher**. Let's filter for paths that have **Refund With Special Voucher** and *not* **Refund With Standard Voucher**. Let's also filter for paths *with* **Refund With Standard Voucher** and *without* **Refund With Special Voucher**.

## Create the 'Refund With Special Voucher' view

1. On the **Filtering** page, ensure **Refund With Special Voucher** is selected in the **holds any of the values** field.
2. On the command bar, select **Add filter** > **Attributes**.
3. This time, select **Does not include** from the **Filter result** dropdown menu.
4. On the **List** tab, select **Refund With Standard Voucher** to place it in the **holds any of the values** field.

Your **Filtering** screen should look like this:

The screenshot shows the filtering interface with two main panels: 'Attributes' on the left and 'List' on the right.

**Attributes Panel:**

- Filter result:** A dropdown menu with 'Does not include' selected. This dropdown is highlighted with a red border.
- cases in which attribute:** A dropdown menu with 'ActivityName' selected.
- holds any of the values:** A dropdown menu with 'Refund With Standard Voucher (1)' selected.

**List Panel:**

- Search bar: 'Search in attribute values'.
- Attribute value list:
  - Confirm Payment Received
  - Credit Memo Creation
  - Credit Memo Entry
  - Fill Credit Memo
  - Invoice Entry
  - Re-issuing the invoice
  - Refund Customer
  - Refund With Special Voucher
  - Refund With Standard Voucher** (highlighted with a red border and a blue checkmark)
  - Reject Invoice



5. On the bottom right corner, select **Apply**.
6. On the command bar at the top, select **Save > Save as**, and then enter **Refund w/ Special Voucher > Save**.

## Create the 'Refund With Standard Voucher' view

1. Go back to the filter screen by selecting the **Filter** button in the bottom left of the screen.
2. Clear the **Filter criteria set** and repeat steps 1 through 4 of the previous section, but choose **Refund With Standard Voucher** in step 1 and **Refund With Special Voucher** in step 4.
3. In the command bar at the top, select **Save > Save as**, and then enter **Refund w/ Standard Voucher > Save**.

## Compare views

You created two different views. One view shows the paths that have the **Refund With Special Voucher** step but not the **Refund With Standard Voucher** step (Refund w/ Special Voucher). The other view is its inverse (Refund w/ Standard Voucher). Let's compare these two views.

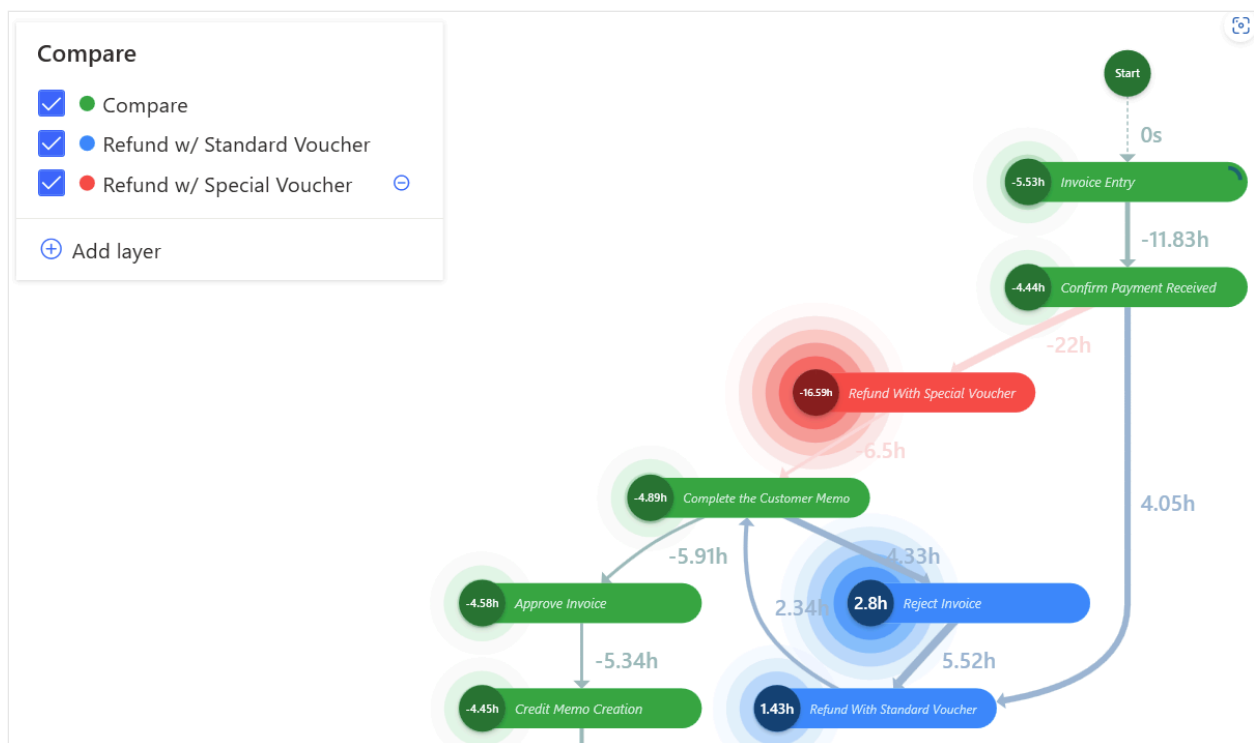
1. On the left panel, select **Process compare**.
2. Below the **Compare** tile, select **Add layer**.
3. From the **Views** dropdown menu, select **Refund w/ Special Voucher > Add layer**.

The process map that's created is a comparison of the two views.

4. In the **Customize** panel, ensure that **Mean duration** is selected as the metric.
5. Save this view as **Standard vs. Special**.

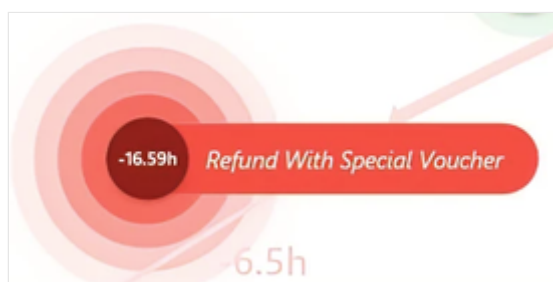
## Understand the process map with different views

The green nodes represent steps common to both views. A red node represents the step that takes place only in the process with a special voucher (as indicated by the **Compare** legend). Blue nodes represent steps that take place only in the paths with standard voucher.

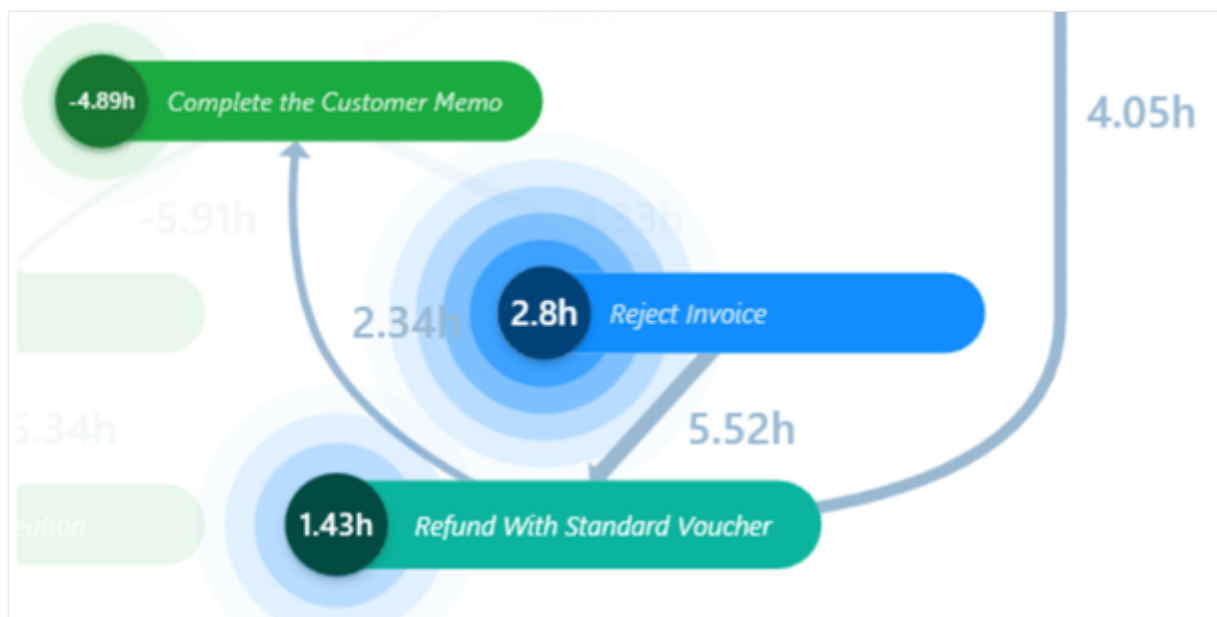


1. Expand the **Customize** panel by selecting **Customize** on the right navigation bar.
2. Select the **Performance** (the clock icon).
3. From the **Metric** dropdown menu, select **Mean duration**.

From the procedure in [Analyze a process](#) (previously in this article), there were only nine cases with **Refund With Special Voucher**. On average, the process is lengthened by almost 17 hours according to the process compare map in this section.



Notice that cases that have the **Refund With Standard Voucher** step also have the possibility of invoices being rejected as the blue node, which represents the **Reject Invoice** step suggests. This **Reject Invoice** step contributes only 2.8 hours on average to the process.



Based on insights we derived from this analysis, let's summarize our findings, derive a conclusion, and offer some recommendations for this process.

## Insights summary

- **Refund With Special Voucher:**
  - Takes place only a few times in the process compared to other steps.
  - Has a relatively low amount of money flowing through it.
  - Significantly increases the mean duration of the entire process.
- **Refund With Standard Voucher:**
  - The cases with this step also have the invoices being subsequently rejected. This causes rework and adds some time to the mean duration of the process.

## Considerations for choosing a special or standard voucher

This organization has two ways to make refunds using vouchers: **Refund With Special Voucher** or **Refund With Standard Voucher**. The latter might sometimes cause some rework because some of those invoices are subsequently rejected. Alternatively, using the special voucher never causes invoice rejection. This might make it seem like using a special voucher should be the consistent course of action.

However, having the possibility of the invoice being rejected through a standard voucher saves the organization more time than using a special voucher. This never

causes the invoice to be rejected—the difference in mean duration is approximately 13.79 hours.

## Recommendation

An organization should focus on using standard vouchers versus special vouchers because just a few special vouchers can add much time to the process.

An organization should do further analysis to determine why using the standard invoice often causes invoice rejection. If they're able to uncover a remedy for this, the organization can implement this to further improve the process.

To learn more about how to take advantage of the advanced capabilities of Power Automate Process Mining, go to [Overview of Power Automate Process Mining](#).

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Azure templates for process mining

Article • 07/18/2023

Easily onboard your process mining data with process mining templates. Templates help you start mining your processes for insights with just a few selections. You'll avoid the data identification and manipulation that's required with traditional process mining tools. [Azure DevOps \(work tracking\)](#), [Azure DevOps \(pipelines\)](#), [Logic Apps \(standard plan\)](#), [Logic Apps \(consumption plan\)](#), and [Durable Functions](#) templates provide insights that help you identify opportunities and optimize your development processes.

Creating and running a template is similar for all the Azure templates.

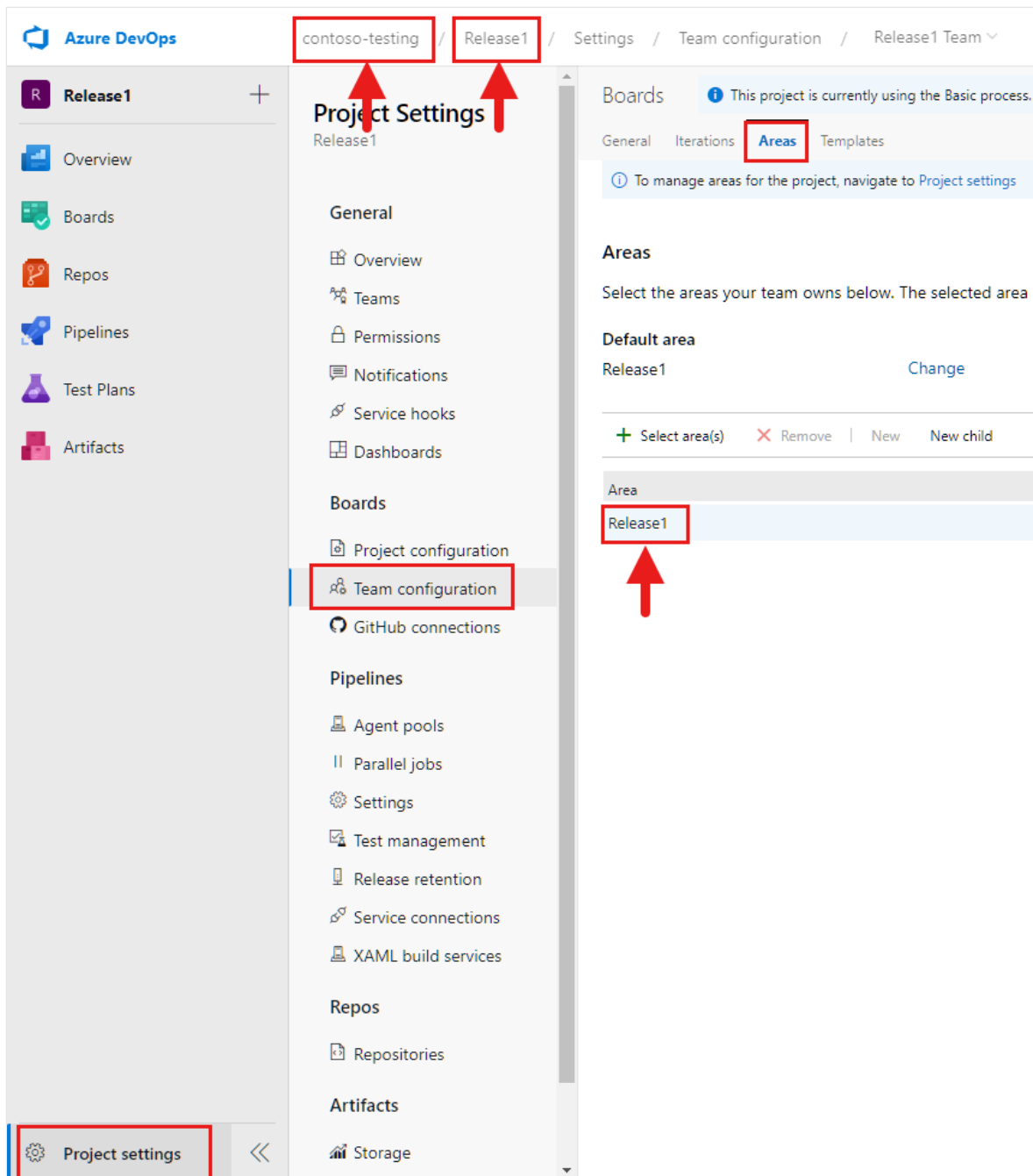
## Azure DevOps (work tracking) template

The Azure DevOps (work tracking) template analyzes the execution and handling of tracked Azure DevOps (ADO) work items to help you maximize your development processes and manage dependencies. To learn more, go to [What is Azure DevOps?](#)

The Azure DevOps (work tracking) template uses data from your Azure Boards to analyze your work items. You'll need to gather some information from ADO before you can run the template.

### Gather information from ADO Boards

1. In your Azure DevOps environment in the left panel, select **Project settings**.
2. Select **Boards** > **Team configuration**, and then select the **Area** tab.



3. Find the organization name and project name at the top of the Project Settings page. Take note of the area name.

## Create and run the Azure DevOps (work Tracking) template

1. In Power Automate in the left panel, select **Process mining**.
2. In the **Start with a popular template** section, select the **Azure** tab, and then select the **Azure DevOps (work tracking)** tile.
3. In the **Process name** field, enter a name for your process.

4. In the **Organization name**, **Project name**, and **Area name** fields, enter the information from ADO.
5. (Optional) In the **Description** field, enter a description of the process.
6. Select **Create**.
7. In the **Connect to data source** screen in the **Authentication kind** field, replace "Anonymous" with **Organizational account**.

If you're signed in, you'll see your credentials. You can switch to a different account if needed. If you're not signed in, select **Sign in** and sign in to your account.

8. Select **Save**.

The process mining capability will analyze your process. It might take a few minutes for the analytics to appear.

Learn how to [visualize and gain insights from processes](#). You can also use the custom attributes filter to dive deeper into your insights.

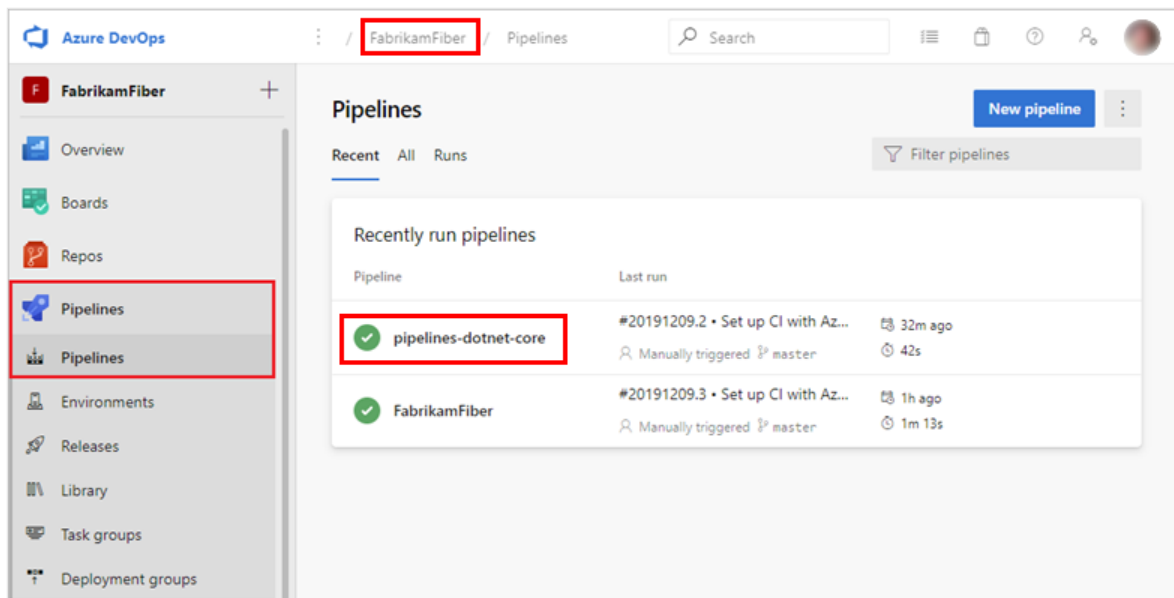
## Azure DevOps (pipelines) template

The Azure DevOps (pipelines) template analyzes the execution and handling of tracked pipelines and boards to help you maximize your development processes and manage dependencies. To learn more, go to [What is Azure Pipelines?](#)

The Azure DevOps (pipelines) template uses data from Azure DevOps to analyze your pipelines. You'll need to gather some information from ADO before you can run the template.

### Gather information from ADO Pipelines

1. In your Azure DevOps environment in the left panel, select **Pipelines**, and then select **Pipelines** again.



2. Find the organization name and project name at the top of the Pipelines page. Take note of the pipeline name.

## Create and run the Azure DevOps (pipelines) template

1. In Power Automate in the left panel, select **Process mining**.
2. In the **Start with a popular template** section, select the **Azure** tab, and then select the **Azure DevOps (pipelines)** tile.
3. In the **Process name** field, enter a name for your process.
4. In the **Organization Name**, **Project name**, and **Pipeline Name** fields, enter the information from ADO.
5. (Optional) In the **Description** field, enter a description of the process.
6. Select **Create**.
7. In the **Connect to data source** screen in the **Authentication kind** field, replace "Anonymous" with **Organizational account**.

If you're signed in, you'll see your credentials. You can switch to a different account if needed. If you're not signed in, select **Sign in** and sign in to your account.

8. Select **Save**.

The process mining capability will analyze your process. It might take a few minutes for the analytics to appear.

Learn how to [visualize and gain insights from processes](#). You can also use the custom attributes filter to dive deeper into your insights.



# Logic Apps (standard plan) template

The Logic Apps (standard plan) template analyzes the execution of your Logic Apps to help you maximize your automated processes and manage dependencies. To learn more, go to [What is Azure Logic Apps?](#).

The Logic Apps with App (standard plan) template uses telemetry data from [Azure Monitor Application Insights](#) to analyze your apps. You'll need to get an Application ID for your app in an Application Insights resource before you can run the template.

## Get your app's Application Insights Application ID

**If you're not an Azure admin:** Ask your Azure admin to create an Application Insights resource for your app and give you the app's Application ID and the dimensions to enter for Case ID and Activity.

**If you're an Azure admin:**

## Create and run the Logic Apps with App Insights template

1. To deploy a template, you need to create an Application Insights resource. For instructions, go to [Create an Application Insights resource](#).
2. On the **Azure** tab in the **Start with a popular template** section, select the **Logic Apps (standard plan)** tile.
3. [Create an Application Insights resource](#) for your app.
4. In the left panel, select **Configure > API Access**.
5. Copy the **Application ID**.

## Create and run the Logic Apps (standard plan) template

1. In Power Automate in the left panel, select **Process mining**.
2. In the **Start with a popular template** section, select the **Azure** tab, and then select the **Logic Apps (standard plan)** tile.
3. In the **Process name** field, enter a name for your process.

4. In the **Logic App Application Insights Application Id** field, paste the Application ID from Application Insights.
5. (Optional) In the **Description** field, enter a description of the process.
6. Select **Create**.
7. In the **Authentication kind** field, replace "Anonymous" with **Organizational account**.

If you're signed in, you'll see your credentials. You can switch to a different account if needed. If you're not signed in, select **Sign in** and sign in to your account.

8. Select **Save**.

The process mining capability will analyze your process. It might take up to two minutes for the analytics to appear.

Learn how to [visualize and gain insights from processes](#). You can also use the custom attributes filter to dive deeper into your insights.

## Logic Apps (consumption plan) template

The Logic Apps (consumption plan) template analyzes the execution of your Logic Apps to help you identify opportunities and optimize your Logic Apps (consumption plan) usage. To learn more, go to [Usage metering, billing, and pricing models for Azure Logic Apps](#).

The **Logic Apps (consumption plan)** template enables you to visualize the execution and orchestration of your Logic Apps. Insights allow you to maximize your automated processes and manage dependencies.

To learn more about Logic Apps, go to the [Azure Logic Apps documentation](#).

### Prerequisite

Before you can visualize your Logic Apps, you must have an Azure Logic Apps Consumption Plan (Multi-tenant) license. To learn more, go to [Logic Apps pricing](#) .

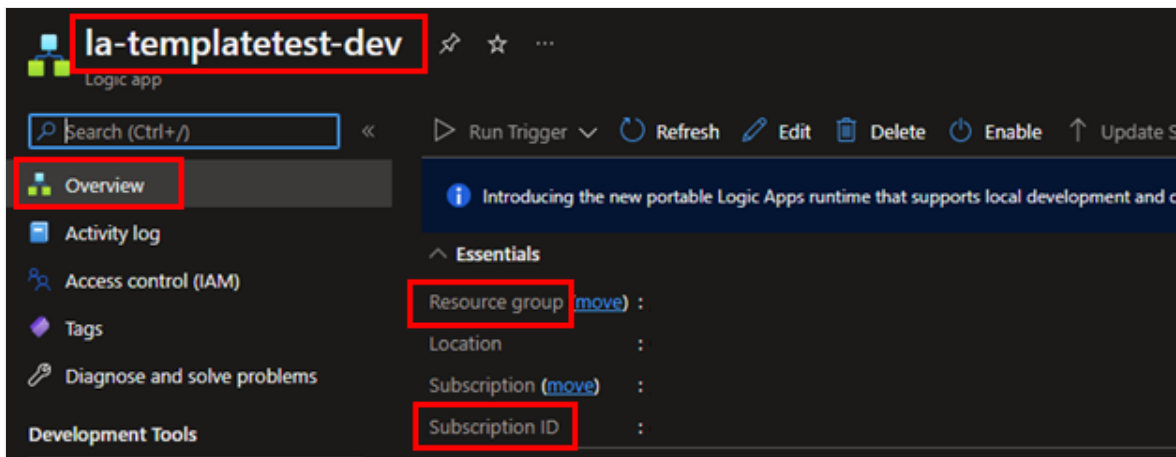
## Create and run the Logic Apps (consumption plan) template

1. To deploy a template, you need to create an Application Insights resource. For instructions, go to [Create an Application Insights resource](#).

The Logic App Consumption Plan template uses data from Azure DevOps to analyze your consumption. You need to gather some information from ADO before you can run the template.

## Gather information from ADO Logic Apps

1. In your Azure Logic Apps environment, select your app, and then in the left panel, select **Overview**.



2. Take note of the app name, **Resource group**, and **Subscription ID**.

## Create and run the Logic Apps (consumption plan) template

1. In Power Automate in the left panel, select **Process mining**.
2. In the **Start with a popular template** section, select the **Azure** tab, and then select the **Logic Apps (consumption plan)** tile.
3. In the **Process name** field, enter a name for your process.
4. In the **Azure subscription Id**, **Resource group name**, and **Logic app name** fields, enter the information from ADO.
5. (Optional) In the **Description** field, enter a description of the process.
6. Select **Create**.
7. In the **Authentication kind** field, replace "Anonymous" with **Organizational account**.

If you're signed in, you'll see your credentials. You can switch to a different account if needed. If you're not signed in, select **Sign in** and sign in to your account.

8. Select **Save**.

The process mining capability will analyze your process. It might take a few minutes for the analytics to appear.

Learn how to [visualize and gain insights from processes](#). You can also use the custom attributes filter to dive deeper into your insights.

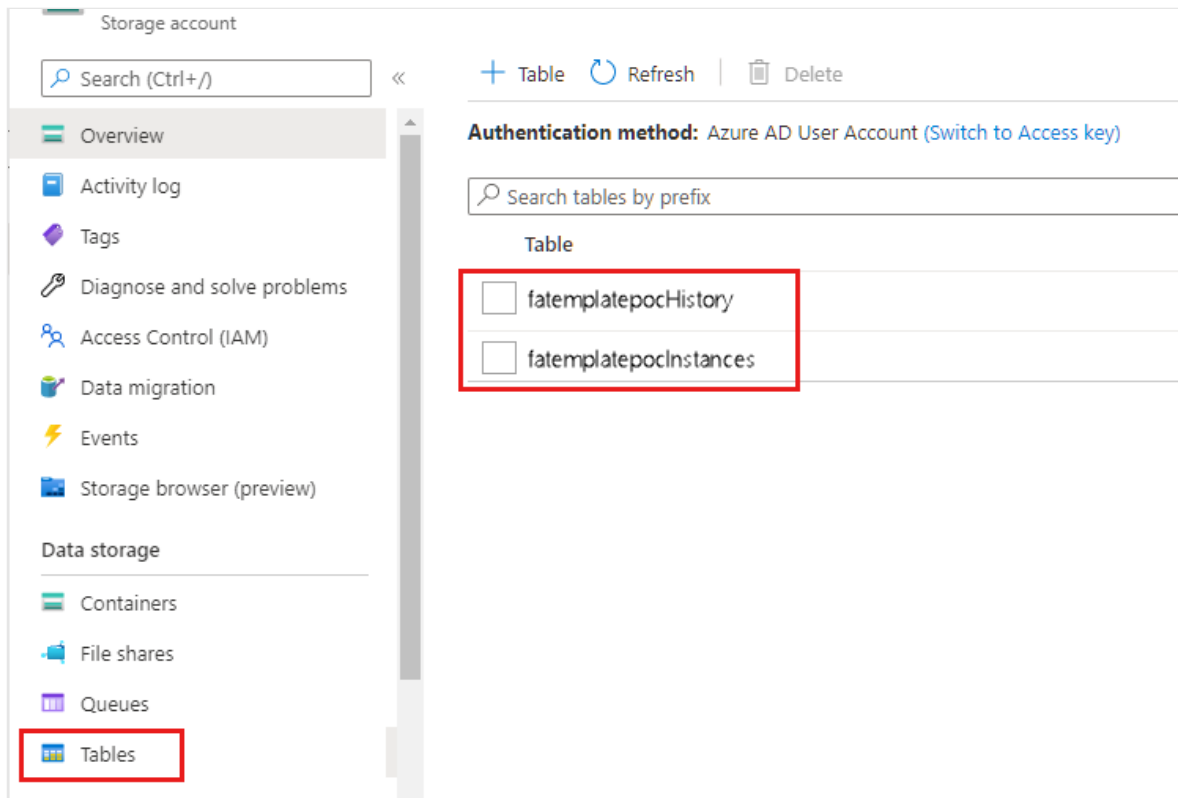
## Durable Functions template

The Durable Functions template analyzes the execution of your Durable Functions to help you identify opportunities and optimize states, checkpoints, and restarts. To learn more, go to [What are Durable Functions?](#)

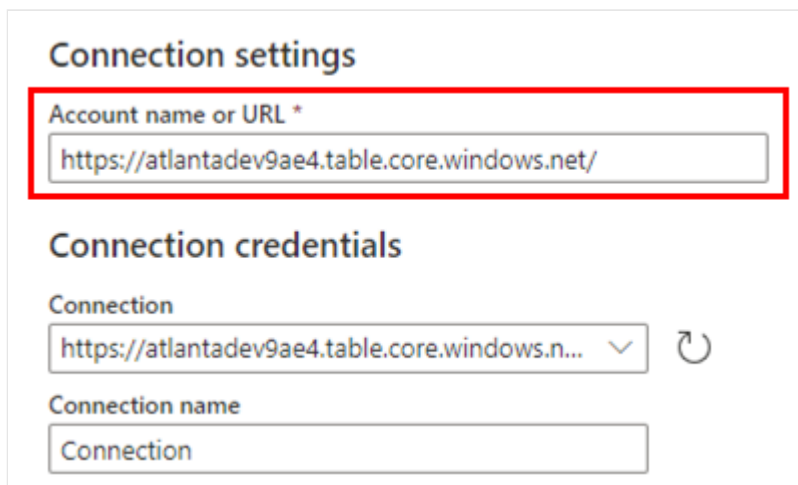
The Durable Functions template uses data from your Azure Durable Functions storage account for its analysis. You'll need to gather some information from Azure before you can run the template.

## Create and run the Durable Functions template

1. Have both the process mining capability in Power Automate and the Azure portal open in separate browser tabs.
2. In the process mining capability, in the **Start with a popular template** section, select the **Azure** tab, and then select the **Durable Functions** tile.
3. In the **Process name** field, enter a name for your process.
4. In Azure portal, go to your Azure Durable Functions storage account. In the left panel under **Data storage**, select **Tables**. Copy the table names that end with **Instances** and **History**.



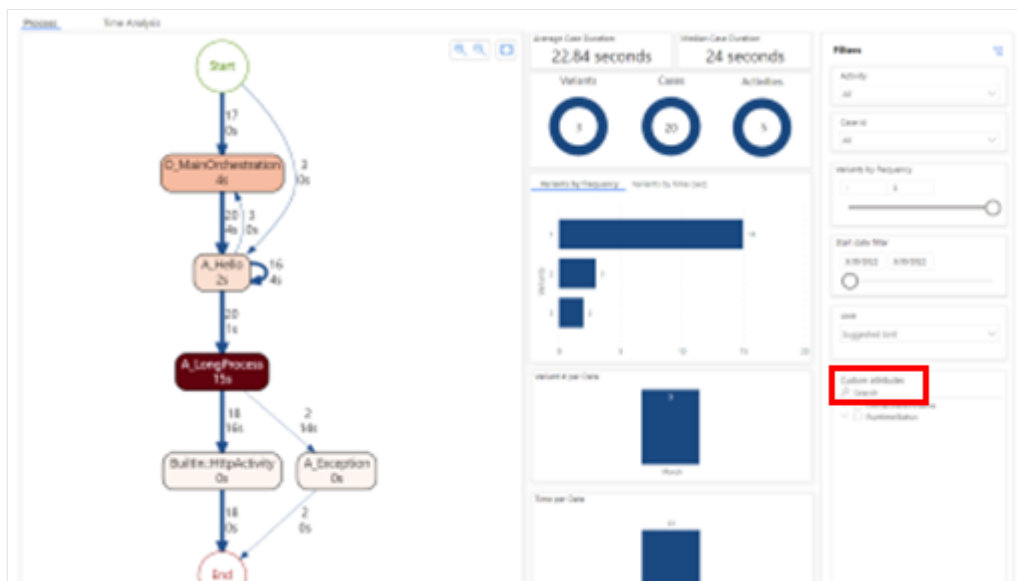
5. In the process mining capability, paste the **Instances** table name in the **Instance Table Storage Name** field and the **History** table name in the **History Table Storage Name** field.
6. In Azure portal, copy the value in the **Url** column.
7. In the process mining capability, paste the URL in the **Table Storage Account URL** field.
8. (Optional) In the **Description** field, enter a description of the process.
9. Select **Create**.
10. On the **Connect to data source** screen, paste the URL from Step 6 in the **Account name or URL** field.



11. In Azure portal in the left pane, select **Security + Networking** > **Access keys**.
12. Select **Show keys**. Copy the value of **Key1** or **Key2**.
13. In the process mining capability, paste the key value in the **Account key** field.
14. Once the connection credentials are established, select **Save**.

The process mining capability will analyze your process. It might take a few minutes for the analytics to appear.

Learn how to [visualize and gain insights from processes](#). You can also use the custom attributes filter to dive deeper into your insights.



## See also

[What is Azure DevOps?](#)

[What is Azure Pipelines?](#)

[What is Azure Logic Apps?](#)

[Azure Monitor Application Insights](#)

[Usage metering, billing, and pricing models for Azure Logic Apps](#)

[What are Durable Functions?](#)

# Finance and operations templates for process mining

Article • 07/18/2023

If you're interested in analyzing your finance and operation process easily, onboard your data with templates in the process mining capability. Templates help you start mining your processes for insights by enabling you to connect to your system of record and surfacing contextual insights. You'll avoid the data identification and manipulation that's required with traditional process mining tools and reach process rich insights on analysis.

## Accounts payable template

The accounts payable (AP) process tracks the process from receiving an invoice to paying it out. Between these two steps, there are countless variants that can occur based on compliance, automation, and industry. The **Accounts payable** template enables SAP users to extract data from their SAP system and visualize their AP process with minimal to no data manipulation required.

### Prerequisites

Connecting and defining the **Accounts payable** template will require IT and admin support.

The **Accounts payable** template requires connection to SAP through:

- [SQL Server database](#)
- [Oracle database](#)
- [OData](#)

For the template ingestion to work, the required tables must be found in the database (copy or original) with the original table name:

Table	Description
BKPF	Accounting document header
BSEG	Accounting document
CDHDR	Change document header

Table	Description
CDPOS	Change document items

## Create and run the Accounts payable template

To see the available templates, select **Process mining** on the left.


1. Under the **Start with a popular template** heading, select the **Finance & Operations** tab, and then select **Accounts payable**.
2. Select a connection type from the three connection types available (**SQL database**, **Oracle database**, and **OData service**).
3. If you're selecting **SQL database**, enter the **Process name**, **Server Name**, **Database Name**, and **Schema Name**.

To learn more, go to [SQL Server](#).


4. (Optional) To improve the analyze time of the report, refine data by defining **Start Date**, **End Date**, **Client**, and **Company Code**.
5. Once you're on the connection page, fill out credential information and select **Next**

To learn more about the fields, go to [Connect to SQL Server database from Power Query Online](#).

### Connection credentials

Connection  
Create new connection ▼ 

Connection name

Data gateway  
(none) ▼ 

Authentication kind  
Basic ▼

Username

Password

Use encrypted connection



6. Once the connection is complete, your process will be analyzed. You can change screens at any time during the analysis.
7. Once the analysis is done, you can view your process report.

## Procure to pay (P2P) template

The procure to pay (P2P) process begins at purchase requisition. Then, it flows to the creation of a purchase order before closing out an invoice payment. It's a complex process that organizations use to ensure compliant spend and fiscal responsibility. The **Procure to pay** template enables SAP users to extract data from their SAP system and visualize their P2P process with minimal to no data manipulation required. This template allows you to find areas for potential efficiencies and automation.

### Prerequisites

Connecting and defining the P2P template will require IT and admin support.

The P2P Template requires connection to SAP through:

- [SQL Server database](#)
- [Oracle database](#)
- [OData](#)

For the template ingestion to work, the required tables must be found in the database (copy or original) with the original table name:

Table	Description
BKPF	Accounting Document Header
BSEG	Accounting Document
CDHDR	Change Document Header
CDPOS	Change Document Items
EKKO	Purchasing Document Header
EKPO	Purchasing Document Items
EKBE	History per Purchasing Document
EBAN	Purchase Requisition
USR02	Logon Data

<b>Table</b>	<b>Description</b>
RSEG	Document item; Incoming Invoice
T008T	Blocking Reason Names
NAST	Message Status
DD07T	DD: Texts for Domain Fixed Values
T001	Company Codes
T024E	Purchasing Organizations
T024	Purchasing Groups
TCURR	Exchange Rates data
TCURX	Decimal places in currency
LFA1	Vendor Master
MAKT	Material Master
T023T	Material Group Descriptions
EKET	Scheduling Agreement Schedule Lines

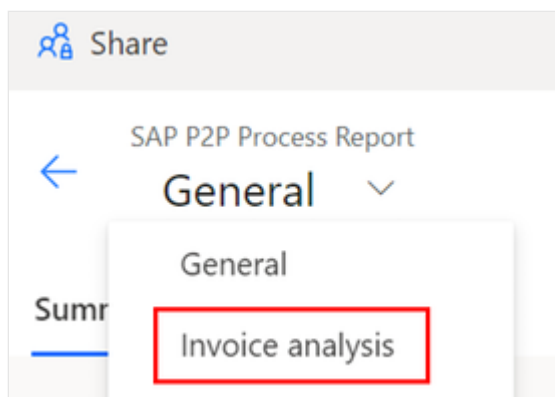
## Create and run the Procure to pay (P2P) template

To see the available templates, select **Process mining** on the left.

1. Under the **Start with a popular template** heading, select the **Finance & Operations** tab, and then select **Procure to pay (P2P)**.
2. To complete creating and running the P2P template, perform the steps in [Create and run the Accounts payable template](#) in this article starting with step 2.

## Read your custom report

Once the analysis is done, there will be a custom report to visualize your P2P process. The first page will have an end-to-end view of the PP2P process. By selecting the caret, you can navigate to the **Invoice analysis** report for a deeper understanding of your invoice process.



## Visualizations and KPIs

P2P templates have additional KPIs and visualizations built on top of the standard report. To learn more about the process map and filters, go to [Visualize and gain insights from processes](#).

- **PO items:** The PO line item is the **Case ID** for this report. Every unique PO line item is represented as a case.
- **PO value:** Aggregate value of PO line items.
- **Net order value normalized:** PO value normalized to USD currency based on the latest conversion rate obtained from the currency table from the SAP system.
- **Spend by company code:** PO line item spend aggregated by company code.
- **Top vendors:** PO line item spend aggregated by the vendor.
- **Purchase order items and value by month:** X axis represents months. Y1 axis represents whole number of PO items (bar graph). Y2 axis represents value of PO items (line graph).
- **Invoice value:** Aggregate value of unique invoices.
- **Invoices:** Count of unique invoices in your process.
- **Average payment term:** Based on invoice payment term, the average days given by vendors to complete payment.
- **Average cycle time:** Based on process, the average time it takes organization to pay out or complete invoices.
- **Discount realization rate:** Total discount taken based on invoice payment date divided by total discount available to organization.
- **Discount availability:** Total available discount to the organization.

- **Paid on time rate:** Invoices paid on or before due date divided by total number of invoices.
- **Paid on time:** X axis represents months. Y1 axis represents whole number of invoices (bar graph). Y2 axis represents paid on time rate (line graph).
- **Invoice Value:** X axis represents months. Y1 axis represents whole number of invoices (bar graph). Y2 axis represents paid on time rate (line graph).

## Customization and issue handling

Templates are composed of a data flow and a report. Like a process created from **Start from Blank**, both the data flow and the report can be customized and changed. To learn more, go to the following topics:

- [Troubleshoot issues with process mining](#)
- [Edit and transform process \(data flows and report\)](#)

# Power Platform templates for process mining

Article • 07/18/2023

Templates designed to work with the process mining capability make it easy for organizations to onboard their data for process mining and gain insights with just a few selections. Unlike traditional process mining tools, Power Platform templates eliminate the need for data identification and manipulation.

Templates are available for [Desktop flows](#), [Power Virtual Agents](#), and [Power Apps insights](#). Each template provides insights that help identify automation opportunities and address performance and compliance issues in workflows.

By using templates in the process mining capability, organizations can quickly and easily start mining their processes for insights and streamline their workflows. Templates simplify the process and allow organizations to focus on the insights and opportunities that matter most, rather than getting bogged down in data manipulation and processing.

## Desktop flows template

The Desktop Flows template analyzes the run history of flows created using [robotic process automation \(RPA\)](#) in Power Automate. This template provides insights into the performance and compliance of RPA workflows. To learn more about desktop flows, please refer to the [Introduction to desktop flows](#) documentation.

By analyzing the run history of RPA flows, the Desktop Flows template can identify potential issues, such as errors or inefficiencies, and provide recommendations for improvement. This information can help organizations optimize their RPA workflows and improve overall performance. Additionally, the Desktop Flows template can help organizations ensure compliance with regulatory requirements by identifying potential violations and recommending corrective actions.

Overall, the Desktop Flows template is a powerful tool that can help organizations maximize the value of their RPA workflows while minimizing risks and improving compliance.

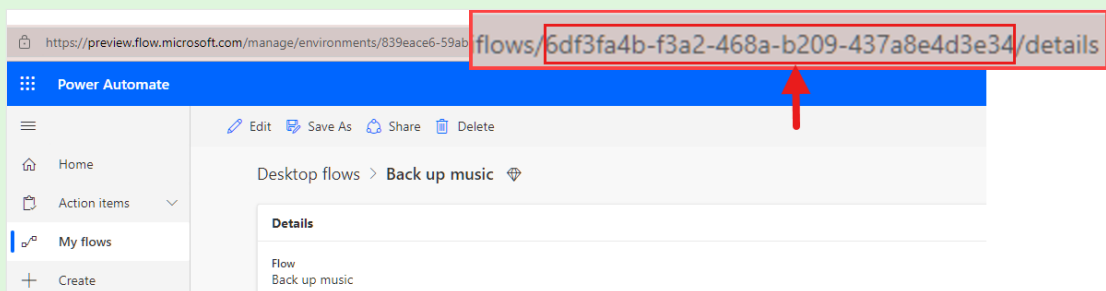
## Create and run the Desktop flows template

1. In Power Automate in the left panel, select **Process mining**.

2. In the **Start with a popular template** section, select the **Power Platform** tab, and then select the **Desktop flows** tile.
3. In the **Process name** field, enter a name for your process.
4. If you know the Flow ID of the flow you want to analyze, enter it in the **Flow ID (optional)** field. If you don't know the Flow ID, you can skip this step.

### 💡 Tip

To find the Flow ID, edit the flow and look at the URL in your browser's address bar. Everything between "flows/" and "/details" is the Flow ID:



5. (Optional) In the **Description** field, enter a description for the process.
6. Select **Create**.
7. In the **Authentication kind** field, replace "Anonymous" with **Organizational account**.

If you're signed in, you'll see your credentials. You can switch to a different account if needed. If you're not signed in, select **Sign in** and sign in to your account.

The process mining capability will analyze your process. It might take up to two minutes for the analytics to appear.

Learn how to [visualize and gain insights from processes](#). You can also use the custom attributes filter to dive deeper into your insights.

## Power Virtual Agents template

The Power Virtual Agents template is designed to analyze the performance and usage of your chatbots, providing insights into your users' journeys and helping you maximize the bots' effectiveness. To learn more about Power Virtual Agents, you can refer to the [Power Virtual Agents overview](#).

# Create and run the Power Virtual Agents template

1. In Power Automate on the left panel, select **Process mining**.
2. In the **Start with a popular template** section, select the **Power Platform** tab, and then select the **Power Virtual Agents** tile.
3. In the **Process name** field, enter a name for your process.
4. (Optional) In the **Description** field, enter a description for the process.
5. Select **Create**.
6. In the **Authentication kind** field, replace "Anonymous" with **Organizational account**.

If you're signed in, you'll see your credentials. You can switch to a different account if needed. If you're not signed in, select **Sign in** and sign in to your account.

7. Select **Save**.

The process mining capability will analyze your process. It might take several minutes for the analytics to appear.

Learn how to [visualize and gain insights from processes](#). You can also use the custom attributes filter to dive deeper into your insights.

## Power Apps insights template

The Power Apps insights template helps you visualize the performance and usage of your Power Apps. It enables you to optimize your apps' functionality and manage its success rate. To learn more about Power Apps, check out [What is Power Apps?](#)

The Power Apps insights template uses telemetry data from [Azure Monitor Application Insights](#) to analyze your apps. To use this template, you'll need to obtain an Application ID for your app in an Application Insights resource.

## Get your app's Application Insights Application ID

**If you're not an Azure admin:** Ask your Azure admin to create an Application Insights resource for your app and give you the app's Application ID and the dimensions to enter for Case ID and Activity.

**If you're an Azure admin:**

1. [Create an Application Insights resource](#) for your app.
2. In the left panel, select **Configure > API Access**.
3. Copy the **Application ID**.
4. Take note of the dimensions you'll want to map to Case ID and Activity in the Power Apps insights template.

To test the dimensions, go to **Log Analytics** and enter the following query:

```
Azure CLI

traces
| where timestamp > ago(30d)
| project
    timestamp,
    message,
    severityLevel,
    operation_Name,
    operation_Id,
    session_Id,
    user_Id,
    client_Type,
    client_City,
    client_StateOrProvince,
    client_CountryOrRegion,
    client_Browser,
    appId,
    customDimensions
```

## Create and run the Power Apps insights template

1. In Power Automate on the left panel, select **Process mining**.
2. In the **Start with a popular template** section, select the **Power Platform** tab, and then select the **Power Apps insights** tile.
3. In the **Process name** field, enter a name for your process.
4. In the **Power Apps application insights app ID** field, paste the Application ID from Application Insights.
5. In the **Case ID field name** and **Activity field name** fields, select the dimensions that represent the Case ID and Activity you want to analyze.
6. (Optional) In the **Description** field, enter a description for the process.



7. Select **Create**.

8. In the **Authentication kind** field, replace "Anonymous" with **Organizational account**.

If you're signed in, you'll see your credentials. You can switch to a different account if needed. If you're not signed in, select **Sign in** and sign in to your account.

9. Go back to the **Create a new process** screen in process mining and paste it in the **Power apps application insights app Id** field.

10. Identify the parameter that you want to analyze from your app and enter it in the **Case Id field name** and **Activity field name** fields in the **Create a new process** screen.

11. Select **Save**.

The process mining capability will analyze your process. It might take up to two minutes for the analytics to appear. You can leave the page and return later.

Learn how to [visualize and gain insights from processes](#). You can also use the custom attributes filter to dive deeper into your insights.

## See also

- [Introduction to desktop flows](#)
- [Power Virtual Agents overview](#)
- [Azure Monitor Application Insights](#)
- [What is Power Apps?](#)

# Prepare processes and data

Article • 04/20/2024

Before you can use the process mining capability in Power Automate effectively, you need to understand:

- [Data requirements.](#)
- [Where to get log data from your application.](#)
- How to [connect to a data source.](#)

Here's a short video on how to upload data for use with the process mining capability:

<https://www.microsoft.com/en-us/videoplayer/embed/RE5b4UA?postJsllMsg=true> 

## Data requirements

Event logs and activity logs are tables stored in your system of record that document when an event or activity occurs. For example, activities you perform in your customer relationship management (CRM) app are saved as an event log in your CRM app. For process mining to analyze the event log, the following fields are necessary:

- **Case ID**

Case ID should represent an instance of your process and is often the object that the process acts on. It can be a "patient ID" for an inpatient check-in process, an "order ID" for an order submission process, or a "request ID" for an approval process. This ID must be present for all activities in the log.

- **Activity Name**

Activities are the steps of your process, and activity names describe each step. In a typical approval process, the activity names may be "submit request," "request approved," "request rejected," and "revise request."

- **Start Timestamp and End Timestamp**

Timestamps indicate the exact time that an event or activity took place. Event logs have only one timestamp. This indicates the time that an event or activity occurred in the system. Activity logs have two timestamps: a start timestamp and an end timestamp. These indicate the start and end of each event or activity.

You can also extend your analysis by ingesting optional attribute types:

- **Resource**

A human or technical resource executing a specific event.

- **Event Level Attribute**

Additional analytical attribute, which has different value per event, for example, Department performing the activity.

- **Case Level Attribute (first event)**

Case Level Attribute is an additional attribute, that from the analytical point of view is considered to have a single value per case (for example, Amount of Invoice in USD). However, the event log to be ingested doesn't necessarily have to comply with consistency by having the same value for the specific attribute for all events in the event log. It might not be possible to ensure that, for example, when incremental data refresh is used. Power Automate Process Mining ingests the data as is, storing all values provided in the event log, but uses a so called *case level attribute interpretation* mechanism to work with the attributes on case level.

In other words, whenever the attribute is used for specific function, which requires event level values (for example, event level filtering), the product uses the event level values. Whenever a case level value is needed (for example, case level filter, root cause analysis), it uses the interpreted value, which is taken from the chronologically first event in the case.

- **Case Level Attribute (last event)**

The same as Case Level Attribute (first event) but when interpreted on case level, the value is taken from the chronologically last event in the case.

- **Financial per Event**

Fixed cost/revenue/numeric value that changes per activity performed, for example, courier service costs. Financial value is calculated as a sum (mean, minimum, maximum) of the financial values per each event.

- **Financial Per Case (first event)**

Financial per Case attribute is an additional numeric attribute, that from the analytical point of view is considered to have a single value per case (for example, Amount of Invoice in USD). However, the event log to be ingested doesn't necessarily have to comply with consistency by having the same value for the specific attribute for all events in the event log. It might not be possible to ensure

that, for example, when incremental data refresh is used. Power Automate Process Mining ingests the data as is, storing all values provided in the event log. However, it uses a so called *case level attribute interpretation* mechanism to work with the attributes on case level.

In other words, whenever the attribute is used for specific function, which requires event level values (for example, event level filtering), the product uses the event level values. Whenever a case level value is needed (for example, case level filter, root cause analysis), it uses the interpreted value, which is taken from the chronologically first event in the case.

- **Financial Per Case (last event)**

The same as Financial Per Case (first event) but when interpreted on case level, the value is taken from the chronologically last event in the case.

## Where to get log data from your application

The process mining capability needs event log data to perform process mining. While many tables that exist in your application's database contain the current state of the data, they might not contain a historical record of the events that happened, which is the required event log format. Fortunately, in many larger applications, this historical record, or log is often stored in a specific table. For example, many Dynamics applications keep this record in the Activities table. Other applications, like SAP or Salesforce, have similar concepts, but the name might be different.

In these tables that log historical records, the data structure can be complex. You might need to join the log table with other tables in the application database to get specific IDs or names. Also, not all events that you're interested in are logged. You might need to determine what events should be kept or filtered out. If you need help, you should contact the IT team that manages this application to understand more.

## Connect to a data source

The benefit of connecting to a database directly is keeping the process report up to date with the latest data from the data source.

[Power Query](#) supports a large variety of connectors that provide a way for the process mining capability to connect and import data from the corresponding data source. Common connectors include Text/CSV, Microsoft Dataverse, and SQL Server database. If you're using an application like SAP or Salesforce, you might be able to connect to

those data sources directly via their connectors. For information on supported connectors and how to use them, go to [Connectors in Power Query](#).

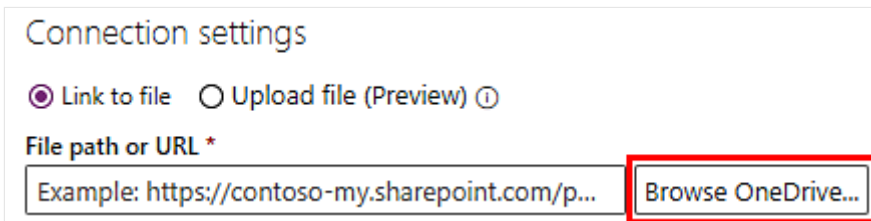
## Try out the process mining capability with the Text/CSV connector

One easy way to try out the process mining capability regardless of where your data source is located is with the Text/CSV connector. You might need to work with your database admin to export a small sample of the event log as a CSV file. Once you have the CSV file, you can import it into the process mining capability using the following steps in the data source selection screen.

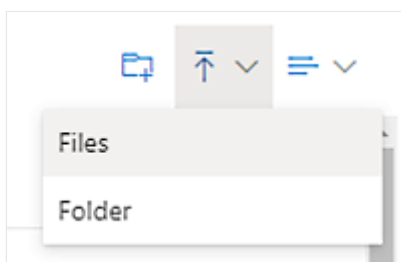
### ⓘ Note

You must have OneDrive for Business to use the **Text/CSV** connector. If you don't have OneDrive for Business, consider using **Blank table** instead of **Text/CSV**, as in the following step 3. You won't be able to import as many records in **Blank table**.

1. On the process mining home page, create a process by selecting **Start here**.
2. Enter a process name and select **Create**.
3. On the **Choose data source** screen, select **All categories** > **Text/CSV**.
4. Select **Browse OneDrive**. You might need to authenticate.



5. Upload your event log by selecting the **Upload** icon in the upper right and then selecting **Files**.



6. Upload your event log, select your file from the list, and then select **Open** to use that file.

# Use the Dataverse connector

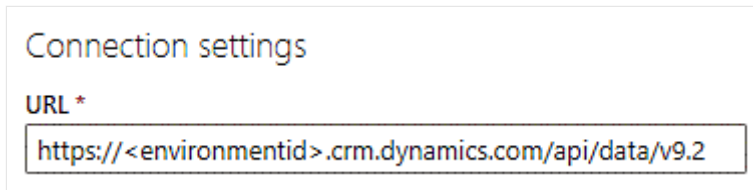
The Dataverse connector isn't supported in Microsoft Power Platform. You need to connect to it using the OData connector, which requires a few more steps.

1. Make sure you have access to the Dataverse environment.
2. You need the environment URL of the Dataverse environment you're trying to connect to. Normally it looks like this:

```
https://<environmentid>.crm.dynamics.com/
```

To learn how to find your URL, go to [Finding your Dataverse environment URL](#).

3. On the **Power Query - Choose data sources** screen, select **OData**.
4. In the URL textbox, type **api/data/v9.2** at the end of the URL so it looks like this:



Connection settings

URL \*

```
https://<environmentid>.crm.dynamics.com/api/data/v9.2
```

5. Under **Connection credentials**, select **Organizational account** in the **Authentication kind** field.
6. Select **Sign in** and enter your credentials.
7. Select **Next**.
8. Expand the **OData** folder. You should see all the Dataverse tables in that environment. As an example, the **Activities** table is called *activitypointers*.
9. Select the checkbox next to the table you want to import, and then select **Next**.

# Copilot in Process Mining ingestion (preview)

Article • 07/26/2024

[This article is prerelease documentation and is subject to change.]

Copilot in Process Mining ingestion navigates you through the ingestion experience in Process Mining. With Copilot in Process Mining ingestion, you can identify your process during data ingestion and automap your data to the required data schema.

Copilot can perform the following actions:

- Discover your process in your Azure Data Lake.
- Give automapping recommendations to required data schema.
- Answer your questions about your process data.
- Answer your general questions about processes.

## 📘 Important

- This feature is generally available only in the United States region, and is in preview for all other regions.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.
- For more information, go to our [preview terms](#).
- This capability is powered by [Azure OpenAI Service](#).
- More information: [FAQ for Copilot data security and privacy in Power Platform](#)

## Prerequisite

You need a Power Platform environment for Copilot in Process Mining.

## ⚠️ Note

- If you still don't see the Copilot experience, contact your admin. An admin can turn the Copilot feature off or on in the Power Platform admin center.

- In some geographic regions outside United States, Australia, and United Kingdom, an admin needs to turn on the cross geo calls to enable Copilot. More information: [Copilot availability by region](#).

## Ingest Data with Copilot

Follow these steps to ingest data with Copilot.

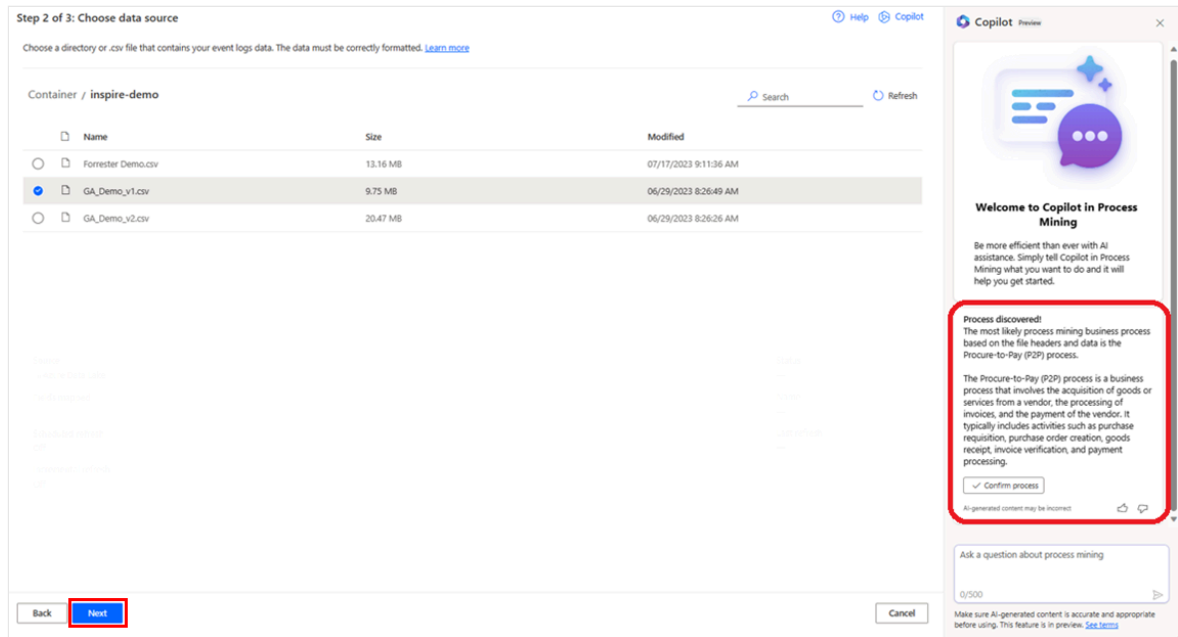
1. Sign in to [Power Automate](#).
2. Select **Process mining** > **Start here** (under **Create new process**).
3. In the **Process name** field, enter a name for your process.
4. Under the **Data source** heading, select **Azure Data Lake (preview)**.
5. Select **Continue**.

The screenshot shows the 'Create a new process' dialog box. It features two main columns for process types: 'Process mining' and 'Task mining'. The 'Process name' field is highlighted with a red box and contains the text 'Bring your own data lake'. Below it is a 'Description' text area. The 'Data source' section is also highlighted with a red box and shows 'Import data' and 'Recordings' as options, with 'Azure Data Lake (preview)' selected. At the bottom right, the 'Continue' button is highlighted with a red box, and the 'Cancel' button is visible next to it.

6. Complete the steps in the **Connection setup** screens for the Azure Data Lake container.
7. Select **Next**.
8. Select the folder or file you're interested in analyzing and Copilot identifies the process.



9. Confirm that it's the process you're interested in analyzing by selecting **Confirm process** > **Next**.



10. In the mapping screen, Copilot offers an automapping suggestion that you can review and choose to map your data to.

11. Once you've reviewed the automapping, you can save and analyze your process.

## Frequently asked questions

For the list of questions for Copilot in Process Mining ingestion, go to [Frequently asked questions](#).

## Limitations of Copilot in Power Automate

For a list of limitations of Copilot in Power Automate, go to [Limitations of Copilot in Power Automate](#).

## Related information

- [Responsible AI FAQs for Power Automate](#)
- [FAQ for Copilot in Power Automate Process Mining](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Copilot in Process Mining process analytics (preview)

Article • 12/18/2023


[This article is prerelease documentation and is subject to change.]

Copilot in Process Mining process analytics provides process insights through quick and easy natural language expression. Copilot can surface insights on your process and recommend solutions in power automate process mining.

Copilot can perform the following actions:

- Surface top insights in your process.
- Offer recommendations on automation.
- Answer your questions about your process data.
- Answer your general questions about process mining.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.
- For more information, go to our [preview terms](#) .
- This capability is powered by [Azure OpenAI Service](#).
- More information: [FAQ for Copilot data security and privacy in Power Platform](#)

## Prerequisite

You need a Power Platform environment for Copilot in Process Mining.

## Note

- If you still don't see the Copilot experience, contact your admin. An admin can turn the Copilot feature off or on in the Power Platform admin center.
- In some geographic regions outside United States, Australia, and United Kingdom, an admin needs to turn on the cross geo calls to enable Copilot.

More information: [Copilot availability by region](#).

## Copilot in Process Mining analysis

Copilot in Process Mining process analytics helps you generate process insights through natural language. Copilot can easily summarize findings from your data quantitatively and qualitatively. Prompts help you get a quick start on your process mining journey.

Make sure you've done the following:

- Finished the process import and see the imported process on the Process Mining web page.
- If you plan to use Copilot on the Process Mining desktop application, download and install the Process Mining desktop application on your local machine.

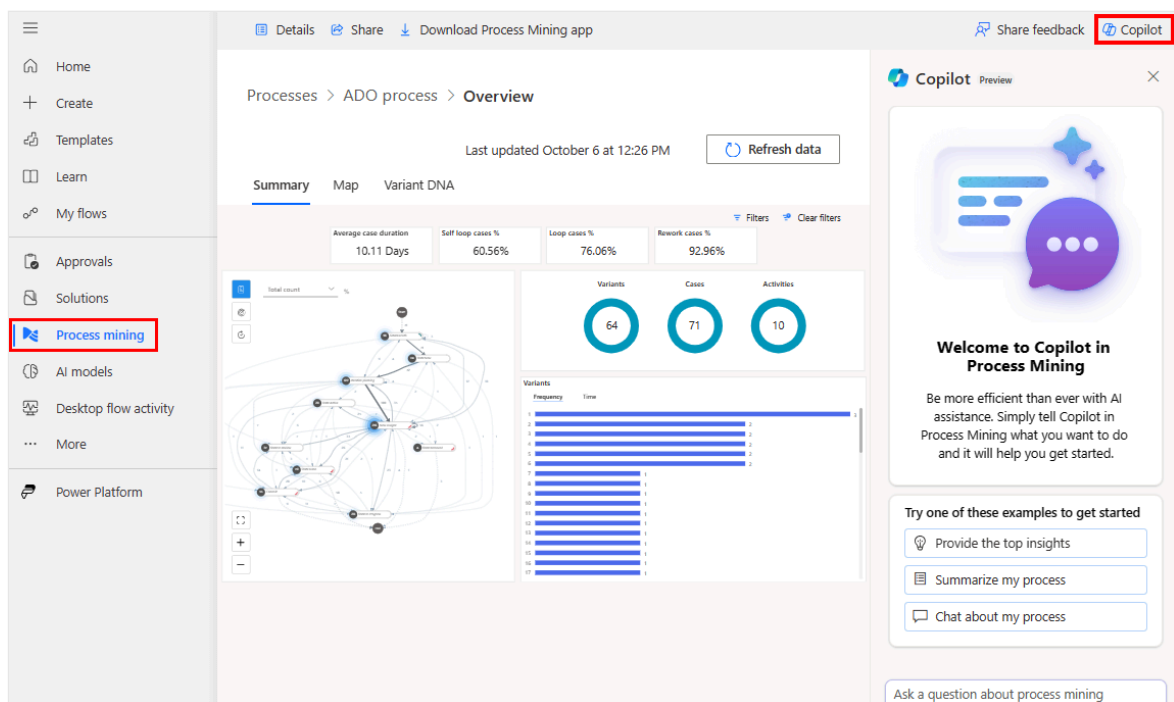
For instructions, go to [Download Power Automate Process Mining desktop app](#).

## Analyze your process

Follow these steps to analyze the process with Copilot. You can analyze your process in the [Power Automate Process Mining web page](#) or in the [Process Mining desktop app](#).

### Analyze your process in the Power Automate Process Mining web page

1. In Power Automate in the left navigation pane, select **Process mining**.
2. In the **Environments** field in the titlebar, select your process mining environment with an imported process.
3. Open the imported process.



There are two ways to open the process:

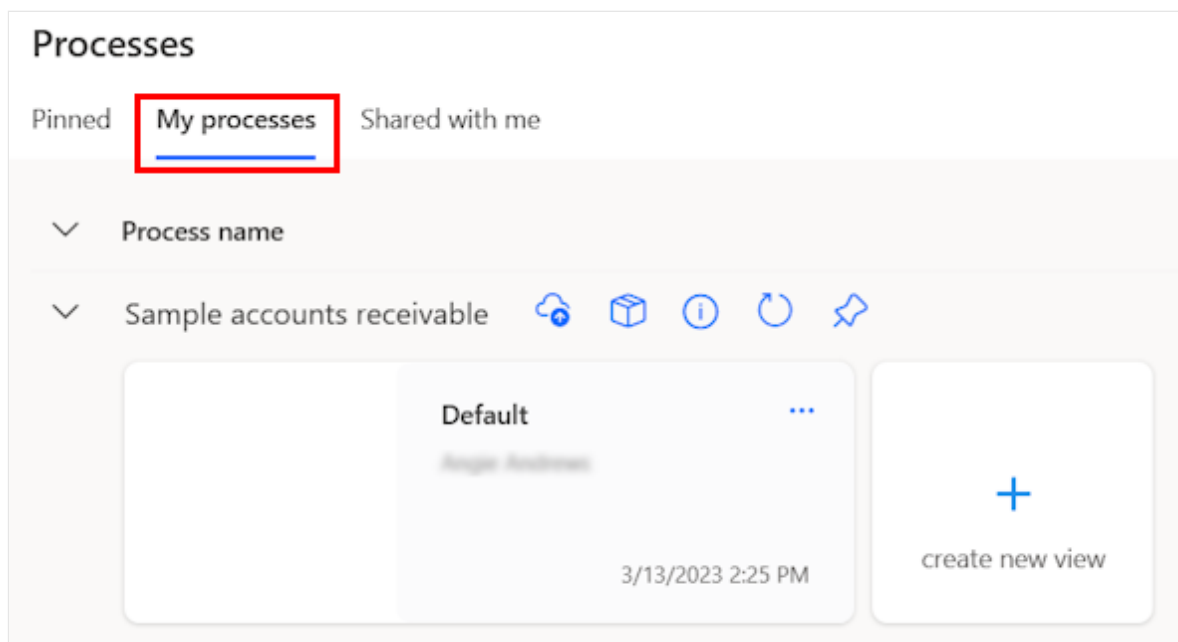
- If you wait until the import operation finishes, the process opens automatically after the import, OR
- After steps 1 and 2, you see the Process Mining environment home page. Processes display as tiles. Select a process tile, or select the **All processes** link to list all processes. To open a process, select its name.

## Analyze your process in the Process Mining desktop app

### **i** Important

This feature is generally available only in the United States region, and is in preview for all other regions.

1. Open the Process Mining desktop app:
  - a. On the taskbar, select the Windows **Start** icon.
  - b. In the search bar, enter **process mining**.
  - c. On the right panel, select **Power Automate Process Mining** app.
2. In the **My processes** tab, select your process mining environment with an imported process.
3. Select the process to analyze.

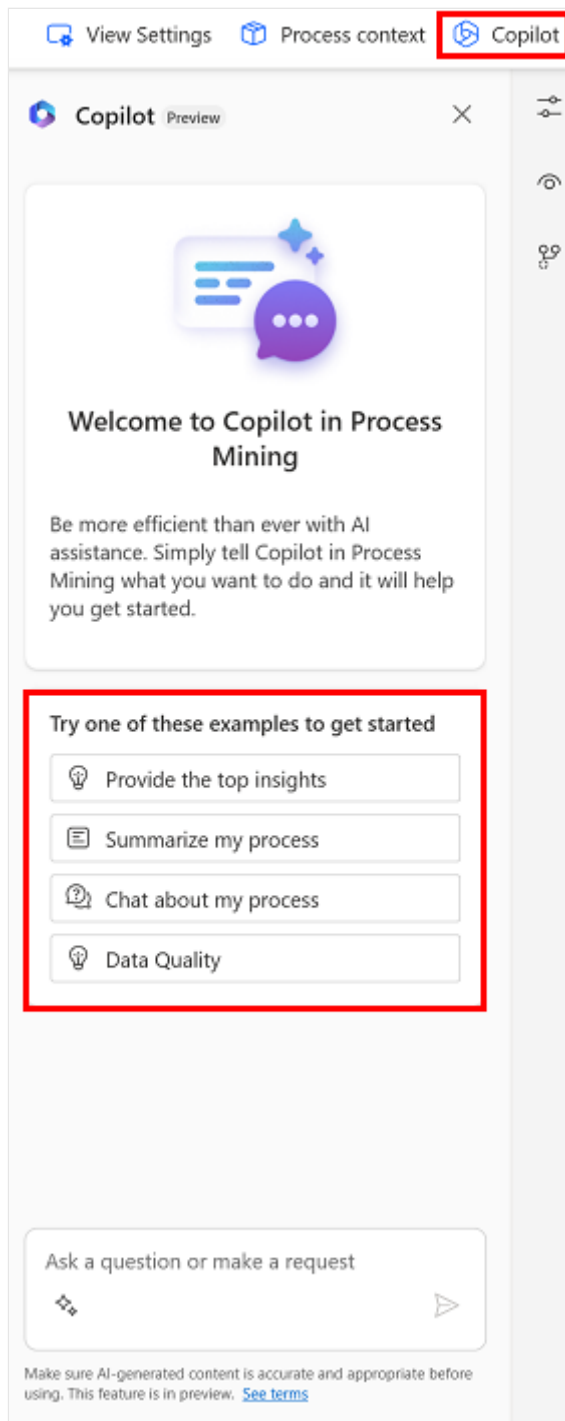


4. In process map view, select **Copilot** on the command bar to the right. The Copilot pane opens.

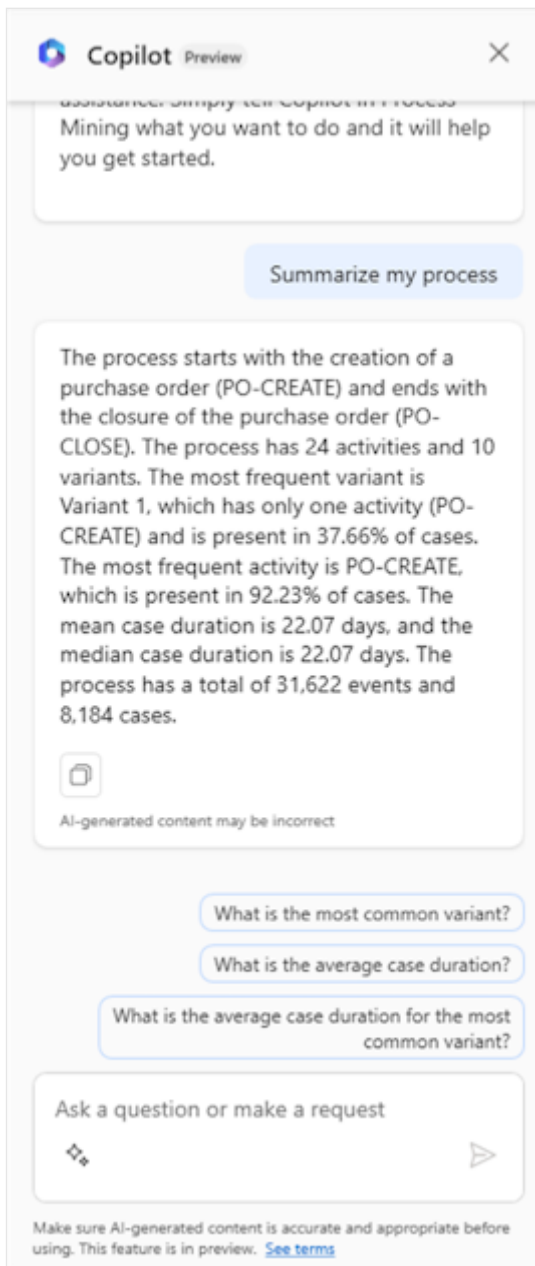
Copilot offers several prepared suggestions to easily get you started on engaging with your data.

5. Select a suggestion to have Copilot provide the response.

If available, it also provides subsequent prepared suggestions.



6. (Optional) You can continue in conversation with Copilot by selecting subsequent suggestions. Alternatively, you can ask your own questions at any time using the text field in bottom part of the Copilot pane.



Copilot in the Process Mining desktop app leverages knowledge of the open process statistics. It communicates the various statistical information.

## How to write a good prompt

For more general information about writing prompts with generative AI, go to [The art of the prompt: How to get the best out of generative AI](#) .

For general information about writing prompts in Power Automate, go to [How to write a good prompt](#).

Copilot in the Process Mining desktop app has access to process statistics for top items for activities, edges, and variants. You can ask questions related to your statistics and Copilot can answer with correct data. When asking about statistical properties, Copilot



has access to information about frequency (activity, edge counts, and case counts), durations (total and average), and rework statistics.

The following list provides examples of good prompts within the scope of available process statistics.

- What is the most common variant?
- Which activity has the highest frequency?
- What activities have the highest rework and rework percentage?
- Compare activities with the highest rework (%) attribute.
- Make a summary description of the process, use the data provided to support your conclusions.

The following list provides examples of prompts focused on general knowledge about process mining.

- Give me introduction to process mining.
- Let's talk about data quality of event log dataset for process mining.
- What are the most common process mining event log related data quality issues?

## Frequently asked questions

Use this section to find answers to frequently asked questions.

### How do I create an environment with Copilot?

1. Go to Create a Power Platform environment.
2. [Create a Power Platform environment](#).

If you need help with creating a preview environment, ask your Power Platform admin.

### Why don't I see Copilot?

Ask your admin if they turned off the Copilot feature in the Power Platform admin center for your environment.

### How do I disable Copilot?

Have your tenant admin ask the MS Support team to disable Copilot in your tenant.

# Limitations of Copilot in process analysis

- Copilot has limited information about processes. Only access to the most common activities and variants are available. If the process contains many activities or variants, Copilot can answer prompts only for the most frequent ones.
- Copilot doesn't have access to statistical information about custom attributes in the process like financial, resource, or vendor attributes.

# Limitations of Copilot in Power Automate

- You can't use Copilot in Process Mining ingestion on processes created with dataflows.
- You can't use Copilot in task mining processes.
- Copilot has a limited view of your ingested data in the ingestion experience. This limits the questions it might be able to answer for your data and process, such as the longest running activity or amount of rework in process.
- (Applies only to Copilot in process analytics) Copilot can't be used in a web report of Process Mining.
- You can't use Copilot if you're using a personal Microsoft account. For example, you can't use `someone@live.com`. Use a work or school account like `someone@contoso.com` instead.
- Copilot supports English language only for models.

## Related information

- [Responsible AI FAQs for Power Automate](#)
- [FAQ for Copilot in Power Automate Process Mining](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# Connect to SAP ERP from process mining (preview)

Article • 07/27/2023

[This topic is pre-release documentation and is subject to change.]

The SAP ERP (enterprise resource planning) connector in beta enables you to extract data from your SAP system. It allows you to invoke remote function calls (RFC) and business application programming interface (BAPI) functions using an on-premises data gateway. This SAP RFC connector is supported by Power Platform dataflows within Microsoft Power Automate Process Mining.

## Important

Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.


## Prerequisites

Enabling SAP ERP connector requires several prerequisites to be completed. All prerequisites must be completed on the same machine where extraction will be made. You must have admin permissions with access to the target SAP instance.

- Ensure the windows machine (64 bit OS) is updated and has access to the target SAP machine.
- Ensure SAP credentials have requisite permission to run the desired RFCs or BAPIs.
- Ensure there are SAP S-user credentials to be able to download the SAP .NET Connector installer.

## Set up the connector

The following installers must exist in the desktop or virtual machine before using the connector.

1. Go to [SAP Connector for Microsoft .NET](#)  to download and install the NCo 3.0 for 64 bit.
  - Don't install NCo 3.1, as this version is not yet supported.

- Access to the download requires a valid S-user. You might need to contact your SAP team.
- Choose the 64 bit version. The 32 bit version won't work.
- During installation, in the optional setup steps screen, select **Install assemblies to GAC**.

2. Download and install [Microsoft SAP RFC Reader](#) (V0.1.02232.26).

- .NET Framework 4.7.2 or greater is required.
- This is supported by Windows 10, Windows 11, Windows Server 2012 R2, Windows Server 2016, Windows Server 2019, and Windows Server 2022.

3. Download and install the Power Query [On-premises data gateway installation](#). To learn more about the gateway requirements or for support, go to [Install an on-premises data gateway](#).

## Connection settings for SAP ERP

To instantiate your dataflow connection to the SAP ERP connector, you need to create a connection string with the following parameters.

Name	Key	Required	Type	Description
AS host	<code>AppServerHost</code>	Application server	String	The hostname of the SAP application server.
Client	<code>Client</code>	Application and message server	Integer	The SAP client ID to connect to the SAP system.
AS system number	<code>SystemNumber</code>	Application server	Integer	The SAP system's system number. It's a number from 00 to 99.
Message server	<code>MessageServerHost</code>	Message server	String	Hostname of the SAP system's message server.
Message server service name/port	<code>MessageServerService</code>	Message server	String	Service name or the port number under which the message server is listening for load balancing requests.
System ID	<code>SystemID</code>	Message server	String	SAP system's three letter system ID.
Logon group	<code>LogonGroup</code>	Message server	String	The logon group for the SAP system from which the message

Name	Key	Required	Type	Description
				server selects an application server.
Logon type	LogonType	Application and message server	String	The type of logon to the SAP system. It's either application server logon (type A), or group logon (Type B, also known as message server). Values can be <code>ApplicationServer</code> or <code>Group</code> .

## Set up the SAP system connection string

This connector supports SAP authentication only currently. Constructing the script is dependent on connection type and is outlined in the following sections.

### Application server

1. Connection string template: `{"AppServerHost": "<application server>", "Client": "<client id>", "SystemNumber": "<system number>", "LogonType": "ApplicationServer"}`.
2. Replace everything in `<>` with your application server system settings. For example, for a server `sap.contoso.com` with system number `00` and client id `100`:  
`{"AppServerHost": "sap.contoso.com", "Client": "100", "SystemNumber": "00", "LogonType": "ApplicationServer"}`.

### Message server

Although **Data gateway** isn't marked as a requirement in connection settings, identifying the data gateway is required for connecting to the SAP ERP connector.

1. Connection string template: `{"MessageServerHost": "<message server>", "MessageServerService": "<message server service name/port>", "LogonType": "Group", "SystemID": "<system id>", "Client": "<client id>", "LogonGroup": "<logon group>"}`.
2. Replace everything in `<>` with your message server system settings noting that you might or might not require both `MessageServerService` and `SystemID`. For example, for server `10.0.0.1` with message server port `3333` and client id `800` and logon group `COTO`: `{"MessageServerHost": "10.0.0.1",`

```
"MessageServerService": "3333", "LogonType": "Group", "Client": "800",  
"LogonGroup": "COTO"}.`
```

## Enable function parsing

After connections, the RFC shows up as a function with the parameter metadata and an optional **Enable Function Parsing** option. Fill in the parameters and select **Invoke** to get the data. You should rely on your SAP produced documentation or custom documentation for RFC parameters.

The function parsing mode for the connector understands contracts of two widely used RFCs: `RFC_READ_TABLE` and `/SAPDS/RFC_READ_TABLE2`. They'll take this interpretation and parse out the output in an easy to read format instead of requiring you to do so in M script. Function parsing can be enabled not only for the previously mentioned RFCs, but also for RFCs with the same contract such as `BBP_RFC_READ_TABLE` or `/BODS/RFC_READ_TABLE2`. This includes custom RFCs deployed by the customer to the SAP system.

## Authentication

The SAP ERP connector only supports basic SAP authentication. Because the connector is designed to be used by multiple users of an app, the connections aren't shared. Each user authenticates with the SAP system.

## Known issues and limitations

The following are some of the known issues and limitations of the SAP ERP connector.

- The connector supports only RFCs and BAPIs.
- The connector doesn't support receiving messages from SAP Server.
- Transactional RFCs (tRFCs) aren't supported.
- The gateway has a 2 MB payload limit for write operations and an 8 MB compressed data response limit for read operations.

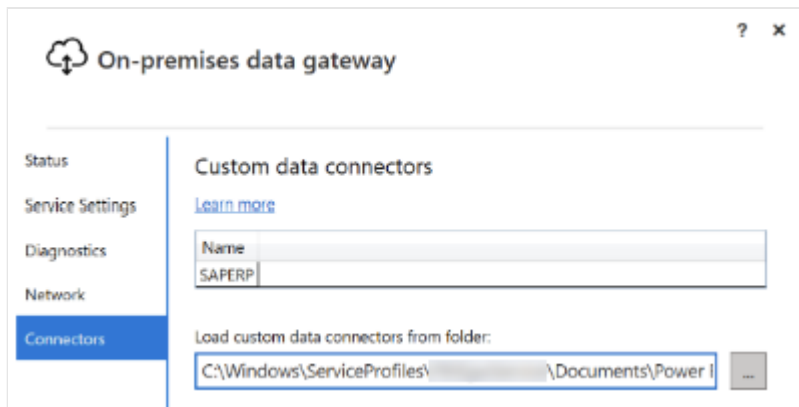
## FAQ

**The SAP ERP beta connector is labeled as third party. Is this connector not created or managed by Microsoft?**

The connector was created by Microsoft and is managed by Microsoft. As a beta connector, it holds a third party label until it becomes generally available.

## I'm getting the following error when attempting to connect: "The given data source kind is not supported Data source kind SAPERP". How do I address this?

As a custom connector, by default we save the connection in your [System Drive]\Windows\ServiceProfiles\PBIEqwService\Documents\Power BI Desktop\Custom Connectors folder. If this folder doesn't exist, or if the gateway is configured to use a different custom connector folder, you get this error. To fix this, copy the **SAPERP.mez** connector file from [System Drive]\Windows\ServiceProfiles\PBIEqwService\Documents\Power BI Desktop\Custom Connectors and into the folder that you configured in your gateway.



## Do I always need to identify a data gateway in connection settings?

As part of connection setting you must identify a data gateway to successfully connect through the SAP ERP connector.

## My connection continues to fail, what can I do to remediate?

Make sure to check that installers described in this article are current. Reinstalling drivers might solve your connection issues.

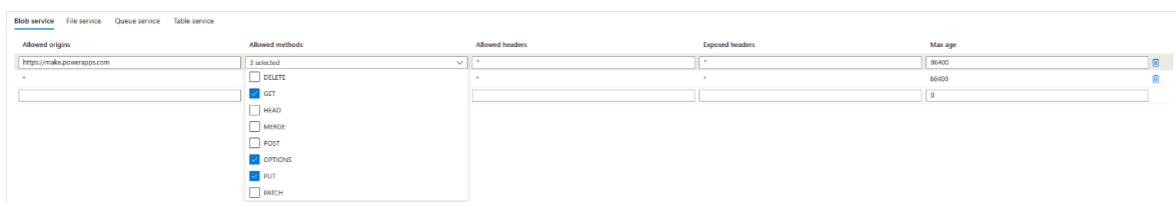
# Bring your own Azure Data Lake Storage Gen2

Article • 05/24/2024

Power Automate Process Mining gives you the option to store and read event log data directly from [Azure Data Lake Storage Gen2](#). This feature simplifies extract, transform, load (ETL) management by connecting directly to your storage account.

## Prerequisites

- The Data Lake Storage account must be Gen2. You can check this out from the Azure portal. Azure Data Lake Gen1 storage accounts aren't supported.
- The Data Lake Storage account must have [hierarchical namespace](#) enabled.
- The **Owner** role must be attributed to the user performing the initial container setup for the environment for the following users in the same environment. These users are connecting to the same container and must have these assignments:
  - **Storage Blob Data Reader** or **Storage Blob Data Contributor** role assigned
  - Azure Resource Manager **Reader** role assigned, at minimum.
- **Resource Sharing (CORS)** rule to your storage account should be established to share with Power Automate Process Mining.
  - Allowed origins must be set to `https://make.powerapps.com`.
  - Allowed methods must include: `get`, `options`, `put`.
  - Allowed headers should be as flexible as possible. We recommend defining them as `*`.
  - Exposed headers should be as flexible as possible. We recommend defining them as `*`.
  - The maximum age should be as flexible as possible. We recommend using `86400`.



Allowed origins	Allowed methods	Allowed headers	Exposed headers	Max age
https://make.powerapps.com	GET, HEAD, MERGE, POST, OPTIONS, PUT, PATCH	*	*	86400

- Data in your Data Lake Storage should meet the following CSV file format requirements:
  - **Compression type:** None



- **Column delimiter:** Comma (,)
- **Row delimiter:** Default and encoding. For example, Default (\r,\n, or \r\n)

File format settings	
Compression type	None
Column delimiter ⓘ	Comma (,)
Row delimiter ⓘ	Default (\r,\n, or \r\n)
Encoding ⓘ	Default(UTF-8)
Quote character ⓘ	Double quote (")
Escape character ⓘ	Double quote (")
Add header to file ⓘ	<input checked="" type="checkbox"/>
Null value ⓘ	

- All data must be in final event log format and meet the requirements listed in [Data requirements](#). Data should be ready to be mapped to the process mining schema. No data transformation is available post ingestion.
- The size (width) of the header row is currently limited to 1 MB.

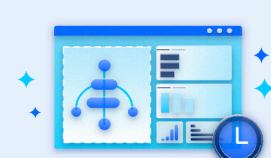
### ⓘ Important

Ensure that time stamp represented in your CSV file follows the ISO 8601 standard format (for example, `YYYY-MM-DD HH:MM:SS.sss` OR `YYYY-MM-DDTHH:MM:SS.sss`).

## Connect to Azure Data Lake Storage


1. On the navigation pane to the left, select **Process mining > Start here**.
2. In the **Process name** field, enter a name for your process.
3. Under the **Data source** heading, select **Import data > Azure Data Lake > Continue**.

### Create a new process ✕



**Process mining**

- Connect, transform, and upload data from a wide variety of sources.
- Visualize a process map and gain insights from data.
- Understand complex business processes across your organization



**Task mining**


- Record the actions required to complete a process.
- Visualize a process map to analyze actions and get insights.
- Use these insights and guided recommendations to begin automating.


Set up a process using recordings or imported data. [Learn more](#)

**Process name \***

**Description**

**Data source \***

  
 Import data

  
 Recordings

Dataflow

Azure Data Lake

Continue
Cancel

4. On the **Connection setup** screen, select your **Subscription ID**, **Resource Group**, **Storage account**, and **Container** from the dropdown menus.

5. Select the file or folder containing the event log data.

You can either select a single file or a folder with multiple files. All files must have the same headers and format.

6. Select **Next**.

7. On the **Map your data** screen, map your data to the required schema.

**Step 3 of 3: Map your data** ? Help

For each of your attributes, map the column of attribute type correctly to set up your process map. **Case ID, Activity, and Event start** are required

Case ID  Activity  Event Start

Showing 11 attributes 
◇ Clear all
☰ Auto map
🏠 Return to container selection

Attribute name	Attribute type <span style="font-size: 0.7em;">▼</span>	Attribute data type <span style="font-size: 0.7em;">⌵</span>
CaseID	Event Level Attribute <span style="font-size: 0.7em;">▼</span>	Text <span style="font-size: 0.7em;">▼</span>
Activity	Event Level Attribute <span style="font-size: 0.7em;">▼</span>	Text <span style="font-size: 0.7em;">▼</span>
StartTimestamp	Event Level Attribute <span style="font-size: 0.7em;">▼</span>	Date/Time <span style="font-size: 0.7em;">▼</span>

8. Complete the connection by selecting **Save and Analyze**.

## Define incremental data refresh settings

You can refresh a process ingested from Azure Data Lake on a schedule, either through a full or incremental refresh. Though there are no retention policies, you can ingest data incrementally using one of the following methods:

If you selected a *single file* in the previous section, append more data to the selected file.

If you selected a *folder* in the previous section, add incremental files to the selected folder.

### Important

When you add incremental files to a selected folder or subfolder, make sure you indicate the increment order by naming files with dates such as YYYYMMDD.csv or YYYYMMDDHHMMSS.csv.

To refresh a process:

1. Go to the **Details** page of the process.
2. Select **Refresh Settings**.
3. On the **Schedule refresh** screen, complete the following steps:
  - a. Turn on the **Keep data up to date** toggle switch.
  - b. In the **Refresh data every** dropdown lists, select the frequency of the refresh.
  - c. In the **Start at** fields, select the date and time of the refresh.
  - d. Turn on the **Incremental refresh** toggle switch.

---

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Bring your own network isolated Azure Data Lake Storage Gen2

Article • 04/22/2024

Onboarding your Azure Data Lake can be found in [Use your own Azure Data Lake Storage Gen2](#), but relates to storage accounts that are open to the public internet. To use Process Mining against network isolated Azure Data Lakes, follow the steps in this article.

## Prerequisites

Perform and verify your Azure Storage account is network isolated.

In the [Azure portal](#), go to the **Networking** tab for the storage account and proceed to set the following values.

These fields are expected to be permanently set:

- **Enabled from selected virtual networks and IP addresses**
- **Allow Azure services on the trusted services list to access this storage account**

This field can be temporarily set:

- **Add your client IP address**

The following screenshot shows the permanent and temporary fields.

**Firewalls and virtual networks** Private endpoint connections

Save Discard Refresh Give feedback

Firewall settings restricting access to storage services will remain in effect for up to a minute after saving updated settings allowing access.

Public network access

Enabled from all networks

Enabled from selected virtual networks and IP addresses

Disabled

Configure network security for your storage accounts. [Learn more](#)

**Virtual networks**

+ Add existing virtual network + Add new virtual network

Virtual Network	Subnet	Address range	Endpoint Status
No network selected.			

**Firewall**

Add IP ranges to allow access from the internet or your on-premises networks. [Learn more](#).

Add your client IP address  ⓘ

Address range

**Resource instances**

Specify resource instances that will have access to your storage account based on their system-assigned managed identity.

Resource type	Instance name
<input type="text" value="Select a resource type"/>	<input type="text" value="Select one or more instances"/>

**Exceptions**

Allow Azure services on the trusted services list to access this storage account. ⓘ

Allow read access to storage logging from any network

## Create a managed identity

You need to run a PowerShell script to create a managed identity. This script needs to be run per environment.

The minimum required role to complete all steps is **Azure Subscription Owner** for the subscription that contains the storage account. The user must be an administrator on the environment that the policy will be connected.

The following steps are needed from a completely new state:

1. Install Azure CLI on your machine: <https://aka.ms/InstallAzureCliWindows>
2. Get the compressed folder in <https://github.com/microsoft/PowerApps-Samples/blob/master/powershell/managed-identities/Common.zip> and download.

3. Extract the compressed folder and make sure you can run PowerShell scripts from that location.
4. From the root of the folder, go through the following set of steps. Some modification is necessary to the scripts.
5. Take the following PowerShell script and use it to create a new `.ps1` file in the root of the `Common` directory. Choose any name for it.

PowerShell

```
# PowerShell script
# To have ready beforehand $subscriptionId, $resourceGroupName,
$enterprisePolicyLocation, $environmentId
# Note: The $enterprisePolicyLocation must be set to the same location as
the environment. And the environments with spaces should have the spaces
removed i.e. "South Africa" -> "southafrica"
# Note: You can choose the value for $NewEnterprisePolicyName i.e.
CreateMSITokenForExternalLake
Install-Module -Name Microsoft.PowerApps.Administration.PowerShell
Install-Module -Name Microsoft.PowerApps.PowerShell -AllowClobber
Az login
Update-AzConfig -DefaultSubscriptionForLogin $subscriptionId
./SetupSubscriptionForPowerPlatform.ps1
$subscriptionId
cd Identity
./CreateIdentityEnterprisePolicy.ps1
$subscriptionId
$resourceGroupName
$NewEnterprisePolicyName
$enterprisePolicyLocation
./NewIdentity.ps1 -environmentId $environmentId -policyArmId
/subscriptions/$subscriptionId/resourceGroups/$resourceGroupName/providers/M
icrosoft.PowerPlatform/enterprisePolicies/$NewEnterprisePolicyName -endpoint
prod
```

6. To find the respective `$enterprisePolicyLocation` for the previous script, go to:
  - a. The `$enterprisePolicyLocation` must be set to the same location as the environment. And the environments with spaces should have the spaces removed.
  - b. For example, set *South Africa* as *southafrica*.
7. Run the newly created `.ps1` file using Windows PowerShell.

```
PS C:\Common> .\[name_of_file].ps1
```

8. Walk through the series of steps until the script outputs a successful `202` response.

ⓘ Note

Only one managed identity can be associated to a Dataverse environment at a time. If another is connected to the same environment, then the previous association is lost.

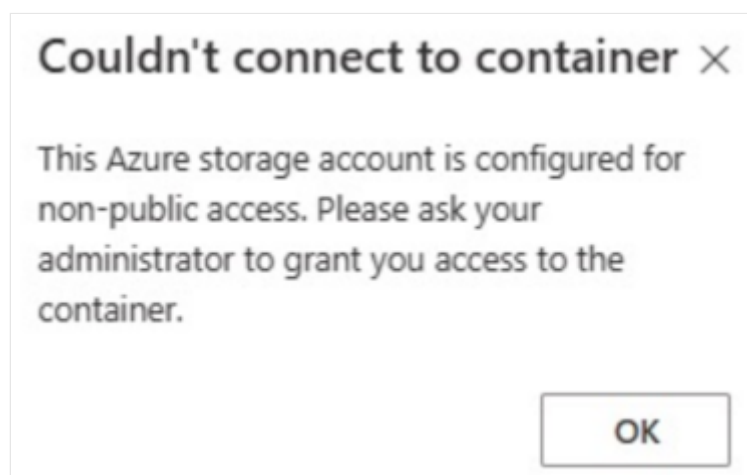
## Add the managed identity

Once the managed identity is successfully created, add it through Access Control (IAM).

1. In the Azure portal, go to the Storage account.
2. On the navigation pane to the left, select **Access Control (IAM)**.
3. In the **Add** dropdown list, select **Add role assignment**.
4. Under **Role**, search for and select **Storage Blob Data Contributor**.
5. Under **members**, select **Managed identity** and then select **Select members**.
6. In the **Subscription** dropdown list, locate your subscription name.
7. In the **Managed identity** dropdown list, find and select **Microsoft.powerplatform/enterprisepolicies**.
8. In the **Select** dropdown list, locate the identity you created. It uses the name you used in the `NewEnterprisePolicyName` in the PowerShell script.
9. Select **Select** and then **Review + assign**.

## Troubleshooting

If you get the error message, **Couldn't connect to container** in the [Connection Setup screen](#), you need to have the owner of the storage account and the person who initially established the connection share the `datalakefolder` record with you in the respective org in Dataverse.



To fix this error, go to `[your_org_url]/main.aspx?app=d365default&forceUCI=1&pagetype=entitylist&etn=datalakefolder` and replace `[your_org_url]` with the real value.

1. Find *[your\_org\_url]* by doing the following steps:

a. In the Power Automate environments, go to the Process Mining homepage.

b. Select **Ctrl + Alt + A**.

c. In **Instance url**, find *[your\_org\_url]*.

d. Go to *[your\_org\_url]/main.aspx?*

**app=d365default&forceUCI=1&pagetype=entitylist&etn=datalakefolder** and replace *[your\_org\_url]* with the real value.

Example:

```
https://org0a00aab.crm10.dynamics.com/main.aspx?
```

```
app=d365default&forceUCI=1&pagetype=entitylist&etn=datalakefolder
```

2. On the loaded page, do the following steps:

a. From the table, select the appropriate **data lake folder** record.

b. At the top of the screen, select **Share**.

c. To search for the user to add, select **Add User/Team**.

d. Select **Share**.



# Transform and map data

Article • 04/20/2024

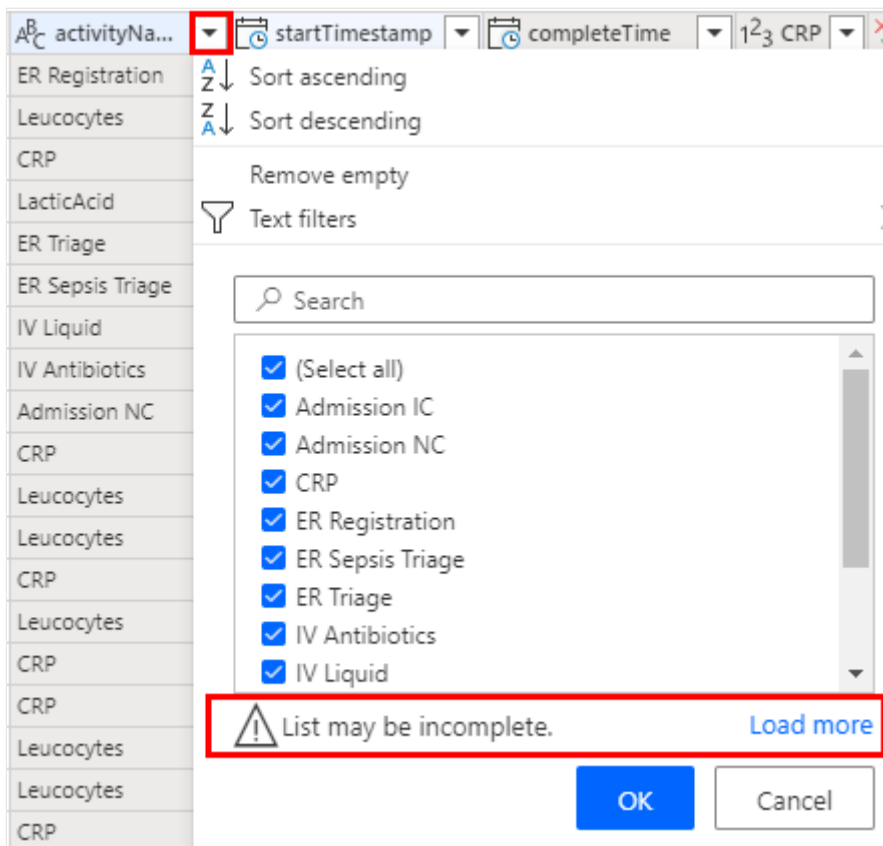
After you select the data source you want to use, you're taken to the Power Query Editor. The Query Editor is a powerful tool to transform your data. To learn more, go to [The Power Query user interface](#).

Here are some reasons why you might want to transform the data:

- You might not be interested in all the activity names that are logged, and so you want to filter for specific activity names that are important to the process you're trying to mine.
- You might want to rename some of the activity names to be more descriptive and understandable. This is often not the case with names in a database.
- You might be interested in only a specific date range, and not the entire history of data.
- You might want to combine multiple ID columns to form the case ID. This is often done when the ID you want to use for process mining doesn't exist or is a combination of multiple IDs in the application. For example, when a customer files support tickets, the support ticket might be assigned to multiple customer service agents. If you want to analyze how each agent handles each ticket, you would combine the agent ID and the ticket ID into the case ID.

## Filter activity names

1. Select the caret next to the activity name column to bring up the sort and filter menu.
2. If there's a message that says **List may be incomplete**, select **Load more**.
3. Select only the activity names that you want to analyze. Uncheck any name you want to exclude.



4. Alternatively, you can use the **Text filter** menu for more advanced filtering. For more information on filtering by value, go to [Filter by values in a column](#).

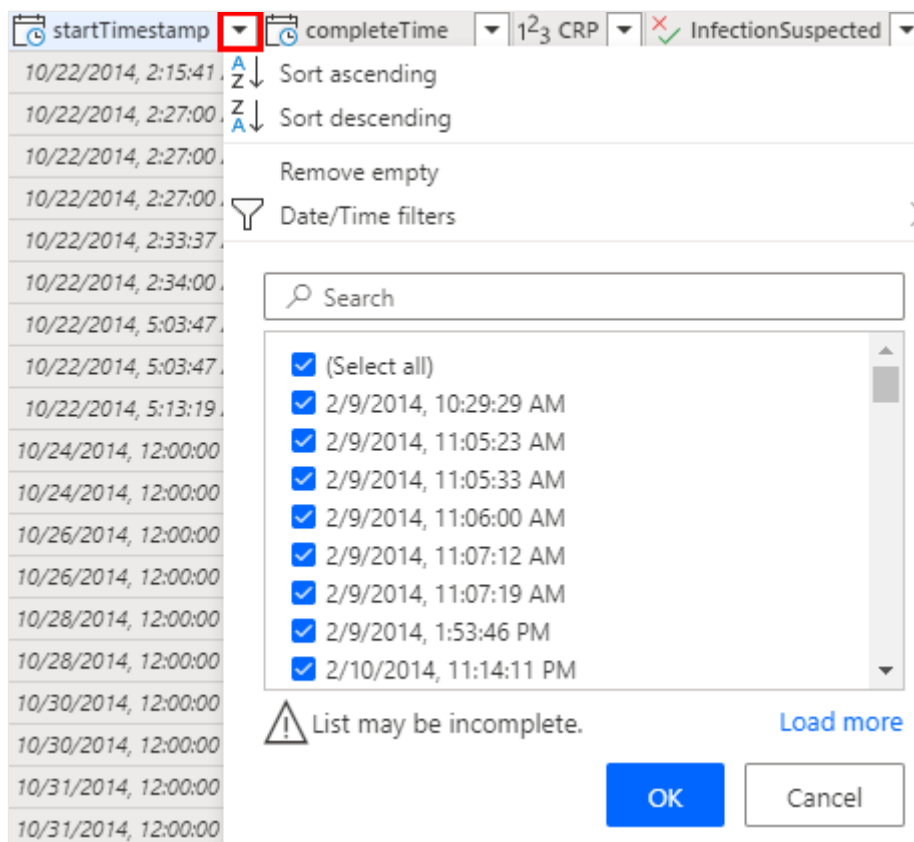
## Rename activities

1. Ensure that the **Activity Name** column is selected.
2. Above the toolbar, select the **Transform** tab.
3. On the toolbar, select **Replace values**.
4. Under **Values to find**, type the activity name as it appears in the data source that you want to replace.
5. Under **Replace with**, type the activity name you want to show in the process map.
6. Repeat this process for all the values you want to replace.

## Reduce the number of total records

One strategy for reducing the total number of records is to use only the latest records. To do this, you need to first sort the data by time.

1. Open the sort and filter menu by selecting the caret next to the **startTimestamp** column.



2. To have the most recent records show up first, select **Sort descending**.
3. Select **OK**, and then select **Keep rows** on the toolbar.
4. Enter **150000** under **Number of rows**.
5. Select **OK** to filter for the top 150,000 rows.

## Combine multiple IDs

You can use **Ctrl + click** to select multiple columns that you want to combine.

1. On the Transform tab toolbar, select **Merge columns**.
2. (Optional) Select a separator from the dropdown list. Alternatively, you can select **none**.
3. Change the name (or make a note of the default name that's generated), so you can select it when mapping to a case ID.

## Map data

Mapping tells the process mining capability what column is mapped to which attribute type (for example, case ID, activity name, or timestamp).

1. To navigate to the Mapping screen, select **Next**.

2. Use the dropdown menus next to the respective columns to select their attribute type. For more information, follow the [description of the attribute types](#).
3. When the data is ingested from Azure Data Lake Gen2 using a CSV file format, you can use the dropdown menus in the **Data type** column to change the data types for the import. For columns having numeric values, consider their analytical usage of whether the attribute is a continuous value (for example, invoice amount set to *Number*) or a categorical value (for example, material code set to *Text*).
4. Case ID, Activity, and Start timestamp are mandatory attributes to continue with the analysis.
5. To start the analysis of your process, select **Save and analyze**.

# Visualize and gain insights from processes

Article • 05/24/2024

This article explains metrics and visuals, and what they could tell you about your process.

Some of the metrics and visuals are only available in setup with your own Power BI workspace. These metrics and visuals are clearly marked in the text as **Premium**. To be able to access them and gain full insights, make sure you complete the steps in the following articles:

- [Connect your Power BI workspace to the process mining capability](#)
- [Create your own custom Power BI workspace](#)
- [Load your process analytics in Power BI](#)

After completing these steps, return to the analytics page of your process in the process mining capability.

## ⓘ Note

The standard report applies the Power BI report filter set to **ViewID = 1**, which usually is the view named **Default**. All report pages and visualisations reflect this filter by default, unless changed.

## Process map

The process map empowers you to visualize and gain insights from processes. By looking at a graphical representation of how your business processes are performed, you can glean insights about where opportunities exist.

Activities describe tasks or actions, the sequence of which makes up a business process. Activities can be performed by humans or machines, in an automation scenario. In the process map, different activities appear as nodes, and transitions between activities appear as edges. Each process sequence has a start and an end.

Different activity combinations and *variants* are shown separately on the process map. A process variant is a unique sequence from start to finish of the process. Each variant differs from the others by at least one activity.

You can easily switch between different layers and associated metrics on the process map using the controls on the top left of the process map visual.

The metrics for following layers visualize the same metric on both nodes and transitions. You can switch between the absolute value and relative ratio to the process level metric by clicking the % icon next to the selected metric.

- **Frequency layer**
  - **Total count:** The total frequency of an activity/transition captured in the process data.
  - **Case count:** The number of process instances in which an activity/transition occurred.
  - **Maximum occurrence in case:** The maximum number of times an activity/transition is repeated in one process instance.
- **Performance layer**
  - **Total duration:** The total duration of an activity/transition captured in the data. Value can also be displayed as a ratio (percentage) between the total duration of an activity/transition captured in the data and the total duration of all cases.
  - **Mean duration:** Mean duration of an activity/transition captured in the data. Value can also be displayed as a ratio (percentage) between the mean duration of an activity/transition captured in the data and the mean case duration.
  - **Maximum duration:** Maximum duration of an activity/transition captured in the data.
  - **Minimum duration:** Minimum duration of an activity/transition captured in the data.

- **Rework layer**

Select different metrics to be visualized on nodes and on transitions to get better insights. If you select the link icon between them, the selection to the same metrics both for nodes and transitions is locked. You can switch between the absolute value and relative ratio to the process level metric by selecting the % icon next to the metric.

- **Rework count:** Rework count represents the sum of all self-loops and loops.
- **Self-loop count:** Self-loop represents a specific repetition where an activity is directly followed by the same activity. In terms of edges/transitions, the starting

and ending activity of edge is the same.

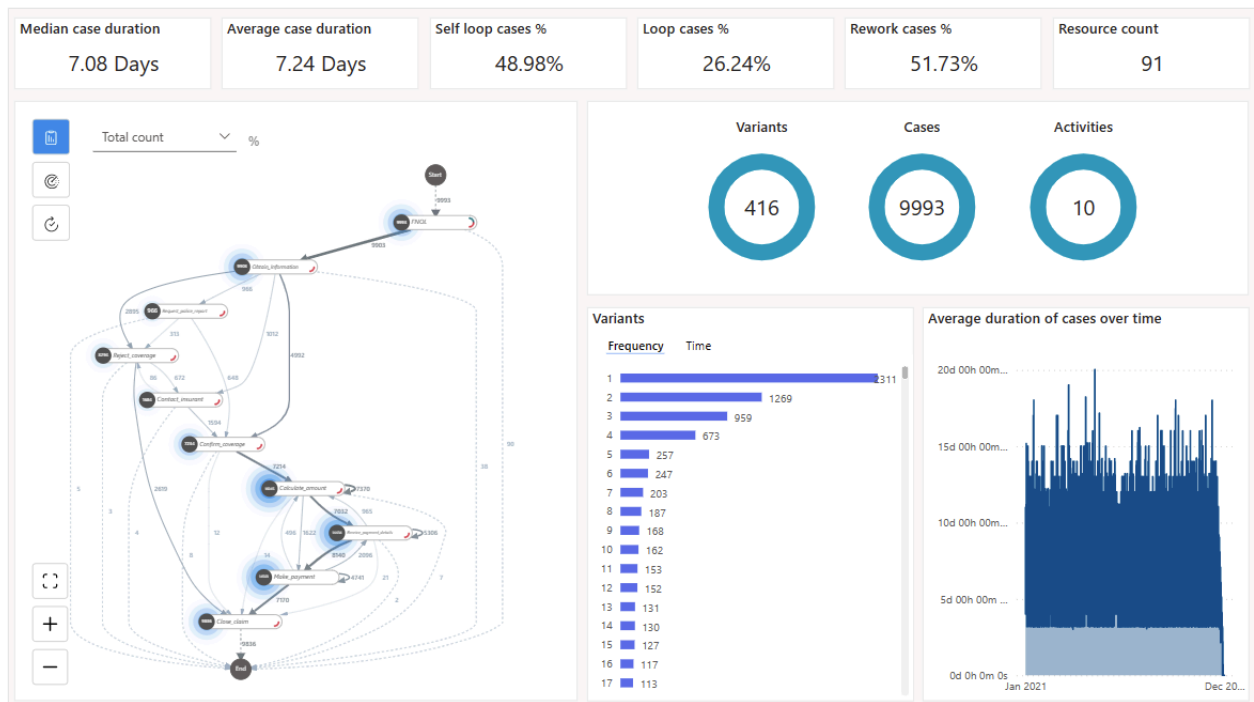
- **Loop inflow:** Loop inflow represents the repetitions of an activity's predecessors.
- **Loop outflow:** Loop outflow represents the repetitions of an activity's successors.
- **Loop count:** Loop represents specific repetition where activity is followed by the same activity, but not directly. For example, at least one more activity is always involved.
- **Net loop gain:** Available for activities only. This activity metric represents the difference between Loop outflow and Loop inflow. If the value is positive, the activity is directly followed by more repeated activities than it was preceded. Such activities start new loops in processes. If the value is negative, the activity is directly followed by less repeated activities than it was preceded. Such activities end, close, or exit loops in processes. The halo effect color also helps us see positive and negative trends in the process - red color represents a problem (start of new loops); the blue color represents a favorable change (end of loops).

To learn more about the process map visual, go to [Process map overview](#).

## Use KPIs and visualizations for analytics

You get several prebuilt KPIs and visualizations to help you to understand your process. You can filter by selectors, such as **Activity** and **Case Id (Premium)**, and custom filters (**Premium**) if you added the custom attributes (data columns) when you uploaded your data for analysis.

The following screenshot is an example of visualizations and analytics you see in the premium version.



If you didn't purchase the premium version, you have access to the default version. The top of the default version shows only the four KPIs listed in the [KPIs](#) section in this article and not the two KPIs with **(Premium)** in the title. Also, you won't see the **Average duration of cases over time** chart.

## KPIs

These KPIs are the same metrics that you see at the top of your report.

- **Median case duration (Premium):** The median case duration shows the center of all the case durations that are more resistant to outliers in the data.
- **Average Case Duration:** Shows the average case duration, which can be greatly affected by outliers in the data.
- **Self-Loop Cases %:** Percentage of cases that have an activity that repeats itself.
- **Loop Cases %:** Percentage of cases that have a sequence of activities that has at least one activity that is repeated.
- **Rework Cases %:** Percentage of cases that have either a Self-Loop or Loop.
- **Resource Count (Premium):** Count of how many resources are in the process.

To enlarge the view so you can dig deeper into your process, select the **Map** tab.

## Filters pane



To drill down into the process, use the filters in the filters dialog. To see the filters, select **Filters** in the upper-right side of the **Summary** tab.

The filters dialog contains the following filters:

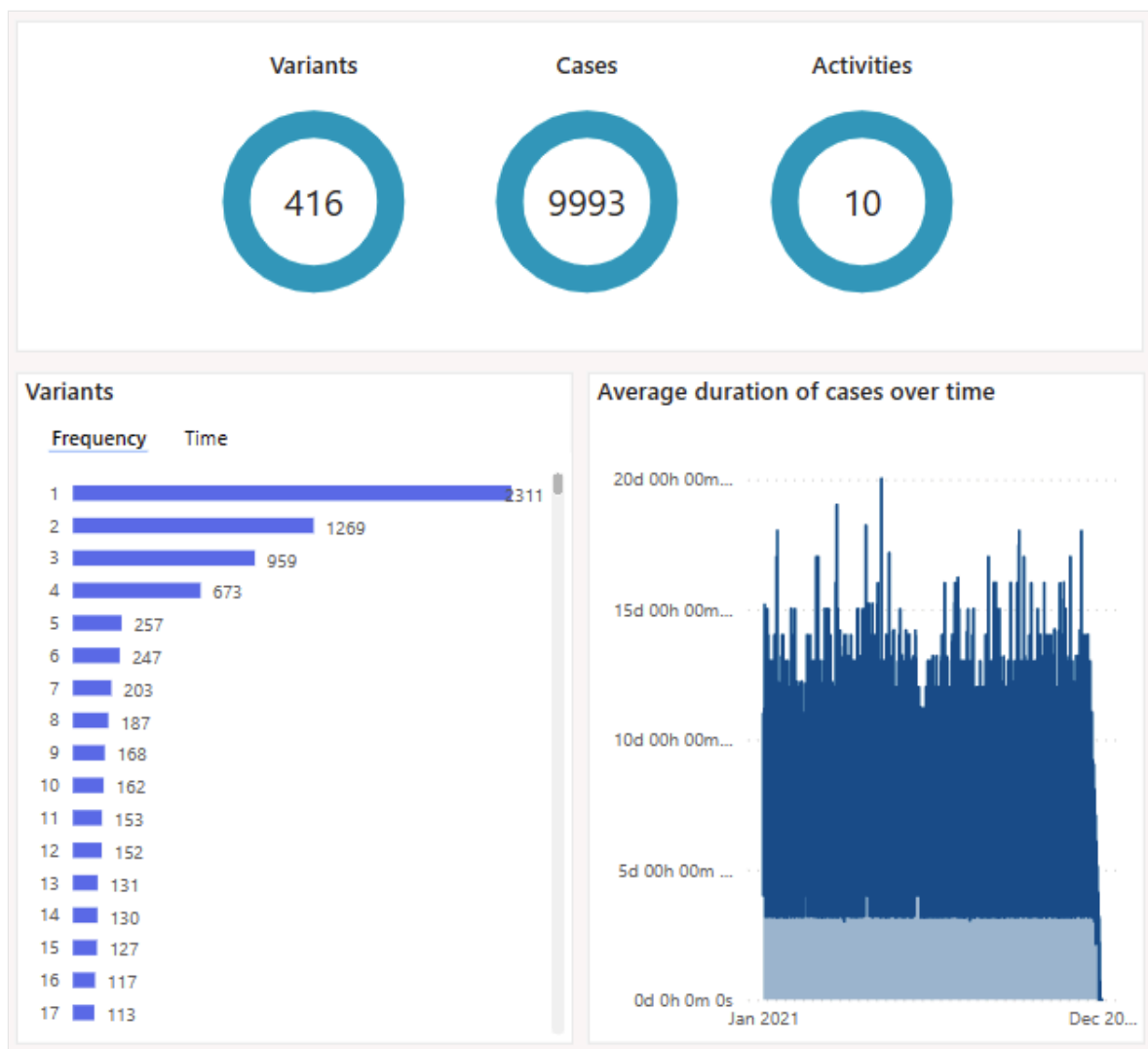
- **Activity selector:** Allows you to select cases that contain the selected activity.
- **Case filter (Premium):** Allows you to see the process visualization and analytics filtered to the case.
- **Start date filter (Premium):** Allows you to see the process visualization in a particular period.
- **Custom attribute filters (Premium):** Allows you to filter on both your event and case level custom attributes for your process.

To select multiple activities or cases, you can use **Ctrl + click** .

If you didn't purchase the premium version, you have access to the default version. The **Filters** pane shows only the activity selector. You don't have access to the other filters listed in this section with **(Premium)** in the title.

## Visualizations

- **Variants by frequency:** Shows which variants are the most common, sorted by the most common to the least common. You can select one or multiple variants in the bar chart to analyze details of the variants by filtering for them. This would update the process map, KPIs, and other visualizations. To select multiple variants, press **Ctrl** and select the desired variants.
- **Variants by time:** Shows a bar chart of the longest duration variant to the shortest one. Filtering on specific variant updates the process map and KPIs so you could get insights into the behavior of the selected variants.
- **Average duration of cases over time (Premium):** Shows how duration of the process changes over time.
- **Cases, Activities, and Variants:** Shows number of cases, activities, and variants based on the current filter settings.



## Time Analysis (Premium)

The **Time Analysis (Premium)** doesn't have an alternative default view. It allows you to drill down into time bottlenecks by cases, variants, and activity. The **Time Analysis (Premium)** also shows you average time spent per case and per variants ordered by the time spent.

The analysis view appears on the right and the corresponding map appears on the left.

### Time spent by case

Case ID	Total Duration
5694	20d 03h 02m 00s
6352	19d 02h 11m 00s
6864	18d 23h 09m 00s
3088	18d 02h 10m 00s
6690	18d 02h 00m 00s
3100	18d 01h 29m 00s
6450	17d 17h 20m 00s
6123	17d 02h 33m 00s
4605	17d 02h 13m 00s
9256	17d 02h 04m 00s
6152	17d 02h 00m 00s
<b>Total</b>	<b>7d 05h 51m 23s</b>

### Time spent by variant

Variant_ID	Average Case Duration
283	20d 03h 02m 00s
255	19d 02h 11m 00s
270	18d 23h 09m 00s
147	17d 17h 57m 20s
333	17d 02h 33m 00s
245	17d 02h 04m 00s
349	17d 01h 50m 00s
187	17d 01h 41m 30s
319	16d 22h 18m 00s
200	16d 21h 18m 00s
209	16d 14h 02m 00s
225	16d 01h 50m 00s
<b>Total</b>	<b>7d 05h 51m 23s</b>

## Variant DNA

The **Variant DNA** view is available in both the default and premium views. To show the order of all the activities in each variant sorted based on the variants that happen the most often, select the **Variant DNA** tab. The activities are color coded and abbreviated to quickly show a high-level view of the order of the activities that occur. This also helps identify noncompliant processes, self-loops, and loops quickly.

Variant Name ↑	Events	Cases % ↑																					
Variant 1 Cases 66	5 events	49.62%	InEn	ChCP	CrME	ReCu	ReTI															InEn	Invoice Entry
Variant 2 Cases 34	8 events	25.56%	InEn	CoPR	RWSV	CTCM	Apln	CrMC	FiCM	ReTI												ChCP	Check Custom
Variant 3 Cases 16	11 events	12.03%	InEn	CoPR	RWSV	CTCM	Reln	RWSV	CTCM	Apln	CrMC	FiCM	ReTI									CrME	Credit Memo E
Variant 4 Cases 7	14 events	5.26%	InEn	CoPR	RWSV	CTCM	Reln	RWSV	CTCM	Reln	RWSV	CTCM	Apln	CrMC	FiCM	ReTI						ReCu	Refund Custom
Variant 5 Cases 3	8 events	2.26%	InEn	CoPR	RWSV	CTCM	Apln	CrMC	FiCM	ReTI												ReTI	Re-issuing the
Variant 6 Cases 2	17 events	1.50%	InEn	CoPR	RWSV	CTCM	Reln	RWSV	CTCM	Reln	RWSV	CTCM	Reln	RWSV	CTCM	Apln						CoPR	Confirm Payme
Variant 7 Cases 1	11 events	0.75%	InEn	CoPR	RWSV	CTCM	Reln	RWSV	CTCM	Apln	CrMC	FiCM	ReTI									RWSV	Refund With St
Variant 8 Cases 1	14 events	0.75%	InEn	CoPR	RWSV	CTCM	Reln	RWSV	CTCM	Reln	RWSV	CTCM	Apln	CrMC	FiCM	ReTI						CTCM	Complete the t
Variant 9 Cases 1	11 events	0.75%	InEn	CoPR	RWSV	CTCM	Reln	RWSV	CTCM	Apln	CrMC	FiCM	ReTI									Apln	Approve Invoic
Variant 10 Cases 1	17 events	0.75%	InEn	CoPR	RWSV	CTCM	Reln	RWSV	CTCM	Reln	RWSV	CTCM	Reln	RWSV	CTCM	Apln						CrMC	Credit Memo C
Variant 11 Cases 1	14 events	0.75%	InEn	CoPR	RWSV	CTCM	Reln	RWSV	CTCM	Reln	RWSV	CTCM	Apln	CrMC	FiCM	ReTI						FiCM	Fill Credit Menr
																						Reln	Reject Invoice
																						RWSV	Refund With S

## Feedback

Was this page helpful?



[Provide product feedback](#)

# Customize a report with your own Power BI workspace

Article • 07/18/2023

You can use your own custom Power BI workspace and leverage a higher capacity to analyze processes with a lot more data. You're also able to customize the look and feel of the report.

## Set up your workspace

You need to set up your Power BI workspace to connect it to the process mining capability and then customize it. The following sections in this article walk you through how to set up your workspace.

## Connect your Power BI workspace to the process mining capability

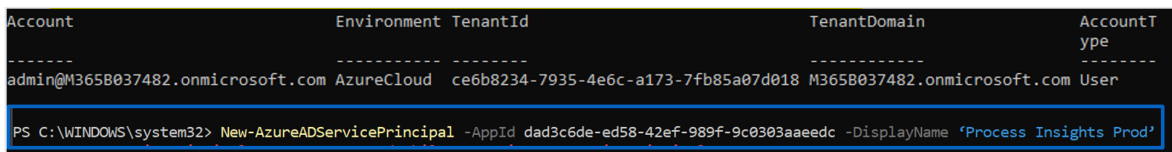
1. Sign in to the [Azure portal](#).
2. Search for **azure active directory** in the search bar and select **Azure Active Directory**.
3. Under **Manage**, select **Users**.
4. Select **User settings** and review the **App registrations** selection.
  - If **App registrations** is **Yes**, any user can register the process mining capability as an app.
  - If **App registrations** is **No**, only admins can register apps. If you're an admin, you can choose to turn this on to allow others to register the process mining capability as an app.
5. On the Windows taskbar, select **Search**.
6. Type **powershell**, and then select **Run as Administrator**.

## Install Azure tools

If you haven't done this yet, install the Azure tools.

1. On the **Administrator: Windows PowerShell** screen, type **Install-Module AzureAD**, and then select **Enter**.
2. When prompted to confirm installation, enter **Y**, and then select **Enter**.
3. Connect your Azure account by typing **Connect-AzureAD**, and then sign in.
4. Validate that you're signed in.
5. Register the process mining service principal by typing this command:

```
New-AzureADServicePrincipal -AppId dad3c6de-ed58-42ef-989f-9c0303aaeedc  
-DisplayName 'Process Insights Prod'
```



```
Account Environment TenantId TenantDomain AccountT  
-----  
admin@M365B037482.onmicrosoft.com AzureCloud ce6b8234-7935-4e6c-a173-7fb85a07d018 M365B037482.onmicrosoft.com User  
PS C:\WINDOWS\system32> New-AzureADServicePrincipal -AppId dad3c6de-ed58-42ef-989f-9c0303aaeedc -DisplayName 'Process Insights Prod'
```

6. Sign in to [Microsoft Power BI](#).
7. Select the ellipsis (...) > **Settings** > **Admin portal**.
8. Scroll down to **Developer settings** and do the following steps:
  - a. Select the dropdown menu for **Allow service principals to use Power BI APIs**.
  - b. Enable it by toggling the slider.
9. Return to the Power BI home page.

## Create your own custom Power BI workspace

Now that you've connected your Power BI workspace to the process mining capability and installed the Microsoft Azure tools, you can create your own custom Power BI workspace.

1. On the left panel, select **Workspaces** > **Create a Workspace**.
2. In **Advanced Options**, select a premium Power BI license. (We recommend a **premium per capacity** license.)
3. Select **Save**.
4. Select **Access**.
5. Search for and add **Process Insights Prod**.

6. Assign it **admin access**.

**Important**

It's required that the service principal gets added as an admin. If you skip this step, the feature won't work.

## Load your process analytics in Power BI

Load your process analytics in Power BI to start customizing your report.

1. After analyzing a process, go to the process **Details** page by selecting the name of the process in the breadcrumbs.
2. On the **Details** card, select **Edit**.
3. In the **Power BI Workspace (optional)** dropdown menu, select a workspace of your choice.
4. If you select a workspace, give the report a unique name in the required **Report name** field.

We recommend that you use a unique name. If you use a name of a report that already exists, the process mining capability overwrites the existing report of another process. This could lead to loss of custom reports and composite datasets of that process. After refreshing the process, if you decide to change the report name, you'll need to publish a new report.

5. You might then toggle the **Update report when refreshing data** option between **on** and **off**.

If the toggle is **on**, a new report is published in Power BI and is embedded in the analytics page of the process mining capability. If the toggle is **off** after refreshing the data, the existing report isn't updated in the process mining capability.

## Customize reports in Power BI workspace

With the powerful integration of the process mining capability with Power BI, you can customize your process reports in an attached Power BI workspace. In this example, you perform a simple customization of the Power BI report to include a card that holds or tracks one of the analytic measures.

To be able to do this, make sure you've completed these steps in this article:

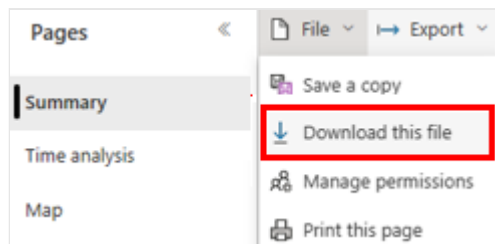
- [Connect your Power BI workspace to the process mining capability](#)
- [Create your own custom Power BI workspace](#)
- [Load your process analytics in Power BI](#)

After completing these steps, return to the analytics page of your process in the process mining capability.

1. Refresh and reanalyze the process by selecting **Refresh**.
2. Select **Open in Power BI**. If you don't see this button, make sure you've completed the steps in the [Load your process analytics in Power BI](#) section in this article.

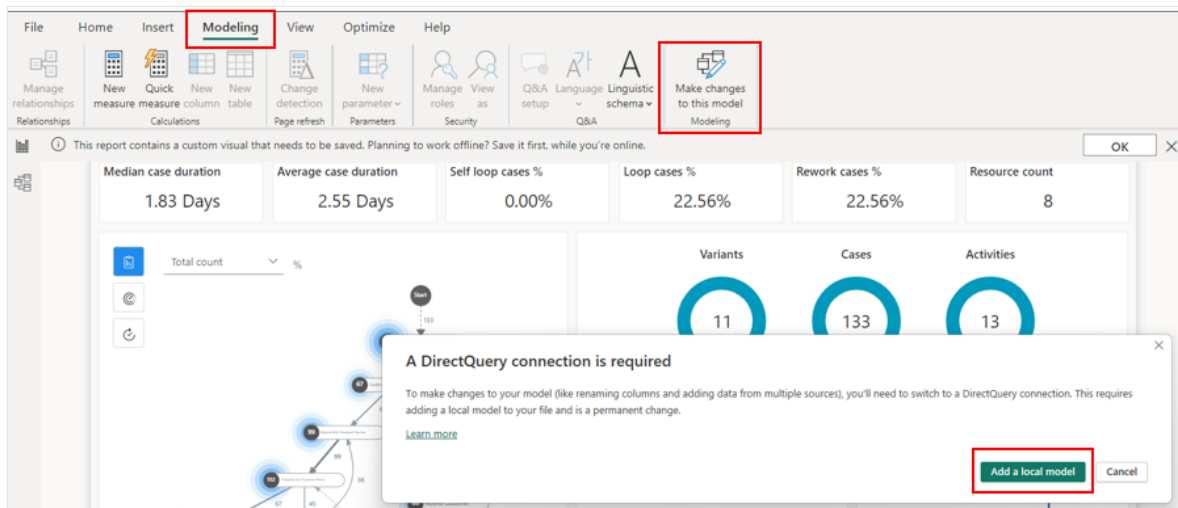
You're redirected to a Power BI web screen that shows you a report of your process.

3. Begin customizing your report by downloading it to your local machine. To do this, select **File > Download this file**.



4. Select the **A copy of your report with a live connection to data online (.pbix)** radio button. The report is downloaded with live connection.
5. Open the downloaded report in Power BI Desktop. Ensure you have the latest Power BI Desktop version.
6. Go to the **Modeling** tab and select **Make changes to this model**. You might need to have the **Contributor** role to be able to see that option in the **Modeling** tab.
7. Select **Add a local model**.





8. Select the tables that you'd like to include in the local model. We recommend that you keep the default selection.

9. Select **Submit**.

The local model is created. Now you can make changes to existing visuals, or add a new data source to the report.

10. Move the cards that hold the donuts (blue circles) for the **Variants**, **Cases**, and **Activities** metrics to the right by selecting and dragging each card.

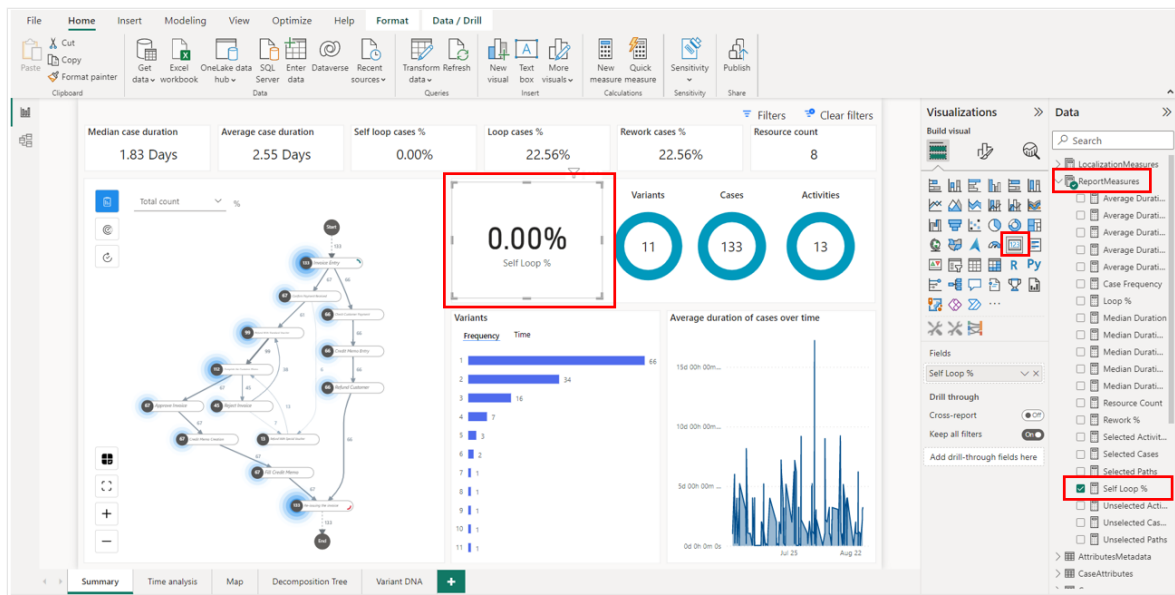
11. On the **Visualizations** pane, select the card element.

12. A new card appears. Resize it, and then drag it to the left of the **Variants** donut (blue circle).

13. On the **Data** pane, expand **ReportMeasures** and select **Self Loop %**.

14. On the command bar, select **Save**.

In your process, you don't have any self loops, so you should see **0.00%** in that card.



15. Save the report.

16. From the **Home** tab, select **Publish**.

17. Select your workspace, and choose **Select** to publish the report to the Power BI service.

After the report has been successfully published, you can open it from the pop-out window.

You've successfully customized your Power BI workspace. Every time you refresh your process and reopen your Power BI report, your metrics and customizations are updated. Try out Power BI and customize your reports to learn how they can help you analyze your process effectively.

Once this step is done, you see the report in your Power BI workspace with the report name that you entered. You can edit and save it. Your report is updated with the changes that you made with Power BI.

If you encounter issues or error messages, go to [Issues with your own Power BI workspace](#).

## See also

[Workspaces in Power BI](#)

# Use the optimized data structure in a Power BI report (preview)

Article • 04/20/2024

[This article is prerelease documentation and is subject to change.]

The new optimized data structure leads to faster and more memory efficient analysis of processes. By saving on memory, customers can analyze larger processes and save on costs by using smaller Power BI capacities to perform analysis.

In addition, a more intuitive Power BI model data structure is used, which allows customers to dig deeper into their insights with less time and effort. To learn more about this data model, go to the [Power BI data model structure](#) section this article.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

## Previous optimized structure to deprecate soon

The new optimized data structure replaces the previous structure completely and the previous data structure will be deprecated. To find out the date and necessary steps, go to the banner in the process **Details** page.

The new optimized data structure takes place in the background, so you'll see it only in the resulting model as described in the following section.

## Enable XMLA read/write setting

To use the optimized data structure, the XMLA endpoint property must be enabled for read-write. By default, Premium capacity or Premium Per User semantic model workloads have the XMLA endpoint property setting enabled for read-only.

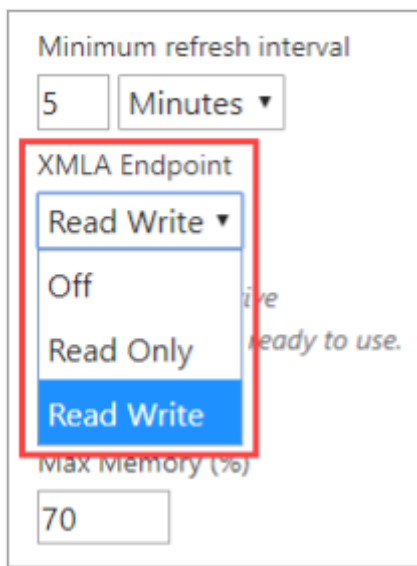
## Important

Enabling XMLA can only be done by the capacity admin.

## Enable read-write for a Premium capacity semantic model workload

1. Sign in to [Power BI](#).
2. Select **Settings** > **Admin portal**.
3. In the Power BI **Admin portal**, select **Capacity settings** > **Power BI Premium** > *capacity name*.
4. Expand **Power BI Workloads**.
5. In the **XMLA Endpoint** setting, select **Read Write**.

The **XMLA Endpoint** setting applies to all workspaces and semantic models assigned to the capacity.



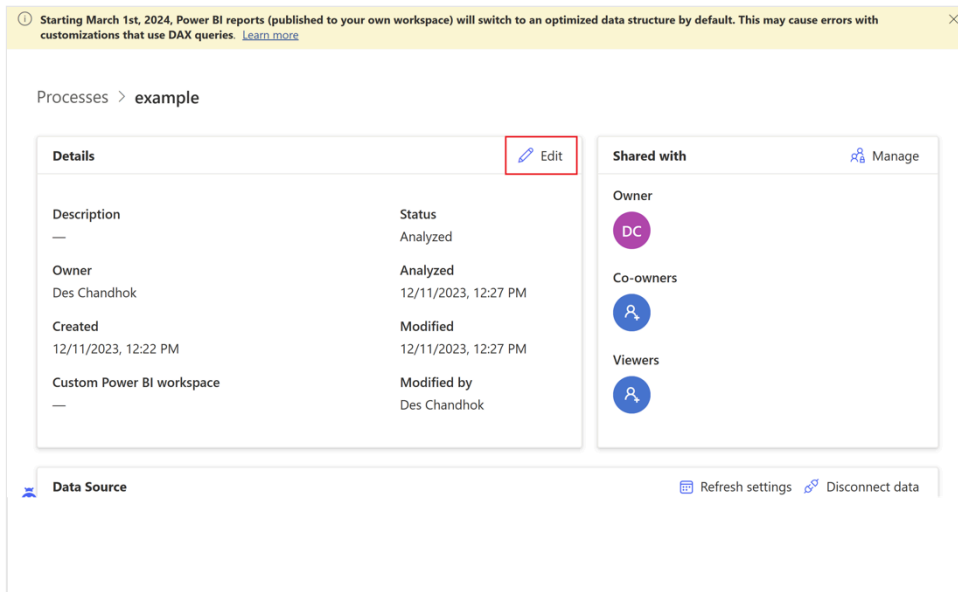
## Enable read-write for a Premium Per User semantic model workload

1. Sign in to [Power BI](#).
2. Select **Settings** > **Admin portal**.
3. In the Power BI **Admin portal**, select **Premium Per User**.
4. Expand **Semantic model workload** settings.
5. In the **XMLA Endpoint** setting, select **Read Write**.

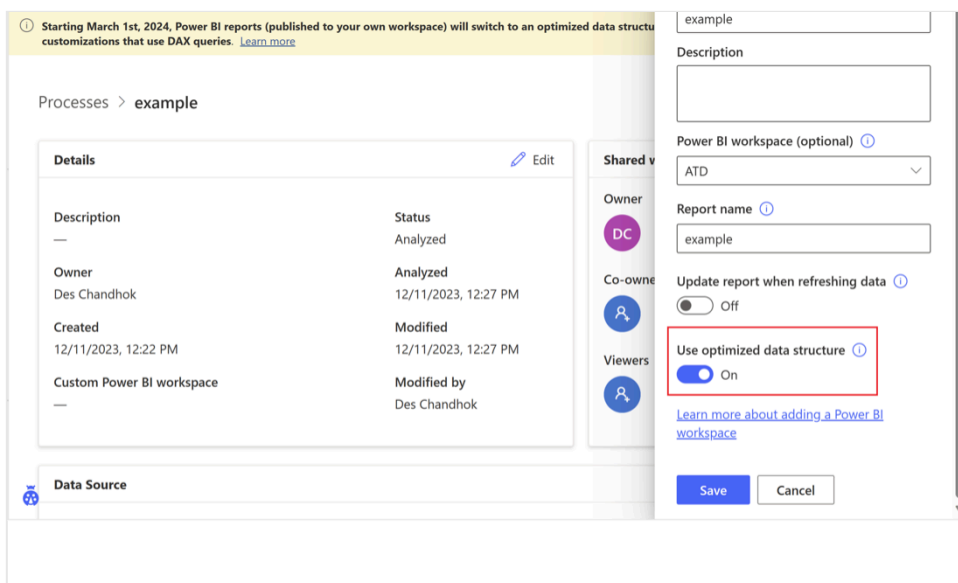
## Enable using the optimized data structure

For new processes that use a custom workspace, the optimized data structure is set to **true** by default. To enable it or confirm it is enabled, perform the following steps.

1. Go to the process details page and select **Edit**.



2. Select a custom workspace by selecting the dropdown menu under the **Power BI Workspace (optional)** field.
3. Confirm that the **Use optimized data structure** toggle is **On**. If it's off, select the toggle to enable it.



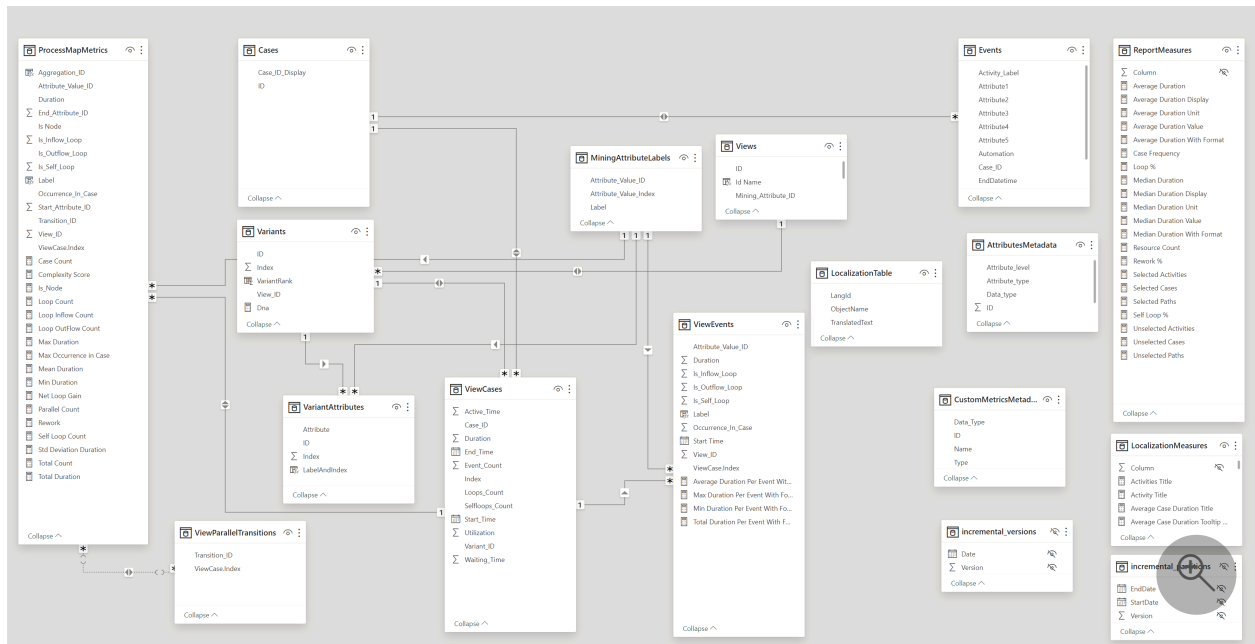
4. To save the changes, select **Save** if the button is enabled.

If it's not enabled, that means the value of the **Use optimized data structure** field was already set to **On**, thus you can skip this step.

## Power BI data model structure

When a process is published to Power BI, a default data source and a corresponding report are created. The following screenshot is an example of the structure of the dataset in the published data source in Power BI.

For an enlarged view of the screenshot, select the magnifying glass in the lower-right corner.



## Relationships

Relationships necessary for filtering and interconnectivity of visuals are predefined in the published data model. There isn't a need to manually create more relationships unless other data sources are connected. For this scenario, use the Power BI composite data model and build relationships on top of that model.

## Data model summary

From a logical perspective, the data model consists of many entity subsets as depicted in the first paragraph of this section.

- **Process Data:** All process related data without filtering and calculated measures.
- **View Data:** Entities giving the process data into the context of the created process analytical view—applied filters, calculated measures, and custom metrics.
- **Visuals data:** Entities providing precalculated data necessary for process mining custom visuals to display.
- **Helping entities:** Other entities needed by Power BI.

Following is the brief description of the subsets and included entities.

## Process Data

The content of process data entities changes in specific scenarios.

- When process model data is refreshed.
- When a new view is created.

Working with these entities allows you to access the raw process data not influenced by the applied filters.

 Expand table

Entity	Description
Cases	List of all cases in the process. Each case contains a unique case identifier index, Case ID display, and values for each of the <i>case attributes</i> , as defined in the mapping setup step.
Events	List of all events in the process. Each event references a case into which it belongs using <code>Case_ID</code> , has a unique event identifier index, and values for each of the <i>event attributes</i> , as defined in the mapping setup step.
AttributesMetadata	Entity holds the definition of all case/event-level attributes as defined in the import of event log data into process model. It includes its datatype, attribute type, and attribute level being either case or event.
MiningAttributeLabels	Holds values of available mining attributes. A process view can be set up to look at the process from different perspective based on the selected mining attribute. If no other mining attribute is available, the entity holds the values of <code>Activity</code> attribute.
CustomMetricsMetadata	Includes the definition of custom metrics created in the Process Mining desktop app. Based on the context in which the metric is available, many entries might exist for the same custom metric, having a different <code>Type</code> . It also includes the custom metric result data type that can be used for conversion or formatting of the values.
Views	List of available (published) views created in the Power Automate desktop app. Only public process views are published to the data set. Entries can be used to filter report, report page, and visual to visualize only data from the specific process view.

## View Data

The content of view data entities changes in the following scenarios.

- When a user changes the filtering definition in any process view.

- When a new custom metric is created.

View data entities allows you to access process data influenced by the applied filters and accesses the measures calculated based on the applied filters. As both case and event level filters can be used in the definition of a process view, it is recommended to work with view data entities, as the influence on the resulting dataset might be significant.

 Expand table

Entity	Description
ViewCases	Entity holds information on which cases are included in which view. In addition, it includes the information for which variant the case is following and precalculated measures for the case. If a case is included in several views, the entity holds a record for each case-view combination. This is important, as some of the values of calculated case measures depend on the filtering criteria set in the view. It also holds any precalculated custom metric values (if defined in process context and valid on case level). The case record is uniquely identified by the <b>Index</b> column.
ViewEvents	Entity holds information on which events are included in which view and which case they are connected to (event level process view filters might modify the events included in the case). In addition, it includes precalculated measures for the event. If an event is included in several views, the entity holds a record for each event-view combination. This is important, as some of the values of calculated event measures depend on the filtering criteria set in the view. It also holds any precalculated custom metric values (if defined in process context and valid on event level). The event record is uniquely identified by the <b>Index</b> column.
ViewTransitions	Entity holds information on which transitions are included in which view. In addition, it includes precalculated measures for the transition. If a transition is included in several views, the entity holds a record for each transition-view combination. This is important, as some of the values of calculated transition measures depend on the filtering criteria set in the view. It also holds any precalculated custom metric values (if defined in process context and valid on transition / edge level). The transition record is uniquely identified by the <b>Index</b> column.
ViewParallelTransitions	Entity holds a record for a combination of transition and case, when that transition is considered parallel in that case in a particular view.
Variants	Entity holds the relations between variants and process views. A record is included if a particular variant is included in a view after the filtering criteria are taken into account.

## Visuals data



Visuals data entities are recalculated only when there's a data refresh for the process model.

 Expand table

Entity	Description
ProcessMapMetrics	Aggregated measures for all nodes and transitions in the process model that are needed for visualization in process map custom visual.
VariantDNA	Aggregated measures and relations to events and attributes that are needed for visualization in variant DNA custom visual.

## Other entities

 Expand table

Entity	Description
LocalizationTable	Internal table used for localization purpose.
LocalizationMeasures	Internal measures used for localization purpose.
ReportMeasures	Precreated and preformatted most frequent measures that can be used for summary KPIs in the process report. Their evaluation might be subject to filtering and interactive selection in Power BI report.

## Power BI composite data model

We recommend that you use the Power BI composite data model on top of the data model published by Power Automate Process Mining and create necessary modifications there for the following scenarios.

- When more data sources are needed
- When more entities should be created
- When more relationships are needed
- When custom DAX queries are needed

To learn more about creating Power BI composite data models, go to [Use composite models in Power BI Desktop](#).

# Application lifecycle management in Process Mining overview

Article • 06/29/2024

ALM (application lifecycle management) encompasses the entire lifecycle of applications, including governance, development, and maintenance. It incorporates various disciplines such as requirements management, software architecture, development, testing, maintenance, change management, support, continuous integration, project management, deployment, release management, and governance.

For an overview of ALM in Power Platform, go to [Overview of application lifecycle management with Microsoft Power Platform](#).

You can migrate all your process mining entities, including dataflow connections, custom metrics, Power BI reports, and more, from one environment to another, or in the case of Power BI reports, from one workspace to another.

If you want to migrate your process mining entities from one environment to another except your customized Power BI reports using Power Platform solutions, go to [Migrate Process Mining entities with Power Platform solutions](#).

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# Migrate ALM process mining entities with Power Platform solutions

Article • 06/29/2024


Application lifecycle management (ALM) in Process Mining allows you to migrate your process mining entities with Power Platform solutions. To complete the migration, you need to create and export your solution in your Dev environment. Then, you need to change to your Test environment to import it.

The source and target of your process mining artifacts determine which environment you need to use:

- **Dev environment:** The environment *from* which you want to port artifacts.
- **Test environment:** The environment *to* which you want to port artifacts.

## Create and export your solution

Create and export your process solution in the Dev environment.

1. Sign in to [Power Automate](#) .
2. Select your Dev environment.
3. On the left navigation menu, select **Process mining** and create your process.

For instructions, go to [Create a process](#).

4. On the navigation menu, select **Solutions**.

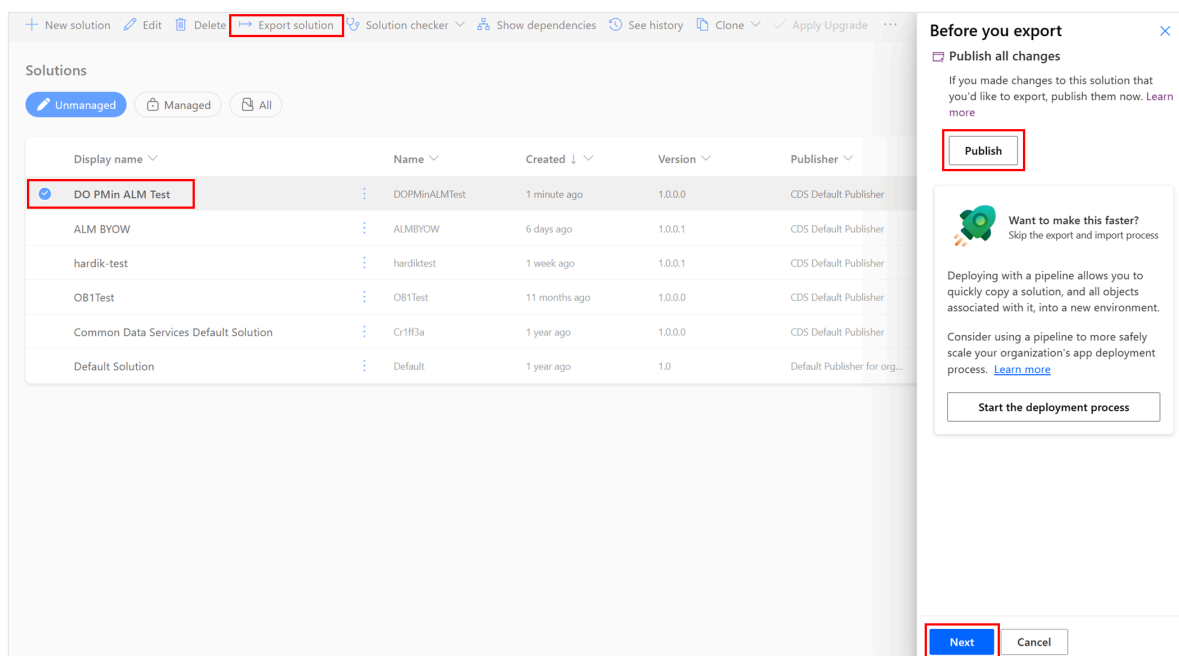
If **Solutions** doesn't appear on the menu, select **More > Solutions**.

5. Create a new solution with the following steps:
  - a. On the menu bar at the top, select **+New solution**.
  - b. In the **Display name** field, enter the name to display.
  - c. In the **Publisher** dropdown menu, select a publisher.

If you want to edit the selected publisher, select the pencil icon next to the dropdown menu.

- d. In the **Version** field, enter a version (for example, 1.0.0.0).

6. At the bottom of the screen, select **Create**.
7. On the menu bar at the top, select **Add existing > More > Other > PM Inferred Task**.
8. From the **Add existing PM Inferred Task** list, select the process you created and want to migrate to the Test environment, and then select **Add**.
9. On the navigation menu, select the back arrow to go to the **Solutions** screen. You should now see the solution you created.
10. Select your solution, and then select **Export solution** on the menu at the top.
11. On the **Before you export** screen, select **Publish**.
12. When all customizations are published, select **Next**.



13. Select **Export**.

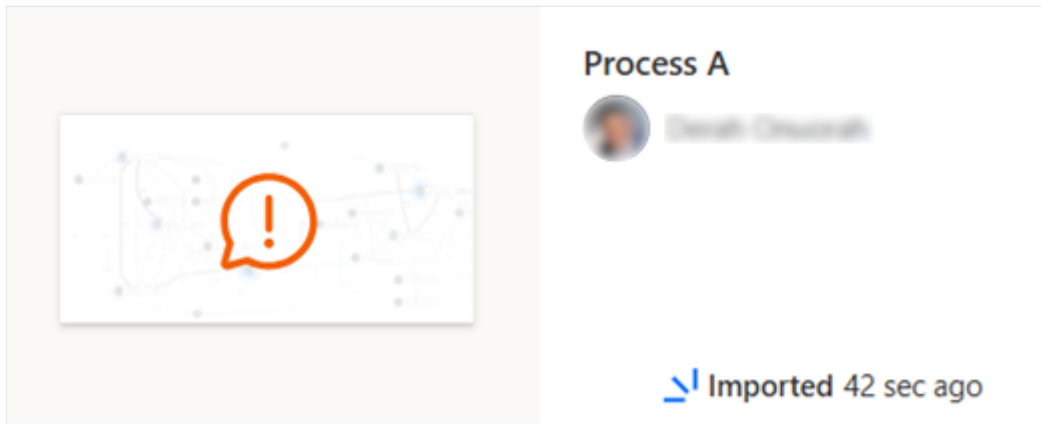
## Download and import your exported solution

Below the menu at the top, a green message bar appears to indicate your export was successful. It also contains a button for you to download the exported folder.

1. From the green message bar, select **Download**.
2. Go to your Test environment.
3. On the left navigation menu, select **Solutions**.
4. Import the solution with the following steps.

- a. On the menu bar at the top, select **Import solution**.
- b. On the **Import a solution** screen, select **Browse**.
- c. From your file explorer, select the solution you downloaded.
- d. Select **Next**.
- e. Select **Import**.

After the solution successfully imports, your process appears on the Process Mining homepage with an orange exclamation mark inside a speech bubble.



5. To complete the import, select your solution and follow the **Setup** process.

## Update entities in your Test environment

You can update entities in your Test environment by upgrading or updating your solution. To learn more, go to [Apply the upgrade or update in the target environment](#).

To learn more about solutions, go to [Solution concepts](#).

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 


# Improve cloud flows with process insights (preview)

Article • 01/13/2024

[This topic is prerelease documentation and is subject to change.]

The process mining capability can help you gain valuable insights and optimize your cloud flows. You can visualize your flow's performance, identify bottlenecks and opportunities for improvement, and monitor for performance drifts. By utilizing the process mining capability to analyze your flow's run history with process mining techniques, you can generate these insights directly from the flow details page.

## Important

- This is a preview feature.
-  **Important**
  - This is a preview feature.
  - Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

## Prerequisites

To generate process insights, you must meet the following prerequisites:

- Flow runs must have been generated within the last 28 days.
- Only the owner of a flow has the ability to generate process insights.
- You must have access to Microsoft Dataverse (i.e., a low-code data platform that allows you to store and manage data for your applications)
- You must have the environment maker role.

## Known limitations

Please note the following known limitations of this feature:

- After a flow runs, it may take approximately 15 to 30 minutes for data to be added for analysis. However, historical runs up to 28 days are immediately available for analysis.
- This feature is not currently supported for Dataverse for Microsoft Teams environments.
- Cloud flow analytics for your older flows might not appear immediately in the Process Mining desktop application. To have the analytics appear, select **Improve your flow** on the details page of your flow.

## Terminology

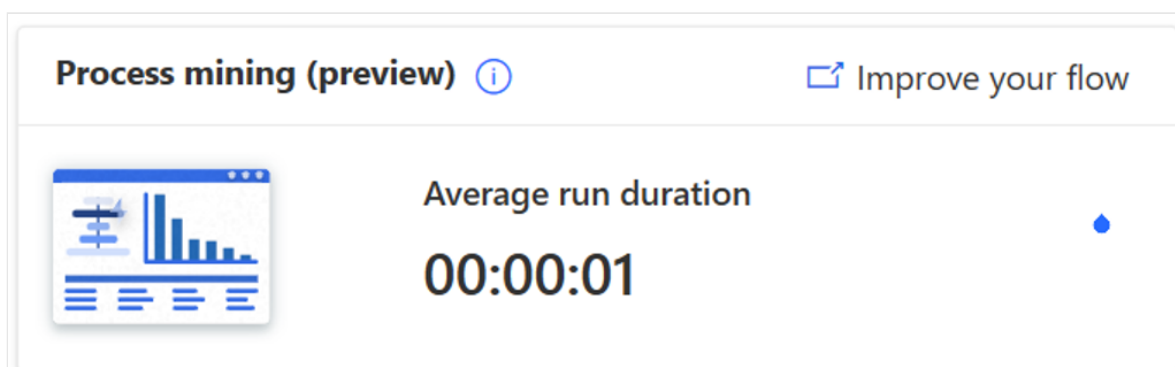
To better understand the process insights feature, it's helpful to be familiar with the following terminology:

- Flow runs are referred to as 'cases' in the report, while actions are represented as 'activities'.
- A path is a specific sequence of activities, representing a 'trace' through the process from start to end. Each path differs from the others by at least one activity.
- Custom metrics and filters enable you to generate personalized insights based on criteria such as flow version or successful versus failed flow runs.

## Improve your flow with process insights

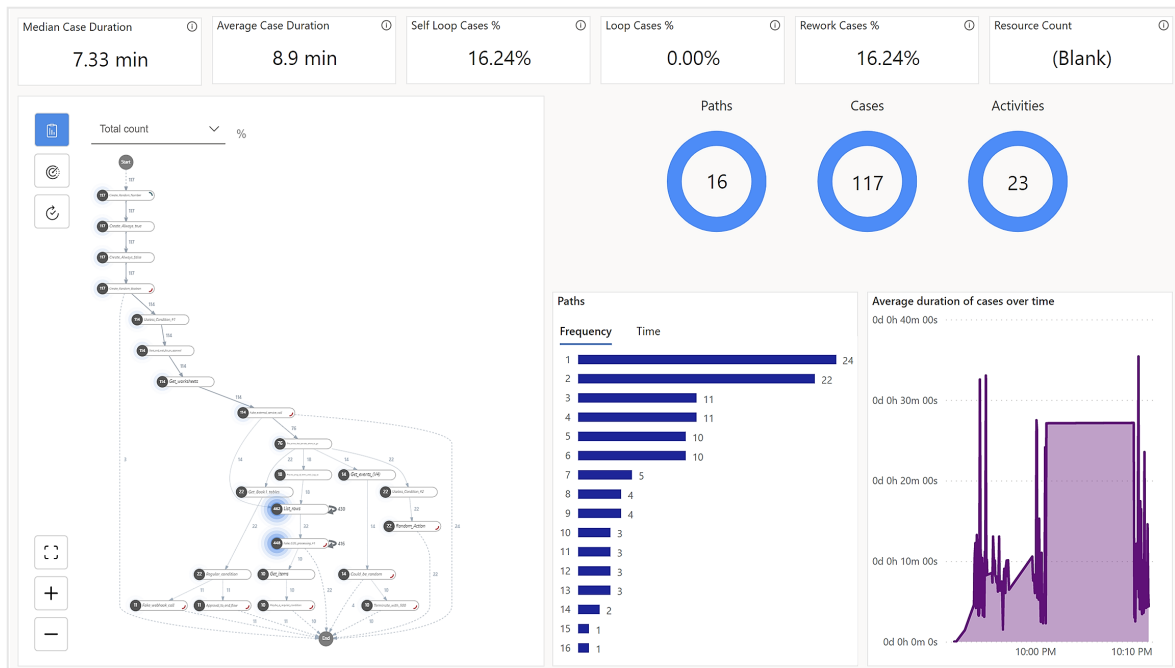
On your flow details page, you can see the **Process insights** card. To see your flow process visualization and analytics, select **Improve your flow**.

1. Go to your flow details page.
2. Generate flow runs if the flow hasn't run in the last 28 days.
3. On the **Process mining (preview)** tile, select **Improve your flows**.



4. Wait for analysis to complete.

When analysis completes, the flow process analytics screen displays.



5. To get the most common run path in your automation, select the most frequent variant.
6. Customize your insights based on custom filters for your flow like flow version, action status, action status code, or action error.
7. Select time analysis report to drill down into bottlenecks based on cases, variants, and time.

#### ! Note

To re-analyze the process based on your latest flow runs, go to the analytics page and select **Refresh**. This updates your data and re-analyzes the process. You can continue viewing the analytics while the analysis is processing.



# Share process mining processes

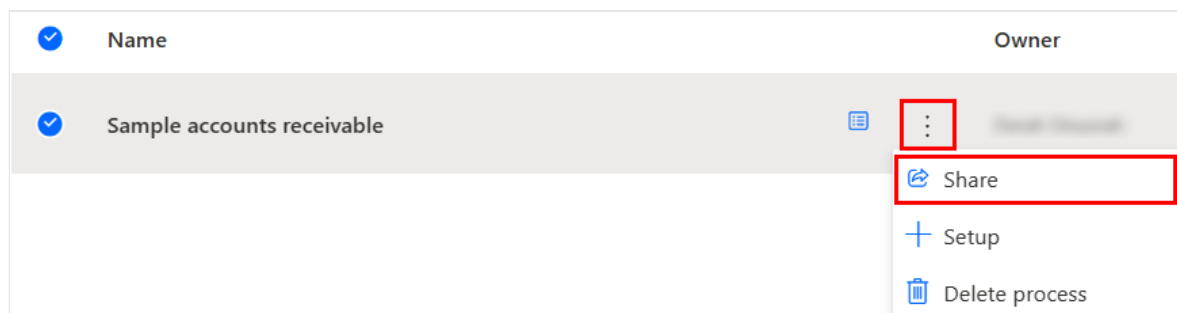
Article • 03/11/2024

When you create a process in the process mining capability, only you can see it. But you might want to share the analytics and insights with others. Share your process mining processes with others in your organization so they can also glean insights to make decisions.

There are a few ways you can share your process.

## Share from process lists page

1. On the process mining homepage, beneath the cards for the processes, select **All processes**.
2. Highlight a process, select the vertical ellipsis (:), and then select **Share**.



## Share from process details page

On the process details page, you can share the process by selecting **Manage** from the **Shared with** card.

## Share from analytics report page

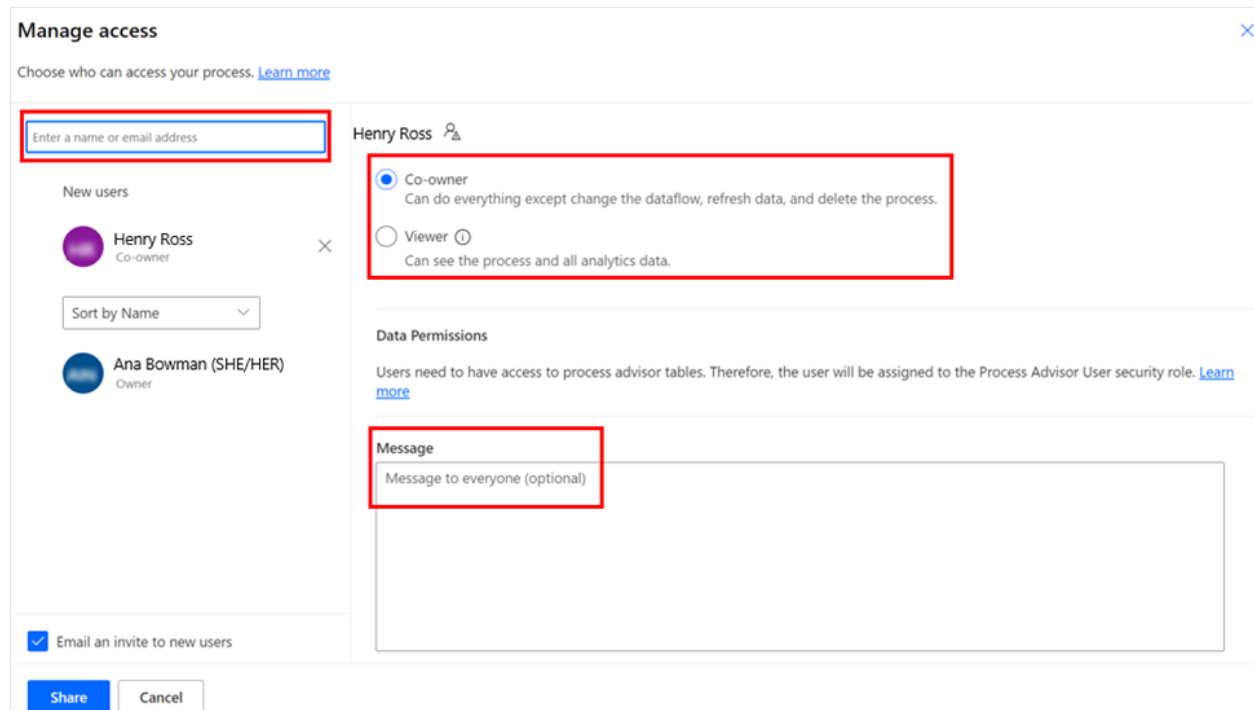
On the analytics report page, you can share the process by selecting **Share** in the command bar.

## Share panel

When you select the share action, a share panel displays. The share panel is where you select users in your Microsoft Entra (which may include external users) and share your

process with them. You can search for any user to invite to your process in the **Dataverse** tenant.

When you share a process with others, the option to send an email invitation is automatically selected for convenience. Viewers are invited to view the process's analytics. There's a link in the email invitation that leads them to the shared process's analytics.



## Share action

The share action is available on the **Processes** screen for the following:

- Each process where you're an owner.
- The system administrator in the environment.
- Any security role that has share permissions on the process mining system entities.

The share action is also available on the process details page with the same conditions. For process mining, only the co-owner and viewer roles are available for sharing with others.

## Share a process with a co-owner

Adding a co-owner to the process allows the owner to include other people who can help manage the process. A co-owner can perform the following actions:

- View and edit process details.
- [View the process analytics.](#)
- Share the process with other co-owners and viewers.

## Share a process with a viewer

Adding a viewer to a process shares analytics and insights with other people. A viewer can perform the following actions:

- View the process details.
- [View the process analytics.](#)

### **ⓘ Important**

- If a user is an admin in an environment, they already have access to all the processes. Therefore, if that user is added as a Co-owner or a Viewer, they won't show up in the list of co-owners or viewers even if they are successfully assigned either of those roles.
- Removing all process roles from a user (such as viewer) doesn't remove that process from the user's process list view. They can't perform any actions on the process.
- Process mining currently does not support sharing for AAD groups.
- Co-owners don't have access to the power query editor and can't modify a dataflow.

# Edit and refresh processes

Article • 07/18/2023

Process mining is a technique used to extract insights from event logs of a process. During the process, it is common to make edits to the mapping or query of an existing process. The following are some of the reasons why you might want to edit your process:

- Your data might have multiple ID columns that can be used as case ID, and changing what you use as a case ID might help you discover more insights.
- Some attributes may be mapped to something more specific, which can provide additional options during analysis, like financial or resource attribute types.
- If you have transformed your data in Power Query, you may want to adjust the transformation if the resulting process is not what you need.

## Edit mapping and query

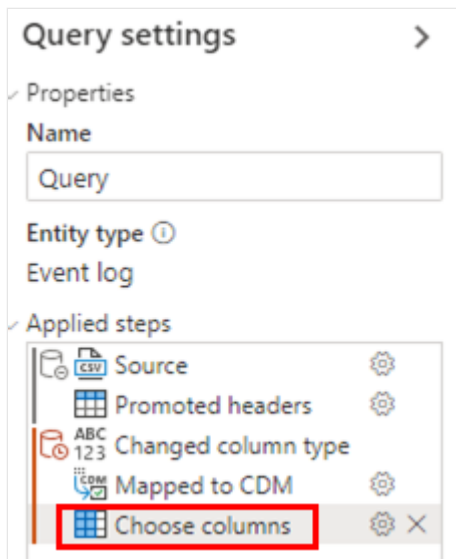
To edit your mapping or query, follow these steps:

1. In the process details page, select **Setup** to return to the mapping page.
2. To change the case ID or other mappings, select the values in the dropdown menu that correspond to the column name from the original data.
3. For more advanced edits, select **Transform data in Power Query** on the top right.
4. In the Power Query editor, you can edit the applied steps, like choose columns, by selecting (or double-clicking) the corresponding step in the **Applied steps** area under **Query settings**. If you want to add a new step, select it in the toolbar.

Otherwise, select the step you want to add in the toolbar.

### **Warning**

Avoid selecting options like **Choose columns** again in the toolbar if they are already listed in the applied steps, as it will be added as a new step to the end of applied steps. This means that if you already applied the **Choose columns** step, the new **Choose columns** step will give you fewer options to choose from, since the original **Choose columns** step already filtered down the list of available columns.



## Refresh data

If you have a transactional data source, like Dataverse or SQL, select **Refresh data** to update your process with the latest data from your data source. The refresh process may take some time, and you will be prompted to confirm the refresh by selecting **Refresh** again.

## Schedule refresh

To keep your data updated, you can use the schedule refresh feature. Select **Schedule refresh** on the right side of the Data Source card to display the schedule refresh panel. By default, the **Keep data up to date** toggle is on, and you can save the default configuration, which is to schedule a refresh every day starting tomorrow at the time you configure by clicking **Save** directly. You can change the default settings by interacting with the controls on the schedule refresh panel to change the interval, the period (day, week, month), the start date and time. Note that the highest refresh frequency is currently every 1 day.

Once schedule refresh is configured, you will see the details in the Data Source card, including the next scheduled refresh date and time.

## Disconnect data

If you want to change the data source for your process, you can easily do this. For example, you might have been using a CSV file before, but now you want to connect to a transactional data source instead. To disconnect your current data source, select **Disconnect data** on the right side of the Data Source card. Once you have disconnected, select **Setup** again to connect to your new data source.

# Overview of Power Automate Process Mining

Article • 10/23/2023

Take advantage of additional enterprise process mining capabilities with the Power Automate Process Mining desktop app. For example, there are many ways to break down your process cycles into smaller pieces for analysis. With the Power Automate Process Mining desktop app, you can easily delve into the details of your processes.

To fully use the Process Mining desktop app, you need a Power Automate Premium license to unlock the enterprise process mining capabilities. To learn how to install the Process Mining desktop app, go to [Download Power Automate Process Mining desktop app](#).

## Benefits of the Process Mining desktop app

The Process Mining desktop app helps businesses to:

- Keep informed of the progress toward key process indicators (KPIs).
- Understand where and why problems occur.
- Identify inefficiencies.
- Standardize and optimize operations.

## Business example

Power Automate Process Mining analyzes data from processes that you create using the process mining capability in Power Automate. For example, you can get deep insights into how your processes run, uncover the root cause of problems, and build useful outputs for the rest of your organization.

## Use Copilot in Process Mining process analytics (preview)

Copilot in Process Mining process analytics provides process insights through quick and easy natural language expression. Copilot can surface insights on your process and recommend solutions in power automate process mining. To learn more, go to [Copilot in Process Mining process analytics \(preview\)](#).

# Components

Following are the main components for the Process Mining desktop app:

- [Process map](#)
- [Process animation](#)
- [Statistics](#)
- [Root cause analysis](#)
- [Variants](#)
- [Process compare](#)
- [Export](#)
- [Filtering](#)
- [Settings](#)
- [Advanced features](#)
  - [Custom metrics](#)
  - [Business rules](#)

# Download Power Automate Process Mining desktop app


Article • 04/18/2024

Before you can start using Power Automate Process Mining, you need to download it to your desktop from the process mining capability.

1. Sign in to [Power Automate](#) <sup>↗</sup>.
2. On the panel to the left, select **Process mining**.
3. At the top of the process mining screen, select **Download app**.

## Understand your business better than ever

Use process mining to find ways to optimize your business processes — including accounts receivable, invoicing, even Power Automate cloud flows. [Learn more about process mining licenses](#) >



**Download app**  
Get even more control of your data with  
Power Automate Process Mining

### ⓘ Note

Power Automate Process Mining desktop app is supported on Windows 10 and above. Windows Server systems aren't supported.

4. After the installer file downloads, select **Install** when prompted to run the installer.  
  
Allow a few minutes for the installer to download and install the application files.
5. When the welcome screen opens, select the preferred application language and select **Next step** to start the guided configuration wizard.
6. In the next step, accept the terms of use and confirm the choice of telemetry data collection, and then select **Next step**.
7. By default, the installation process will store process mining data in a new **Process Mining** folder in the **Documents** folder in your OneDrive. Change the location if necessary, and then select **Next step**.

If the selected folder has been used before, Power Automate Process Mining lets you choose whether you want to use the content of the folder (for example, data and settings from a previous installation), or cleanup the folder. Select **Use or**



**Cleanup** to specify your choice. To go back and change the storage location, select **Cancel**.

8. Select **Apply and Mine!** to finish the wizard.

9. Sign in to Power Automate Process Mining with your work account.

10. Start process mining from the **Processes** screen.

## See also

[Explore the home page](#)

# Explore the home page

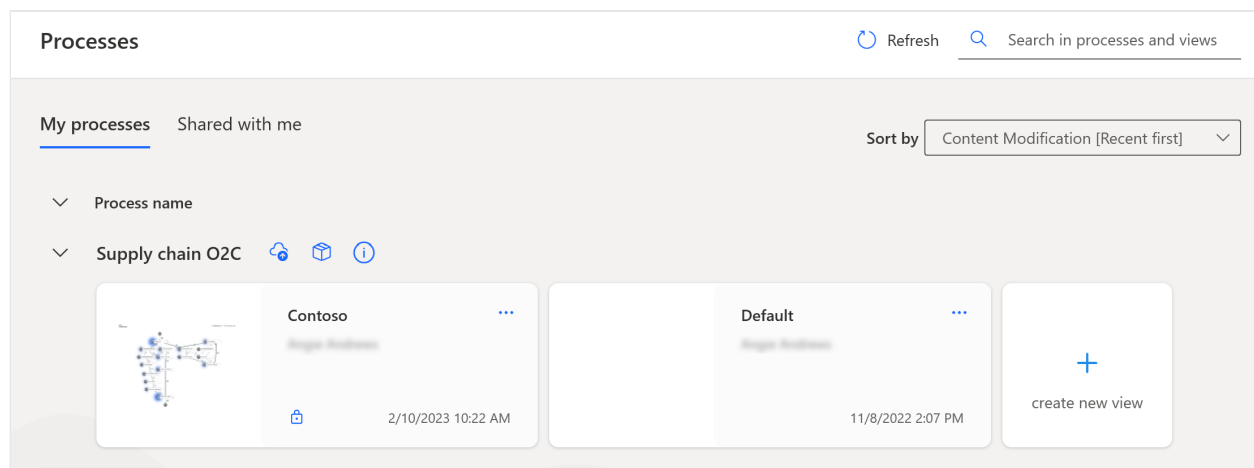
Article • 07/18/2023

The **Processes** screen is the Power Automate Process Mining desktop app home page. It's where you'll find an overview of your processes and views. It's also where you can dig deeper into your processes by creating different views, or ways of analyzing your processes.

## Launch the application

Although Power Automate Process Mining is a desktop app, it's connected to Power Automate through your work account. The first screen you'll see is **Processes**. It lists the processes you created in process mining, and displays the views associated with them as tiles.

Open the Process Mining desktop app and sign in with your work account.



## Select an environment

If the **Process** screen doesn't show the processes you expect, you might need to select a different environment.

1. Select **Environments** in the title bar to open the list of environments you have access to.
2. Select an environment, or search for and select an environment.

## Organize your processes

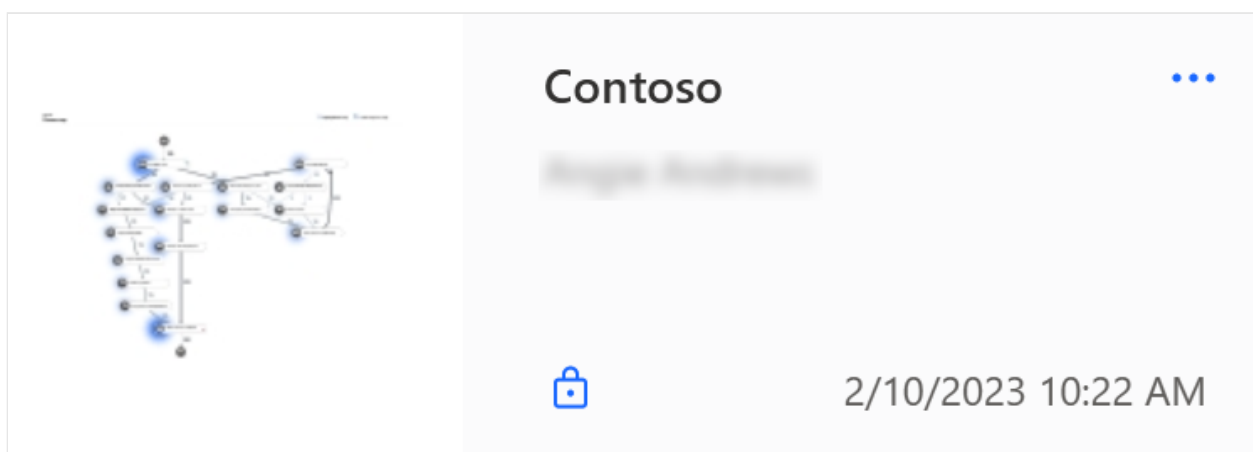
You can organize your processes and views in a way that works best for you.

- **My processes > Process name:** List processes by name, with their associated views displayed as tiles below them. Select the caret to the left of the process name to show or hide the views. This view is the default when you open the Process Mining desktop app.
- **Shared with me > Process name:**
- **Sort by:** Select an option in this dropdown menu to sort views in ascending or descending order by name, or by most recent or oldest.
- **Refresh:** Refresh the list of processes from process mining in Power Automate. For example, if you create a process in the process mining portal of Power Automate, select **Refresh** to update the list in the **Processes** screen.
- **Search in processes and views:** Search for a process or view by name.

## Explore view tiles

A view represents an analysis of a single process model. It stores all your settings for analyzing the process. To analyze a process from several viewpoints, create multiple views. You can work with a view by yourself or with your colleagues.

The first time you open the Process Mining desktop app, if you haven't created any views of your processes, you'll see a default view for each process. The **Default** tile is blank until after the first time you select it. After you've opened a view, the tile displays a miniature version of the process map, as in the following example:



A view tile contains the following information:

- The name of the view.
- The view's save state.
- The date and time the view was last modified.

- A lock icon if the view is private to you only, No lock indicates the view is public.

## Manage views

To open a view, select its tile. If the view isn't updated to the process version, the app displays a warning.

To delete, rename, or change the privacy of a view, in the **Processes** or **Views** view, select (...) in a view tile to open a menu of actions.

- **Make private** or **Make public**: Make a public view private or make a private view public.
- **Rename**: Change the name of a view.
- **Delete**: Delete a view you no longer need.

## Manage processes

In the **My processes** view, you'll see icons and a tile that allow you to manage your processes.

- **Icons**
  - **Publish to Power BI**: Publish changes to the view settings and filters back into Power BI report. This will trigger re-analysis of the process.
  - **Process context**: Display, create, and change custom metrics, map hierarchies, and other process settings.
  - **Process info**: Display information about the attributes of the process model data and its refresh history.
- **Tile**
  - **Create new view**: Open the process in its default state so that you can change the view settings, apply filters and save them as a new view.

# Manage settings with process context

Article • 07/18/2023

The **Process context** page is where you can create and manage process level settings that you want to apply to the views you create for a process.

## Open the Process context screen

There are two ways to open the **Process context** screen depending on where you are in the Power Automate Process Mining desktop app.

- **From the Processes screen:** Select **Process context**.



- **From any other screen in Power Automate Process Mining:** On the menu bar in the upper right corner, select **Process context**.

## Launch process mining capabilities

On the **Process context** screen, you can launch the following capabilities. To learn about each capability, select the link.

- **Custom metrics:** Create and manage [custom metrics](#).
- **Business rules:** Create and manage [business rules](#).
- **Map Hierarchies:** Create and manage [hierarchies](#).
- **Case categorization:** [Categorize cases](#) as Running, Finished, or Stuck.
- **General settings:** Select the [default Activity label](#).

## See also

[Explore the home page](#)

# Categorize cases

Article • 07/18/2023

Case categorization allows you to identify which cases are finished, running, stuck, and incompletely imported. You can then use these categories in custom metrics.

Case categories are split into two groups:

- Exclusive (**Finished**, **Running**, and **Stuck**)
- Case flags (**Incompletely imported**)

A case can be placed in only one of the three categories: either it's **Finished**, **Running**, or **Stuck**. The **Incompletely imported** flag can be applied to any case, regardless of its category. For example, a case can be both **Running** and **Incompletely imported**.

## Create categorization rules

Set rules in simple or advanced mode. Any rule that you set in simple mode carries over to advanced mode. Change modes by turning **Advanced mode** on or off.

Following is an example of the simple mode, which appears when **Advanced mode** is turned off.

Advanced mode:

### ⓘ Note

Switching from advanced mode to simple mode resets the rules to the default.

1. Enter the **Case categorization** screen from any location with the **Process context** selection.

- **From the Processes screen:** Select **Process context**.



- **From any other screen in the Power Automate Process Mining desktop app:** On the menu bar in the upper right corner, select **Process context**.

2. Set rules for categorizing cases as directed in the following sections.

3. Select **Save**.

## Categorize cases as Finished

Initially, all cases are categorized as **Finished**. Turn **Advanced mode** off to continue in simple mode.

Select which activities are finishing activities. Cases that end in one of these activities are considered **Finished**.

## Use the simple mode

In simple mode, select an activity (or multiple activities) in the **List** tab. Alternatively, search for an activity in the **Search in attribute values** field and then select it. You can also select the **Expression** tab and use the comparison dropdown menu and value field to define an activity in terms of an expression.

The screenshot shows the 'Case categorization' settings page. On the left is a navigation menu with options: Custom metrics, Business rules, Map Hierarchies, Case categorization (selected), and General settings. The main content area is titled 'Case categorization' and includes a 'Category' section. Under 'State', there are three items: 'Finished' (100%), 'Stuck' (0%), and 'Running' (0%). The 'Finished' item is highlighted with a red box. Under 'Annotation', there is one item: 'Incompletely imported' (0%). On the right, the 'Advanced mode' toggle is turned off. Below this, the 'List' tab is selected, and the 'Expression' tab is active. The 'Case is considered finished if its last event is:' section shows a dropdown menu set to 'Greater than' and a text input field containing the number '5'.

## Use the advanced mode

When **Advanced mode** is turned on, you have more options:

- Select a filter in the **Add filter** dropdown menu to specify attributes that define a finishing activity or use any combination of filters.
- Remove all filters.
- Use the import and export filters by selecting (...).

- Switch individual filters on or off.

Process context

Category  
**Case categorization**

State

Finished	100%
Stuck	0%
Running	0%

Annotation

Incompletely imported	0%
-----------------------	----

**Finished**

Case is considered Finished if it meets these rules:

+ Add filter    - Remove all filters    ...

**Filters criteria set**

Case

End events

## Categorize cases as Stuck

Cases that aren't **Finished** are either **Stuck** or **Running**. To distinguish between them, you can define when the case is considered **Stuck**. If a case isn't **Finished** and the time between the last activity in the case and the date you select exceeds the time value, the case is considered **Stuck**.

1. In simple mode, select **Stuck**.
2. Enter or select a date, or select the last event in the dataset.
3. Enter a time value.

When **Advanced mode** is turned on, you have more options:

1. Select a filter in the **Add filter** dropdown menu to specify attributes that define a **Stuck** case.
2. Use the import filter by selecting (...).

## Categorize cases as Running

Cases that aren't **Finished** or **Stuck** are considered **Running**.

The case is evaluated in sequence. If it satisfies the conditions for **Finished**, categorization stops there. If it doesn't, the app checks the conditions for **Stuck**. If those conditions are also false, it categorizes the case as **Running**.

## Categorize cases flagged as Incompletely imported



Cases that don't start where they should are flagged as **Incompletely imported**. This can happen when the export from the original data source split the case in half and only included the latter part of the case activities.

To clear the **Incompletely imported** flag, select which activities are starting activities.

1. In simple mode, select an activity (or multiple activities) in the **List** tab.

Alternatively, search for an activity in the **Search in attribute values** field and then select it. You can also select the **Expression** tab and use the comparison dropdown menu and value field to define an activity in terms of an expression.

2. When **Advanced mode** is turned on, you have more options:

- Select a filter in the **Add filter** dropdown menu. You can use any combination of filters.
- Remove all filters.
- Use the import and export filters by selecting (...).
- Switch individual filters on or off.

## Use case categories

After you categorize the case, each category has its own function in custom metrics, returning True or False for each case:

- ISFINISHED()
- ISSTUCK()
- ISRUNNING()
- ISINCOMPLETEIMPORT()

## See also

[Explore the home page](#)

# Process map overview

Article • 07/18/2023

A process map provides a view of the activities performed in a process and their sessions. It represents the behavior of the process captured in data by means of activities and directed edges.

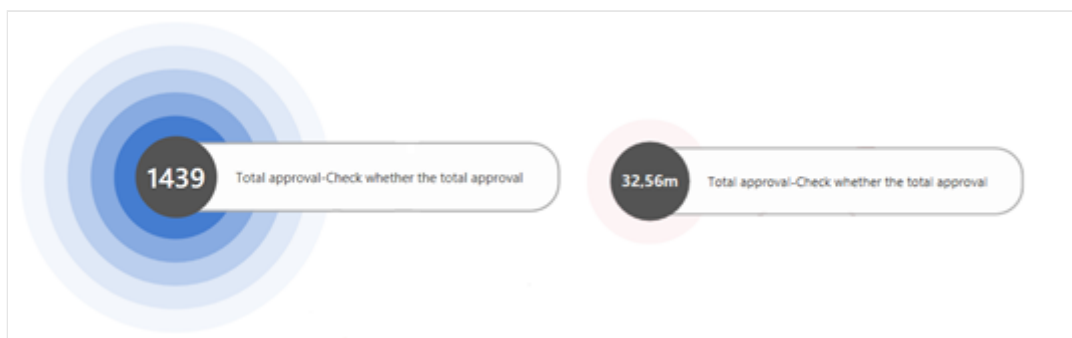
The process map corresponds with the mining result of the process. It reflects filter settings above the data, and the chosen frequency, or time metrics. When you apply filters, mining is performed again, metrics are recalculated, and a new process map is generated.

## Process map nodes

Process map activities (also known as nodes) represent a unique activity, or unique values of different selected mining attributes, performed, executed, or passed through in the process.

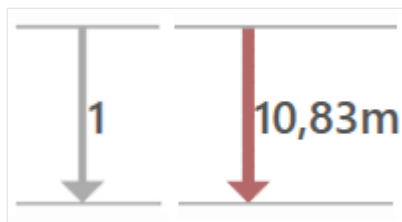
Frequency metric, time metric, or finance metric can be displayed for nodes. The system can display only one metric at a time.

The size and color of the highlight (also known as the halo effect) expresses the total proportion of the frequency, time metric in question in relation to the other nodes in the process map.



## Process map edges

Chart edges represent transitions between individual events and describe the sequence of activities in the process. A transition between events means that they directly follow one after the other. The thickness of the edge and the number displayed next to it depend on the selected display metric (frequency, time, finance) and its value.



## Start and end node

All nodes/activities starting process instances are connected to the start node. All nodes/activities ending process instances are connected to the end node. These nodes don't represent process nodes/activities, but the input and output points of the process under analysis. Their purpose is to facilitate the identification of the start and end nodes/activities of the process. The display of these nodes and edges related to them can be turned off in the Process Map Display Settings panel.



## Start and end identifier

Chart nodes starting and ending process instances contain colored indicators in the right part of the node. The green indicator represents the initial activity (upper right), the red indicator represents the final activity (bottom right) of the process. A node occurs as each start and end in process instances contains both indicators.



## Manage process map views

When you open a project view for the first time, a process map with the default view parameters displays. The structure of the process map and the information vary depending on your view settings. The default process map typically contains the backbone of the process. It displays the most frequent activities and the most dominant edges. The basic view also includes the start and end nodes.

The following table describes ways that you can manage views.

Action	Description
Switch views from the <b>Processes</b> screen	On the command bar at the top left, select <b>Processes</b> , and then select another process.
Switch views from the current screen	On the command bar at the center, select the dropdown menu, and then choose an option.
Rename, save, save as, and discard a process	On the command bar at the top, select the <b>Save</b> dropdown menu and choose an option.
View ongoing tasks	On the title bar, select <b>Tasks</b> (the bell icon). You'll see the status of tasks that are running in the background and the history of completed tasks. If a task couldn't be completed, select <b>Retry</b> to restart it. If you want to edit its parameters before restarting the task, select <b>Edit</b> .

## Node details

If you select a node, detailed information about the activity displays.

Detail	Description
Frequency	The frequency information about a process activity.
Performance	Information about the duration of an event/activity compared to the entire process under analysis. For example, you can find out the total time or average duration of the activity.
Rework	Various metrics about activity repetitions within the cases. For example, you can find out how many times the activity has been repeated or how many times the activity was followed by a repeated activity.
Financial analysis	Finance information about a process activity. For example, you can find out the total costs/incomes about process activity, average values, costs/incomes about the case, and more.
Custom metrics	Information about the custom metrics. To learn more, go to <a href="#">Custom metrics</a> .
Business rules	Information about the business rules. To learn more, go to <a href="#">Business rules</a> .
Top attributes	An overview of the most frequent attributes in the event. If there are more attributes available in the process, you can also add displayed information to the other attributes.

Detail	Description
Advanced panel	To display the advanced panel for a node, select <b>Advanced Panel</b> button. This panel displays a list of previous or subsequent activities with a selected attribute and an optional number of attribute values. On this panel, you can display only the attributes that were marked as case-level attributes during the process import. To switch to the list of previous or next activities, select <b>Predecessor/Successor</b> button on the top of the panel.

## Edge details

If you select an edge, detailed information about the transition displays.

Detail	Description
Frequency	Frequency information about an edge/transition in the process.
Performance	information about the duration of the transition compared to the entire process under analysis. The duration of the transition represents the waiting time between the end of the previous event and the beginning of the next event.
Rework	Various metrics about the edge repetitions within cases. For example, you can find out how often the edge/transition is repeated in comparison to the total edge occurrences. You can also compare how many times the starting and ending activities of the edge were repeated.
Financial analysis	Information about the costs/incomes of the whole case given the case-level finance attribute.
Custom metrics	Information about the custom metrics. To learn more, go to <a href="#">Custom metrics</a> .
Top attributes	Overview of the most frequently occurring attributes within the event. If there are multiple attributes within a process, you can add displaying of the information to other attributes. Only attributes that were marked as case-level attributes during the process import can be added among the top attributes of this panel. The number of displayed values of the selected attributes is optional.
Top attributes	Overview of the most frequently occurring attributes within the event. If there are multiple attributes within a process, you can add displaying of the information to other attributes. Only attributes that were marked as case-level attributes during the process import can be added among the top attributes of this panel. The number of displayed values of the selected attributes is optional.
Advanced panel	To display the advanced panel for an edge, select <b>Advanced Panel</b> . This panel displays the starting and ending activities of the edge with the selected attribute and an optional number of attribute values. On this panel, you can view any attribute imported with the process.

# Process map settings

To open the process map settings, select **Customize** on the right side of the screen.



The **Customize** panel allows you to choose between the process map or the [social chart](#). Switching between these views will cause mining in the process to start over.

## Mining attribute selection

By default, the process map displays based on the **Activity** attribute, which is a standard mining attribute. You can observe the process flow between the executed activities. If you want to see how the process flows between values of a different event level attribute (for example, **Resource**, but not in social chart layout, regions, departments, or plants, a **Mining Attribute Selection** is available.

Mining attribute selections shows only relevant event log attributes and by selecting a different attribute, the process map is recalculated including the available metrics used in frequency, performance, finance, or rework analysis.

The selection of the mining attribute has an impact on the process map view and included metrics, but it doesn't influence the other process view screens, which are still calculated using the Activity attribute.

Variant analysis screen is available also for other mining attributes. A separate selection must be used. To learn more, go to [Variant mining attribute](#).

## Activities

Use this slider to determine the number of activities to be shown on the process map. It changes the complexity of the process map based on the importance of the activities performed in the process.

## Paths

Use this slider to determine the number of transitions shown on the process map. It changes the amount of detail in the process view with regards to links between activities found in the process.

You can filter displayed edges/transitions using the edge slider. It defines the range of edge metric values which are shown to the user, hiding unimportant edges/transitions. This control doesn't affect the data set but helps to focus on the most relevant aspects of the process map transitions.

## Map clustering

Map clustering allows you to visually encapsulate activities in the process map view into clusters. You can also do this in the social chart view with a resource attribute selected. Nodes are grouped and laid out close to each other and visually bordered by blue dashed rectangles based on the value of the selected clustering attribute.

1. On the panel to the right, select **Customize** (the top icon).
2. Select either the **Process map** or **Social chart** tab.
3. In the **Mining attribute** dropdown menu, select an attribute.
4. In the **Clustering attribute** dropdown menu, select an attribute.

The map clustering attribute selection control is populated automatically by Power Automate Process Mining. The attributes must fulfill the following premises:

- **Process map:** Each value of the attribute Activity must have exactly one corresponding value of the clustering attribute. It can also be an empty value. In this case, the activity is placed on canvas outside of any cluster. For example, approval must have always value **Management** in clustering attribute and PO archival must always have value Accounting.
- **Social chart:** Each value of the attribute Resource must have exactly one corresponding value of the clustering attribute. It can also be an empty value. In this case, the resource is placed on canvas outside of any cluster. For example, John Doe must always have the value CostCenter1 in the clustering attribute and Mary Jane must always have the value CostCenter34.

A specific activity or resource can be included only in one cluster, or outside of any cluster.

The clusters are collapsible/expandable so that you can simplify the process map by hiding the activities/resources in the cluster. To do this, select the blue icon with two arrows in the top right corner of the cluster border. To expand the cluster, select the two arrows icon on the cluster (which is highlighted in blue color).

It's also possible to collapse or expand all clusters at the same time using the **Collapse All/Expand All** options in the clustering context menu.

## Hierarchical process maps

Hierarchical process maps use clustering technique to enable you to visually encapsulate activities in clusters. They group them into further clusters in the process map view or resource in the social chart view. Nodes are grouped and laid out close to each other and are visually bordered by blue dashed rectangles based on the value of the selected clustering attributes.

Hierarchical process maps allow you to drill down into a hierarchy of clusters, analyze aggregated data for individual hierarchy levels, and focus only on relevant process parts, even in very complex unstructured processes. Functionality can be used with added value in RPA initiatives to drill down into either UI recording combined with high level IS event logs, and in bot monitoring scenarios to drill down into bot execution. Organizational structure mining, hardware infrastructure, and software system structure are other use cases.

To learn more, go to [Hierarchical process mining](#).

## Process map advanced settings

The following properties can be set in the advanced settings of the process map:

- Display start and end nodes, and edges related to them.
- Store the backbone activities on the same line on the process map.
- Map orientation: Top to bottom or left to right.
- Highlight the activities that go before and after the activity being presently monitored.

## Export a process map

A process map can be converted and exported into a BPMN 2.0 compliant format that allows you to work with the map in any standard BPMN modeling tool.

A process or social map can also be exported as:

- PNG image



- XML file containing a list of activities and edges (for processing in any 3rd party tools)

To export process map, select **Export process map** on the menu at the top, and then make your selection.

## Social chart

The social chart shows the important parts and parameters of your process through links and dependencies between resources involved in the process.

### Social chart advanced settings

You can set the following properties in the advanced settings of the social graph:

- Display start and end nodes and edges related to them.
- Highlight resources connected to the resource currently monitored.

### Switch chart layout

Use the switch to switch chart layout according to different algorithms. The option to switch chart layout is especially important for large and complex charts and to make process analysis easier. The layouts are designed to display social graphs with a large number of nodes and edges.

### Resources

Use this slider to determine the number of resources to be shown in the social chart. It changes the complexity of the chart based on the importance of the resources entering the process.

### Connections

Use this slider to determine the number of connections to be shown in the social graph.

### Variant panel

The Variant panel contains a list of variants created during the process reconstruction. Variants can be arranged according to the number of process instances they group or by the number of events in case of variants. By selecting each variant in the list, the

sequence of one or more variants in the process or social map will be highlighted. The selected variants can be filtered immediately on the filter screen by selecting the filter icon.

When selecting one or more variants to the right of the indicator of the current volume of process instances and events, a coverage indicator of the process instances by the selected variants is displayed at the bottom of the screen. If the complexity of the process map was reduced with the scrolling elements, not all process activities or edges are shown, the number of not shown activities and edges of the selected variants displays in the lower right corner.

## View settings

To define various settings valid only for the current view, select **View Settings** on the command bar at the top.

To learn more, go to [View settings](#).

# View settings

Article • 07/18/2023

You can define various settings for the current process view on the **View settings** screen.

The screen consists of four tabs:

- General settings
- Duration settings
- Activity label
- Calendar settings

## General settings

The **General settings** tab allows you to define the duration format to be used for the current view. The global settings of the duration format used for all new processes and views can be defined in **Settings > Options > General**.

To learn more, go to [Settings](#).

## Duration settings

The **Duration settings** tab allows you to select the maximum unit of time to be displayed. For example, if you select **Day**, all the larger units of time (for example, weeks, months, and years) will be converted into days while all the smaller units (hours, minutes, seconds, and milliseconds) will display normally based on the time format precision setting.

Since the length of months and years vary, they are converted to days using their average length:

```
1 month = 30.436875 days
1 year = 365.2425 days
```

Use the **Time format precision** dropdown menu to define how many time units will displayed. For example, when you select **Year** in the **Max time unit** dropdown menu, and

then select **2** in the **Time format precision**, only years and months will display. If you select **3**, years, months, and weeks will display.

#### ⓘ Note

The values of the units that aren't displayed aren't converted into larger ones but are completely omitted. For example, 15 days will display as 2 weeks and not 2.07 weeks.

The **Show duration in working hours** checkbox automatically sets the max time unit to "hour" and time format precision to "unlimited".

## Activity label

The **Activity label** tab allows you to do the following:

- Set the default activity label.
- Select the display format (**Activity**, **Label**, or **Custom**)
- (If the default label is **Custom**) Edit the display format.

## Calendar settings

Select an existing calendar in the **Calendar** dropdown menu. If the menu options don't include the calendar template that you want to use, select the ellipses (...) to define a new template. If an existing calendar is close to what you want, select it in the **Calendar** dropdown menu, and then select (...) > **Edit**.

Calendar templates can be shared across Power Automate Process Mining projects. To manage all calendar templates, select **Settings** > **Working hours**. To learn more, go to [Settings](#).

## See also

[Process map overview](#)

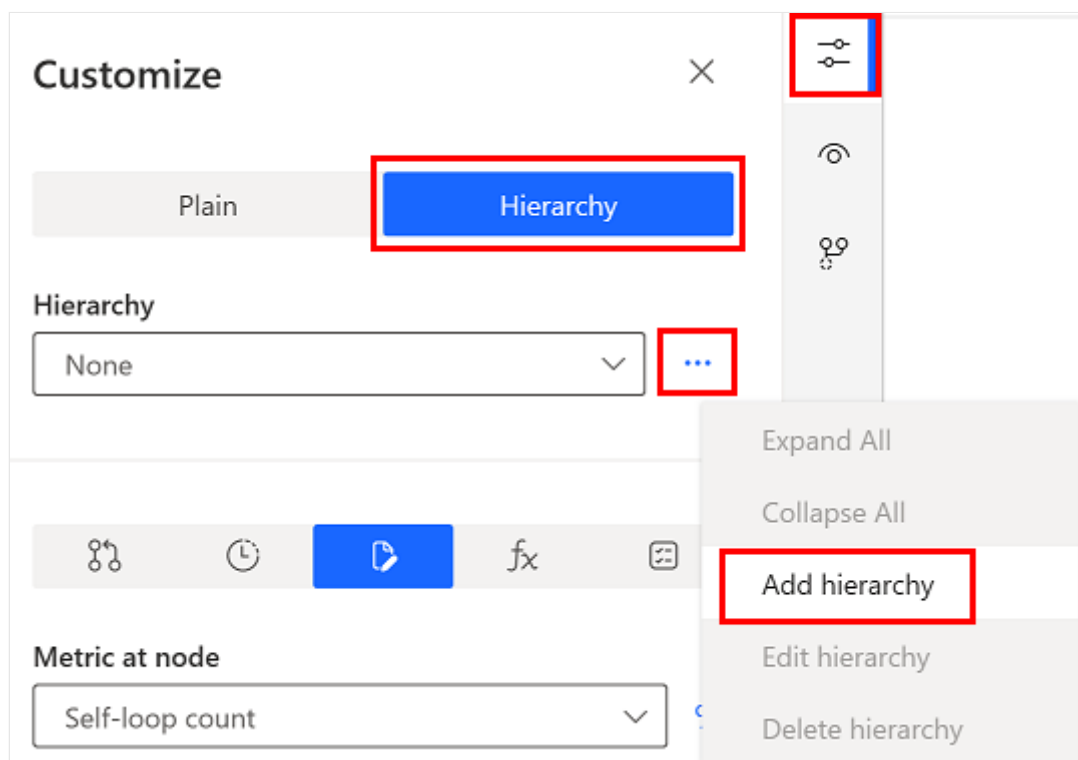
# Hierarchical process mining

Article • 07/18/2023

The defined hierarchy, as it's bound to process attributes, is valid and usable for all process views in the context of the process for which it has been defined.

To define the hierarchy in the process map view and social chart:

1. On the panel to the right, select **Customize** (the top icon).
2. On the toolbar in the **Customize** panel, select the **Hierarchy** tab.
3. Next to the **Hierarchy** field, select the ellipses (...), and then select **Add hierarchy**.



Use the **Edit hierarchy** and **Delete hierarchy** items to modify the defined hierarchies.

You can do the same in the **Process context** menu screen. It allows you to define the name of the hierarchy, and automatically identifies all clustering attributes in the process, specifying the number of unique attribute values - levels. To define the hierarchy, select and move the desired attributes to the right part of the screen. Use drag and drop to reorder the items in the final list. The list of hierarchies is validated for correctness. The same rules that apply for the individual clustering attributes must be applied for the levels in the hierarchy. The lower level of the hierarchy must act as a clustering attribute for the higher hierarchy level.

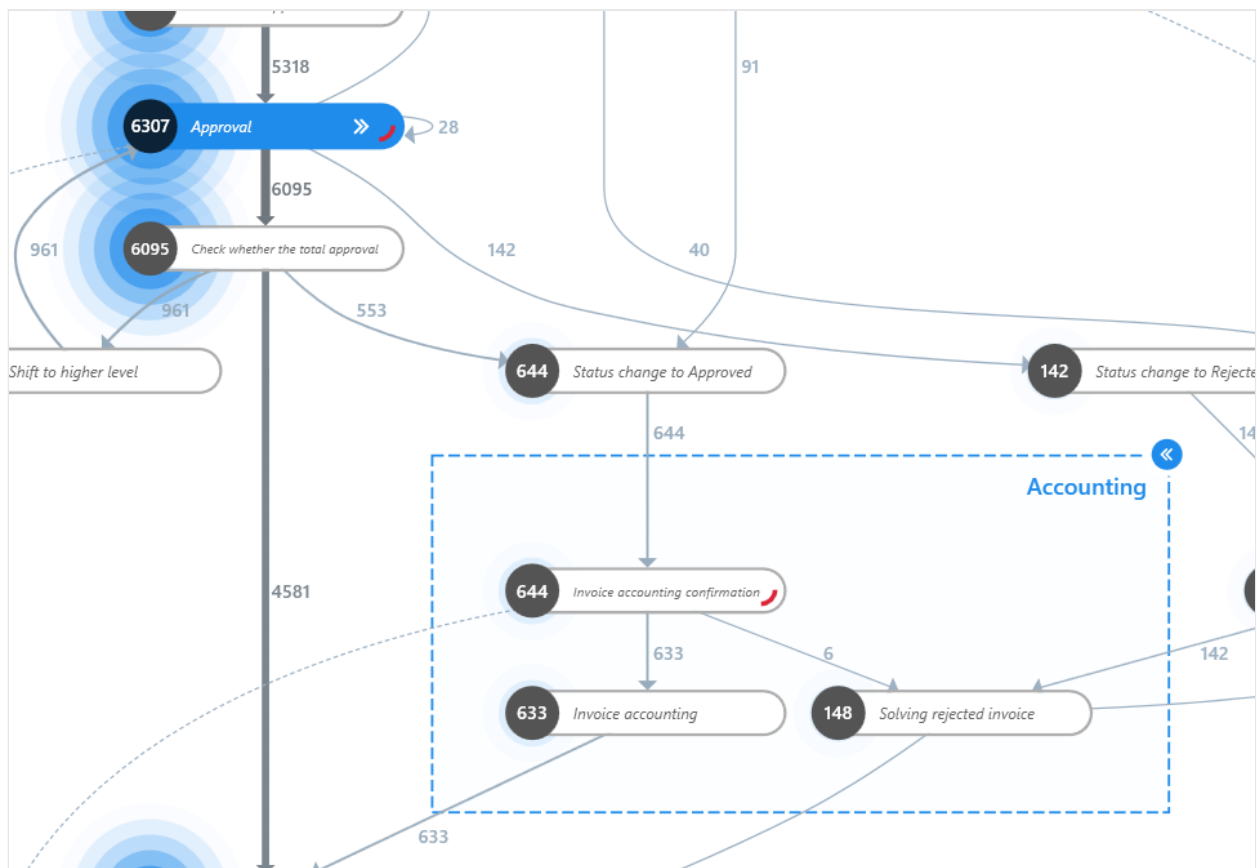
You're informed if the validation rules aren't met and saving of the hierarchy isn't allowed.

The available clustering attributes must fulfill the following premises:

- **Process map:** Each value of the attribute **Activity** must have exactly one corresponding value of the clustering attribute. It can also be an empty value (in this case, the activity is placed on canvas outside of any cluster). For example, **Approval** must have always value **Management** in the clustering attribute, and **PO archival** must always have value **Accounting**.
- **Social chart:** Each value of the attribute **Resource** must have exactly one corresponding value of the clustering attribute. It can also be an empty value. In this case, the resource is placed on canvas outside of any cluster. For example, John Doe must always have the value *CostCenter1* in the clustering attribute and Mary Jane must always have the value *CostCenter34*.

A specific activity or resource can be included only in one cluster, or outside of any cluster. The same applies between clusters in lower and clusters in higher hierarchy level.

The clusters are collapsible and expandable so that you can simplify the process map by hiding the activities or resources in the cluster. To do this, select the blue << in the top right corner of the cluster border. To expand the cluster, select >> on the cluster, which is highlighted in blue.



It's also possible to collapse and expand all clusters at the same time using the **Collapse All/Expand All** options in the clustering context menu.

The process may contain multiple levels of hierarchy. To quickly navigate through individual levels, use the hierarchy display options available in the bottom right corner of the **Process map** and **Process animation**. Using the selection list, you can select an exact level or expand all clusters. Using the buttons next to this list, you can successively increase and decrease the displayed level.

## See also

[Process map overview](#)

# Rework metrics

Article • 07/08/2023

Rework metrics represent a layer of data analysis with a focus on identifying various kinds of repetitions found in a process. Rework information is covered in the **Statistics** screen and can be visualized on the process map for better understanding the root cause of each repetition and its overall impact. Reducing repetitions is crucial for improving the efficiency of the process as well as reducing costs.

The following sections list the types of rework metrics.

## Self-loop

Self-loop represents a specific repetition where an activity is directly followed by the same activity. In terms of edges and transitions, the starting and ending activity of edge is the same.

## Example of self-loop

The activity called *BP Transfer* repeats itself nine (9) times. There are zero values over all the other activities and edges because no other activities are involved in this type of repetition.

## Loop

Loop represents specific repetition where an activity is followed by the same activity, but not directly. For example, at least one additional activity is always involved.

## Example of loop

Activities *SetDeliveryDate* and *Approve* are repeated seven (7) times. The edge between these two activities is also repeated seven (7) times. Keep in mind that in a process map, an activity might be repeated, but each time a different edge or transition can be used. The loop count value for a non-repeated edge is zero, regardless of the loop count for the starting or ending activity of the edge.

## Rework

Rework count represents the sum of all self-loops and loops.



## Example of rework

The number of self-loops of the activity *BP Transfer* displays with the number of loops of the activities *SetDeliveryDate* and *Approve*. If any of the activities contained both self-loops and loops, their numbers would add up.

## Loop inflow

Loop inflow represents the repetitions of an activity's predecessors.

### Example of loop inflow

In this example, the activity *SetDeliveryDate* has been repeated seven (7) times, so the loop inflow for the activity *Approve* is also seven (7), as *SetDeliveryDate* is the only predecessor of *Approve*.

As the activity *SetDeliveryDate* has been preceded by non-repeated activities, its loop inflow value is zero, regardless of the number of repetitions of itself. However, the edge between *SetDeliveryDate* and *Approve* has a non-zero value as the starting activity was repeated.

## Loop outflow

Loop outflow represents the repetitions of an activity's successors.

### Example of loop outflow

The activity *Approve* has the value of zero, none of the successor activities was repeated. *SetDeliveryDate* shows value 7, as activity's *Approve* loop count equals 7. The edge between *SetDeliveryDate* and *Approve* shows value 7, as the ending edge activity *Approve* has been repeated 7 times.

## Net loop gain

This activity metric represents the difference between *Loop outflow* and *Loop inflow*. If the value is positive, the activity is directly followed by more repeated activities than it was preceded. Such activities start new loops in processes. If the value is negative, the activity is directly followed by less repeated activities than it was preceded. Such activities end, close, or exit loops in processes. The halo effect color also helps us see

positive and negative trends in the process - red color represents a problem (start of new loops); the blue color represents a favorable change (end of loops).

## Example of net loop gain

*SetDeliveryDate* is followed by repeated activity *Approve* while it has no repeated predecessors (value 0). The activity is thus involved in the creation of seven (7) new loops (value 7). Activity *Approve* is not followed by a repeated activity (value 0), but its predecessors are repeated seven (7) times. The activity *Approve* is thus involved in closing seven (7) loops (value -7).

## Rework metrics - process map

In rework metrics, the map displays information representing the volume of repetitions for activities and edges the process involves.

To display the rework information:

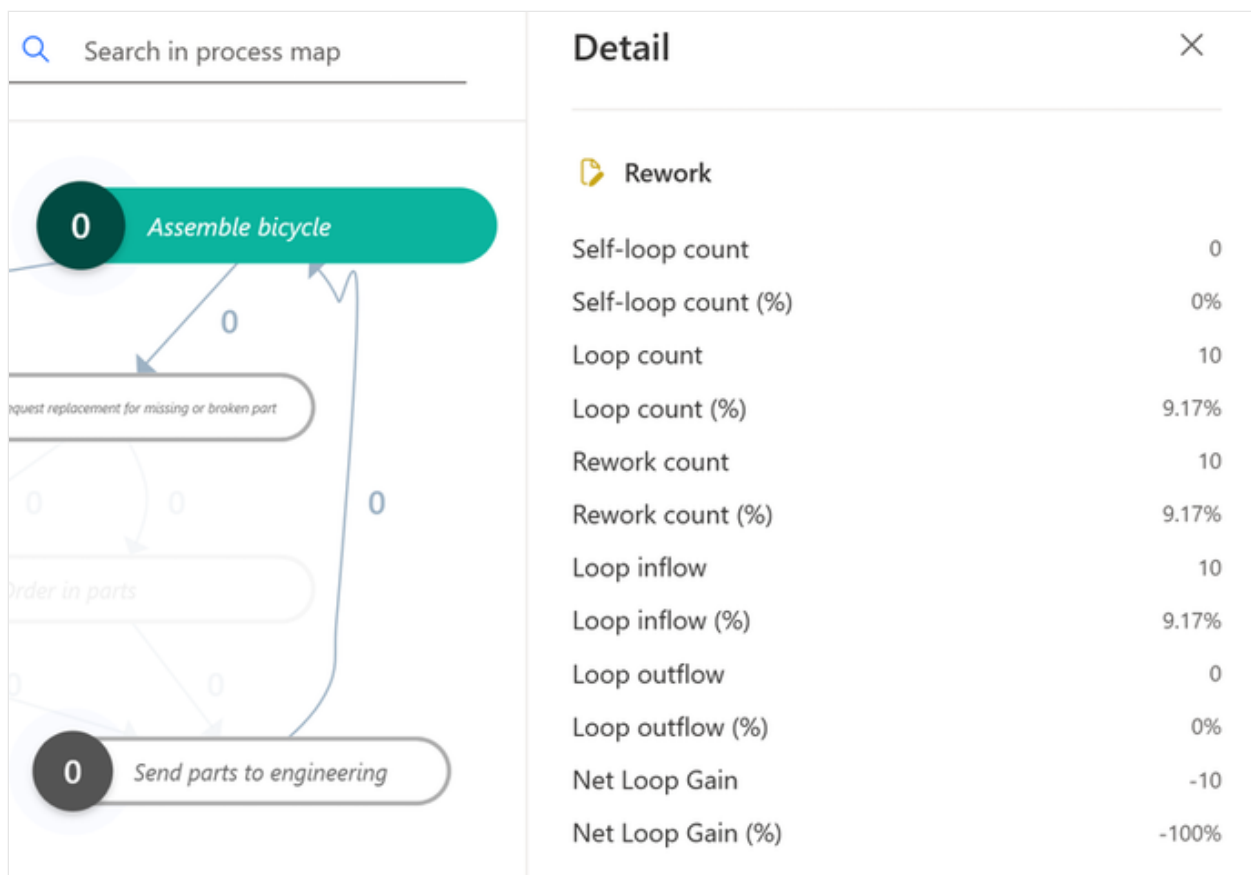
1. On the panel on the right, select **Customize** (the top icon).
2. On the **Customize** toolbar, select **Rework**.

You can select if one metric is used both for activities and edges, or each metric is set separately. To switch between count and percentage for each metric, select %.

The list of metrics is the same for both activities and edges, with one exception.

Metric **Net Loop Gain** is available only for activities.

By selecting an activity or edge, you can display rework details about the particular object. The percentage represents the proportion of the individual types of reworks to the overall number of instances.



## Rework metrics - statistics

In the **Statistics** screen, the rework information is available for **Case overview**, **Activities**, **Edge statistics**, **Resources**, and all event-level attribute statistics.

The rework columns are located at the far-right end of the table and the information can be also displayed in the chart. The percentage is calculated from the **Event frequency** value. In **Case overview**, it's calculated from the **Event** count.

Information about reworks is also present in the overview panel. The percentage shows the proportion of the displayed rows that contain self-loops, loops, and reworks. In the following example, one out of two cases contains a self-loop so the overview panel shows **50%** average self-loop. Similarly, one out of the two contains a loop. This is why the average loop shows **50%**. This means that both cases contain a rework, so the average rework shows **100%**.

Mean case duration <b>120d 12h</b>	Statistics table											
Mean active time <b>0ms</b>	Case	Event count	Start	End	Duration	Case active time	Case waiting time	Utilization	Self-loop (%)	Loop (%)	Rework (%)	
Mean waiting time <b>120d 12h</b>	1	6	1/1/2023 12:00:00 AM	6/1/2023 12:00:00 AM	151d	0ms	151d	0.00%	0.00%	33.33%	33.33%	
Mean utilization <b>0.00%</b>	2	4	1/1/2023 12:00:00 AM	4/1/2023 12:00:00 AM	90d	0ms	90d	0.00%	25.00%	0.00%	25.00%	
Start <b>1/1/2023 12:00:00 AM</b>												
End <b>6/1/2023 12:00:00 AM</b>												
Self-loop cases <b>50.00%</b>												
Loop cases <b>50.00%</b>												
Rework cases <b>100.00%</b>												

In this example, one case contains one self-loop and one loop. The other one doesn't contain any reworks. That means the average self-loop, average loop, and average rework fields in the overview panel are **50%** because only one of the two cases contain them.

Mean case duration <b>135d 12h</b>	Statistics table											
Mean active time <b>0ms</b>	Case	Event count	Start	End	Duration	Case active time	Case waiting time	Utilization	Self-loop (%)	Loop (%)	Rework (%)	
Mean waiting time <b>135d 12h</b>	3	7	1/1/2023 12:00:00 AM	7/1/2023 12:00:00 AM	181d	0ms	181d	0.00%	14.29%	28.57%	42.86%	
Mean utilization <b>0.00%</b>	4	4	1/1/2023 12:00:00 AM	4/1/2023 12:00:00 AM	90d	0ms	90d	0.00%	0.00%	0.00%	0.00%	
Start <b>1/1/2023 12:00:00 AM</b>												
End <b>7/1/2023 12:00:00 AM</b>												
Self-loop cases <b>50.00%</b>												
Loop cases <b>50.00%</b>												
Rework cases <b>50.00%</b>												

## Rework metrics - filters

The Metrics filter supports filtering per case according to the amount of self-loops, loops, and reworks.

Filters **Attributes (conditional)** and **Edge (conditional)** allow using rework metrics filter per event.

## Filtering

Filters criteria set	Attributes (conditional)	List	Expression
<b>Case</b>		<input type="text" value="Search in attribute values"/>	
Timeframe <input type="checkbox"/>	<b>Filter result</b> <input type="text" value="Includes"/>		
Metrics <input type="checkbox"/>	<b>cases in which</b>	<b>Attribute value</b>	
<b>Attributes (conditional) <input type="checkbox"/></b>	<b>attribute</b> <input type="text" value="Delivery method"/>	<input checked="" type="checkbox"/> In-store pickup	
	<b>holds any of the values</b> <input type="text" value="In-store pickup (1)"/>	<input type="checkbox"/> Standard shipping	
	<b>and at the same time</b>		
	<input type="text" value="Metric"/>		
	<input type="text" value="Loop count"/>		

## See also

[Process map overview](#)

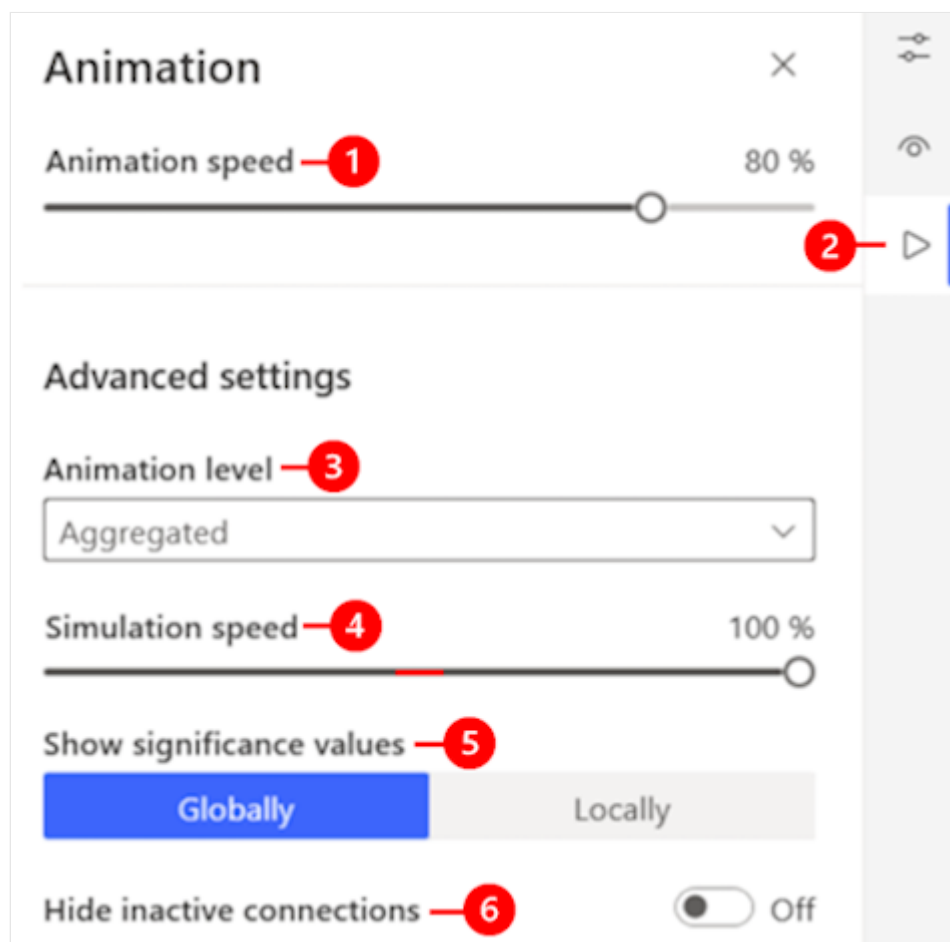
# Process animation overview

Article • 07/18/2023

With process animation, you can visualize process development over time. You can watch the animation play over your process map or social graph on the **Animation** screen.

## Adjust animation control settings

Control animation speed, advanced settings, and more on the **Animation** screen.



Legend:

1. **Animation speed slider:** Move the slider to adjust the animation playback speed. The information displayed in the animation frame remains unchanged.
2. **Right arrow icon:** Select to open the **Animation** screen.
3. **Animation level dropdown menu:** There are two options: Select **Immediate** to indicate that actual dynamics in the process will be shown during playback. Select

**Aggregated** to indicate that the process dynamics aggregated in the time period around the currently monitored time point will be shown during playback.

The length of the time period used to aggregate information for the current view is part of process mining. It depends on the duration of the process and the simulation speed setting. For example, the higher the simulation speed, the longer the time period is aggregated.

4. **Simulation speed slider:** Move the slider to adjust the process simulation speed which the displayed animation information is based on. The simulation speed change has an impact on the degree of detail in the displayed process dynamics. Depending on the nature of the process in question, its duration, and the objective of the analysis, dynamics with a higher or lower degree of detail may be preferred.

Alternatively, if you have a long-lasting process and need a detailed analysis of dynamics over a shorter period, you might want to use a filter to restrict the process under analysis only to the period in question.

5. **Show significance values:** Set the mode with the color highlighting of edges and nodes in the animation. Two options: Select **Globally** to highlight the current value in color in chart edges and nodes compared to all values of all nodes and edges in the entire simulated process. Select **Locally** to highlight in color in chart edges and nodes compared to the current values of all nodes and edges in the simulated process.

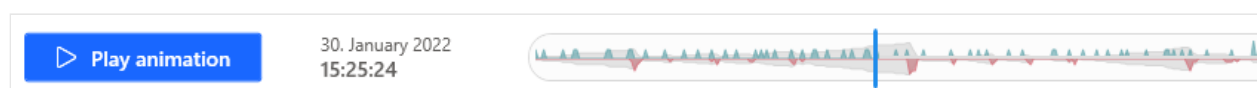
To learn more, go to [Display the significance of values](#).

6. **Hide inactive connections:** Turn **On** or **Off** to show or hide the connections that aren't currently active. Hiding inactive connections makes the animation less cluttered.

## Use the playback control

The animation playback control is located in the bottom part of the screen. Use it to start the animation, pause it, or skip to any position in the process.

The information about the actual time in the process appears to the right of **Play animation**.



1. To play the animation, select **Play animation**. As the automation plays, the node numbers and edge colors on your process simulation change. To learn more, go to

## Functions of animation elements.

When you select **Play animation**, the button turns into **Pause automation**.

2. To temporarily stop the automation from playing, select **Pause automation**.



# Understand process animation controls

Article • 07/18/2023

This article explains the meaning of the various changes (colors, numbers, and more) in the controls for your process during animation play.

## Display the significance of values

The **Show significance values** options set the mode with the color highlighting of edges and nodes in the animation.

- **Setting for all nodes and edges:** Select **Global** to highlight the current value in color in chart edges and nodes compared to all values of all nodes and edges in the entire simulated process. This means that the thickest edge or the most highlighted node represents the global maximum for the whole duration of the process.
  - A node is highlighted if the number of currently incoming events is significant compared to the global maximum of all events ongoing at the same time or in the aggregated interval in one node.
  - An edge is highlighted if the number of its currently ongoing transitions is significant compared to the global maximum of all transitions ongoing at the same time or in the aggregated interval in one edge.
- **Setting for current nodes and edges:** Select **Locally** to highlight the current value in color in chart edges and nodes compared to the current values of all nodes and edges in the simulated process. Thus, the thickest edge or the most highlighted node represents the local maximum for the present moment.
  - A node is highlighted if the number of currently incoming events is significant compared to the current maximum of events ongoing at the same time or in the aggregated interval in one node.
  - An edge is highlighted if the number of its currently ongoing transitions is significant compared to the current maximum of transitions ongoing at the same time or in the aggregated interval in one edge.

## Understand number and color highlight of a node

The number at the chart node represents how many events of the given activity are currently in progress. The color highlight makes it possible to easily distinguish how many events are dealing with the activity at the moment. During the animation, you can easily see which activities often take place in parallel.



To learn more about color highlighting, go to [Display the significance of values](#) in this topic.

## Understand number and color highlight of the edge

The number at the chart edge represents how many transitions between activities are currently in progress. This tells you how many pending cases are waiting for the next event to take place. The color highlight of the edge allows you to easily identify if there are too many cases concurrently waiting for an activity to take place.



To learn more about color highlighting, go to [Display the significance of values](#) in this topic.

## Activity Progress

The following example shows the highlighted progress indicator for an activity in the process. This indicates the proportion of the count of already performed events of the activity compared to the total count of events of this activity in the process. If all events of the given activity being present in the process in question have already been played back in the animation, the indicator will fill the entire circle.



## Related information

[Process animation](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) [↗](#)

# Statistics overview

Article • 07/18/2023

This article provides an overview of the properties of the process undergoing analysis. This includes the information about the process through summary charts and statistics. Statistics are shown in the top panel. The listings of specific records displayed in the statistics appear in the bottom panel.

The statistics always reflect the data after filters, if any, have been applied.

## Types of statistics

To open the statistics screen, select **Statistics** on the left panel in the opened view. The following types of statistics are available:

- **Case overview:** Statistics per single cases with case level metrics. To learn more, go to [Case overview statistics](#).
- **Activity statistics:** Activities that display their various event level properties. To learn more, go to [Activities \(event-level\) statistics](#).
  - Attributes imported with the process marked as **Others** and **Source** have the same statistical summary as the statistics for the activity.
- **Edge statistics:** Process paths (edges) metrics. To learn more, go to [Edge statistics](#).
- **Cases duration influence:** Analytical insight that evaluates the influence of case-level attributes (including financial) on the mean case duration. To learn more, go to [Case duration influence](#) in this article.
- **Business rules:** Overview of defined business rules. To learn more, go to [Business rules overview](#).

## Export statistics

You can export your statistics chart in .png format, or your table of records in .csv format.

To export, select an option in the **Export** dropdown menu.

## Statistics samples

Statistics allow you to quickly identify issues in the process. The following sections provide examples.

## Average resource activity time

Show the average activity time of resources. As in the following screenshot, it's apparent that some resources need much longer time to complete their activities than others. You can narrow your list of resources to get more data.

To choose specific resources:

1. In the **Category** dropdown menu, select **activityName**.
2. Select **Enable filter**.
3. In the **Filtered by** dropdown menu, select **Associate**.
4. Open the **Attribute value** list by selecting the blank **values** field.
5. Select the associates names. The names are added to the **values** field.
6. Select **Apply**.

activityName	Case frequency ↑	Case frequency (%)	Event frequency	Event frequency (%)
Request replacement for missing or broken part	10	5.05%	10	0.61%
Order in parts	29	14.65%	30	1.82%
Collect payment	73	36.87%	73	4.44%
Help load or handoff bicycle	73	36.87%	73	4.44%

## Cases duration

Show the number of cases with varying duration intervals. If the chart shows that there are rare cases in the data that distort the average values, such cases might require attention, or possibly should be excluded from process analysis as non-standard.

To select case duration:

1. In the **Category** dropdown menu, select **Case overview**.
2. In the **Active cases** dropdown menu, select **Cases duration**.

Case	Event count	Start ↑	End	Duration	Case active time	Case waiting time	Utilization	Self-loop (%)	Loop (%)	Rework (%)
742	9	1/21/2022 11:29:00 PM	1/31/2022 12:01:00 PM	228h 32m	178h 32m	50h	78.12%	0.00%	0.00%	0.00%
743	5	1/22/2022 5:50:00 AM	1/24/2022 11:36:00 AM	53h 46m	53h 46m	0ms	100.00%	0.00%	0.00%	0.00%
744	8	1/22/2022 5:04:00 PM	1/24/2022 12:32:00 PM	43h 28m	43h 28m	0ms	100.00%	0.00%	0.00%	0.00%
746	9	1/22/2022 11:45:00 PM	1/24/2022 1:51:00 PM	38h 6m	38h 6m	0ms	100.00%	0.00%	0.00%	0.00%

## Filtering in statistics charts

You can filter selected values in the summary charts in the statistics of process instances and in the statistics of attributes by selecting each column. When you make a selection, the Filtering screen opens with the preset values of the filter.

Category  
**Filtering**

**Filters criteria set**

Case

Attributes

**Attributes**

Filter result: Includes

cases in which attribute: Delivery method

holds any of the values: In-store pickup, Standard shipping (2)

**List** Expression

Search in attribute values

- Attribute value
- In-store pickup
- Standard shipping

Changes are not applied. Do you want to apply changes?

## Sort in the statistics grid

You can sort the statistics grid by selecting the up or down arrow in the header of a column where sorting is available. This will change ascending and descending sorting order.

## Case duration influence

Case duration influence is a complex analytical insight that evaluates the influence of case-level attributes (including financial) on the mean case duration. The Power Automate Process Mining desktop app takes all case-level attribute values and, based on the mean duration of the cases having the specific case-level attribute value weighted by the volume of cases having this value, calculates the percentile influence of cases having this value on the overall mean case duration.

For example, if the Article is Software Licenses, the mean duration is longer than for article Hardware, but the influence on the overall case duration is not so strong. This is because the case frequency is much smaller for Software Licenses than it is for Hardware.

A positive percentage number in red means that the corresponding attribute value is slowing the process. A negative percentage number in green is making the process faster. Its influence on the mean duration is represented by the percentage value.

To access the case duration influence, select **Case duration influence** statistics from the selection control in the top left corner.

# Gather case overview statistics

Article • 07/18/2023

Case overview statistics provide information for case-level metrics. They also contain a table of cases in the actual view with standard and custom case-level metrics, including generated case cost metrics, which are based on the financial attributes in the process.

## Statistical charts

The metrics in the following table are available in the chart.

Metric	Description
New events	Number of started events for the duration of the process.
Active events over time	Number of active events for the duration of the process.
Cases over time	Number of new cases.
Active cases	Number of active cases for the duration of the process.
Variants	Distribution of cases per process variant. To learn more, go to <a href="#">Variants overview</a> .
Events per case	Number of events recorded in the process instance data. The statistics value reflects the number of lines in the log per case.
Cases duration	Occurrence of cases with varying duration. The total spread of case duration is divided into intervals of equal size (the X-axis on the chart). The chart displays the quantity of cases whose duration falls in these intervals.
Case utilization	Efficiency of cases can be used as an indicator of the time spent performing an activity relative to the time between performing activities in the case. If the value is 100%, all time of the case is used for the performance of activities.  This chart is available if there are two timestamps recorded in the data and imported with the process.
Mean active time	This chart is available if there are two timestamps recorded in the data and imported with the process. The average duration of the activity shows the average amount of time spent on activities in each process instance. The total spread of activity times in cases is divided into intervals of equal size (the X-axis on the chart). The chart displays the quantity of cases whose activity time falls in these intervals.



<b>Metric</b>	<b>Description</b>
Mean waiting time	Average waiting time indicates the average amount of time spent between the performance of activities in each process instance. The total spread of waiting times in cases is divided into intervals of equal size (the X-axis on the chart). The chart displays the number of cases whose waiting time falls in these intervals.
Self-loop count	Distribution of cases per self-loops within the case.
Loop count	Distribution of cases per loops within the case.
Rework count	Distribution of cases per rework (loops and self-loops together) within the case.

Besides these standard statistics, the list contains all defined Case level custom metrics with continuous output data type and Case(cost) metrics, which are automatically generated by the Power Automate Process Mining desktop app for each finance attribute.

## Summary header and table of cases

The summary provides an overview of standard metrics provided by the Process Mining desktop app. The list of these metrics isn't configurable and no additional metrics can be included in this summary row. The table of cases contains standard metrics, generated case cost metrics, and custom metrics applicable on the case level.

The metrics in the following table are available in the summary header.

<b>Metric</b>	<b>Description</b>
Event Count, Case count	Total number of events and cases in actual view.
Activities	Number of unique activities in the actual view. The activity attribute is defined in process import/configuration. This metric is not affected by the selection of the mining attribute on the process map.
Resources	Number of unique resources in the actual view. Resource attribute is defined in process import/configuration. In the case of multiple resource attributes, the first one (according to the order of process attributes) is used.
Variant count	Number of variants generated by process activity. Selection of mining attribute or variant mining attribute (on Variants screen) does not affect this metric.
Median case duration,	Median and average case duration.

<b>Metric</b>	<b>Description</b>
mean case duration	
Mean active time	Average duration of all events in one case calculated over all cases. This metric is calculated only for event logs with defined event duration (event has start and end timestamps or start timestamp and event duration). For one timestamp, the event logs duration of events isn't known and the Process Mining desktop app isn't able to calculate active time. In such an event log, active time for all cases is zero.
Mean waiting time	Average waiting time is calculated as the time difference between the end of the previous activity and the start of the current activity. In the event log, without event duration, the all-time difference between the start of two events is considered as waiting time.
Mean utilization	Average utilization of cases. Utilization is calculated as the ratio between case duration and duration of case events. This metric is calculated only for event logs with defined event duration. In processes without event duration, utilization per case and thus mean utilization for all cases is zero.
Start, end	Date of the start of the earliest case and date of the end of the latest case in the actual view.
Self-loop cases	Percentage of cases that involve particular amounts of self-loops relative to the total number of cases in the process.
Loop cases	Percentage of cases that involve particular amounts of loops relative to the total number of cases in the process.
Rework cases	Percentage of cases that involve particular amounts of reworks relative to the total number of cases in the process.

## Case cost

The value represents the case cost of the financial attribute that is present in the brackets. Whenever one or more financial attributes are specified during the import process, they automatically become available in the statistics table both as additional columns in the table and as parameters available for the chart.

## Case information export

Case information can be exported from the **Case overview**.

1. In the open view, select **Export** on the left panel.

2. In the **Export type** dropdown menu, select **Cases**.
3. Verify that the **Export as** selection is **CSV** and the **Delimiter** field is a comma.
4. Select statistics to be exported.
5. Select **Export**.

Category

## Export

Apply filters:

Export type:

Cases ▼

Export as:

CSV ▼

Export as ZIP:

Delimiter:

,

Statistics to export:

- Event count
- Start
- End
- Duration
- Case active time
- Case waiting time
- Utilization
- Loop (%)
- Rework (%)
- Self-loop (%)
- caseld

Export

## See also

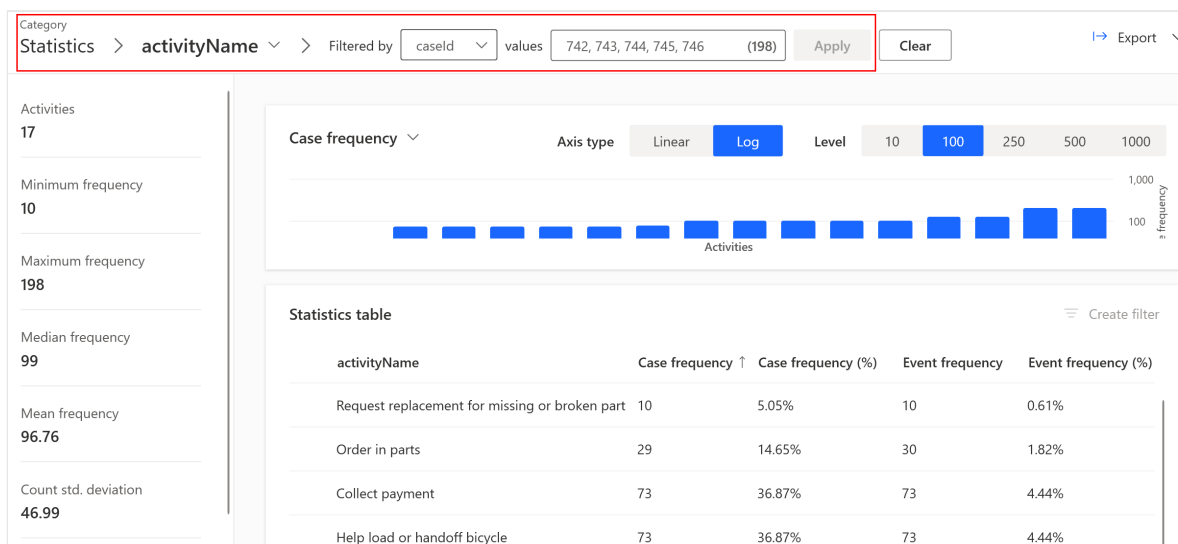
[Statistics overview](#)

# Customize activities (event-level) statistics

Article • 07/18/2023

The Power Automate Process Mining desktop app provides statistics at the level of activities, or events, in both chart and table form. You can customize many aspects of the chart and the tabular data.

1. On the left panel in the **Processes** screen, select **Statistics**.
2. In the **Category** group, select the attribute from the dropdown menu. In the following screenshot, the selected attribute is **activityName**.
3. Select **Enable filter**.
4. In the **Filtered by** dropdown menu, select the filter data. In the following screenshot, the filtered data is **caseid**.
5. Select the empty **values** field.
6. Select all values by hovering over the area to the left of **Attribute value** and selecting the circle.
7. Select **Apply**,



## Statistical chart and table of activities

The metrics in the following table are in the chart and the table of activities.

<b>Metric</b>	<b>Description</b>
Case frequency	Number of cases in which an activity occurs
Case frequency (%)	Percentage of cases in which an activity occurs relative to all cases in the process
Event frequency	Number of times an activity occurs in the process
Event frequency (%)	Percentage of occurrences of an activity relative to all activities in the process
Maximum repetitions	Largest number of activity repetitions in process instances
Total duration	Total duration of each activity in the process; available only if two timestamps are recorded in the data and imported with the process
Total duration (%)	Percentage of the total duration of each activity relative to the total duration of all cases in the process; available only if two timestamps are recorded in the data and imported with the process
Mean duration	Average duration of each activity in the process; available only if two timestamps are recorded in the data and imported with the process
Mean duration (%)	Percentage of each activity's average duration relative to the average duration of all cases in the process; available only if two timestamps are recorded in the data and imported with the process
Minimum duration	Shortest duration of each activity in the process; available only if two timestamps are recorded in the data and imported with the process
Maximum duration	Longest duration of each activity in the process; available only if two timestamps are recorded in the data and imported with the process
Duration range	Difference between the longest and shortest duration of each activity in the process; available only if two timestamps are recorded in the data and imported with the process
Duration standard deviation	Standard deviation of each activity in the process; available only if two timestamps are recorded in the data and imported with the process
Self-loop count	Number of self-loops on an activity
Self-loop (%)	Percentage of self-loops on an activity relative to the total occurrence of that activity in the process
Loop count	Number of times an activity is involved in a loop
Loop (%)	Percentage of involvements of an activity in a loop relative to the total occurrence of that activity in the process

<b>Metric</b>	<b>Description</b>
Rework count	Number of times an activity involved in <a href="#">rework</a>
Rework (%)	Percentage of involvements of an activity in rework relative to the total occurrence of that activity in the process
Loop inflow	Value of loop inflow of an activity in the process
Loop inflow (%)	Percentage of loop inflow of an activity relative to the total occurrence of that activity in the process
Loop outflow	Value of loop outflow of an activity in the process
Loop outflow (%)	Percentage of loop outflow of an activity relative to the total occurrence of that activity in the process
Net loop gain	Value of net loop gain of an activity in the process
Net loop gain (%)	Percentage of net loop gain of an activity relative to the total occurrence of that activity in the process

Along with these standard statistics, the chart displays all event-level custom metrics that have the continuous output data type.

The table of activities displays event-level standard and custom metrics. In the table, all event-level custom metrics are available, whether their output data type is discrete or continuous.

## Metrics in the summary row

The metrics in the following table are in the summary row.

<b>Metric</b>	<b>Description</b>
Activities (value)	Total number of unique values for activities or event-level attributes The Activity attribute is defined during process import and configuration and isn't affected by the selection of mining attribute on the process map.
Minimum frequency	Smallest number of occurrences of a given activity (attribute value) in a single case
Maximum frequency	Largest number of occurrences of a given activity (attribute value) in a single case
Median frequency	Median number of occurrences of a given activity (attribute value) in a single case

<b>Metric</b>	<b>Description</b>
Mean frequency	Mean number of occurrences of a given activity (attribute value) in a single case
Count std. deviation	Standard deviation of activity (attribute value) occurrences in a view
Minimum duration and maximum duration	Global minimum and maximum duration of a single event
Mean duration	Average duration of events
Duration standard deviation	Standard deviation of activity (attribute value) durations in a view
Self-loop events	Percentage of events in self-loops relative to the total number of events in the view
Loop events	Percentage of events in loops relative to the total number of events in the view
Rework events	Percentage of events in rework relative to the total number of events in the view

## See also

[Statistics overview](#)



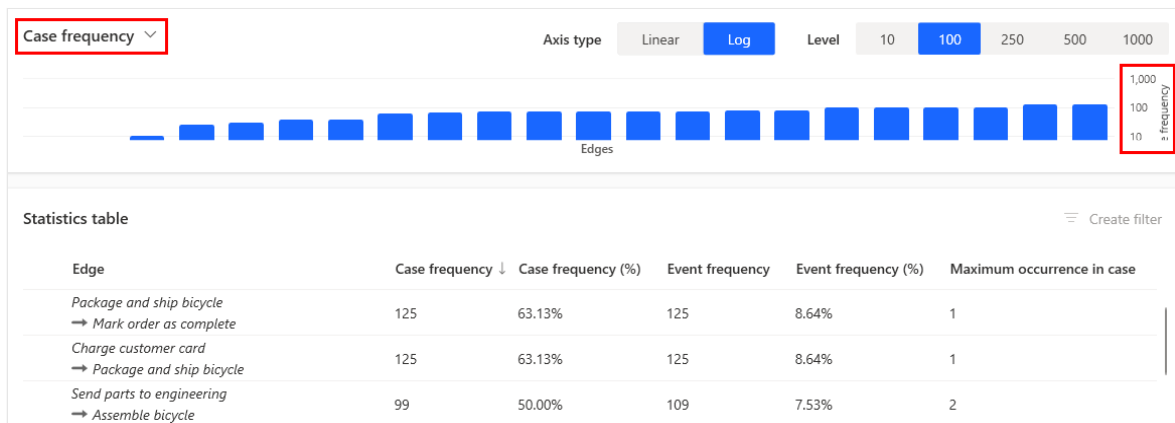
# Review edge statistics

Article • 07/18/2023

These statistics refer to edges in the process undergoing analysis and display their various properties. Edge statistics can be reviewed from the perspective of activities (process map-related edges) as well as from the viewpoint of resources (social chart-related edges).

To review edge statistics:

1. On the left panel in the opened view, select **Statistics**.
2. In the **Category** dropdown menu, select **Edge statistics**.
3. Select the metric for your chart in the dropdown menu in the chart.



## Statistical chart

The metrics in the following table are available in the chart.

Metric	Description
Case frequency	Total number of cases containing a particular edge in the process.
Case frequency (%)	Percentage of cases containing a particular edge in the process relative to all cases in the process.
Event frequency	Total number of each edge occurrence in the process.
Event frequency (%)	Percentage of each edge occurrence in the process relative to all edges.
Maximum occurrence in case	Largest number of edge repetitions in process instances.
Total duration	Total duration of each edge in the process.

<b>Metric</b>	<b>Description</b>
Total duration (%)	Percentage of the total duration of each edge in the process relative to the total duration for all cases in the process.
Mean duration	Average duration of each edge in the process.
Mean duration (%)	Average duration of each edge in the process relative to the average duration for all cases in the process.
Minimum duration	Shortest duration of each edge in the process.
Maximum duration	Longest duration of each edge in the process.
Duration range	Difference between the longest and shortest duration of the occurrence of each edge for each edge in the process.
Duration std. dev.	Standard deviation of each edge duration in the process.
Self-loop count	Number of occurrences of self-loop edges.
Self-loop (%)	Percentage of occurrences of self-loop edges relative to their total occurrences in the process. To learn more, go to <a href="#">Rework metrics</a> .
Loop count	Number of occurrences of edges in loops.
Loop (%)	Percentage of occurrences of edges in loops relative to their total occurrences in the process.
Loop inflow	Value of the loop inflow of edges in the process.
Loop inflow (%)	Percentage of loop inflow of edges relative to their total occurrences in the process.
Loop outflow	Value of loop outflow of edges in the process.
Loop outflow (%)	Percentage of loop outflow of edges relative to their total occurrences in the process.

Besides these standard statistics, the list contains all defined edge-level custom metrics with the continuous output data type.

## Summary header and table of edges

The summary provides an overview of standard metrics provided by Power Automate Process Mining. The list of these metrics isn't configurable and no additional metrics can be included in this summary row. The table of edges contains standard edge-level metrics, and custom metrics applicable on edge-level. In the table, all mentioned custom metrics are available regardless of their discrete or continuous output data type.

Edges	Minimum frequency	Maximum frequency	Median frequency	Mean frequency	Count std. deviation	Minimum duration	Maximum duration	Mean duration	Duration std. deviation	Self-loop events	Loop events	Rework events
33	1	5330	553	1650.03	2117.25	0ms	32d 22h 3m 12s	3h 28m 55s 879ms	19h 7m 53s 944ms	0.00%	0.55%	0.55%
EDGE	LOOP OUTFLOW	LOOP OUTFLOW (%)	TOTALDIFFERENCE	SUBSTRING	SIMPLE-DUR	MIN-START	AVG-DUR	AVG-CASE-DURATION				
Status change to Being Approved → Check order numbers	0	0.00%	0.00	est	True	18-Feb-15 14:38:12	97ms	2d 8h 32m 17s 916ms				
Process start → Status change to Being Approved	0	0.00%	0.00	est	False	18-Feb-15 14:38:12	0ms	2d 8h 32m 17s 916ms				
Start → Process start	0	0.00%	0.00	est	True	18-Feb-15 14:38:03	145ms	2d 8h 32m 17s 916ms				
Compare of sums → Check cost center	0	0.00%	0.00	est	True	18-Feb-15 14:38:13	118ms	2d 7h 10s 188ms				

The metrics in the following table are available in the summary header.

Metric	Description
Edges	Total number of unique edges in the view.
Minimum frequency	Minimal number of occurrences of an edge in a single case.
Maximum frequency	Maximum number of occurrences of an edge in a single case.
Median frequency	Median number of occurrences of an edge in a single case.
Mean frequency	Mean number of occurrences of an edge in a single case.
Count std. deviation	Standard deviation of edge occurrences in a view.
Minimum duration, maximum duration	The global minimum and maximum duration of a single edge.
Mean duration	The average duration of edges.
Duration std. deviation	The standard deviation of edges durations in a view.
Self-loop events	Shows the percentage of self-loop edges relative to the total number of edges in the view. A self-loop edge is an edge with the same starting and ending node (activity).
Loop events	Shows the percentage of edges in loops relative to the total number of edges in the view. An edge is in the loop if its ending node (activity) is repeated within a case.
Rework events	Shows the percentage of edges in rework relative to the total number of edges in the view. Rework edge is edge either in a loop or in a self-loop.

## See also

[Statistics overview](#)

# Root cause analysis overview

Article • 04/03/2023

Root cause analysis (RCA) allows you to find hidden connections in your data. For example, it helps you understand why some cases take longer to complete than others, or why some cases get stuck in reworks while others run smoothly. RCA will show you the key differences between such cases.

## Required data

RCA can use all your case level attributes, metrics and custom metrics to find connections among them, and a metric of your choosing.

The best sample is to include all data you can as a case level attribute and let RCA do the choosing of which attribute actually influences the metric and which doesn't.

## How RCA works

The RCA algorithm will compute a tree structure where each node will split the dataset into two smaller parts. This is based on one variable where it finds the best correlation between the variable split and the target metric. From this, you can see the hidden connections in the data. This is where it will tell you which combination of attributes will influence the case in which way.

## How RCA finds the best split

First, we generate hundreds to thousands of combinations of possible splits. Then we try each split to discover how well will it actually split the dataset into two parts. We calculate the variance of the main metric in each part of the split and calculate the score for each split with the following calculation:

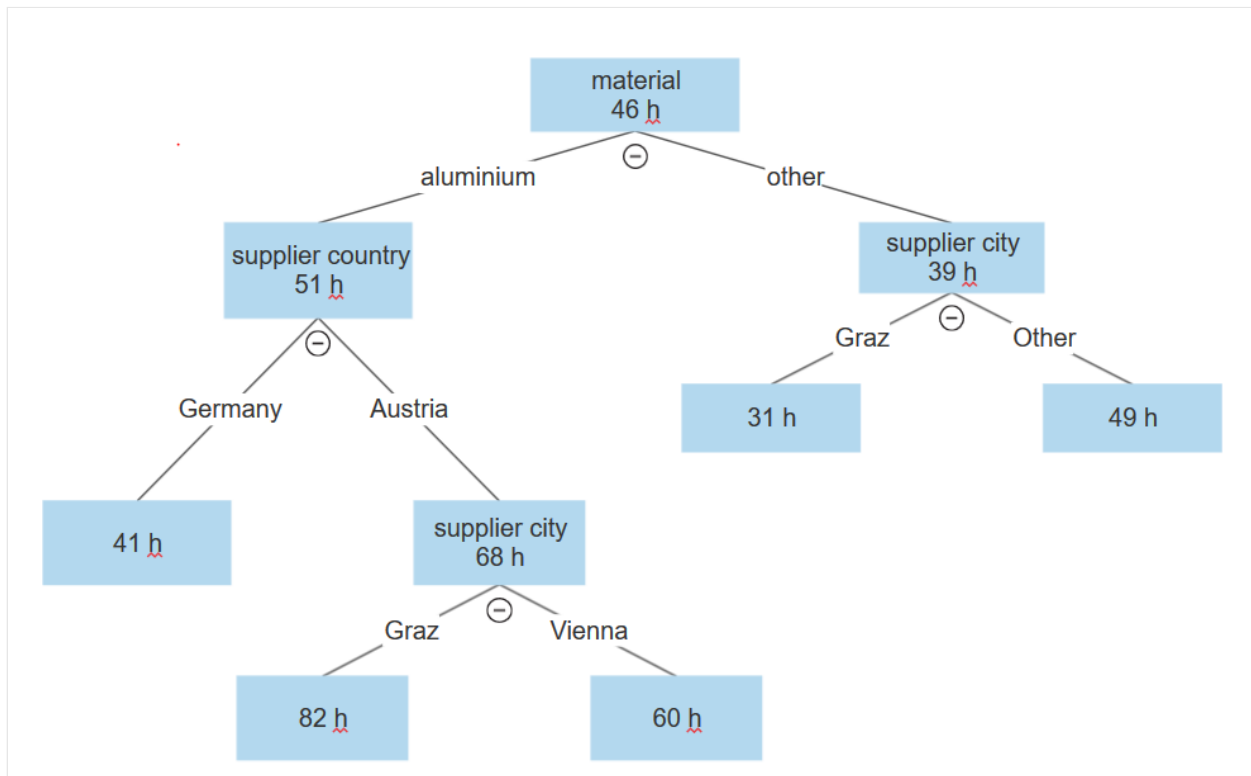
$$\text{score}_{\text{split}_x} = \text{variance}_{\text{left}} * \text{number of cases}_{\text{left}} + \text{variance}_{\text{right}} * \text{number of cases}_{\text{right}}$$

Then, we sort all splits by this score and the best splits are taken from the beginning, with the lowest score. For the categorical main metric (string), we calculate Gini impurity instead of variance.

## RCA example

In this example, we want to see the root cause behind the case duration. In the data, we have case level attributes *supplier country*, *supplier city*, *material*, *total amount*, and *cost center*. The average case duration is 46 hours.

By looking at each value of each attribute separately, we can see that the highest influencer of case duration is when *supplier city* is *Graz*, which on average increases the duration of the case by additional 15 hours. From this initial analysis, we can see that the other values of attributes influence the target metric far less. However, when we compute the tree model, we can see that the computation above is misleading (as in the following screenshot).



The tree structure looks like this:

- The first split is the data along the **material** variable. The data with **aluminium** is on one side and all **other** materials is on the other side.
- The **aluminium** branch is split further by **supplier country** into **Germany** and **Austria**.
- The **Austria** branch continues with a split by **supplier city**, with **Graz** on one side and **Vienna** on the other.
- In the node **Graz**, the average case was 36 hours slower than the overall average duration of 46 hours.

In the same tree, we can see that if we have another material than aluminium, it also splits by the variable **supplier city**, where on one side is **Graz** and on the other is Vienna,

Munich or Frankfurt. But here, the values are the opposite. **Graz** has much better statistics than Vienna or any German city, with average case in Graz being 15 hours faster than the overall average for all cases.

From this, we can see that the initial statistics are misleading because Graz is performing poorly when the material is aluminium, It is, however, performing above average when the material is other than aluminium and is completely opposite for other cities.

**Case Duration Influence** statistics takes into account only one value and sometimes can be misleading. RCA takes into account combinations of them to give you more insights into your process.

# Find hidden connections

Article • 07/18/2023

Find hidden connections in your data with root cause analysis (RCA) in the Power Automate Process Mining desktop app.

To create a new RCA, create an analysis.

1. In the open view, select **Root cause analysis** on the left panel.
2. In the **Metric** dropdown menu, select a metric.
3. On the **Influenced by** panel, select which attributes you think are important for that metric.

If you're not sure which attributes should be influencing your metric, choose all of them and the algorithm will find the best one. To select all attributes, select the circle to the left of the **Metric name** heading.

4. Select **Analyze**. The **Analysis** tab opens.

If you choose a main metric, you can't choose the same metric in **Influenced by**. Also, don't choose similar metrics in **Influenced by** as the main metric, as the algorithm will choose those metrics on every split. For example, if your main metric is **Case duration**, don't select **Case Active Time** in the **Influenced by** section, as this will provide you no new information.

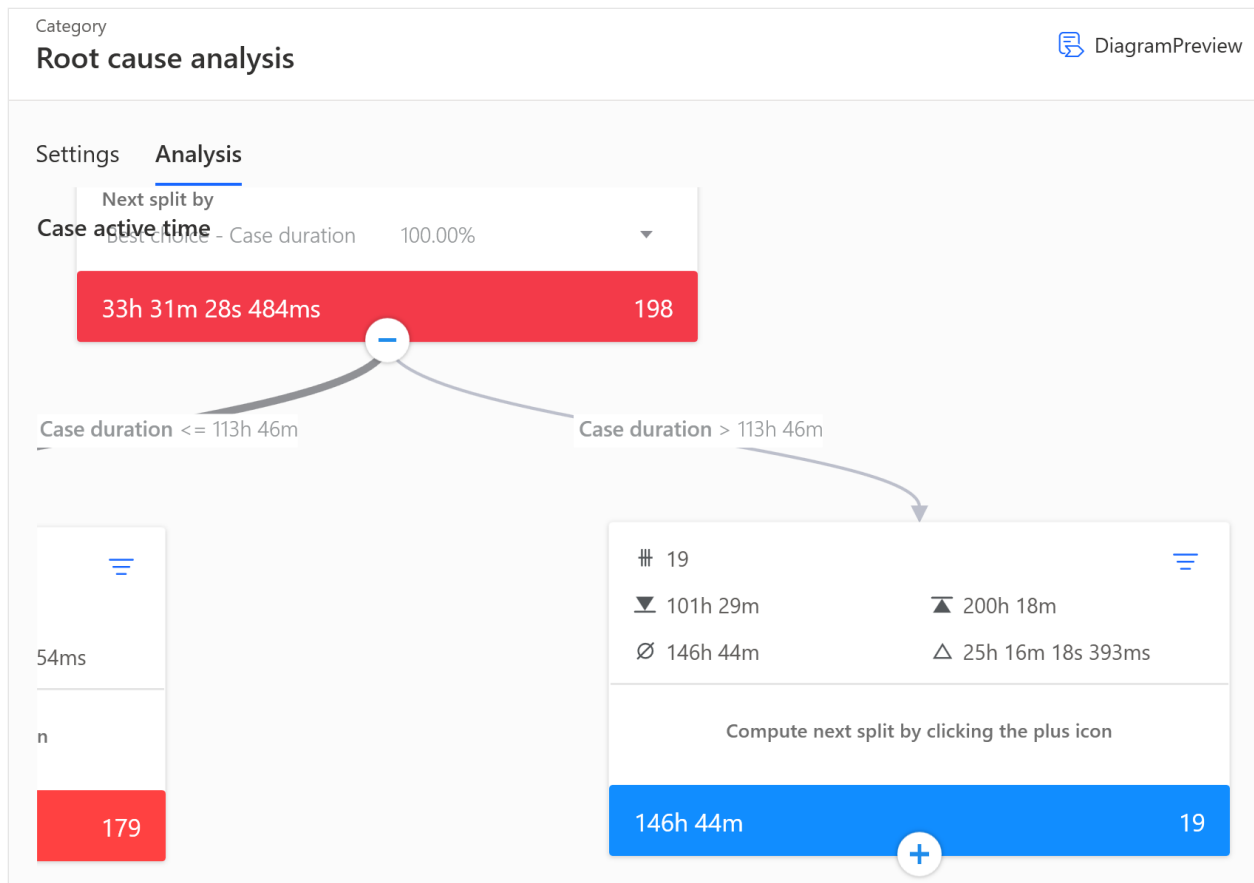
## Change options in the Analysis tab

You can customize the view to your preferences.

## See more or less information in a node

Nodes are connected by arches (rules). Each node is a collection of data filtered by the rules in the arches connecting it to the root node.

To expand or collapse a node, select the plus or minus sign. The expanded view allows you to see more information about that part of the data.



## Choose another split

If the split that is chosen as the best one by the algorithm is on an attribute which you don't want to use at that point, you can choose another split from the list. In the list, there is a best split for each selected attribute in the analysis.

To open the available splits you can choose from, select the down arrow in the node heading.

## Change the view size

If the tree is too large and can't be navigated easily, you can open the **Diagram preview** to navigate around the tree. You can also change the layout as you wish.





DiagramPreview



Legend



Layout type



Export



## Diagram preview



Zoom

60 %

### ! Note

When you find the correct part of dataset that you need to explore further, you can convert the rules that lead up to that node into a set of filters.

If you do this, the original analysis becomes view only, as the underlying data has changed (filters applied).

## Use categorical main metric

If you want to explore why some cases have gone one way or another, it's easy to analyze this with RCA using a custom metric returning string values.

For example, if you want to analyze why some cases end in some activities and others in different ones, you can use the formula `LAST(CaseEvents, Activity)` as your custom metric.

For other use cases, you might want to explore why cases that went through an activity X are then going to one of direct descendants of activity X. For this, you can use custom metric `FIRSTIF(CaseEvents, Activity == "Process start", NEXT(Activity))`. This metric returns the name of the activity after activity "Process start". If a case goes through this

activity multiple times, it will only take into account the first pass. If you want the last one, you can use `LASTIF` instead of `FIRSTIF`.

The same can be achieved with `FIRSTIF(CaseEvents, Activity == "Check order numbers", MOVE(1, Activity))`, where you can specify the number of events that it has to move down the case.

For other similar use cases, you can use custom metrics to get event attributes on a case level so it can be used in RCA. To do this, get the value of an event attribute Y at an activity X. This is done by using custom metric `FIRSTIF(CaseEvents, Activity=="X", Y)`.

All of these metrics, can be also used in **Influenced by**.

To learn more about custom metrics, go to [List of other operations](#).

## See also

[Root cause analysis overview](#)

# Analyze processes with variants

Article • 07/18/2023

With process variants, you can accurately explore all possibilities of how a process can develop and identify problematic scenarios (for example, a transition variant with an unusually high number of events). The quantity of variants makes it possible to accurately identify the most frequent scenarios occurring in the process. This way, you can easily and quickly determine which process scenarios require your attention.

The careful examination of process variants can help you uncover various scenarios and situations that occur in the process. With filtering by variants, the analyzed process can be easily restricted to only those parts or scenarios that are of interest for achieving the final objective of the analysis. A process variant is an organized sequence of activities that corresponds to the course of at least one case in the process under analysis. All cases in the process in which the same activities are performed in the same sequence fall under one variant.

The decisive condition for determining the respective variant and the arrangement of events is the **event start** time.

## Variant mining attribute

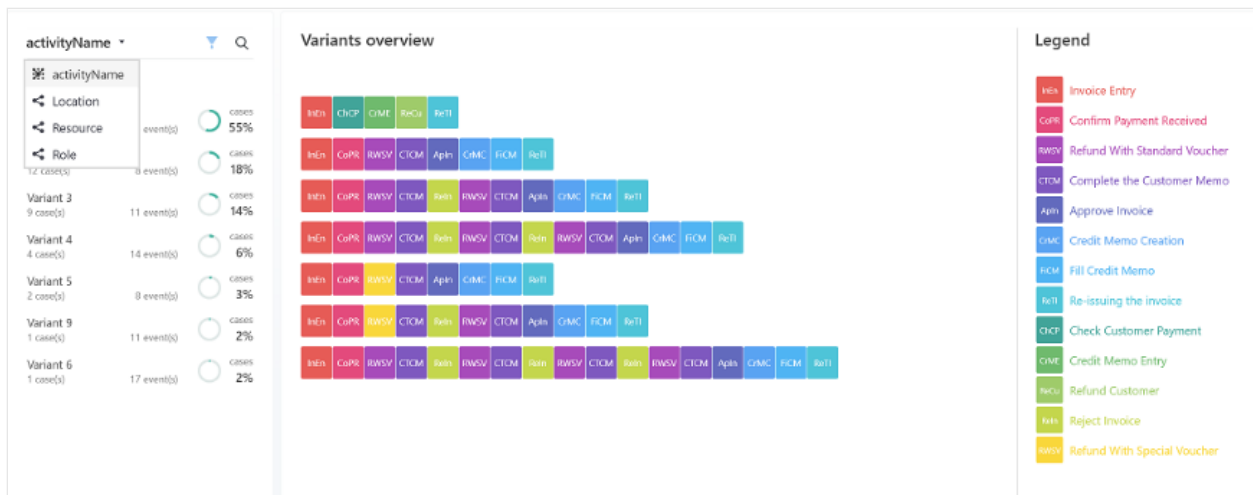
Similar to a process map, which is by default generated using activities but can be switched to a resource viewpoint (similar to a social chart in the process map), the list of variants is generated using the selected mining attribute. In the same way, the variants overview can be generated using different relevant event log attributes (for example, department, plant, or region). This selection is independent of the selection of mining attributes on the process map.

## Variant names

Process variants are among the results of process mining. They're labeled by a number that's used consistently on all process analysis screens regardless of any applied filters.

## Components of the Variants screen

To open the **Variants** screen, go to the open view and select **Variants** on the left menu.



The default screen contains three panels:

- [Attribute](#)
- [Variant overview](#)
- [Legend](#)

## Attribute panel

In the first panel next to the menu, you'll see a list of process variants. This is sorted by the count of occurrences of cases under the variant by default.

Select (...) to sort the list of variants by **Event count** or **Performance**. You might also see a **Finance** option. This is available only when there is a finance attribute in the process. Performance and finance sorting criteria contain a list of available sub-criteria, which enables further options for sorting.

Sorting by **Case Count** displays a total number of cases for a variant in a single case. Select the up or down arrow next to the sorting criteria name to change the sort order (ascending or descending).

Variants		
Attribute: <b>activityName</b> ▾		
<div style="border: 1px solid red; padding: 2px;"> <b>Case Count</b> ↓ <b>Performance</b> ... <b>Cases %</b> </div>		
Variant 1 62 case(s)	975h 36m	31%

## Variants overview panel (variant DNA)

All cases for the selected variant appear in the center panel. This is also where you can see variant DNA.

The variant DNA view allows you to:

- Get a visual overview of all the process variants found in the current open process view
- Get a glimpse of process characteristics and variations of the process
- Get a glimpse of process standardization level
- Identify differences or repeated patterns
- Identify similarities of variations

To display Variant DNA:

1. Make sure that no variant is selected in the list.
2. Select any of the available variants by selecting it in the list on the first panel next to the menu.

## Legend panel

Lists the full names of the abbreviations in the **Variants overview** panel.

## Search for case specific data

You can get specific data for a variant. When you select a variant in the left panel **Case Count** column, you'll see three tabs:

The screenshot shows the 'Variants' panel with a table of variants and a search dropdown. The table has columns for 'Case Count', 'Performance', and 'Cases %'. The first row, 'Variant 1', is selected. The search dropdown is set to 'Mean duration'. A notification for 'Confirm order' is visible at the bottom right.

Attribute: activityName	Case Count ↓	Performance	Cases %
Variant 1 62 case(s)	975h 36m	31%	
Variant 2 40 case(s)	906h 46m	20%	

Variant overview | Cases table | Cases gantt

Mean duration

1 Confirm order 12.11h

- [Variant overview](#)

- [Cases table](#)
- [Cases gantt](#)

## Variant overview tab

Get a map of activities on the left, where you can observe the duration of activities and edges of the variant in the **Variant Overview** tab. The statistical indicators of selected variant metrics are present on the right. The graph shows the distribution of cases over time. The blue part represents the overall distribution. The orange part represents the selected variant.

## Cases table tab

Explore each issue individually in the **Case table** tab. In the center panel, there's a list of all cases under the variant sorted by their case ID. Each issue can be explored individually.

To see the details of its development, select a case number in the **Case ID** column. The events of the selected case appear on the right column.

## Cases gantt tab

Development of the case on a timeline in the **Cases gantt** tab. The following information about each case is available:

1. Start and end time for the case
2. Name of the performed activity
3. Visualization of the duration of the activity on the timeline
4. The **parallel** flag means that the activity runs in parallel with another activity.
5. The parallel conduct of the two activities can be clearly seen on the timeline.
6. Waiting time for another activity after the completion of the current activity

When you select the black dot within the time progress of the activity, all information about the activity displays.

## Customize settings

Change the setting in any panel or tab in the **Variants** screen.

1. On the menu at the top-right, select **View Settings**.
2. Choose from **General settings**, **Duration settings**, **Activity label**, and **Calendar settings**.

By default, each activity has its own color. Use the **Activity label** to display the same color for all activities with the same label.

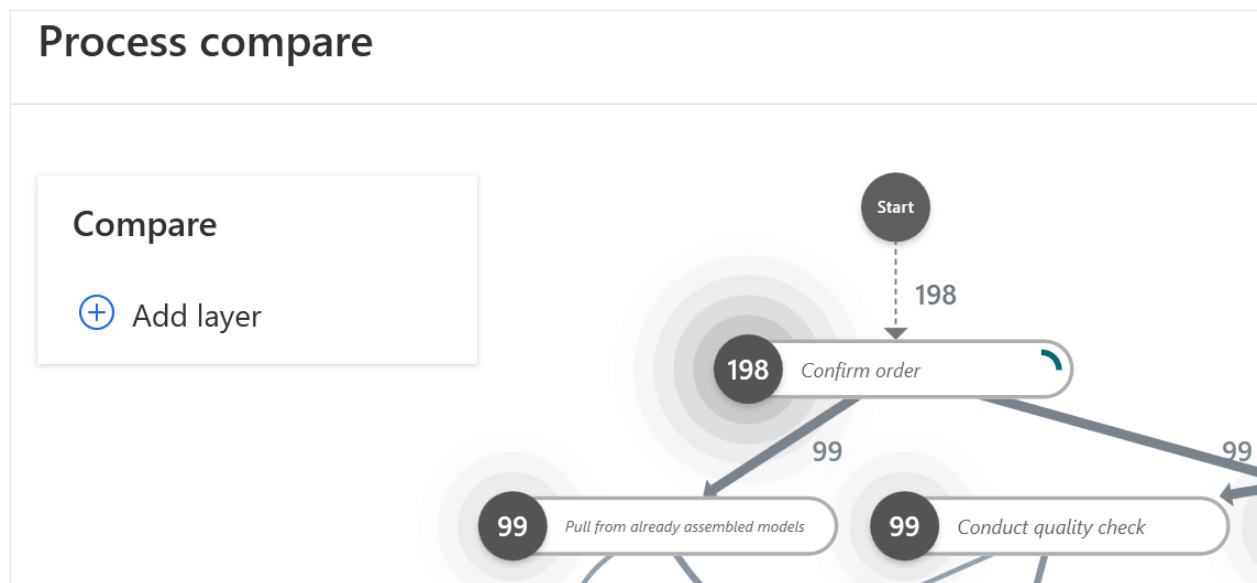
3. Select **Save**.

# Compare process views for compliance

Article • 07/18/2023

Comparison of the processes allows an intuitive and efficient comparison of processes. You can compare the processes at the level of the process map, where the generated visualization allows you to identify the differences in the flow and frequency, or time metrics.

You can also change the complexity of the map, zoom, or nodes offset in the **Customize** and **Visualize** icons on the far right.



You can compare in detail values of metrics and attributes at the level of activities and edges. You can also compare the views of various processes or different views generated from a single process (for example, for different periods of time) by selecting a process in the **Compare** box.

## Add views

A view, from which the functionality was displayed, is the basis for comparison. All added views as layers are constantly compared to the view you're currently working on.

To add a layer:

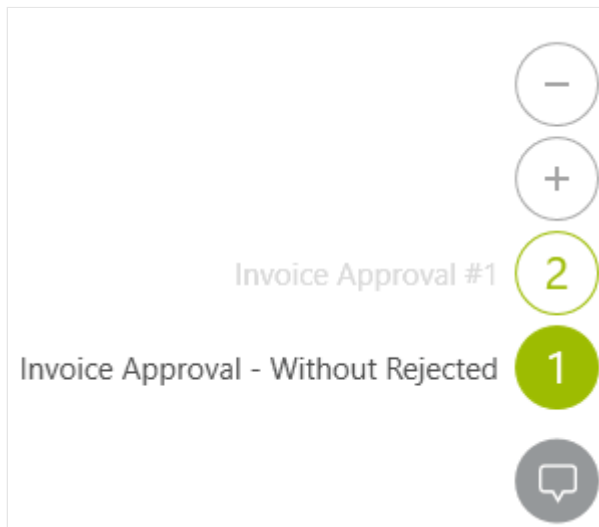
1. On the **Compare** box, select **Add layer**.
2. In the **Views** dropdown menu, select a process.
3. (If your process is in a blueprint format) Select **BPMN** and then select a properly formatted BPMN diagram. The BPMN diagram will be transformed and compared



to the currently open view.

## Changing the view

List of all available layers is shown in the **Compare** box. The individual layers can be switched on and off by checking or unchecking them. The currently open view and the **Compare** layer are switched on by default. Unchecking the currently open view will highlight those activities and transitions which are common in both compared layers. Select (-) to remove the layer from the list.



Each layer/view has an associated color. Activities and edges that form an intersection of the compared layers/views are colored as the **Compare** key.

# Export process data

Article • 07/18/2023

Export process data to an external file. After you choose your export type, you can choose to export data as a CSV, XES, or an MXML file. You can also choose to export as a zip file, and enter the delimiter to use. If you choose to export cases (as opposed to events), you'll see a list of statistics you can choose to export.

## Choose export options

1. On the left menu in the open view, select **Export**.
2. In the **Export as** dropdown menu, select **Events** or **Cases**.
3. If you select **Cases**, also de-select the statistics you don't want to include in your export in the **Statistics to export** list.
4. If you want to export as a zip file, place a check in the **Export as ZIP** checkbox.
5. If you want to use a delimiter other than the default comma, enter it in the **Delimiter** field.
6. Select **Export**.

## Export

Apply filters:

Export type:

Export as:

Export as ZIP:

Delimiter:

## Export option details

The options in the following table are available for your export file.

Option	Description
Apply filters	Specify if set filters in the currently open view should be applied to the process before export. If the filters aren't applied, all records in the process will be exported.
Export type	Select either <b>Cases</b> or <b>Events</b> . When you export events, the entire process log is exported. When you export cases, the selected information about cases without respective individual events is exported.
Export as	Share specific findings in the process, for example when filtering is applied. Data can be imported again by another user who has the resource file (export). The following formats are supported: <b>CSV</b> (comma separated records), <b>XES</b> (Extensible Event Stream), and <b>MXML</b> (Mining eXtensible Markup Language).
Export as ZIP	Compress the exported file into ZIP format. If you select this, select the type of compression to use. Choose from among <b>Optimal</b> , <b>Fastest</b> , or <b>No compression</b> .
Delimiter	Enter a record separator When exporting to the CSV format.

<b>Option</b>	<b>Description</b>
(For exporting cases) Statistics to export	Select which metrics and attributes will be exported with individual cases. The attributes exported with the case must be imported as the case-level attributes.

# Filtering overview

Article • 07/18/2023

Use filters to adjust which cases will be included in the process analysis. For example, you can use filters to define only a certain time period, only specific resources or scenarios in the process, or modify cases by excluding activities that aren't important for the current analytical problem. Filtering can also be helpful in identifying and focusing on the problematic parts of the process.

## Filter components

A filter is a rule or a set of rules determining which cases and/or events from the process will be later included in process mining. There are two groups of filters available in the Power Automate Process Mining desktop app: event level and case level. To learn more about each filter, select the link.

### Event level filters

Event level filters modify cases by removing events based on the applied filter criteria.

Event level filter types:

- [Event attributes](#)
- [Subprocess](#)
- [Event metrics](#)

### Case level filters

Case level filters are always applied to complete cases in the process.

Case level filter types:

- [Timeframe](#)
- [Case attributes](#)
- [Attributes \(conditional\)](#)
- [Edge \(conditional\)](#)
- [Variants](#)
- [Case metrics](#)
- [Sequence](#)

- [End events](#)
- [Conflict of interests](#)

Case and event level filters can be combined to form a single combined filtering criteria in a view. There are filters that have the same syntax, but different semantics based on the type. For example, the **Event attributes** filter can be applied on the event and case level.

The combined filter criteria order is defined as criteria are added. The order is modifiable inside of the filter category by using drag-and-drop. Filters are evaluated in the final defined top-down order. Input for the first filter is the whole data set. Its output—filtered data set—serves as input for the next filter. The output (filtered) data set from the last filter in the order defines the process view.

#### ⓘ Note

Event filters are always applied first, before any case filter is applied to the resulting dataset. You can't mix order between event level and case level filters. Ordering is modifiable only within its group.

Filters can be exported and imported to be re-used in different views or processes. To learn more, go to [Export and import filters](#).

## Add a filter

A filter is a convenient tool in a process analysis, as we can use it to focus only on certain parts of the process in analysis. For example, it can be used to define only a certain time period, only specific resources or scenarios in the process, or modify cases by excluding activities that aren't important for the current analytical problem. It can also be helpful in identifying and focusing on the problematic parts of the process.

To add a filter:

1. In the open view, select **Filter** in the lower-left corner below the menu.
2. On the menu at the top, select the **Add filter** dropdown menu.
3. Select a filter.
4. On the **Filtering** screen, select the options for the filter.
5. If you want to give the filter another name, select (double-click) the filter in the filter list column in the left panel, enter the new name in the **Filter name** field, and

select **Save**.

## 6. Select **Apply**.

The screenshot displays a software interface for configuring filters. At the top, there are buttons for '+ Add filter', 'Remove all filters', and 'Show details'. The main area is titled 'Filtering' and is divided into three sections: 'Filters criteria set', 'Timeframe', and 'Range Expression'. In the 'Filters criteria set' section, the 'Timeframe' filter is selected and enabled. The 'Timeframe' section shows a 'Filter result' dropdown set to 'Includes', with radio button options for 'fit in' (selected), 'finish in', 'start in', 'intersecting', and 'pass through'. Below these are 'in range' date pickers for '1/21/2022 11:29:00 PM' and '4/1/2022 9:58:00 AM AM', along with 'ongoing' and 'started' toggle options. The 'Range Expression' section features a 'Level' selector with values 10, 100, 250, 500, and 1000. A line chart on the right shows data points over time, with a green bar at the bottom indicating the selected range from '1/21/2022 - 4/1/2022'. At the bottom right, there are 'Apply' and 'Discard' buttons.

## Customize your filters

The following table lists common actions that you can use in the filtering screen to customize your filtering experience.

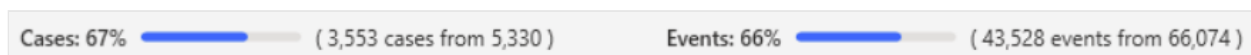
Action	Description
Show details	To see the filter configuration details for all filters, turn on <b>Show details</b> at the top of the screen.
Delete a filter	Select the filter you want to delete and then select <b>X</b> .
Delete all filters in the list	On the menu at the top of the screen, select the <b>Remove all filters</b> .
Disable a filter temporarily	If you don't want to delete a filter completely from the list, but prefer to disable it temporarily, turn off <b>Enable filter</b> next to the selected filter.
Invert a filter	Some filtering rules may be difficult to express. It's often more convenient to define the rule in an inverted form and then to invert the filter. An inverted filter also changes how the filtering results are calculated. Particularly for more

Action	Description
	<p>complex rules and large-scale processes, inverted rules might simplify and speed up the calculation of the filtering results.</p> <p>To invert a filter, use the filter rule by changing the <b>Filter result</b> option (includes/does not include) in the center panel.</p>
Apply filters	After the filters have been configured, select <b>Apply</b> . The new mining of the process will start only after the filters are applied.
Combine filters	Filters are applied in the order in which they are defined in the list of filters. However, event level filters are always evaluated before case level filters. It's possible to change the order in the respective category using drag-and-drop. The final filtering result consists of the cases that fulfill the criteria of all active filters applied in the order.

## Filtering indicators

When analyzing the process by means of filters, you can see the size of the data set you're working with.

Data size indicators provide information about the data set, like the number of filtered events and cases. The indicators are located on the bottom of the application on each screen of an open view.





# Timeframe filter

Article • 07/18/2023

The timeframe filter lets you specify time related options for your analysis. On the left side, you can edit the filter rule. The right side shows the visualization of the course of the process divided into equal time intervals.

1. On the left panel, select your timeframe filter.
2. On the **Level** row, select the detail level of the chart by selecting number.
3. On the center panel, specify you filter results.
4. On the center panel, select the cases to display in the chart (**ongoing**, **started**, and **ended**).

The colors of your selections match the colors in the visual on the right.

5. Select **Apply**.

The screenshot displays the Timeframe filter configuration interface. On the left, the 'Filter result' dropdown is set to 'Includes'. Under 'cases which', the 'fit in' radio button is selected. The 'in range' section shows a start time of '1/21/2022 11:29:00 PM' and an end time of '4/1/2022 9:58:00 AM'. Below this, three checkboxes are visible: 'ongoing' (checked, blue), 'started' (checked, orange), and 'ended' (checked, pink). On the right, the 'Range' tab is active, showing a 'Level' selector with options 10, 100, 250, 500, and 1000. The '100' level is selected. The main visualization is a multi-colored area chart showing data points over time, with a green bar at the bottom indicating the timeframe from '1/21/2022 - 4/1/2022'.

## Evaluation of presence in a timeframe

Specify the evaluation method to determine if a case falls in the specified timeframe.

The following list describes the options:

- **Fit in:** The case must start and finish within the specified timeframe.
- **Finish in:** The case must finish within the specified timeframe and start outside the specified timeframe.
- **Start in:** The case must start within the specified timeframe and finish outside the specified timeframe.
- **Intersecting:** Cases extend to the time frame. They might be contained, start, or finish in it.
- **Pass through:** The case must start before the beginning of the specified timeframe and finish after the end of the specified timeframe.

## Timeframe specification

To specify a timeframe, enter its start and finish time.

1. In the **in range** field, select the calendar icon and select the start date.
2. At the bottom of the calendar, set the start time by selecting the hour, minute, and AM or PM.
3. In the **and** field, select the calendar icon and select the end date.
4. At the bottom of the calendar, set the end time by selecting the hour, minute, and AM or PM.

# Case attributes filter

Article • 07/18/2023

The **Attributes** filter selects cases that contain—or don't contain—a specific attribute.

## Filter values from a list

Use the filter to select cases that include a certain activity or resource.

1. On the left panel, select your attributes filter.
2. In the **Filter result** dropdown menu, select if the cases you select for the filter should or shouldn't be included.
3. In the **cases in which attribute** dropdown menu, select an attribute.
4. In the **holds any of the values** dropdown menu, select one or more values in the **List** tab to the right.
5. Select **Apply**.

<p><b>Attributes</b></p> <p><b>Filter result</b></p> <p>Includes</p> <p><b>cases in which attribute</b></p> <p>activityName</p> <p><b>holds any of the values</b></p> <p>Assemble bicycle (1)</p>	<p><b>List</b> Expression</p> <p>Search in attribute values</p> <p><b>Attribute value</b></p> <p>Assemble bicycle</p> <p>Charge customer card</p> <p>Check inventory for parts</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## Filter values from an expression

Use the filter to select cases that include an expression. You can include both string and numeric attributes in an expression.

1. Follow steps 1 through 3 in [Filter values from a list](#) in this article.
2. On the panel to the right, select **Expression**.
3. In the first dropdown menu, select the operator for your expression.

4. In the field next to the operator, enter the value.

5. Select **Apply**.

## Enter a custom expression

You can switch between a constant value and a custom expression by selecting **Fx** in the **Expression** tab.

To learn how to use a custom expression, go to [Custom metrics overview](#).

### See also

[Custom metrics overview](#)

[Tips and examples](#)

# Case attributes conditional filter

Article • 07/18/2023

The **Attributes (conditional)** filter adds conditions to the **Attribute** filter. Use it, for example, to find all cases where an approval activity occurs, but only if a specific resource executed the approval or the duration of the activity exceeds a certain KPI.

1. On the left panel, select your attributes (conditional) filter.
2. In the **Filter result** dropdown menu, select if the cases you select for the filter should or shouldn't be included.
3. In the **cases in which attribute** dropdown menu, select an attribute.
4. In the **holds any of the values** dropdown menu, select one or more values in the **List** tab to the right.
5. In the **and at the same time** dropdown menu, select a criteria type, either **Attribute**, **Metric**, or **Process Metric**.

If you select **Metric** or **Process Metric**, you'll need to complete additional fields. To learn more, go to [Process metric](#) in this article.

6. In the next dropdown menu, select an attribute or metric.
7. Based on the characteristics of the selected attribute or metric, complete the filtering criteria using the offered controls or use the **Expression** tab, select an operator, and enter a value.
8. Select **Apply**.

**Attributes (conditional)**

**Filter result**  
Includes

**cases in which**  
**attribute**  
activityName

**holds any of the values**  
Assemble bicycle (1)

**and at the same time**  
Process Metric

Case frequency

**is in range**  
0

**and**  
0

**Range** Expression

0

and

0

## Process metric

Process metric calculates the total value for all cases in the process. In the view filtering, it returns either empty (0% cases) or full (100% cases) for data set coverage. Use process metrics for filters in business rules, where you can deactivate or activate the business rule by filtering out the whole data set.

# Edge conditional filter

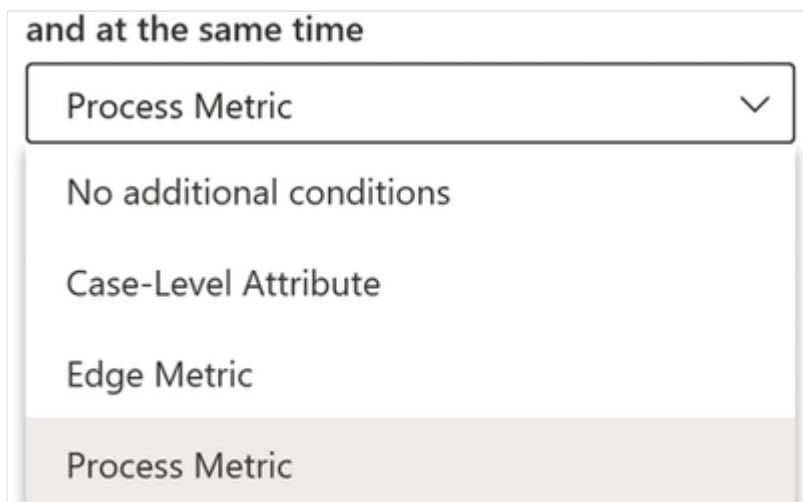
Article • 07/18/2023

This case-level filter is similar to the attribute (conditional) filter, only it's related to edges instead of events. Both activity-based process map and resource-based social chart edges are supported. **Activity attribute name** is the first process map based attribute.

If there are defined resource attributes in the active process, the dropdown offers to select Resource attributes.

As we are dealing with edges, the available condition is limited to either case-Level attributes or edge-related metrics. For example, you want to find all cases where edge Approving -> Demand for information occurs, but only those where this edge happened for a certain supplier or region, or the mean duration of this edge exceeds a certain KPI. (If we used a resource-based attribute, the list of edges follows resource transitions, such as Lara Obrien -> Azalia Hansen.)

1. Select the additional criteria type (**Case-Level Attribute**, **Edge Metric**, or **Process metric**):



The image shows a dropdown menu with the title "and at the same time". The menu is currently open, showing a list of options. The top option is "Process Metric" with a downward arrow icon. Below it are "No additional conditions", "Case-Level Attribute", "Edge Metric", and "Process Metric". The bottom "Process Metric" option is highlighted with a grey background.

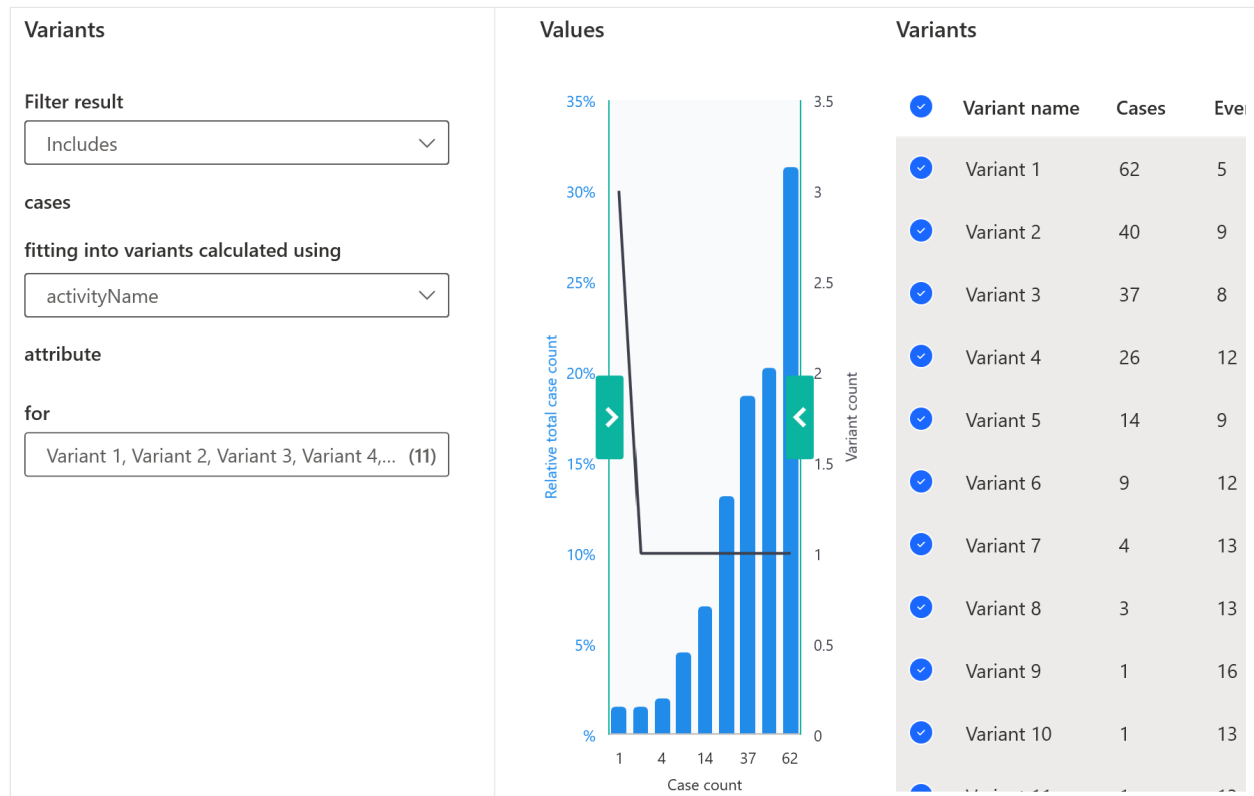
2. Complete the filter by specifying the values for it.

# Variants filter

Article • 07/18/2023

Use this filter to restrict the mining in the process only to the cases following a certain scenario (variant).

In the **Values** pane, there's the visualization of the dependence of the number of variants on the number of cases falling in each variant.



## Variant mining attribute

Variants may be calculated using activity attribute (default one) or any mining attribute (any non-case level attribute). Choosing a variant mining attribute in filters doesn't depend on, nor modifies the selected mining attribute on the process map.

The process map can be calculated using the activity attribute, while data may be filtered by the most common variants (scenarios) based on the resource attribute.

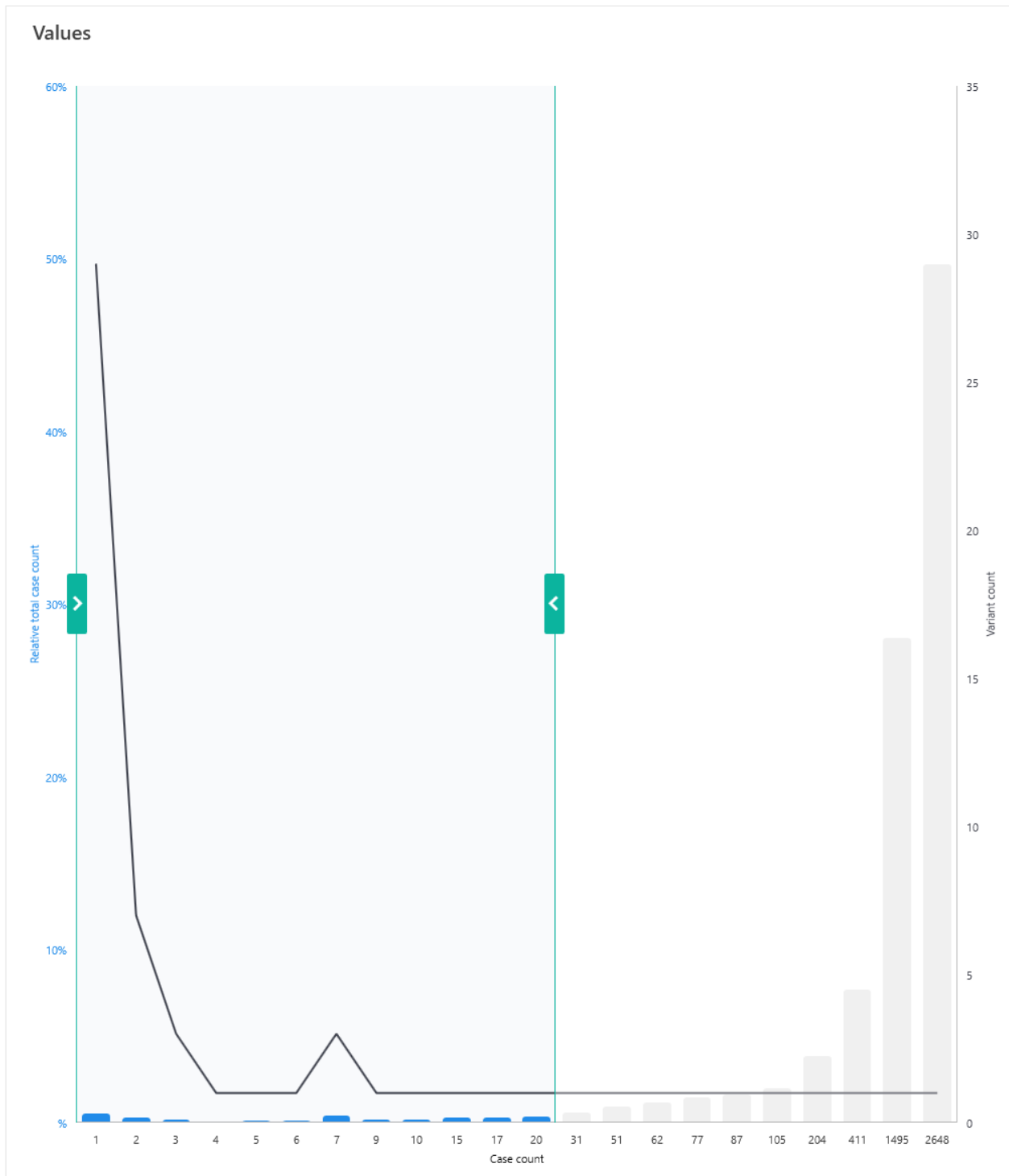
## Variant selection

Variants can be selected by marking them on the chart in the center part of the filter. The chart can be used to distinguish variants with high case count from variants with

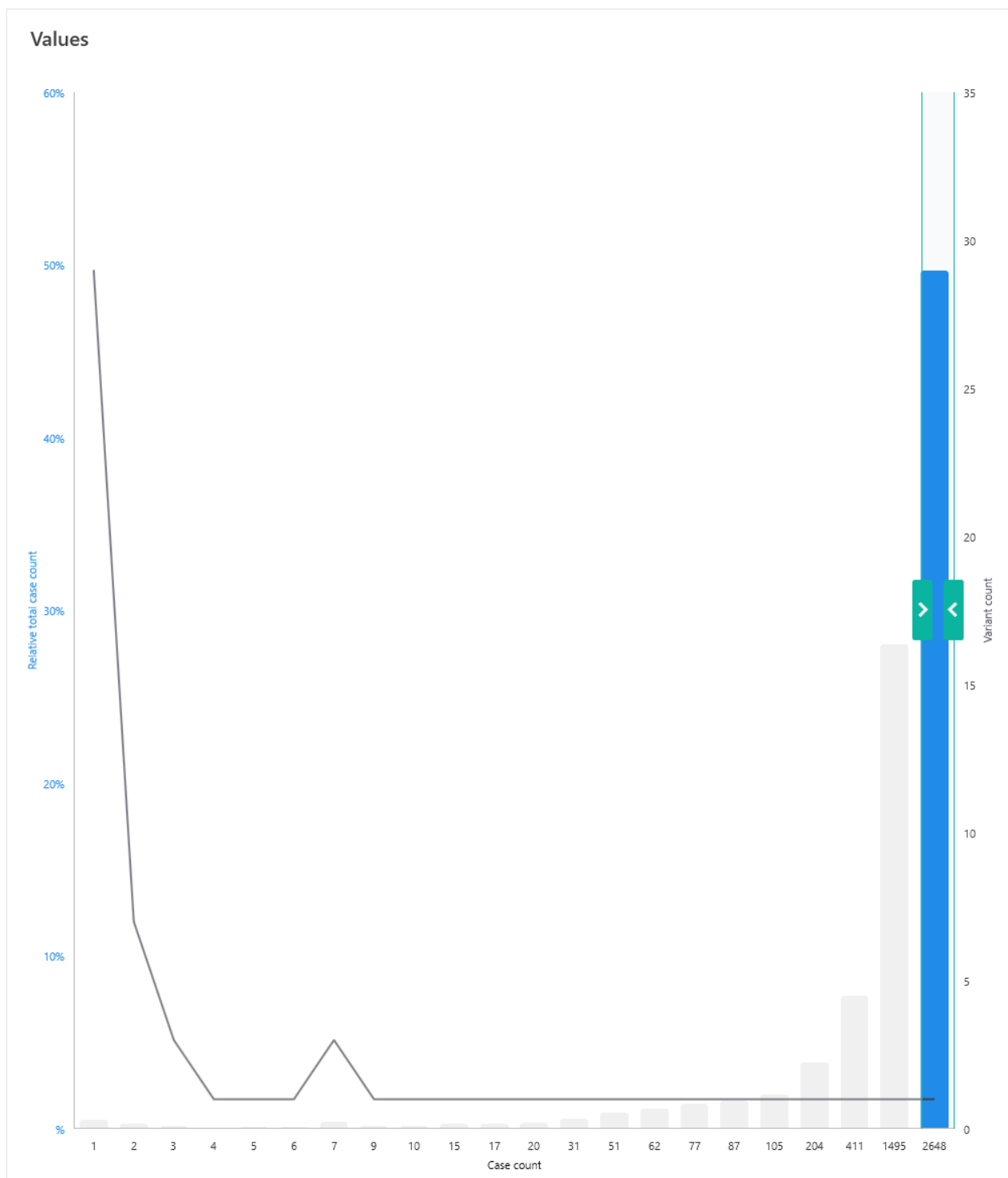


low case count. The height of chart bars depends on the number of variants with equal case count.

The following example show the results of 50 variants containing 3% of all cases in the process.



The following example show the results of one variant containing 50% of all cases in the process.



To select a discontinuous group of variants or to select variants by their number, you can select specific variants on the right. Select a variant to select and remove it from the list. To make the selection of variants easier, use the selection buttons to select all variants, and to cancel the selection of all variants.

# Case metrics filter

Article • 07/18/2023

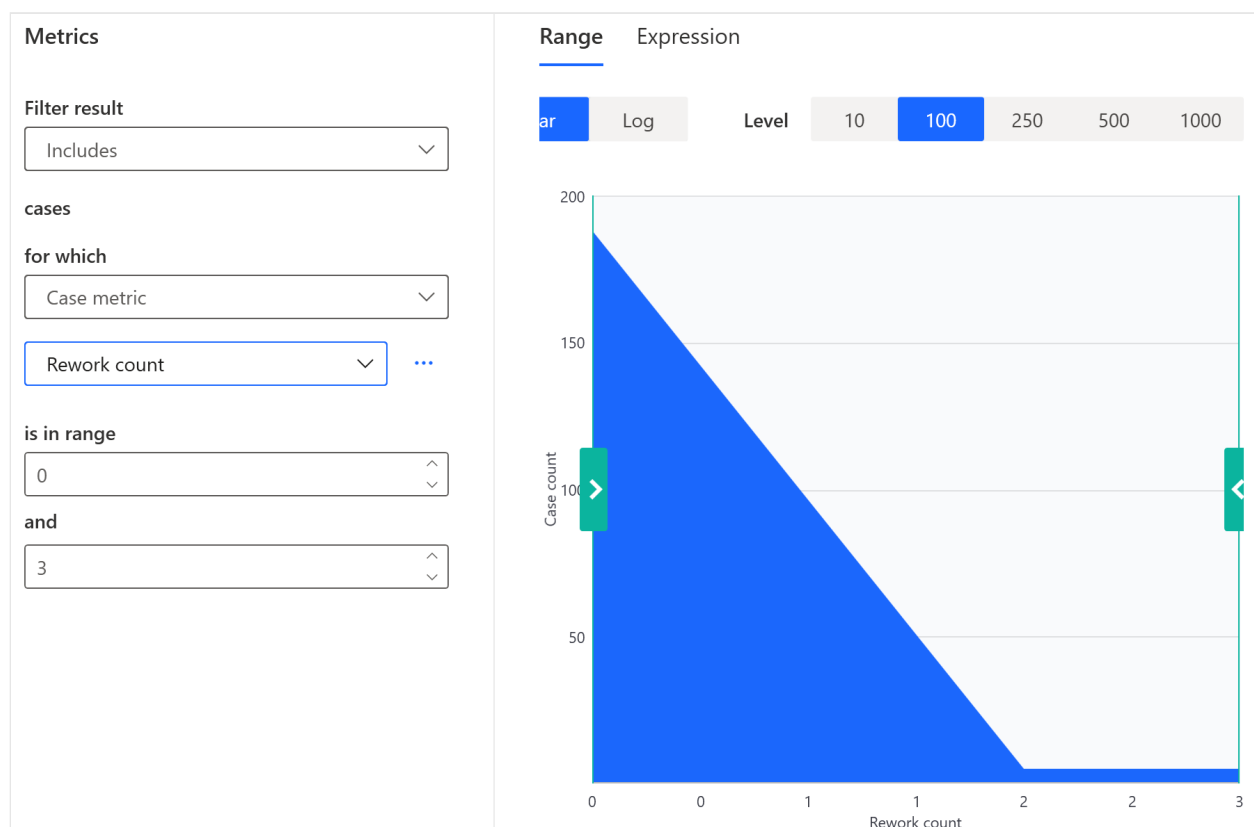
This case-level filter can be used to filter cases based on various metrics. The case count based on the selected metrics is visualized on the right. The number of intervals (for example, chart detail level), can be changed by the switch. You can select different types of metrics.

- **Case metric:** Evaluation of the case by the selected case metric.
- **Event metric:** Evaluation of the case when at least one or all events meet the event metric.
- **Edge metric:** Evaluation of the case when at least one or all edges meet the edge metric.

In all types of metrics, you can select between standard default metrics found in the Power Automate Process Mining desktop app and custom metrics created within the process context.

## Select the case metric

The selection of the case metric and filter values represents a simpler form of the case metric filter.



You can select from the following types of standard metrics:

- **Case duration:** Case duration, which is the time from case start to case finish.
- **Case active time:** Time during which an activity was in progress in the case, which is the total duration of all events in the case.
- **Case waiting time:** Total time without any ongoing activity in the case.
- **Case utilization:** Ratio of the time spent on an activity to the total duration of the case. Maximum case utilization is 1 (100%), which means that no waiting has occurred in the case.
- **Case cumulative utilization:** Ratio of the total time spent on activities to the total duration of a case.
- **Event count:** Number of events.
- **Self loop count:** Number of occurrences of activities in self loop.
- **Loop count:** Number of occurrences of activities involved in loops.
- **Rework count:** Value of rework count of all activities in the process.
- **Case cost:** Whenever one or more finance attributes are specified during the import process, they automatically become available as additional metrics filtering options.

Apart from the standard metrics, the dropdown menu automatically offers all custom metrics which meet the case metric requirements. To learn more, go to [Calculation context](#).

## Select the event and edge metrics

Selection of event or edge metric requires additional setting to specify validity of metric over all or at least one element (event or edge) in the case:

You can specify the filtering values in two ways. You can either enter a range of values or use the slider. The examples in this section are valid for *Event count*.

To specify a range:

1. In the **is in range** field, enter the minimum value.
2. In the **and** field, enter the maximum value.

As an alternative, you can select the range of values by dragging the sliders in the chart.



## Specify values in the Expression tab

The selection options differ according to the selected metrics type.

1. Go to the **Expression** tab.
2. From the dropdown menu, select one of the operators (for example, **Equal to**).
3. Enter the value. You can select *fx* again to use [custom metrics](#).

# Sequence filter

Article • 07/18/2023

This case level filter applies to the sequence in which events are performed in a case. You can use it to define the sequence in which two events with specific attribute values are performed and to specify further requirements for the progress of events in a case.

The following screenshot shows the filter configuration in which we are only interested in the cases where Riley started to work on a case immediately after Alex.

Sequence	List	Expression
<b>Filter result</b> Includes	<input type="text" value="Search in attribute values"/>	
<b>cases in which</b> <b>for attribute</b> Associate	<b>Attribute value</b>	
<b>an event with the attribute value in</b> Alex (1)	Alex	
is directly followed by	Cameron	
<b>an event with the attribute value in</b> Riley (1)	Erin	
having [the same/different]	Payton	
<b>values of attribute</b> caseld	<input checked="" type="checkbox"/> Riley	
<b>and the time between the events is</b> [shorter/longer/equal]	Sam	
0:00:00:00.000		

# Define the sequence filter

The sequence filter doesn't take the waiting time into account. It takes into account only the event start sequence.

1. From the **for attribute** dropdown menu, select an attribute of interest for sequence filtering.
2. Select the **an event with the attribute value in** field, and then select the attribute values for the first event in sequence in the **List** tab to the right. Your selections appear in the field.
3. In the next field, specify the requirements for the chronological arrangement of events (for example, **is directly followed by**).

For a list of other requirements, go to [Event attribute requirements for sequence filtering](#) in this article.

4. Select the **an event with the attribute value in** field, and then select the attribute values for the second event in sequence in the **List** tab to the right. Your selections appear in the field.
5. In the next field, define other requirements for the same or different properties of the first and second event. For example, select if the given property (attribute) is to be the same or different.

If you leave the setting as **[the same/different]**, this condition won't be taken into consideration.

6. From the **values of attribute** dropdown menu, select which event attribute should have the same/different value.
7. From the **and the time between the events is** dropdown menu, select the time span between the first and second event.

If you leave the first field as **[shorter/longer/equal]**, this condition won't be taken into consideration.

## Event attribute requirements for sequence filtering

Following are the selections and their descriptions:

- **Is directly followed by:** Event 2 occurred immediately after event 1.

- **Is followed by:** Event 2 occurred some time after event 1. Another event may or may not have occurred between the two events.
- **Is not directly followed by:** Event 2 didn't occur immediately after event 1, but it may or may not have occurred at a later time.
- **Is not followed by:** Event 2 didn't occur at any time after event 1.
- **Is parallel with:** Event 2 did occur at least partly during the time of event 1.
- **Is not parallel with:** Event 2 didn't occur any time during the time of event 1.
- **Is directly followed by or parallel with:** Event 2 did occur immediately after event 1, or during the time of event 1.
- **Is followed by or parallel with:** Event 2 occurred some time after event 1 or during the time of event 1. Another event may or may not have occurred between the two events.



# End events filter

Article • 07/18/2023

Use this filter to restrict cases according to the property of the event that occurred at the beginning or at the end of the case.

The filter in the following screenshot will only select the cases starting with the **Confirm order** activity and ending with the **Mark order as complete** activity.

**End events**

**Filter result**

Includes

**cases in which**

**attribute**

activityName

**on a starting event of the single case holds any of the values**

Confirm order (1)

**and on a finishing event of the single case holds any of the values**

Mark order as complete (1)

**List** Expression

Search in attribute values

Attribute value

Mark order as complete

In the same way, you can create a resource-based condition (for example, if you want to select only the cases that Anna started to deal with).

## Define the end events filter

1. From the **attribute** dropdown menu, select which attribute is of interest when assessing events.
2. Select the **on a starting event of the single case holds any of the values** field, and then select the attribute value for the end event in the **List** tab to the right. Your selections appear in the field.

Only the values that are present in the starting events of the process are available for selection. If the attribute values of the starting event are of no interest, all values should remain active/selected.

3. Select the **and on a finishing event of the single case holds any of the values** field, and then select the attribute value for the end event in the **List** tab to the right. Your selections appear in the field.

Only the values that are present in the finishing events of the process are available for selection. If the attribute values of the finishing event are of no interest, all values should remain active/selected.

# Conflict of interests filter

Article • 07/18/2023

Use this filter to expose cases with conflict of interests. A typical example is the violation of rules for assigning roles in performing critical tasks.

By means of the filter, you can specify two sets of events which should happen in the process in given order and should or shouldn't have the same value of an attribute. All events from the first group are always compared with all events from the second group. If there is the intersection of the two groups, the filter result will always return all such events.

The screenshot shows a situation where this filter is used to find out if there's been a customer who was charged by the same person as the one who actually collected payment. For this purpose, the filter is set to select all cases where these two activities occurred and were carried out by the same person.

Conflict of interests	List
<b>Filter result</b> Includes	Search in attribute values
<b>cases in which</b> 2 consecutive events exist with attribute activityName	<b>Attribute value</b>
<b>having</b> for the first event, values Charge customer card (1)	Assemble bicycle
for the second event, values Collect payment (1)	Charge customer card
and both events have equal value of attribute Associate	Check inventory for parts
	<input checked="" type="checkbox"/> Collect payment
	Conduct quality check
	Confirm order
	Help load or handoff bicycle
	Mark order as complete

## Define the conflict of interests filter

1. From the **2 consecutive events exist with attribute** dropdown menu, select the attribute on the basis of which the events in the case are selected.
2. Select the **for the first event, values** field, and then select the attribute values in the **List** tab to the right. Your selections appear in the field.
3. Select the **for the second event, values** field, and then select the attribute values in the **List** tab to the right. Your selections appear in the field.
4. From the **and both events have equal value of attribute** dropdown menu, select which attribute is decisive for assessing the conflict of interests.

# Event attributes filter

Article • 07/18/2023

Use this event level filter to only select those events in cases that contain/don't contain a specific attribute value – such as only certain activities or events performed by a certain department (for example, First line support department for ServiceDesk).

Attributes	List	Expression
<b>Filter result</b> <input type="text" value="Includes"/>	<input type="text" value="Search in attribute values"/>	
<b>events in which attribute</b> <input type="text" value="activityName"/>	<b>Attribute value</b>	
<b>holds any of the values</b> <input type="text" value="Assemble bicycle, Check inventory for p... (2)"/>	<input checked="" type="checkbox"/> Assemble bicycle	Charge customer card
	<input checked="" type="checkbox"/> Check inventory for parts	Collect payment

## Define the event attributes filter

1. From the **events in which attribute** dropdown menu, select an attribute for the filter rule.
2. Select the **holds any of the values** field, and then select the attribute values in the **List** tab to the right. Your selections appear in the field.

## Use list and expression values

There are two possibilities to define the values for filter criteria. This is done in the **List** or **Expression** tab.

- **List:** Available for string attributes. Select or remove values to and from the list. If the list is long, you can use search to find specific values.
- **Expression:** Available for both string and numeric attributes. Specify an expression such as „Starts with“, „Contains“ for string and, an expression such as „Greater than“, „Equal“ for numeric attributes.

You can also select **fx** to use [custom metrics](#).

# Subprocess filter

Article • 07/18/2023

Use this event level filter to „cut out“ a part of the process from all the cases. Where the criteria for the subprocess doesn't apply, the case is completely excluded. For example, in a purchase order approval process, you want to focus on the part from purchase order creation until the purchase order is marked as approved. Another example is, in a service center ticket solving process, you want to see only the part being dealt with by the second level support department.

The following screenshot depicts the settings for the subprocess from the first occurrence of **Mark order as complete** or **Suggest relevant options** to the last occurrence of **Notify customer that bike is ready for pickup** activity.

Subprocess	List	Expression
<p>Filter results into modified cases. Each case</p> <p>Includes <input type="text"/></p> <p>events located between the first occurrence of event with attribute</p> <p>activityName <input type="text"/></p> <p>having one of the values</p> <p>Mark order as complete, Suggest releva... (2)</p> <p>and the last occurrence of event having one of the values</p> <p>Notify customer that bike is ready for pi... (1)</p>	<p><input type="text"/></p> <p>Search in attribute values</p> <p>Attribute value</p> <p>Mark order as complete</p> <p><input checked="" type="checkbox"/> Notify customer that bike is ready for pickup</p> <p>Order in parts</p> <p>Package and ship bicycle</p> <p>Perform bike fitting</p> <p>Pull from already assembled models</p>	

## Define the subprocess filter

In general, this filter can be defined as extracting events of each case in chronological order from the first occurrence of event with a specific value(s) of first attribute until the last occurrence of event with specific value(s) of second attribute.

1. From the **events located between the first occurrence of event with attribute** dropdown menu, select the attribute on the basis of which the events in the case are selected.

2. Select the **having one of these values** field, and then select which events belong to the first group of events in the **List** tab to the right. Your selections appear in the field.
3. Select the **and the last occurrence of event having one of these values** field, and then select which events belong to the second group of events in the **List** tab to the right. Your selections appear in the field.

## Use list and expression values

There are two possibilities to define the values for filter criteria. This is done in the **List** or **Expression** tab.

- **List:** Available for string attributes. Select or remove values to and from the list. If the list is long, you can use search to find specific values.
- **Expression:** Available for both string and numeric attributes. Specify an expression such as „Starts with“, „Contains“ for string and, an expression such as „Greater than“, „Equal“ for numeric attributes.

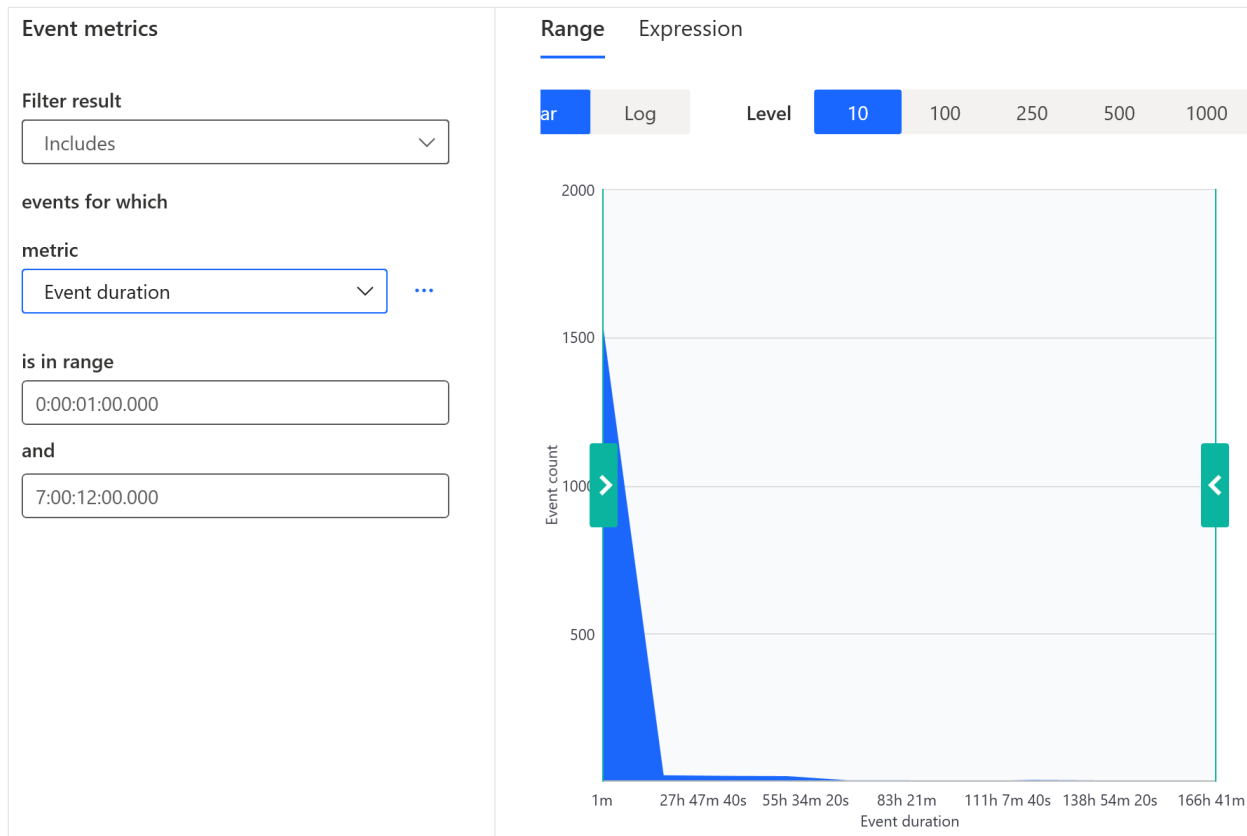
You can also select **fx** to use [custom metrics](#).



# Event metrics filter

Article • 07/18/2023

Use this event level filter to filter events based on various metrics. Only event metrics are applicable here.



## Specify metrics values

You can specify the filtering values in different ways. Value selection depends on the type of selected metric.

When specifying the range in the **is in range/and** fields, you can enter the minimum and maximum values. Alternatively, you can select the range of values by using the sliders in the chart.

The selection options differ according to the selected metrics type.

To define the values using an expression, select the **Expression** tab, select one of the available operators (for example, **Equal to**) and enter the value. You can also select **fx** to use [custom metrics](#).

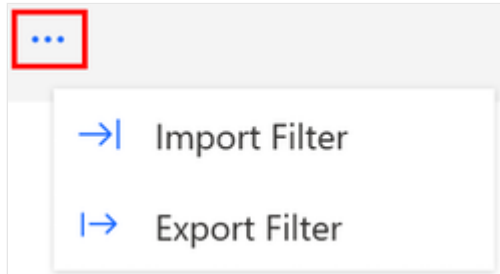
## Create a custom metric

You can choose between standard default metrics found in the Power Automate Process Mining desktop app and custom metrics created in the process context. To create a custom metric, select (...) > **Add**.

# Export and import filters

Article • 07/18/2023

The Power Automate Process Mining desktop app offers an option to export existing set of filters in the view and re-use them in another view or process. To export or import filters, select (...) in the menu at the top of the **Filtering** screen.



## Filter export

Filter export saves filter definitions into a file on a disk. The file extension is **mfltr**. The exported file can be re-used by another user on different Process Mining desktop app installation.

All the filter types are exportable, except for the variant filters which are dependent on the actual data set (Variant 1 in two different processes may mean totally different process variants). Only enabled view filters are exported, so it's possible to manage the set of filters for export without deleting any filter.

## Filter import

Filter import enables you to load previously exported filters and apply them into the current view. As filters might contain references to attributes or custom metrics which aren't available in the current view (process), there's a mapping wizard for filter import. It helps align the filter definition with the actual process data structure and definitions.

There are three categories of filters in terms of import mappings:

- No dependencies to data structure
- Attribute references
- Custom metric references

## No dependencies to data structure

In some cases, filters don't depend on the actual data structure but on the reference to general metrics like case duration, case start, or end time. Such filters are valid in all processes and no mapping activity is needed during the filter import.

## Attribute references

A filter using references to process attributes requires the user mapping of which attribute in the active process will be used instead of the original one saved in the filter. For example, the original attribute filter might be using **"CostCenter Code"** attribute. Such attribute doesn't exist in the current process, but if you're using mapping to **"CC.Code"** attribute, the imported filter will be valid using reference to new attribute.

If straightforward mapping between attributes isn't possible, the option to delete attribute reference is available. After such import, the filter will be saved in the view with a missing reference to any attribute.

The Process Mining desktop app notifies you of the missing attribute reference and the filter is marked with **asterisk**.

The filter definition is saved in the view, but all the original values from filter are lost, just as is the missing attribute reference. You'll need to assign the relevant attribute and relevant filter values to create working filter again.

## Custom metrics references

Filters using references to custom metrics require two-step mapping. First, you need to map the custom metric, then the referenced attributes within the custom metric. The attributes mapping is the same as previously described. Custom metric mapping offers three options:

- Custom metric mapping to existing one.
- Create new custom metric.
- Delete custom metric reference.

### Custom metric mapping to existing one

If there's a custom metric in the current process which can be replaced with the original one, you can map these two custom metrics. The imported filter will contain a reference to the existing custom metric in the active process.

### Create a new custom metric

If you're able to recreate an original custom metric using attributes from the active process, you can select the **NEW** option. In the first step, the name of the new custom metric is confirmed. To see what attributes need to be mapped, the custom metric formula may be displayed in the mapping wizard panel.

If the custom metric doesn't contain reference to any process specific attribute, this is the end of mapping wizard. If the custom metric is referencing a process-specific attribute like "**CostCenter Code**", in next step, you need to map the used attributes in the original custom metric to the attributes in the active process. Notice that the attribute mapping is the only available operation. The custom metric formula isn't updated in any other way.

The filter is imported using reference to newly created custom metric and is ready to use.

If you select to create a new custom metric, yet are unable to map referenced attributes in the custom metric, the filter import isn't possible. The option to delete the attribute reference works only for attributes mapping. For attributes mapping, it's possible to delete attribute reference, but not for a new custom metric. In such a situation, the creation of new custom metric is stopped and you're not able to import the filter.

## Delete a custom metric reference

The last option is to delete reference to the custom metric in original filter.

The Process Mining desktop app notifies you of the missing custom metric reference in the filter. In the filter, the original custom metric reference is empty. Also, the filter values are lost. Until a new metric and filter values are selected by the user, the filter isn't valid.

# Settings overview

Article • 07/18/2023

The **Settings** in options allow you to set the general options and default configuration of the Power Automate Process Mining desktop app, define the working hours calendar templates, and update the application or license.

## Set options

Change various settings in the Process Mining desktop app.

1. On the title bar, select the gear icon > **Options**.
2. Select you settings.
3. Select **Save**.

Unsaved changes are indicated by an asterisk next to the section name.

To learn about the **Options** tabs, go to [Application settings](#).

## Options ✕

**General**   Process explorer   Process map   Animation

**User interface language:**

English ▾

**Default export location:**

C:\Users\mgpandrews\Downloads ⋮

**Time format**

Show duration in working hours:

**Max time unit:**

Hour ▾

**Time format precision:**

Unlimited ▾

**Numeric format**

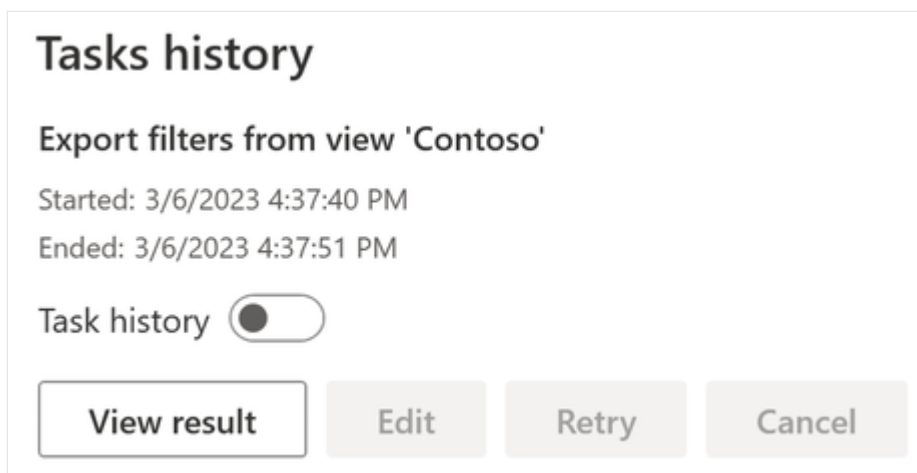
**Decimal precision:**

2 ▾

## Set task history

View the history of performed tasks such as publish to Power BI or data export from a view.

1. On the title bar, select the gear icon > **Tasks history**.
2. To show or hide task history details, turn the **Task history** slider off or on.
3. Select **Save**.



If a task couldn't be completed, select **Retry** to restart. Alternatively, you can edit its parameters before restart by selecting **Edit**. You can also display the result of the task by selecting **View result**.

## Set working hours

The **Working hours** screen allows you to define calendar templates that can be applied to process views in order to influence the performance analysis calculation. The default setting is 24 hours, 7 days per week.

1. On the title bar, select the gear icon > **Working hours**.
2. To create a new template of working hours, select **Create new calendar template**.  
To learn about the **Calendar template** tabs, go to [Working hours](#).
3. In the **General** tab, enter a name in the **Template name** field.
4. In the **Working week** and **Non-working days** tabs, customize your new calendar.
5. Select **Save**.

To delete a calendar, select the ellipses (...) > **Delete**.

If you have an existing calendar and want to make a new calendar based on it, select the ellipses (...) > **Create duplicate**. This way, you don't need to create a calendar from scratch.

To learn more, go to [Working hours](#).

## About

Display the Process Mining desktop app version information.



1. On the title bar, select the gear icon > **About**.

2. When you're done, select **Close**.

# Application settings

Article • 07/18/2023

You can change the application settings in the **Options** tab.

- **Change general settings:** In the **General** tab, change general settings such as the user interface language or set where the exported files will be stored. You can also define the default duration format used for all newly created processes and views. To learn more, go to [View settings](#).
- **Change viewing preferences:** In the **Process explorer** tab, change the default settings for view creation processes. These settings will be used whenever a new process view is created.
- **Change process map and social chart settings:** In the **Process map** tab, change the default settings for displaying the process map and social graphs, such as spacing between nodes, displaying the start and end nodes, or chart alignment. These settings will be used whenever a new process view is created.
- **Change process animation settings:** In the **Animation** tab, change settings for process animation. These settings will be used as default, whenever a new process view is created.

## See also

[Settings overview](#)

# Working hours

Article • 07/18/2023

The **Working hours** tab allows you to define calendar templates, which can be applied to process views in order to influence the performance analysis calculation. The default setting is 24 hours, 7 days per week.

You can define a new calendar template by selecting **Create new calendar template** in the upper right corner. You can also define a new calendar by duplicating an existing calendar by selecting the ellipses (...) > **Create duplicate** to the right of the calendar template name.

To edit the calendar template, select the template name. After you make changes, remember to select **Save**.

## Define basic parameters

On the **General** tab, define basic parameters.

- **Template name:** The name of the calendar template.
- **Calendar type:** You can choose from two options, which influence how calendar template influences the performance calculations, when applied to the process view.
  - **Resource specific (nodes only):** The calendar template is applied only to work performed by resources (activities/nodes) in the process map (relevant for event logs with two timestamps). Waiting times between activities are calculated on a 24 hour, seven days a week basis.
  - **SLA specific (nodes and edges):** The calendar template is applied to both activities and edges (relevant for all event logs). Both active and waiting time are recalculated with the applied calendar template configuration.

## Define your working week time

On the **Working week** tab, define the structure of your working time during a standard working week.

- **Calendar type:** Specify the behavior of the working time setting controls:
  - **Mo, Tu, We, Th, Fr, Sa, Su:** Time for each working day is set separately.

- **Mo-Fr, Sa, Su:** Monday through Friday share the same settings. Time for Saturday and Sunday is set separately.
- **Mo-Su:** Monday through Sunday share the same settings.
- **Working/not working:** To set the specific day as non-working, uncheck the **Working** checkbox on the right side of the item. To set the working time, drag the left and right side of the blue slider corresponding to the respective working day.

## Define your non-working days

On the **Non-Working days** tab, define special non-working days such as bank holidays, national holidays, or company specific holidays.

- There are two main types of non-working days:
  - **Recurring:** Non-working for each year, regardless of where you set it.
  - **Non-recurring:** Non-working only for the respective year.

To set the days as working or non-working, select the desired day or range of days in the calendar view and select the relevant item below the calendar.

To switch the displayed year, select the arrows next to the year label above the calendar view.

- **Holidays:** Simplify the definition of bank and national holidays by importing them all at once. To initialize the import, select **Import holidays** below the calendar view. A window opens where you can choose the specific calendar and specify the year range. The Power Automate Process Mining desktop app automatically sets holidays for the defined range. You can import as many countries as needed.

If you imported a set of holidays by mistake, you can delete them from the calendar template by selecting **Remove holidays** below the calendar view.

## See also

[Settings overview](#)

# Custom metrics overview

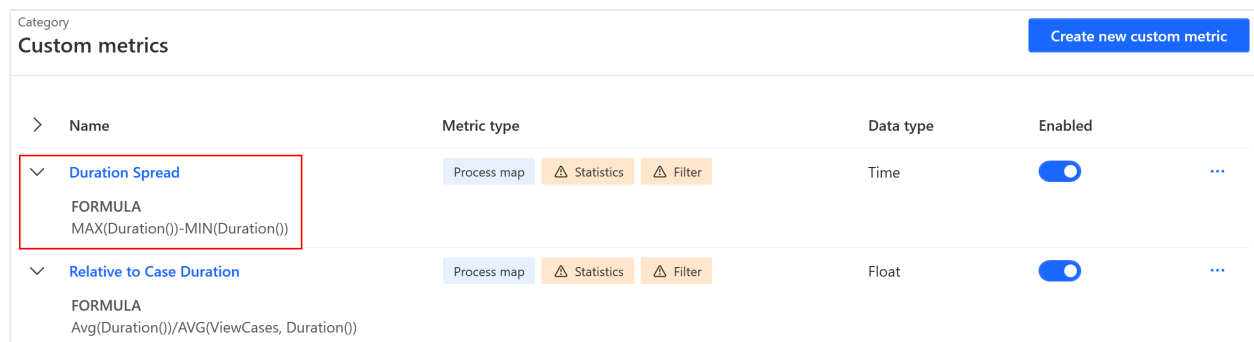
Article • 07/18/2023

Custom metrics (also known as calculated metrics) allow you to use the following to define your own custom metrics:

- Pre-defined metrics in the application.
- Different aggregations, mathematical, datetime, string, and other operations.
- Functions and constants in a formula editor.

It's then possible to visualize them in the process map or according to their context in other parts of the application in a similar way as the static ones.

If you already have custom metrics defined, you see a list in the **Process context** screen. To view the formula for a custom metric, select the right arrow next to its name. The arrow turns into a down arrow.



Category		Custom metrics			Create new custom metric	
>	Name	Metric type	Data type	Enabled		
∨	Duration Spread FORMULA MAX(Duration())-MIN(Duration())	Process map Statistics Filter	Time	<input checked="" type="checkbox"/>	⋮	
∨	Relative to Case Duration FORMULA Avg(Duration())/AVG(ViewCases, Duration())	Process map Statistics Filter	Float	<input checked="" type="checkbox"/>	⋮	

## Define a custom metric

Define custom metrics in the context of the current process. They can be used and evaluated only if they're valid in the particular context.

1. In the **Processes** screen, select a process.
2. On any screen selected from the left panel, select **Process context** on the menu at the top-right.
3. Select **Create new custom metric**.
4. In the **Custom metric name** field, enter a name.
5. In the **Metric formula** field, write your formula.

The editor offers full syntax editing features including the following:

- Syntax highlighting
- Intellisense with function overload hints
- Formula **validation** - syntax errors, datatype issues
- Resulting metrics **data type identification**

## 6. Select **Save**.

### Custom metric

Custom metric name:

Metric formula:

`MAX(Duration())-MIN(Duration())`

✓ Formula is valid

i Your custom metric is currently defined as context aware - it's calculation method depends on where it is used. Is this not what you wanted? [Learn more.](#)

Metric data type: 🕒 Time

Metric type: Process map ⚠ Statistics ⚠ Filter

Enabled: 🔘 On

## 7. Select a **Metric type** to see further details to verify the applicability of the expression for various functions.

To learn more about the requirements for using custom metrics for various purposes, go to [Requirements for application](#).

# Apply a custom metric to a process map

The process map visualization will adjust to the selected metric based on the context and datatype you select, and show the calculated values.

1. On the panel to the right, select the **Customize** (the first icon).
2. On the toolbar in the **Customize** panel, select **Custom** (the *fx* icon).
3. Below the toolbar, select the desired metrics from the dropdown menus.

The top dropdown menu is used for selecting the custom metric on the activities and the bottom one for edges. The link icon in between will lock the metric for activities and edges to show the same metric for both elements.

Use the ellipses (...) next to the dropdown menu to add a new custom metric to process context, edit the formula of the selected metric, or delete it.

## Apply a custom metric to filters

You can use custom metrics for all types of filters except for **Timeframe**, **Edge (conditional)**, and **Variants**.

To enter a custom metrics formula:

1. Select or add a filter in the **Add filter** dropdown menu.
2. Select the filter setting you want to define (for example, for the **Attributes** filter).
3. Select the **holds any of the values** field.
4. Select the **Expression** tab.
5. Select the appropriate operator (for example, select **Equal to**), and then select **fx** to enter a custom metrics formula in the **Expression** field.

The editor supports syntax highlighting, intellisense, and formula validation.

For the **Metrics** filter type, you can also apply custom metrics stored in the process context or create a new one.

6. To select existing custom metrics, use the metric dropdown menu. Custom metrics are available at the end of the list.
7. To create a new custom metric, select (...) next to the metric dropdown menu and select **Add**.

This opens the standard custom metrics editor (see previous step). You can also edit and delete existing custom metrics here.

## Use a custom metric in the Statistics view

Once a custom value or case type metric is defined in the process map, it also becomes available in the **Statistics** view as a new column. It also can be visualized in the graph.

# Use a custom metric in root cause analysis (RCA)

Custom metrics that return values on case level can be used in RCA either as a main metric, or in the influenced by section. Supported custom metrics are any returning numerical, time, or boolean value and metrics returning string values with less than 50 unique values for the data used in RCA.

Custom metrics can be also created in RCA settings screen by selecting (...) next to the main metric in the **Metric** field.



# Tips and examples

Article • 07/18/2023

## Metric formula

Define the metric formula in a text form. It can consist of predefined operations.

Individual operations are divided into two basic groups:

- **Aggregation operations:** Input of aggregation operation is a set of values for which the resulting value will be calculated (for example, average, maximum, and more).
- **Scalar operations:** The input of scalar operation is one or more values for which the resulting value will be calculated (for example, absolute value of the number, obtaining part of the tax, and more).

Operations can use [constants](#), can be combined using [unary or binary operators](#) (for example, addition, subtraction, and more), or be nested.

Scalar operations also include operations to obtain a value, either directly available in the form of an attribute or in the form of derived statistics (event duration).

Some operations also support specifying the context for which the operation is evaluated. This is important for aggregation operations that can aggregate values, for example, only for a specific activity, or for all activities or events. The implicit context resulting from the metric context or the parent operation context is also supported.

A metric formula can return one of the [supported data types](#). Data types for specific formulas are defined in this article next to the formula syntax definition.

## Aggregation operations

[Aggregation operations](#) are the basis of each metric. The most commonly used aggregation operations are:

- **COUNT:** Returns the number of aggregated values (incl. COUNTIF, COUNTUNIQUE).
- **SUM:** Returns the sum of aggregated values (incl. SUMIF).
- **AVG:** Returns the average of aggregated values.
- **MIN:** Returns the minimum of aggregated values.
- **MAX:** Returns the maximum of aggregated values.

The voluntary parameter of the aggregation operations will be the operation context and the scalar operation for modification of the input value. The complete list of supported calculation contexts is described in [Calculation context](#).

## Scalar operations

The purpose of scalar operations is to get one value and its transformation to the desired state. Currently supported operations can be divided into several types:

- **Mathematical:** Includes operations to obtain the absolute value of a number, rounding, and more.
- **Date and Time:** -Includes operations to work with the date, such as getting part of the date, adding up dates, and more.
- **String:** - Includes operations to work with string data, such as getting a substring, splitting strings, and more.
- **Statistical:** Includes operations to get different statistics such as number of cases, case waiting time, and more.
- **Other:** Includes other operations, for example, operations accessing event, case, derived statistics, and more.

## Attribute names

If an attribute name is used as a parameter for operation, there are three ways for how to reference it:

- Use **the attribute name directly** (for example, `Resource`).
- Use the `GETVALUE("attribute name")` operation (for example, `GETVALUE("Resource")`).
- Use the **shortened attribute name** directly (for example, `attribute "Resource ID"` might be referenced as `ResourceID`).

The second form is used when the attribute name doesn't fulfill the naming convention. The attribute naming convention is defined as following:

- The Attribute name should start with a letter character or underscore.
- The Attribute name can contain only characters from the following Unicode standard classes: letter character (Lu, Ll, Lt, Lm, Lo, or Nl), combining character (Mn or Mc), decimal digit character (Nd), connecting character (Pc), or formatting character (Cf).

For information on the Unicode character classes mentioned above, see The Unicode Standard, Version 3.0, section 4.5.

The third form is used optionally when the attribute name fulfills the naming convention, but also contains space characters. Instead of using the second form `GETVALUE("attribute name")`, it's possible to remove space characters and use the shortened version, `attributename`. Both forms are equivalent.

## Examples of VALID attribute names

- `DocumentCategory`
- `DocCat`
- `DocCat23`

## Examples of INVALID attribute names

- `Document.Category`
- `Document Category`
- `23DocCat`

## Metric formula examples

To calculate the relative duration of activity in a map:

```
AVG (DURATION()) / AVG (VIEWCASES, DURATION())
```

# Requirements for application

Article • 04/16/2024

Custom metrics can be applied in **Process map**, **Statistics**, and **Filtering**. You can see where your metrics are applicable directly on the editor screen.

The sections in this article list the specific requirements for their application.

## Process map

Following are the requirements for the process map metric type:

- **Node:** Requires aggregation. Uses event context functions. For example, standard total count metric can be implemented via custom metric expression `COUNT(EventsPerAttribute)`
- **Edge:** Requires aggregation and functions valid for edges. It's not possible to access the values of event-level attributes. The standard calculation for total count per edges with custom metric is `Count(EdgesPerAttribute)`

## Statistics

Following are the requirements for the statistics metric type:

- **Event Level Attribute:** Requires aggregation. Uses event context functions. For example, `AVG(AllInView,DURATION())` returns the average duration of all activities/edges.
- **Case Level Attribute:** Requires aggregation. Uses case context functions. It's not possible to access the values of event-level attributes. For example, `AVG(CaseEvents, PriceUSD)` returns the average value of the attribute **PriceUSD**.
- **Case Duration Influence:** Requires aggregation. Uses case context functions. It's not possible to access the values of event-level attributes. For example, `AVG(CasesPerAttribute,DURATION())` returns the average duration of cases for selected case level attribute value.
- **Case Overview:** Aggregation isn't needed since **Case Overview** displays results per individual cases. Uses functions valid for cases. If you want to calculate statistics of all cases and use them in a metric, you need to define the scope of aggregation.

For example, `DURATION()/AVG(ViewCases,DURATION())` returns the ratio between the specific case duration to the average case duration.

- **Edges:** Requires aggregation and functions valid for edges. It's not possible to access the values of event-level attributes. For example, `AVG(AllInView,START())` returns the average start date for a given edge.

## Filter

Following are the requirements for the filter metric type:

- **Attribute Conditional (event-level attribute):** The requirements are the same as for **Statistics - Event Level Attribute**.
- **Attribute Conditional (case-level attribute):** The requirements are the same as for **Statistics - Case Level Attribute**.
- **Edge Conditional:** The requirements are the same as for **Statistics - Edges**.
- **Metric:** The requirements are the same as for **Statistics - Case Overview**.

## Root Cause Analysis

Following are the requirements for the process root cause analysis metric type:

**RCA:** The requirements are the same as for **Statistics - Case Overview** in the [Statistics](#) section in this article.

# List of data types for custom metrics

Article • 07/18/2023

The following table lists the data types for custom metrics.

<b>Data type</b>	<b>Description</b>	<b>Allowed value range</b>
INT	Integer	-9,223,372,036,854,775,808 - 9,223,372,036,854,775,807
FLOAT	Real numbers, value with a fractional value	$\pm 5.0 \times 10^{-324}$ - $\pm 1.7 \times 10^{308}$ with precision ~15-17 digits
BOOL	True/False	True, False
STRING	String	
DATE	Date and Time	1.1.0001 00:00:00 - 31.12.9999 23:59:59
TIME	Time Interval	-10675199.02:48:05.4775808 - 10675199.02:48:05.4775807

# List of constants

Article • 07/18/2023

The following table lists the constants in the Power Automate Process Mining desktop app.

Constant	Data type	Description
PI	FLOAT	Mathematical constant $\pi = 3.14159265358979$
E	FLOAT	Euler's number $e = 2.71828182845905$

# List of unary and binary operators

Article • 07/18/2023

The following tables describe unary and binary operators.

## Unary operators

The following table describes unary operators.

Operator	Description	Input data type	Output data type
+x	Returns the value x	INT, FLOAT, TIME	INT, FLOAT, TIME
-x	Returns negation of the value x (its opposite value)	INT, FLOAT, TIME	INT, FLOAT, TIME
!x	Returns negation of the value x (produces a value of true when its operand is false and a value of false when its operand is true)	BOOL	BOOL

## Binary operators

The following table describes binary operators.

Operator	Description	Input data type	Output data type
x + y	Adds the arguments	INT, FLOAT, DATE, TIME	INT + INT = INT, INT + FLOAT = FLOAT, FLOAT + INT = FLOAT, FLOAT + FLOAT = FLOAT, DATE + TIME = DATE, TIME + TIME = TIME
x - y	Subtracts the arguments	INT, FLOAT, DATE, TIME	INT - INT = INT, INT - FLOAT = FLOAT, FLOAT - INT = FLOAT, FLOAT - FLOAT = FLOAT, DATE - DATE = TIME, DATE - TIME = DATE, TIME - TIME = TIME
x * y	Multiplies the arguments	INT, FLOAT, TIME	INT * INT = INT, INT * FLOAT = FLOAT, FLOAT * INT = FLOAT, FLOAT * FLOAT = FLOAT, TIME * INT = TIME, INT * TIME = TIME, TIME * FLOAT = TIME, FLOAT * TIME = TIME



<b>Operator</b>	<b>Description</b>	<b>Input data type</b>	<b>Output data type</b>
$x / y$	Divides the arguments	INT, FLOAT, TIME	INT / INT = INT, INT / FLOAT = FLOAT, FLOAT / INT = FLOAT, FLOAT / FLOAT = FLOAT, TIME / TIME = FLOAT, TIME / FLOAT = TIME, TIME / INT = TIME,
$x \% y$	Finds the remainder after division of x by y	INT, FLOAT, TIME	INT % INT = INT, INT % FLOAT = FLOAT, FLOAT % INT = FLOAT, FLOAT % FLOAT = FLOAT, TIME % TIME = TIME
$x == y$	Returns TRUE only if x is equal to y, else returns FALSE	INT, FLOAT, BOOL, STRING, DATE, TIME	BOOL
$x != y$	Returns TRUE only if x is NOT equal to y, else returns FALSE	INT, FLOAT, BOOL, STRING, DATE, TIME	BOOL
$x > y$	Returns TRUE only if x is greater than y, else returns FALSE	INT, FLOAT, DATE, TIME	BOOL
$x >= y$	Returns TRUE only if x is greater than OR equal to y, else returns FALSE	INT, FLOAT, DATE, TIME	BOOL
$x < y$	Returns TRUE only if x is less than y, else returns FALSE	INT, FLOAT, DATE, TIME	BOOL
$x <= y$	Returns TRUE only if x is less than OR equal to y, else returns FALSE	INT, FLOAT, DATE, TIME	BOOL
$x \&\& y$	Returns TRUE only if BOTH x and y are TRUE, else FALSE	BOOL	BOOL
$x    y$	Returns TRUE if either x OR y is TRUE, else FALSE	BOOL	BOOL

# List of aggregations

Article • 04/22/2024

This article describes the aggregations you can use in custom metrics.

## AVG([context],[value])

Calculates the average of values grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

**Output data type:** FLOAT, DATE, TIME

## AVGIF([context],[condition],[value],[default])

Calculates the average of values that meet the [condition], grouped according to the [context].

- **[context]**: The context in which the operation is calculated (supported: process, case, event, edge)
- **[condition]**: The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

- **[default]**: Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

**Output data type:** INT, FLOAT, DATE, TIME

**Example:** `AVGIF(ViewEvents, userName == "Laura", eventCost)`

Custom metric can be used anywhere in the application. Returns the average event cost for events associated with the user "Laura".

## COUNT([context])

Counts the number of values grouped according to the [context].

- [context]: The context in which the operation is calculated

Output data type: INT

## COUNTIF([context],[condition],[default])

Counts the number of values fulfilling the [condition], grouped according to the [context].

- [context]: The context in which the operation is calculated
- [condition]: The condition under which the [value] is included in the calculation

Data type: BOOL

- [default]: Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT

Output data type: INT

## COUNTUNIQUE([context],[value])

Counts the number of unique values, grouped according to the [context].

- [context]: The context in which the operation is calculated
- [value]: An attribute name, nested operation, or expression

Data type: INT, FLOAT, BOOL, STRING, DATE, TIME

Output data type: INT

## COUNTUNIQUEIF([context],[condition],[value],[default])

Counts the number of unique [value] that meet the [condition], grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[condition]**: The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

- **[default]**: Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT

**Output data type:** FLOAT, TIME

## MAX([context],[value])

Returns the maximum of [value], grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

**Output data type:** INT, FLOAT, DATE, TIME

## MAXIF([context],[condition],[value],[default])

Returns the maximum of [values] that meet the [condition], grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[condition]**: The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

- **[default]**: Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

Output data type: FLOAT, TIME

## MAXVAL([context],[value1],[value2])

Selects item with maximum value from [value1] and returns its calculated value defined by [value2], grouped according to the [context].

- **[context]:** The context in which the operation is calculated (supported: process, case, event, edge)
- **[value1]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME, DATE

- **[value2]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, STRING, TIME, DATE

Output data type: INT, FLOAT, STRING, TIME, DATE

**Example:** `MAXVAL(EventsPerAttribute, Duration(), userName)`

Can be used on the process map Returns the username of a user who worked on the longest event per activity.

## MAXVALIF([context],[condition],[value1],[value2],[default])

Selects item with the maximum value defined by [value1] that meets the [condition] and returns its calculated value defined by [value2], grouped according to the [context].

- **[context]:** The context in which the operation is calculated (supported: process, case, event, edge)
- **[condition]:** The condition under which the [value1] is included in the calculation

Data type: BOOL

- **[value1]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

- **[value2]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, STRING, TIME, DATE

- **[default]**: Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

**Output data type:** INT, FLOAT, STRING, TIME, DATE

## MIN([context],[value])

Returns the minimum of [value], grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

**Output data type:** INT, FLOAT, DATE, TIME

## MINIF([context],[condition],[value],[default])

Returns the minimum of [value] that meets the [condition], grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[condition]**: The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

- **[default]**: Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

**Output data type:** FLOAT, TIME

## MINVAL([context],[value1],[value2])

Selects item with the minimum value defined by [value1] and returns its calculated value defined by [value2], grouped according to the [context].

- **[context]:** The context in which the operation is calculated (supported: process, case, event, edge)

- **[value1]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

- **[value2]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, STRING, TIME, DATE

**Output data type:** INT, FLOAT, STRING, TIME, DATE

## **MINVALIF([context],[condition],[value1],[value2],[default])**

Selects item with the minimum value defined by [value1] that meets the [condition] and returns its calculated value defined by [value2], grouped according to the [context].

- **[context]:** The context in which the operation is calculated (supported: process, case, event, edge)

- **[condition]:** The condition under which the [value1] is included in the calculation

Data type: BOOL

- **[value1]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

- **[value2]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, STRING, TIME, DATE

- **[default]:** Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

**Output data type:** INT, FLOAT, STRING, TIME, DATE

## **RANGE([context],[value])**

Returns the range (maximum-minimum) of [value], grouped according to the [context].

- **[context]:** Defines the context in which the operation is calculated
- **[value]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

**Output data type:** INT, FLOAT, TIME

## **RANGEIF([context],[condition],[value],[default])**

Returns the range (maximum-minimum) of [value] that meets the [condition], grouped according to the [context].

- **[context]:** The context in which the operation is calculated
- **[condition]:** The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]** - An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

- **[default]:** Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

**Output data type:** FLOAT, TIME

## **STDEV([context],[value])**

Calculates the standard deviation of [value], grouped according to the [context].

- **[context]:** The context in which the operation is calculated
- **[value]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, DATE, TIME

**Output data type:** FLOAT, TIME

## **STDEVIF([context],[condition],[value])**



Calculates the standard deviation of [value] that meets the [condition], grouped according to the [context].

- **[context]:** The context in which the operation is calculated
- **[condition]:** The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

- **[default]:** Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

**Output data type:** FLOAT, TIME

## SUM([context],[value])

Calculates the sum of [value], grouped according to the [context].

- **[context]:** The context in which the operation is calculated
- **[value]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

**Output data type:** FLOAT, TIME

## SUMIF([context],[condition],[value],[default])

Calculates the sum of [value] that meets the [condition], grouped according to the [context].

- **[context]:** The context in which the operation is calculated
- **[condition]:** The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]:** An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

- **[default]**: Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

**Output data type:** FLOAT, TIME

## FIRST([context],[value])

Returns the first [value], grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

**Output data type:** FLOAT, TIME

## FIRSTIF([context],[condition],[value],[default])

Returns the first [value] that meets the [condition], grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[condition]**: The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME, STRING

- **[default]**: Value to be returned, when condition is not met

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output data type:** BOOL, INT, FLOAT, STRING, DATE, TIME

## LAST([context],[value])

Returns the last [value], grouped according to the [context].

- **[context]**: The context in which the operation is calculated

- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

**Output data type:** FLOAT, TIME

## LASTIF([context],[condition],[value],[default])

Returns the last value that meets the [condition], grouped according to the [context].

- **[context]**: The context in which the operation is calculated
- **[condition]**: The condition under which the [value] is included in the calculation

Data type: BOOL

- **[value]**: An attribute name, nested operation, or expression

Data type: INT, FLOAT, TIME

- **[default]**: Value to be returned, when condition is not met

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output data type:** BOOL, INT, FLOAT, STRING, DATE, TIME

## SELFLOOP([context],[attributeName])

Calculates a count of self-loop events, grouped according to the [context]; short version of COUNTIF(ISSELFLOOP()) expression.

- **[context]**: The context in which the operation is calculated
- **[attributeName]**: An attribute name; if no attribute is defined, the current activity (mining) attribute is used

Data type: STRING

**Output data type:** INT

## LOOP([context],[attributeName])

Calculates a count of loop events, grouped according to the [context]; short version of COUNTIF(ISLOOP()) expression.

- **[context]**: The context in which the operation is calculated
- **[attributeName]**: An attribute name; if no attribute is defined, the current activity (mining) attribute is used

Data type: STRING

**Output data type:** INT

## **REWORK([context],[attributeName])**

Calculates a count of rework events, grouped according to the [context]; short version of COUNTIF(ISREWORK()) expression.

- **[context]**: The context in which the operation is calculated
- **[attributeName]**: An attribute name; if no attribute is defined, the current activity (mining) attribute is used

Data type: STRING

**Output data type:** INT

## **LOOPINFLOW([context],[attributeName])**

Calculates a count of loop inflows, grouped according to the [context]; short version of COUNTIF(ISLOOPINFLOW()) expression.

- **[context]**: The context in which the operation is calculated
- **[attributeName]**: An attribute name; if no attribute is defined, the current activity (mining) attribute is used

Data type: STRING

**Output data type:** INT

## **LOOPOUTFLOW([context],[attributeName])**

Calculates a count of loop outflows, grouped according to the [context]; short version of COUNTIF(ISLOOPOUTFLOW()) expression.

- **[context]**: The context in which the operation is calculated

- **[attributeName]**: An attribute name; if no attribute is defined, the current activity (mining) attribute is used

Data type: STRING

**Output data type:** INT

## NETLOOPGAIN([context],[attributeName])

Calculates the sum of loop gains, grouped according to the [context]; short version of SUM(LOOPGAIN()) expression.

- **[context]**: The context in which the operation is calculated
- **[attributeName]**: An attribute name; if no attribute is defined, the current activity (mining) attribute is used

Data type: STRING

**Output data type:** INT

## MODE([context],[value])

Returns the most common [value] from [context].

- **[context]**: The context in which the operation is calculated
- **[value]**: An attribute name, nested operation, or expression

Data type: STRING, INT, FLOAT, DATE, TIME, BOOL

**Output data type:** STRING, INT, FLOAT, DATE, TIME, BOOL

## MODEIF([context],[condition],[value],[default])

Returns the most common [value] from data elements that meet the [condition] in the [context].

- **[context]**: The context in which the operation is calculated
- **[condition]**: The condition under which the [value] is included in the calculation
- **[value]**: An attribute name, nested operation, or expression

Data type: STRING, INT, FLOAT, DATE, TIME, BOOL

- **[default]**: Default value returned by operator when no element in defined [context] meets the [condition]

Data type: INT, FLOAT, DATE, TIME

**Output data type:** STRING, INT, FLOAT, DATE, TIME, BOOL

## ALL([context],[condition])

Returns true if all values, grouped according to the [context], meet the [condition].

- **[context]**: The context in which the operation is calculated (supported: process, case, event, edge)
- **[condition]**: The condition under which the [value] is included in the calculation

Data type: BOOL

**Output data type:** BOOL

**Example** `ALL(CaseEvents, eventCost > 0)`

Can be used on case metrics filters or case overview statistics. Returns true if all events in the case have an event cost greater than zero.

## ANY([context],[condition])

Returns true if any of the values, grouped according to the [context], meet the [condition].

- **[context]**: The context in which the operation is calculated (supported: case [implicit])
- **[condition]**: The condition under which the [value] is included in the calculation

Data type: BOOL

**Output data type:** BOOL

**Example:** `ANY(CaseEvents, eventCost > 0)`

Can be used on case metrics filters or case overview statistics. Returns true if any event in the case has an event cost greater than zero.

**See also**

All calculation contexts for aggregation operations

# List of date and time operations

Article • 07/18/2023

## TODATE([year],[month],[day])

Creates a date from specified date parts.

**Parameters:-** [year] - the year part of the date Data type: INT

- [month] - the month part of the date Data type: INT
- [day] - the day part of the date

Data type: INT

**Output Data Type:** DATE

## TODATE([year],[month],[day],[hour],[minute],[second],[millisecond])

Creates a date from specified date parts along with time.

**Parameters:-** [year] - the year part of the date

Data type: INT

- [month] - the month part of the date

Data type: INT

- [day] - the day part of the date

Data type: INT

- [hour] - the hour part of the date

Data type: INT

- [minute] - the minute part of the date

Data type: INT

- [second] - the second part of the date



Data type: INT

- **[millisecond]** - the millisecond part of the date

Data type: INT

**Output Data Type:** DATE

## **TODATE([year],[month],[day],[time])**

Creates a date from specified date parts along with time.

**Parameters:-** **[year]** - the year part of the date

Data type: INT

- **[month]** - the month part of the date

Data type: INT

- **[day]** - the day part of the date

Data type: INT

- **[time]** - the time part of the date

Data type: INT

**Output Data Type:** DATE

## **TOTIME([hour],[minute],[second],[millisecond])**

Creates a timespan from the specified date parts.

**Parameters:-** **[hour]** - the hour part of the date

Data type: INT

- **[minute]** - the minute part of the date

Data type: INT

- **[second]** - the second part of the date

Data type: INT

- **[millisecond]** - the millisecond part of the date

Data type: INT

Output Data Type: TIME

## TOTIMEFROMDAYS([value])

Creates a time interval from the total number of days.

**Parameters:-** [value] - attribute name, nested operation, or expression to create a timespan

Data type: INT

Output Data Type: TIME, FLOAT

## TOTIMEFROMHOURS([value])

Creates a time interval from the total number of hours.

**Parameters:-** [value] - attribute name, nested operation, or expression to create a timespan

Data type: INT

Output Data Type: TIME, FLOAT

## TOTIMEFROMMILLIS([value])

Creates a time interval from the total number of milliseconds.

**Parameters:-** [value] - attribute name, nested operation, or expression to create a timespan

Data type: INT

Output Data Type: TIME

## TOTIMEFROMMINUTES([value])

Creates a time interval from the total number of minutes.

**Parameters:-** [value] - attribute name, nested operation, or expression to create a timespan

Data type: INT, FLOAT

Output Data Type: TIME

## TOTIMEFROMSECONDS([value])

Creates a time interval from the total number of seconds.

**Parameters:-** [value] - attribute name, nested operation, or expression to create a timespan

Data type: INT, FLOAT

Output Data Type: TIME

## ADDDAYS([date],[count])

Adds the specified number of days to the date / time interval.

**Parameters:-** [date] - a specific date to which days are added

Data type: DATE, TIME

- [count] - the number of days that are added to the date

Data type: INT, FLOAT

Output Data Type: DATE, TIME

## ADDHOURS([date],[count])

Adds the specified number of hours to the date / time interval.

**Parameters:-** [date] - a specific date to which hours are added

Data type: DATE, TIME

- [count] - the number of hours that are added to the date

Data type: INT, FLOAT

Output Data Type: DATE, TIME

## ADDMILLIS([date],[count])

Adds the specified number of milliseconds to the date / time interval.

**Parameters:-** `[date]` - a specific date to which milliseconds are added

Data type: DATE, TIME

- `[count]` - the number of milliseconds that are added to the date

Data type: INT, FLOAT

**Output Data Type:** DATE, TIME

## **ADDMINUTES([date],[count])**

Adds the specified number of minutes to the date / time interval.

**Parameters:-** `[date]` - a specific date to which minutes are added

Data type: DATE, TIME

- `[count]` - the number of minutes that are added to the date

Data type: INT, FLOAT

**Output Data Type:** DATE, TIME

## **ADDMONTHS([date],[count])**

Adds the specified number of months to the date / time interval.

**Parameters:-** `[date]` - a specific date to which months are added

Data type: DATE, TIME

- `[count]` - the number of months that are added to the date, ignores fractional values

Data type: INT, FLOAT

**Output Data Type:** DATE, TIME

## **ADDSECONDS([date],[count])**

Adds the specified number of seconds to the date / time interval.

**Parameters:-** [date] - a specific date to which seconds are added

Data type: DATE, TIME

- [count] - the number of seconds that are added to the date

Data type: INT, FLOAT

**Output Data Type:** DATE, TIME

## **ADDYEARS([date],[count])**

Adds the specified number of years to the date / time interval.

**Parameters:-** [date] - a specific date to which years are added

Data type: DATE, TIME

- [count] - the number of years that are added to the date, ignores fractional values

Data type: INT, FLOAT

**Output Data Type:** DATE, TIME

## **DATE([date])**

Returns the date part of the date without a timespan.

**Parameters:-** [date] - the date from which the date part is returned

Data type: DATE

**Output Data Type:** DATE

## **DAY([date])**

Returns the day of the month from the date.

**Parameters:-** [date] - the date from which the day part is returned

Data type: DATE

**Output Data Type:** INT

## **DAYOFWEEK([date])**

Returns the day of the week from the date.

**Parameters:-** [date] - the date from which the day of the week is returned

Data type: DATE

**Output Data Type:** INT

## **DAYOFYEAR([date])**

Returns the day of the year from the date.

**Parameters:-** [date] - the date from which the day of the year is returned

Data type: DATE

**Output Data Type:** INT

## **HOUR([date])**

Returns an hour from the date.

**Parameters:-** [date] - the date from which the hour is returned

Data type: DATE

**Output Data Type:** INT

## **MILLISECOND([date])**

Returns a millisecond from the date.

**Parameters:-** [date] - the date from which the millisecond is returned

Data type: DATE

**Output Data Type:** INT

## **MINUTE([date])**

Returns a minute from the date.

**Parameters:-** [date] - the date from which the minute is returned

Data type: DATE

**Output Data Type:** INT

## **MONTH([date])**

Returns a month from the date.

**Parameters:-** [date] - the date from which the month is returned

Data type: DATE

**Output Data Type:** INT

## **QUARTER([date])**

Returns the quarter from the date.

**Parameters:-** [date] - the date from which the quarter is returned

Data type: DATE

**Output Data Type:** INT

## **SECOND([date])**

Returns the seconds part from the date.

**Parameters:-** [date] - the date from which the second is returned

Data type: DATE

**Output Data Type:** INT

## **TIMEOFDAY([date])**

Returns the time part of the date.

**Parameters:-** [date] - the date from which the time part is returned

Data type: DATE

Output Data Type: TIME

## WEEKOFYEAR([date])

Returns the week number of the year from a date according to ISO 8601 standard.

**Parameters:-** [date] - the date from which the week number of the year according to ISO 8601 standard is returned

Data type: DATE

Output Data Type: INT

## YEAR([date])

Returns the year from the date.

**Parameters:-** [date] - the date from which the year is returned

Data type: DATE

Output Data Type: INT

## ISLEAPYEAR([year])

Returns TRUE if the year is leap, otherwise returns FALSE.

**Parameters:-** [year] - the year which I'm checking whether it is a leap one or not

Data type: INT

Output Data Type: BOOL

## DAYS([time])

Returns the day part from the timespan.

**Parameters:-** [time] - the date from which the day part is returned

Data type: TIME

Output Data Type: INT



## HOURS([time])

Returns the hour part from the timespan.

**Parameters:-** [time] - the date from which the hour part is returned

Data type: TIME

**Output Data Type:** INT

## MILLISECONDS([time])

Returns the millisecond part from the timespan.

**Parameters:-** [time] - the date from which the millisecond part is returned

Data type: TIME

**Output Data Type:** INT

## MINUTES([time])

Returns the minute part from the timespan.

**Parameters:-** [time] - the date from which the minute part is returned

Data type: TIME

**Output Data Type:** INT

## SECONDS([time])

Returns the second part from the timespan.

**Parameters:-** [time] - the date from which the second part is returned

Data type: TIME

**Output Data Type:** INT

## TOTALDAYS([time])

Returns the value of the timespan expressed in whole and fractional days.

**Parameters:-** [time] - the date from which the timespan expressed in whole and fractional days is returned

Data type: TIME

**Output Data Type:** FLOAT

## TOTALHOURS([time])

Returns the value of the timespan expressed in whole and fractional hours.

**Parameters:-** [time] - the date from which the timespan expressed in whole and fractional hours is returned

Data type: TIME

**Output Data Type:** FLOAT

## TOTALMILLIS([time])

Returns the value of the timespan expressed in whole and fractional milliseconds.

**Parameters:-** [time] - the date from which the timespan expressed in whole and fractional milliseconds is returned

Data type: TIME

**Output Data Type:** FLOAT

## TOTALMINUTES([time])

Returns the value of the timespan expressed in whole and fractional minutes.

**Parameters:-** [time] - the date from which the timespan expressed in whole and fractional minutes is returned

Data type: TIME

**Output Data Type:** FLOAT

## TOTALSECONDS([time])

Returns the value of the timespan expressed in whole and fractional seconds.

**Parameters:-** [time] - the date from which the timespan expressed in whole and fractional seconds is returned

Data type: TIME

**Output Data Type:** FLOAT

## **ISWORKINGHOUR([dateTime])**

Returns true when time date belongs to working hours defined in the actual calendar.

**Parameters:-** [dateTime] - the date to be evaluated

Data type: DATE

**Output Data Type:** BOOL

## **ISWORKINGDAY([date])**

Returns true when date belongs to working day defined in the actual calendar.

**Parameters:-** [date] - the date to be evaluated

Data type: DATE

**Output Data Type:** FLOAT

## **ISPUBLICHOLIDAY([date])**

Returns true when date belongs to public holiday defined in the actual calendar.

**Parameters:-** [date] - the date to be evaluated

Data type: DATE

**Output Data Type:** FLOAT

## **DURATIONCALENDAR([startDate], [endDate])**

Returns working time duration between two dates calculated actual calendar.

 **Important**

The calculations associated with the work calendar work correctly only in the range from the start of the process minus 6 months to the end of the process plus 24 months. Calculating calendar values such as working days or working hours outside this range will return an error and a default value. This calendar range can't be set by you in the application and is automatically applied after each data refresh.

**Parameters:** - [startDate] - start date of timespan.

Data type: DATE

- [endDate] - end date of timespan

Data type: DATE

**Output Data Type:** FLOAT

## ADDWORKINGDAYS([date],[count])

Adds the specified number of working days to the date. Exact number of defined working hours is not relevant. Any day which is marked as working day is counted as one.

### Important

The calculations associated with the work calendar return correct results only in the range from 6 months prior to the process start until 24 months past the process end date. Calculating calendar values (for example, working days and working hours) outside this range will return an error and a default value. This range is automatically applied after each data refresh and isn't available for you to change.

**Parameters:** - [date] - a specific date to which days are added.

Data type: DATE

- [count] - the number of working days that are added to the date

Data type: INT

**Output Data Type:** DATE

## ADDWORKINGHOURS([date],[count])

Adds the specified number of working hours to the date.

### Important

The calculations associated with the work calendar return correct results only in the range from 6 months prior to the process start until 24 months past the process end date. Calculating calendar values (for example, working days and working hours) outside this range will return an error and a default value. This range is automatically applied after each data refresh and isn't available to change.

**Parameters:** - **[date]** - a specific date to which working hours are added.

Data type: DATE

- **[count]** - the number of working hours that are added to the date

Data type: INT

**Output Data Type:** DATE

## ADDWORKINGMINUTES([date],[count])

Adds the specified number of working minutes to the date.

### Important

The calculations associated with the work calendar return correct results only in the range from 6 months prior to the process start until 24 months past the process end date. Calculating calendar values (for example, working days and working hours) outside this range will return an error and a default value. This range is automatically applied after each data refresh and isn't available for you to change.

**Parameters:** - **[date]** - a specific date to which working minutes are added.

Data type: DATE

- **[count]** - the number of working minutes that are added to the date

Data type: INT

**Output Data Type:** DATE

# List of mathematical operations

Article • 07/18/2023

## ABS([value])

Returns the absolute value of the number.

**Parameters:**

- [value] - input value

Data type: FLOAT, INT

**Output Data Type:** FLOAT, INT

## CEIL([value])

Returns the smallest integer greater than or equal to the given number.

**Parameters:**

- [value] - input value

Data type: FLOAT, INT

**Output Data Type:** FLOAT, INT

## FLOOR([value])

Returns the greatest integer smaller than or equal to the given number.

**Parameters:**

- [value] - input value

Data type: FLOAT, INT

**Output Data Type:** FLOAT, INT

## MAX([value1],[value2])

Returns the maximum of the given values (value1 and value2).

**Parameters:**

- **[value1]** - input value

Data type: FLOAT, INT, DATE, TIME

- **[value2]** - input value Date type: FLOAT, INT, DATE, TIME

**Output Data Type:** FLOAT, INT, DATE, TIME

## **MIN([value1],[value2])**

Returns the minimum of the given values (value1 and value2).

**Parameters:**

- **[value1]** - input value

Data type: FLOAT, INT, DATE, TIME

- **[value2]** - input value

Data type: FLOAT, INT, DATE, TIME

**Output Data Type:** FLOAT, INT

## **LOG([value],[base])**

Returns the logarithm of the number to the specified base.

**Parameters:**

- **[value]** - input value

Data type: FLOAT, INT

- **[base]** - base of the logarithm

Data type: FLOAT, INT

**Output Data Type:** FLOAT

## **POWER([value],[exponent])**

Returns the value of the specified expression to the specified power.

**Parameters:**

- **[value]** - input value

Data type: FLOAT, INT

- **[exponent]** - specified power

Data type: FLOAT, INT

**Output Data Type:** FLOAT

## **ROUND([value],[digits])**

Rounds a number to a specified number of digits.

**Parameters:**

- **[value]** - input value

Data type: FLOAT, INT

- **[digits]** - number of digits

Data type: INT

**Output Data Type:** FLOAT

## **SIGN([value])**

Returns -1 if value is smaller than 0, 0 if value is 0, 1 if value is greater than 0.

**Parameters:**

- **[value]** - input value

Data type: FLOAT, INT

**Output Data Type:** INT

## **SQR([value])**

Calculates the square of the value (second power).

**Parameters:**



- [value] - input value

Data type: FLOAT, INT

**Output Data Type:** FLOAT

## SQRT([value])

Calculates the square root of the value.

**Parameters:**

- [value] - input value

Data type: FLOAT, INT

**Output Data Type:** FLOAT

## TRUNCATE([value])

Returns the integer part of the number (rounded to the nearest integer toward zero).

**Parameters:**

- [value] - input value

Data type: FLOAT, INT

**Output Data Type:** FLOAT

# List of statistical operations

Article • 07/18/2023

This article lists statistical operations in the Power Automate Process Mining desktop app.

## START()

Returns the start of a process/event/case/path.

**Supported context:** process, event, case, edge

**Output Data Type:** DATE

## END()

Returns the end of a process/event/case/path.

**Supported context:** process, event, case, edge

**Output Data Type:** DATE

## DURATION()

Returns the duration of a process/event/case/path.

**Supported context:** process, event, case, edge

**Output Data Type:** TIME

## EVENTCOUNT()

Returns number of the events in the case/process.

**Supported context:** process, event

**Output Data Type:** INT

## CASECOUNT()

Returns number of the cases in the process.

Supported context: process

Output Data Type: INT

## ACTIVETIME()

Returns case active time.

Supported context: case

Output Data Type: TIME

## WAITINGTIME()

Returns case waiting time.

Supported context: case

Output Data Type: TIME

## ISPARALLEL()

In the case context, it returns TRUE if at least one event occurred in parallel with another event, otherwise FALSE. In the event context, it returns TRUE if the event occurred in parallel with another event, otherwise FALSE.

Supported context: case, event

Output Data Type: BOOL

## ISPARALLELWITH([condition])

Returns TRUE if the event occurred in parallel with another event which fullfills a given condition, otherwise FALSE.

Supported context: event

Parameters:

- *[condition]* - condition under which is parallelism accepted

Data type: BOOLEAN

Output Data Type: BOOL

## UTILIZATION()

Returns case utilization (number from 0 to 1).

**Supported context:** case

**Output Data Type:** FLOAT

## PARALLELUTILIZATION()

Returns the cumulative case utilization (a number from 0 to 1 to N). A value above 1 is due to parallel events that last longer than the case itself.

**Supported context:** case

**Output Data Type:** FLOAT

## REWORKCOUNT([attributeName])

Returns the total count of all reworks (loops and self-loops) within the case.

**Supported context:** case

**Parameters:**

- **[attributeName]** - Attribute to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional.

Data type: STRING (only fixed string is allowed)

**Output Data Type:** INT

## LOOPCOUNT([attributeName])

Returns count of loops within the case.

**Supported context:** case

**Parameters:**

- **[attributeName]** - Attribute to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional

Data type: STRING (only fixed string is allowed)

Output Data Type: INT

## SELFLOOPCOUNT([attributeName])

Returns count of self-loops within the case.

Supported context: case

Parameters:

- *[attributeName]* - Attribute to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional

Data type: STRING (only fixed string is allowed)

Output Data Type: INT

## OCCURRENCE([attributeName])

Returns occurrence index of a given event attribute value within the case.

Supported context: event

Parameters:

- *[attributeName]* - Attribute to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional

Data type: STRING (only fixed string is allowed)

Output Data Type: INT

## ISSELFLOOP([attributeName])

Returns true when event/edge has self-loop repetition.

Supported context: event, edge

Parameters:

- *[attributeName]* - Attribute to calculate repetitions. If none is entered, default attribute is mining attribute (activity attribute), optional

Data type: STRING (only fixed string is allowed)

Output Data Type: BOOL

## ISLOOP([attributeName])

Returns true when event/edge has loop repetition.

Supported context: event, edge

Parameters:

- *[attributeName]* - Attribute to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional

Data type: STRING (only fixed string is allowed)

Output Data Type: BOOL

## ISREWORK([attributeName])

Returns true when event/edge has any kind of rework (self-loop or loop).

Supported context: event, edge

Parameters:

- *[attributeName]* - Attribute name to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional

Data type: STRING (only fixed string is allowed)

Output Data Type: BOOL

## ISLOOPINFLOW([attributeName])

Returns true when event/edge has loop inflow.

Supported context: event, edge

Parameters:

- *[attributeName]* - Attribute to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional

Data type: STRING (only fixed string is allowed)

Output Data Type: BOOL

## ISLOOPOUTFLOW([attributeName])

Returns true when event/edge has loop outflow.

Supported context: event, edge

Parameters:

- *[attributeName]* - Attribute to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional

Output Data Type: BOOL

## LOOPGAIN([attributeName])

Returns difference between the event's loop outflow and loop inflow. Value +1 when the event has loop outflow and no loop inflow. Value -1 when the event has no loop outflow and loop inflow. Otherwise returns 0.

Supported context: event

Parameters:

- *[attributeName]* - Attribute name to calculate repetitions. If none is entered, the default attribute is mining attribute (activity attribute), optional

Data type: STRING (only fixed string is allowed)

Output Data Type: INT

## MEDIAN([context],[value],[compression])

Calculates the approximate median of values grouped according to the defined context.

Supported context: process, case, event, edge

Parameters:

- *[context]* - defines the context in which the operation is calculated

Data type: STRING (only fixed string is allowed)

- *[value]* - value over which the median is calculated

Data type: STRING (only fixed string is allowed)

- **[compression]** - controls the estimation accuracy and memory utilization. High compression values increase the accuracy of estimation but make the operation slower. The value must be between 20 and 1000, the default value is 200.

Data type: FLOAT

Output Data Type: INT, FLOAT, DATE, TIME

## QUANTILE([context],[value],[q],[compression])

Calculates the approximate q-th quantile of values grouped according to defined context. The q-th quantile of a data set is defined as that value where a q fraction of the data is below that value and (1-q) fraction of the data above that value.

Supported context: process, case, event, edge

Parameters:

- **[context]** - defines the context in which the operation is calculated

Data type: STRING (only fixed string is allowed)

- **[value]** - value for evaluation

Data type: INT, FLOAT, DATE, TIME

- **[q]** - quantile to compute, must be between 0 and 1 inclusive.

Data type: FLOAT (only constant value is allowed)

- **[compression]** - controls the estimation accuracy and memory utilization. High compression values increase the accuracy of estimation but make the operation slower. The value must be between 20 and 1000, the default value is 200.

Data type: FLOAT

Output Data Type: INT, FLOAT, DATE, TIME

## CDF([context],[value],[x],[compression])

Calculates the estimated cumulative distribution function (cdf) for the given value from values grouped according to the defined context.



**Supported context:** case, event, edge

**Parameters:**

- **[context]** - defines the context in which the operation is calculated

Data type: STRING (only fixed string is allowed)

- **[value]** - value for evaluation for cumulative distribution.

Data type: INT, FLOAT, DATE, TIME

- **[x]** - threshold value Data type: INT, FLOAT, DATE, TIME (need to be the same data type as [value] parameter)

- **[compression]** - controls the estimation accuracy and memory utilization. High compression values increase the accuracy of estimation but make the operation slower. The value must be between 20 and 1000, the default value is 200.

Data type: FLOAT

**Output Data Type:** INT, FLOAT, DATE, TIME

## ISFINISHED()

Returns true when the case is categorized as finished (as defined in Process Context – Case Categorization).

**Supported context:** case

**Output Data Type:** BOOL

## ISRUNNING()

Returns true when the case is categorized as running (as defined in Process Context – Case Categorization)

**Supported context:** case

**Output Data Type:** BOOL

## ISSTUCK()

Returns true when the case is categorized as stuck (as defined in Process Context – Case Categorization).

**Supported context:** case

**Output Data Type:** BOOL

## ISINCOMPLETEIMPORT()

Returns true when the case is categorized as import incomplete (as defined in Process Context – Case Categorization)

**Supported context:** case

**Output Data Type:** BOOL

## STATS([Aggregate]\*,[Type]\*\*)

Returns calculated process statistics according to the selected aggregation and type of statistics.

**Supported context:** process

**Parameters:**

- *[Aggregate]* – aggregation by which the process statistics will be calculated (eg: sum, average, minimum, maximum, range, standard deviation)
- *[Type]* - the type of statistics used in the calculation

**Output Data Type:** INT, FLOAT, TIME, DATE

## Types of Aggregations

Following are the allowed aggregation types:

- Sum
- Avg
- Min
- Max
- Range
- Stdev

# Types of Statistics

<b>Name</b>	<b>Description</b>
CaseStart	Case start
CaseEnd	Case end
CaseDuration	Case Duration
CaseActiveTime	Case Active Time
CaseWaitingTime	Case Waiting Time
CaseUtilization	Case Utilization
EventCount	Event Count

# List of string operations

Article • 01/17/2024

Following are the string operations that you can use in the Power Automate Process Mining desktop app.

## CONCAT([string1],..., [stringN])

Concatenates given strings.

**Parameters:**

- **[string1]** - input string

Data type: STRING

- **[stringN]** - last input string

Data type: STRING

**Output Data Type:** STRING

## CONTAINS([string],[value])

Returns TRUE if the string contains the given value, else returns FALSE.

**Parameters:**

- **[string]** - input string

Data type: STRING

- **[value]** - value to be matched in input string

Data type: STRING

**Output Data Type:** BOOL

## ENDSWITH([string],[value])

Returns TRUE if string ends with the given value, else returns FALSE.

**Parameters:**

- **[string]** - input string

Data type: STRING

- **[value]** - value to match end of input string

Data type: STRING

**Output Data Type:** BOOL

## **LEFT([string],[count])**

Extracts a given number of characters from the left side of a supplied text string.

**Parameters:**

- **[string]** - input string

Data type: STRING

- **[count]** - number of characters

Data type: INT

**Output Data Type:** STRING

## **LEN([string])**

Returns the length of the string.

**Parameters:**

- **[string]** - input string

Data type: STRING

**Output Data Type:** INT

## **LOWER([string])**

Returns a lower-case version of a given text string.

**Parameters:**

- **[string]** - input string

Data type: STRING

Output Data Type: STRING

## LTRIM([string])

Removes whitespace from the beginning of the string.

Parameters:

- [string] - input string

Data type: STRING

Output Data Type: STRING

## RIGHT([string],[count])

Extracts a given number of characters from the right side of a supplied text string.

Parameters:

- [string] - input string

Data type: STRING

- [count] - number of characters

Data type: INT

Output Data Type: STRING

## RTRIM([string])

Removes whitespace from the end of the string.

Parameters:

- [string] - input string

Data type: STRING

Output Data Type: STRING

## STARTSWITH([string],[value])

returns TRUE if string starts with the given value, else returns FALSE

### Parameters:

- **[string]** - input string  
Data type: STRING
- **[value]** - value to be matched  
Data type: STRING

Output Data Type: BOOL

## SUBSTRING([string],[start],[count])

Returns substring from the specified start position and by the specified number of characters.

### Parameters:

- **[string]** - input string  
Data type: STRING
- **[start]** - start position of substring  
Data type: INT
- **[count]** - length of substring  
Data type: INT

Output Data Type: STRING

## TOINT([string],[default])

Converts a string to an integer. Returns 0 or default value (optional) if conversion error occurs

### Parameters:

- **[string]** - input string to be converted

Data type: STRING

- **[default]** - default value

Data type: INT, FLOAT

**Output Data Type:** INT

## TOSTRING([int],[format]\*)

Converts an integer to a string according to the formatting string (if an optional parameter is specified).

**Parameters:**

- **[int]** - input int value

Data type: STRING

- **[format]\*** - formatting string

[Learn more about formatting strings](#)

Data type: STRING (only fixed string is allowed)

**Output Data Type:** STRING

## TOSTRING([float],[format]\*)

Converts a float to a string according to the formatting string (if an optional parameter is specified).

**Parameters:**

- **[float]** - input float value

Data type: FLOAT

- **[format]\*** - formatting string

[Learn more about formatting strings](#)

Data type: STRING (only fixed string in allowed)

**Output Data Type:** STRING



# TOSTRING([bool])

Converts boolean to a string - "True" or "False".

## Parameters:

- **[bool]** - input boolean value

Data type: BOOL

Output Data Type: STRING

# TOSTRING([date],[format]\*)

Converts a date to a string according to the formatting string (if an optional parameter is specified).

## Parameters:

- **[date]** - input date

Data type: STRING

- **[format]\*** - formatting string applied on date

[Learn more about formatting strings](#)

Date type: STRING (only fixed string is allowed)

Output Data Type: STRING

# TOSTRING([time],[format]\*)

Converts a time to a string according to the formatting string (if an optional parameter is specified).

## Parameters:

- **[time]** - input time

Data type: STRING

- **[format]\*** - formatting string applied on time

[Learn more about formatting strings](#)

Data type: STRING (only fixed string is allowed)

**Output Data Type:** STRING

## **TRIM([string])**

Removes whitespace at the beginning and at the end of the string.

**Parameters:**

- [string] - input string

Data type: STRING

**Output Data Type:** STRING

## **UPPER([string])**

Returns upper-case version of a given text string.

**Parameters:**

- [string] - input string

Data type: STRING

**Output Data Type:** STRING

# List of other operations

Article • 07/18/2023

Following are other operations that you can use in Power Automate Process Mining.

## attributeName

Returns the event/case attribute value.

**Output Data Type:** BOOL, INT, STRING, FLOAT, TIME, DATE

**Example:** `MAX(eventCost)`

Metric applicable on process map calculates the maximum cost of the event per activity. Attribute name - eventCost - is case insensitive, valid formats are also for example EVENTCost, eventcost, or EventCOST.

## GETVALUE([attributeName])

Returns the event/case attribute value.

**Parameters:**

- *[attributeName]* - attributeName

Data type: STRING (only fixed string is allowed)

**Output Data Type:** BOOL, INT, FLOAT, TIME, DATE

**Example:** `GetValue("invoice total")`

If the attribute contains space in the name, it isn't possible to write it directly as part of the custom metric expression. In such cases, use the operator GetValue to access the value of a given attribute.

## IF([condition],[valueIfTrue],[valueIfFalse])

Returns the first or second value based on the condition.

**Parameters:**

- *[condition]* - boolean value or expression

Data type: BOOL

- **[valueIfTrue]** - value to be matched in input string

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

- **[valueIfFalse]** - returned value if condition is not met

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `IF(EventCount() > 10, "Complex", "Simple")`

Metric applicable on case overview statistics screen. If the case contains more than 10 events, the returned value is "Complex", otherwise "Simple".

## SOURCE([operation])

Changes the context of the operation to initial event path (only allowed for paths).

**Supported context:** edge

**Parameters:**

- **[operation]** - value to be returned from the initial event path

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `SUM(SOURCE(Duration()+Duration())`

Metric applicable on process map calculates the sum of the initial event duration in the path and the path duration itself.

## TARGET([operation])

Changes the context of the value to ending event path (only allowed for paths).

**Supported context:** edge

**Parameters:**

- **[operation]** - input string

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `SUM(SOURCE(Duration()+TARGET(Duration()))`

Metric applicable on process map calculates total duration of path's starting and ending events for each path.

## CASE([operation])

Changes the context of the operation to case event/path (only allowed for events and paths).

**Supported context:** event, edge

**Parameters:**

- **[operation]** - value to be calculated on the case level of a current event or edge

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIM

**Example:** `Duration() / CASE(Duration())`

Metric applicable on event-level filter calculates the ratio of event duration to case duration.

## FIRSTEVENT([operation])

Changes the context of the operation to the first event case (only allowed for cases).

**Supported context:** case

**Parameters:**

- **[operation]** - value to be calculated on the context of the first event in the case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `FIRSTEVENT(Duration())`

Metric applicable on case overview statistic calculates the duration of the first case's event per each case.

## LASTEVENT([operation])

Changes the context of the operation to the end event case (only allowed for cases).

**Supported context:** case

**Parameters:**

- *[operation]* - value to be calculated on the context of the last event in the case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** LASTEVENT(Duration())

Metric applicable on case overview statistic calculates the duration of the last case's event per each case.

## PROCESS([operation])

Changes the context of the operation to a process.

**Supported context:** process, case, event, edge

**Parameters:**

- *[operation]* - value to be calculated in the context of the actual process

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** PROCESS(EventCount())

Metric applicable for any custom metric usage within the application. Returns total number of events in the current process (in actual view).

## IN([operation], value1, value2, value3, ....., valueN)

returns TRUE if the operation is equal to any of given values. It is a shortened version of the logical operation OR.

**Parameters:**

- **[operation]** - value to be calculated in the context of the actual process

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

- **[value1], [value2], .., [value3]** - list of values for compare. All values need to be the same data type and the same data type as the operation

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL

**Example:** `COUNTIF(IN(userName, "Peter", "Martin", "Laura"))`

Metric applicable on process map for activities. Returns the total count of events with users named "Peter" or "Martin" or "Laura" per activity.

## NEXT([value],[default])

Returns the value of the next event in the case. If the next event doesn't exist, returns the default value.

**Supported context:** case (implicit)

**Parameters:**

- **[value]** - value to be calculated in the context of the next event within the actual case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

- **[default]** - default value to be returned if there is no next event in the actual case.

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `NEXT(eventCost, 0)`

Metric applicable on filter metrics. Returns event cost of the next event in the case. If the current event is the last event in the case, returns zero.

# NEXTIF([condition], [value], [default])

Returns the value of the first next event in the case which met the condition. If no such next event exists, returns default value.

**Supported context:** case (implicit)

**Parameters:**

- **[condition]** - the condition which needs to be met for the event selection

Data type: BOOL

- **[value]** - value to be calculated in the context of the first next event which matches the [condition] within the actual case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

- **[default]** - default value to be returned if there is no next event in the actual case which matches the condition

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `NEXTIF(userName == "Laura", eventCost, 0)`

Metric applicable on any custom metric usage within the application. Returns total number of events in the current process (in the actual view).

# PREVIOUS([value], [default])

Returns value of the previous event in the case. If previous event doesn't exist, returns default value.

**Supported context:** case (implicit)

**Parameters:**

- **[value]** - value to be calculated in the context of the previous event within the actual case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

- **[default]** - default value to be returned if there is no previous event in the actual case.



Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `PREVIOUS(userName, "n/a")`

Metric applicable on metrics filter. Returns value of userName attribute for the previous event in the case. If the previous event does not exist (for example, for the first event in case), it returns "n/a".

## PREVIOUSIF([condition], [value], [default])

Returns value of the first previous event in the case which met the condition. If no such previous event exists, returns the default value.

**Supported context:** case (implicit)

**Parameters:**

- **[condition]** - the condition which needs to be met for the event selection

Data type: BOOL

- **[value]** - value to be calculated in the context of the first previous event which matches the [condition] within the actual case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

- **[default]** - default value to be returned if there is no previous event in the actual case which matches the condition

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `PREVIOUSIF(eventCost > 0, userName, "n/a")`

Metric applicable on metrics filter. Returns value of userName attribute for the first previous event in the case with the eventCost greater than zero. If no such previous event exists, it returns "n/a".

## MOVE([offset], [value], [default])

Returns the value of the event in the case retrieved by the offset. Offset 1 means next event, offset -1 previous, offset 0 current. If the event does not exist on the given offset,

it returns the default value.

**Supported context:** case (implicit)

**Parameters:**

- **[offset]** - offset to current event

Data type: INT

- **[value]** - value to be calculated in the context of the specified event within the actual case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

- **[default]** - default value to be returned if there is no such event in the actual case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `SUM(MOVE(2, eventCost, 0) + MOVE(1, eventCost, 0))`

Metric applicable on the process map. Returns the sum of event cost for the next two (subsequent) events calculated per activity.

## **MOVEIF([offset], [condition], [value], [default])**

Returns the value of the event satisfying the condition retrieved by the offset. Offset 1 means the next following fulfilling event, offset -1 the nearest previous fulfilling event, offset 0 the current fulfilling event. If such an event doesn't exist, it returns the default value.

**Supported context:** case (implicit)

**Parameters:**

- **[offset]** - event offset

Data type: INT

- **[condition]** - the condition which needs to be met for the event selection

Data type: BOOL

- **[value]** - value to be calculated in the context of the specified event within the actual case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

- **[default]** - default value to be returned if there is no such event in the actual case

Data type: BOOL, INT, FLOAT, STRING, DATE, TIME

**Output Data Type:** BOOL, INT, FLOAT, STRING, DATE, TIME

**Example:** `MOVEIF(3, userName == "Laura", eventCost, 0)`

Metric applicable on metrics filter. Returns event cost for the third next event which was done by the user "Laura" in the current case.

# List of calculation context

Article • 07/18/2023

In aggregation functions, the calculation context defines the data scope that's used as the source for the aggregation. The Power Automate Process Mining desktop app provides several data calculation modes, which are described in [Requirements for application](#).

Custom metrics can include nested aggregations, or aggregations used in an expression. For example, the expression `AVG(DURATION()/AVG(AllInView, DURATION()))` returns the ratio of the average duration of certain activities or edges to the average duration of all activities or edges.

## Available contexts

Context	Description
Implicit	Default context; no need to specify. Aggregation is calculated for each unique value; that is, for each activity or edge in the map.
AllInView	Aggregation is calculated for all values in the view.
ViewCases	Aggregation is calculated for all cases in the view.
ViewEvents	Aggregation is calculated for all events in the view.
ViewEdges	Aggregation is calculated for all edges in the view.
AllInProcess	Aggregation is calculated for all values in the process.
ProcessCases	Aggregation is calculated for all cases in the process.
ProcessEvents	Aggregation is calculated for all events in the process.
ProcessEdges	Aggregation is calculated for all edges in the process.
AllInBR	Aggregation is calculated for all values in the business rule scope.
BRCases	Aggregation is calculated for all cases in the business rule scope.
BREvents	Aggregation is calculated for all events in the business rule scope.
BREdges	Aggregation is calculated for all edges in the business rule scope.
EventsPerAttribute	Aggregation is calculated for all events with the same value for the selected attribute.

Context	Description
EdgesPerAttribute	Aggregation is calculated for all edges with the same value for the selected attribute.
CasesPerAttribute	Aggregation is calculated for actual cases, with each case calculated one time.
CaseEvents	Non-aggregated evaluation of events in a single case.
CaseEdges	Non-aggregated evaluation of edges in a single case.

## Use different calculation contexts

**AVG(DURATION())**: Returns the average duration of a specific activity or edge. When visualized in the process map, the value differs for different activities or edges. In other words, the average duration is calculated in the context of the activity or edge that's visualized.

**AVG(AllInView, DURATION())**: Returns the average duration of all activities or edges in the view. When visualized in the process map, one value is used for all activities and a different value is used for all edges. In other words, there are two different values.

**AVG(ProcessCases, DURATION())**: Returns the average duration of all cases in the process, regardless of the view filters. When visualized in the process map, the value is the same for all activities and edges. In other words, there's one value for all activities and edges.

**AVG(ViewEvents, DURATION())**: Returns the average duration of all events in the view. When visualized in the process map, the value is the same for all activities and edges. In other words, there's one value for all activities and edges.

**AVG(ViewEdges, DURATION())**: Returns the average duration of all edges in the view. When visualized in the process map, the value is the same for all activities and edges. In other words, there's one value for all activities and edges.

**AVG(CasesPerAttribute, DURATION())**: Returns the average duration of all cases that flow across the activities and edges. It's the same value for all activities and edges that contain the same set of cases.

**AVG(CasesPerAttribute, DURATION())**: The same metric as the one above, now used in the Statistics case-level attribute. It returns the average duration of all cases in the view that have the same value for the attribute Supplier.City, with each case calculated once.

**AVG(EventsPerAttribute, DURATION()):** Returns the average duration of all events in the view that have the same activity value. This is a standard metric in the Performance view - Mean Duration. This metric is unavailable for edges. The calculation context is limited to events only.

**AVG(EventsPerAttribute, DURATION()):** The same metric as the previous one, now used in the Statistics event-level attribute. It returns the average duration of all events in the view that have the same value for the attribute Resource. Refer to the last column, EventsPerAttribute-Avg.

**AVG(EdgesPerAttribute, DURATION()):** Returns the average duration of all edges in the view for a process map path. This is the standard metric in the Performance view - Mean Duration on edges. This metric is unavailable for events. The calculation context is limited to edges only.

# Custom metrics calculation methods

Article • 07/18/2023

Use this article if you're already familiar with the basic functionality of the Power Automate Process Mining desktop app and understand the basics of process mining. It offers a methodical introduction to the calculation methods after which you'll be able to define the desired calculation scope.

## Metrics in Power Automate Process Mining

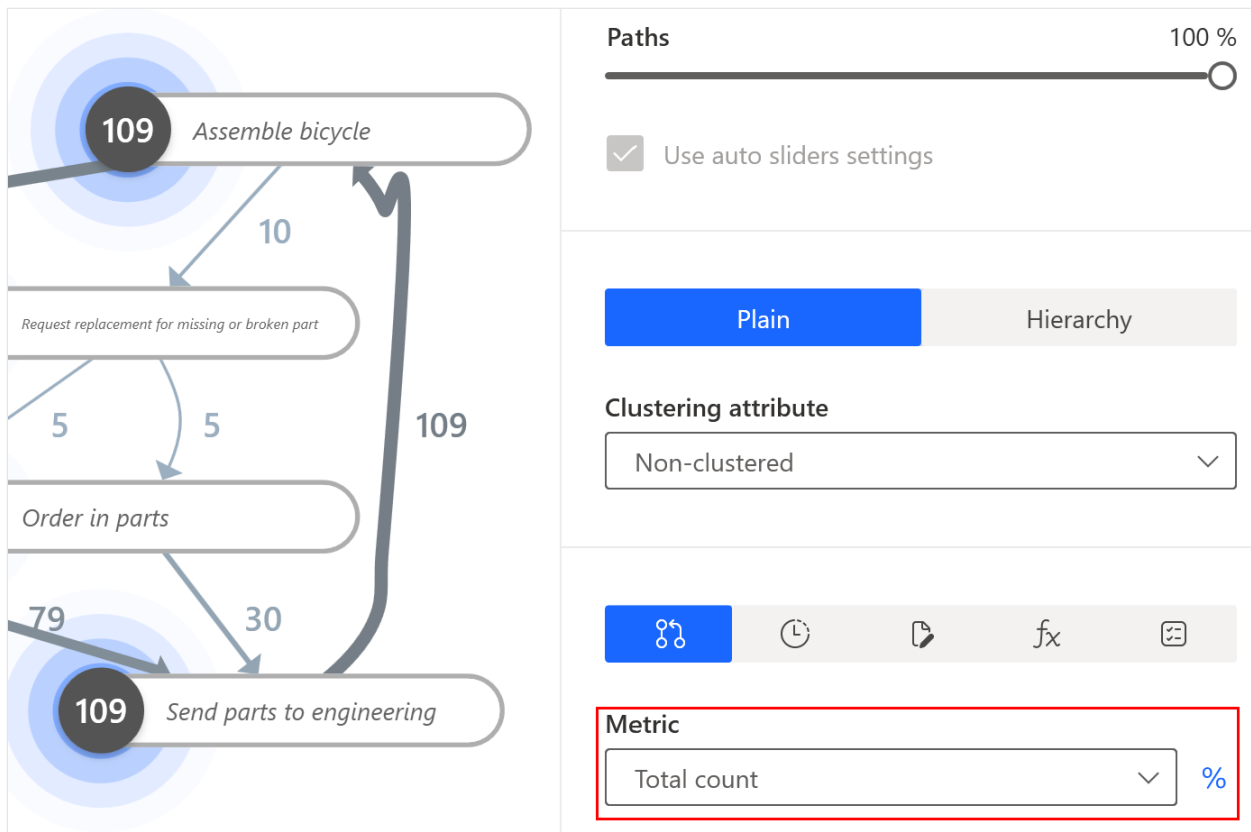
The Process Mining desktop app offers a wide set of predefined standard metrics (for example, number of events, number of cases, average duration of cases, number of variants, and more). These metrics might be separated in two basic groups:

- **Aggregated metrics:** Most common result. Display calculated values grouped by selected context across the Process Mining desktop app.
- **Non-aggregated metrics:** Display values per individual data element like event, edge, or case.

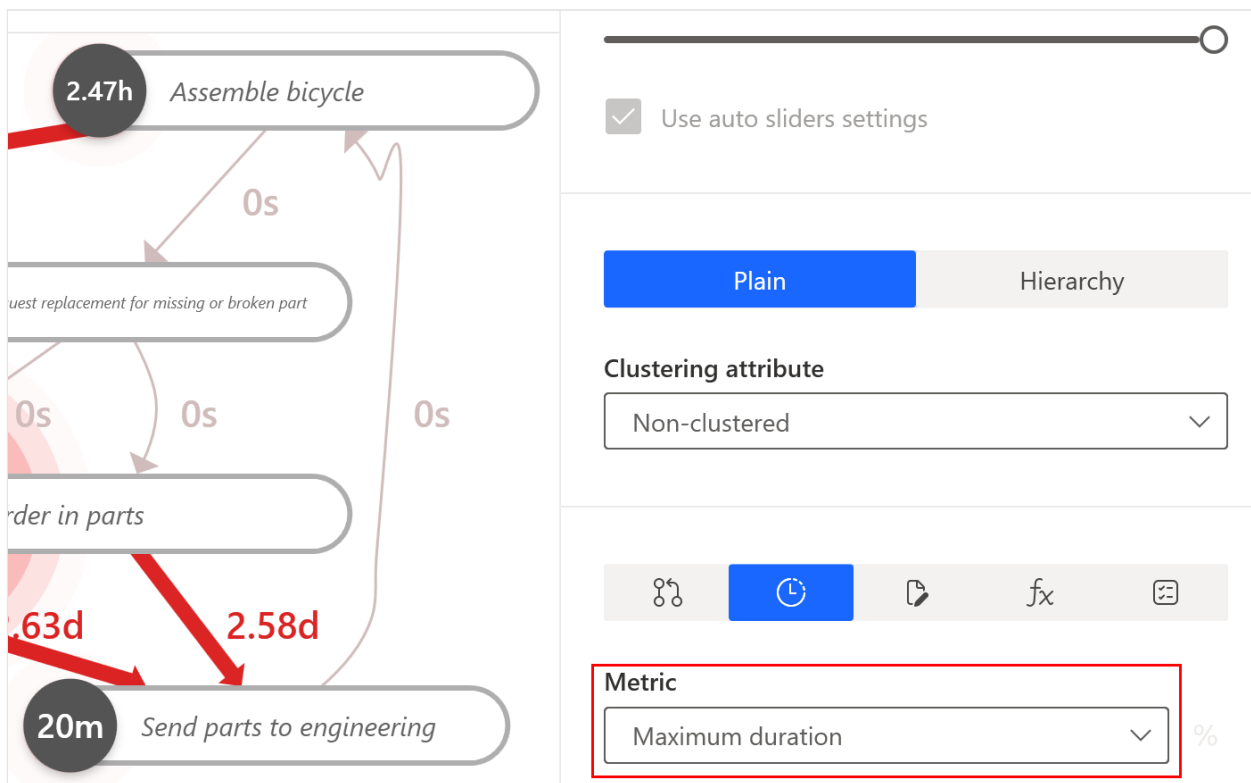
## Aggregated metrics

Aggregation or calculation is done over certain calculation scope or context. Scope is defined by different analytical views in the Process Mining desktop app. This example uses the process map.

Process map is the most common type of display for process mining analysis. Each element of the map - node (activity) or path (edge) displays an aggregated value for all events with the same activity value. In the example below, you see the representation of two activities: *Assemble bicycle* and *Send parts to engineering*. For both nodes, the displayed value represents 109 single events in the data set and displays the aggregated value for all of it. In this case, it's the total number of events.



When you select another metric (**maximum duration**) in the right panel, the process map displays the maximum duration which occurred among 109 events with activity *Assemble bicycle* and maximum duration among 109 events with activity *Send parts to engineering*.



The statistics panel per single attributes uses the same aggregation as the process map, which aggregates the results per attribute value. If you have a resource (for example, a



user attribute in statistic panel), you're able to see result per each user occurred in actual view.

The Process Mining desktop app displays aggregated results in three main categories:

- **Single result:** Usually a single global value per actual data set, for example, number of cases. Input is a whole data set and output is a single result.
- **Aggregation per single case:** In **Statistics**, the **Case overview** panel results are calculated per single case. Calculation scopes for such aggregations are case events or case edges. Input is set of events or edges within case. Output is a set of results, and single result per single case.
- **Aggregation per attribute value:** Most common calculation scope, and is represented by **Process map** or **Statistics** panel for any attribute. Input is a set of events or edges with the same value of selected attribute. Output is set of results, single result per each attribute value. The default **Process map** uses attribute *activityName* to calculate results per each set of events with the same *activityName* value.

In the **Statistics Case overview** panel, you can see a global single result for the total count of all events in view. In the same panel, there's a list of all cases. In a table of cases, there's a column named **Event count**. This time, the value represents the number of events in the case. This grouping is called *aggregation by single case*.

In the **Statistics activityName** panel, there's a list of all activities. The table of activities contains a column named **Event frequency**. This time, the event count is calculated per each activity. This grouping is called *aggregation by attribute value*.

Statistics table			
activityName	Case frequency ↑	Case frequency (%)	Event frequency
Request replacement for missing or broken part	10	5.05%	10
Order in parts	29	14.65%	30
Collect payment	73	36.87%	73

We've seen value 109 for activities *Assemble bicycle* and *Send parts to engineering* in the [Aggregated metrics](#) section previously in this article. Calculation for all three metrics categories is the same, and the only difference is calculation scope. The first example uses all view events and calculates single result. The second one generates the result per single case and uses per each result only for events within given case. The last one

generates the result per each activity and uses per each result only events with the given activity value.

## Non-aggregated metrics

The major difference to aggregated metrics is that calculation is done per single element: either case, event, or edge. An example is if an event has assigned a resource attribute, or if case duration is outside defined working hours. There are only a few places where non-aggregated metrics (and attribute values) are displayed and available:

- Statistics panel for case overview where values per single case are displayed. Be aware, the displayed metrics are result of aggregation per single case (over events within given case), but from case level perspective these are non-aggregated metrics as represents single case.
- Case/event metric filters are among a few places where non-aggregated values are displayed and available to user.

The **Event metrics** filter is a good example of where duration of single events is displayed and evaluated. Event filters take each event individually and evaluate its attribute or metric value as it is. All other standard visualizations in the Process Mining desktop app display event duration in some aggregated way (for example, mean, total, minimum, or maximum).

## Custom metrics

Custom metric is a named calculation formula defined by user per process. This custom metric is applied by the standard ways for how the Process Mining desktop app displays the data. It displays standard metrics in an aggregated and non-aggregated way.

Custom metrics must follow the same rule. Therefore, there are two main different types of custom metrics:

- **Scalar (non-aggregated) formulas**—**Calculation over single element like case, edge or event:** Simple scalar formulas don't contain aggregation operation in its formula. In more complex examples, it's possible to use aggregation as part of nested expression (for example, compare event duration to average duration of all events). The important rule is the result of scalar formula is generated per single case, edge or event. Individual results aren't further grouped nor processed by application into aggregated results.
- **Aggregated formulas**—**Calculation over certain calculation scope or 'context'.** **User can alternate context in formula:** Aggregated formulas contain aggregation

operator (for example, **AVG**) at a top evaluation level. The Process Mining desktop app offers a set of standard aggregation operators - see Custom metrics help for reference. Aggregation operation as first argument takes calculation scope. This determines two properties:

- Input set of data taken into account
- Grouping or granularity of the results

## Input set of data

You determine what part of the data set is taken into calculation. Calculation of average event duration for the process map is required to take into calculation only events which belong to the same activity.

## Grouping or granularity of the result

Another aspect of the calculation scope is to determine the granularity of result. Average event duration in the whole view is a single number, and the count of results is exactly one. Calculating values for the process map requires the number of results to match number of nodes (for example, activities) in the process map. We already know there are three main categories for how results are grouped:

- Single global result
- Aggregation per single case
- Aggregation per attribute value

## Generic form for custom metric formulas

Consider the following task: Calculate *average revenue per hour for invoice processing* in cases when **order number** was entered manually, and **invoice status** was never rejected.

## Logical breakdown for a generic form

The following table provides examples and descriptions of custom metrics.

Example	Description
Aggregation	Aggregation converts multiple results (for example, per case) into a single value. If the aggregation part is missing, we have scalar, non-aggregated metric.

Example	Description
Calculation	Standard calculations in the Process Mining desktop app are: <code>Total(sum)</code> , <code>Mean(avg)</code> , <code>min</code> , <code>max</code> . Advanced calculations like ratio of two attributes need to be done with custom metrics.
Data filtration	Filtration in the Process Mining desktop app can be done with filters, custom metrics with conditional operators, or business rules with filters.

The example shows the possibility to perform advanced filtering in custom metrics. To make the example easier, we'll focus on the aggregation and calculation part. When we create the view, filters which fit the requirements of "order number was entered manually, and invoice status was never rejected" we might simplify the task.

## The simplified task

Calculate average revenue per hour for invoice processing for cases in actual view.

## Logical breakdown for a simplified task

The following table provides examples and descriptions of custom metrics.

Example	Description
Aggregation	Aggregation converts multiple results (for example, per case) into a single value. Scope of aggregation is defined by context definition.
Calculation	Standard calculations in the Process Mining desktop app are: <code>Total(sum)</code> , <code>Mean(avg)</code> , <code>min</code> , <code>max</code> . Advanced calculations like ratio of two attributes need to be done with custom metrics.
Data filtration	Simplified filtering means the scope or context definition.

## Generic formula for aggregated custom metrics

```
Aggregation([Data filtration/scope], calculation)
```

Replace the generic placeholders with actual operators and expressions:

```
Avg(ViewCases, 1.0 * InvoiceTotalAmountWithoutVAT / TOTALHOURS(Duration()))
```

The aggregation part is represented by the simple average operator (avg).

Calculation scope is the first part to define in the formula itself. We're looking for a single global result using all cases in the view. This is easily achieved by selection of `ViewCases` value for context definition. Other types of using aggregated results, like per single case or per attribute value, have no use in this example.

Core calculation is completely done through an expression that contains four elements:

- Conversion to float ("1.0 \*")
- Attribute specification ("InvoiceTotalAmountWithoutVAT")
- (Case) duration converted to time unit 'hour' (TOTALHOURS)
- Division to calculate ratio

# Basic examples

Article • 07/18/2023

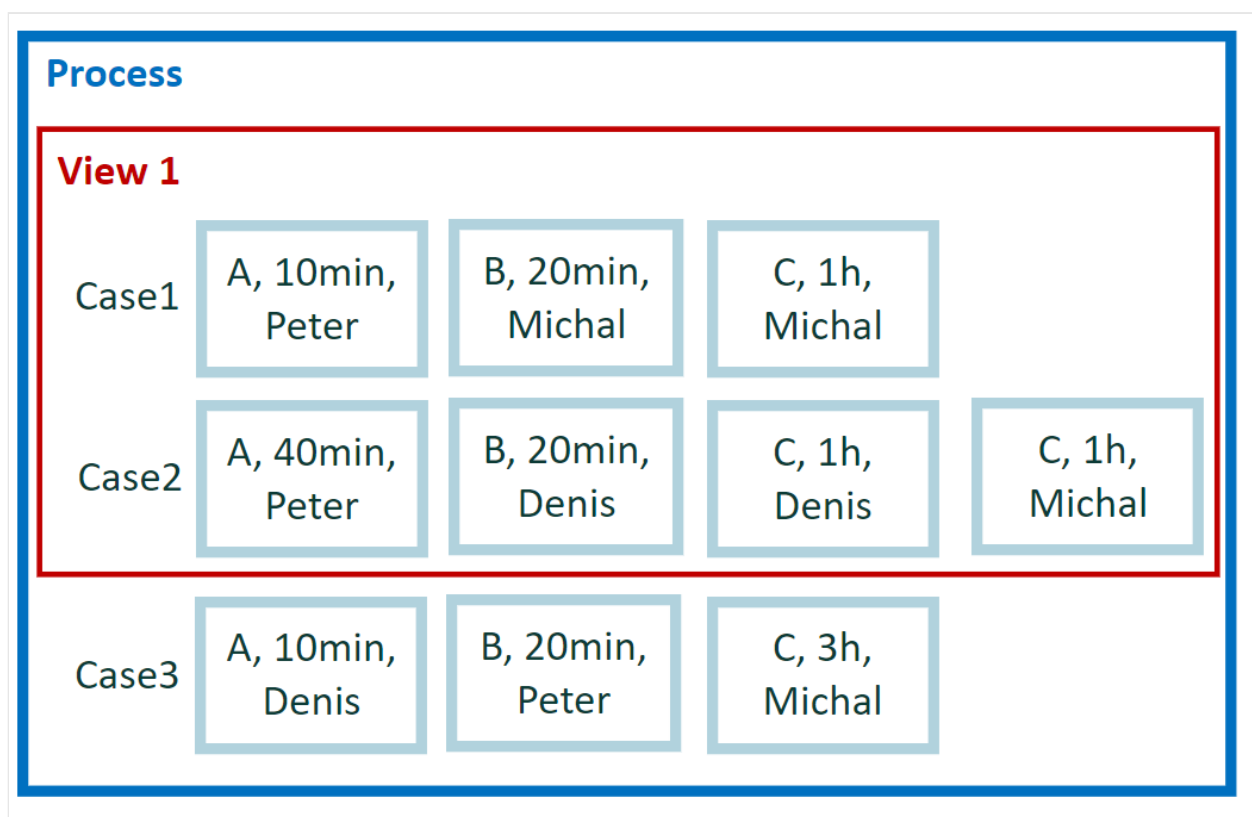
The following examples show various calculation methods for custom metrics with a focus on proper context/aggregation selection. For a complete list of supported operators (like statistical, calendar or math functions), go to [Custom metrics](#).

## Dataset description

The examples use a tiny data set. It contains three cases, 10 events, and there's one view defined—two out of three cases. For easy manual calculations, we assume zero waiting time between events; therefore, case duration is a simple sum of events duration. Also, there's no parallelism among events.

### 1. Event level aggregation (view)

*What's the total duration of events in the view?* We're looking for a single result for the whole data set in actual view.

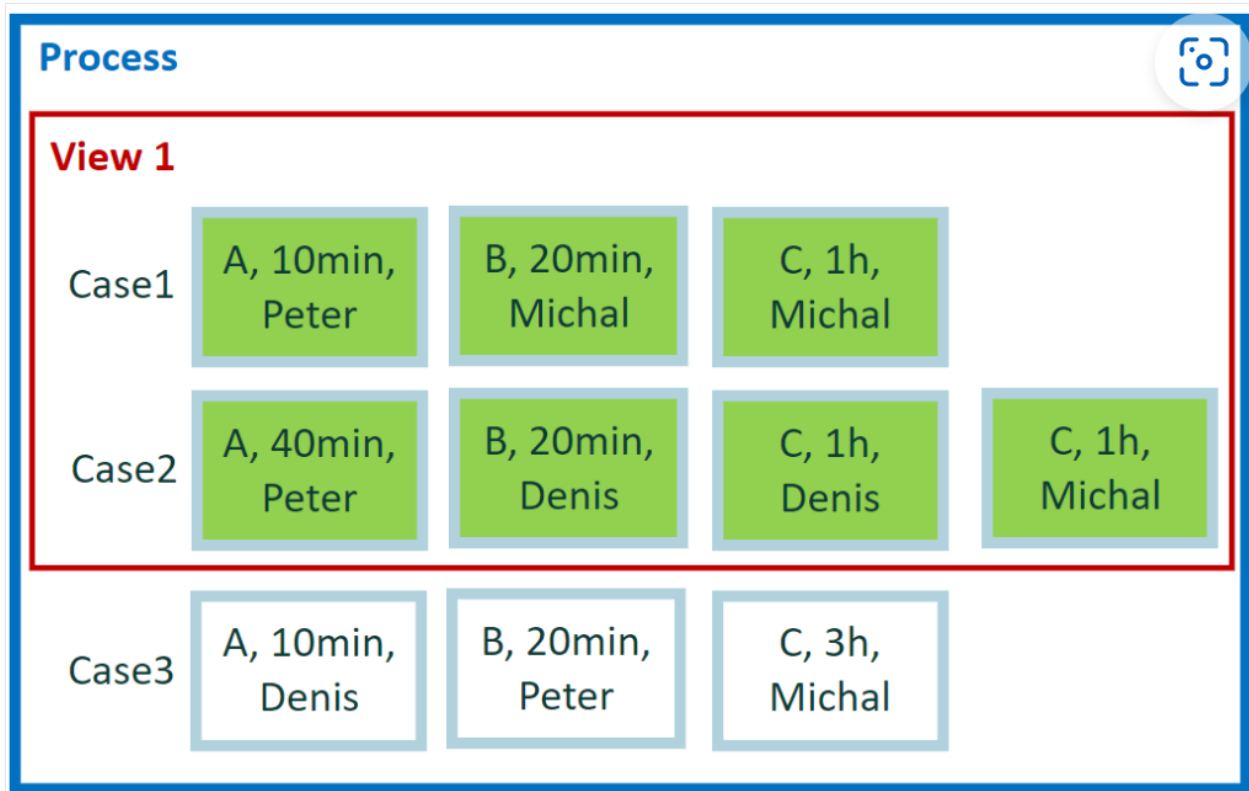


### Calculation for example 1

We need to run across all available events in the view. Assignment of events to cases isn't taken into account. Such calculation provides single result in the whole view. When we manually sum all event duration, we arrive at the requested result.

## Result for example 1

4:30 hours (events in case 1 = 90 minutes + events in case 2 = 180 minutes = 270 minutes, in total 4:3 hours)



Expression in the custom metric formula

Metric formula:

```
SUM(ViewEvents, Duration())
```

PROCESS MAP	STATISTICS	FILTER
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics
	<input checked="" type="checkbox"/> Edges	

Metric data:

Metric type:

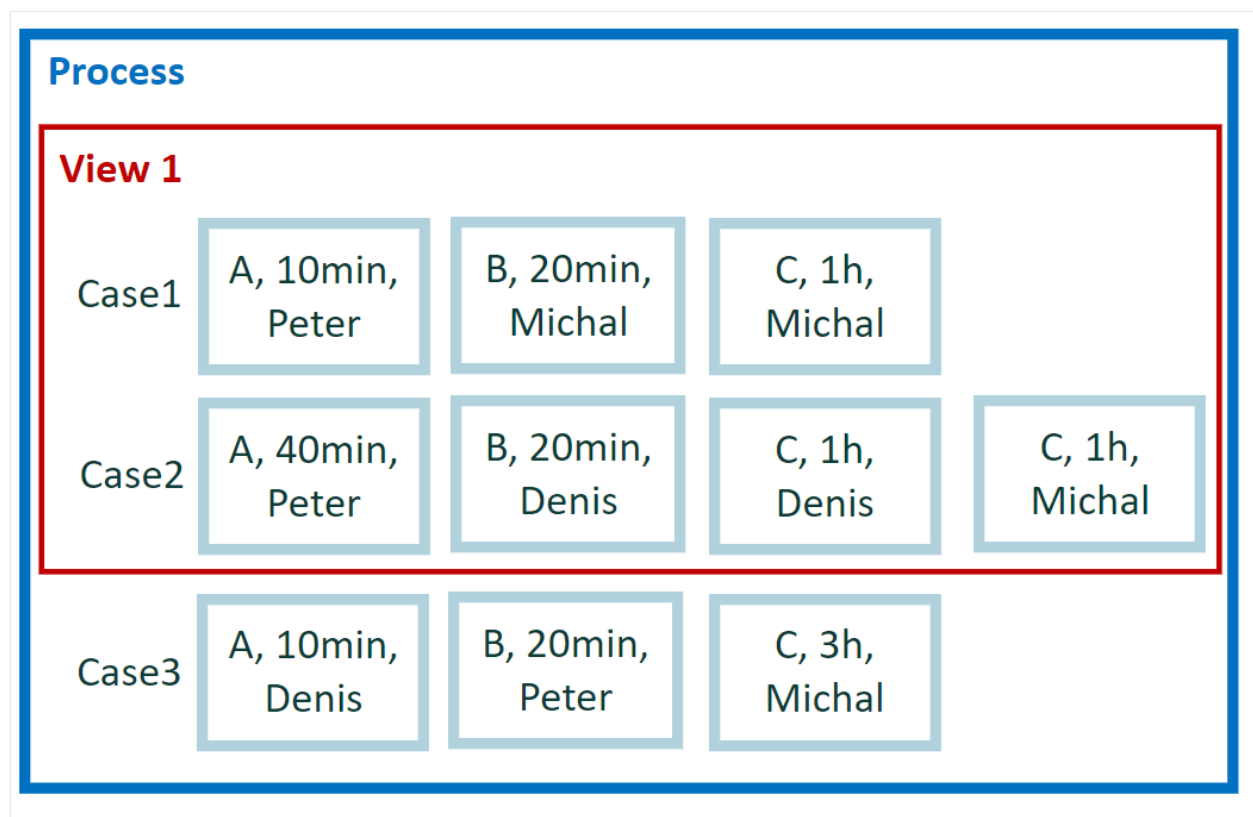
Process map
 Statistics
 Filter

## Usage for example 1

The custom metric editor indicates the result is applicable everywhere in the Power Automate Process Mining desktop app. The reason is that a single result is a numerical constant, which can be used in any expression and any place where the metric is displayed. Such metric - returning single value may be displayed in process map, statistics for case overview, statistics for attributes, filters, or root cause analysis.

## 2. Event level aggregation (process)

*What's the total duration of events in the process?* We're looking for a single global result, but not on scope of view, but on scope of complete process data.



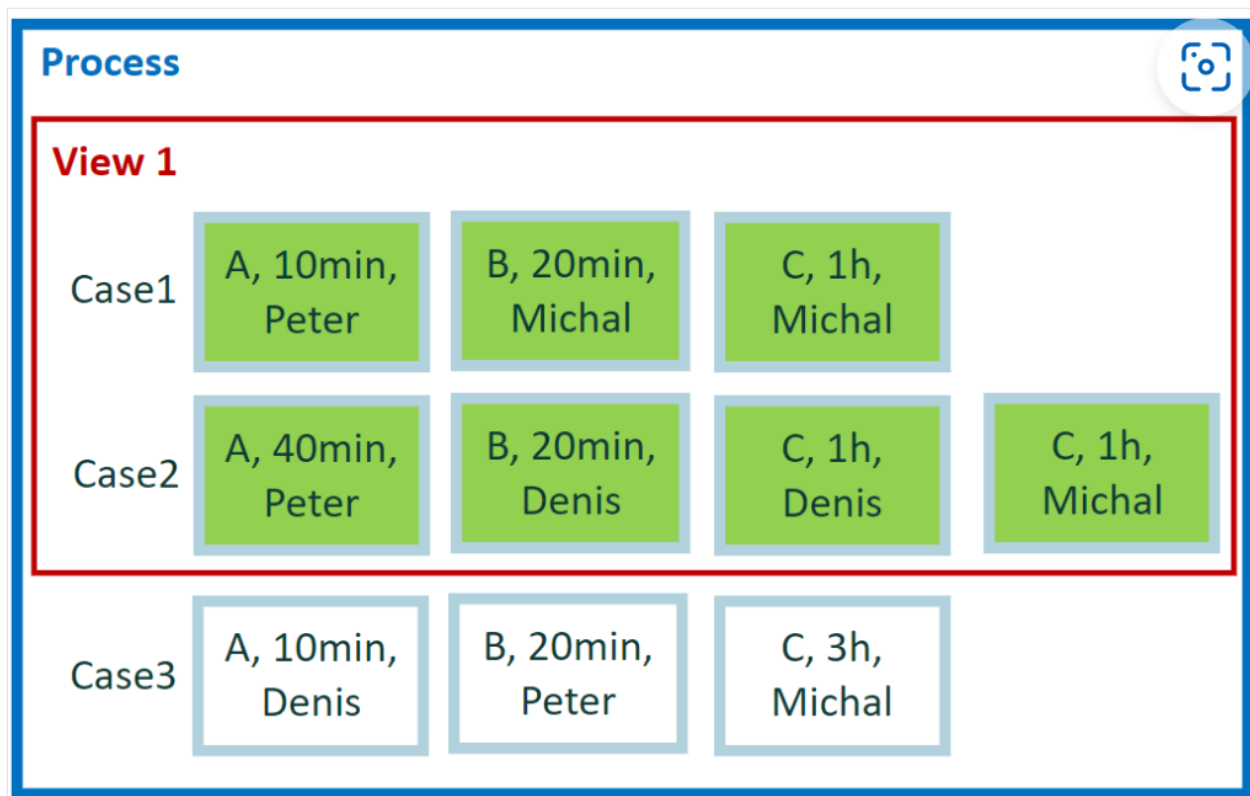
## Calculation for example 2

In this example, we need to run across all available events in process regardless cases or any filtering by view. Such calculation provides single result in whole view (process). When we manually sum all event duration, we arrive at the requested result.

## Result for example 2

8:00 hours (events in case 1 = 1 hour 30 minutes + events in case 2 = 3 hours + events in case 3 = 3 hours 30 minutes, in total 8:00 hours)





Expression in the custom metric editor

Metric formula:

```
SUM(ProcessEvents, Duration())
```

PROCESS MAP	STATISTICS	FILTER
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics
	<input checked="" type="checkbox"/> Edges	

Metric data:

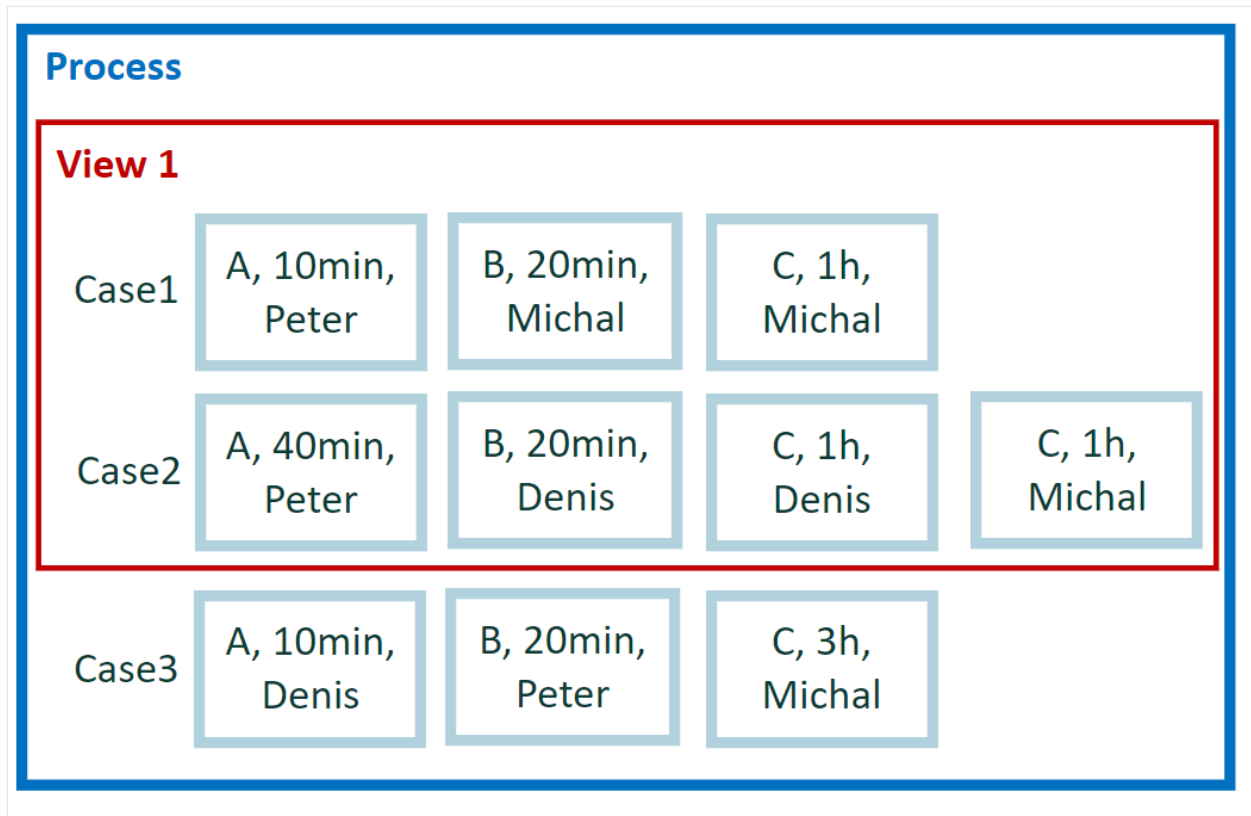
Metric type:  Process map  Statistics  Filter

## Usage for example 2

Result is applicable everywhere in the Process Mining desktop app. The same logic for application as for previous example.

## 3. Case events aggregation

What's the total duration of events per case? We're asking for the result per case, not a single global result.



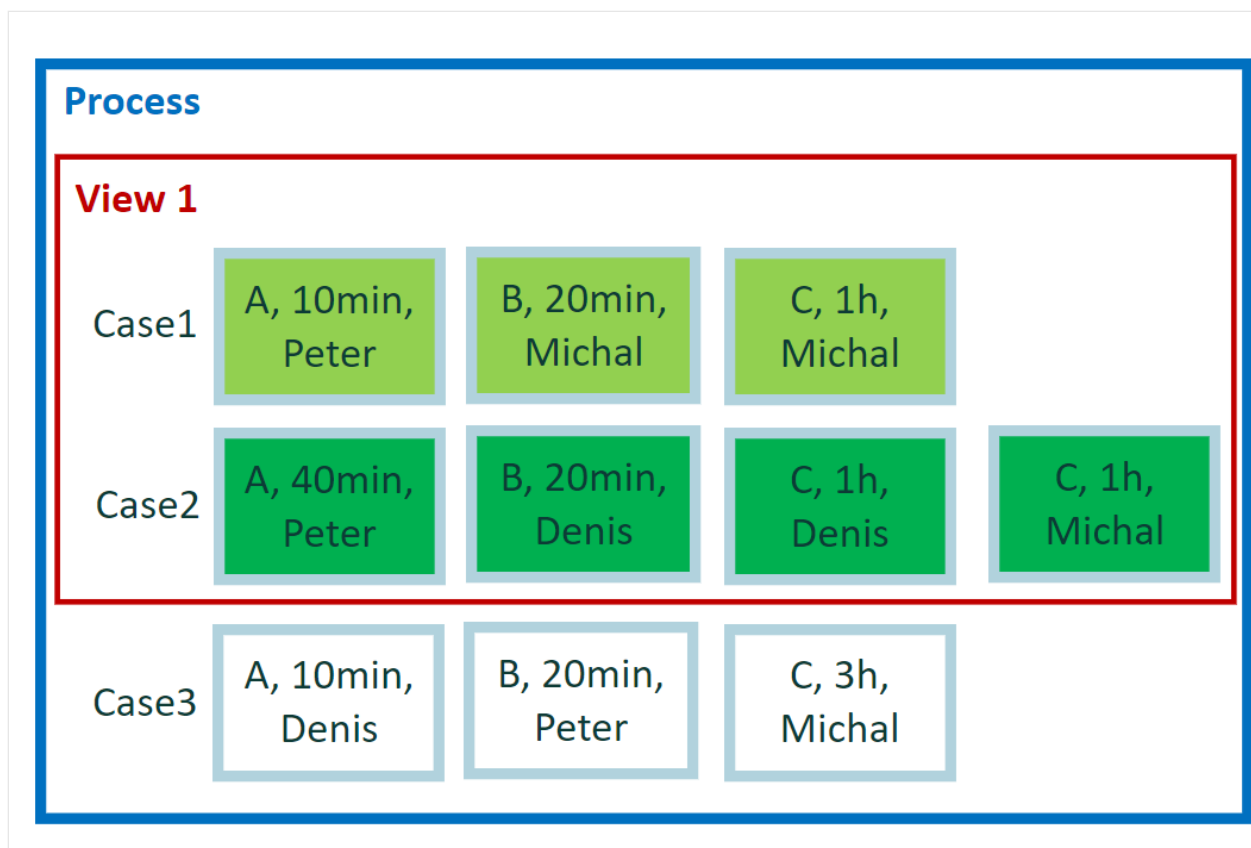
## Calculation for example 3

We need to calculate events duration per single case. As the view contains two cases, the number of results is two (2). Each result is calculated as sum of event duration across the single case.

## Result for example 3

The result is *per case*. It's calculated by events in case1 and events in case2, but most important is that the result is per case.

- Case 1 = 1:30 hours (events in case 1)
- Case 2 = 3:00 hours (events in case 2)



### Expression in the custom metric editor

Metric formula:

**SUM(CaseEvents, Duration())**

PROCESS MAP	STATISTICS	FILTER
<input type="checkbox"/> Node	<input type="checkbox"/> Event Level Attribute	<input type="checkbox"/> Attribute Conditional
<input type="checkbox"/> Edge	<input type="checkbox"/> Case Level Attribute	<input type="checkbox"/> Edge Conditional
	<input type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics
	<input checked="" type="checkbox"/> Case Overview	<input type="checkbox"/> Event Metrics
	<input type="checkbox"/> Edges	

Metric data:

Metric type:  Process map  Statistics  Filter

Calculation context *CaseEvents* (and *CaseEvents*) is very useful as it allows to create additional case level metric calculated using the case events. User is then able to evaluate the single cases based on calculated value.

### Usage for example 3

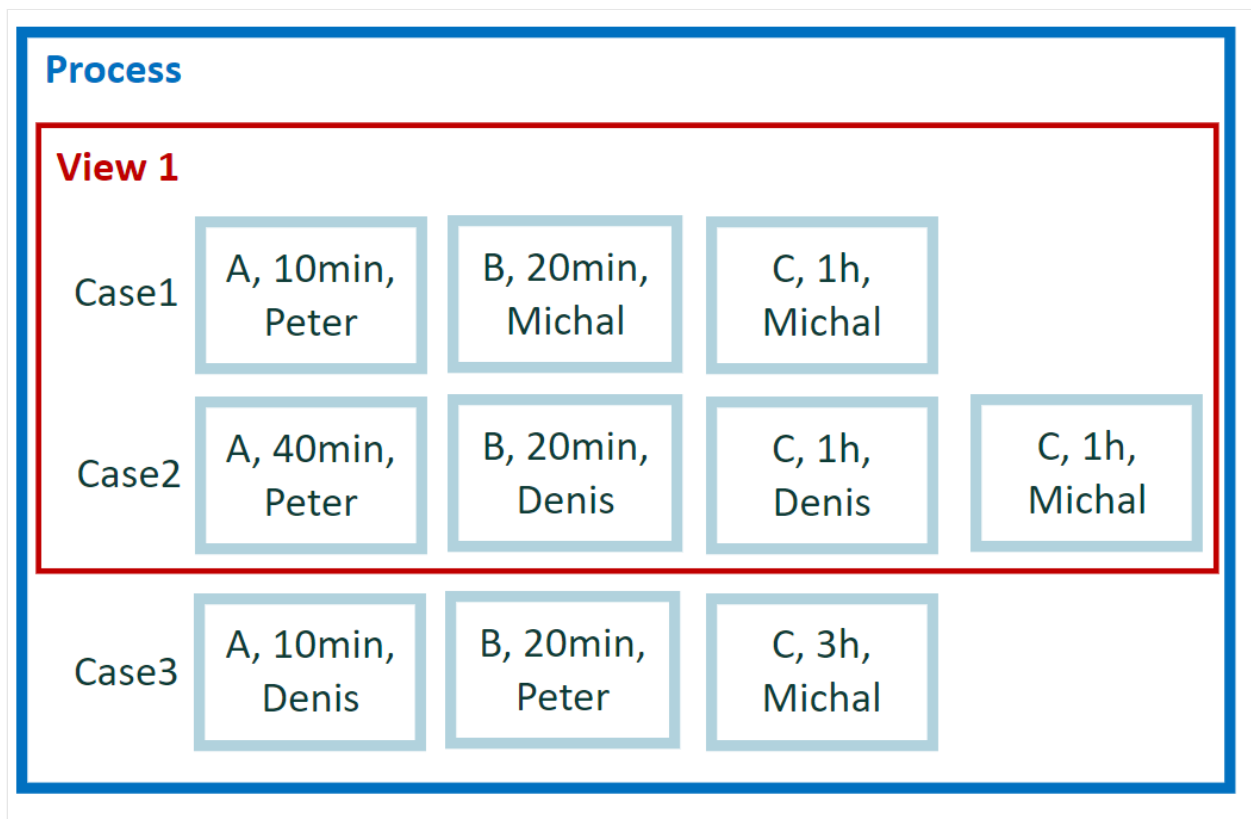
As we have single result per each case in current view, results are available only in screens with results per single case:

- Case Metric filter
- Case Overview Statistic panel
- Root cause analysis

Results for CaseEvents or CaseEdges are not applicable on Process map. Theoretically Process map is able to display results per case, but default aggregation (industry standard) is per activity.

## 4. Attribute aggregation

*What's the total duration per activities?* We're interested in evaluation of activities. This is a different calculation compared to previous example.

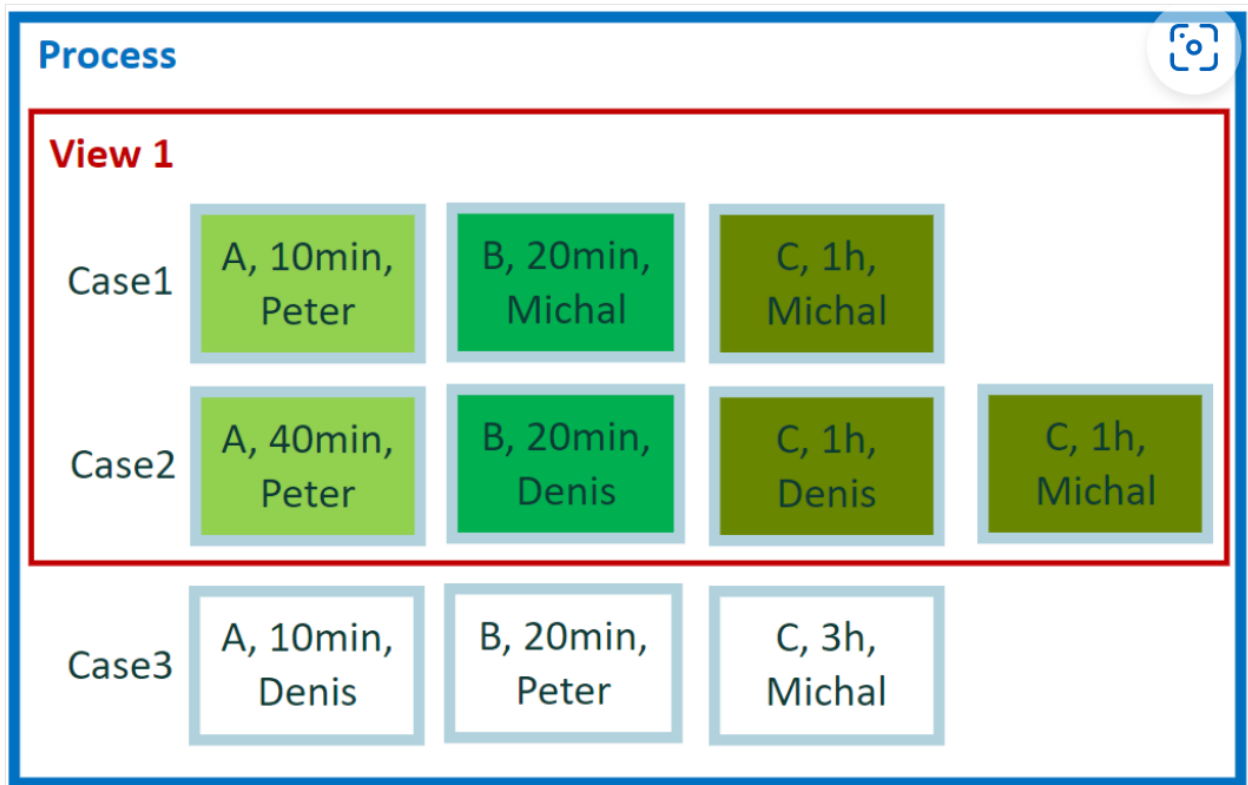


### Calculation for example 4

How do you calculate results per activity properly? We're not concerned with the distribution of events among cases. All we take into consideration is distribution of events among activities. All events in view are grouped according to activity value. We have activities 'A', 'B' and 'C'. Per each set of events, we calculate result separately - sum of event durations.

### Result for example 4

- A = 50 minutes
- B = 40 minutes
- C = 3 hours



### Expression in the custom metric editor

Metric formula:  
`SUM(EventsPerAttribute, Duration())`

PROCESS MAP	STATISTICS	FILTER
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional
<input type="checkbox"/> Edge	<input type="checkbox"/> Case Level Attribute	<input type="checkbox"/> Edge Conditional
	<input type="checkbox"/> Case Duration Influence	<input type="checkbox"/> Metrics
	<input type="checkbox"/> Case Overview	<input type="checkbox"/> Event Metrics
	<input type="checkbox"/> Edges	

Metric data:

Metric type:  Process map  Statistics  Filter

### Usage for example 4

We have single result per activity in current view. Results are available on screens with aggregated events per activity value:

- Process Map (nodes)

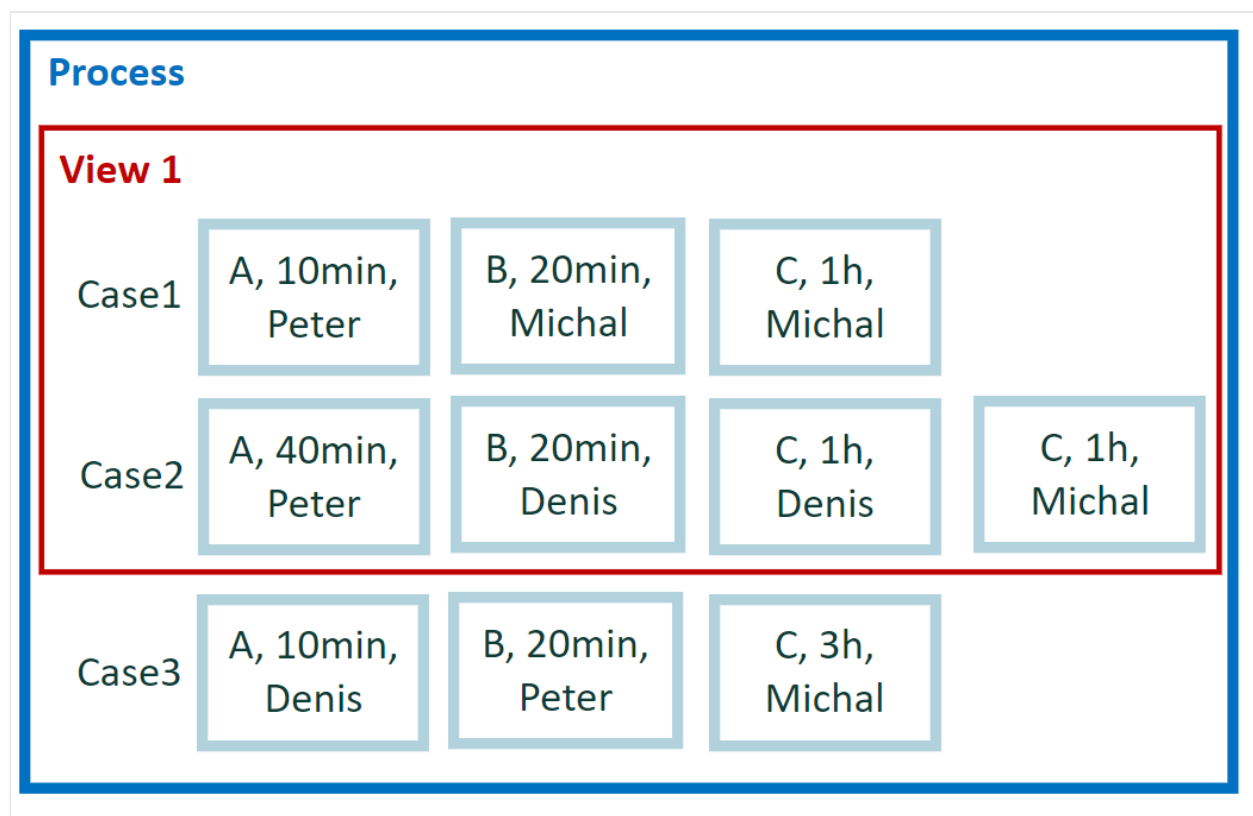
- Statistics – Activities
- Attribute conditional filter (To learn more, go to [7 Bonus: Attribute conditional filter.](#))

Process map and Statistics panels for any attribute (including activity) share the same calculation scope. Despite different visuals, both screens display results grouped by activity value.

Attribute conditional filter contains the attribute aggregation inside the single case. For example, Case 2 contains two events with activity 'C'. Attribute conditional filter does aggregation over these events and aggregated value is evaluated. To learn more about behavior for this filter go to [7 Bonus: Attribute conditional filter.](#)

## 5 Generic attribute aggregation

*What's the total duration per user?* What we care about is the total time spend, not by activities but by users.



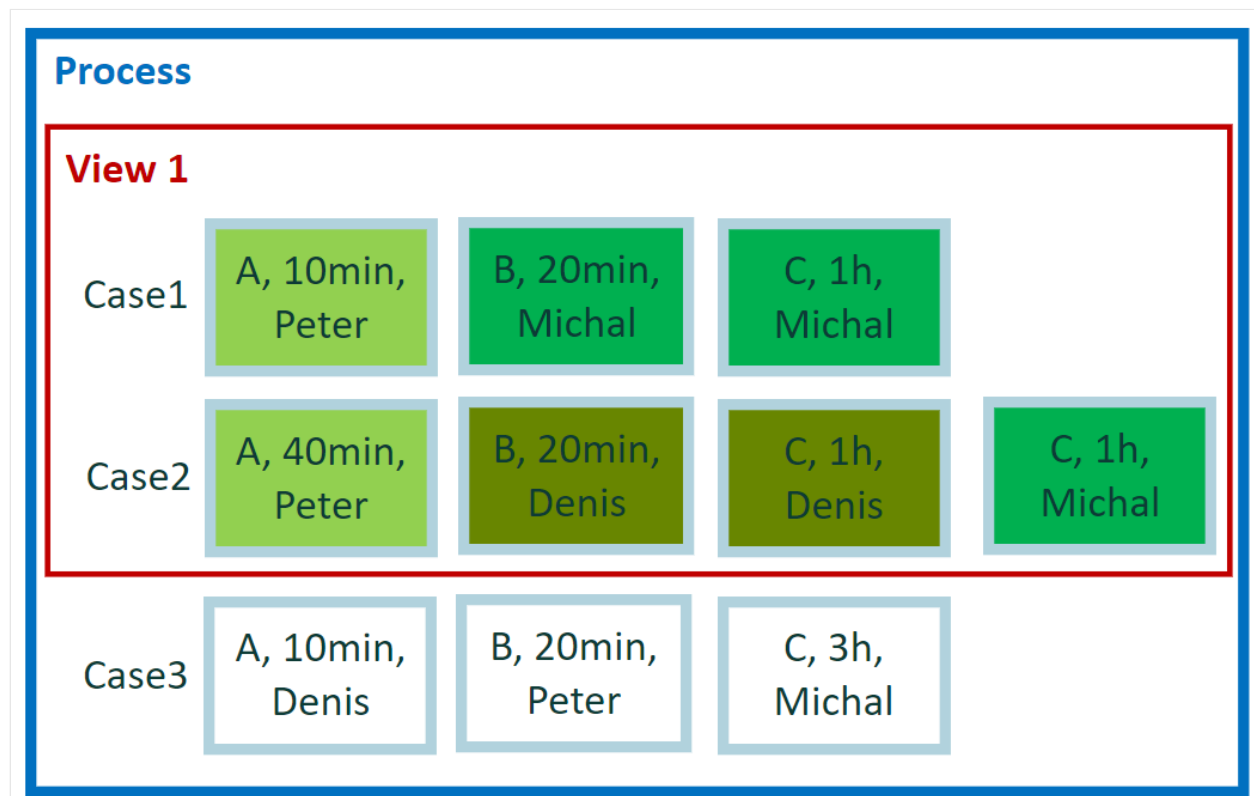
### Calculation for example 5

This example is similar to previous one. We again take into consideration distribution of events among one of its attributes. This time, it's user attribute. We have users 'Peter',

'Michal' and 'Denis'. Per each set of events, we calculate result separately - sum of event durations.

## Result for example 5

- Peter = 50 minutes (Events in case 1 = 10 minutes + events in case 2 = 40 minutes, in total 50 minutes)
- Michal = 2:20 hours (events in case 1 = 1:20 hours + events in case 2 = 1 hour, in total 2:20 hours)
- Denis = 1:20 hours (Events in case 2 = 1:20 hours)






Expression in custom metric editor:

Metric formula:

**SUM(EventsPerAttribute, Duration())**

PROCESS MAP	STATISTICS	FILTER
✓ Node	✓ Event Level Attribute	✓ Attribute Conditional
✗ Edge	✗ Case Level Attribute	✗ Edge Conditional
	✗ Case Duration Influence	✗ Metrics
	✗ Case Overview	✗ Event Metrics
	✗ Edges	

Metric data:

Metric type:  Process map  Statistics  Filter

Why the expression is the same as for previous one? It's simple. The calculation per attribute value is the same for any event attribute. Activity is just a special mandatory event attribute. All metrics calculations are applied in the same way for activity as for any other attribute.

## Usage for example 5

We again have single result per attribute value in current view. Results are available on screens with aggregated events per attribute value:

- Process map (why?)
- Statistics – any attribute
- Attribute Conditional filter ((To learn more, go to [7 Bonus: Attribute conditional filter.](#))

If you want to see results per user in the Process Mining desktop app, go to Statistics for user attribute. There are displayed events aggregated by user attribute. What if we open process map or statistic panel for another attribute. In such case the results will be aggregated by selected attribute. For example, in **Process map**, it's by default activity attribute.

## 6 Attribute by case aggregation

*What's the total duration of cases processed per user?* We're again interested in results per user, but this time we want to know total duration of cases in which users were involved.



## Process

### View 1

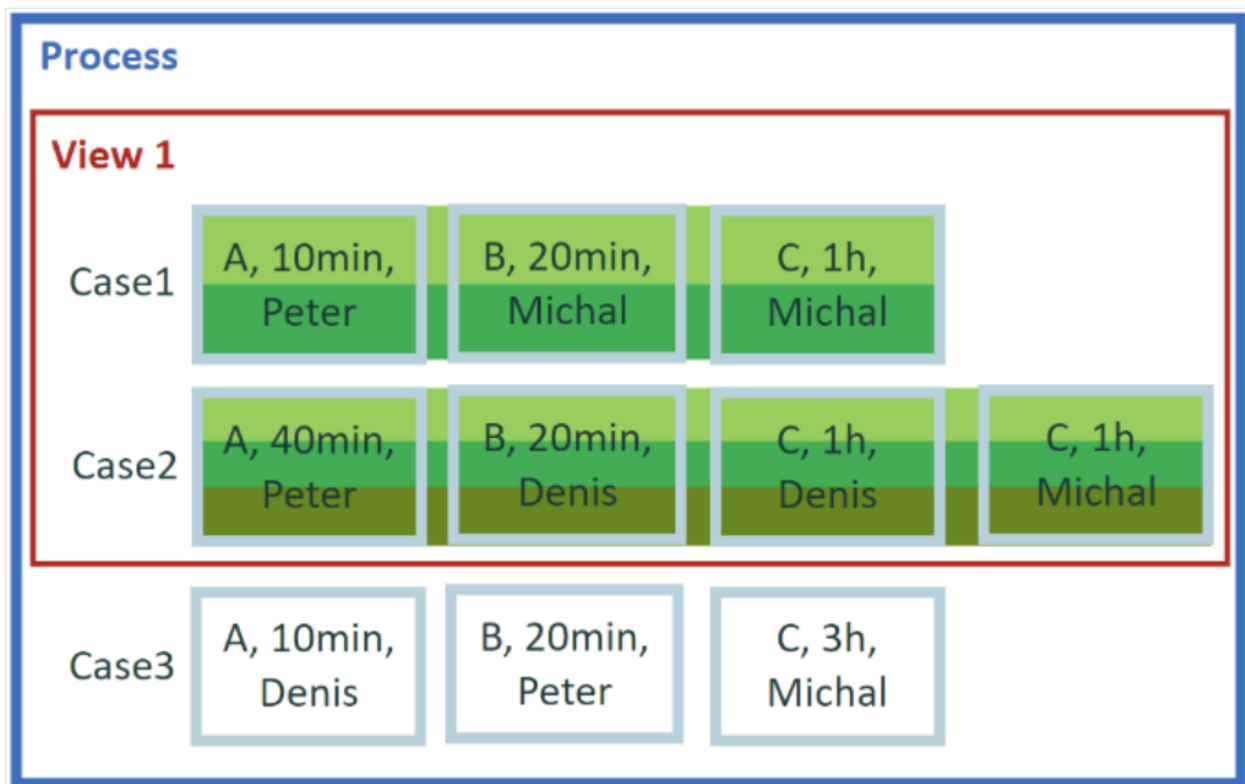
Case1	A, 10min, Peter	B, 20min, Michal	C, 1h, Michal	
Case2	A, 40min, Peter	B, 20min, Denis	C, 1h, Denis	C, 1h, Michal
Case3	A, 10min, Denis	B, 20min, Peter	C, 3h, Michal	

## Calculation for example 6

The calculation logic for this request is very similar to previous one. We group users by value of user attribute. We have users 'Peter', 'Michal' and 'Denis'. The difference is in the values we are going to summarize. Per each event, we take duration of *case*, not duration of event. User 'Denis' worked only on case 2, so the answer for him is duration of case 2. Users 'Peter' and 'Michal' were involved in both cases, so the answer is combined the duration of case 1 and case 2.

## Result for example 6

- Peter = 4 hours 30 minutes
- Michal = 4 hours 30 minutes
- Denis = 3 hours



As you can see, we don't care how many events were done by user in case. One or multiple events done by given user, the length of case isn't obviously changed. We don't want to take duration of single case multiple times for the same user. Result is calculated per user (attribute value), takes case level metric (duration of case, no duration of events), and takes each case into result once at most.

While this calculation seems odd, it is a very basic calculation used for standard financial case level metrics. Total of invoice is still the same regardless how many events, how many reworks occurred in the case. Invoice total is not multiplied because some events - activities or users occurred multiple times in invoice processing.

### Expression in the custom metric editor

Metric formula:

**SUM(CasesPerAttribute, Duration())**

PROCESS MAP	STATISTICS	FILTER
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional
<input checked="" type="checkbox"/> For	<input checked="" type="checkbox"/> Case Duration Influence	<input type="checkbox"/> Metrics
<input type="checkbox"/> You	<input type="checkbox"/> Case Overview	<input type="checkbox"/> Event Metrics
	<input checked="" type="checkbox"/> Edges	

Metric data:

Metric type:

Process map
  Statistics
  Filter

## Usage for example 6

Single result is generated per attribute value so all displays for attribute aggregations are available. As we use case level metrics the results are also applicable for edges (both in process map and in statistic):

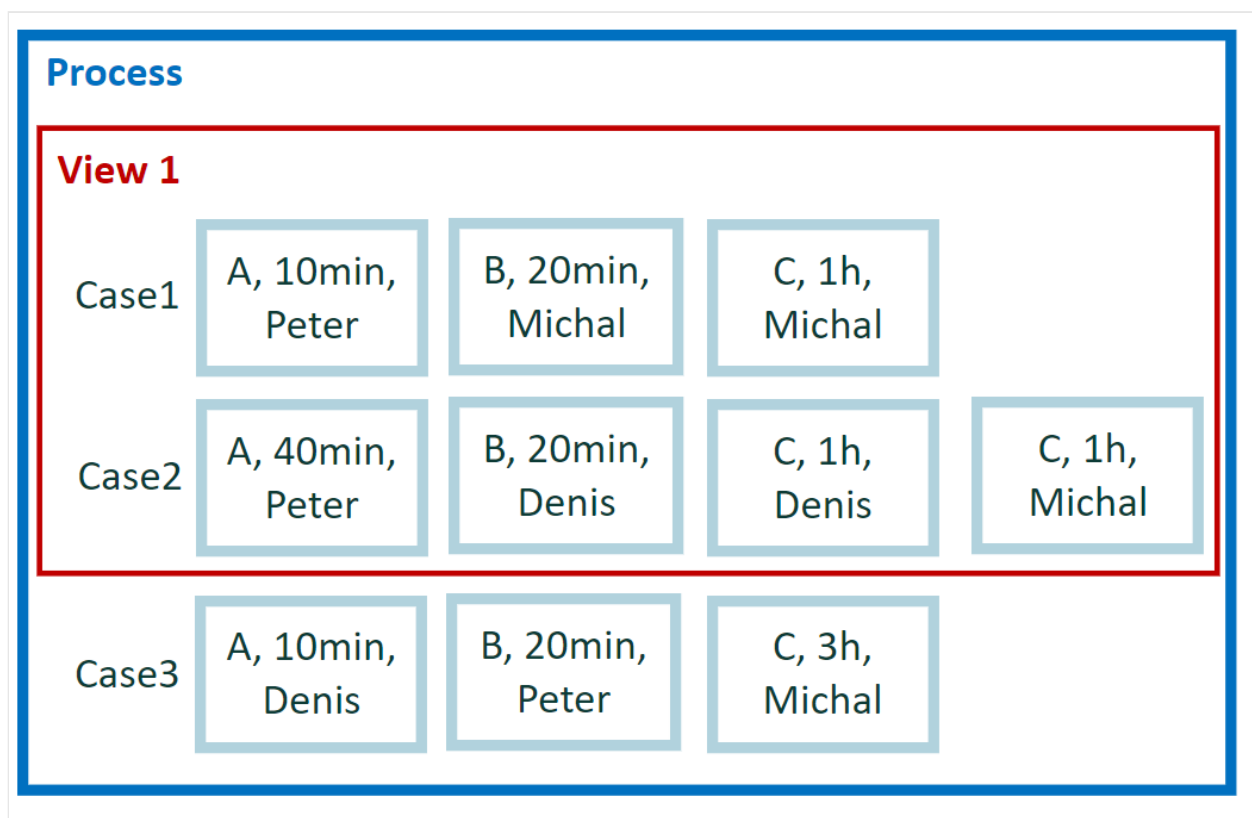
- Process map (nodes & edges)
- Statistics attribute panels (why not in Case overview?)
- Attribute/Edge Conditional filters

The results are not calculated per single case, but per attribute value, so Case overview and Case/Event metrics are not usable for such calculations.

## 7 Bonus: Attribute conditional filter

Attribute conditional filter contains the attribute aggregation inside the single case. This explains the applicability of metrics using aggregation by attribute value in this filter.

*How do I filter cases with total duration for C activities longer than 1 hour and 30 minutes? The number of events with activity C is not important inside the case. The only criteria is total duration for such events.*



## Calculation for example 7

The question requires to evaluate data set by single cases. In each case, we look into total duration of all events with activity C and compare it defined limit 1 hour 30 minutes. Case may contain zero, one, or multiple events with activity C, but it isn't relevant.

## Result for example 7

Case 2

Process				
View 1				
Case1	A, 10min, Peter	B, 20min, Michal	C, 1h, Michal	
Case2	A, 40min, Peter	B, 20min, Denis	C, 1h, Denis	C, 1h, Michal
Case3	A, 10min, Denis	B, 20min, Peter	C, 3h, Michal	

Attribute conditional filter is case level filter, it evaluates the single cases. For each case it calculates the result per selected attribute value (activity C in our example) and compares the calculated result to filter requirement (greater than 1 hour 30 minutes). As case may contain multiple events, which fits the criteria (activity C), these event level values are (have to be) aggregated according to filter requirements (total of all events) to provide single value before comparison to filter requirement.

## Filter definition

The filter evaluation at first calculates aggregated result (total) per attribute value (activity C) per case and afterward this result is compared to filter requirements (greater than 1 hour 30 minutes). Therefore, any standard or custom metric that aggregates the results per attribute value is applicable also in attribute conditional filter.

# Advanced examples

Article • 07/18/2023

Due to complex examples, this article uses some specific custom operators like `DURATIONCALENDAR` or `FIRSTIF`. No specific knowledge of these operators is required.

For easy examples of how to create custom metrics, go to [Basic examples](#).

## Recapitulation of previous examples

The following table provides descriptions and examples of custom metrics.

Description	Example
Aggregation per attribute value (For example, result per activity = all events with the same activity value)	AVG(Duration()) AVG(EventsPerAttribute, Duration()) AVG(EdgesPerAttribute, Duration())
Aggregation within cases (result per single case)	AVG(CaseEvents, Duration())
Aggregation over cases (aggregation per attribute value, case is taken into calculation one time)	SUM(CasesPerAttribute, invoTotal) AVG(CasesPerAttribute, Duration())
Global aggregation (over all elements in view/process/business rule)	COUNTIF(ProcessEvents, user == "Peter") AVG(ProcessEvents, Duration())

## Dataset description

The new tiny data set is used for easy calculation for the remaining examples. It contains four cases and 12 events.

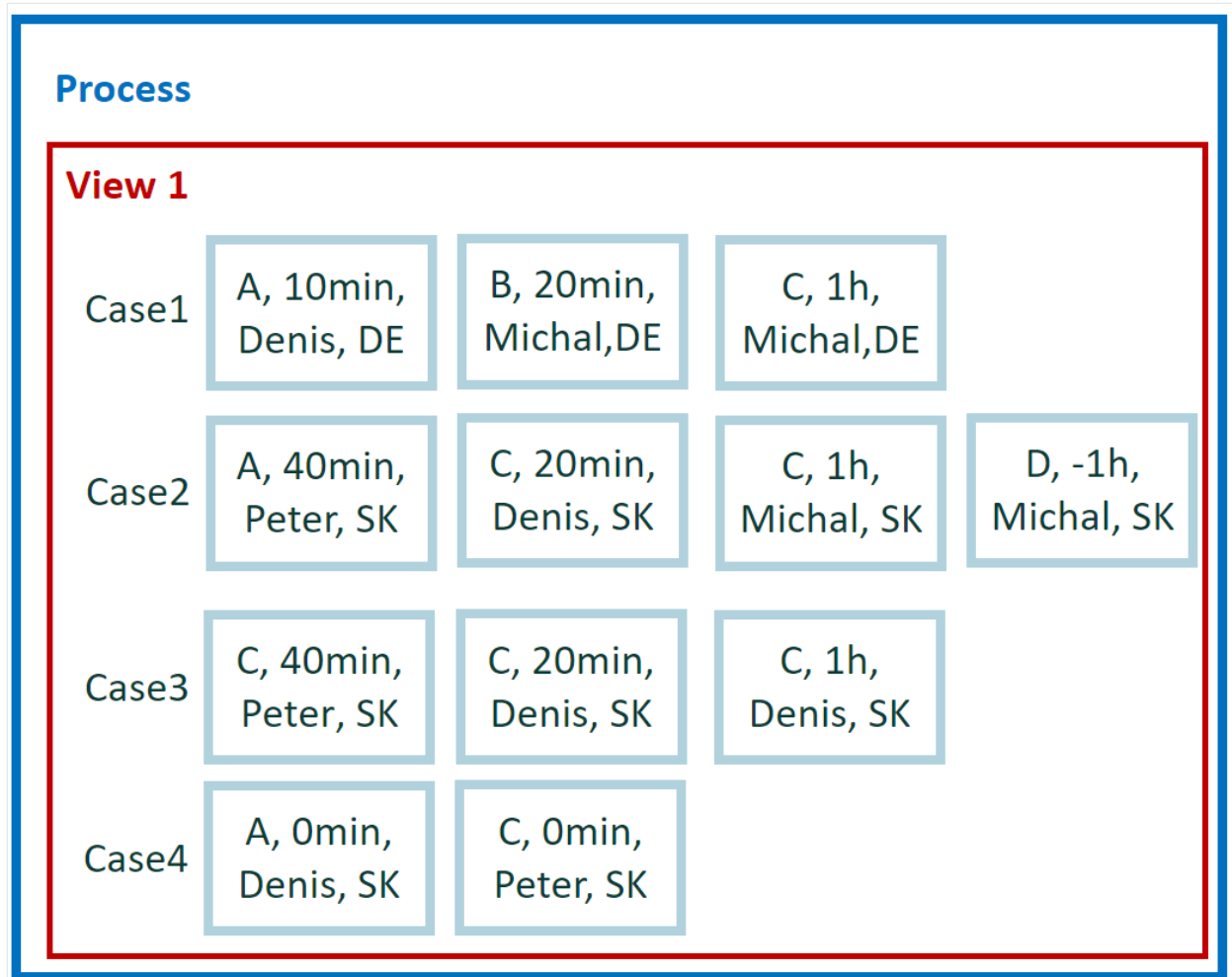
For easy manual calculations, we assume zero waiting time between events.

Therefore, case duration is simple sum of events duration. Also, there's no parallelism among events.

In total, we have five attributes: activity, start, end, user, and county. Country is a case level attribute. The other attributes are event level.

## 1 Event level non-aggregation

How do I filter out through CM events with positive duration? Evaluate single events and remove the ones with corrupted timestamps.



## Calculation for example 1

Run and evaluate each event one-by-one. Generate a single result per event. No aggregation operation is required. Compare end and start attribute values in each event.

## Result for example 1

Per each event:

- 1x False
- 11x True

## Process

### View 1

Case1	A, 10min, Denis, DE ✓	B, 20min, Michal, DE ✓	C, 1h, ✓ Michal, DE	
Case2	A, 40min, Peter, SK ✓	C, 20min, Denis, SK ✓	C, 1h, ✓ Michal, SK	D, -1h, ✗ Michal, SK
Case3	C, 40min, Peter, SK ✓	C, 20min, Denis, SK ✓	C, 1h, ✓ Denis, SK	
Case4	A, 0min, Denis, SK ✓	C, 0min, Peter, SK ✓		

## Expression in custom metric editor

Metric formula:  
`end < start`

Metric data type:  Boolean

Metric type:

- PROCESS MAP
  - Node
  - Edge
- STATISTICS
  - Event Level Attribute
  - Case Level Attribute
  - Case Duration Influence
  - Case Overview
  - Edges
- FILTER
  - Attribute Conditional
  - Edge Conditional
  - Metrics
  - Event Metrics
- ROOT CAUSE ANALYSIS
  - RCA

## Usage for example 1

As we have a single result per each event in the current view, results are available only in screens that display and process an event metric:

- Event metric filter
- Case metric filter

The event metric filter is the obvious option, as it allows you to filter events based on attribute or metric values. Case metric filter by default uses case level metrics. It also allows you to select the event metric filter with additional specification if all or at least one event in the case has to meet the event metric. This switch allows the case level metric filter to switch to event level metrics.

#### ⓘ Note

Event attribute values are displayed also in the **Variant cases** table panel, but this view displays only event attributes and doesn't display event metrics.

## 1.1 Event level non-aggregation (alternative)

*Alternative: How do I filter out via CM events with negative duration?* Instead of using attributes 'end' and 'start' write the expression using generic metrics.

It's a best practice to use generic metrics instead of process attributes.

- Better performance
- Portability
- One formula fits more applications (for example, case overview and root cause analysis)
- Aggregated form works with case/event/edge



## Process

### View 1

Case1	A, 10min, Denis, DE	B, 20min, Michal,DE	C, 1h, Michal,DE	
Case2	A, 40min, Peter, SK	C, 20min, Denis, SK	C, 1h, Michal, SK	D, -1h, Michal, SK
Case3	C, 40min, Peter, SK	C, 20min, Denis, SK	C, 1h, Denis, SK	
Case4	A, 0min, Denis, SK	C, 0min, Peter, SK		

### Expression in custom metric editor

Metric formula:  
`end() < start()`

Metric data type:  Boolean

Metric type:

- PROCESS MAP
  - Node
  - Edge
- STATISTICS
  - Event Level Attribute
  - Case Level Attribute
  - Case Duration Influence
  - Case Overview
  - Edges
- FILTER
  - Attribute Conditional
  - Edge Conditional
  - Metrics
  - Event Metrics
- ROOT CAUSE ANALYSIS
  - RCA

## 2 Case level non-aggregation

How do I filter out cases with empty (zero) duration? After we removed corrupted events, you need remove invalid cases. Remove complete cases with zero duration.

## Process

### View 1

Case1	A, 10min, Denis, DE	B, 20min, <u>Michal,DE</u>	C, 1h, <u>Michal,DE</u>	
Case2	A, 40min, <u>Peter,SK</u>	C, 20min, <u>Denis,SK</u>	C, 1h, <u>Michal,SK</u>	D, -1h, <u>Michal,SK</u>
Case3	C, 40min, <u>Peter,SK</u>	C, 20min, <u>Denis,SK</u>	C, 1h, <u>Denis,SK</u>	
Case4	A, 0min, <u>Denis,SK</u>	C, 0min, <u>Peter,SK</u>		

## Calculation for example 2

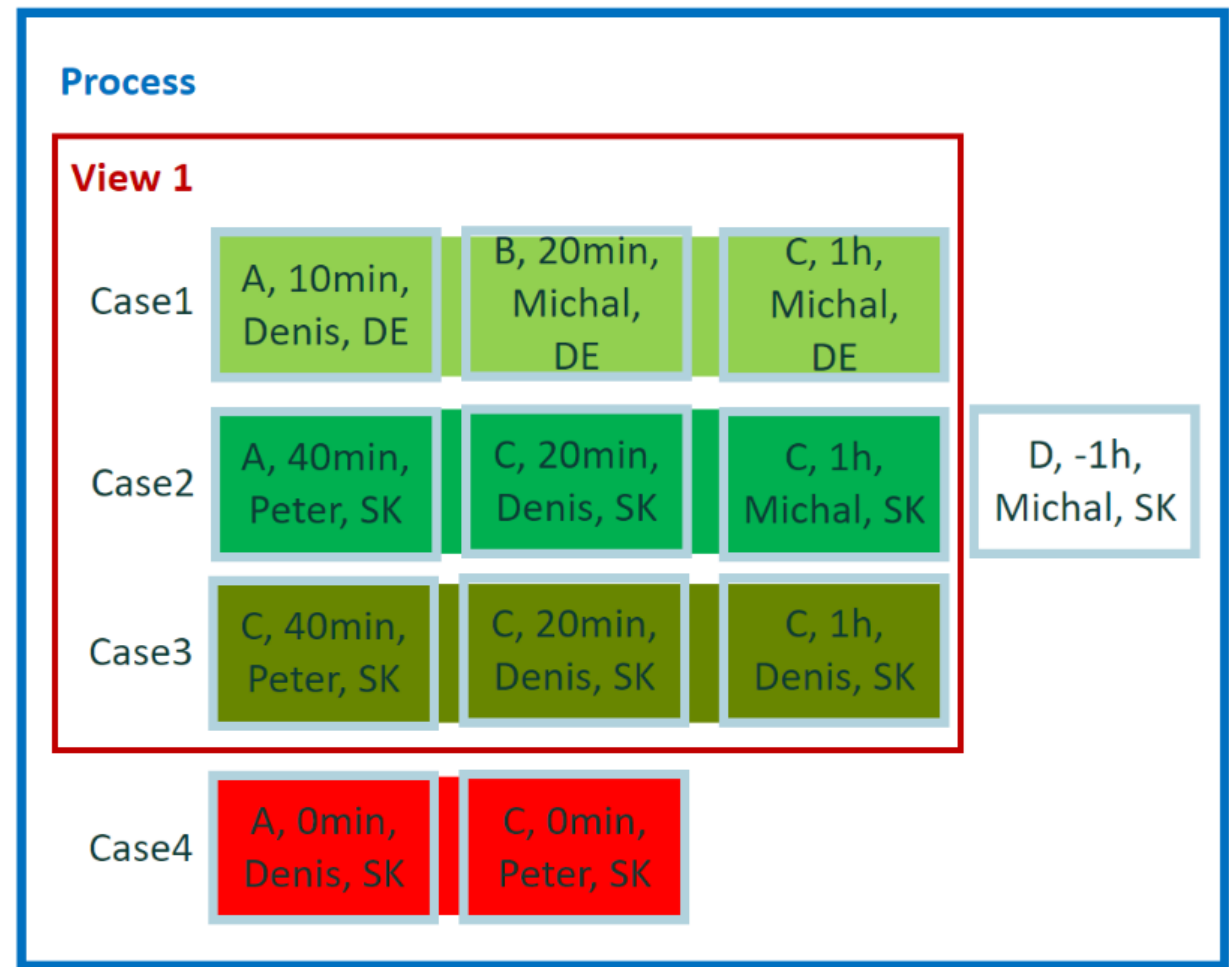
Run and evaluate each case one-by-one. Generate a single result per case. As there is operator `duration()`, which is applied on case level, no aggregation operation is required.

## Result for example 2

Per each event:

- Case 1 - true
- Case 2 - true
- Case 3 - true
- Case 4 - false

Result: Per each event **Case 1 - true ; Case 2 - true ; Case 3 - true ; Case 4 - false**



Expression in custom metric editor

Metric formula:  
`Duration() > TOTIME(0,0,0)`

Metric data type:  Boolean

Metric type:

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		

Usage for example 2

As you have single result per case, results are available only in screens that display results per case:

- Case metric filter
- Statistics case overview
- Root cause analysis
- Event metric filter

Usage of case level metric (aggregated or non-aggregated) in **Statistics Case overview**, **Root cause analysis** or **Case metric filter** is no surprise.

To answer why there is an indication for usage for **Event metrics**, it doesn't offer any advanced setting to switch to case level. The answer is in the expression formula, which uses `Duration()` operator. The Power Automate Process Mining desktop app offers the same operator `Duration()` on event and on case level. Therefore, the same expression is applicable on both the case and event level.

### 3 Edge aggregation

*What's the number of user changes per path (edge)?* Instead of looking on events values, you'll ask for changes occurred between events. So you're looking for result per edge.

`Edge (path)`: Transition between two directly followed events.

## Process

### View 1

Case1	A, 10min, Denis, DE	B, 20min, <u>Michal, DE</u>	C, 1h, <u>Michal, DE</u>	
Case2	A, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Michal, SK</u>	D, -1h, <u>Michal, SK</u>
Case3	C, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Denis, SK</u>	
Case4	A, 0min, <u>Denis, SK</u>	C, 0min, <u>Peter, SK</u>		

## Calculation for example 3

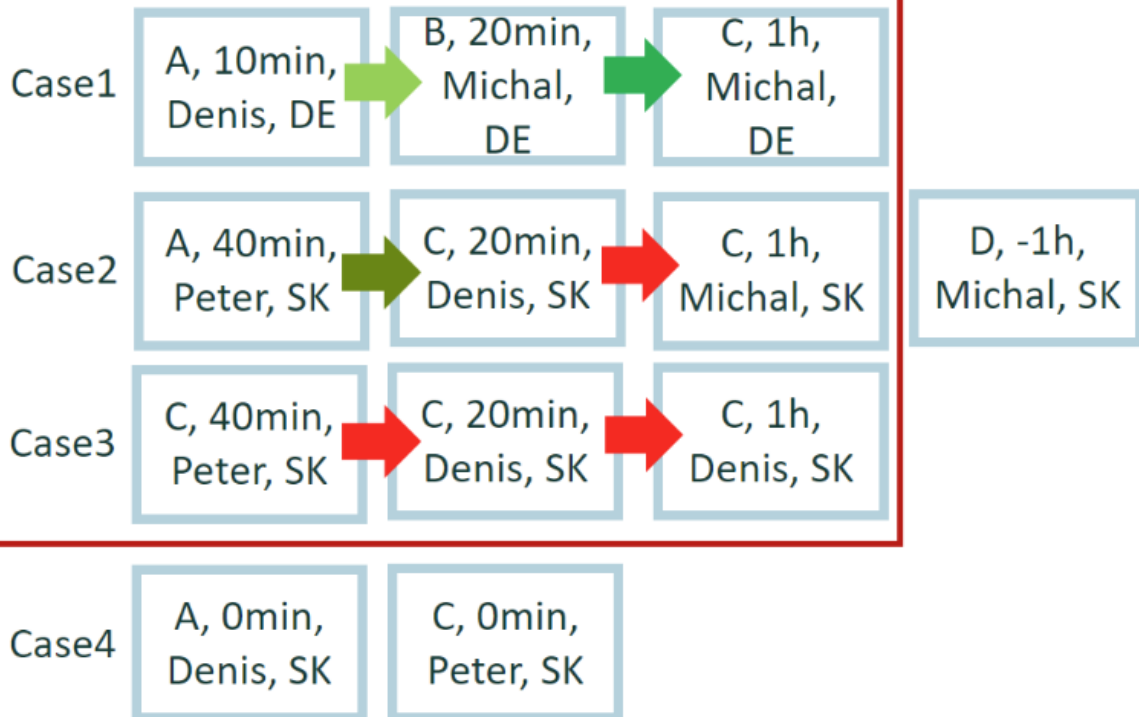
You're evaluating how often you've changed when case was progressing through events. You want to identify on which transitions (edges) occurs user switching. First, identify set of edges in our data. For case 1, there are two edges A->B and B->C. In case 2 we have A->C and C->C. For case 3, you only one edge C->C. In total, you have four (4) unique edges (based on activity values) - A->B, B->C, A->C and C->C. Per each of these edges, you need to aggregate number of user changes. For example, you have only one instance of edge B->C where user Michal on starting event and also on the on ending event, so there is no user change for this edge at all.

## Result for example 3

- A->B = 1
- B->C = 0
- A->C = 1
- C->C = 2

## Process

### View 1



## Expression in custom metric editor

Metric formula:

```
COUNTIF(EdgesPerAttribute, TARGET(user) != SOURCE(user))
```

Metric data type: # Integer

Metric type:

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input type="checkbox"/> Node	<input type="checkbox"/> Event Level Attribute	<input type="checkbox"/> Attribute Conditional	<input type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input type="checkbox"/> Case Duration Influence	<input type="checkbox"/> Metrics	
	<input type="checkbox"/> Case Overview	<input type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		

Operators `TARGET()` and `SOURCE()` return values of the requested attribute for ending and starting node to the actual edge.

## Usage for example 3

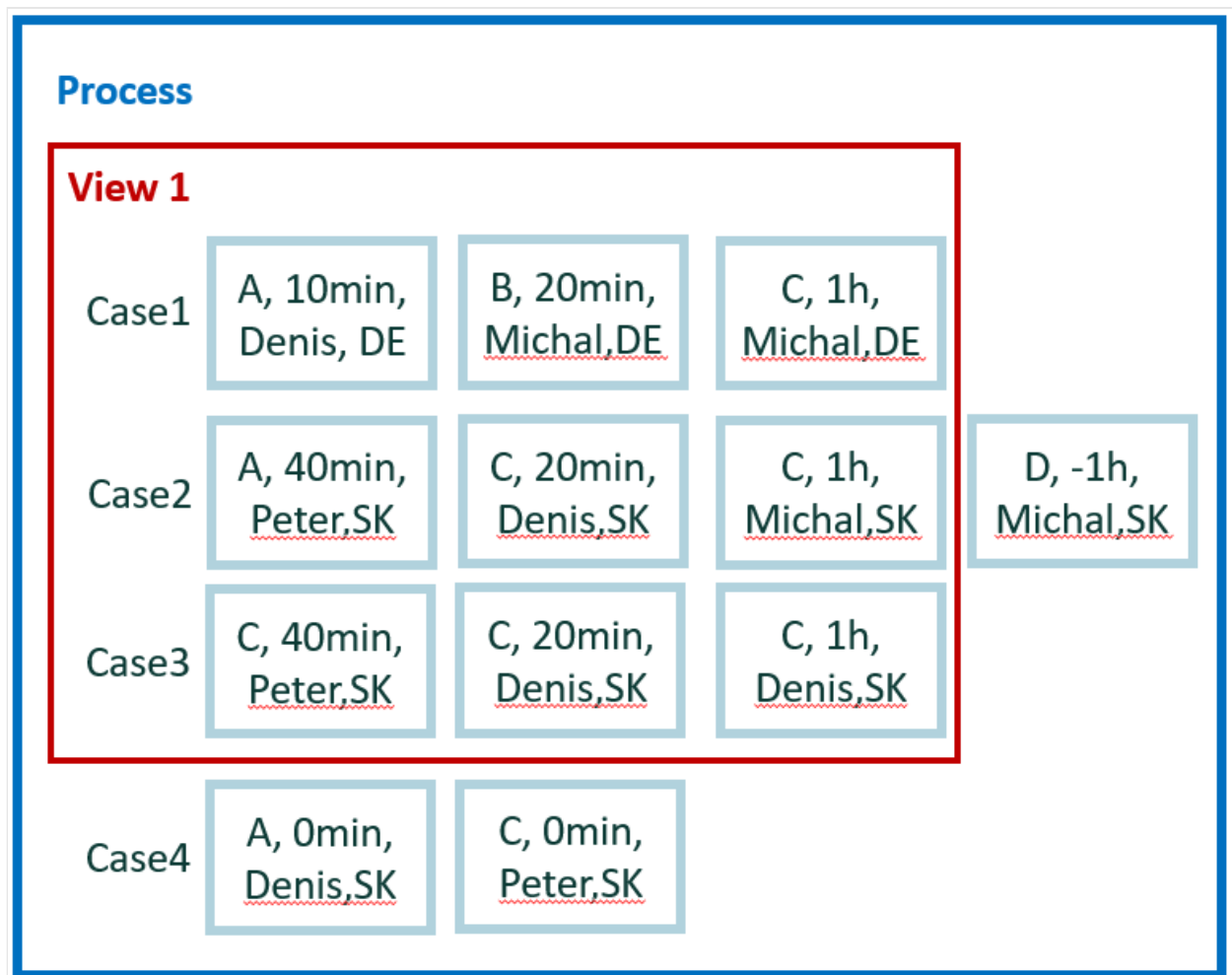
Defined custom metrics generates result per edge (attribute) value, so it's applicable everywhere when aggregated results per edge are used:

- Process Map edges
- Statistics edges
- Edge conditional filter

## 4 Case events aggregation II

In the previous section, you've had a simple example of using `CaseEvents` aggregation. Here you'll take another example with a more complex formula.

*What's the duration from first C start and last C end activity in cases? You're looking for a result per case and to do some conditional aggregation over case events.*

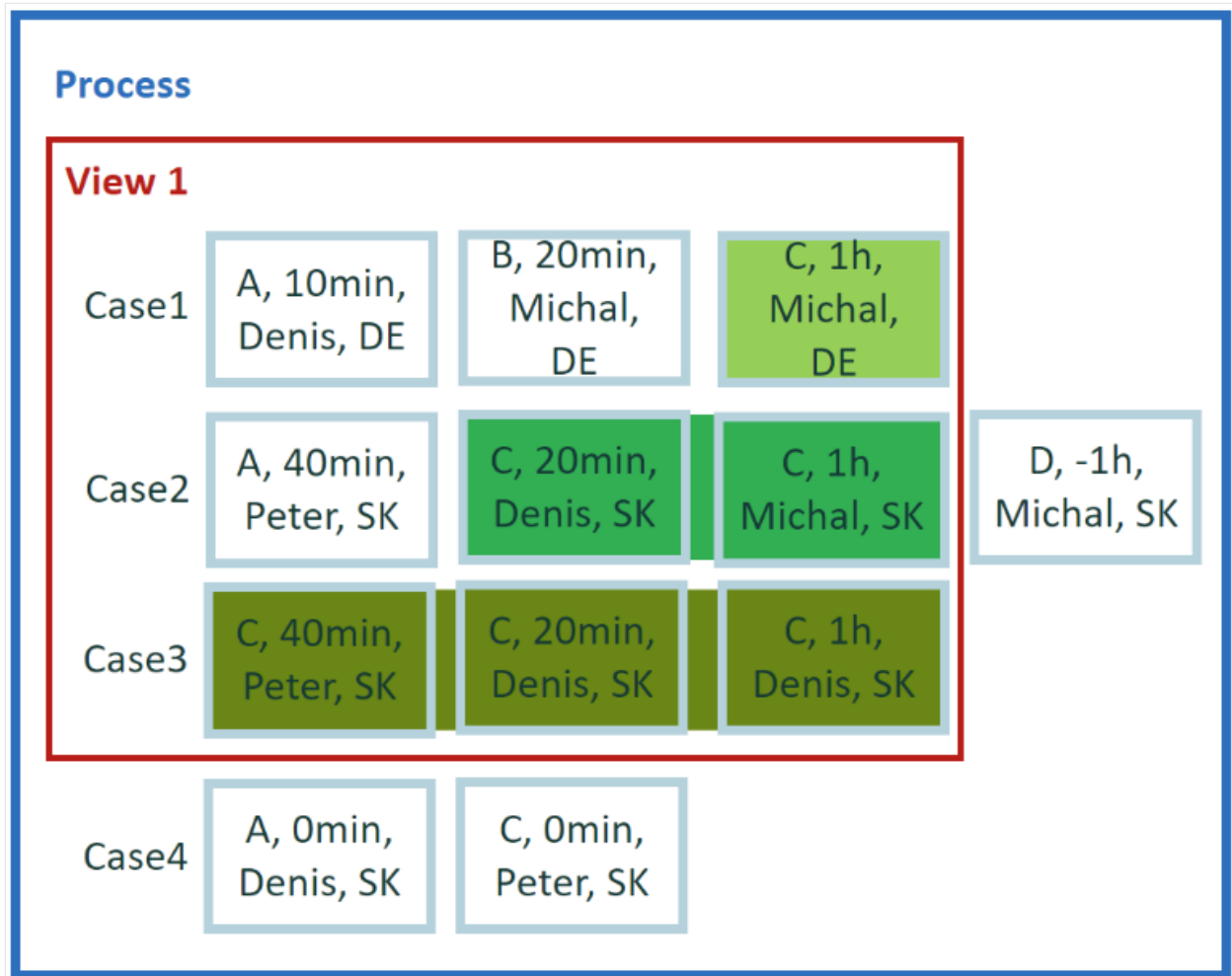


### Calculation for example 4

Run across all available events within its case. Get the first and last activity 'C' in a case and measure the duration between start of first one and end of last one.

## Result for example 4

- Case 1 = 1 hour 00 minutes
- Case 2 = 1 hour 20 minutes
- Case 3 = 2 hours 00 minutes



## Expression in custom metric editor

Metric formula:

```
LASTIF(CaseEvents,activity=="C",end)-FIRSTIF(CaseEvents,activity=="C",start)
```

Metric data type: Time

Metric type:

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		



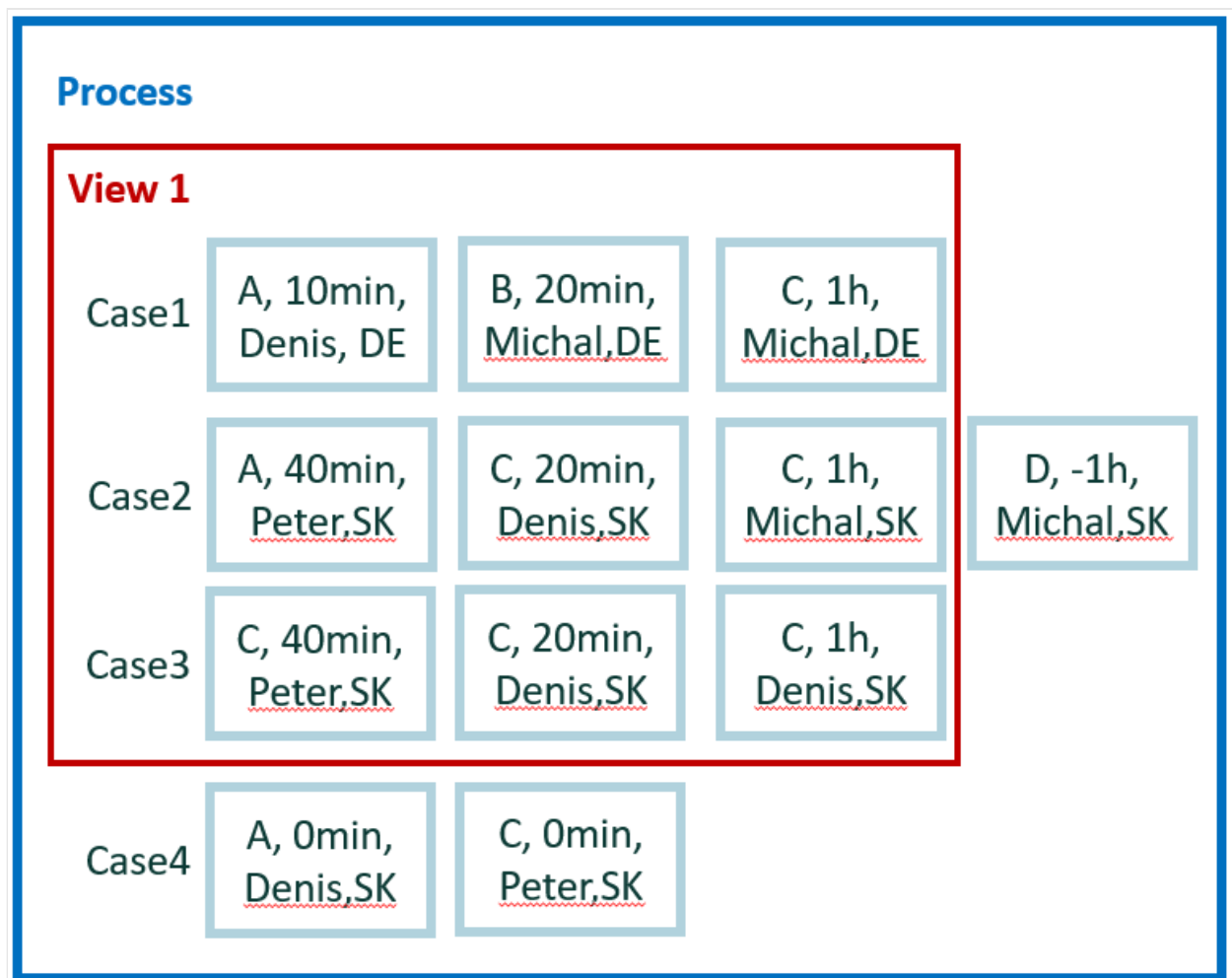
This time the expression is little more complicated but shows how to combine multiple aggregations into single formula. Operators `FIRSTIF()` and `LASTIF()` are aggregation operators, which return first/last event based on input criteria over defined calculation scope (this time `CaseEvents`).

## Usage for example 4

Application of custom metric follows the standard requirements for single case aggregation (regardless complexity of expression).

### 4.1 Case events aggregation II (alternative)

What's the duration from first C start and last C end activity, but calculated only over working hours? The example is the same as the previous one, but here you want to calculate time difference only over working hours. Previously, the simple difference between timestamp values was enough.



### Calculation for example 4.1

Run across all available events within its case. Get the first and last activity 'C' in a case and measure the duration between start of first one and end of last one. For measuring the duration, use working hours defined in the applied calendar.

## Result for example 4.1

- Case 1 = ???
- Case 2 = ???
- Case 3 = ???

### Expression in custom metric editor

Metric formula:  
`DURATIONCALENDAR(FIRSTIF(CaseEvents,activity=="C",start), LASTIF(CaseEvents,activity=="C",end))`

Metric data type: Time

Metric type:

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input type="checkbox"/> Node	<input type="checkbox"/> Event Level Attribute	<input type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input type="checkbox"/> Edge	<input type="checkbox"/> Case Level Attribute	<input type="checkbox"/> Edge Conditional	
	<input type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input type="checkbox"/> Event Metrics	
	<input type="checkbox"/> Edges		

To calculate duration over working hours, the `DURATIONCALENDAR()` operators have been used. Operators to find first and last events are used as operator arguments creating a nested expression. Notice the complexity of the expression doesn't affect or modify the selected calculation scopes.

## Usage for example 4.1

Application of custom metric follows the standard requirements for single case aggregation regardless complexity of expression.

## 5 Categorical vs. quantitative results

*Does the case contain C->C path?* This is simple question when you need to categorize single cases based on existence edge C->C.

## Process

### View 1

Case1	A, 10min, Denis, DE	B, 20min, <u>Michal, DE</u>	C, 1h, <u>Michal, DE</u>	
Case2	A, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Michal, SK</u>	D, -1h, <u>Michal, SK</u>
Case3	C, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Denis, SK</u>	
Case4	A, 0min, <u>Denis, SK</u>	C, 0min, <u>Peter, SK</u>		

## Calculation for example 5

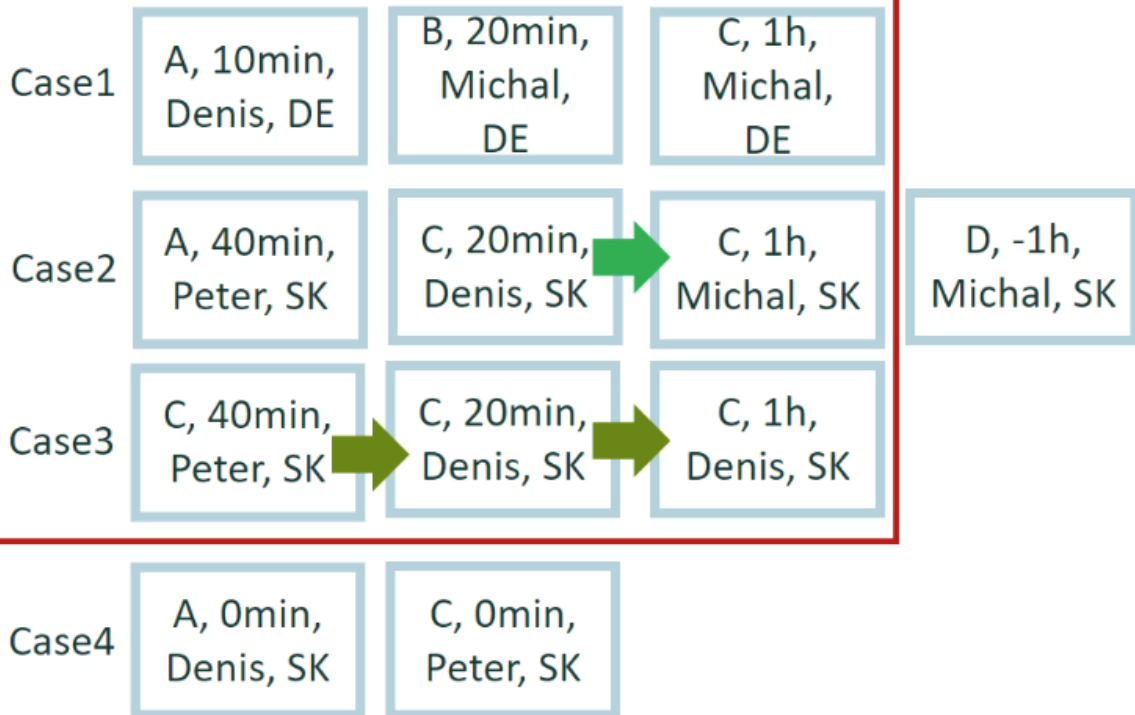
Run across all available edges within its case. If case contains C->C edge, it passes the criteria. Results are generated per case. Count of such edges isn't important.

## Result for example 5

- Case 1 = False
- Case 2 = True
- Case 3 = True

## Process

### View 1



## Expression in custom metric editor

Metric formula:

```
ANY(CaseEdges, SOURCE(activity)=="C" && TARGET(activity)=="C")
```

Metric data type:  Boolean

Metric type:

- PROCESS MAP
- STATISTICS
- FILTER
- ROOT CAUSE ANALYSIS

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		

Operator `ANY()` returns boolean true/false value when at least one element in a given context meets the criteria. See also operator `ALL()`\*k, which returns a true value when all elements in the given context meets the criteria.

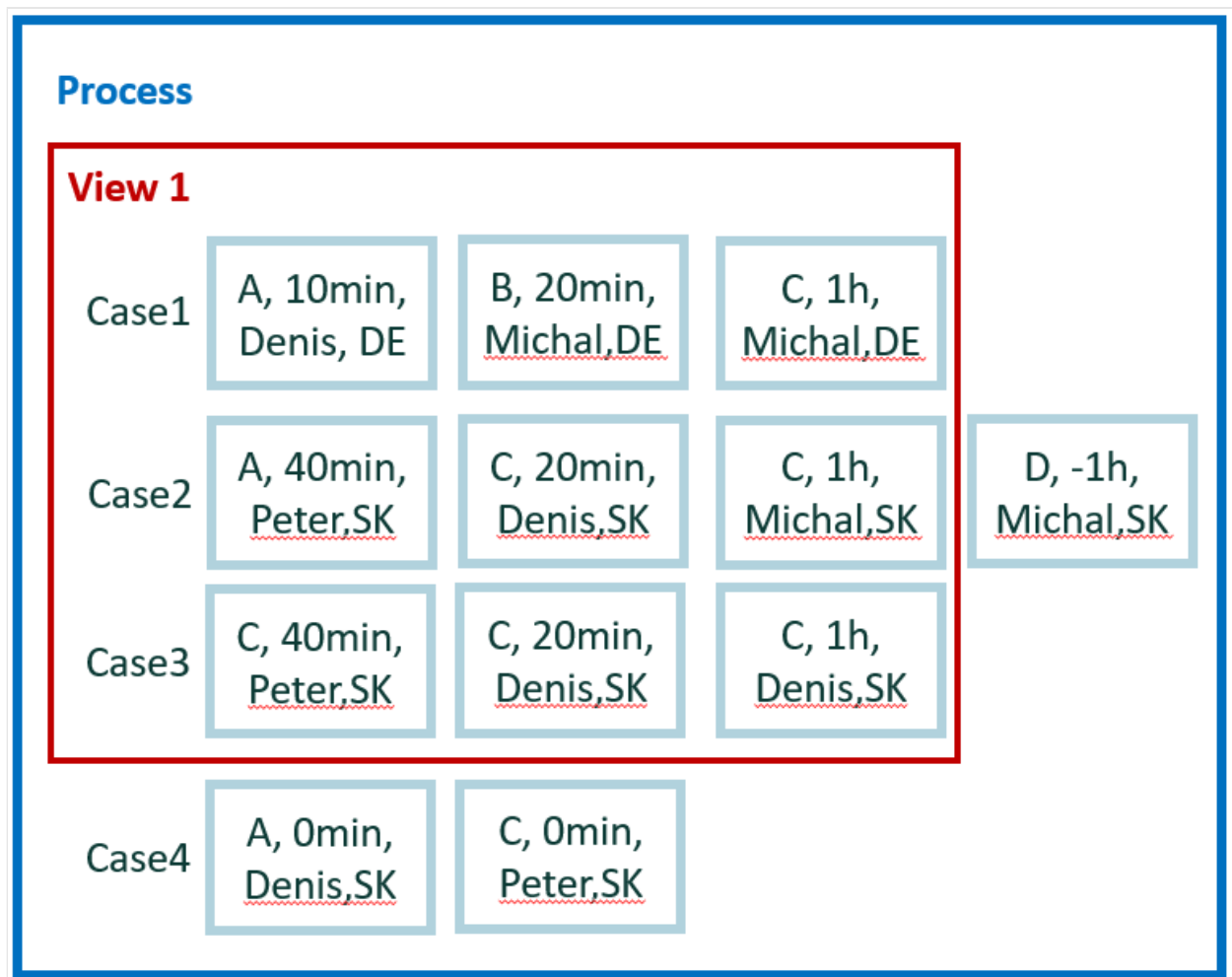
## Usage for example 5

Application of custom metric follows the standard requirements for single case aggregation:

- Case Metric filter
- Root cause analysis
- Case overview statistic panel

### 5.1 Categorical vs. quantitative results (alternative)

*How many C->C paths are within the case? Change the previous question from if case contains edge C->C to how many such edges are there.*

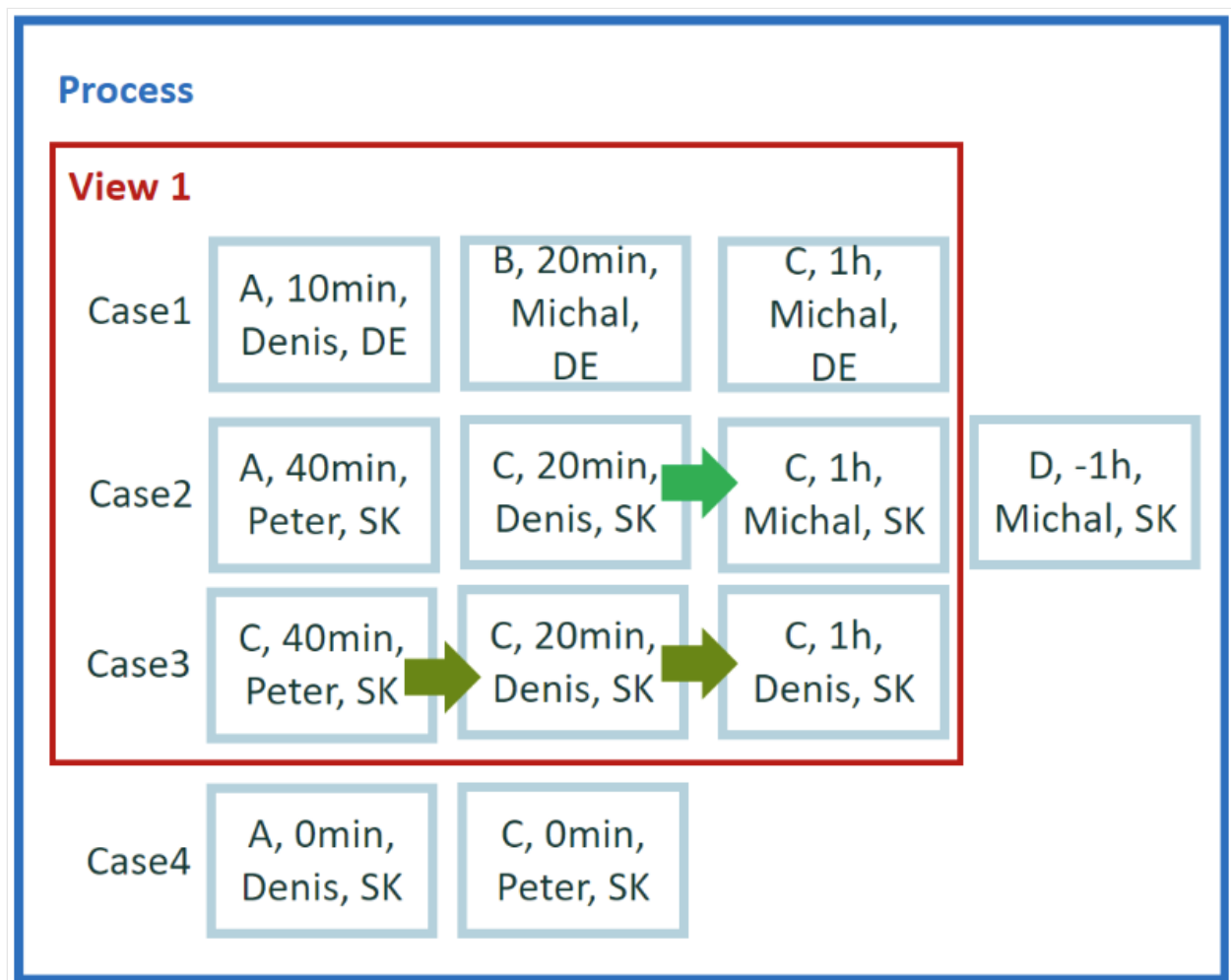


### Calculation in example 5.1

Run across all edges within its case. Count any edges C->C found. If no such edge is found, count is zero for given case.

## Result in example 5.1

- Case 1 = 0
- Case 2 = 1
- Case 3 = 2




Expression in custom metric editor

Metric formula:

```
COUNTIF(CaseEdges, SOURCE(activity)="C" && TARGET(activity)="C")
```

Metric data type: # Integer

Metric type:



PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input type="checkbox"/> Node	<input type="checkbox"/> Event Level Attribute	<input type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input type="checkbox"/> Edge	<input type="checkbox"/> Case Level Attribute	<input type="checkbox"/> Edge Conditional	
	<input type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input type="checkbox"/> Event Metrics	
	<input type="checkbox"/> Edges		

In comparison to the previous formula, you've just replaced operator `ANY()` with `COUNTIF()`.

## Usage for example 5.1

Application of custom metric follows the standard requirements for single case aggregation.

## 6 Event or edge-case aggregation using case-wide context

*How many cases in DE contains edge C->C?* This request contains two values. The first one is the value of country attribute 'DE' and second one is the value for edge 'C->C'.

The limitation for 'C->C' edge describes the domain requirement and why country 'DE' is one of attribute values.

## Process

### View 1

Case1	A, 10min, Denis, DE	B, 20min, <u>Michal, DE</u>	C, 1h, <u>Michal, DE</u>	
Case2	A, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Michal, SK</u>	D, -1h, <u>Michal, SK</u>
Case3	C, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Denis, SK</u>	
Case4	A, 0min, <u>Denis, SK</u>	C, 0min, <u>Peter, SK</u>		

## Calculation for example 6

Why not calculate the result for all countries/regions? At first, re-think the original question. It's possible to generate results per attribute value (for example, for attribute country), but there's no way (except for business rules) to create a calculation for a single attribute value. In your using business rules, you can skip this section. Knowing this, you can update the original question to generic form:

*How many cases contains C->C edge per country?*

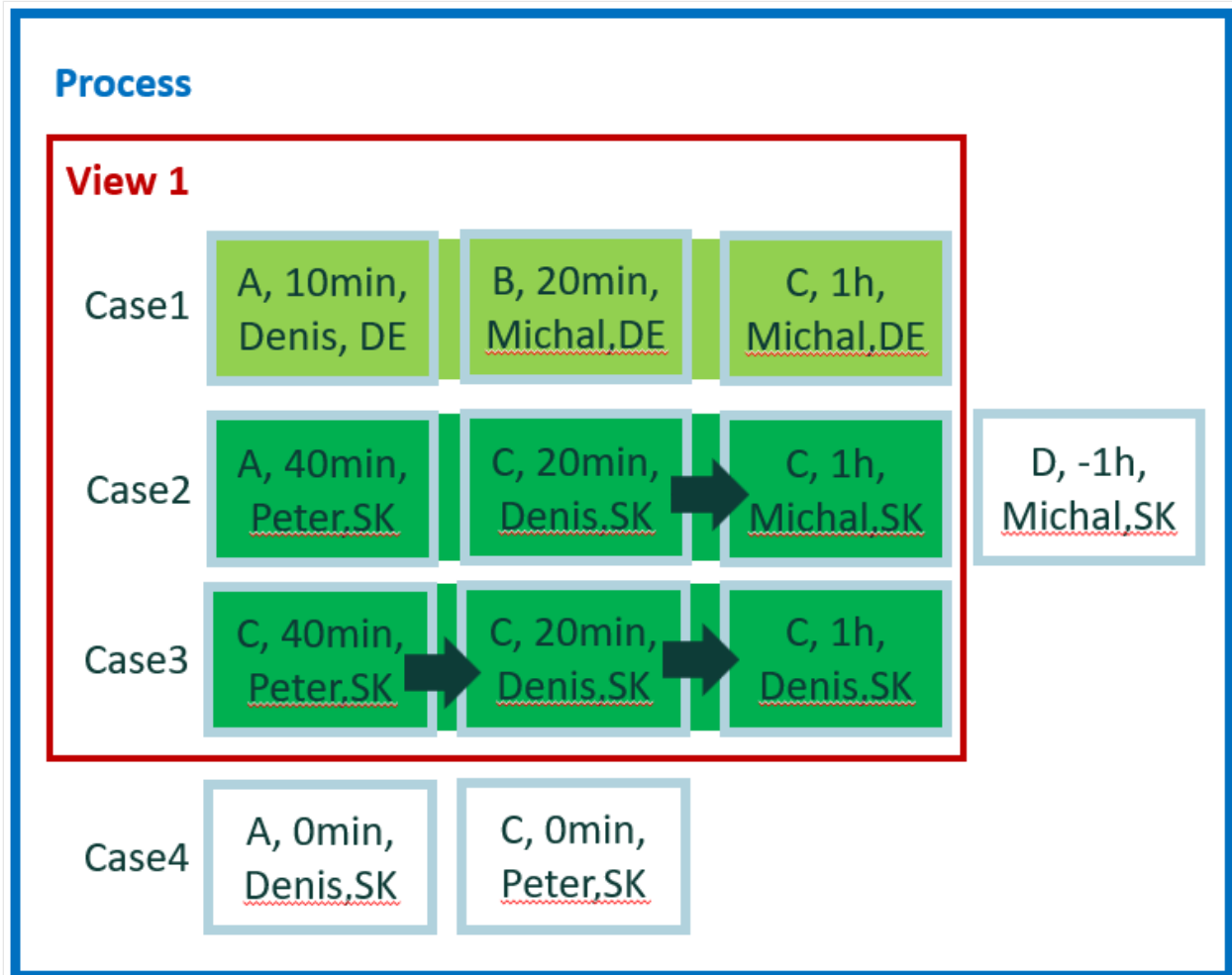
Now the calculation consists of two steps. At first, run through each case and check existence of 'C->C' edges. The exact number of 'C->C' edges in the case isn't important. After it, in the second step, aggregate the results per single case according to a value of the case level attribute country. There are two values 'DE' and 'SK', so there will be two results.

Both cases for country attribute 'SK' contain 'C->C' edge, so the result for 'SK' is 2. The total number of edges is 3, but we don't count number of edges.

## Result for example 6



- DE = 0
- SK = 2



### Expression in custom metric editor

Metric formula:

```
COUNTIF(CasesPerAttribute, ANY(CaseEdges, SOURCE(activity)=="C" && TARGET(activity)=="C"))
```

Metric data type: # Integer

Metric type:

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		

The nested formula contains a two-step aggregation. The inner one runs over all edges within case. The outer one aggregates cases by attribute value. The outer aggregation uses context *CasesPerAttribute* because the result per case is exactly one. The context

*EventsPerAttribute* also groups the result per attribute value, but it may involve the same case multiple times (per each involved event) into the result.

## Usage for example 6

Custom metric is applicable on every screen where values are displayed per attribute value. Attribute value may be grouped using event level (*EventsPerAttribute*) or case level (*CasesPerAttribute*) context. These two calculation contexts provide a different calculation, but share the same applicability of the calculation (custom metric):

- Process map (both nodes and edges)
- All statistics except for **Case overview**, which requires results per case.
- Attribute and edge conditional filters.

For an expression with nested aggregations, the most outer aggregation context determines the application in the Process Mining desktop app.

## 6.1 Event or edge-case aggregation (alternative)

Convert the previous example from categorical evaluation to quantitative.

*How many C->C edges are in cases in DE?* Convert the question to a generic form: *How many C->C edges are in cases per country?*

## Process

### View 1

Case1	A, 10min, Denis, DE	B, 20min, <u>Michal, DE</u>	C, 1h, <u>Michal, DE</u>	
Case2	A, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Michal, SK</u>	D, -1h, <u>Michal, SK</u>
Case3	C, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Denis, SK</u>	
Case4	A, 0min, <u>Denis, SK</u>	C, 0min, <u>Peter, SK</u>		

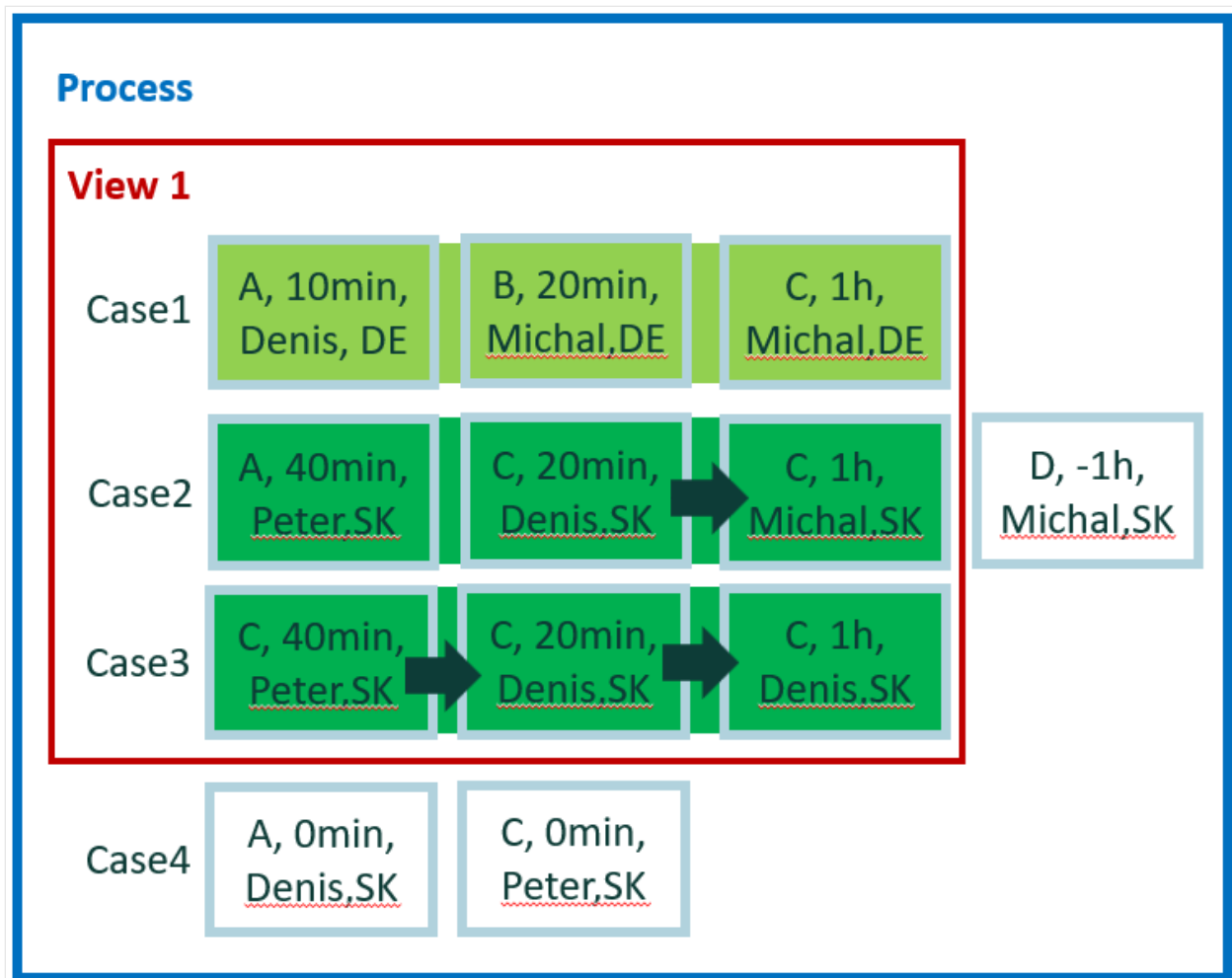
## Calculation in example 6.1

Again, the calculation consists of two steps. At first, run through each case and count 'C->C' edges. After it, in the second step, aggregate the results per single case according to the value of case level attribute country. There are two values: 'DE' and 'SK', so there will be two results.

Both cases for country attribute 'SK' contains 'C->C' edges. The result for 'SK' and total count for these edges is 3 (1 + 2).

## Result in example 6.1

- DE = 0
- SK = 3



### Expression in custom metric editor

Metric formula:

```
SUM(CasesPerAttribute, COUNTIF(CaseEdges, SOURCE(activity)=="C" && TARGET(activity)=="C"))
```

Metric data type: # Integer

Metric type:

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		

The expression again contains two step (nested) aggregation. The inner one runs over all edges within case and the outer one aggregates cases by attribute value.

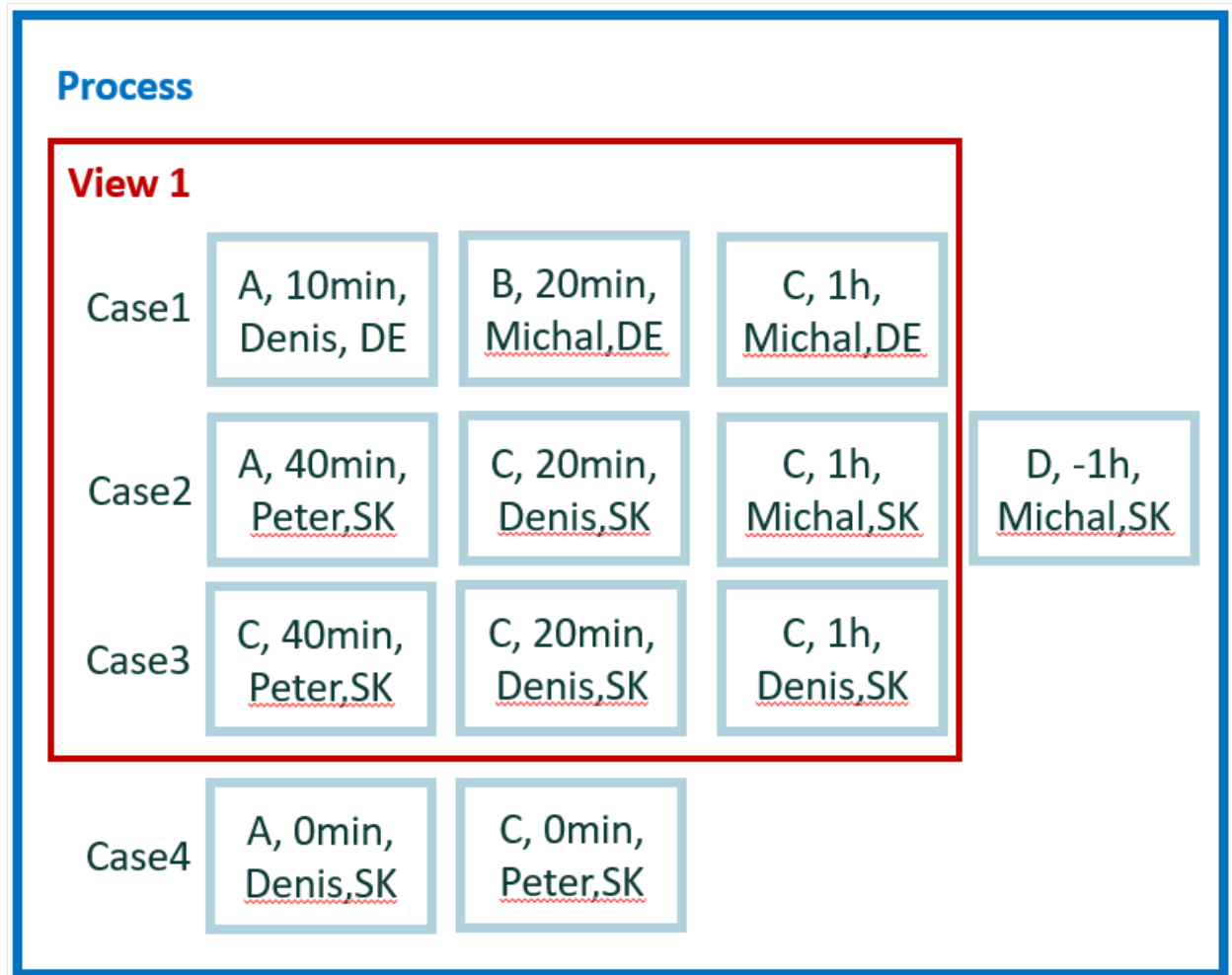
### Usage for example 6.1

Custom metric is applicable on every screen where values display per attribute value.

# 7 Switch from event to case context

What's average activity duration to case duration? How much time do we spend in average in activities is one of standard performance metrics.

But what if we need to calculate the average ratio of how much time we spend in activities in comparison to case duration? Where do we spend relatively the most time? Is it over the threshold?



## Calculation for example 7

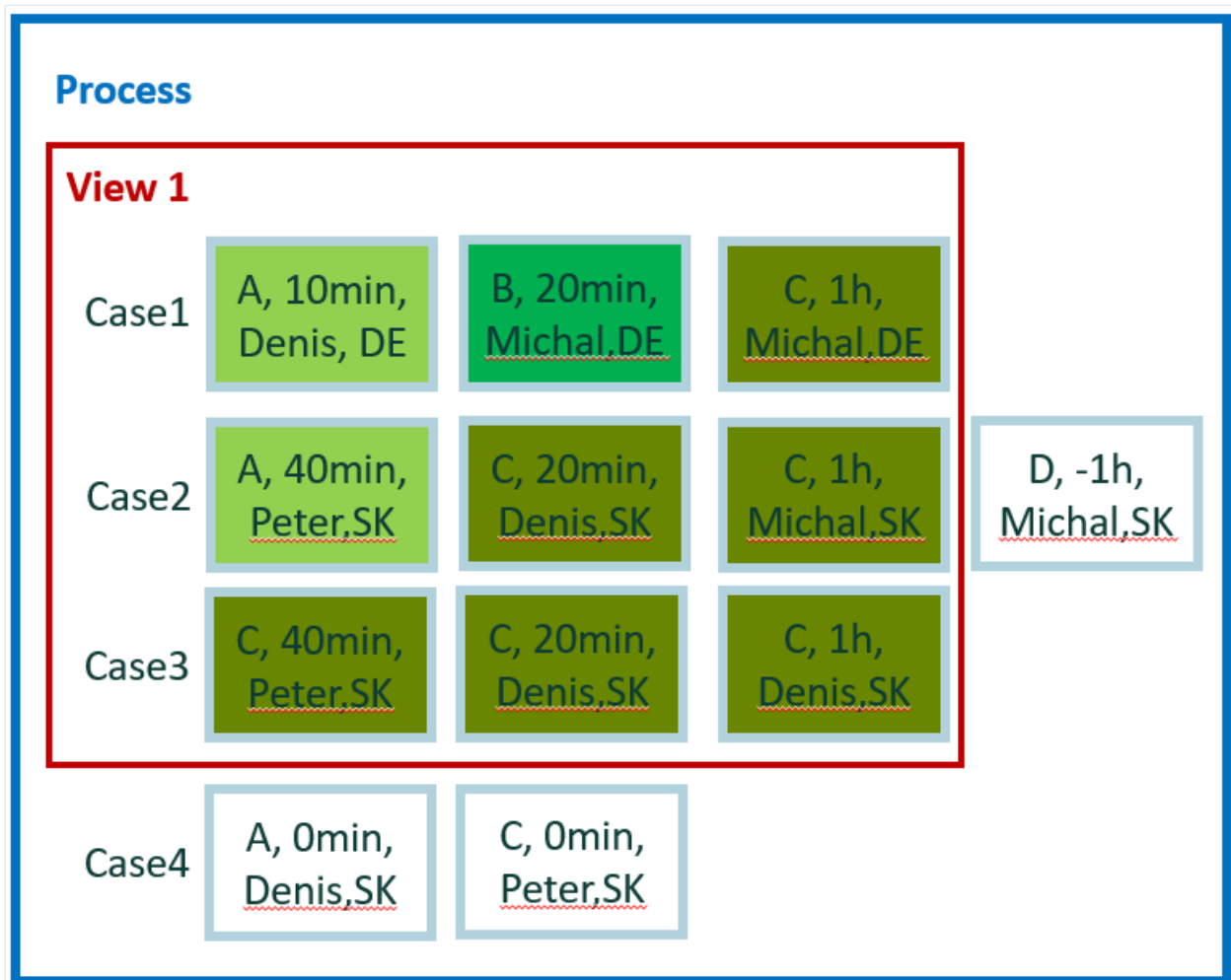
What exactly are we going to calculate? We want result per activity, so we get results per 'A', 'B', and 'C'. Activity 'B' is only in case 1. Case 1 duration is 90 minutes and activity 'B' duration is 20 minutes. The result for case 1 and activity 'B' is  $20/90 = \sim 0.22$ . Because 'B' isn't included in other cases, this is also the final result for 'B'.

Do the calculation for activity 'A', for case 1 the ratio is  $10/90$ , for case 2 the ratio is  $40/120$ , with average value  $0.22$  ( $0.11 + 0.33$  divided by 2). In the same manner, we calculate 6 individual results per each of events 'C' and make the average.

In terms of aggregation, it's nothing new. We generate results per attribute value, but for calculation, we used metric (value) from case.

## Result for example 7





- A = 0.22
- B = 0.22
- C = 0.375



Expression in custom metric editor

Metric formula:  
`AVG(Duration()/CASE(Duration()))`

Metric data type: ## Float

Metric type:    

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		

The expression is simple, but uses the important operator `CASE()`, which allows you to switch context for case level. This is the only way how to calculate event level metrics and ask for metrics (values) from its case.

## Usage for example 7

Application of custom metric follows the standard requirements for aggregation per attribute value. Because the expression uses `Duration()` and not attribute value, it's also applicable on edges (both in process map and statistics).

## 8 Event-case-event aggregation

Generic relation between events inside case.

*How many events done by Michal were in cases touched by Peter?* Imagine 'Peter' is a senior team member who is usually involved only in some troubles. We want to know how many times 'Peter' had to perform action when another user 'Michal' was involved in the same case.

Change the question to a generic form: *How many events per user were done in cases with Peter?*

## Process

### View 1

Case1	A, 10min, Denis, DE	B, 20min, <u>Michal, DE</u>	C, 1h, <u>Michal, DE</u>	
Case2	A, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Michal, SK</u>	D, -1h, <u>Michal, SK</u>
Case3	C, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Denis, SK</u>	
Case4	A, 0min, <u>Denis, SK</u>	C, 0min, <u>Peter, SK</u>		

## Calculation in example 8

Event is valid for this question, if it's within case, where there's at least one event done by user 'Peter'. Evaluate each event and group results per attribute user value - 'Michal', 'Peter', and 'Denis'.

## Result in example 8

- Michal = 1
- Peter = 2
- Denis = 3



## Process

### View 1





Case1	A, 10min, Denis, DE	B, 20min, <u>Michal,DE</u>	C, 1h, <u>Michal,DE</u>	
Case2	A, 40min, <u>Peter.SK</u>	C, 20min, <u>Denis.SK</u>	C, 1h, <u>Michal.SK</u>	D, -1h, <u>Michal,SK</u>
Case3	C, 40min, <u>Peter.SK</u>	C, 20min, <u>Denis.SK</u>	C, 1h, <u>Denis.SK</u>	
Case4	A, 0min, <u>Denis,SK</u>	C, 0min, <u>Peter,SK</u>		

## Expression in custom metric editor

Metric formula:

```
COUNTIF(CASE(Any(CaseEvents, user=="Peter")))
```

Metric data type: # Integer

Metric type:    

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		

Expression is short but requires some knowledge to understand it. The most inner part  $Any(CaseEvents, user=="Peter")$  is a simple result per single case. It evaluates if case contains user 'Peter' or not. The most outer part  $COUNTIF()$  does simple aggregation by attribute value. The requirement is to do aggregation on event level attribute user, but

the calculated value is case level metric. Switch between these two contexts is done by `CASE()` operator in the middle.

#### ⓘ Note

In this example, the *EventsPerAttribute* context isn't specified. Custom metric then applied implicit calculation context.

## Usage for example 8

Application of custom metric follows the standard requirements for aggregation per attribute value.

### 8.1 Event-case-event conditional aggregation

Relation between two event level attributes within case with condition.

*How many times Michal worked on repeated C with Peter in case?* This is a similar question to previous one, but there is added conditional.

Convert the question to a generic one: *How many times Michal (per user) worked on repeated C in cases with Peter?*

## Process

### View 1

Case1	A, 10min, Denis, DE	B, 20min, <u>Michal, DE</u>	C, 1h, <u>Michal, DE</u>	
Case2	A, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Michal, SK</u>	D, -1h, <u>Michal, SK</u>
Case3	C, 40min, <u>Peter, SK</u>	C, 20min, <u>Denis, SK</u>	C, 1h, <u>Denis, SK</u>	
Case4	A, 0min, <u>Denis, SK</u>	C, 0min, <u>Peter, SK</u>		

## Calculation for example 8.1

Evaluate each event and group results per attribute user value: 'Michal', 'Peter', and 'Denis', like in the previous example. Event evaluation is more complicated, as there's limitation only for repeated activities 'C'.

In case 1, there aren't repeated activities 'C', in case 2 is one repeated activity 'C' done by 'Michal', and in case 3 are two repeated activities 'C' done by 'Denis'.

## Result for example 8.1

- Michal = 1
- Peter = 0
- Denis = 2

## Process

### View 1





Case1	A, 10min, Denis, DE	B, 20min, Michal, DE	C, 1h, Michal, DE	
Case2	A, 40min, Peter, SK	C, 20min, Denis, SK	C, 1h, Michal, SK	D, -1h, Michal, SK
Case3	C, 40min, Peter, SK	C, 20min, Denis, SK	C, 1h, Denis, SK	
Case4	A, 0min, Denis, SK	C, 0min, Peter, SK		

### Expression in custom metric editor

Metric formula:

```
COUNTIF((activity=="C" && OCCURRENCE("activity") > 1) && CASE(Any(CaseEvents, user=="Peter")))
```

Metric data type: # Integer

Metric type:    

PROCESS MAP	STATISTICS	FILTER	ROOT CAUSE ANALYSIS
<input checked="" type="checkbox"/> Node	<input checked="" type="checkbox"/> Event Level Attribute	<input checked="" type="checkbox"/> Attribute Conditional	<input checked="" type="checkbox"/> RCA
<input checked="" type="checkbox"/> Edge	<input checked="" type="checkbox"/> Case Level Attribute	<input checked="" type="checkbox"/> Edge Conditional	
	<input checked="" type="checkbox"/> Case Duration Influence	<input checked="" type="checkbox"/> Metrics	
	<input checked="" type="checkbox"/> Case Overview	<input checked="" type="checkbox"/> Event Metrics	
	<input checked="" type="checkbox"/> Edges		

Two step (nested) aggregation—inner one evaluates the single case, the outer one group results per attribute value. Conditions are also separated between these to aggregation. The inner one handles case requirement if it contains user 'Peter'. The outer one groups events so it contains the event related condition if activity is 'C' and if it is repeated.

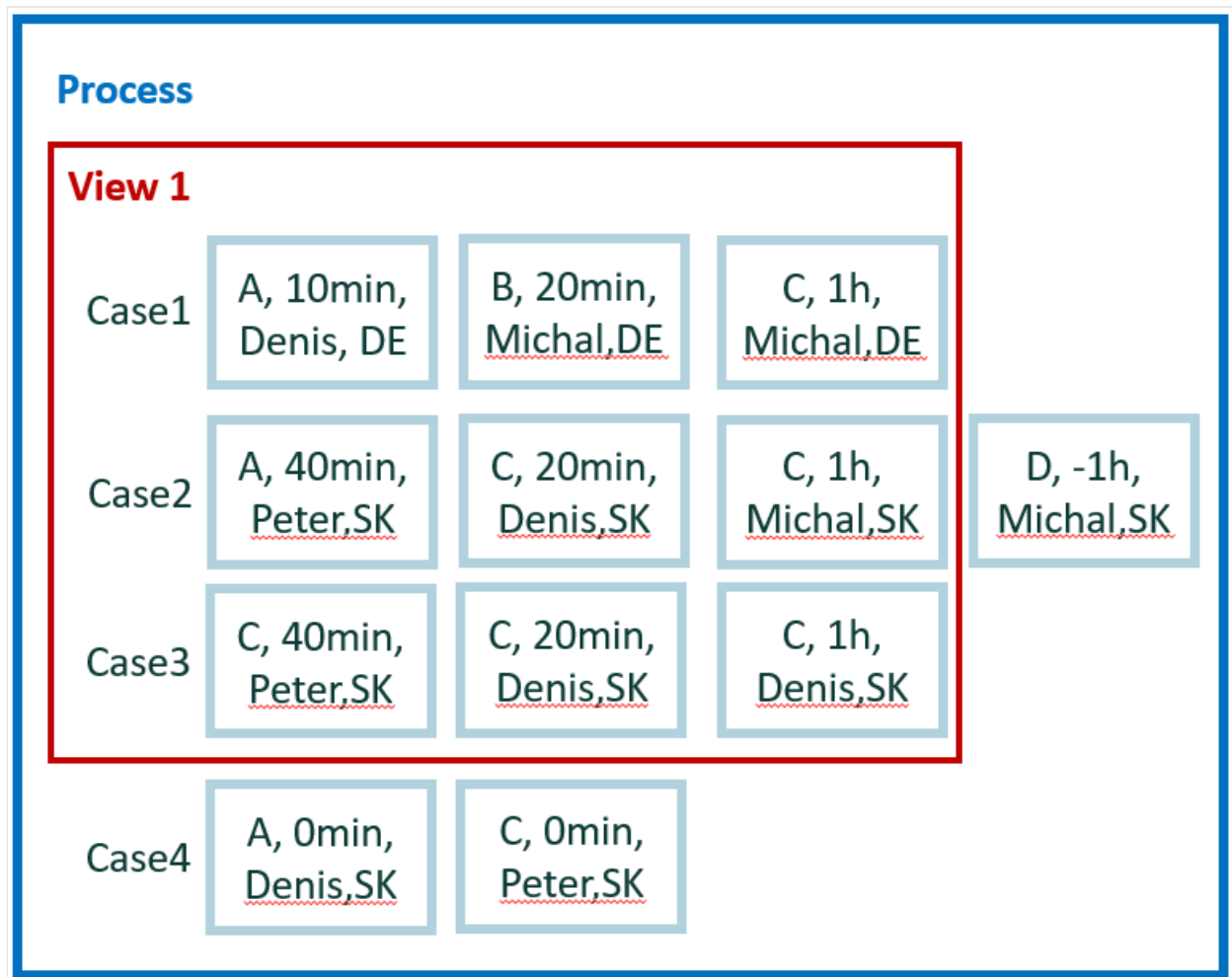
Operator `OCCURRENCE()` returns occurrence index of a given event attribute value within the case.

## Usage for example 8.1

Application of custom metric follows the standard requirements for aggregation per attribute value.

## 9 Extra: Value specific custom metrics

- *Is it possible to avoid operator `CASE()`? Is there way to simplify the expressions? Yes, it is, but there are tradeoffs. See the following example.*
- *How many events done by Michal (per user) were in cases with Peter? The same question like in [8 Event-case-event aggregation](#).*
- *Is it possible to answer question without using `CASE()` operator?*



Generic solution using `CASE()` operator

Metric formula:

```
COUNTIF(CASE(Any(CaseEvents, user == "Peter")))
```

It is possible to skip `CASE()` operator at the cost of creating value specific custom metric? In such a custom metric, we have to specify requested custom value 'Michal' and have drop calculations for other attribute values (per user) and grouping by another attributes.

### Custom metric limited to specific custom value

Metric formula:

```
SUM(CasesPerAttribute,  
COUNTIF(CaseEvents, user == "Michal") * IF(ANY(CaseEvents, user == "Peter"), 1, 0))
```

Reasoning behind the latter one:

1. Select cases with 'Peter' (operator `ANY()`)
2. Convert boolean result to numeric zero or one (operator `IF()`)
3. Count number of activities with requirement (operator `COUNTIF()`)
4. Apply result per case per each case exactly once (calculation context *CasesPerAttribute*)
5. At last Sum count of events per case (operator `SUM()`)

The custom metric without `CASE()` operator is maybe easier to read by humans, but it brings some disadvantages.

- Per each resulting attribute value ("Michal"), we need a separate custom metrics. For other attribute values, the metric returns zero.
- Operator `COUNTIF()` is locked for user attribute. Results grouped by another attribute, for example, country requires change of condition to specific country code, for example, `COUNTIF(CaseEvents, country == "DE")`.

# Business rules overview

Article • 07/18/2023

The Power Automate Process Mining desktop app allows you to define business rules that evaluate your key performance indicators (KPI). Business rules set thresholds that are associated with a category flag—**Error**, **Warning**, or **OK**—to help you quickly spot problems in your processes.

Thresholds apply to all business rules in the process context. However, each business rule can have its own calculation formula and filters. Because business rules are part of the process context, they're available in any view you create for that process.

## View, duplicate, or delete business rules

You can view, duplicate, or delete business rules in the **Process content** screen.

1. On the upper-right in the top menu, select [Process context](#).
2. On the panel to the left, select **Business rules**.

The **Business rules** screen lists all the business rules you've defined in the current context.

3. To delete or duplicate a business rule, select the ellipses (...) in the last column of the business rule row, and then select either **Delete** or **Create duplicate**.

## Define business rules

You can define business rules in the **Process content** screen.

1. On the upper-right in the top menu, select [Process context](#).
2. On the panel to the left, select **Business rules**.
3. Select **Create new business rule**.
4. In the **Rule name** field, enter a name for the business rule.
5. In the **Scope** field, select the [calculation scope](#) in the dropdown menu.
6. Add a filter:
  - a. Select **Add filter**, and then select the desired case or event.

b. On the **Attributes** screen, complete the field and select **Save**.

To learn more, go to [Define filters detail](#) in this article.

7. Define custom output:

a. Select the **Output** tab.

b. Select **Number of cases** or **Custom result formula**.

c. In the **Custom result formula** field, enter your formula and select **Save**.

To learn more, go to [Define custom output detail](#) in this article.

8. Add a severity:

a. Select the **Severities** tab.

b. Select **Add new severity** and select a type of severity from the dropdown menu.

c. Select an expression from the dropdown menu, enter a value, and select **Save**.

To learn more, go to [Define severities detail](#) in this article.

9. Select **Save**.

## Define filters detail

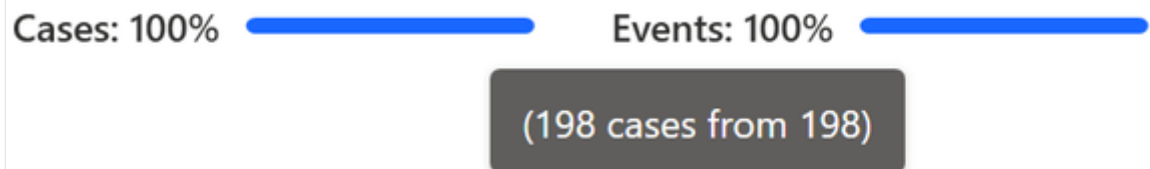
Filters that you define in the business rule apply on top of any filters that you've applied to the process view. If no filters are defined in the business rule, the business rule data set is the same as the process view data set.

### Additional options

- To exclude a filter from the business rule without deleting it, turn off **Enabled**.
- To delete all the filters in the business rule, select **Remove all filters**.
- To save the filters to a file, or to import saved filters into another business rule, select the ellipses (...) and select **Export Filter** or **Import Filter**.

Indicators at the bottom of the business rule panel show you at a glance how much of the view data set the business rule will cover. Hover over an indicator to view the number of cases or events that will be covered out of the total number of cases or events.





## Define custom output detail

All business rule scopes, other than the process scope, have one default output. It's the count of cases, events, or edges that are in the business rule data set. You can also define a custom result formula output using [custom metrics](#).

For all custom formulas in the business rule, you can specify a [calculation context](#).

## Define severities detail

Define severities, or thresholds and limits, to score the results of the business rule outputs and assign a performance category flag. Three categories are available: **Error**, **Warning**, and **OK**.

Thresholds and limits can include both constant values and custom expressions that are dynamically calculated. For example, you might assign an **Error** flag when the duration of a case is longer than the average case duration.

You must define severities before you can save the business rule. The simplest definition of a severity category is the expression **Any**.

If the business rule doesn't have a custom output defined, severities are applied over the default output, count.

## See also

[Process context](#)

[Business rules for process maps](#)

[Business rules statistics](#)

[Custom metrics overview](#)

# Business rule scope

Article • 07/18/2023

Select a **Scope** when you define a business rule. It determines the scope to which the output result is delivered.

## Event scope

Event scope provides results per activity. The data element over which the formula is calculated is events. The default output is the number of events that fit into the business rule data set.

The calculation result displays in the **Statistics** and **Process map** screens. In the detail view for a business rule, the results display per activity. Each activity is categorized according to the defined severities. In the process map, the results display per activity, in the same way as in the detailed view for a single business rule in Statistics.

## Case scope

Case scope provides a single result per business rule data set. The data element over which the formula is calculated is cases. The default output is the number of cases that fit into the business rule data set.

The calculation result display in the **Statistics** and **Process map** screens. The process map highlights all activities and edges that belong to any of the cases in the business rule.

## Process scope

Process scope is the most generic. It provides a single result per business rule data set.

For a process scope, define the custom result formula with an explicit calculation context to determine over which data elements the formula is calculated—events, edges, or cases. The default business rule result—count of elements—isn't available.

The calculation result isn't relevant to activities and edges. It displays in the **Statistics** screen only.

An example of process scope is average case or event duration. When it's longer than two days, the value is assigned the category flag **Error**.

# Edge scope

Edge scope is the same as event scope, except that results are provided per edge. The calculation result displays in the **Statistics** and **Process map** screens.

## See also

[Business rules overview](#)

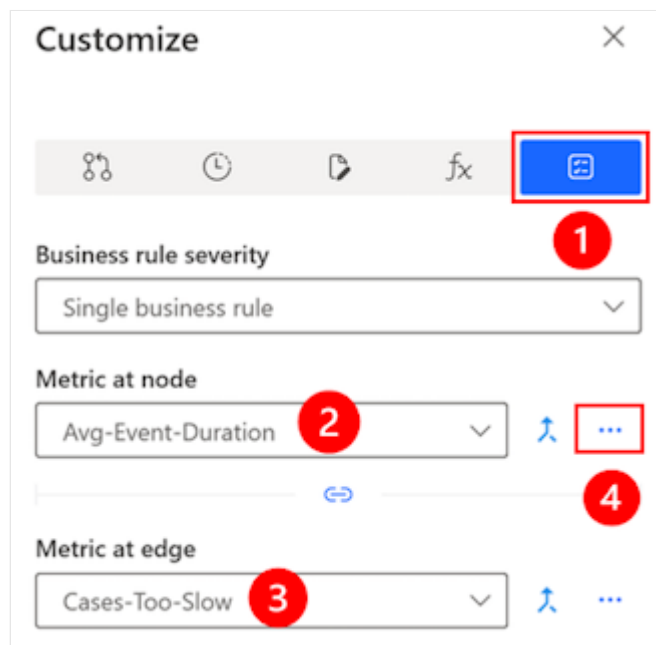
# Business rules for process maps

Article • 07/18/2023

To select business rules to view in the process map, select the **Customize** icon on the panel on the right in the **Process map** screen. You can display results per single business rule, or by severity over all business rules. Process scope business rules aren't available in the process map.

## Single business rule display

If you select **Single business rule**, results are displayed for the business rule you select in the events and edges lists. You can select different business rules for events and edges.



Legend:

1. Business rule views icon.
2. **Metric at node:** Event scope and case scope business rules.
3. **Metric at edge:** Edge scope and case scope business rules.
4. Value switch icon and business rule actions (...).

Because case scope business rules represent complete cases, you can select case scope business rules from both the events and edges lists. Event scope and edge scope business rules are available only in the corresponding list.

To switch between the default output—count—and a custom formula result, select the value switch icon to the right of the business rule list. Hover over the icon to show which

value is being displayed in the process map. You can show any combination of default and custom output values for the business rules you selected.

## Severity display

If you select a severity, the process map displays the total number of occurrences of each element with that severity. That is, it shows the total number of cases, activities, and edges that are in the data sets for each business rule that resulted in the selected severity.

Export process map Search in process map

198 × Assemble bicycle

20 × Request replacement for missing or broken part

50 × 10 × 10 × 198

**Customize** ×

Clustering attribute  
Non-clustered

Business rule severity  
Error

## Details display

Select an activity in the process map to view its details. In the **Business rules** section of the **Details** panel, you can select one or more business rules to display for the activity. The detailed view shows both default and custom results.

Export process map Search in process map

198 × Assemble bicycle

20 × Request replacement for missing or broken part

198 × 50 × 10 × 10 × 58 × 150 × 58 × 198

**Detail** ×

Loop outflow 0

Loop outflow (%) 0%

Net Loop Gain -10

Net Loop Gain (%) -100%

Custom metrics

Select metric to add

**Business rules**

NAME	COUNT	OUTP...
Avg-Event... ×	99	99 ×
Cases-Too... ×	99	99 ×

## See also

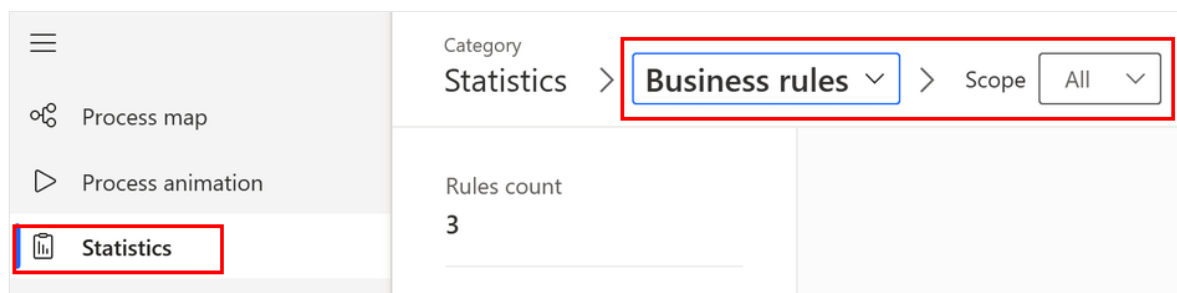
[Business rules overview](#)

# Business rules statistics

Article • 07/18/2023

Along with statistics about your cases, activities, and edges, the Power Automate Process Mining desktop app collects statistics on each of your business rules. You can view them in the **Statistics** screen.

1. In the left panel, select **Statistics**.
2. In the dropdown menu, select **Business rules**.
3. (Optional) Select a scope. By default, the display includes all scopes.



Statistics are available at two levels:

- **Summary view:** Displays a row of metrics for each business rule of the selected scope
- **Detailed view:** Displays metrics per activity or edge for a single business rule

## Summary view

The summary view displays a single row of metrics for each business rule you defined for the process or for business rules of the selected scope. The category isn't evaluated for event and edge business rules when you display them in the summary view. To display metrics per activity or edge, use the [detailed view](#).

If you select a scope other than **All**, the list of business rules is limited to rules of the selected scope.

## Detailed view

Event scope and edge scope business rules calculate results per event or edge. To display the details of events or edges, select the scope and then select a business rule of that scope.

1. In the **Scope** dropdown menu, select **Event** or **Edge**.
2. To add a filter, select **Enable filter**.
3. In the dropdown menu, select a business rule.

The table shows metrics for each activity or edge in the data set of the selected business rule.

## See also

[Statistics overview](#)

[Business rule scope](#)



# Overview of task mining

Article • 07/18/2023

Task mining is a technology that enables organizations to capture detailed steps for tasks performed on users' desktops, either independently or collaboratively with colleagues.

By analyzing recorded user actions, the task mining capability in Power Automate allows organizations to gain insights into how they perform tasks, identify common mistakes made during task performance, and pinpoint tasks that can be automated, all of which can help optimize their business processes.

## Benefits of the task mining capability

The task mining capability helps businesses to:

- Streamline workflows.
- Identify inefficiencies and bottlenecks in workflows.
- Reduce costs.
- Foster a culture of continuous improvement where employees are encouraged to optimize their work processes.

## Business example

A retail company can use the task mining capability to analyze the order fulfillment process. By recording and analyzing user actions, the organization can gain insights into how orders are processed, identify inefficiencies and bottlenecks, and pinpoint tasks that can be automated.

The task mining capability can automatically produce a process map that visualizes the order fulfillment process, allowing the organization to identify which activities take the longest, how many variations of the order fulfillment process exist, and which variations and actions take the most time.

In addition, the application analytics report can show which applications teams spend the most time in and which activities can be optimized. With this information, the organization can create flows with automation recommendations that reveal which connectors to use based on the analysis done with task mining.

Using insights from task mining, the retail company can streamline the order fulfillment process, reduce errors, and improve customer satisfaction. The company can also

automate repetitive tasks, freeing employees to focus on more value-added activities such as customer service and inventory management.

## Components

Following are the main components for the task mining capability:

- Prepare processes and recordings
- Analyze processes
- Visualize processes
- Identify automation recommendations
- Share processes

# Tutorial: Get started with the task mining capability

Article • 07/18/2023

This tutorial with sample data allows you to experience task mining in the process mining capability. In this tutorial, you will:

- [Import a solution](#)
- [View sample recordings](#)
- [Analyze a process](#)
- [Gather insights with a process map](#)
- [View metrics with activity combinations and variants](#)
- [Identify automation opportunities](#)

For the task mining tutorial, download [User recording demo data](#). For the process mining tutorial, go to [Tutorial: Get started with the process mining capability](#).

## Get ready for task mining

1. Sign in to [Power Automate](#).
2. Select your environment.
3. On the navigation pane to the left, select **Process mining** > **Processes**.

## Import a solution

In this tutorial, you'll import a solution which already has sample recordings.

1. On the navigation pane to the left, select **Solutions**.
2. In the toolbar at the top, select **Import solution**.
3. Select **Browse**.
4. Download the [RPA in a Day](#) .zip file and open it.
5. Select **Next**.
6. Select **Import** and wait for the solution to import.

# View sample recordings

1. Once you've successfully imported the .zip file, on the navigation pane to the left, select **Process mining** > **All processes** below the process cards.
2. Select the **Invoice submission process**.

## ⓘ Note

If this is the first time you're accessing the process mining capability, make sure you've selected **Processes** at least once and waited until the **Getting things ready** loading spinner has disappeared before importing. If you try to import the RPA in a Day solution without first initializing the **Processes** section of the process mining capability, you see only a couple of recordings in the imported solution.

You can see some of the existing recordings under **Recordings**.

3. To be sure you see the entire list of existing recordings, select **See all**.
4. Go back to the **Invoice submission process** by selecting it from the breadcrumbs at the top of the page.

## Explore the features

You'll see the following features:

- **New recording:** Create a new recording.
- **Analytics:** See the process map and insights.
- **Share:** Share your processes with your team members.

Process owners can pick two role options when sharing with other users: contributor and co-owner. The **Contributor** role gives the user the ability to upload their own recording to the process. The **Co-owner** role gives the user the ability to upload recordings and edit other recordings.

- **Analyze:** Analyze a process.
- **Create activity names:** Create activity names for your process.
- **Delete process:** Delete your process.

# Analyze a process

When you analyze a process, the process mining capability analyzes existing recordings to identify any bottlenecks within the business process.

## 1. Select **Analyze**.

The analysis will take a few minutes to complete. During this process, a status message displays under the **New recording** button.

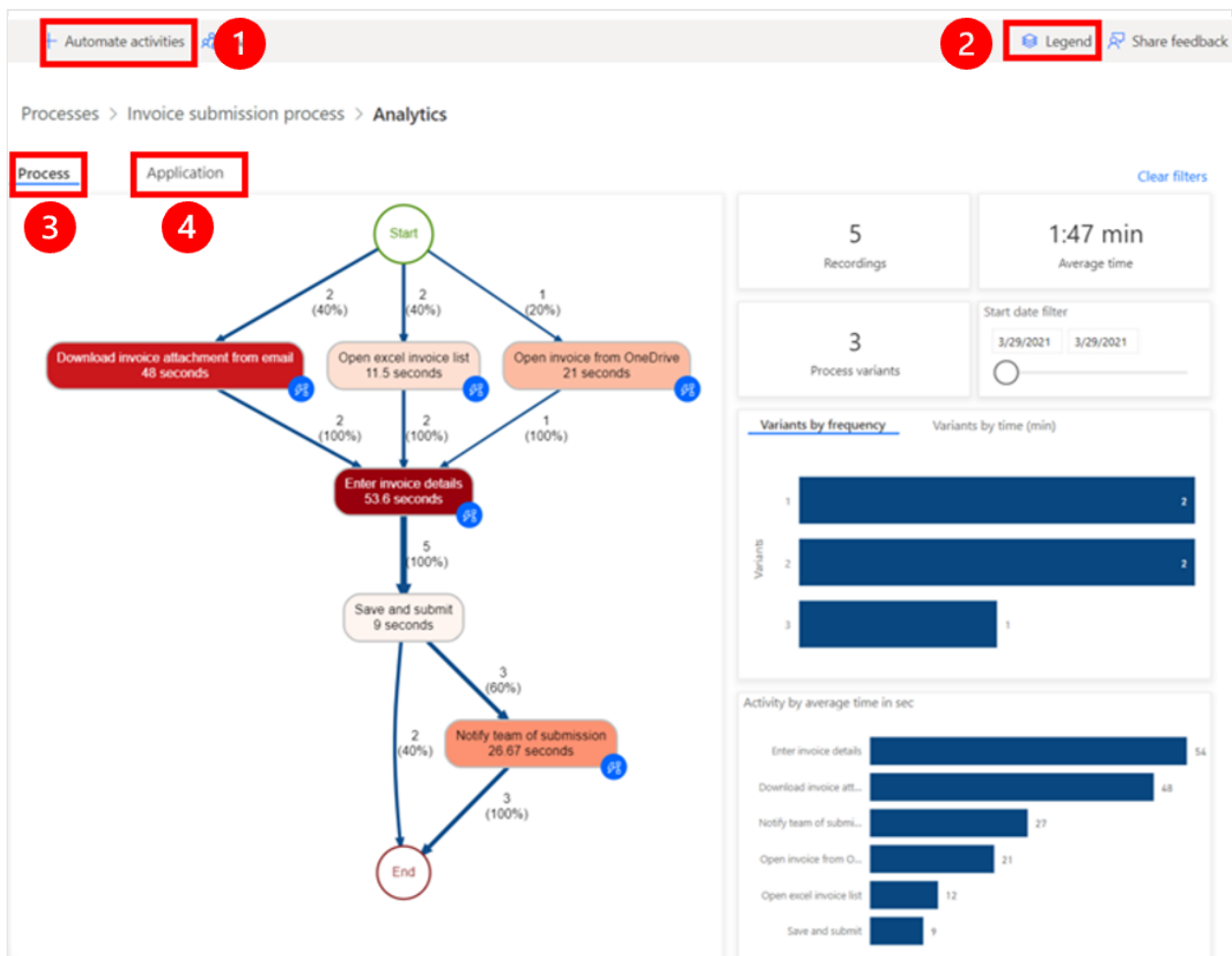
## 2. If you run into an error during the analysis stage, select **Analyze** to trigger this action again.

## 3. Once it's done, you see the **Process analysis status** change to **Analyzed**. Select **Analytics** to see the process map and insights.

This step may take a couple minutes to complete after the analysis has been performed.

# Analytics page layout

This section explains what you can do on the **Analytics** screen.



Legend:

1. **Automate activities:** To streamline the automation process, you can use the **Automate activities** feature. This feature detects if the user performed actions using an application that has Power Automate actions available, such as Microsoft Outlook or Excel. Upon selecting **Automate activities**, a draft Power Automate process containing the relevant actions is generated. The user can then modify and customize the draft process to create the final automated process.
2. **Legend:** Additional information about the report, helping them to better understand the visualizations and data presented.
3. **Process:** In-depth information about the analyzed process, including the process map, time analytics for each variant and each recording author.
4. **Application:** Information about the apps used in recordings. This includes what apps were used by authors, how often were they used, and what the transitions were between them. This report explains which connectors should be used when implementing automation for the process, and where to potentially use desktop flows, as there's no existing connector.

## Business process step relationships

In the previous example, you see the various steps in the business process and their related durations. These steps include:

- Download invoice attachment from email (48 seconds)
- Open Excel invoice list (11.5 seconds)
- Open invoice from OneDrive (21 seconds)
- Enter invoice details (53.6 seconds)
- Save and submit (9 seconds)
- Notify team of submission (26.67 seconds)

## Gather insights with a process map

Visualizing and analyzing processes is made possible through the process map. By examining a graphical representation of how business processes are performed, you can gather insights about potential areas for improvement..

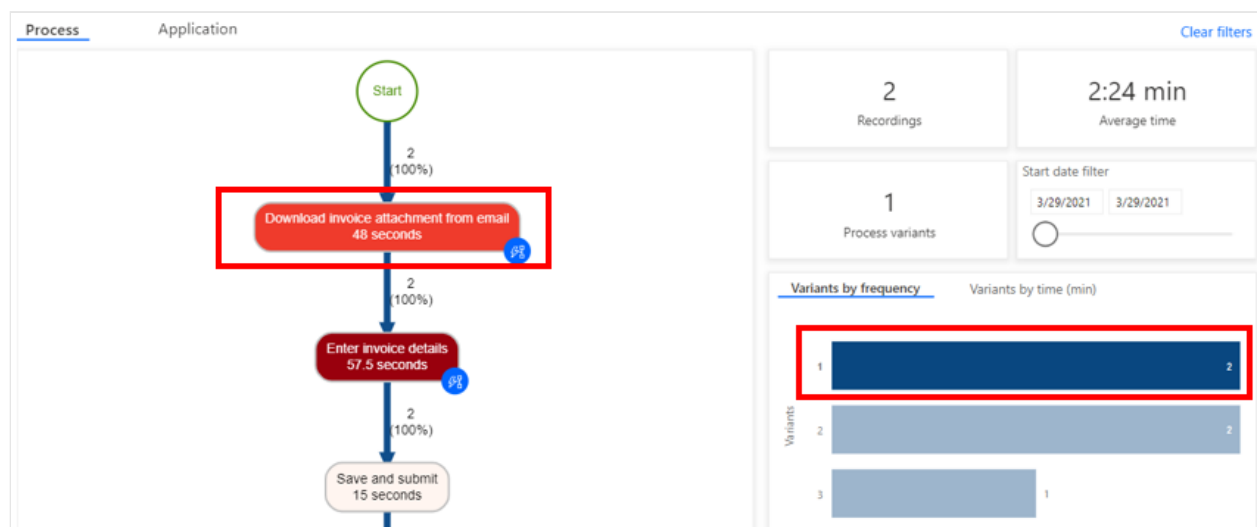
Go to the process map by selecting **Analytics > Process map**.

## View metrics with activity combinations and variants

This section explains the **Variants by frequency** bars on the right panel. The corresponding process map is on the left panel.

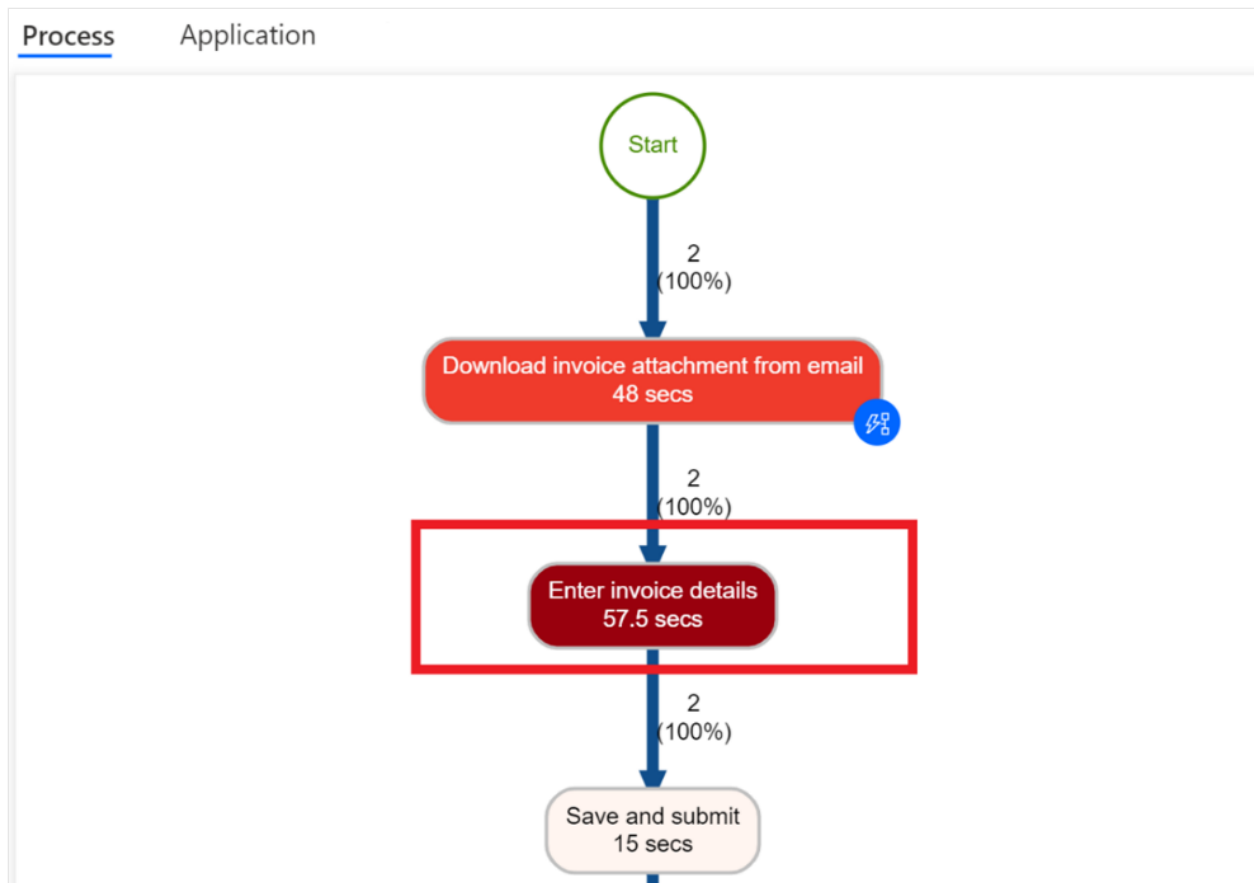
On the process map, you can observe various activity combinations and variants that are displayed individually. A process variant represents a distinct sequence from the start to the end of the process. It is like a 'trail' through the process that varies from other variants by at least one activity. The process map also provides additional metrics such as activity frequency and throughput time. Activity frequency indicates the total number of recordings or cases that pass through it. Throughput time measures the duration between the first event of the case and the last event.

By selecting the first bar on the process map, you can view the most frequent process variant, which is the invoice coming through email. It may take some time for any changes to reflect on the chart.



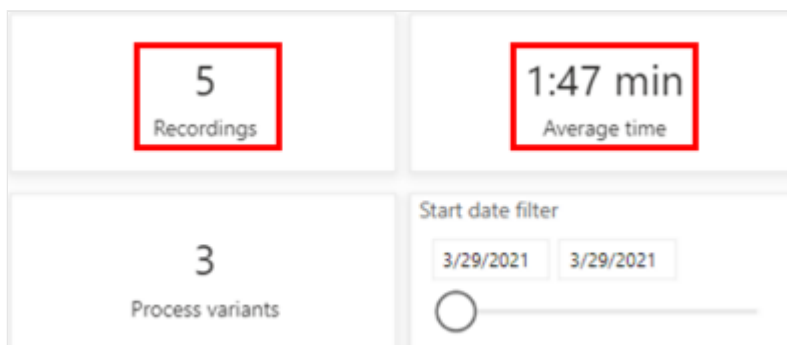
## Identify automation opportunities

You can see that people spend a lot of their time entering the information in the application. This helps identify an opportunity to automate the process.



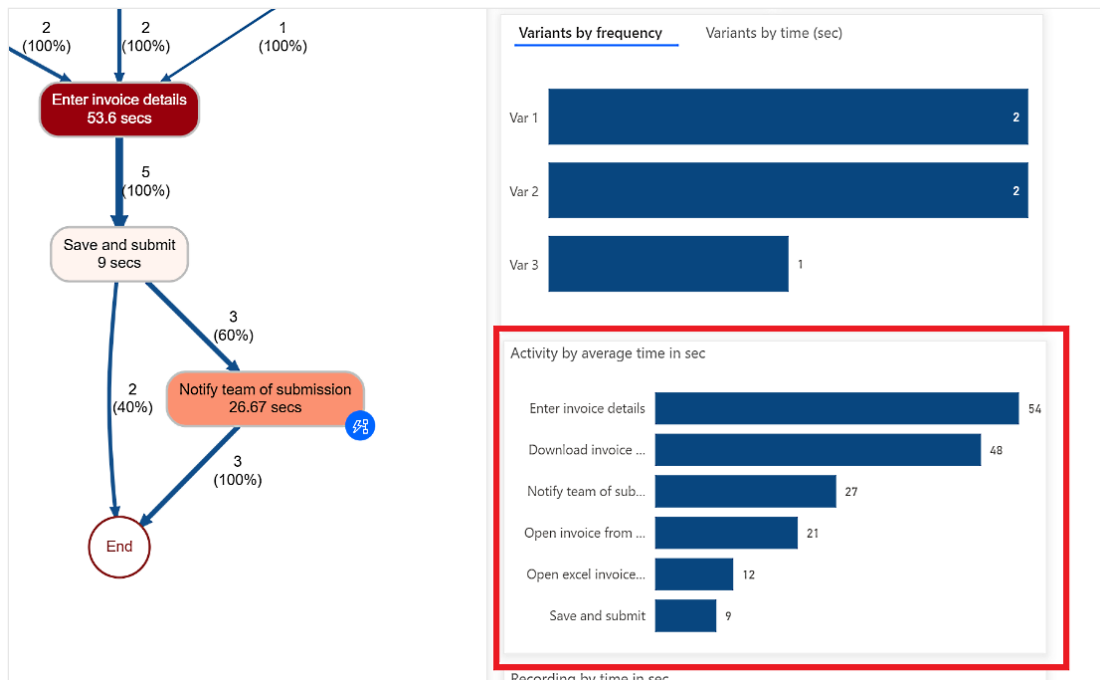
## View analytics data

1. Deselect **Var 1** by selecting any blank space within the **Variant by frequency** area.
2. Look at the top analytics data. The average process time is 1.47 minutes out of five recordings.

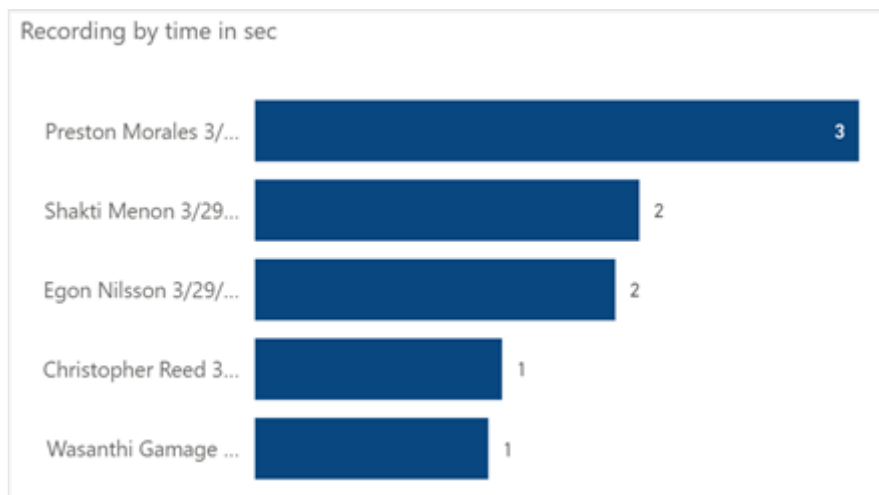


3. Analyze other time-based metrics dashboards.
  - **Activity by average time in sec:** Notice that **Enter invoice details** and **Download invoice** are taking the most time.





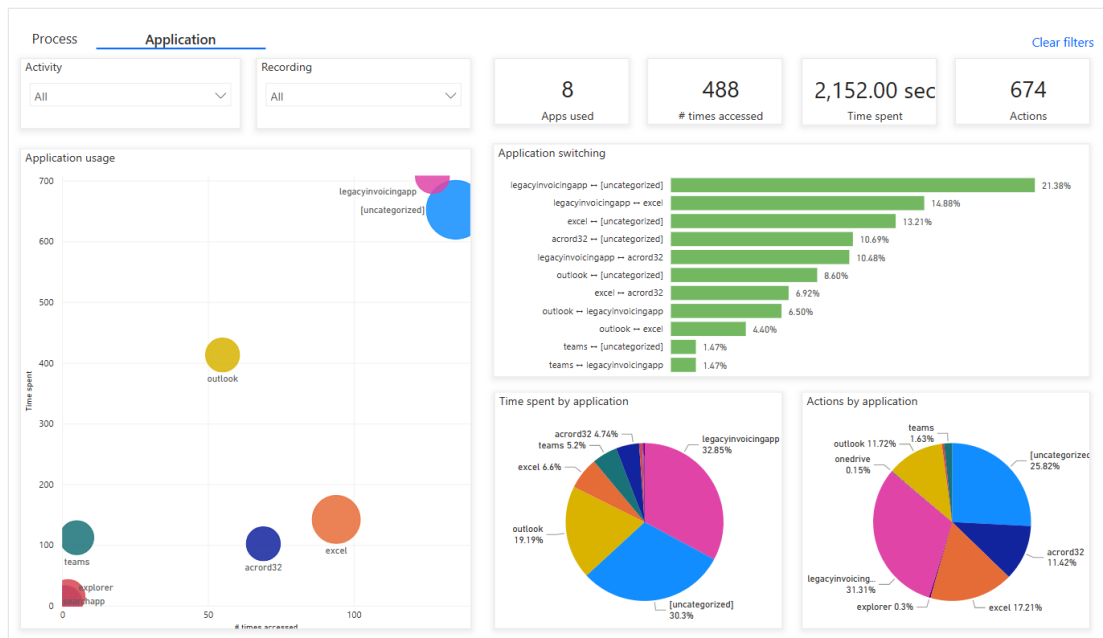
- Recording by average time in min: Notice that some people (Preston Morales and Shakti Menon) are taking more time than others.



4. Select the **Application** tab to see details on which applications were used.

It might take a while to load the reports.

- By providing information on the applications utilized in a business process, their frequency of usage, and the amount of time spent on each application, this report is crucial for gaining insights into the process.
- For example, the dashboard shows that a legacy invoicing app, Outlook, and Excel have significant contributions to time spent and actions by applications.
- Take time to get familiar with the different reports.



5. Go back to the process map by selecting **Process**.

6. Look at the automate activities feature. From the process map, you can see that the process mining capability has highlighted several activities as potential candidates for automation based on applications.

7. Start to create a flow for automation by selecting **Automate activities** at the top.

A tab opens in the browser and shows the flow designer. The recommended actions that match to the activities from the process map automatically appear on the right panel. For example, several email connectors are suggested for you to use in order to automate the **Download invoice attachment from email** activity.

Power Automate Search

Invoice submission process Undo Redo Automate activities


Manually trigger a flow

+ New step Save

### Automate activities

Invoice submission process

Here are some of the activities we found that you may want to automate. Add a connector to get started. [Learn more](#)

- Download invoice attachment from e...  
Add a connector to your flow  
Office 365 Outlook
- Open invoice from OneDrive  
Add a connector to your flow  
OneDrive
- Notify team of submission  
Add a connector to your flow  
Office 365 Outlook  
Microsoft Teams
- Other connectors 
  - Custom connector  
Didn't find what you need? Create a custom connector. [Learn more](#)
  - Desktop flow connector  
Automate processes on your desktop environment.  
Desktop flows

# Prepare processes and recordings

Article • 07/18/2023

Before you can use the task mining capability to visualize and analyze your processes, you need to:

- [Create your process](#) in the process mining capability in Power Automate.
- [Record the activities](#) that make up the process using the Power Automate recorder.
- [Prepare the recording for analysis](#).
- (Optional) [Create recommended activity names](#) to make it easier for you and others to prepare the recording for analysis.

Learn more about processes in the following video.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKx7r?postJsllMsg=true>

## Create a process

In general, processes you think might be inefficient or repetitive are good candidates for analysis.

1. Sign in to [Power Automate](#).
2. On the left-side navigation pane, select **Process mining**.
3. In the **Create a new process** section, select the **Start here** tile.
4. Enter a name for your process and description, and then select **Recordings**.
5. Select **Create**.

## Record your process

Create a recording in one of two ways:

- [Right after process creation](#).
- [From the process details page](#).

## Create a recording right after process creation

After you create a process, you see a screen with two options as next steps.

- Select **Add a recording**.

## Create a recording from the process details screen

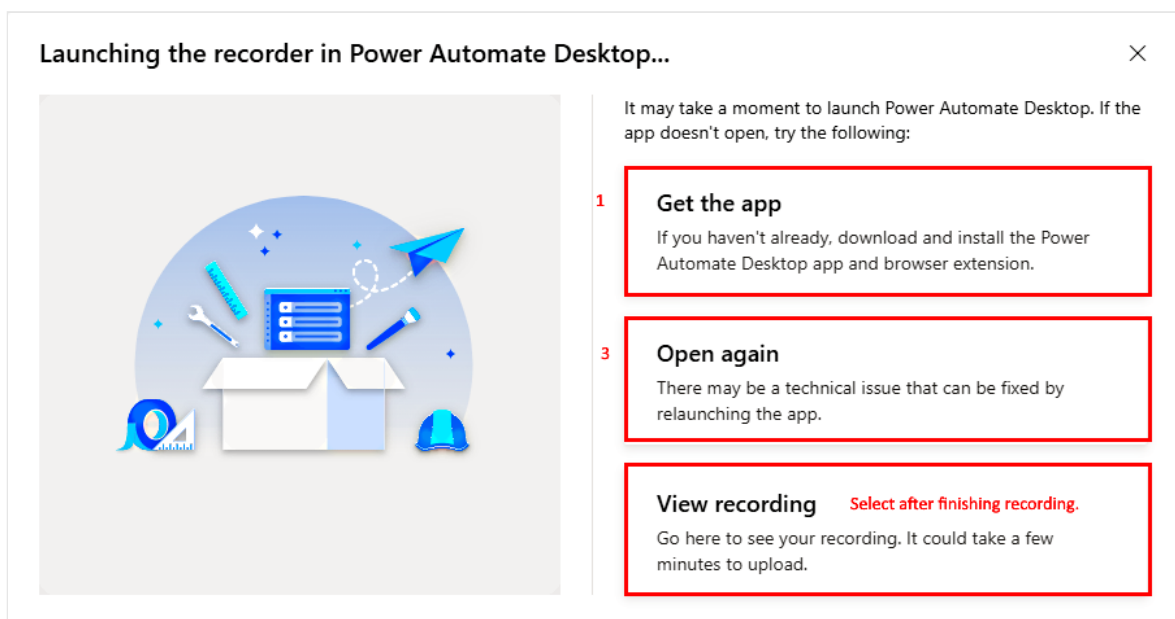
To create a recording from the details screen, find and select your process.

1. Select **Process mining** > **All processes** below the tiles to the right.
2. Select the name of the process to go to the process details screen.
3. On the menu at the top, select **New recording**.
4. Select **Open recorder**.

## Launch the recorder in Power Automate

By using any of the methods described previously, you should receive a message that says **Launching the recorder in Power Automate**.

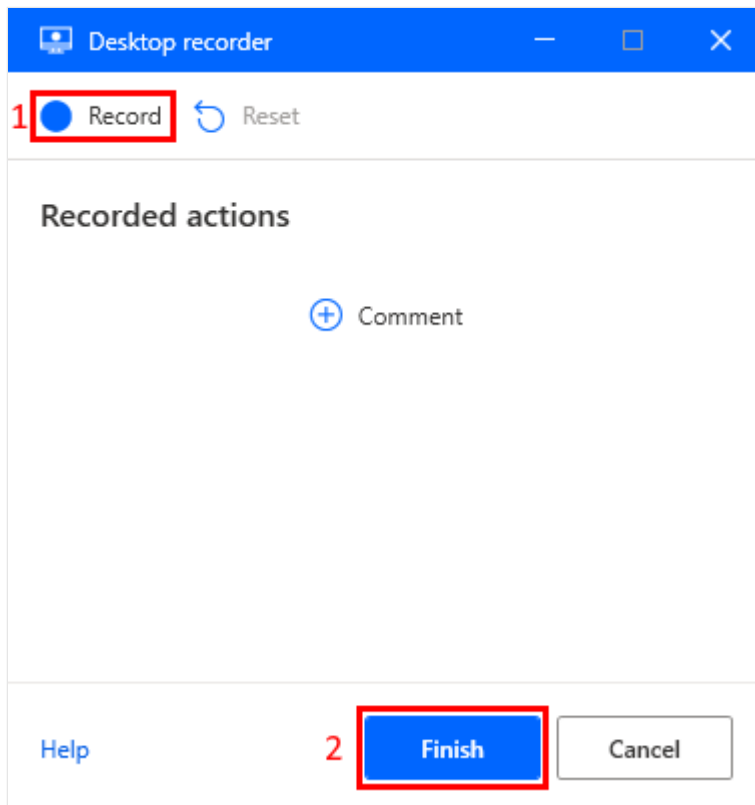
1. You should've [downloaded Power Automate](#) before you started. However, you can also select **Get the app** to install it.
2. If you've installed Power Automate, you should see an **Open Power Automate** browser pop-up window. Select it to open the app.
3. If Power Automate is installed but doesn't open correctly, select **Open again**.



## Use the Power Automate recorder

Start recording your process in just one step.

1. On the Desktop recorder screen, select **Record**.
2. Perform the actions that you want to record, and then select **Finish** at the bottom of the recorder screen.



3. After the recording has been saved successfully, select **View recording** to view the recorded steps and prepare the recording for analysis.

#### ⓘ Note

Depending on the length of the recording, it might take some time before the actions are available.

## Recorder features

As you record your actions, the action descriptions are listed on the recorder screen.

- To delete any action from your recording, select the trash can icon.
- To temporarily stop recording, select **Pause recording** at any time.
- To continue recording from where you left off, select **Start recording again**.
- To erase all the recorded actions and start over, select **Reset recording**.

## Recording tips

Use these tips to improve your recording experience.

- Be methodical in your actions. This includes waiting for the red box to focus on the item you're trying to interact with before selecting it, as there may be a slight delay.
- If there were any selections made by mistake, delete the action in the recorder screen.
- If you record a step that's not intended to be a part of the process, delete the step with the trash icon.

## Prepare a recording for analysis

Once the recording is finished, the recorded actions can be viewed on the recording details screen. It's important to prepare the recording for analysis before proceeding.

The actions that were recorded during the process can be very detailed and specific. In order to make sense of them and create a clear process map, these actions need to be grouped together into larger activities. The process mining capability is now able to automatically group similar actions into activities.

Ensure that any sensitive information is removed from the recording before analysis. This can be done to protect data privacy and security. For more information on how to protect your data, go to [Protect your data](#).

Here's a short video on how to prepare a recording for analysis.

<https://www.microsoft.com/en-us/videoplayer/embed/RWN6PQ?postJsllMsg=true> 

## Grouping actions into activities

Once you have completed the recording process, you might notice that some activities have already been automatically created for you. You have the option to keep these activities as they are, or you can modify them to better suit your needs.

## Edit an existing activity

Here are some tips on editing an existing activity.

1. To change the starting action of an activity, drag the header of the activity up or down the list of actions to the desired starting point.
2. To change the name of an activity, select it and a combo box appears on the right.
3. You can choose from existing activity names in the dropdown menu, or create your own if needed.

## Add a new activity

You can add an activity to a process after you recorded it.

1. Select **Add activity** to add an activity header. All actions below the header and before the next activity header are part of the group.
2. Move the activity header up or down the actions list to where you want the activity to start.
3. Name the activity on the right, using the dropdown menu to find existing activity names or create a new one.

## Delete an activity

To analyze, you need at least two activities. Otherwise, the process map wouldn't be meaningful.

1. If you don't want an auto create activity or made a mistake and want to delete an activity, select **Delete activity** in the command bar.
2. If you don't want any of the auto created activities or just want to start over from scratch, select **Delete all activities** in the command bar.
3. At any time, select **Save** on the top right to save your work.

## Save and analyze

1. When you finish grouping, select **Save and analyze** on the top right.
2. Once analyzed, select **View analytics** in the notification bar to go to the analytics page.

To learn more, go to [Analyze processes](#).



3. Alternatively, you can save without analyzing by selecting the caret next to **Save and analyze**, and then select **Save**.
4. Select **Close** to return to the process details screen.

## Grouping tips

Here are some tips to group actions into activities, which may be helpful for your use case.

1. **Use existing activity name:** This creates a more consistent and accurate process map. Activity names are available in the dropdown menu whenever a recording is saved. To remove an activity name from the menu after it's removed from all recordings that use that name, you need to analyze the recording.
2. **Look for patterns:** Analyze the recorded actions for patterns that occur frequently, such as similar steps taken to complete a task or common applications used. Grouping these actions together can help identify common activities.
3. **Use discretion:** Group actions together that make sense to you and are related to the overall process. For example, if you are analyzing a sales process, you might group actions related to lead generation, outreach, and closing deals.
4. **Consider frequency:** You may want to group actions that occur frequently together. This can help identify bottlenecks in the process or areas where automation could be beneficial.
5. **Think about dependencies:** Consider grouping actions that have dependencies on each other. For example, if you need to download a file before uploading it, these two activities could be grouped together.
6. **Use feedback:** Collaborate with other stakeholders in the process, such as employees who perform the tasks or supervisors who oversee the process, to get feedback on the grouping of actions. Their insights can help improve the accuracy and usefulness of the process map.

## Create recommended activity names

As a process owner or co-owner, you can create recommended activity names for a process. This ensures more consistency in naming across recordings.

1. On the process details screen, select **Create activity names**.
2. To add a new activity name entry to the recommended list, select **New name**.

3. When you're done, select **Save**.

The activity names you added now appear under **Recommended names** in the dropdown menu when grouping actions for a recording. Any activities that aren't defined in the recommended list appear under **Custom names**.

# Analyze tasks and processes

Article • 07/18/2023

You can access most of your tasks and process management activities in the task mining capability.

1. On the left navigation pane in Power Automate, select **Process mining > All Processes**.
2. Select your process to go to the **Details** screen.

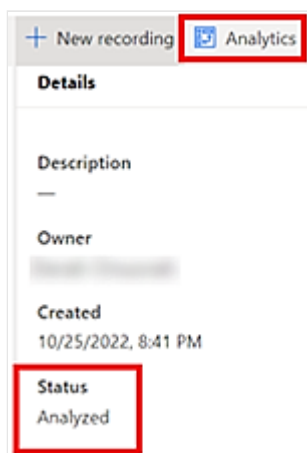
## ⓘ Note

The **TDS endpoint setting** for your organization needs to be enabled. This feature is enabled by default, but if it's disabled for any reason, ask your Microsoft Power Platform administrator to enable it in the Power Platform admin center.

## View your process map and related analytics

To begin analyzing your process, start by checking the status of your recordings and using **Analyze** on the command bar. This button adds the selected recording into the process map and related analytics. The analytics reports the insights only from recordings that have the **Analyzed** status.

- After the task is analyzed, the process map and related analytics are available when you select **Analytics** in the menu.
- On the **Details** pane, you can check the status of the analysis for your process and whether it has been previously analyzed.



- Analysis happens at the process level for all recordings that are ready to be analyzed.
- Pay attention to the recording status, which you can find under the Status column of the Recordings pane. Only recordings with the **Ready to analyze** status are considered for analysis.

Here's a short video on how to view analytics:

<https://www.microsoft.com/en-us/videoplayer/embed/RWMYVy?postJsllMsg=true>



## View your recording status

The status of each recording can be found under the Status column of the Recordings pane. Recordings can have one of the following statuses:

**-In progress:** This means that the recording is currently being made, or it might not have started yet. The web portal can't determine the status of the recording until it's been saved because the recording happens in the desktop client. Even after a recording has been saved, it's possible to see the "In progress" status because some processing is required to make the recording ready to view.

- **Failed:** An error occurred while processing the recording. You need to create a new recording.
- **Not analyzed:** The recording has been processed and is available to view and edit, but it hasn't been marked as ready for analysis.
- **Ready to analyze:** The recording has been marked as ready for analysis and is included in the report and analytics the next time you analyze the process.
- **Analyzed:** The recording has been analyzed and is included in the analytics output that can be viewed through the **Analytics** screen.

An analyzed recording might have one of the following icons next to it:

Icon	Description
	Indicates that the recording has been analyzed, but has been marked not ready to analyze. It won't be included if the process is analyzed again.
	Indicates that the recording has been modified and might be out of sync with the previous analysis. If you analyze the process again, the recording is synchronized with the analysis output and the process map.

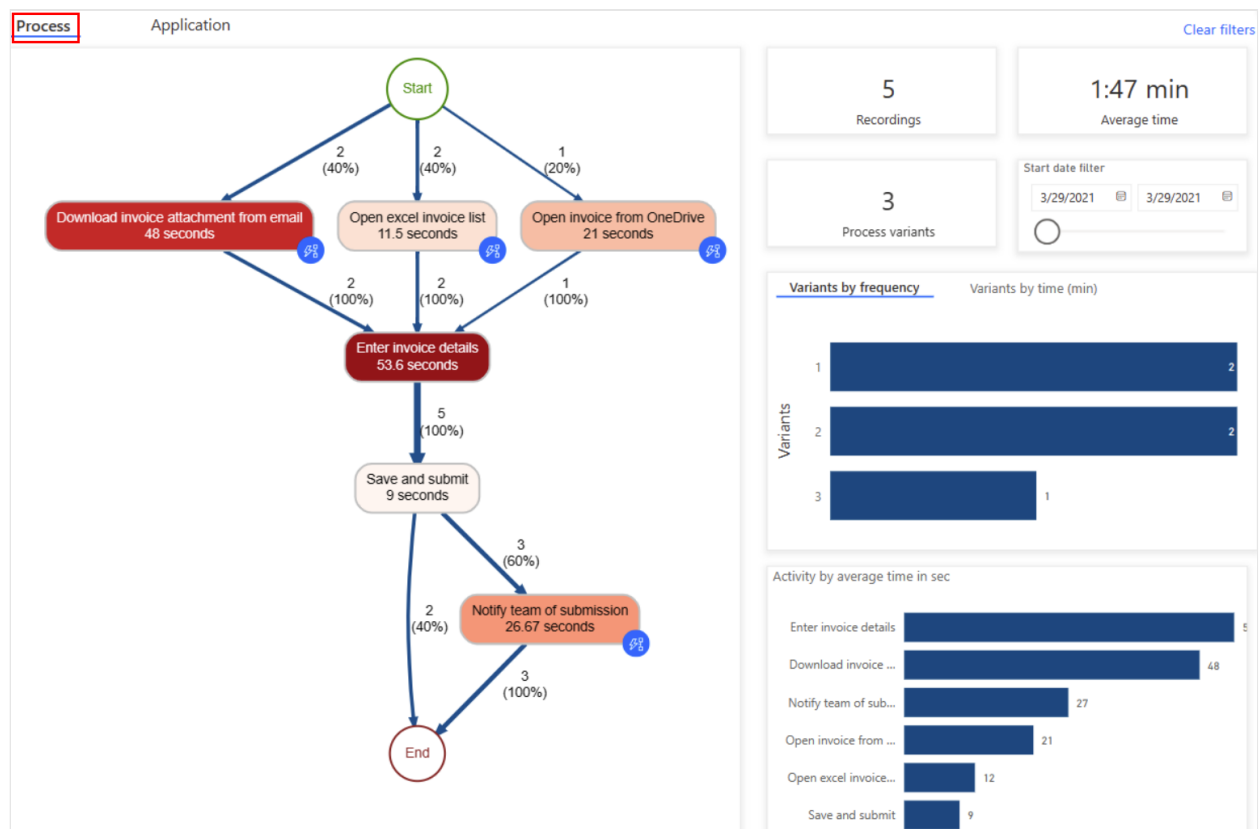
# Visualize processes

Article • 07/18/2023

The process map is a powerful tool that can help you visualize and analyze your business processes. It provides a graphical representation of how your processes are performed, making it easier to identify areas for improvement.

## Process map

You can access the process map by selecting the **Analytics > Process** tab. From there, you can see a detailed view of your processes, including each step in the process and how they are connected. The process map can help you identify inefficiencies or bottlenecks in your processes, allowing you to make improvements that can save time and resources.



Activities are tasks or actions that form a business process, and they can be performed by humans or machines. In the process map, activities are represented as nodes and transitions between them as edges, with each sequence having a start and an end.

The process map displays different combinations of activities as separate process variants. Each process variant is a unique sequence of activities from the start to the end of the process. Each variant differs from the others by at least one activity. The process map provides metrics such as the frequency of activities and throughput time for each

variant. Frequency indicates the total number of recordings/cases that pass through an activity, while throughput time is the time between the first and last event of a case.

There are various filters available for you to drill down into the process:

- **Variant selector:** You can activate this filter by selecting one or multiple bars in the **Variants** bar graph. It allows you to select one variant or a set of process variants to visualize in your process map.
- **Recording selector:** You can activate this filter by clicking one or multiple bars in the **Recording by time** bar graph. It allows you to select one recording or a set of recordings to visualize in your process map.
- **Start date filter:** Allows you to see the process visualization in a particular period.

Furthermore, there are specific metrics provided as key performance indicators that can help you gain a better understanding of your process. These metrics are discussed in more detail below.

## Process KPIs

- **Number (#) of recordings:** This KPI displays the total number of recordings of the same process that were submitted to analyze the process. The more recordings available, the more insights can be gained. For instance, if you only provide a few recordings of a process that has multiple paths to completion, you may not gain insights into all the possible process variations.
- **Number of variants:** This KPI indicates the number of paths a process could take. For example, if a process has one additional activity, it would be counted as one more variant of the process.
- **Average time:** This KPI displays the average time taken to complete a process across all the recordings associated with the process. It is a crucial data point for process mining because examining the duration of a process can reveal any bottlenecks.

## Process map visualizations

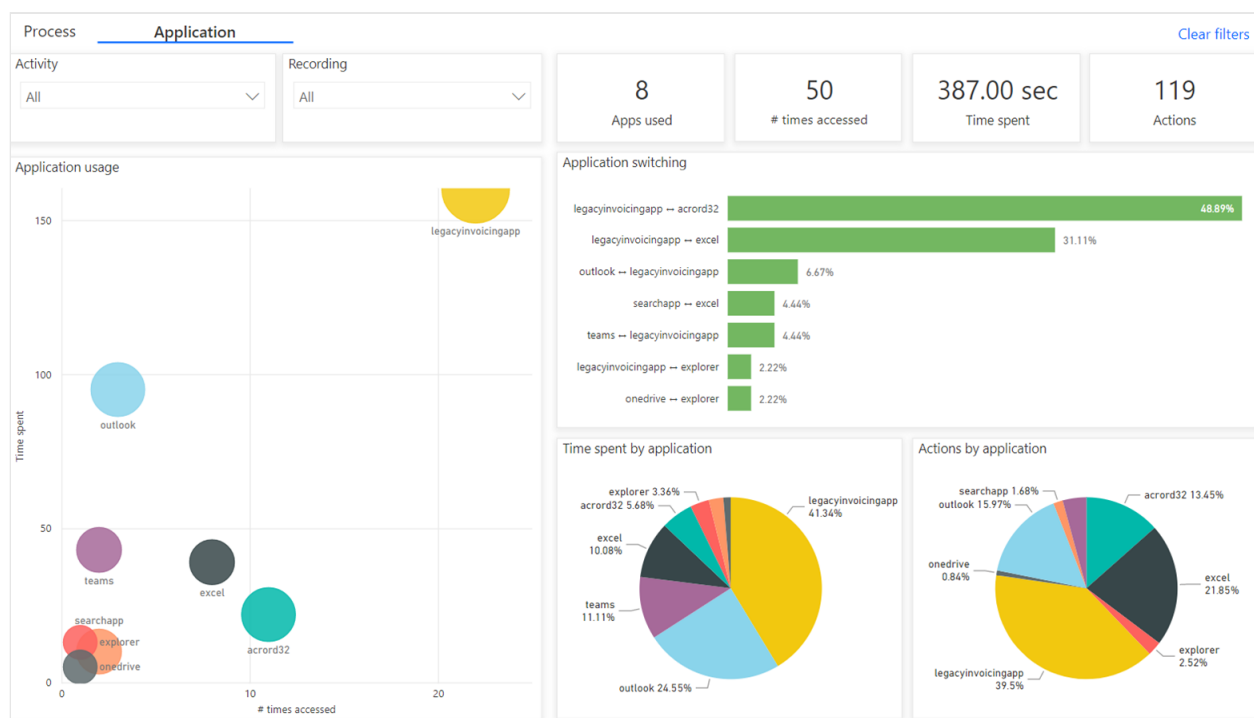
- **Variants by frequency:** Displays how frequently a specific process path was followed by the process.
- **Variants by time:** Shows the average time spent to finish the process per variant.

- **Activity by average time:** Displays the average time taken for each activity. A quick glance at this visual can help identify the most time-consuming activities of a process.
- **Recordings by time:** Displays the time taken for each recording in a process.
- **Start date:** Shows you Shows you the date range for the analytics and process maps shown in the report.

## Application analytics

Application analytics allow you to gain more insights from recordings by understanding application usage. This report informs you about:

- The top apps used.
- Access patterns and what apps are used together.
- App insights for each activity or recording.



## Application analytics KPIs

- **Apps used:** The total number of apps used in a process.
- **Number (#) of times accessed:** The number of app accesses. Times accessed is when an app comes back into focus.

- **Time spent:** The amount of time spent using apps. This doesn't count time spent when not focused on an app—for example, desktop.
- **Actions:** The count of actions within apps.

## Application analytics visualizations

- **Application usage:** This scatter plot shows the time spent and times accessed for each app used, with the size of the circles representing how many recordings use that app. The goal of this plot is to understand usage patterns. Some apps may be used frequently but only for short periods, indicating the recorder is jumping back and forth between this application and others. Other applications may be used for a longer period of time, and the process relies heavily on actions occurring within that application, without requiring extensive of other applications.

The size of the circles in the scatter plot indicates the frequency of usage of each application across all recordings. Applications that are used in most or all recordings have larger circles. This information can be helpful in identifying essential applications in a process that may require optimization or automation to improve overall efficiency.

- **Application switching:** This bar chart is used to display the frequency of pairs of applications used together. It complements the application usage scatter plot by providing additional information on what two applications are most frequently used in conjunction. The insights gained from this chart can help identify any data transfers or manual input between these applications, which is important to consider when optimizing or automating the process.
- **Time spent by application:** This is a pie chart that is used to represent the distribution of time spent on each application. This visual provides a clear understanding of which applications are being utilized the most in terms of time spent on them.
- **Actions by application:** This is a pie chart that is hows the distribution of actions performed on each application. This visual helps identify which applications have the most actions or manual inputs, providing insight into areas that may require further optimization or automation.

## See also

[Connector overview](#)

[Overview of cloud flows](#)



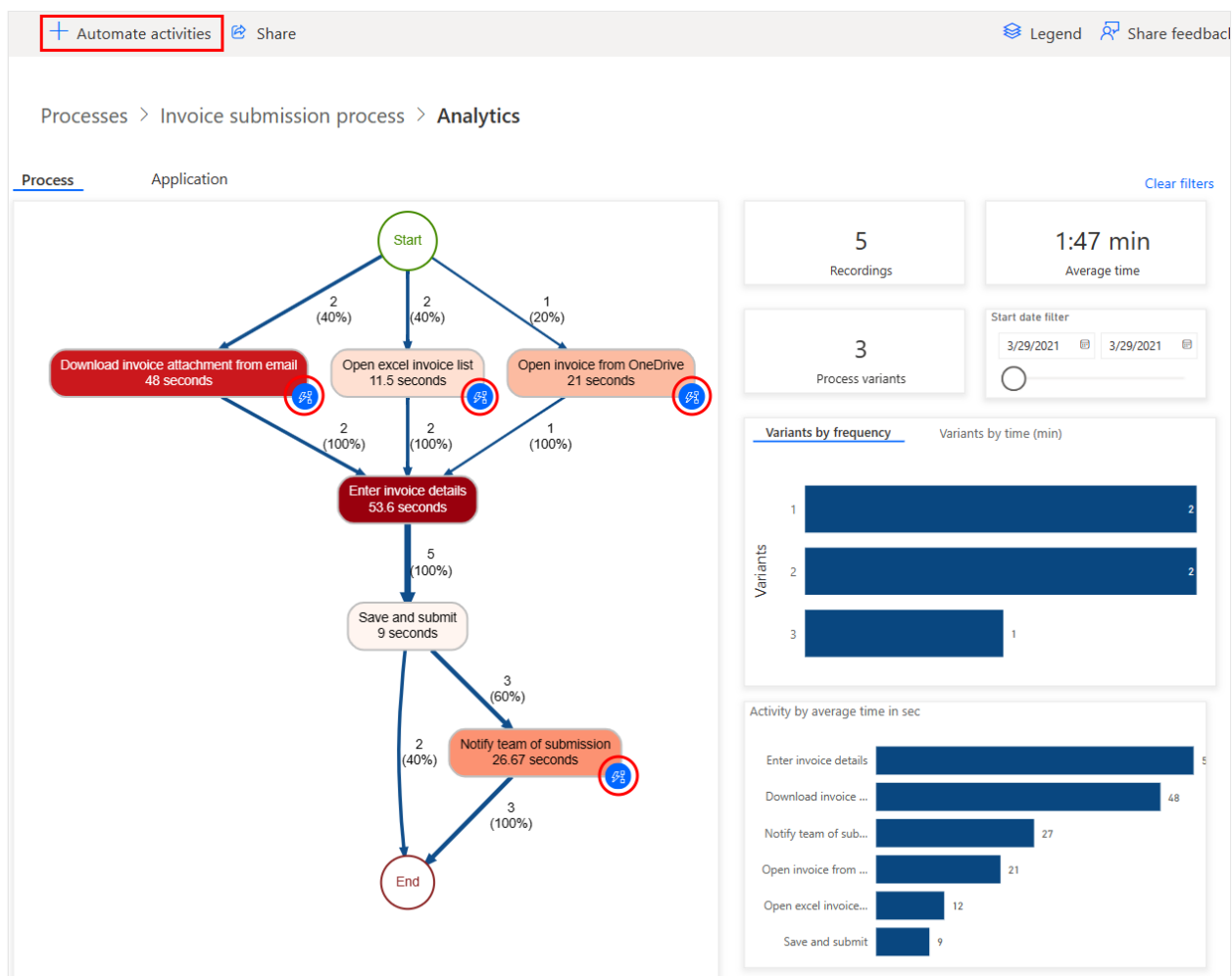
# Identify automation opportunities

Article • 07/18/2023

The automation recommendation feature in the process mining capability helps you identify automation opportunities and guides you through automating your processes using Microsoft Power Automate. You can watch this short video to learn how to use the feature:

<https://www.microsoft.com/en-us/vidoplayer/embed/RWN6PS?postJsIIMsg=true>

The blue recommendation icons on the process map activities indicate automation opportunities.



To automate an activity, select the **+Automate activities** option above the process map. This takes you to the Power Automate form designer, where you can see the connector recommendations for the activities in your process map. From there, you can select and add the connectors to your flow to automate your process.

## Automate activities



### Invoice submission process

Here are some of the activities we found that you may want to automate. Add a connector to get started. [Learn more](#)

#### Download invoice attachment from e...

Add a connector to your flow



Office 365 Outlook

#### Open invoice from OneDrive

Add a connector to your flow



OneDrive

#### Notify team of submission

Add a connector to your flow



Office 365 Outlook



Microsoft Teams

#### Other connectors ⓘ

##### Custom connector

Didn't find what you need? Create a custom connector. [Learn more](#)

##### Desktop flow connector

Automate processes on your desktop environment.



Desktop flows

## See also

[Connector overview](#)

[Visualize processes](#)

# Share task mining processes

Article • 07/18/2023

When you create a process in the process mining capability, only you can see it. But getting input from others is a key to understanding different ways to accomplish the process you've created. Share your processes with others in your organization so they can also manage or contribute to them.

Here's a short video on how to share a process.

<https://www.microsoft.com/en-us/videoplayer/embed/RWN6PP?postJsllMsg=true> 

There are two primary ways to share a process:

- Share a process with a co-owner.
- Share a process with a contributor.

If you're the co-owner or contributor of a process, you'll find it listed on the **Processes** screen.

## Important

You must be the owner or co-owner to add or remove owners and contributors to a process.

## Share action

The share action can be done by selecting **Share** on the **Processes** screen. Alternatively, select **Manage** on the **Details** screen for the following:

- Each process where you're an owner or co-owner.
- The system administrator in the environment.
- Any security role that has share permissions on system entities of the process mining capability.

## Share panel

After selecting the share action, a share panel appears. This is where you can select Microsoft Dataverse users within your organization to share your process with. You can search for any user within the Dataverse tenant and invite them to your process.

When sharing a process with others, an option to automatically send an email invitation is available. Co-owners or contributors will be asked to help manage the process or add new recordings, respectively. The email invitation will contain a link to the shared process.

**Manage access** ✕

Choose who can access your process and set their permissions. Consider inviting several people to record as this helps us provide you with better insights. [Learn more](#)

Enter a name or email address

**New users**

**PM** Contributor ✕

Shared with Sort by Name ▾

**CR** Owner

Email an invite to new users

**Permissions**

**Contributor**  
Can add their own recording to your process.

**Co-owner**  
Can edit and publish your process, add a recording, and invite others to add their own recordings.

Message to everyone (optional)

**Share** Cancel

## Share a process with a contributor

The most common way to share a process is by adding a contributor. A contributor of a process has the following abilities:

- View the details of the process.
- Add and label recordings.
- Manage their own recordings that have been added to the process, including labeling and deleting recordings.

# Share a process with a co-owner

When you add a co-owner to a process, you enable them to assist you in labeling and validating contributors' recordings, managing the process, and visualizing the process analytics and dashboard. Here are the actions that any co-owner of a process can perform:

- [View your process map and related analytics](#)
- [Update properties, such as name and description](#)
- [Invite co-owners and contributors](#)
- [Add and label recordings](#)
- [Manage all recordings that have been added to the process \(including labeling and deleting others' recordings\)](#)
- [View the analytics of an analyzed process](#)
- [Delete the process](#)

## **ⓘ Important**

- Only the owners of a process can analyze it.
- Removing all process roles from a user (such as co-owner and contributor) doesn't remove that process from the user's process list view. They can't perform any actions on the process.
- The admin experience for processes they don't own isn't supported.

# Security and privacy

Article • 10/30/2023

The process mining capability relies on environment security and Microsoft Dataverse security roles and privileges to grant access to its features in Power Automate. For more information, go to [Power Platform security overview](#).

## Security

Some privileges are set by default in Dataverse. This allows built-in security roles to use the process mining capability without further actions from system administrators. Specifically:

- The **Environment maker** role can use the process mining capabilities to create, share, and contribute to processes.
- Administrators and system customizers can access all processes created in the environment.
- The **Process Mining User** security role can only view created process reports.


### Important

The **Process Mining Application** is an *internal security role* that process mining uses. (Process mining was formerly named *process advisor*). Don't assign this security role to users. Don't modify the set of privileges in the **Process Mining User** or **Process Mining Application** security roles.

The **Process Mining User** security role won't suffice to create, share, and contribute to processes.

If you're using Conditional Access policies to limit access to Power Automate and its features, the following apps must be included in **Cloud apps** policy application:

- Power Apps
- Power Automate

Currently, having conditional access to only Power Automate isn't enough. To learn how to set up Conditional Access policies, go to [Plan a Conditional Access deployment](#) and [Control Access to Power Apps and Power Automate with Microsoft Entra Conditional Access Policies](#) .

# Privacy

Sharing processes and their recordings is essential to create rich analysis and insights in the process mining capability. Users can add recordings to a process. They can then use Power Automate to record processes and then import the processes into the process mining capability. Owners and contributors can see some data from the process and its recordings.

While most of the information process recordings capture can be essential to the understanding of the process activities, some steps might contain sensitive information. You can modify and delete sensitive information such as personally identifiable information (PII) from your recordings.

In Power Automate, users can:

- Delete sensitive steps or modify input data information.
- Pause and resume recording to avoid recording sensitive information and PII.

After you import the recording into the process mining capability, you can remove sensitive information by doing the following:

- Rename step names or descriptions.
- Delete screenshots.

# Protect your data

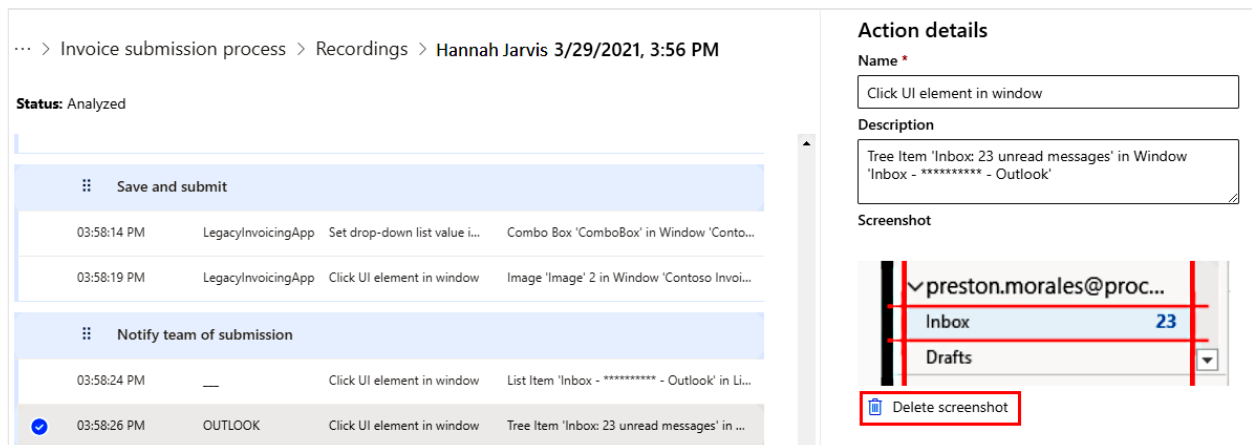
Article • 07/18/2023

To ensure that sensitive data is not exposed, the process mining capability allows you to remove screenshots and text entries stored during the recording session in the task mining capability. Before preparing your recordings, you can also remove any confidential information in the text or images to further protect your data.

## Delete screenshots

To remove screenshots from your recording, follow these steps:

1. Open the recording in the process mining capability.
2. Select the step that contains the screenshot you want to remove.
3. Select **Delete screenshot**. This procedure removes the selected screenshot from the recording. Make sure to save the changes before exiting the recording.



The screenshot displays the process mining interface for a recording titled "Hannah Jarvis 3/29/2021, 3:56 PM". The status is "Analyzed". The recording is divided into two main sections: "Save and submit" and "Notify team of submission".

Time	Application	Action	Target
03:58:14 PM	LegacyInvoicingApp	Set drop-down list value i...	Combo Box 'ComboBox' in Window 'Conto...
03:58:19 PM	LegacyInvoicingApp	Click UI element in window	Image 'Image' 2 in Window 'Contoso Invoi...
03:58:24 PM	---	Click UI element in window	List Item 'Inbox - ***** - Outlook' in Li...
03:58:26 PM	OUTLOOK	Click UI element in window	Tree Item 'Inbox: 23 unread messages' in ...

The "Action details" panel on the right shows the selected action: "Click UI element in window". The description is "Tree Item 'Inbox: 23 unread messages' in Window 'Inbox - \*\*\*\*\* - Outlook'". A screenshot of the Outlook interface is shown, with a red box highlighting the "Delete screenshot" button at the bottom.

## Remove text

In the process mining capability, you can protect sensitive data by removing it from any text entries recorded during a session. To do this, select the text entry that contains the sensitive information and modify the step description to remove it. For example, you could replace the sensitive data with a generic term or placeholder. Be sure to save your changes before sharing or analyzing the recording.



Status: Analyzed

Save and submit			
03:58:14 PM	LegacyInvoicingApp	Set drop-down list value i...	Combo Box 'ComboBox' in Window 'Conto...
03:58:19 PM	LegacyInvoicingApp	Click UI element in window	Image 'Image' 2 in Window 'Contoso Invoi...
Notify team of submission			
03:58:24 PM	---	Click UI element in window	List Item 'Inbox - ***** - Outlook' in Li...
03:58:26 PM	OUTLOOK	Click UI element in window	Tree Item 'Inbox: 23 unread messages' in ...

### Action details

Name \*

Click UI element in window

Description

Tree Item 'Inbox: 23 unread messages' in Window 'Inbox - \*\*\*\*\* - Outlook'

Screenshot



Delete screenshot

# Export and import your process

Article • 07/18/2023

You can copy or move process mining processes from one environment to another using Microsoft Power Platform solutions. You need to be an owner or co-owner of a process to export it.

## ⓘ Note

Only the export and import of *task mining* (recordings) processes are currently supported. *Process mining* (data) processes can't currently be exported and imported.

To learn more about solutions from Microsoft Power Platform, go to [Overview of solution-aware flows](#).

## Export a process

1. Sign in to [Power Automate](#).

Make sure you've selected the environment where the process you want to export has been created.

2. Select **Solutions** in the navigation pane on the left.
3. In the list, select the solution you want to use to add your process, or create a solution and select it.
4. Select **Add existing** > **PM Inferred Task**.
5. Search for and select the process you want to export, and then select **Add**.

You can now export your solution and import it in another environment.

For more information about solution export, go to [Export a solution](#).

## Import a process

To import a process into another environment:

1. Make sure you've exported your process with a solution.

2. Go to the environment where you want to import your process.
3. Follow the instructions in [Import a solution](#).

# Known issues in the process mining capability

Article • 07/18/2023

We'll continue to add issues here. If you're experiencing an issue not mentioned, check the [Process Mining community forums](#).

## Unable to access the process mining capability

If you can't see the process mining capability in Power Automate, receive error messages, or if you can't access the home page, verify that:

- You have a Power Automate license.

If you don't have a license, you can activate your trial license from **Desktop flows** in Power Automate.

- You have access to the Power Automate environment and the permissions required by the process mining capability described in the [Security and privacy](#) article.
- Your browser has the feature to accept third-party cookies enabled. You can enable it in your browser settings.

# Glossary in the process mining capability

Article • 07/18/2023

**Activity** — An activity in the process mining capability refers to a specific task or action that is part of a business process. These activities can be carried out by either humans or machines, and the sequence of these activities leads to the completion of a business process.

**Attributes** — Attributes refer to the dimensions or columns in your data.

**Contributor** — A role that allows users to create and upload recordings to a task mining process. Contributors can manage and label their own recordings, but they cannot edit other people's recordings or the process itself.

**Co-owner** — A role that has similar privileges to the process owner. Co-owners can edit the process and its recordings, invite people to the process, manage label templates, and more.

**Dataflow** — A cloud-based, self-service data preparation technology that enables users to ingest, transform, and load data into Microsoft Dataverse environments, Power BI workspaces, or their organization's Azure Data Lake Storage account.

**Data Lake** — Azure Data Lake is a platform that provides developers, data scientists, and analysts with the capabilities to store and process data of any size, shape, and speed across different platforms and languages.

**Data source** — The location of the event log data. Dataflow uses connectors to access various data sources.

**Event logs** — Tabular data that captures the details of a business process, including the sequence of activities, time stamps, and resources used. The minimum column requirements for process mining are case ID, activity ID, and start timestamp. Also known as event data.

**Power Query** — A data transformation and preparation engine that comes with a graphical interface for acquiring data from sources and a Power Query Editor for applying transformations.

**Process** — A series of activities performed to achieve a specific goal. Examples include planning demand and converting purchase requisitions to purchase orders.

Process map — A visual representation of the flow of a process based on imported user or system data.

Process mining — Visualizing and analyzing business processes based on event logs. These event logs are stored in information systems and can capture details such as order information, activity start and completion times, resource usage, and more.

Recording — A recorded sequence of activities that a user performs on their desktop. Multiple recordings are typically analyzed together to gain insights into different variants of the same task.

Robotic process automation (RPA) — Software that automates basic, repetitive tasks across applications.

Task mining — A technology that captures and analyzes users' interactions with computers to improve task performance.

Variant — A specific path that a process can take to completion.

Workflow — The sequence of industrial, administrative, or other processes through which a piece of work passes from initiation to completion.

# Troubleshoot issues in the process mining capability

Article • 04/20/2024

This article explains common issues and error messages in the process mining capability. You find solutions to troubleshoot with procedures and helpful tips.

## Issues with dataflow refresh

**"There was an issue with a recent dataflow refresh, check your dataflow refresh history."**

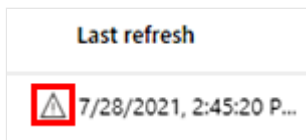
When you go through setup, the process mining capability creates a dataflow that's tied to the process. Normally you don't need to interact with the dataflow, but if there are issues with the dataflow refresh, you might need to troubleshoot them. Dataflow refresh is what reads the data source and makes it ready to be analyzed.

To troubleshoot:

1. Make a note of the environment in the environment display on the upper-right corner of the page.
2. Make a note of the value of **Name** in the Data Source card below the Details card.
3. Sign in to [Power Apps](#).
4. Select the same environment that you noted in step 1.
5. Select **More > Dataflows**.

Dataflows					
Name	Type	Draft status	Last published	Last refresh	Next refresh
Process Insights   fab9000-d024-ee11-b875-0e...	Analytical	Published	7/17/2023, 2:46:32 PM	7/17/2023, 12:43:12 PM	N/A
Process Insights   fab9000-d024-ee11-b875-0e...	Analytical	Published	6/14/2023, 8:50:35 PM	N/A	N/A
Process Insights   fab9000-d024-ee11-b875-0e...	Analytical	Published	6/15/2023, 1:06:23 AM	4/14/2023, 1:01:59 PM	N/A

6. Find the dataflow name that you noted in step 2.
7. View the issue by selecting the **Warning** icon in the **Last refresh** column.



8. Download the report by selecting the **Download** icon in the **Actions** column.
9. Open the report to see details of the issue.

## "There was an issue with your Dataverse access privileges for dataflows"

When you go through setup, the process mining capability creates a dataflow that's tied to the process. A dataflow requires certain sets of Dataverse privileges. If these privileges are revoked or altered, it might result in this issue.

To troubleshoot, system administrators can review the privileges on the dataflow tables for the environment Maker role, and ensure they have the default privileges at the **Organization** level set.

Tables		Miscellaneous privileges	Privacy-related privileges									
Show only assigned tables		Compact Grid View <input checked="" type="checkbox"/> On										
Table ↑	Name	Record ownership	Permission Settings	Create	Read	Write	Delete	Append	Append to	Assign	Share	
Custom Tables (2)												
Dataflow	...	User or Team	Full Access	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization	
DataflowRefreshHistory	...	User or Team	Full Access	Organization	Organization	Organization	Organization	Organization	Organization	Organization	Organization	


## Issues with analyze

### Failure when analyzing

If you encounter an error message while attempting to create and analyze a process, it might be due to a missing security role. To resolve this, contact the administrator of your environment and request that they assign you the **Environment Maker** security role.

### Analyze a process

Once you're done with setup, select **Analyze**. You'll be able to view the Analytics page when the analysis is complete. Analysis typically takes a few minutes but might be faster or slower depending on how much data needs to be analyzed.

 **Note**



If you don't visit the Analytics page for 14 days, you need to re-analyze the process to access the Analytics page again.

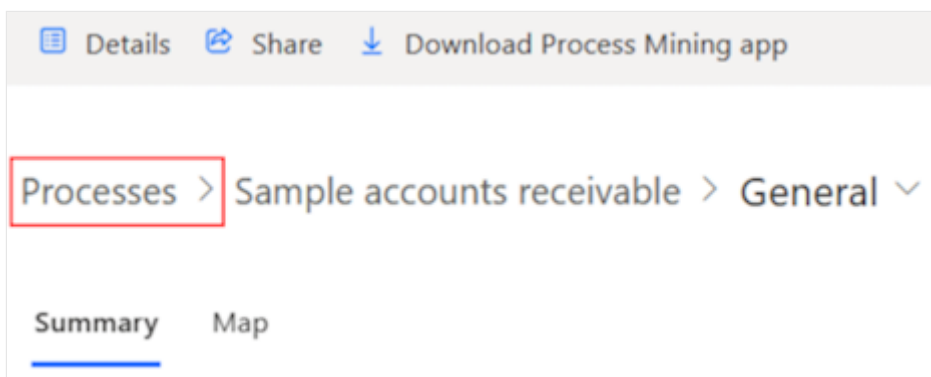
For more information and a short video of analytics, go to [Use KPIs and visualizations for analytics](#).

**"The process can't be analyzed because there are too many processes in this environment. To fix this, delete some of the processes, use a different environment, or use your own Power BI workspace."**

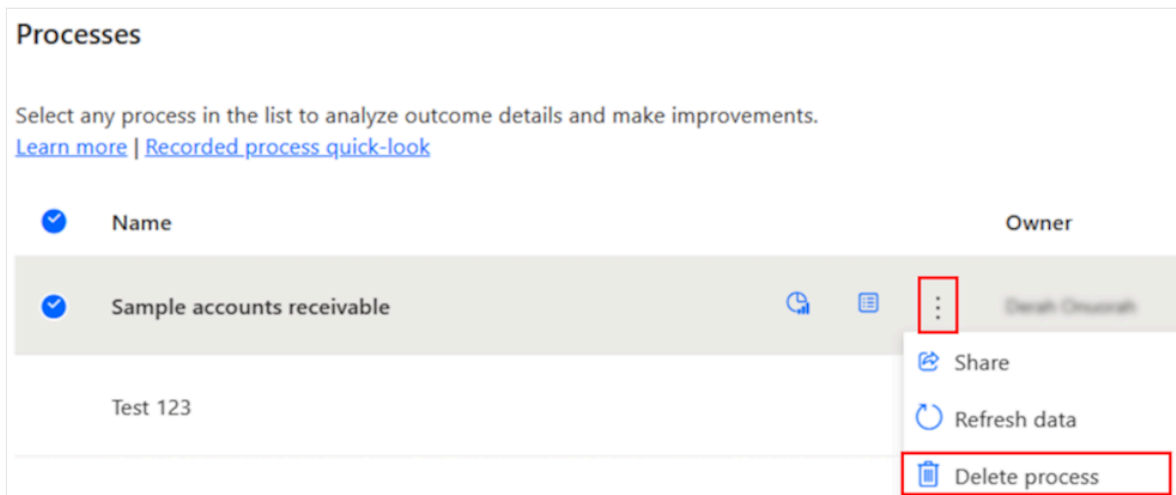
Currently, Dataverse-managed Power BI workspaces allow only 1,000 reports for each environment. This means you need to delete a few processes from the current environment, or create a new environment to analyze the process in. To learn more about limitations, go to [Workspaces in Power BI—Considerations and limitations](#).

To delete a process, follow these steps:

1. Select **Processes** from the breadcrumbs on the analytics or details page, or select **All processes** from the **Process mining** home page.



2. Select the vertical ellipses (⋮) for the process you want to delete, and then select **Delete process** from the dropdown menu.



3. To delete the process, select **Confirm**.

Another option is to use your own Power BI workspace to store the generated reports. This option surpasses the limit of the Dataverse-managed Power BI workspace.

To learn more, go to [Create your own custom Power BI workspace](#).

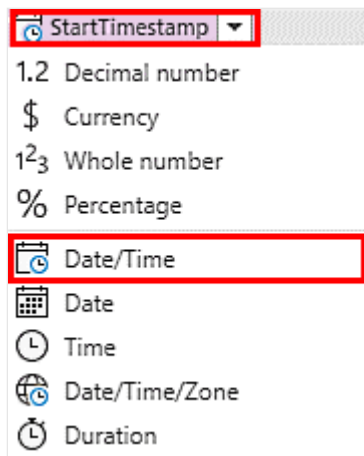
## "You must have one case with at least two activities to analyze your process. Please change your data."

Process mining isn't normally helpful when there's only one activity name in the data. This is because the process map visualizes the flow of the process from one activity to the next. In this case, you should do the steps in the following list:

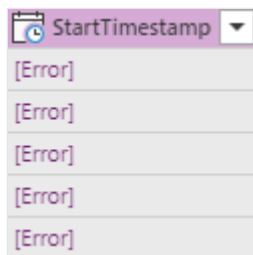
- Check the column that's been mapped to activity name.
- Confirm that there's only one value for that column.
- Determine if there's another column that contains something with more than one possible value that can represent activities of the process.

## "Following column(s) don't have the right data types: [x]. Please check your data and try again."

The *case ID* and *activity name* columns should be of the **Text** data type. The *timestamp* columns should be of the **Date/Time** data type. One of the most frequent causes of invalid format is in the *timestamp* column. To fix the format, return to setup and select the icon next to the *timestamp* column, and ensure it's been mapped to **Date/Time**.

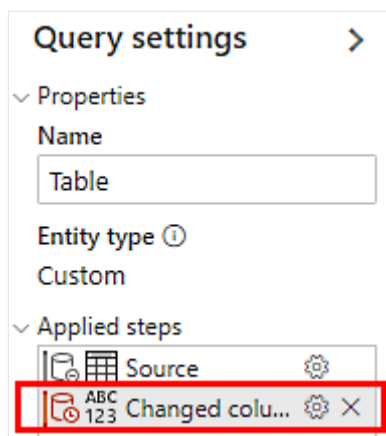


If the format is incorrect, you see something like this:



One possibility is that although the *timestamp* column has a valid datetime format, the format is valid for a different locale than the locale that the process is created in. A typical example is this datetime format being used in the United States locale: **dd/mm/yyyy hh:mm:ss**. In this case, we won't automatically detect that column as a datetime column. One way to fix this issue is by manually changing the locale. To do this:

1. Delete the **Changed column** type step that you did previously. Do this by selecting **X** next to the last applied step in the Query settings pane on the right.



2. On the toolbar, select **Options > Project options**.
3. On the **Locale** dropdown list, select the correct locale and then select **OK**.
4. Use the same method to set the *timestamp* column to the **Date/Time** data type again.

Where the format is `dd/mm/yyyy hh:mm:ss`, setting the locale to **English (Canada)** should result in successful conversion of the column type. For other cases, find the correct locale that supports your specific datetime format.

**"More than 50% of your data has invalid format. Please check your data and try again."**

To fix this issue, go to [Following column\(s\) do not have the right data types: \[x\]. Please check your data and try again.](#)

**"Following column(s) are missing from your dataflow: [x]. Please check your data and try again."**

This issue should occur only if you didn't properly map the columns in your data source to the columns. For more information, go to [Map data](#).

**"Your entity contains no data, check your dataflow and try again."**

This issue should occur only if there's no data. Either the data source that you're connecting to has no data, or the power query expression you used filtered out all the data. Check your query and ensure that you can see some data rows in the preview table.

**"The number of rows in your data exceeds the limit. [x] rows have been ignored."**

We support only up to 150,000 rows of data. To learn how to fix this issue using Power Query, go to [Reduce the number of total records](#).

**"Analysis failed, please try again."**

You might have run into other analyze issues. For more ways that we can support you, go to [Support](#), or post your issue in the [Community Forums](#).

## Issues with your own Power BI workspace

**"You must be an admin of the Power BI workspace to use it with this report."**

You must be an admin of your Power BI workspace. To learn more about user access and permissions, go to [Give users access to workspaces](#).

**"You must be an admin of the Power BI workspace to use it with this report. After you become an admin, try to reanalyze the report."**

This is the same as the previous issue, but the error occurred during process analysis. Once you become an admin using the fix from the previous issue, reanalyze the report.

**"The process mining service principal must be an admin of the Power BI workspace to refresh this report."**

Enable admin access for the process mining capability prod service principal. To learn how to give the service principal admin access, go to [Create your own custom Power BI workspace](#).

**"The process mining service principal must be an admin of the Power BI workspace to refresh this report. After the problem is fixed, try to reanalyze the report."**

This is the same as the previous issue, but the error occurred during process analysis. After ensuring the process mining capability service principal is the admin of the workspace, reanalyze the report.

**"The process mining service principal can't access the Power BI workspace."**

Set up the process mining capability service principal for your Power BI workspace. To learn how to set up, go to [Set up your workspace](#).

**"The process mining service principal can't access the Power BI workspace. After the problem is fixed, try to reanalyze the report."**

This is the same as the previous issue, but the error occurred during process analysis. After ensuring that the process mining service principal is added to the workspace and has admin access, reanalyze the report.

## **"The selected Power BI workspace needs premium capacity to work with this report."**

Assign a premium license to your workspace. To learn how to enable premium capacity, go to [Premium capacity settings](#).

## **"The selected Power BI workspace needs premium capacity to work with this report. After the problem is fixed, try to reanalyze the report."**

This is the same as the previous issue, but the error occurred during process analysis. After ensuring that your workspace has premium capacity per [Premium capacity settings](#), reanalyze the report.

## **Optimized data model isn't created**

Confirm the *Allow XMLA endpoints and Analyze in Excel with on-premises semantic mode* setting is enabled (*this setting is enabled by default*). You can find this setting in **Power BI admin portal > Tenant-level settings > Integration Settings**. If an admin doesn't want to enable this setting for all users, it's necessary to add the **Process Insights service principal** to a security group where the setting is enabled.

## **Issues with your own Azure Data Lake Storage Gen2 and incremental data refresh**

### **If you encountered an error message, "Couldn't connect to container"**

Revisit the prerequisites to make sure settings are correct.

### **How can I check if a CORS issue exists or not?**

You can check the network logs in your browser with developer tools while connecting data lake storage. Some HTTP requests failed with a 403 error and it could state "CORS

not enabled, or no matching rule found for this request."

## **Although I set CORS setting correctly, why do I still get the error and am unable to access?**

The browser cached CORS settings. Retry after flushing out browser cache. As the client browser does cache the CORS setting, you need to remove the cache if you have trouble even after you set the CORS properly. You can also adjust the max age of CORS settings.

## **Your header row is larger than 1 MB**

Check the event log file and rename the column headers so that their aggregated length including separator (comma) is less than 1 MB.

# Power Platform and Azure Logic Apps connectors documentation

A Power Platform connector allows the underlying service to talk to Microsoft Power Automate, Microsoft Power Apps, and Azure Logic Apps. It provides a way for users to connect their accounts and leverage a set of prebuilt actions and triggers to build their apps and workflows.

## About connectors

---

### OVERVIEW

[Connectors overview](#)

[Connectors architecture](#)

[List all connectors](#)

## Connector reference by product

---

### REFERENCE

[Power Apps connectors](#)

[Power Automate connectors](#)

[Logic Apps connectors](#)

## Connector reference by tier

---

### REFERENCE

[Standard connectors](#)

[Premium connectors](#)

## Connector reference by release status

---

### REFERENCE



[Preview connectors](#)

[Production connectors](#)

## Connector reference by publisher

---

### REFERENCE

[Microsoft published connectors](#)

[Verified published connectors](#)

## Create a custom connector

---

### QUICKSTART

[Create a custom connector from the custom connector wizard](#)

[Create a custom connector from an OpenAPI definition](#)

[Create a custom connector from a Postman collection](#)

[Create a Logic Apps connector](#)

[Create custom connectors in solutions](#)

[Custom connector FAQ](#)

### SAMPLE

[Custom connector samples](#)

## Certification

---

### DEPLOY

[Certification overview](#)

[Prepare connector and plugin files for certification](#)

[Verified publisher certification process](#)

[Independent publisher certification process](#)

[Test your connector post certification](#)

[Update your certified connector](#)

[Move your connector from preview to general availability](#)

## Advanced tutorials

---

### TUTORIAL

[Extend an OpenApi definition](#)

[Create a Postman collection](#)

[Create and update a custom connector using CLI](#)

[Authenticate with Microsoft Entra ID](#)

[Use a custom polling trigger](#)

[Use a webhook trigger](#)

[Learn best practices for string fields](#)

[Implement a test connection](#)

[Versioning operations](#)

[Specifying connection parameters](#)

## Use a custom connector

---

### HOW-TO GUIDE

[Use a custom connector from a logic app](#)

[Use a custom connector from a flow](#)

[Use a custom connector from a Power Apps app](#)

## Policy templates

---

### REFERENCE

[Policy templates overview](#)

## Online training

---

 TRAINING

[Build custom connectors for Power Automate](#)

# Manage connections in Power Automate

Article • 03/10/2023

Power Automate uses *connections* to make it easy for you to access your data while building flows. Power Automate includes commonly used connections, including SharePoint, SQL Server, Microsoft 365, OneDrive for Business, Salesforce, Excel, Dropbox, Twitter, and more. Connections are shared with Power Apps, so when you create a connection in one service, the connection shows up in the other service.

Here's a quick video on managing connections.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKZQq?postJsllMsg=true>

You can use connections to perform these tasks:

- Update a SharePoint list.
- Get data from an Excel workbook in your OneDrive for Business or Dropbox account.
- Send email in Microsoft 365.
- Send a tweet.

You can create a connection in multiple scenarios, including:

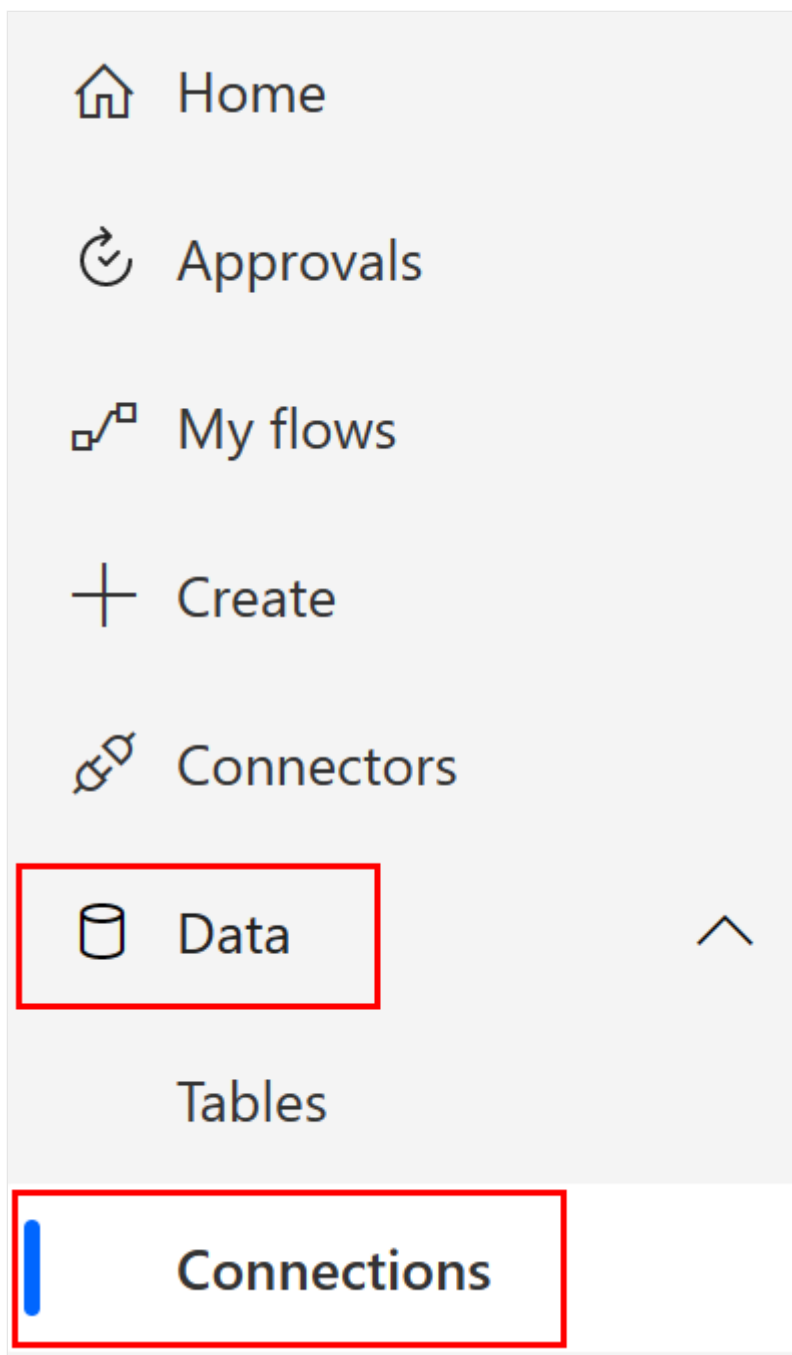
- Creating a [flow from a template](#).
- Creating a [flow from a blank](#), or updating an existing flow.
- Creating a connection in [Power Automate](#).

## Tip

For detailed information about using SharePoint with Power Automate, see the [SharePoint documentation](#).

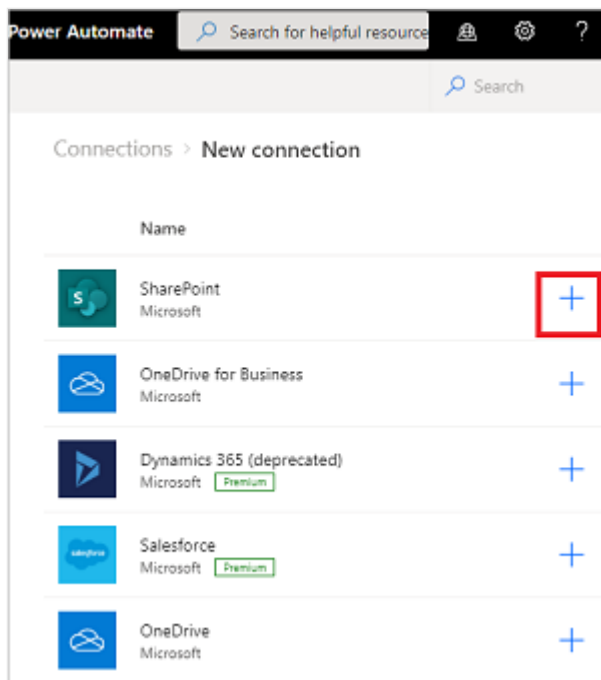
## Add a connection

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **Data > Connections**.



3. At the top of the page, select **New connection**.

4. In the list of available connections, choose the connection that you want to set up (such as SharePoint) by selecting the plus sign (+).



5. To find a particular connection option, enter the connector name into the search box that's located in the top right corner of the page, below the settings and help buttons.
6. Follow the steps to enter your credentials to configure the connection.

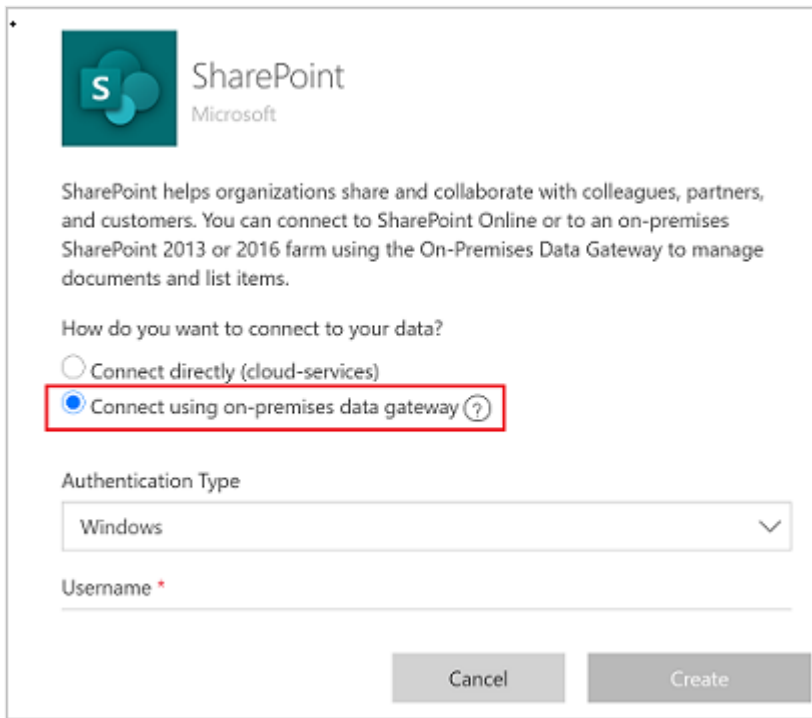
#### Tip

You can find all the connections that you've created under **Data > Connections**.

## Connect to your data through an on-premises data gateway

Some connectors, such as the SharePoint connector, support the on-premises data gateway. To create a connection that uses a gateway:

1. Follow the steps earlier in this topic to [add a connection](#).
2. In the list of available connections, select **SharePoint**.
3. Select the **Connect using on-premises data gateway** option.



4. Provide the connection's credentials, and then select the gateway that you want to use. More information: [Manage gateways](#) and [Understand gateways](#)

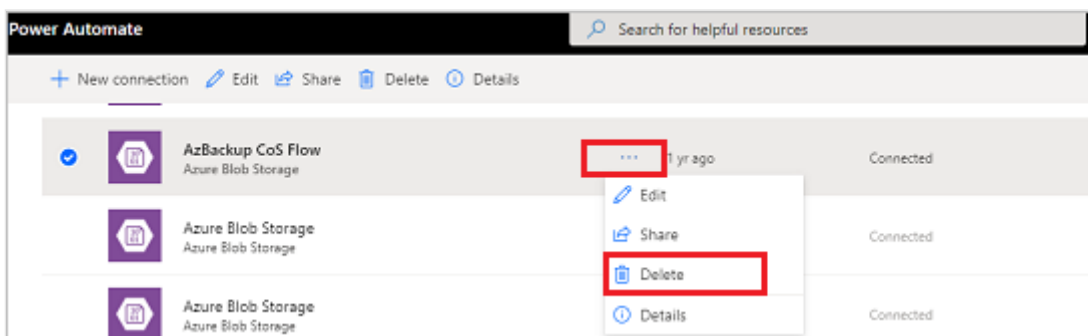
#### ⓘ Note

After the connection is configured, it's listed in **Connections**.

## Delete a connection

When you delete a connection, it's removed from both Power Apps and Power Automate.

1. Go to **Data > Connections**, and select the connection that you want to delete.
2. Select ... to view more commands, and then select **Delete**.

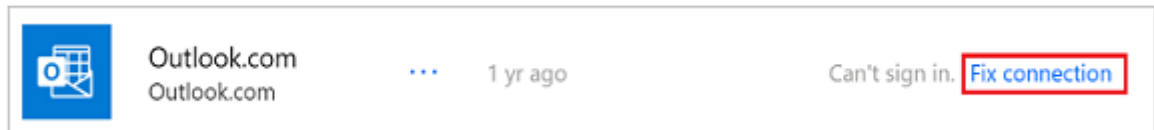


3. Select **Delete** to confirm that you would like to delete the connection.

# Update a connection

You can update a connection that isn't working because your account details or your password changed. When you update a connection, it's updated for both Power Apps and Power Automate.

1. Go to **Data > Connections**, and then select the **Fix connection** link for the connection that you want to update.



2. When prompted, update your connection with new credentials.

# Find which apps and flows use a connection

You can identify the apps and flows that use a connection to understand how the connection is used.

1. Go to **Data > Connections**, and then select the connection that you want to learn more about.
2. Select ... to view more commands, and then select **Details** to see the details for the connections, including the status and the date it was created.
3. To view apps that use the connection, select **Apps using this connection**.
4. To view flows that use the connection, select **Flows using this connection**.

# Troubleshoot connections

## Connection ownership by a different account

Per the policies in your organization, you might need to use the same account to sign in to Power Automate and to create a connection to SharePoint, Microsoft 365, or OneDrive for Business, for example.

For example, you might sign in to Power Automate with *yourname@outlook.com* but receive an error when you try to connect to SharePoint with *yourname@contoso.com*. You can instead sign in to Power Automate with *yourname@contoso.com* and you'll be able to connect to SharePoint.



# Deprecation of the Power Automate Management connector's third-party authentication option

The [Power Automate Management connector](#) authentication option of [third party](#) was deprecated in June 2020 and will no longer work after October 1, 2022.

Follow these steps to replace third party authentication connections.

1. Find the third party authentication connection you want to replace, and then delete it.
2. Create a "first party authentication" connection.
3. Add the new connection on the flows that need it.

## Find Power Automate Management connections as an admin

If you are an admin, you can find these problematic connections using a repeatable pattern that can be automated in a flow with the help of some admin connectors:

1. Find the environments using [List environments as admin](#).
2. Find the connections in those environments using [Get Connections as admin](#).
3. Find the connections to be replaced with `id="shared_flowmanagement"` and `properties.connectionParametersSet.name="thirdParty"` using a Parse JSON action with conditions .
4. Then finally, get the connection details, including the connection display name and the creator who should replace the connection.

After you have that list of connections, contact the connection owners to let them know that the connections should be replaced.

## Find Power Automate Management connections as a user

If you are a non-admin user, you can find your Power Automate Management connections and learn about the apps and flows that use each connection before replacement.

If you don't know what authentication option was used on the Power Automate Management connection, you could create a flow and use the [List my connections](#) action to see the advanced connection metadata, or delete the existing connection and replace it with a new connection using the **Authentication Type** of **First Party**.

## Deprecation of the Power Automate Management connector's legacy default authentication option

The [default](#) authentication option was also deprecated in June 2020, however, it was immediately hidden so that it couldn't be used from that date. All connections with the authentication of [default](#) were created prior to June 2020. Those connections should also be replaced. If you use the [Get Connections as admin](#) action, those connections will have `id="shared_flowmanagement"` and `properties.connectionParametersSet.name=""`.

# Manage an on-premises data gateway in Power Automate

Article • 07/17/2024

Install and manage an on-premises data gateway to securely integrate a variety of cloud-based apps with your on-premises data and apps through Power Automate.

With a gateway, you can connect to on-premises data over the following connections.

- Apache Impala
- BizTalk Server
- Custom connectors that you create
- DB2
- File System
- Http with Microsoft Entra ID
- Informix
- MySQL
- Oracle Database
- PostgreSQL
- SAP ERP
- SharePoint
- SQL Server
- Teradata

## Important

Microsoft SharePoint data gateways now support both HTTP and HTTPS traffic.

## Prerequisites

- The user name and password that you used to [sign up](#) for Power Automate.
- Administrative permissions on a gateway.

You have these permissions by default for each gateway that you install. Also, an administrator of another gateway can grant you these permissions for that gateway.

- A license that supports gateways. For more information, see the “Connectivity” section of the [pricing page](#).

### 💡 Tip

You can create a gateway and an on-premises connection for [any environment](#).

## Install a gateway

To install a gateway, follow the steps in [Install an on-premises data gateway](#). Install the gateway in standard mode because the *on-premises data gateway (personal mode)* is available only for Power BI.

## View your gateways

Sign in to [Power Automate](#), and then select **Data** > **Gateways** in the navigation pane on the left side.

### ⓘ Note

If you created or were given access to a gateway in Power Apps, that gateway appears in the **My gateways** list in Power Automate.

## Cluster your gateways

You can create [high availability clusters of on-premises data gateway installations](#) to avoid single points of failure in accessing on-premises data resources.

By default, Power Automate uses the primary gateway in the cluster. If the primary gateway isn't available, the service switches to the next gateway in the cluster, and so on.

Once you've set up a gateway cluster, you can allow traffic to be distributed across all gateways in the cluster.

Follow these steps to distribute your traffic across your gateways:

1. Select **Data** on the navigation bar on the left side.
2. Select **Gateways**.
3. Select any of your gateways.
4. Select **Distribute requests across all active gateways in this cluster**.
5. Select **Apply** to save your changes.

For more information, see [Understand gateways](#).

---

## Feedback

Was this page helpful?

Yes

No

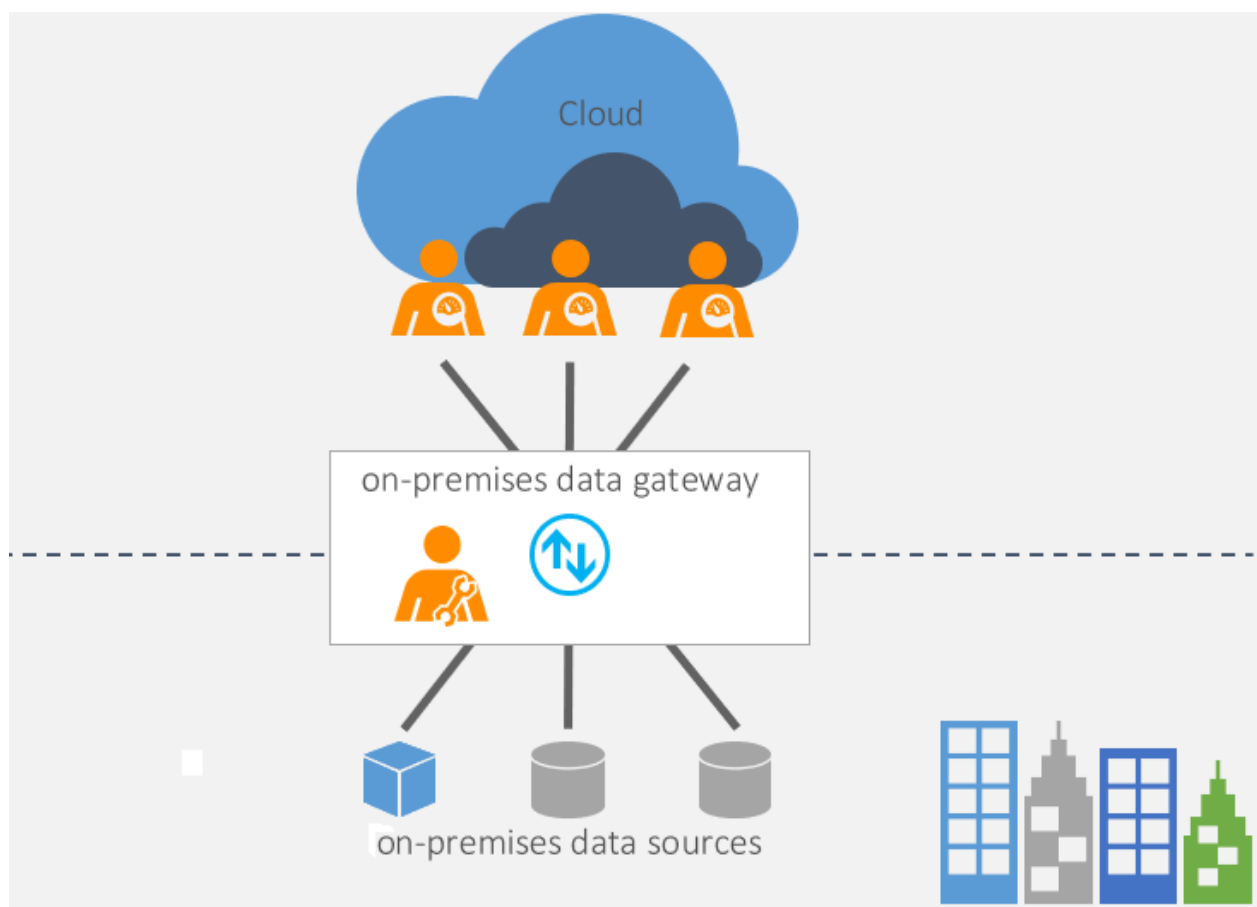
[Provide product feedback](#) 

# What is an on-premises data gateway?

Article • 12/16/2022

The on-premises data gateway acts as a bridge to provide quick and secure data transfer between on-premises data (data that isn't in the cloud) and several Microsoft cloud services. These cloud services include Power BI, Power Apps, Power Automate, Azure Analysis Services, and Azure Logic Apps. By using a gateway, organizations can keep databases and other data sources on their on-premises networks, yet securely use that on-premises data in cloud services.

## How the gateway works



For more information on how the gateway works, see [On-premises data gateway architecture](#).

## Types of gateways

There are two different types of gateways, each for a different scenario:

- **On-premises data gateway** allows multiple users to connect to multiple on-premises data sources. You can use an on-premises data gateway with all

supported services, with a single gateway installation. This gateway is well-suited to complex scenarios with multiple people accessing multiple data sources.

- **On-premises data gateway (personal mode)** allows one user to connect to sources, and can't be shared with others. An on-premises data gateway (personal mode) can be used only with Power BI. This gateway is well-suited to scenarios where you're the only person who creates reports, and you don't need to share any data sources with others.

## Use a gateway

There are four main steps for using a gateway.

1. [Download and install the gateway](#) on a local computer.
2. [Configure](#) the gateway based on your firewall and other network requirements.
3. [Add gateway admins](#) who can also manage and administer other network requirements.
4. [Troubleshoot](#) the gateway in case of errors.

## Next steps

- [Install the on-premises data gateway](#)

# SAP Procurement template for Power Platform

Article • 03/21/2024

SAP enterprise resource planning (ERP) is a centralized system of record that facilitates the management of data and business processes between departments in an organization. Microsoft Power Platform can help you transform the way you view and work with your SAP data. Enhanced functionalities in the on-premises data gateway and the [SAP ERP connector](#) make it easier for you to get started with and manage your SAP integration with Power Platform.

The SAP Procurement template accelerates the integration of data between SAP and Power Platform to drive efficiencies in your procure-to-pay processes. The template contains the building blocks needed to streamline all the SAP screens and attributes related to a core process into one simple screen in Power Apps, with further automation of processes behind the scenes using Power Automate flows. With little to no training, procurement team members can manage SAP data in less time, reduce inefficiencies in current manual processes, and avoid data entry mistakes.

The template's starter apps, flows, and other components are ready for you to extend and customize to meet your organization's unique needs. It consists of the following layered solutions:

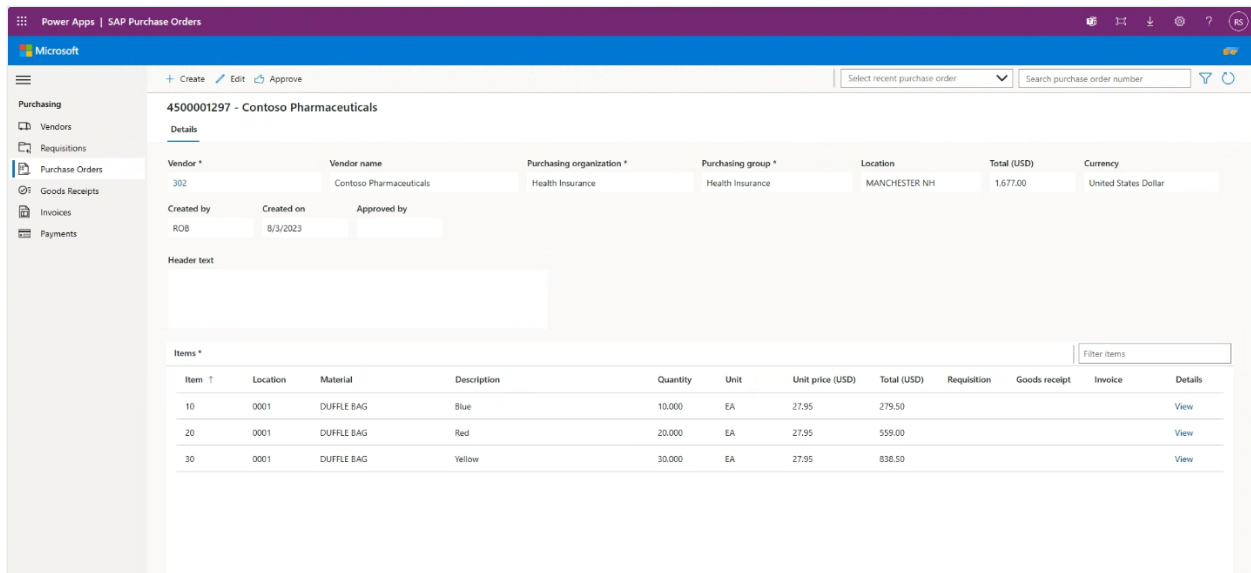
- **SAP Base** contains base components used by the SAP Procurement solution template and future SAP solution templates.
- **SAP Procurement** contains components that help transform your procure-to-pay business processes connected to SAP.

## Streamline and automate SAP procurement processes

The SAP Procurement template contains the building blocks necessary to:

- Streamline all the SAP screens and attributes related to core SAP procurement processes into one simple screen in Power Apps.
- Automate core processes behind the scenes using Power Automate flows.

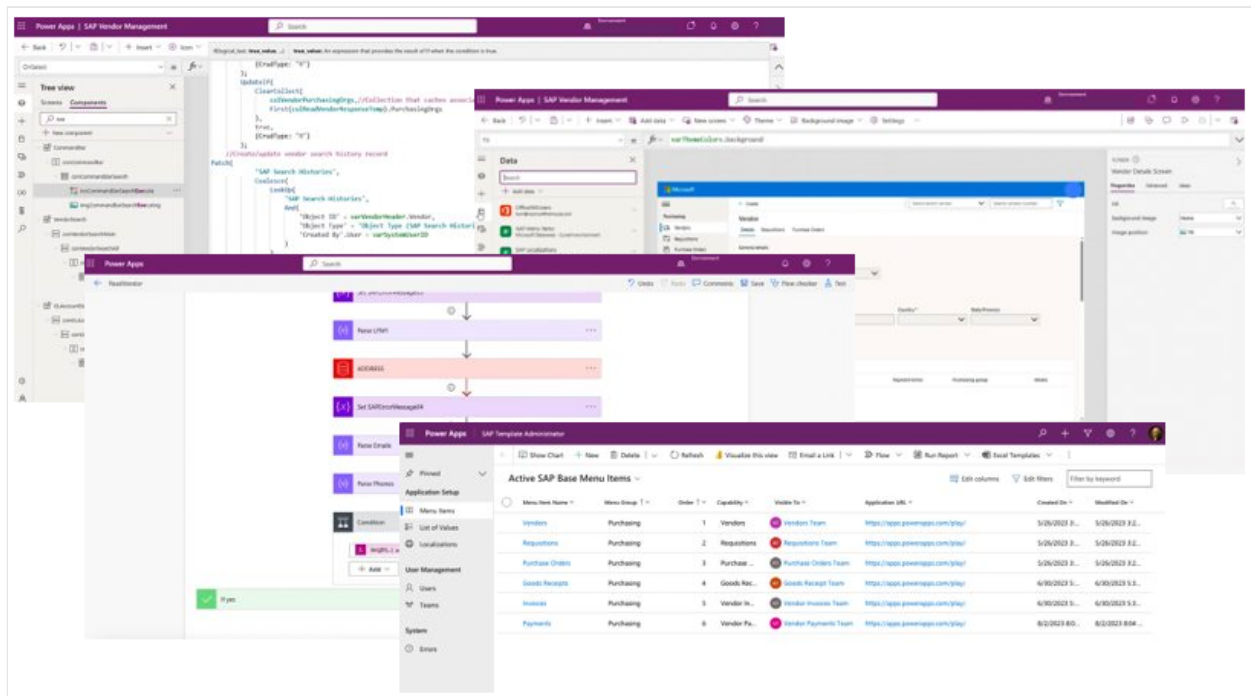




## Extend the SAP Procurement solution

The solution template's starter apps, flows, and other components are ready to be built upon and customized to meet your organization's unique needs. You can:

- Customize your solutions to meet your organization's unique needs.
- Integrate your system of record with other features, applications, and systems.
- Incorporate additional controls over how your users interact with data.



## Experience the benefits

The SAP solution template is a framework designed to help you quickly and easily configure, deploy, and manage SAP solutions on Power Platform so your organization

can experience a swift return on investment.

During the design phase, the solution template helps you:

- See how your system's data can be accessed and organized in a streamlined view in Power Apps.
- Realize how workflows can be automated by Power Automate cloud flows operating behind the scenes.
- See how you can further extend the solutions to meet your organization's needs.

Once deployed, you'll see your procurement team members quickly and easily adapt to working with SAP data using Power Apps and experience:

- Enhanced user experiences
- Improved operational efficiencies
- Fewer errors
- Greater insights into data

## Access the SAP Procurement template

You can access the SAP Procurement template two ways:

- [Microsoft AppSource](#) 
- [Template for Power Platform on GitHub](#) 

### Important

Before accessing and installing the SAP Procurement template solution files, you must [integrate SAP with Power Platform](#).

## Next step

[Get started with SAP Procurement template](#)

## See also

- [Frequently asked questions about SAP integration with Power Platform](#)
- [SAP Vendor Management app](#)
- [SAP Requisition Management app](#)
- [SAP Purchase Order Management app](#)
- [SAP Goods Receipt Management app](#)

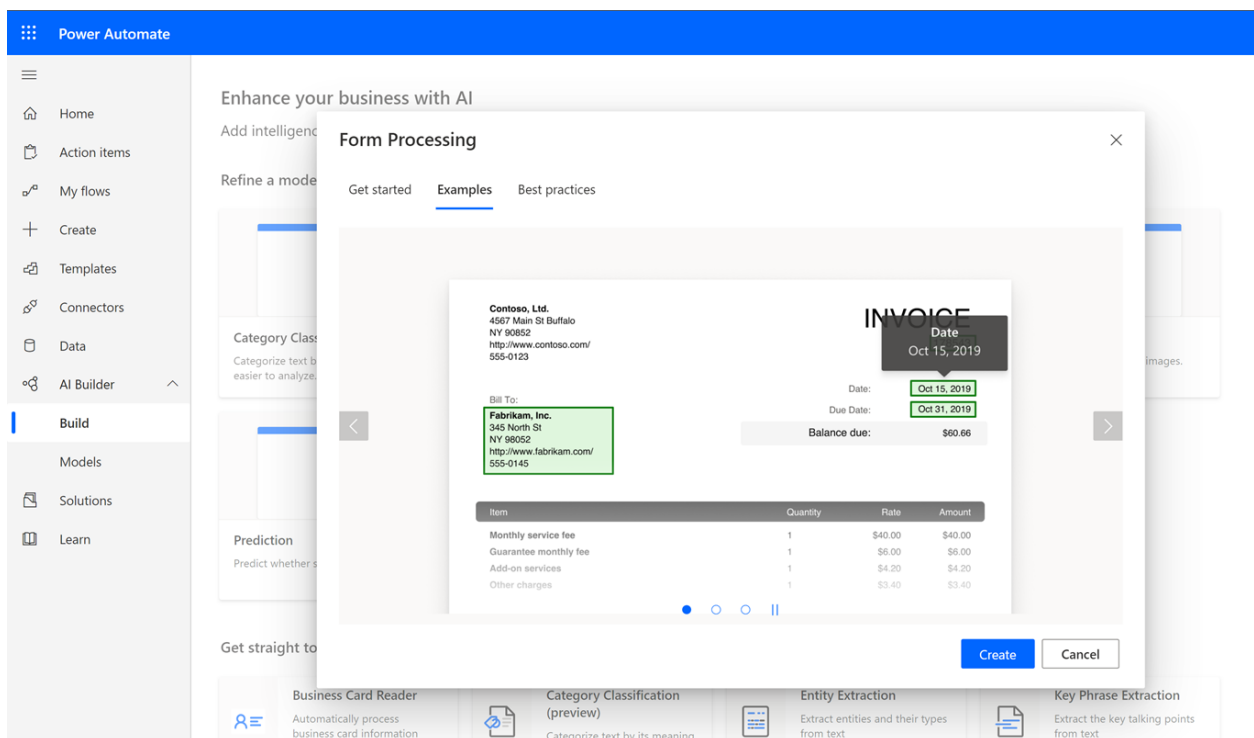
- SAP Vendor Invoice Management app
- SAP Vendor Payment Management app

# Use AI Builder in Power Automate

Article • 02/10/2023

AI Builder is a new Microsoft Power Platform capability that enables you to add intelligence to your automated processes, predict outcomes, and help improve business performance. AI Builder is a turnkey solution that brings the power of Microsoft AI through a point-and-click experience and is directly integrated into Power Apps and Power Automate. More information: [What is AI Builder?](#)

You can build AI models by using the **AI Builder** option from the left navigation pane of [Power Automate](#). More information: [AI model types](#)



Use your AI Builder models in your flows to add intelligence to your organization. More information: [Use AI Builder in Power Automate](#)

# Power Automate for enterprise developers, ISVs, and partners

Article • 10/30/2023

As a developer, you can extend Power Automate, enabling even more powerful solutions for organizations and customers.

## Power Automate for enterprise developers

As an enterprise developer, empower your organization to build robust tailored solutions on Power Automate:

- **Build custom connectors:** Develop custom connectors to connect to your organization's data and web services through Power Automate. [Learn more](#)
- **Build Azure Functions:** Craft Azure Functions to extend apps with custom server-side logic. [Learn more](#)
- **Embed Power Automate:** Embed Power Automate directly into your website experiences to create integrated solutions, surfacing workflows or processes where people in your organization already do their work. [Learn more](#)
- **Run desktop flows:** Integrate desktop flows directly into your product to enable robotic process automation in your solutions. [Learn more](#)

## Power Automate for ISVs and Microsoft partners

As a Microsoft partner or Independent Software Vendor (ISV), accelerate customer adoption by extending your products to integrate with your customers' data and business processes, and add and customize workflows to automate business processes as part of your application. After you've completed the below eight steps, your application will have the ability to use a robust cloud-scale workflow engine that can connect to 200+ different services.

 [Expand table](#)

Phase	Step	When needed?
Development	1. Build a custom connector to your data	If you want to expose your own ISV data to Power Apps or Power Automate
Development	2. Add support for your application to authenticate users with Microsoft Entra ID	If you want to embed the Power Automate UI, integrate with desktop flows or list in Microsoft AppSource
Development	3. Embed the Power Automate UI into your application using our web-based IFrame	If you want to include flow creation or management in your application
Development	4. Integrate with desktop flow APIs	If you want to include desktop flow (RPA) capabilities programmatically within your applications
Development	5. Create and publish flow templates	If you want to pre-build flows for your customers
Development	6. Add application logic to programmatically deploy flows	If you want to automatically deploy your pre-built flows for your customers
Distribution	7. Grant your customers licenses to Microsoft Flow through the Microsoft Cloud Solution Provider program	If your customers don't have Office 365 or Dynamics 365 licenses
Distribution	8. List your solution on Microsoft AppSource	It's recommended to increase the visibility of your ISV solution

## 1. Connecting to your APIs OR Enabling customers to connect to your APIs

As an ISV, you often have proprietary data that you would like customers to access through your flows. You can expose access to any of your data through a custom connector. [Learn more](#)

Once created, there are two ways to make the connector available to your customers:

- The connector can be deployed into the customer's tenant via REST APIs or PowerShell.
- To make the custom connector publicly available for all users, you can submit your connector for certification. [Learn more](#)

## 2. Authentication

To call REST APIs and embed authenticated UI, your application needs to use Microsoft Entra federated single sign-on to authenticate end users and customers. Go to [Microsoft identity platform](#) for information on how to enable Microsoft Entra federated SSO. We don't have support for unauthenticated access, or access with identity providers other than Microsoft Entra.

### 3. Embedding UI components

Embed Power Automate within your app to enable deep, in-context integration between your app and all the other services that Power Automate supports. [Learn more](#)

### 4. Running desktop flows

Integrate desktop flow capabilities to enable robotic process automation through your applications, listing, running and canceling desktop flows created by you or your customers. [Learn more](#)

### 5. Create and publish flow templates

Once you have a connector, you should publish templates that demonstrate how to use your service. These templates will serve as examples that users can use to learn and then extend to their own unique workflows. [Learn more](#)

### 6. Deployment

To give end users access to flows that they can use automatically, deploy them into the Microsoft Entra tenant of the user. Use a deployment package that you deploy using our REST APIs or PowerShell. [Learn more](#)

### 7. Licensing

If your customers already have either Office 365 or Dynamics 365, and these licenses are associated with the identities that users sign in with Microsoft Entra ID, there are no other licensing requirements for them to use standard connectors. Your users will need one of the [Power Automate licenses](#) to use premium and custom connectors. If your customers don't use Office 365 or Dynamics 365, then you must acquire use rights on their behalf for Power Automate, so that they're licensed to use those embedded components in your application.

We offer the [Microsoft Cloud Solution Provider](#) program to acquire licenses on behalf of your customers. There are different [pricing plans](#) available for Power Automate, which you should check for plan and feature details.

See also: [Overview of Power Automate licensing](#)

## 8. List on AppSource

Once you have integrated Power Automate into your application, you can list it on AppSource. With AppSource, you can generate new leads for your business by building an app and publishing it to AppSource for new customers to test-drive. [Learn more](#)



# Extend apps with Power Automate

Article • 06/23/2023

Here are some of the ways you can extend your application with Power Automate:

- Create and connect to a custom connector.
- Share your custom connector with all Power Automate users.
- Embed the flow experience within an app.
- Highlight all custom connectors so that users can interact with Power Automate in the best way for them.

## Prerequisites

- A [Power Automate](#) account.

## Create a custom connector

If you have a web service to which you want to connect from Power Automate, you'll first need to create a custom connector. When you register a custom connector, you teach Power Automate about the characteristics of your web service, including the authentication it requires, the triggers and actions that it supports, and the parameters and outputs for each of those actions.

To learn about how to create custom connectors, go to [Build and certify custom connectors](#). After you register your custom connector, you can share it within your organization for testing.

## Share a custom connector with all Power Automate users

After you fully test your custom connector, [get your connector certified](#) to have it approved by Microsoft for sharing with all other Power Automate users.

## Embed the flow experience into your website or app

You can [embed](#) Power Automate into your app to enable deep, in-context integration between your app and all other services that Power Automate supports. For example,

you can:

- Browse all templates that relate to your service and let users select a template.
- Manage the flows that users have related to your app.

## Next steps

Learn how to [embed](#) Power Automate into your app.

# Work with cloud flows using code

Article • 03/25/2024

All flows are stored in Dataverse and you can use either the Dataverse SDK for .NET or Web API to manage them.

This article covers the management of flows included on the **Solutions** tab in Power Automate. Currently, managing flows under **My Flows** aren't supported with code.

## Interact with Dataverse APIs

Dataverse provides equivalent capabilities using either the Dataverse SDK for .NET or Web API.

## Which method should I use?

The best method depends on the project technology and the skills you have.

SDK for .NET

If your project uses .NET, we recommend using the SDK. The SDK simplifies your development experience by providing a typed object model and methods to authenticate.

More information: [Use the Organization service](#)

## How to connect?

How to connect depends on whether you're using the Dataverse SDK for .NET or Web API.

SDK for .NET

With the SDK, you need to connect with a client application to get access to an [IOrganizationService](#) instance. `IOrganizationService` is an interface that provides methods you can use to interact with Dataverse.

More information:

- [Quickstart: Execute an Organization service request \(C#\)](#)

- [Use the Organization service](#)
- [IOrganizationService Interface](#)

## Workflow table

Cloud flows are stored in the [Process \(Workflow\) table](#) that is represented in the Web API as the [workflow EntityType](#)

The following table describes important columns in the workflow table:

 Expand table

Logical Name	Type	Description
<code>category</code>	Choice	The category of the flow. Here are the different categories. <code>0</code> - Classic Dataverse workflows. <code>1</code> - Classic Dataverse dialogs. <code>2</code> - Business rules. <code>3</code> - Classic Dataverse actions. <code>4</code> - Business process flows. <code>5</code> - Modern Flow (Automated, instant or scheduled flows). <code>6</code> - Desktop flows.
<code>clientdata</code>	String	A string-encoded JSON of the flow definition and its <code>connectionReferences</code> .
<code>createdby</code>	Lookup	The user who created the flow.
<code>createdon</code>	DateTime	The date when the flow was created.
<code>description</code>	String	The user-provided description of the flow.
<code>ismanaged</code>	Bool	Indicates if the flow was installed via a managed solution.
<code>modifiedby</code>	Lookup	The last user who updated the flow.
<code>modifiedon</code>	DateTime	The last time the flow was updated.
<code>name</code>	String	The display name that you have given the flow.
<code>ownerid</code>	Lookup	The user or team who owns the flow.
<code>statecode</code>	Choice	The status of the flow. The status can be: <code>0</code> - Draft (Off) <code>1</code> - Activated (On) <code>2</code> - Suspended.

Logical Name	Type	Description
type	Choice	Indicates if the flow is a running flow, or a template that can be used to create more flows. <ol style="list-style-type: none"> <li>1 - Definition,</li> <li>2 - Activation</li> <li>3 - Template.</li> </ol>
workflowid	Guid	The unique identifier for a cloud flow across all imports.
workflowidunique	Guid	The unique identifier for this installation of the flow.

### ⓘ Note

With Web API, Lookup values are single-valued navigation properties that can be expanded to get details from the related record.

Lookup columns also have corresponding GUID lookup properties that can be used in queries. Lookup properties have this naming convention: `_<logical name>_value`. For the workflow entitytype in Web API you can reference these lookup properties: `_createdby_value`, `_modifiedby_value`, and `_ownerid_value`.

## List flows

To retrieve a list of cloud flows, you can query the workflow table. The following query returns the first automated, instant, or scheduled flow that is currently 'on':

SDK for .NET

This static `OutputFirstActiveFlow` method requires an authenticated client that implements the `IOrganizationService`. It uses the `IOrganizationService.RetrieveMultiple` method.

```
C#
/// <summary>
/// Outputs the first active flow
/// </summary>
/// <param name="service">Authenticated client implementing the
IOrganizationService interface</param>
public static void OutputFirstActiveFlow(IOrganizationService service)
{
    var query = new QueryExpression("workflow")
    {
```

```

ColumnSet = new ColumnSet("category",
                           "createdby",
                           "createdon",
                           "description",
                           "ismanaged",
                           "modifiedby",
                           "modifiedon",
                           "name",
                           "ownerid",
                           "statecode",
                           "type",
                           "workflowid",
                           "workflowidunique"),
Criteria = new FilterExpression(LogicalOperator.And)
{
    Conditions = {
        { new ConditionExpression(
            "category",
            ConditionOperator.Equal,
            5) }, // Cloud Flow
        { new ConditionExpression(
            "statecode",
            ConditionOperator.Equal,
            1) } // Active
    }
},
TopCount = 1 // Limit to one record
};

EntityCollection workflows = service.RetrieveMultiple(query);

Entity workflow = workflows.Entities.FirstOrDefault();

Console.WriteLine($"category:
{workflow.FormattedValues["category"]}");
Console.WriteLine($"createdby:
{workflow.FormattedValues["createdby"]}");
Console.WriteLine($"createdon:
{workflow.FormattedValues["createdon"]}");
// Description may be null
Console.WriteLine($"description: {workflow.GetAttributeValue<string>
("description")}");
Console.WriteLine($"ismanaged:
{workflow.FormattedValues["ismanaged"]}");
Console.WriteLine($"modifiedby:
{workflow.FormattedValues["modifiedby"]}");
Console.WriteLine($"modifiedon:
{workflow.FormattedValues["modifiedon"]}");
Console.WriteLine($"name: {workflow["name"]}");
Console.WriteLine($"ownerid: {workflow.FormattedValues["ownerid"]}");
Console.WriteLine($"statecode:
{workflow.FormattedValues["statecode"]}");
Console.WriteLine($"type: {workflow.FormattedValues["type"]}");
Console.WriteLine($"workflowid: {workflow["workflowid"]}");
Console.WriteLine($"workflowidunique:

```

```
{workflow["workflowidunique"]}");  
}
```

To retrieve more records, remove the [TopCount](#) limit.

## Output

Console

```
category: Modern Flow  
createdby: SYSTEM  
createdon: 5/20/2020 9:37 PM  
description:  
ismanaged: Unmanaged  
modifiedby: Kiana Anderson  
modifiedon: 5/6/2023 3:37 AM  
name: When an account is updated -> Create a new record  
ownerid: Monica Thomson  
statecode: Activated  
type: Definition  
workflowid: d9e875bf-1c9b-ea11-a811-000d3a122b89  
workflowidunique: c17af45c-10a1-43ca-b816-d9cc352718cf
```

More information:

- [Build queries with QueryExpression](#)
- [Access formatted values](#)

## Create a cloud flow

The required properties for automated, instant, and scheduled flows are: `category`, `name`, `type`, `primaryentity`, and `clientdata`. Use `none` for the `primaryentity` for these types of flows.

SDK for .NET

This static method requires an authenticated client that implements the [IOrganizationService](#). It uses the [IOrganizationService.Create](#) method.

```
C#  
  
/// <summary>  
/// Creates a cloud flow  
/// </summary>  
/// <param name="service">Authenticated client implementing the
```

```

IOrganizationService interface</param>
/// <returns>The workflowid</returns>
public static Guid CreateCloudFlow(IOrganizationService service)
{
    var workflow = new Entity("workflow")
    {
        Attributes = {
            {"category", new OptionSetValue(5) }, // Cloud flow
            {"name", "Sample flow name"},
            {"type", new OptionSetValue(1) }, //Definition
            {"description", "This flow reads some data from Dataverse."
        },
            {"primaryentity", "none" },
            {"clientdata", "{\"properties\":{\"connectionReferences\":
{\\\"shared_commondataserviceforapps\\\":{\\\"impersonation\\\":
{}},\\\"runtimeSource\\\":\\\"embedded\\\",\\\"connection\\\":{\\\"name\\\":\\\"shared-
commondataser-114efb88-a991-40c7-b75f-2693-
b1ca6a0c\\\",\\\"connectionReferenceLogicalName\\\":\\\"crdcb_sharedcommdatase
rviceforapps_109ea\\\"},\\\"api\\\":
{\\\"name\\\":\\\"shared_commondataserviceforapps\\\"}}},\\\"definition\\\":
{\\\"$schema\\\":\\\"https://schema.management.azure.com/providers/Microsoft.L
ogic/schemas/2016-06-
01/workflowdefinition.json#\\\",\\\"contentVersion\\\":\\\"1.0.0.0\\\",\\\"parameter
s\\\":{\\\"$connections\\\":{\\\"defaultValue\\\":
{}},\\\"type\\\":\\\"Object\\\"},\\\"$authentication\\\":{\\\"defaultValue\\\":
{}},\\\"type\\\":\\\"SecureObject\\\"}},\\\"triggers\\\":{\\\"manual\\\":{\\\"metadata\\\":
{\\\"operationMetadataId\\\":\\\"76f87a86-89b3-48b4-92a2-
1b74539894a6\\\"},\\\"type\\\":\\\"Request\\\",\\\"kind\\\":\\\"Button\\\",\\\"inputs\\\":
{\\\"schema\\\":{\\\"type\\\":\\\"object\\\",\\\"properties\\\":{}},\\\"required\\\":
[ ]}}}},\\\"actions\\\":{\\\"List_rows\\\":{\\\"runAfter\\\":{}},\\\"metadata\\\":
{\\\"operationMetadataId\\\":\\\"9725b30f-4a8e-4695-b6fd-
9a4985808809\\\"},\\\"type\\\":\\\"OpenApiConnection\\\",\\\"inputs\\\":{\\\"host\\\":
{\\\"apiId\\\":\\\"/providers/Microsoft.PowerApps/apis/shared_commondataservic
eforapps\\\",\\\"connectionName\\\":\\\"shared_commondataserviceforapps\\\",\\\"oper
ationId\\\":\\\"ListRecords\\\"},\\\"parameters\\\":
{\\\"entityName\\\":\\\"accounts\\\",\\\"$select\\\":\\\"name\\\",\\\"$top\\\":1},\\\"authenti
cation\\\":\\\"@parameters('$authentication')\\\"}}}},\\\"schemaVersion\\\":\\\"1.0
.0.0\\\"}" }
        }
    };

    return service.Create(workflow);
}

```

More information: [Create table rows using the Organization Service](#)

The `statecode` of all flows created this way are set to 0 (Draft or 'Off'). The flow needs to be enabled before it can be used.

The most important property is the `clientdata`, which contains the `connectionReferences` that the flow uses, and the `definition` of the flow. The



connectionReferences are the mappings to each connection that the flow uses.

JSON

```
{
  "properties": {
    "connectionReferences": {
      "shared_commondataserviceforapps": {
        "runtimeSource": "embedded",
        "connection": {},
        "api": {
          "name": "shared_commondataserviceforapps"
        }
      }
    },
    "definition": {
      "$schema":
"https://schema.management.azure.com/providers/Microsoft.Logic/schemas/2016-
06-01/workflowdefinition.json#",
      "contentVersion": "1.0.0.0",
      "parameters": {
        "$connections": { "defaultValue": {}, "type": "Object" },
        "$authentication": { "defaultValue": {}, "type": "SecureObject" }
      },
      "triggers": {
        "manual": {
          "metadata": {},
          "type": "Request",
          "kind": "Button",
          "inputs": {
            "schema": { "type": "object", "properties": {}, "required": [] }
          }
        }
      },
      "actions": {
        "List_rows": {
          "runAfter": {},
          "metadata": {},
          "type": "OpenApiConnection",
          "inputs": {
            "host": {
              "apiId":
"/providers/Microsoft.PowerApps/apis/shared_commondataserviceforapps",
              "connectionName": "shared_commondataserviceforapps",
              "operationId": "ListRecords"
            },
            "parameters": {
              "entityName": "accounts",
              "$select": "name",
              "$top": 1
            }
          },
          "authentication": "@parameters('$authentication')"
        }
      }
    }
  }
}
```

```
    }
  }
},
"schemaVersion": "1.0.0.0"
}
```

## Update a cloud flow

To update a flow, set only the properties you want to change.

SDK for .NET

This static method requires an authenticated client that implements the [IOrganizationService](#). It uses the [IOrganizationService.Update](#) method to update a flow description and set the owner.

C#

```
/// <summary>
/// Updates a cloud flow
/// </summary>
/// <param name="service">Authenticated client implementing the
IOrganizationService interface</param>
/// <param name="workflowid">The ID of the flow to update.</param>
/// <param name="systemuserid">The id of the user to assign the flow to.
</param>
public static void UpdateCloudFlow(IOrganizationService service, Guid
workflowid, Guid systemuserid) {

    var workflow = new Entity("workflow",workflowid)
    {
        Attributes = {
            {"description", "This flow will ensure consistency across
systems." },
            {"ownerid", new EntityReference("systemuser",systemuserid)},
            {"statecode", new OptionSetValue(1) } //Turn on the flow.
        }
    };

    service.Update(workflow);
}
```

More information: [Update and delete table rows using the Organization Service > Basic update](#)

# Delete a cloud flow

The following examples show how to delete the workflow record that represents a cloud flow.

SDK for .NET

The static `DeleteCloudFlow` method deletes a workflow record.

```
C#  
  
/// <summary>  
/// Deletes a workflow  
/// </summary>  
/// <param name="service">Authenticated client implementing the  
IOrganizationService interface</param>  
/// <param name="workflowId">The id of the cloud flow to delete.</param>  
public static void DeleteCloudFlow(IOrganizationService service, Guid  
workflowId) {  
  
    service.Delete(entityName:"workflow",id: workflowId);  
  
}
```

More information: [Delete a record using the SDK](#)

## Get all users with whom a cloud flow is shared

Use the `RetrieveSharedPrincipalsAndAccess` message to get a list of all the users that a cloud flow is shared with.

With the SDK, use the [RetrieveSharedPrincipalsAndAccessRequest Class](#), and with the Web API use the [RetrieveSharedPrincipalsAndAccess Function](#).

More information: [Get principals with access to a record](#)

## Share or unshare a cloud flow

Share a cloud flow like any other Dataverse record using the `GrantAccess` message. With the SDK, use the [GrantAccessRequest Class](#) and with the Web API use the [GrantAccess Action](#). More information: [GrantAccess example](#)

If you want to change the access rights you grant when you share a record, use the `ModifyAccess` message. With the SDK, use the [ModifyAccessRequest Class](#) and with the Web API use the [ModifyAccess Action](#). More information: [ModifyAccess example](#)

To unshare a record, use the `RevokeAccess` message. With the SDK, use the [RevokeAccessRequest Class](#) and with the Web API use the [RevokeAccess Action](#). More information: [Revoking access](#)

## Export flows

When a flow is part of a solution, you can export it by exporting the solution that contains the flow using the `ExportSolution` message.

SDK for .NET

The static `ExportSolution` example method below uses the [ExportSolutionRequest](#) to retrieve a `byte[]` containing the ZIP file of the unmanaged solution with the specified [UniqueName](#).

C#

```
/// <summary>
/// Exports an unmanaged solution
/// </summary>
/// <param name="service">Authenticated client implementing the
/// IOrganizationService interface</param>
/// <param name="solutionUniqueName">The uniquename of the solution.
</param>
/// <returns></returns>
public static byte[] ExportSolution(
    IOrganizationService service,
    string solutionUniqueName)
{
    ExportSolutionRequest request = new() {
        SolutionName = solutionUniqueName,
        Managed = false
    };

    var response = (ExportSolutionResponse)service.Execute(request);

    return response.ExportSolutionFile;
}
```

## Import flows

When you have a solution ZIP file, you can import it using the `ImportSolution` message.

When you import flows, you should set the following parameters:

 Expand table

Property name	Description
<code>OverwriteUnmanagedCustomizations</code>	If there are existing instances of these flows in Dataverse, this flag needs to be set to <code>true</code> to import them. Otherwise they won't be overwritten.
<code>PublishWorkflows</code>	Indicates if classic Dataverse workflows will be activated on import. This setting doesn't apply to other types of flows.
<code>CustomizationFile</code>	A base 64-encoded zip file that contains the solution.

SDK for .NET

The static `ImportSolution` sample method shows how to import a solution file using the [ImportSolutionRequest Class](#)

C#

```
/// <summary>
/// Imports a solution.
/// </summary>
/// <param name="service">Authenticated client implementing the
IOrganizationService interface</param>
/// <param name="solutionFile">The byte[] data representing a solution
file. </param>
public static void ImportSolution(
    IOrganizationService service,
    byte[] solutionFile) {

    ImportSolutionRequest request = new() {
        OverwriteUnmanagedCustomizations = true,
        CustomizationFile = solutionFile
    };

    service.Execute(request);
}
```

## Related information

Entity class operations using the Organization service

Perform operations using the Web API

Sharing and assigning

Verifying access in code

Work with solutions using the Dataverse SDK

---

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Work with desktop flows using code

Article • 02/19/2024

Developers can add [desktop flows](#) functionality to their applications, including programmatically triggering and canceling desktop flows. These capabilities are offered as part of the Microsoft Dataverse platform.

## Prerequisites

1. Knowledge of [Dataverse Web API](#), [authentication with Dataverse](#) and [using OAuth with Dataverse](#).
2. Knowledge of Dataverse environment and organization notions, and [how to retrieve the organization URL](#) manually or programmatically.
3. Knowledge of [desktop flows notions](#) and of what [connections are and how to create them](#).

### Important

In this article, you must replace all squared brackets [...] in URLs and input/output data with values specific to your scenario.

## List available desktop flows

All desktop flows scripts are in Dataverse as part of the [workflow entity](#).

Filter the list of workflows based on the category to identify desktop flows.

## Request to get desktop flows

HTTP

**Authorization:** Bearer eyJ0eXAiOi...

**Accept:** application/json

**GET** [https://\[Organization URI\]/api/data/v9.2/workflows?  
\\$filter=category+eq+6&\\$select=name,workflowid&\\$orderby=name](https://[Organization URI]/api/data/v9.2/workflows?&filter=category+eq+6&select=name,workflowid&orderby=name) HTTP/1.1

## Response to the request to get desktop flows

JSON

```
{
  "@odata.context": "https://[Organization
URI]/api/data/v9.2/$metadata#workflows(name,workflowid)",
  "value": [
    {
      "@odata.etag": "W1069462",
      "name": "Desktop flow 1",
      "workflowid": "f091ffab-58bb-4630-a115-659453d56f59",
    },
    {
      "@odata.etag": "W1028555",
      "name": "Desktop flow 2",
      "workflowid": "eafba1a2-e8d4-4efa-b549-11d4dfd9a3d1",
    }
  ]
}
```

## Get the schema for desktop flows

If you need to retrieve the flow schema for inputs and/or outputs, you can use the `clientData` field for the target workflow.

## Request inputs schema for desktop flows

HTTP

```
Authorization: Bearer eyJ0eXAiOi...
```

```
Accept: application/json
```

```
GET https://[Organization URI]/api/data/v9.2/workflows([Workflow
Id])/inputs/$value HTTP/1.1
```

## Response to the request to get the desktop flows inputs schema

JSON

```
{
  "schema": {
    "properties": {
      "inputText": {
        "default": "",
        "description": "",
        "format": null,

```



```

        "title": "inputText",
        "type": "string",
        "value": ""
    },
    "inputInteger": {
        "default": "",
        "description": "",
        "format": null,
        "title": "inputInteger",
        "type": "number",
        "value": "0"
    }
},
"type": "object"
}
}

```

## Request outputs schema for desktop flows

HTTP

**Authorization:** Bearer eyJ0eXAiOi...

**Accept:** application/json

GET [https://\[Organization URI\]/api/data/v9.2/workflows\(\[Workflow Id\]\)/outputs/\\$value](https://[Organization URI]/api/data/v9.2/workflows([Workflow Id])/outputs/$value) HTTP/1.1

## Response to the request to get the desktop flows outputs schema

JSON

```

{
  "schema": {
    "properties": {
      "outputText": {
        "default": "",
        "description": "",
        "format": null,
        "title": "outputText",
        "type": "string",
        "value": null
      },
      "outputInteger": {
        "default": "",
        "description": "",
        "format": null,
        "title": "outputInteger",
        "type": "number",

```

```
        "value": null
      },
    },
    "type": "object"
  }
}
```

## Get the status of a desktop flow run

Dataverse stores all desktop flow runs in the [flowsession](#) entity.

### Request the status of a desktop flow run

HTTP

**Authorization:** Bearer eyJ0eXAiOi...

**Accept:** application/json

GET https://[Organization URI]/api/data/v9.2/flowsessions([Flow session ID])?\$select=statuscode,statecode,startedon,completedon HTTP/1.1

### Response for the status of a desktop flow run

JSON

```
{
  "@odata.context": "https://[Organization URI]/api/data/v9.2/$metadata#flowsessions(statuscode,statecode,startedon,completedon)/$entity",
  "@odata.etag": "W1276122",
  "statuscode": 8,
  "statecode": 0,
  "startedon": "2022-06-16T12:54:40Z",
  "completedon": "2022-06-16T12:57:46Z",
}
```

## Get desktop flow outputs

If the desktop flow has outputs, you can query the outputs field to retrieve them.

### Request for desktop flow outputs

HTTP

**Authorization:** Bearer eyJ0eXAiOi...

**Accept:** application/json

GET [https://\[Organization URI\]/api/data/v9.2/flowsessions\(\[Flow session ID\]\)/outputs/\\$value](https://[Organization URI]/api/data/v9.2/flowsessions([Flow session ID])/outputs/$value) HTTP/1.1

## Response to the request for desktop flow outputs

JSON

```
{
  "Output1": "My output value"
}
```

## Trigger a desktop flow run

By using Dataverse, you can add the functionality of triggering a desktop flow through your application. To implement this functionality, you need to use the [RunDesktopFlow action](#).

To call the action, you'll need the following information.

- The **ID** of the desktop flow that you want to run. You can get this ID via the API as the [List available desktop flows](#) section outlines earlier in this article.

### Tip

Alternatively, you can retrieve the ID manually from the desktop flow details URL in Power Automate. The URL format is:

```
https://make.powerautomate.com/manage/environments/[Environment ID]/uiflows/[Desktop Flow ID]/details.
```

For more information, see [Manage desktop flows](#).

- The **name** of the desktop flow connection (targeting a machine/machine group) to use to run your flow. The name can be retrieved from the URL of the same connection page in Power Automate. The URL format is:

```
https://make.powerautomate.com/manage/environments/[Environment ID]/connections?apiName=shared_uiflow&connectionName=[Connection Name].
```

### ⓘ Note

For more information, see [Create desktop flow connections](#).

### 💡 Tip

Alternatively, you can use a connection reference's logical name as the input of the connection instead of the connection name (usage example described below). The connection references are stored in the `Dataverse` table `connectionreference` and can be listed programmatically in the same way as desktop flows detailed in the [List available desktop flows](#) section.

For more information, see [Use a connection reference in a solution and connectionreference table/entity reference](#).

## Request to trigger a desktop flow

HTTP

**Authorization:** Bearer eyJ0eXAiOi...

**Accept:** application/json

POST [https://\[Organization URI\]/api/data/v9.2/workflows\(\[Workflow ID\]\)/Microsoft.Dynamics.CRM.RunDesktopFlow](https://[Organization URI]/api/data/v9.2/workflows([Workflow ID])/Microsoft.Dynamics.CRM.RunDesktopFlow) HTTP/1.1

```
{
  "runMode": "attended",
  "runPriority": "normal",
  "connectionName": "[Connection Name]",
  "timeout": 7200,
  "inputs": "{\"Input1\":\"Value\", \"Input2\":\"Value\"}"
}
```

## Request to trigger a desktop flow with a connection reference

HTTP

**Authorization:** Bearer eyJ0eXAiOi...

**Accept:** application/json

POST [https://\[Organization URI\]/api/data/v9.2/workflows\(\[Workflow ID\]\)/Microsoft.Dynamics.CRM.RunDesktopFlow](https://[Organization URI]/api/data/v9.2/workflows([Workflow ID])/Microsoft.Dynamics.CRM.RunDesktopFlow) HTTP/1.1

```
{
```

```
"runMode": "attended",
"runPriority": "normal",
"connectionName": "[Connection Reference Logical Name]",
"connectionType": 2,
"timeout": 7200,
"inputs": "{\\"Input1\\":\\"Value\\", \\"Input2\\":\\"Value\\"}"
}
```

## Response from request to trigger a desktop flow

JSON

```
{
  "@odata.context": "https://[Organization
URI]/api/data/v9.2/$metadata#Microsoft.Dynamics.CRM.RunDesktopFlowResponse",
  "flowsessionId": "d9687093-d0c0-ec11-983e-0022480b428a"
}
```

The inputs of the script are viewable in the run details page on the Power Automate portal (in Preview).

### Warning

When using the API, there are some limitations to be aware of:

- Triggering a desktop flow run with an account having "User" privileges will work. However, canceling the run and querying the status needs "Owner" privileges.
- Dataverse impersonation isn't supported.
- The input field content size is limited to 2 MB.

## Receive notification on script completion

An optional parameter "callbackUrl" is available in the body of the [RunDesktopFlow action](#). You can use it if you want to be notified of your script completion. A POST request will be sent to the provided URL when the script is complete.

## Request received by the callback endpoint

HTTP

```
User-Agent: EnterpriseConnectors/1.0
Content-type: application/json; charset=utf-8
x-ms-workflow-id: [Workflow ID]
x-ms-run-id: [Flow session ID]
```

```
POST [yourCallbackURL]
```

JSON

```
{
  "statuscode": 4,
  "statecode": 0,
  "startedon": "2022-09-05T08:04:11Z",
  "completedon": "2022-09-05T08:04:41Z",
  "flowsessionid": "d9687093-d0c0-ec11-983e-0022480b428a"
}
```

If no callback URL parameter is provided, the flow session status should be polled from Dataverse (refers to [Get the status of a desktop flow run](#)).

#### ⓘ Note

- You can still use the status polling as a fallback mechanism even if you provide a callback URL parameter.
- Your callback endpoint operation should be idempotent.
- The POST request will be retried three times with one second interval if your endpoint responds with a Server Error response (code 500 and above) or a "Request Timeout" response (code 408).

Requirements for the callback URL parameter

- Your server must have the current [TLS and cipher suites](#).
- Only the HTTPS protocol is allowed.
- Access to localhost (loopback) isn't permitted.
- IP addresses can't be used. You must use a named web address that requires DNS name resolution.
- Your server must allow connections from [Power Platform and Dynamics 365 services IP address values specified under the AzureCloud service tag](#).

#### 💡 Tip

As the callback call isn't authenticated, some precautions should be taken

- Check the flow session Id validity when the callback notification is received. Dataverse is the source of truth.
- Implement a rate limit strategy on your server side.
- Try to limit the callback URL sharing between several organizations.

## Cancel a desktop flow run

Similar to the [Trigger](#) functionality, you can also cancel a queued/running desktop flow. To cancel a desktop flow, use the [CancelDesktopFlowRun](#) action.

## Request to cancel a desktop flow run

HTTP

**Authorization:** Bearer eyJ0eXAiOi...

**Accept:** application/json

**POST** https://[Organization URI]/api/data/v9.2/flowsessions(d9687093-d0c0-ec11-983e-0022480b428a)/Microsoft.Dynamics.CRM.CancelDesktopFlowRun HTTP/1.1

## Response from a request to cancel a desktop flow

JSON

HTTP/1.1 204 No Content

## Errors

When an error occurs, the response has a different format that matches Dataverse error messages. The http error code and the message should provide enough information to understand the issue.

HTTP

HTTP/1.1 403 Forbidden

```
{
  "error": {
    "code": "0x80040220",
    "message": " Principal user (Id=526..., type=8) is missing
    prvReadworkflow privilege (Id=88...*)"
  }
}
```

```
}  
}
```

## Known limitations

- We currently support up to 70 desktop flows runs per minute for every connection.



# Build and certify custom connectors

Article • 03/25/2024

Without writing any code, you can build workflows and apps with [Azure Logic Apps](#), [Power Automate](#), and [Power Apps](#). To help you integrate your data and business processes, these services offer [1000+ connectors](#) - for Microsoft services and products, as well as other services, like GitHub, Salesforce, Twitter, and more.

Sometimes though, you might want to call APIs, services, and systems that aren't available as prebuilt connectors. To support more tailored scenarios, you can build *custom connectors* with their own triggers and actions. We have a complete set of basic and advanced tutorials for custom connectors on the Connectors documentation site. We recommend that you start with the [custom connector overview](#), but you can also go straight to the following topics for details on a specific area:

- [Create a custom connector from an OpenAPI definition](#)
- [Create a custom connector from scratch](#)
- [Use a custom connector from a cloud flow](#)
- [Share custom connectors in your organization](#)
- [Submit your connectors for Microsoft certification](#)
- [Custom connector FAQ](#)

# Integrate Power Automate with websites and apps

Article • 10/30/2023

Embed Power Automate into your app or website using *flow widgets* to give your users a simple way to automate their personal or professional tasks.

Flow widgets are iframes located in a host document. This document points to a page in the Power Automate designer. These widgets integrate specific Power Automate functionality into the third-party application.

Widgets can be simple. For example, a widget that renders a list of templates with no communication between the host and iframe. Widgets can also be complex. For example, a widget that provisions a cloud flow from a template and then triggers the flow via two-way communication between the host and the widget.

## Prerequisites

- A Microsoft Account or
- A work or school account

## Use the unauthenticated widget

To use the unauthenticated templates widget, embed it directly into the host application using an iframe. You don't need the JS SDK or an access token.

## Show templates for your scenarios

To start, add this code to show the Power Automate templates on your website:

HTML

```
<iframe src="https://make.powerautomate.com/{locale}/widgets/templates/?q={search term}&pagesize={number of templates}&destination={destination}&category={category}"></iframe>
```

 Expand table

Parameter	Description
locale	The four-letter language and region code for the template view. For example, <code>en-us</code> represents US English, and <code>de-de</code> represents German.
search term	The search term for the templates that you want to show in the view. For example, search <code>SharePoint</code> to show templates for SharePoint.
number of templates	The number of templates that you want to show in the view.
destination	The page that opens when users select the template. Enter <code>details</code> to show the details about the template, or enter <code>new</code> to open the Power Automate designer.
category	Filters to the given template category.
parameters. {name}	Additional context to pass into the flow.

If the destination parameter is `new`, the Power Automate designer opens when users select a template. Users can then create a cloud flow in the designer. See the next section if you want to have the full experience from the widget.

## Passing additional parameters to the flow template

If the user is in a specific context in your website or app, you might want to pass that context to the flow. For example, a user might open a template for *When an item is created* while looking at a certain list in SharePoint. Follow these steps to pass in the list ID as a *parameter* to the flow:

1. Define the parameter in the flow template before you publish it. A parameter looks like

```
@{parameters('parameter_name')}.
```

2. Pass the parameter in the query string of the iframe src. For example, add `&parameters.listName={the name of the list}` if you have a parameter called `listName`.

## Full sample

To show the top four SharePoint templates in German and to start the user with `myCoolList`, use this code:

HTML

```
<iframe src="https://make.powerautomate.com/de-de/widgets/templates/?q=sharepoint%20&pagesize=4&destination=details&parameters.listName=myCoolList"></iframe>
```

## Use the authenticated flow widgets

The following table shows the list of Power Automate widgets that support the full experience within the widget using user authentication access token. You will need to use Power Automate's JavaScript Software Developer Kit (JS SDK) to embed the widgets and provide the required user access token.

 Expand table

Widget type	Supported feature
flows	Shows a list of flows in a tab for personal and shared flows. Edit an existing flow or create a new flow from a template or blank.
flowCreation	Creates a cloud flow from a template Id that the host application provides.
runtime	Triggers a manual or hybrid-trigger flow that the host application provides.
approvalCenter	Embeds approval requests and sent approvals.
templates	Shows a list of templates. The user chooses one to create a new flow.

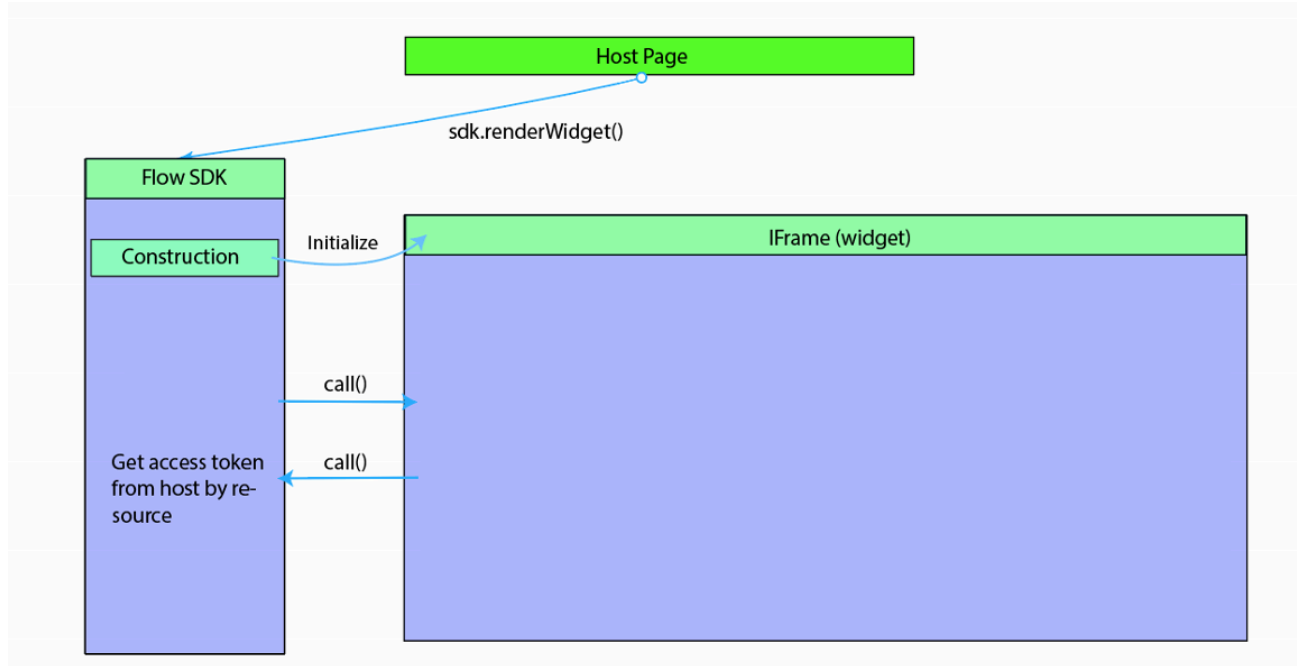
Use the authenticated Flow SDK to allow users to create and manage flows directly from your website or app (instead of navigating to Power Automate). You'll need to sign the user in with their Microsoft Account or Microsoft Entra to use the authenticated SDK.

### Note

There is no way to hide the Power Automate branding when you use widgets.

# Widget architecture

Power Automate widgets work by embedding an iframe that references Power Automate into a host application. The host provides the access token that's required by the Power Automate widget. Power Automate's JS SDK enables the host application to initialize and manage the widget life cycle.



## JS SDK details

The Power Automate team provides the JS SDK to facilitate integrating Flow widgets in third-party applications. The Flow JS SDK is available as a public link in the Flow service and lets the host application handle events from the widget and interact with the Flow application by sending actions to the widget. Widget events and actions are specific to the widget type.

## Widget initialization

The Flow JS SDK reference needs to be added to the host application before initializing the widget.

HTML

```
<script src="https://flow.microsoft.com/Content/msflowsdk-1.1.js"></script>
```

### Note


- The recommended way to include the Flow JS SDK in your application is using the above reference. Adding a local copy of the Flow JS SDK to your application or web page can result in you using an older unsupported version of the SDK over time causing breaks in functionality.
- Power Automate stores some data such as user identity and preferences locally leveraging your browsers capabilities. Problems occur if the browser blocks storage of such local data, or third-party cookies set by Power Automate. Users need to enable third party cookies in their browser in order for the widget to load correctly.

Create a JS SDK instance by passing optional hostName and locale values in a JSON object.

#### JavaScript

```
var sdk = new MsFlowSdk({
  hostname: 'https://make.powerautomate.com',
  locale: 'en-US'
});
```

 Expand table

Name	Required/Optional	Description
hostname	Optional	Power Automate host name, for example, <a href="https://make.powerautomate.com">https://make.powerautomate.com</a> 
locale	Optional	Client locale for the widget (defaults to <code>en-us</code> if not specified)

Once the JS SDK instance is created you can initialize and embed a Power Automate widget in a parent element in the host application. To do so, add an HTML div:

#### HTML

```
<div id="flowDiv" class="flowContainer"></div>
```

Then, initialize the Power Automate widget with the JS SDK `renderWidget()` method. Be sure to provide the widget type and corresponding settings.

#### JavaScript

```
var widget = sdk.renderWidget('<widgettype>', {
  container: 'flowDiv',
  flowsSettings: {},
  templatesSettings: {},
  approvalCenterSettings: {},
  widgetStyleSettings: {}
});
```

Here's a sample style for the container that you can modify to match with the host application's dimensions.

#### HTML

```
<head>
  <style>
    .flowContainer iframe {
      width: 400px;
      height: 1000px;
      border: none;
      overflow: hidden;
    }
  </style>
</head>
```

These are the parameters for `renderWidget()`:

 Expand table

Parameter	Required/Optional	Description
container	Required	Id of a DIV element on the host page where the widget will be embedded.

Parameter	Required/Optional	Description
<code>environmentId</code>	Optional	Widgets need an environment Id. If you don't provide an Id, a default environment is used.
<code>flowsSettings</code>	Optional	Power Automate settings object
<code>templatesSettings</code>	Optional	Template settings object
<code>approvalCenterSettings</code>	Optional	Approval settings object

## Access tokens

After the JS SDK `renderWidget()` runs, the JS SDK initializes an iframe which points to the Power Automate widget URL. This URL contains all the settings in the query string parameters. The host application needs to get a Power Automate access token for the user (Microsoft Entra ID JWT token with audience `https://service.flow.microsoft.com`) before it initializes the widget. The widget raises a `GET_ACCESS_TOKEN` event to request an access token from the host. The host needs to handle the event and pass the token to the widget:

JavaScript

```
widget.listen("GET_ACCESS_TOKEN", function(requestParam, widgetDoneCallback) {
  widgetDoneCallback(null, {
    token: '<accesstokenFromHost>'
  });
});
```

The host application is responsible for maintaining the token and passing it with a valid expiry date to the widget when requested. If the widget is open for longer periods, the host should check if the token is expired and refresh the token if it's needed before passing it to the widget.

## Detecting if the widget is ready

After successful initialization, the widget raises an event to notify that the widget is ready. The host can listen to the `WIDGET_READY` event and execute any additional host code.

JavaScript

```
widget.listen("WIDGET_READY", function() {
  console.log("The flow widget is now ready.");
  // other host code on widget ready
});
```

## Widget settings

### FlowsSettings

`FlowsSettings` can be used to customize the functionality of the Power Automate widget.

JavaScript

```
flowsSettings?: {
  createFromBlankTemplateId?: string;
  flowsFilter?: string;
```

```
tab?: string;
};
```

[Expand table](#)

Parameter	Required/Optional	Description
<code>createFromBlankTemplateId</code>	Required	Use the template's GUID when the user selects the <b>Create from blank</b> button on the Flow widget
<code>flowsFilter</code>	Optional	The Power Automate widget applies the provided filter when listing flows. For example, show flows that reference a specific SharePoint site. <code>flowsFilter: "operations/any(operation: operation/sharepoint.site eq 'https://microsoft.sharepoint.com/teams/ProcessSimple' )"</code>
<code>tab</code>	Optional	Defaults the active tab to show in the Power Automate widget. For example, <code>tab: 'sharedFlows'</code> displays the Team tab and <code>tab: 'myFlows'</code> Displays the My flows tab.

## TemplatesSettings

This applies to all widgets that enable you to create flows from a template, including Flows, FlowCreation, and Templates widgets.

JavaScript

```
templatesSettings?: {
  defaultParams?: any;
  destination?: string;
  pageSize?: number;
  searchTerm?: string;
  templateCategory?: string;
  useServerSideProvisioning?: boolean;
  enableDietDesigner?: boolean;
};
```

[Expand table](#)

Parameter	Required/Optional	Description
<code>defaultParams</code>	Optional	Design time parameters to use when creating a cloud flow from a template, for example: <code>defaultParams: { 'parameters.sharepoint.site': 'https://microsoft.sharepoint.com/teams/ProcessSimple', 'parameters.sharepoint.list': 'b3a5baa8-fe94-44ca-a6f0-270d9f821668' }</code>
<code>destination</code>	Optional	Valid values are 'new' or 'details'. When set to 'details', a detail page is shown when creating a cloud flow from a template.
<code>pageSize</code>	Optional	Number of templates to display. Default size = 6
<code>searchTerm</code>	Optional	Display templates that match the provided search term
<code>templateCategory</code>	Optional	Display templates in a specific category

## ApprovalCenterSettings

Applies to ApprovalCenter widgets.

JavaScript

```
approvalCenterSettings?: {
  approvalsFilter?: string;
  tab?: string;but
  showSimpleEmptyPage? boolean;
  hideLink?: boolean
};
```

[Expand table](#)

Parameter	Required/Optional	Description
<code>hideLink</code>	Optional	When set to <code>true</code> , the widget hides the received and the sent approval links
<code>approvalsFilter</code>	Optional	The approval widget will apply the specified approval filter when listing the approvals, for example: The approval widget will apply the specified approval filter when listing the approvals, for example: <code>approvalsFilter: 'properties/itemlink eq \\'https://microsoft.sharepoint.com/teams/ProcessSimple/_layouts/15/listform.aspx?PageType=4&amp;ListId=737e30a6-5bc4-4e9c-bcdc-d34c5c57d938&amp;ID=3&amp;ContentTypeID=0x010010B708969A9C16408696FD23801531C6\\''</code> <code>approvalsFilter: 'properties/itemlinkencoded eq \\'{Your base64 encoded item link url} \\'</code>
<code>tab</code>	Optional	Default active tab to show in the Flow widget. Valid values : 'receivedApprovals', 'sentApprovals'
<code>showSimpleEmptyPage</code>	Optional	Shows an empty page when there are no approvals
<code>hideInfoPaneCloseButton</code>	Optional	Hides the info-pane Close button (or the host already has a Close button)

## Widget events

The Power Automate widget supports events that let the host listen to widget life-cycle events. The Power Automate widget supports two types of events: one-way notification events (for example, `Widget_Ready`) and events raised from the widget to fetch data from the host (`Get_Access_Token`). The host needs to use the `widget.listen()` method to listen to specific events raised from the widget.

## Usage

JavaScript

```
widget.listen("<WIDGET_EVENT>", function() {
  console.log("The flow widget raised event");
});
```

## Supported events by widget type

[Expand table](#)

Widget event	Details
<code>WIDGET_READY</code>	Widget loaded successfully



Widget event	Details
WIDGET_RENDERED	Widget loaded and UI rendering is complete
GET_ACCESS_TOKEN	Widget request for embed user-access token
GET_STRINGS	Allows host to override a set of UI strings shown in the widget

## Runtime widget

[Expand table](#)

Widget event	Details	Data
RUN_FLOW_STARTED	Triggered and the flow run was started	
RUN_FLOW_COMPLETED	Flow run triggered successfully	
RUN_FLOW_DONE_BUTTON_CLICKED	User selected Done button on flow run	
RUN_FLOW_CANCEL_BUTTON_CLICKED	User selected Cancel button on flow run	
FLOW_CREATION_SUCCEEDED	The flow was created successfully	<code>{ flowUrl: string, flowId: string, fromTemplate: string }</code>
WIDGET_CLOSE	Fired when the host should close the widget	

## Flow Creation widget

[Expand table](#)

Widget event	Details	Data
FLOW_CREATION_FAILED	Flow creation failed	
WIDGET_CLOSE	Fired when host should close the widget	
TEMPLATE_LOAD_FAILED	The template failed to load	
FLOW_CREATION_SUCCEEDED	The flow was created successfully	<code>{ flowUrl: string, flowId: string, fromTemplate?: string }</code>

## Approval widget

[Expand table](#)

Widget event	Details
RECEIVED_APPROVAL_STATUS_CHANGED	Received approval status changed
SENT_APPROVAL_STATUS_CHANGED	Sent approval status changed

GET\_STRINGS event lets you customize text for some of the UI elements shown in the widget. The following strings can be customized:

[Expand table](#)

String key	Use in the widget
FLOW_CREATION_CREATE_BUTTON	Text displayed on the create flow button in both flow creation and runtime widget
FLOW_CREATION_CUSTOM_FLOW_NAME	The initial value to use for the flow name in the flow creation widget. Only used when the allowCustomFlowName setting is enabled.
FLOW_CREATION_HEADER	Header to use when creating a cloud flow in both the flow creation and runtime widget
INVOKE_FLOW_HEADER	Header to use when invoking a cloud flow in the runtime widget
INVOKE_FLOW_RUN_FLOW_BUTTON	Text displayed on the button used to invoke/run a cloud flow in the runtime widget

## Example

Call `widgetDoneCallback` passing a JSON object with key-value pairs of string key and text to override the default value.

JavaScript

```
widget.listen("GET_STRINGS", function(requestParam, widgetDoneCallback) {
  widgetDoneCallback(null, {
    "FLOW_CREATION_HEADER": "<string override would go here>",
    "INVOKE_FLOW_RUN_FLOW_BUTTON": "<string override would go here>"
  });
});
```

## Widget actions

The host uses widget actions to send a specific action or message to the widget. Widget JS SDK provides the `notify()` method to send a message or a JSON payload to the widget. Each widget action supports a specific payload signature.

## Usage

JavaScript

```
widget.notify('<WIDGET_ACTION>', parameterMatchingParameterInterface)
  .then(result => console.log(result))
  .catch(error => console.log(error))
```

## Example

Invoke a cloud flow by sending the following command to a runtime widget

JavaScript


```
widget.notify('triggerFlow', { flowName: flowName, implicitData:implicitData });
```

## Runtime widget

 Expand table

Widget action	Details	Parameter interface
<code>triggerFlow</code>	Triggers a cloud flow run	<code>{ flowName: string, implicitData?: string }</code>
<code>triggerFlowByTemplate</code>	Triggers a cloud flow run by template	<code>{ templateId: string, implicitData?: string, designTimeParameters?: Record&lt;string, any&gt; }</code>
<code>getTriggerSchema</code>	Gets trigger schema for a cloud flow	<code>{ flowName: string, }</code>
<code>closeWidget</code>	Cancels any pending activity and raises a WIDGET_CLOSE event	

## Flow Creation widget

 Expand table

Widget action	Details	Parameter interface
<code>createFlowFromTemplate</code>	Creates a cloud flow for the selected template	<code>{ templateName: string, designTimeParameters?: Record&lt;string, any&gt; }</code>
<code>createFlowFromTemplateDefinition</code>	Creates a cloud flow for the selected template definition	<code>{ templateDefinition: string }</code>
<code>closeWidget</code>	Cancels any pending activity and raises a WIDGET_CLOSE event	

## Approval widget

 Expand table

Widget action	Details	Parameter interface
<code>closeInfoPane</code>	Closes the info-pane displaying approval details	N/A

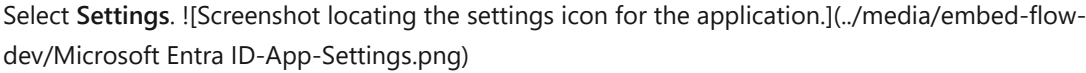
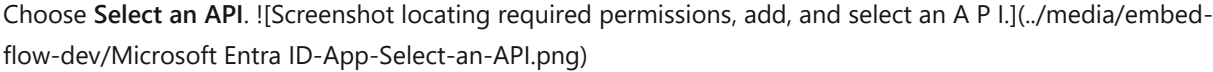

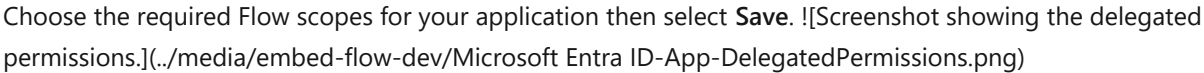
## Configuring your client application

You will need to configure your client application with Flow Service Scopes (Delegated Permissions). If the Microsoft Entra (Microsoft Entra ID) app used for the widget integration uses a 'code grant' authorization flow, the Microsoft Entra app needs to be preconfigured with delegated permissions that are supported by Power Automate. This provides delegated permissions that let the application:

- Manage approvals
- Read approvals
- Read activities
- Manage flows
- Read flows

Follow these steps to select one or more delegated permissions:

1. Go to <https://portal.azure.com>


2. Select **Microsoft Entra ID**.
3. Select **App registrations** under **Manage**.
4. Enter the third-party application to be configured for Flow service scopes.
5. Select **Settings**.  (../media/embed-flow-dev/Microsoft Entra ID-App-Settings.png)
6. Select **Required permissions** under **API access**.
7. Select **Add**.
8. Choose **Select an API**.  (../media/embed-flow-dev/Microsoft Entra ID-App-Select-an-API.png)
9. Search for **Power Automate service** and select it. Note: Before you can see Power Automate service, your tenant needs to have at least one Microsoft Entra user signed into the Flow portal (<https://make.powerautomate.com> )
10. Choose the required Flow scopes for your application then select **Save**.  (../media/embed-flow-dev/Microsoft Entra ID-App-DelegatedPermissions.png)

Your application will now get a Flow Service token that contains delegated permissions in the 'scp' claim in the JWT token.

## Sample application embedding flow widgets

A sample JavaScript Single Page Application (SPA) is provided in the resources section so you can experiment with embedding flow widgets in a host page. Using the sample application requires registering a Microsoft Entra application with implicit grant flow enabled.

## Registering a Microsoft Entra app

1. Sign in to the [Azure portal](#) .
2. In the left navigation pane, select **Microsoft Entra**, then select **App registrations** (Preview) > **New registration**.
3. When the **Register an application** page appears, enter a name for your application.
4. Under **Supported account types**, select **Accounts** in any organizational directory.
5. Under the **Redirect URL** section, select the web platform and set the value to the application's URL based on your web server. Configure this value to `http://localhost:30662/` to run the sample app.
6. Select **Register**.
7. On the app **Overview** page, note the application (client) ID value.
8. The sample requires [implicit grant flow](#) to be enabled. In the left navigation pane of the registered application, select **Authentication**.
9. In **Advanced settings**, under **Implicit grant**, enable both **ID tokens** and **Access tokens** checkboxes. ID tokens and access tokens are required since this app needs to sign in users and call Flow API.
10. Select **Save**.

## Running the sample

1. Download the sample and copy it to a local folder on your device.
2. Open the index.html file under the FlowSDKSample folder and modify the `applicationConfig` to update the `clientId` to the application ID you registered earlier.

```
var applicationConfig = {
  ... clientId: '<Client ID>' //This is your client ID
  ... authority: "https://login.microsoftonline.com/common", //Default authority value is https://login.microsoftonline.com/common
  ... flowScopes: ["https://service.flow.microsoft.com//Flows.Read.All", "https://service.flow.microsoft.com//Flows.Manage.All"],
};
```

3. The sample app is configured to use Flow scopes **Flows.Read.All** and **Flow.Manage.All**. You can configure additional scopes by updating the `flowScopes` property in `applicationConfig` object.

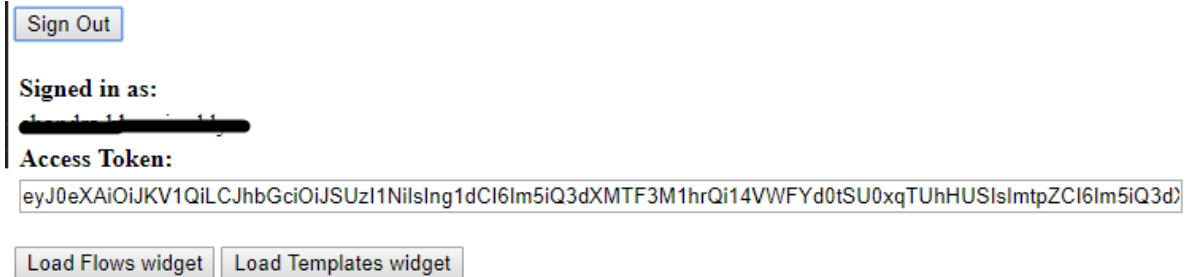
4. Run these commands to install the dependency and run the sample app:

```
> npm install > node server.js
```

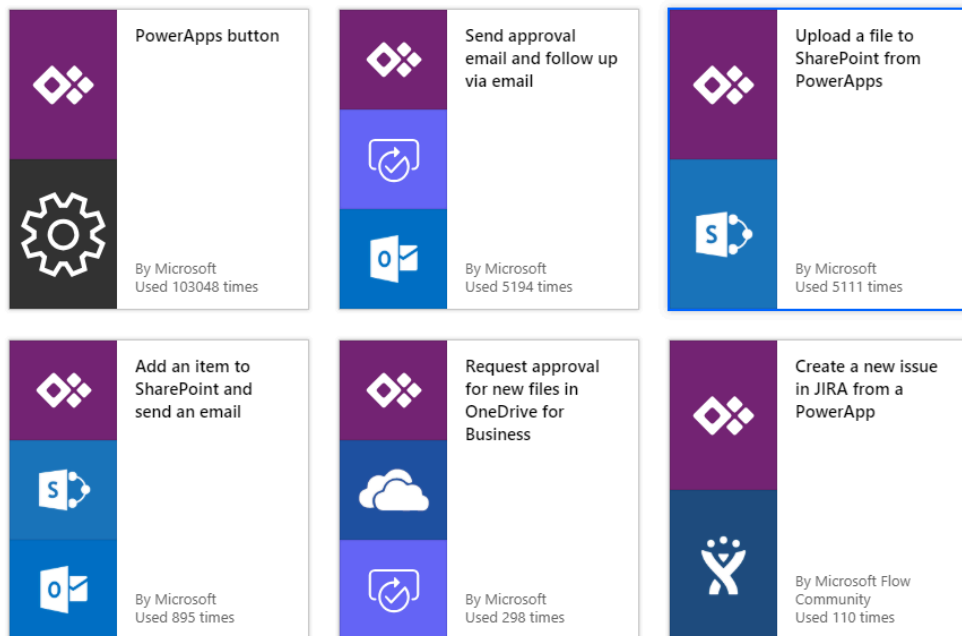
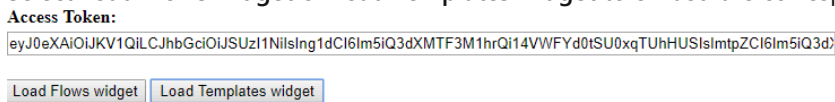
5. Open the browser and then enter <http://localhost:30662>

6. Select the **Sign in** button to authenticate to Microsoft Entra and acquire a cloud flow access token.

7. The **Access Token** text box contains the access token.



8. Select **Load Flows widget** or **Load Templates widget** to embed the corresponding widgets.



[See more templates](#)

Sample application [download link](#).

## Resources

### Widget test pages

Find out more about widget integration and settings:

- Templates widget: <<https://make.powerautomate.com/test/templateswidget/>>
- FlowCreation widget: <<https://make.powerautomate.com/test/flowcreationwidget/>>
- Runtime widget: <<https://make.powerautomate.com/test/runtimewidget/>>
- Approvals center widget: <<https://make.powerautomate.com/test/approvalcenterwidget/>>
- Flows widget: <<https://make.powerautomate.com/test/managewidget/>>

# Supported widget locales

If the initialized locale isn't listed, Flow will default to the closest supported locale.

[Expand table](#)

Locale	Language
bg-bg	Bulgarian (Bulgaria)
ca-es	Catalan (Catalan)
cs-cz	Czech (Czech Republic)
da-dk	Danish (Denmark)
de-de	German (Germany)
el-gr	Greek (Greece)
en-US	English (United States)
es-es	Spanish (Castilian)
et-ee	Estonian (Estonia)
eu-es	Basque (Basque)
fi-fi	Finnish (Finland)
fr-fr	French (France)
gl-es	Galician (Galician)
hi-HU	Hungarian (Hungary)
hi-in	Hindi (India)
hr-hr	Croatian (Croatia)
id-id	Indonesian (Indonesia)
it-it	Italian (Italy)
jp-Jp	Japanese (Japan)
kk-kz	Kazakh (Kazakhstan)
ko-kr	Korean (Korea)
lt-LT	Lithuanian (Lithuania)
lv-lv	Latvian (Latvia)
ms-my	Malay (Malaysia)
nb-no	Norwegian (Bokmål)
nl-nl	Dutch (Netherlands)
pl-pl	Polish (Poland)
pt-br	Portuguese (Brazil)
pt-pt	Portuguese (Portugal)
ro-ro	Romanian (Romania)

Locale	Language
ru-ru	Russian (Russia)
sk-sk	Slovak (Slovakia)
sl-si	Slovenian (Slovenia)
sr-cyrl-rs	Serbian (Cyrillic, Serbia)
sr-latn-rs	Serbian (Latin, Serbia)
sv-se	Swedish (Sweden)
th-th	Thai (Thailand)
tr-tr	Turkish (Türkiye)
uk-ua	Ukrainian (Ukraine)
vi-vn	Vietnamese (Viet Nam)

Use of the Power Automate Embed SDK is covered under [the Microsoft Software License Terms](#).

---

## Feedback

Was this page helpful?



[Provide product feedback](#)

# Let customers test drive your flows on AppSource

Article • 10/30/2023

Do you want to show off how your app integrates with Power Automate? We now Test Drive solutions on [AppSource.com](https://appsource.com) as a way for you to share Power Automate integration with customers, and generate leads for your business.

## What is a Test Drive solution?

A Test Drive solution enables your customers to try out a real app without installing any applications. Customers just sign into AppSource.com using their Microsoft Entra ID (Microsoft Entra ID) account and run the app in a web browser. Without Test Drive, customers can only read about your app or watch a video that describes it. With Test Drive, customers get a better idea of what your solution is and what functionality your app has. And they have the experience of actually using the app. Customers won't be able to look under the hood to see how your app is built, so your intellectual property is protected. We collect and share lead information with you to help you grow your business.

## How do I build a Test Drive solution?

Building an app for a Test Drive solution is just like building any app, but you need to use a data source that the user can be granted access to as a read-only user. Using a data source that's already set up will mean there is zero friction for them to try it out. The full solution that you ultimately distribute to customers will include writable data, but read-only data works well for a Test Drive solution.

## Embed flow into your product

Once you have a data source that you can grant the user read-only access to, you can embed Power Automate into your application. [Read more about embedding here](#). You will likely want to use the search functionality to highlight templates that are unique to your application. For example, if your application creates data in Dynamics 365, you can highlight a Dynamics 365 template that pulls data and then sends an email to the user.



# How do I list my Test Drive solution on AppSource.com?

Now that your app is ready, it's time to publish it to AppSource.com. In order to start this process, please complete the [application form](#). Once you apply you will receive an email with instructions on how to submit your app to be published on AppSource.com.

# Work with business process flows using code

Article • 12/16/2022

A *business process flow* lets you create more efficient and streamlined sales, service, and other business processes. It creates a visualization of your business process by placing special controls at the top of the table forms. Users are guided through various stages of sales, marketing, or service processes towards completion. Each process supports multiple stages and steps. You can add or remove steps, change the order of stages, or add new tables to the business process flow.

Different business process flow instances can run concurrently against the same table row. Users can switch between concurrent business process instances, and resume their work at a current stage in the process.

This topic provides information about how you can programmatically work with business process flows.

## ⓘ Note

You don't have to write code to work with business process flows. For information about using the UI to create and manage business process flows, see [Business Process Flows overview](#)

## Prerequisites for business process flow

Custom tables and tables that have updated UI forms can participate in the business process flow. The updated UI tables have the `IsAIRUpdated` property set to `true`.

To enable a table for the business process flow, set the `IsBusinessProcessEnabled` property to `true`.

## ⓘ Important

Enabling a table for business process flow is a one way process. You can't reverse it.

## Define business process flow

Use the visual business process flow designer to define a business process flow. More information: [Create a business process flow](#)

By default, a business process flow row is created in the `Draft` state.

A business process flow definition is stored in the `workflow` table, and the stage information for the business process flow is stored in the `processtage` table.

## Activate business process flow

Before you can use the process flow, you have to activate it. To activate it, you must have the `prvActivateBusinessProcessFlow` privilege for the `Workflow` table. Use the `UpdateRequest` message to set the state of the `Workflow` table row to `Activated`. More information: [Perform specialized operations using Update](#)

### ⓘ Note

You can also use the business process flow designer to activate a business process flow.

## Business process flow table

Once you activate a business process flow definition by changing the state of the corresponding `Workflow` table row or by using the business process flow designer, a custom table with the following name is automatically created to store the activated business process flow instances: "`<activesolutionprefix>_<uniquename>`", where the `uniquename` is derived from the name you specify.

For example, if you specified "My Custom BPF" as the name of the business process flow definition and are using the default publisher (new) for your active solution, the name of the custom table created for storing process instances will be "new\_mycustombpf".

If the `uniquename` value isn't available for a business process flow definition, for example if the business process flow was imported as part of solution from an earlier version, the default name of the custom table will be "`\`

`<activesolutionprefix>_bpf_<GUID_BPF_Definition>`:

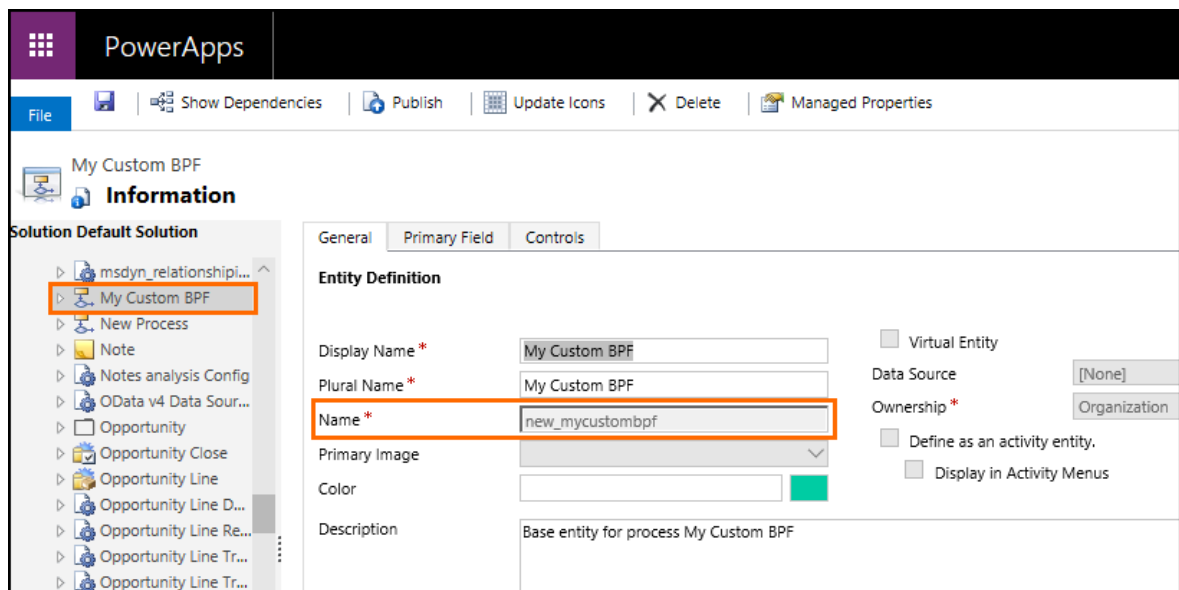
### ⓘ Important

The sample business process flow rows use system tables to store the corresponding business process flow instance rows.

However, any new business process flow definitions you create will use custom tables to store its instance rows as explained earlier.

You can retrieve the name of your business process flow table using any of the following ways:

- **Using the UI:** Use the customization UI to browse to your business process flow table:



- **Using the Web API:** Use the following request:

### Request

```
GET [Organization URI]/api/data/v9.0/workflows?$filter=name eq 'My Custom BPF'&$select=uniquename HTTP/1.1
```

### Response

```
{
  "@odata.context": "[Organization URI]/api/data/v9.0/$metadata#workflows(uniquename)",
  "value": [
    {
      "@odata.etag": "W/\"1084677\"",
      "uniquename": "new_mycustombpf",
      "workflowid": "2669927e-8ad6-4f95-8a9a-f1008af6956f"
    }
  ]
}
```

```
    }  
  ]  
}
```

- **Using the Organization service:** Use the following code sample:

```
c#  
  
QueryExpression query = new QueryExpression  
{  
    EntityName = "workflow",  
    ColumnSet = new ColumnSet("uniquename"),  
    Criteria = new FilterExpression  
    {  
        Conditions =  
        {  
            new ConditionExpression  
            {  
                ColumnName = "name",  
                Operator = ConditionOperator.Equal,  
                Values = { "My Custom BPF" }  
            }  
        }  
    }  
};  
Workflow Bpf =  
(Workflow)_serviceProxy.RetrieveMultiple(query).Entities[0];
```

### ⓘ Note

The `IsBPFEntity` property is `true` for business process flow tables. You can retrieve all the business process flow tables in your instance by running the following Web API request:

HTTP

```
GET [Organization URI]/api/data/v9.0/EntityDefinitions?  
$select=SchemaName,LogicalName,DisplayName&$filter=IsBPFEntity eq true  
HTTP/1.1
```

## Manage security for business process flows

The custom table that is automatically created on activating a business process flow to store business process flow instances adheres to the standard security model as for any

other custom table in Microsoft Dataverse. This implies that privileges granted on these tables define the runtime permissions for users for business process flows.

The custom business process flow table has organization scope. The regular create, retrieve, update and delete privileges on this table define the permission users would have based on their assigned roles. By default, when the business process flow custom table is created, only **System Administrator** and **System Customizer** security roles are granted access to it, and you must explicitly grant permissions to the new business process flow table (for example, **My Custom BPF**) for other security roles as required.

Entity	Create	Read	Write	Delete	Append	Append To	Assign	Share
Expired Process	●	●	●	●	●	●		
Lead To Opportunity Sales Process	●	●	●	●	●	●		
Purchase Order Business Process	○	○	○	○	○	○		
Project Stages	○	○	○	○	○	○		
Case to Work Order Business Process	○	○	○	○	○	○		
Agreement Business Process	○	○	○	○	○	○		
Work Order Business Process	○	○	○	○	○	○		
Invoice Process	○	○	○	○	○	○		
<b>My Custom BPF</b>	○	○	○	○	○	○		
New Process	●	●	●	●	●	●		
Opportunity Sales Process	●	●	●	●	●	●		
Phone To Case Process	●	●	●	●	●	●		
Translation Process	●	●	●	●	●	●		

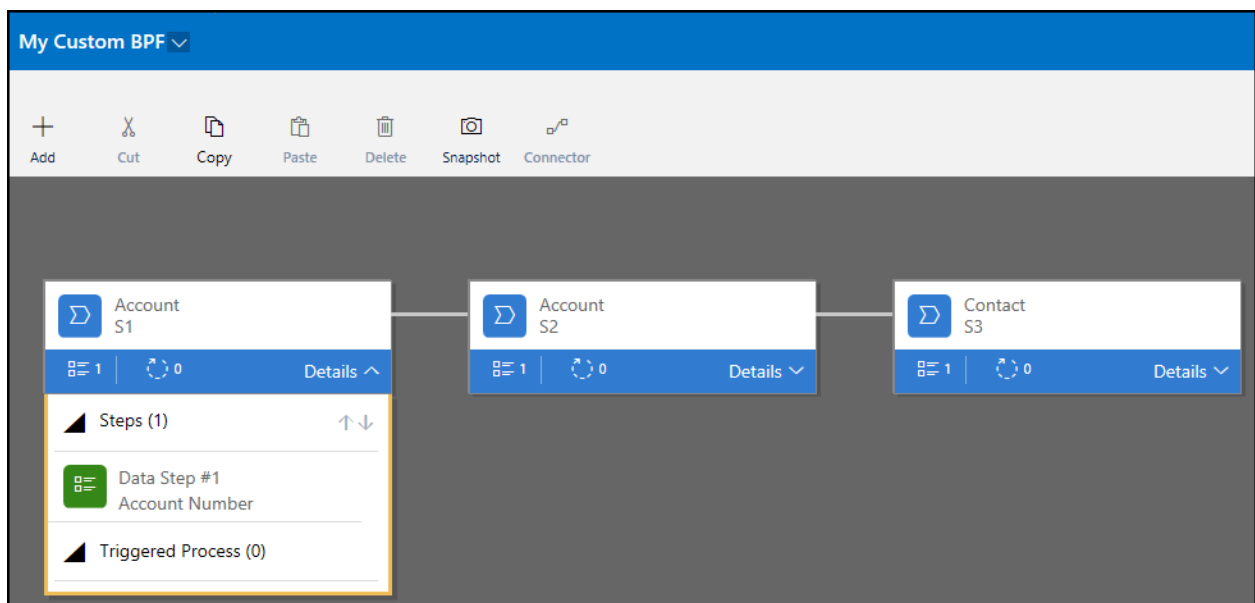
## Create, retrieve, update, and delete business process flow table rows (process instances)

The custom table that is automatically created on activating a business process flow definition stores all the process instances for the business process flow definition. The custom table supports the standard programmatic creation and management of rows (process instances) using Web API and CRM 2011 endpoint.

### **i** Important

Switching to another process instance for a table row is only supported through UI (client) or programmatically using information available in this section. You can no longer use the `SetProcess` message (**SetProcess Action** or **SetProcessRequest**) to programmatically switch processes (set another business process flow as the active process instance) for the target table row.

Lets consider the following example where we have a cross-table business process flow, "My Custom BPF," with 3 stages: S1:Account, S2:Account, and S3:Contact.



## Retrieve all the rows (instances) for a business process flow table

If the name of your business process flow table is "new\_mycustombpf", use the following query to retrieve all the rows (process instances) for your business process flow table:

HTTP

```
GET [Organization URI]/api/data/v9.0/new_mycustombpf HTTP/1.1
```

At this point, you might not get any instances in your response as there are none. Run this request after creating an instance of your business process flow definition later in this topic.

### ⓘ Note

To know how to retrieve the name of your business process flow table, see the earlier section, [Business process flow table](#).

## Create a business process flow table row (process instance)

Create a business process flow table row (process instance) programmatically if you want to switch to another business process flow for a table row without using the UI.

To create a business process flow table row, you need to specify the following values:

- Associate the business process flow table row to a primary table row by setting the single-valued navigation property using the `@odata.bind` annotation. To find out the navigation-property name that points to the primary table row for your business process flow definition, use the [CSDL \\$metadata document](#).
- Associate the business process flow table row to a valid stage specified in the business process flow definition by setting the single-valued navigation property using the `@odata.bind` annotation. To find out the navigation-property name (typically `activestageid`) that points to the stage row for your business process flow definition, use the [CSDL \\$metadata document](#).

Also, you can retrieve information about all the stages for a business process flow definition by using the following Web API request assuming that the ID of your business process flow definition is 2669927e-8ad6-4f95-8a9a-f1008af6956f:

### Request

```
HTTP

GET [Organization URI]/api/data/v9.0/processstages?
$select=stagename&$filter=processid/workflowid eq 2669927e-8ad6-4f95-
8a9a-f1008af6956f HTTP/1.1
```

### Response

```
HTTP

{
  "@odata.context": "[Organization
URI]/api/data/v9.0/$metadata#processstages(stagename)",
  "value": [
    {
      "@odata.etag": "W/\"858240\"",
      "stagename": "S1",
      "processstageid": "9a9185f5-b75b-4bbb-9c2b-a6626683b99b"
    },
    {
      "@odata.etag": "W/\"858239\"",
      "stagename": "S3",
      "processstageid": "a107e2fd-7543-4c1a-b6b4-b8060ecb1a1a"
    },
    {
      "@odata.etag": "W/\"858238\"",
      "stagename": "S2",
      "processstageid": "19a11fc0-3398-4214-8522-cb2a97f66e4b"
    }
  ]
}
```



```
]
}
```

Next, use the following request to create an instance of your business process flow definition for an account row (ID=a176be9e-9a68-e711-80e7-00155d41e206) and the active stage set as the first stage of the process instance, S1 (ID=9a9185f5-b75b-4bbb-9c2b-a6626683b99b):

## Request

HTTP

```
POST [Organization URI]/api/data/v9.0/new_mycustombpfs HTTP/1.1
Content-Type: application/json; charset=utf-8
OData-MaxVersion: 4.0
OData-Version: 4.0
Accept: application/json

{
  "bpf_accountid@odata.bind": "/accounts(a176be9e-9a68-e711-80e7-00155d41e206)",
  "activestageid@odata.bind": "/processstages(9a9185f5-b75b-4bbb-9c2b-a6626683b99b)"
}
```

## Response

HTTP

```
HTTP/1.1 204 No Content
OData-Version: 4.0
OData-EntityId: [Organization URI]/api/data/v9.0/new_mycustombpfs(cc3f721b-026e-e811-80ff-00155d513100)
```

Note that if you want to create an instance of your business process flow definition with the active stage set as a stage *other* than the first stage, you must also provide `traversedpath` in your request. Traversed path is the comma-delimited string of process stage ids that represent visited stages of the business process flow instance. The following request creates an instance for an account row (ID=679b2464-71b5-e711-80f5-00155d513100) and active stage set as the second stage, S2 (ID=19a11fc0-3398-4214-8522-cb2a97f66e4b).

HTTP

```
POST [Organization URI]/api/data/v9.0/new_mycustombpfs HTTP/1.1
Content-Type: application/json; charset=utf-8
OData-MaxVersion: 4.0
```

```
OData-Version: 4.0
Accept: application/json
```

```
{
  "bpf_accountid@odata.bind": "/accounts(679b2464-71b5-e711-80f5-00155d513100)",
  "activestageid@odata.bind": "/processstages(19a11fc0-3398-4214-8522-cb2a97f66e4b)",
  "traversedpath": "9a9185f5-b75b-4bbb-9c2b-a6626683b99b,19a11fc0-3398-4214-8522-cb2a97f66e4b"
}
```

## Update a business process flow table row (process instance)

You can update a process instance to move to next or previous stage, abandon a process instance, reactivate a process instance, or finish a process instance.

### Stage navigation

To navigate to a different stage, you need to update a process instance row to change its active stage ID and accordingly update the traversed path. Note that you must only move to the next or previous stage while updating a business process flow instance.

To perform stage navigation, you will need the ID of the business process flow instance that you want to update. To retrieve all the instances of your business process flow, see [Retrieve all the rows \(instances\) for a business process flow table](#) earlier.

Assuming the ID of the process instance you want to update is dc2ab599-306d-e811-80ff-00155d513100, use the following request to update the active stage from S1 to S2:

```
HTTP
```

```
PATCH [Organization URI]/api/data/v9.0/new_mycustombpfes(dc2ab599-306d-e811-80ff-00155d513100) HTTP/1.1
```

```
Content-Type: application/json
```

```
OData-MaxVersion: 4.0
```

```
OData-Version: 4.0
```

```
{
  "activestageid@odata.bind": "/processstages(19a11fc0-3398-4214-8522-cb2a97f66e4b)",
  "traversedpath": "9a9185f5-b75b-4bbb-9c2b-a6626683b99b,19a11fc0-3398-4214-8522-cb2a97f66e4b"
}
```

## Change the state of a process instance: Abort, Reactivate, or Finish

A process instance can have one of the following states: **Active**, **Finished**, or **Aborted**. The state is determined by the following columns on the process instance row:

- **statecode**: Displays the status of the process instance.

 Expand table

Value	Label
0	Active
1	Inactive

- **statuscode**: Displays information about status of the process instance.

 Expand table

Value	Label
1	Active
2	Finished
3	Aborted

So, to **Abort** a process instance, use the following request set the `statecode` and `statuscode` values appropriately:

HTTP

```
PATCH [Organization URI]/api/data/v9.0/new_mycustombpfes(dc2ab599-306d-e811-80ff-00155d513100) HTTP/1.1
Content-Type: application/json
OData-MaxVersion: 4.0
OData-Version: 4.0

{
  "statecode" : "1",
  "statuscode": "3"
}
```

### Note

You can abort a process instance at any stage.

Similarly, to reactivate a process instance, replace the `statecode` and `statuscode` values in the above code with `0` and `1` respectively.

Finally, to set a process instance status as **Finished**, which is only possible at the last stage of a process instance, replace the `statecode` and `statuscode` values in the above code with `0` and `2` respectively.

## Cross-table navigation

For cross-table navigation in this example, you must set the active stage of the process instance to the last stage, S3 (ID=a107e2fd-7543-4c1a-b6b4-b8060ecb1a1a), update the traversed path accordingly, and set a contact row as the primary table row as per the business process flow definition.

HTTP

```
PATCH [Organization URI]/api/data/v9.0/new_mycustombpfes(dc2ab599-306d-e811-80ff-00155d513100) HTTP/1.1
Content-Type: application/json
OData-MaxVersion: 4.0
OData-Version: 4.0

{
  "activestageid@odata.bind": "/processstages(a107e2fd-7543-4c1a-b6b4-b8060ecb1a1a)",
  "traversedpath": "9a9185f5-b75b-4bbb-9c2b-a6626683b99b,19a11fc0-3398-4214-8522-cb2a97f66e4b,a107e2fd-7543-4c1a-b6b4-b8060ecb1a1a",
  "bpf_contactid@odata.bind": "/contacts(0e3f10b0-da33-e811-80fc-00155d513100)"
}
```

## Delete a business process flow table row (process instance)

Use the following Web API request:

### Request

HTTP

```
DELETE [Organization URI]/api/data/v9.0/new_mycustombpfes(dc2ab599-306d-e811-80ff-00155d513100) HTTP/1.1
```

### Response

If the row exists, you'll get a normal response with status 204 to indicate the delete was successful. If the table isn't found, you'll get a response with status 404.

## Use RetrieveProcessInstances and RetrieveActivePath messages

Use the `RetrieveProcessInstances` message ([RetrieveActivePath Function](#) or [RetrieveProcessInstancesRequest](#)) to retrieve all the business process flow instances for a table row across all business process definitions. The business process flow instances returned for a table are ordered based on the `modifiedon` column for the instance. For example, the most recently modified business process flow instance will be the *first* row in the returned collection. The most recently modified business process flow instance is the one that is active on the UI for a table row.

Each business process flow instance row returned for a table row as a result of using the `RetrieveProcessInstances` message stores the ID of the active stage in the `processstageid` column that can be used to find the active stage, and then move to the previous or next stage. To do so, you first need to find the active path of a business process flow instance and the stages available in the process flow instance using the `RetrieveActivePath` message ([RetrieveActivePath Function](#) or [RetrieveActivePathRequest](#)).

Once you have the active stage and the active path information for a business process flow instance, you can use the information to move to a previous or next stage in the active path. Forward navigation of stages must be done in sequence, that is, you should only move forward to the next stage in the active path.

For the complete sample that code demonstrates the usage of these two methods and stage navigation using the [Organization service](#), see [Sample: Work with business process flows](#).

## Apply business process flow while creating a table row

This section provides information about the default behavior for applying business process flows automatically to new table rows created in Dataverse, and how you can override it to apply a business process flow of your choice for new table rows.

By default, for a table that has multiple business process flows defined for it, the system applies a business process flow to the new table row using the following multi-step

logic:

1. Identify all business process flows applicable to the new table row based on the **Workflow.PrimaryEntity** column of the business process flow definition rows.
2. Identify the business process flow definitions that the current user has access to. For information about how access to a business process flow is determined and managed, see [Manage security for business process flows](#) earlier in this topic.
3. All business process flow definitions in the system are subject to a global order per table. The order of the business process flow is stored in the **Workflow.ProcessOrder** column. The business process flow definitions for a table are sorted based on this order, and the one with the least order value is picked.
4. Finally, if the table row is created from a business app (app module), one more level of filtering is applied to pick the business process flow to be applied automatically to the new table row. When working in an app, users can access only relevant tables, business process flows, views and forms that they have access to by virtue of the security roles assigned to the business app.
  - If the business app does not contain any business process flow then business process flow is applied as explained until step 3.
  - If the business app has one or more business process flows then only the business process flows present in the app would be applicable. In this case, when the user is working within a business app context, the list of business process flows from step 3 are filtered further to the ones that are part of the business app that are present inside the app module, and are sorted based on the process order.
  - If no business process flow is available in a business app for the table or one that the user has access to then no business process flow is applied for the new table row.

You can override the default logic of business process flows getting applied automatically to new table rows. To do so, set the **ProcessId** column of the table to one of the following values while creating a new table row:

- Set to **Guid.Empty** to skip setting a business process flow for new table rows. You might want to do that if you are bulk creating table rows, but don't want business process flow to be applied to them.
- Set it to a specific business process flow table (as a table reference). In this case, the system will apply the specified business process flow instead of the default logic.

If you do not set a value for the **ProcessId** column while creating a new table row, the system will apply the default logic as explained earlier.

### ⓘ Note

Overriding the default logic of business process flows getting applied automatically to new table rows is only supported programmatically. You cannot do this using the UI.

## Legacy process-related columns in tables

The legacy process-related columns (such as **ProcessId**, **StageId**, and **TraversedPath**) on tables enabled for business process flows are already deprecated. Manipulating these legacy process related columns for target table rows does not guarantee consistency of the business process flow state, and is *not* a supported scenario. The recommended way is to use the columns of the business process flow table as explained earlier in the section [Create, retrieve, update, and delete business process flow table rows \(process instances\)](#)

The only exception to this is programmatically modifying the **ProcessId** column while creating a table row to override the default application of the business process flow to the new row as explained in the previous section: [Apply business process flow while creating a table row](#).

## Client-side programmability support for business process flows

There is a client-side object you can use to interact with business process flows in your form scripts. Business process flows trigger client-side events every time a process is either applied to a row, the stage is changed, or its status is changed to `Active`, `Finished`, or `Aborted`. More information: [formContext.data.process \(Client API reference\)](#)

## Maximum number of processes, stages, and steps

Per table, the default value for the maximum number of activated business process flows is 10. You can specify a different value by using the `Organization.MaximumActiveBusinessProcessFlowsAllowedPerEntity` column. However, if the value is greater than 10, you may see a decrease in your system's performance when you switch processes or open a row that has an assigned business process flow. This may be especially noticeable if processes span multiple tables.

The following settings aren't customizable:

- The maximum number of stages per table in the process is 30.
- The maximum number of steps in each stage is 30.
- The maximum number of tables that can participate in the process flow is 5.



# Sample: Work with business process flows

Article • 12/16/2022

This sample demonstrates how to programmatically work with business process flows such as retrieving the business process flow instances for a table row, retrieving active path for a business process flow instance and its process stages, and changing the active stage. For information about these concepts, see [Work with business process flows using code](#)

This sample is available to download from [Sample: Work with business process flows](#) ↗.

## Prerequisites

Before you can run the sample:

1. Have access to a Dataverse environment.
2. Have appropriate privileges on the Lead, Opportunity, and Workflow tables and business process flow definition table rows used in this sample.
3. Have Visual Studio 2015 or later to run the sample.
4. Have Internet connection to download the sample project and to restore the NuGet packages used in the sample project.

## What this sample does

1. Creates a sample Lead row. This automatically creates an instance of the "Lead To Opportunity Sales Process" business process flow for the Lead row.
2. Converts the Lead row to an Opportunity row.
3. Retrieves the business process flow instances associated with the "Opportunity" row using the `RetrieveProcessInstances` message. The first row in the returned collection is the active business process flow instance for the opportunity row, which is "Lead To Opportunity Sales Process" in this case.
4. Retrieves the active path and the process stages for the "Lead To Opportunity Sales Process" instance using the `RetrieveActivePath` message.

- Retrieves the currently active stage for the "Lead To Opportunity Sales Process" instance, and prompts the user whether to move to the next stage. On confirmation to move, sets the next stage in the active path as the active stage for the "Lead To Opportunity Sales Process" instance.
- Finally, prompts the user whether to delete the rows created during the sample run.

Here is the output of the sample:

```
Created a Lead: 'SDK Sample Record'.
Process instance automatically created for the new Lead record: 'Lead to Opportunity Sales Process'

Qualified Lead to create an Opportunity record.
Current active process instance for the Opportunity record: 'Lead to Opportunity Sales Process'

Retrieved stages in the active path of the process instance:
  Stage 1: qualify (StageId: f99b4d48-7aad-456e-864a-8e7d543f7495)
  Stage 2: develop (StageId: bfc9108c-8389-406b-9166-2c3298a2e41f)
  Stage 3: propose (StageId: 3a275c22-fc45-4e89-97fc-41e5ec578743)
  Stage 4: close (StageId: 7f5247fe-cfc3-42bc-aa77-b1d836d9b7c0)

Active stage for the process instance: 'develop' (StageID: bfc9108c-8389-406b-9166-2c3298a2e41f)

Do you want to move to the next stage (y/n):
y

Changed active stage for the process instance to: 'propose' (StageID: 3a275c22-fc45-4e89-97fc-41e5ec578743)

Do you want these entity records deleted? (y/n)
y
Entity records have been deleted.
Press <Enter> to exit.
```

## Run the sample

- [Download](#) the WorkWithBPF Visual Studio sample project, and extract it to a folder on your computer.
- Locate the `WorkWithBPF.sln` file in your extracted folder, and open it in Visual Studio.
- The sample project uses NuGet packages that must be restored before running the sample. Ensure that automatic restore of NuGet packages is enabled in Visual Studio. More information: [Enabling and disabling NuGet package restore](#)

Alternatively, select **Project > Manage NuGet Packages**, and select **Restore** to manually restore the packages used in the sample.

- Press F5 or select **Debug > Start Debugging**.
- If you have not previously run one of the samples before, you'll need to enter information to run the code, otherwise enter the number for one of the instances you have previously set up.

Prompt	Description
Enter a Dynamics 365 server name and port [crm.dynamics.com]	Type the name of your Dynamics 365 server. The default is Dynamics 365 (online) (crm.dynamics.com) in North America.  Example: crm5.dynamics.com
Is this organization provisioned in Microsoft online services (y/n) [n]	Type <b>y</b> if this is a Microsoft online services provisioned organization. Otherwise, type <b>n</b> .
Enter domain\username	Type your Microsoft account.
Enter password	Type your password. The characters will show as "*" in the window. Your password is securely saved in the Microsoft Credential Manager for later reuse.
Specify an organization number (1-n) [1]	From the list of organizations shown that you belong to, type the corresponding number. The default is 1, indicating the first organization in the list.

6. The sample will perform the operations described in [What this sample does](#) and may prompt you with additional options.
7. When the sample is complete, press ENTER to close the console window.

# Custom Dataverse workflow activities (workflow assemblies)

Article • 12/16/2022

Dataverse supports the registration and execution of custom workflow activities in addition to the out-of-box activities provided by [Windows Workflow Foundation](#).

Windows Workflow Foundation includes an activity library that provides activities for control flow, sending and receiving messages, doing work in parallel, and more.

However, to build applications that satisfy your business needs, you may need activities that perform tasks specific to that application. To make this possible, Windows Workflow Foundation supports the creation of custom workflow activities.

More information: [Create a workflow extension](#)

## Related topics

[Dataverse Developer Overview](#)

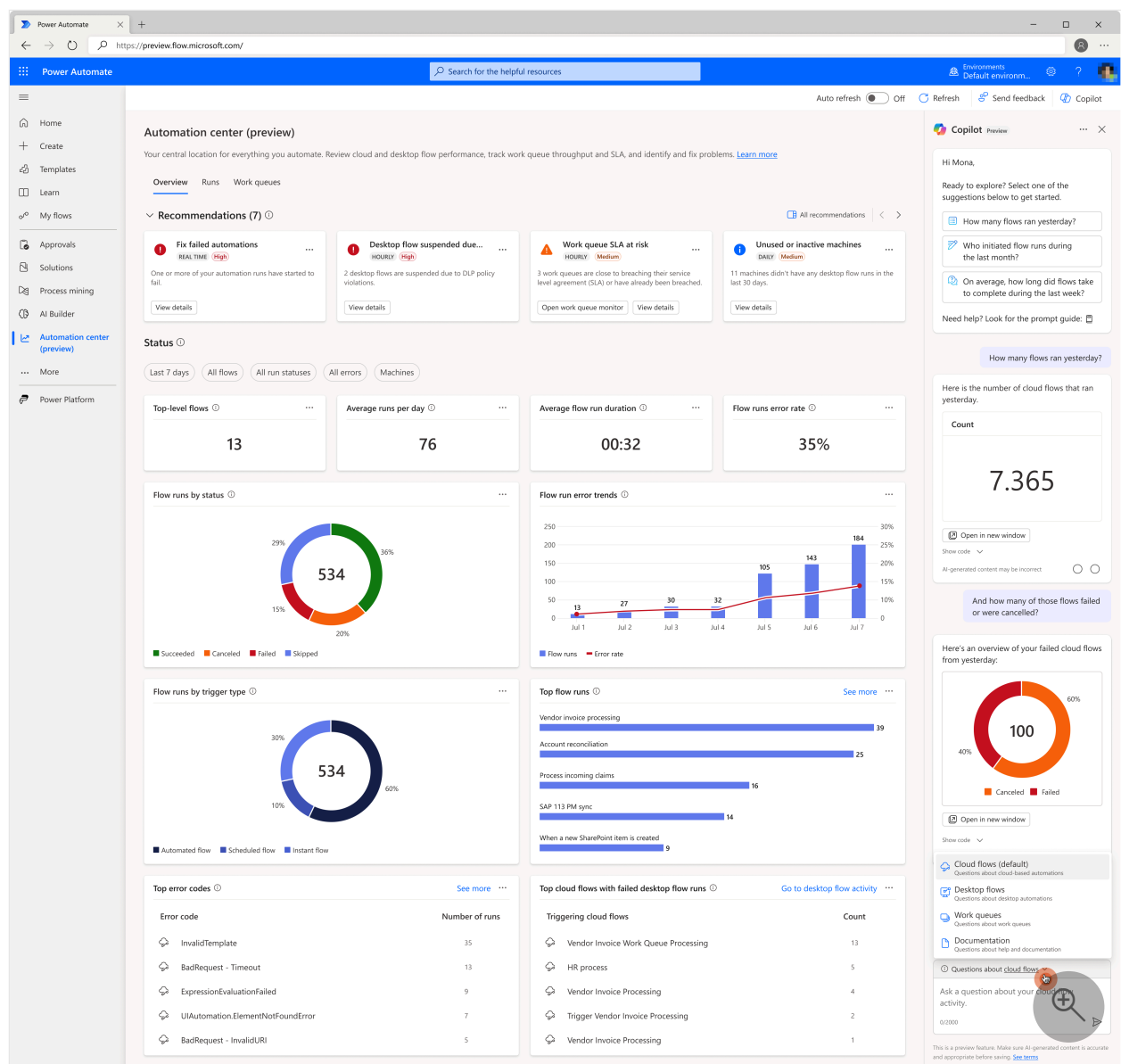
[Create a plug-in](#)

# Automation center (preview)

Article • 05/20/2024

[This article is prerelease documentation and is subject to change.]

The automation center provides comprehensive monitoring and troubleshooting experiences for your automation processes across Power Automate, catering to various personas involved in automation. Whether you're a maker, an operator, a Center of Excellence (CoE) team member, or a business analyst, the automation center serves as a centralized hub to monitor and manage automation activity within your environment. With its user friendly interface and dashboard, the automation center enables you to gain a holistic view of all automation related data, including recommendations, execution logs, performance metrics, and an integrated copilot.



**Important**

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

## Data and visualization strategy

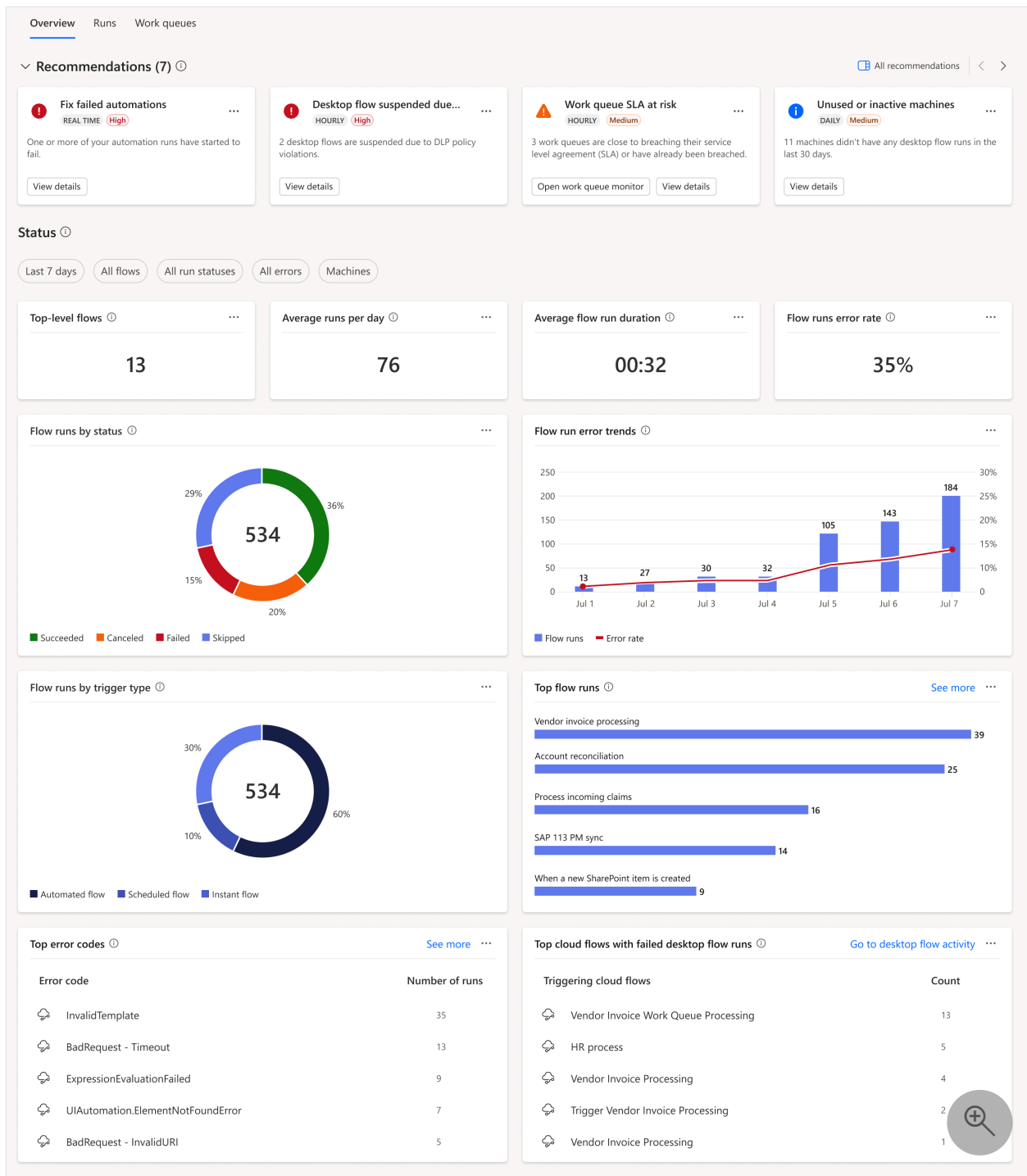
The information displayed on the [Overview](#) and [Runs](#) pages is based on cloud and desktop flow run data that is stored in Microsoft Dataverse. These pages are designed to provide you with a top-level view of your flow run activities, including first-level child cloud or desktop flow runs associated with a particular top-level flow. This approach enables you to monitor the entire automation from start to end. It allows you to determine whether the overall automation succeeded or failed, providing data on the total and average duration of the runs, among many other metrics.

### ⓘ Note

- Some filters may not be available for some tabs because of the nature of the presented data.
- Data under the **Work queues** tab and **Recommendations** are premium features, which require a Power Automate Premium license.
- When you navigate between tabs, the tab keeps the active filtering selection. Select **Clear filters** to reset the applied filters.
- Desktop flow related activities like desktop flow runs and work queues etc. have always been available in Dataverse, however cloud flow run history has only recently been introduced in Dataverse. [Learn more](#).
- Cloud flow run history shown on the overview and runs tab might take up to an hour to be available in Dataverse and the automation center.

## Overview tab

This tab provides an end-to-end automation health view within the environment and is based on top-level flow reporting. The [Recommendations](#) section of this tab provides actionable insights to your automation estate. You can prioritize and address the most important issues and recommendations, based on their potential impact.



[Expand table](#)

Visual	Description
Recommendations	List of automation health, compliance, best practice insights, and actionable recommendations.
Top-level flows	Number of top-level flows that had one or more runs based on selected filters. Gives an overall automation health indication and helps identify which top-level runs are failing the most.
Average runs per day	Average number of flow runs per day based on selected filters.
Average run duration	Average flow run duration based on selected filters.

Visual	Description
Flow runs error rate	Percentage of errors that occurred during flow execution based on selected filters.
Flow runs by status	Overview of top-level runs status, can be used as to correlate with other factors such as triggering type, run modes, or machines.
Flow runs error trends	Tracks usage and reliability trends of top-level runs over time.
Flow runs by trigger type	Shows top-level flow runs by trigger type.
Top flow runs	Quickly identify critical and regularly failing automations, in order to improve health, resiliency, and exception handling.
Top error codes	Identifies most common errors during flow runs.
Top cloud flows with failed desktop flow runs	Shows which cloud flows are causing the most desktop flow failures and might need to be modified to reduce desktop flow failures.

## Recommendations

The recommendations section offers both proactive and reactive insights, along with suggestions concerning various elements of your automation landscape. Suggestions might include addressing sudden automation failures, work queues at risk of not meeting their service level agreement (SLA) targets, and unused machines or machine groups in the environment. These recommendations can help you identify areas for improvement and take appropriate action based on their effect. For more information, see [automation center recommendations](#).

## Copilot

Copilot is designed to assist with the analysis of automation activity, work queue performance, and to provide answers to common questions about Power Automate capabilities (generative answers). For example, users can ask about the number of flows that ran yesterday, which queue items are put on hold, or how to analyze activity with Copilot. In response, Copilot generates outputs that provide insights and answers to the questions asked. For more information, see [Use Copilot to analyze automation activity and ask product questions](#).

### Important

- This capability is powered by [Azure OpenAI Service](#).



- Copilot is a new technology that is still being developed. It is optimized for use with English language and has limited support with other languages. As such, parts of it might appear in English rather than your preferred language.
- During initial preview, you must have an environment in the United States region to use this feature. If you don't have access to an environment that's based in the United States, you can ask your administrator to [create a new environment in Power Platform admin center and select United States](#) as its region.
- Read the [responsible AI FAQs for Copilot in automation center \(preview\)](#) to learn more about this new copilot experience.

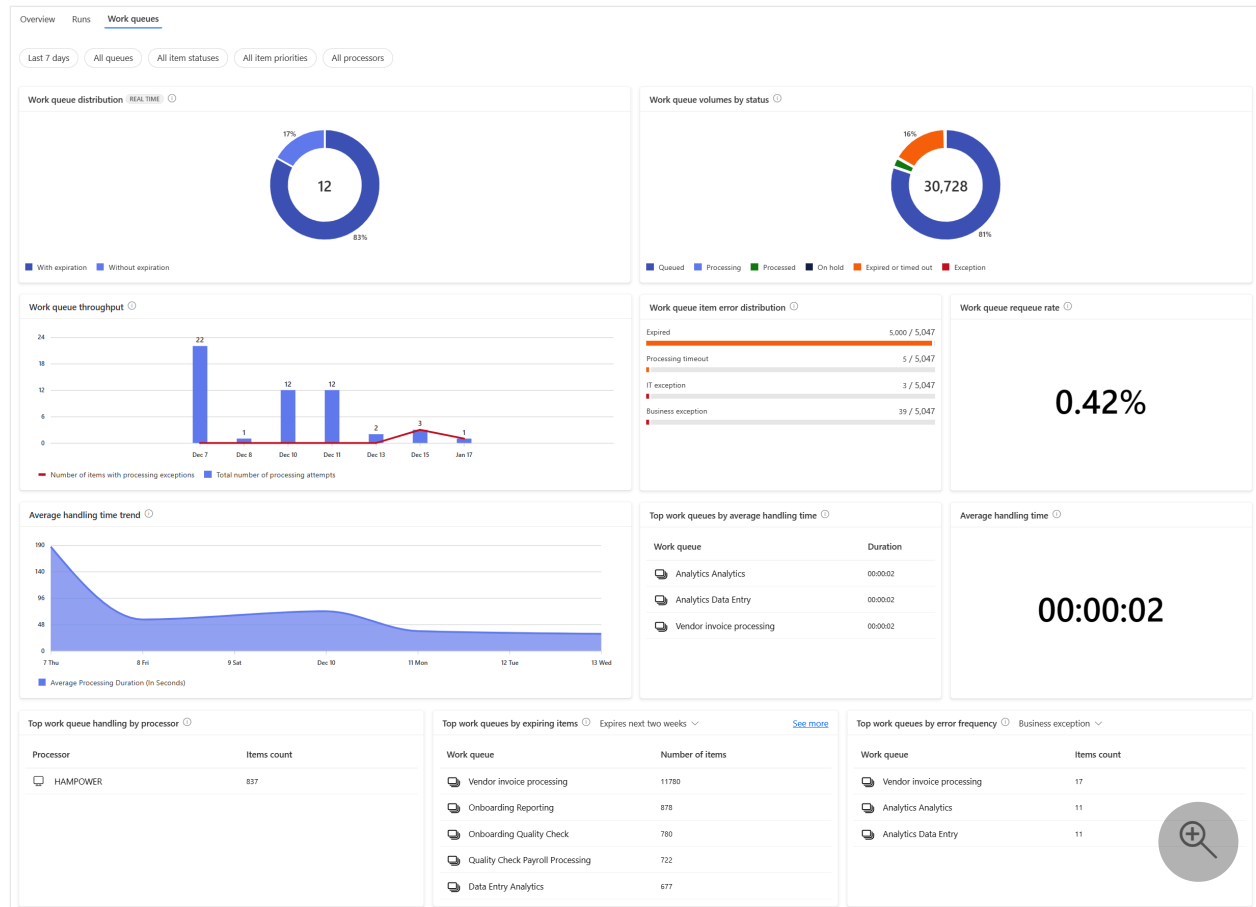
## Runs tab

This tab presents a consolidated view of cloud and desktop flow run data displayed in a hierarchical list view. The data is organized based on top-level cloud flows. If a cloud flow has one or more child flows (supporting both cloud and desktop children), the child flow names are indented and preceded with a '>' character. This view is useful in scenarios where individual flow session runs succeeded, but other dependent runs failed, ultimately resulting in the top-level flow's failure. By displaying these runs in connection to their parent, we're enhancing automation monitoring and efficient root cause analysis of exceptions.

Flow name	Flow type	Trigger type	Status	Run start	Run mode	Duration	Error
Vendor Invoice Processing	Cloud flow	Scheduled	<span>✔ Succeeded</span>	08/05/2024, 09:33:09	—	00:03:08	—
> Process Invoices (Step4: Send Notifications)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 09:34:26	Unattended	00:01:46	—
> Process Invoices (Step2: Get Approval)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 09:34:26	Unattended	00:00:22	—
> Process Invoices (Step3: Settle Invoices)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 09:34:26	Unattended	00:01:00	—
> Process Invoices (Step1: Register)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 09:33:09	Unattended	00:01:10	—
Vendor Invoice Processing	Cloud flow	Scheduled	<span>✔ Succeeded</span>	08/05/2024, 08:39:03	—	00:03:46	—
> Process Invoices (Step2: Get Approval)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 08:40:05	Unattended	00:01:39	—
> Process Invoices (Step4: Send Notifications)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 08:40:05	Unattended	00:02:42	—
> Process Invoices (Step3: Settle Invoices)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 08:40:05	Unattended	00:00:29	—
> Process Invoices (Step1: Register)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 08:39:04	Unattended	00:00:57	—
Process vendor invoices	Cloud flow	Scheduled	<span>✔ Succeeded</span>	08/05/2024, 08:35:00	—	78 ms	—
Vendor Invoice Processing	Cloud flow	Scheduled	<span>✔ Succeeded</span>	08/05/2024, 08:34:03	—	00:02:47	—
> Process Invoices (Step4: Send Notifications)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 08:35:57	Unattended	00:00:43	—
> Process Invoices (Step2: Get Approval)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 08:35:57	Unattended	00:00:21	—
> Process Invoices (Step3: Settle Invoices)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 08:35:57	Unattended	00:00:40	—
> Process Invoices (Step1: Register)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 08:34:04	Unattended	00:01:39	—
Vendor Invoice Processing	Cloud flow	Scheduled	<span>✘ Failed</span>	08/05/2024, 07:38:59	—	00:04:47	Action failed
> Process Invoices (Step4: Send Notifications)	Desktop flow	Instant/Manual	<span>✘ Failed</span>	08/05/2024, 07:40:39	Unattended	00:03:04	RunFlowFailedError
> Process Invoices (Step3: Settle Invoices)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 07:40:39	Unattended	00:02:11	—
> Process Invoices (Step2: Get Approval)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 07:40:39	Unattended	00:01:32	—
> Process Invoices (Step1: Register)	Desktop flow	Instant/Manual	<span>✔ Succeeded</span>	08/05/2024, 07:39:00	Unattended	00:01:39	—
Process vendor invoices	Cloud flow	Scheduled	<span>✔ Succeeded</span>	08/05/2024, 07:30:15	—	00:00:01	—
Vendor Invoice Processing	Cloud flow	Scheduled	<span>✘ Failed</span>	08/05/2024, 07:23:58	—	00:05:59	Action failed

# Work queues tab

This tab provides metrics to monitor the health status of work queue items, including throughput, average handling time, and distribution. These metrics help to identify areas for improvement and track performance over time.



Expand table

Visual	Description
<b>Work queue distribution</b>	Shows the number of work queues with SLA-specific configuration, such as "default item expiration" applied.
<b>Work queue volumes by status</b>	Shows the number of work queue items categorized by their processing status, with a breakdown of exception types (available when hovering over the exception category).
<b>Work queue throughput</b>	Shows the number of items successfully processed in a work queue within a specific time unit, along with their error rate and trend.
<b>Work queue item error distribution</b>	Shows the distribution of work queue items per error state, such as "Business exception", "IT exception", and "Processing timeout".
<b>Work queue requeue rate</b>	Shows how often work queue items are being requeued for further processing or manual handling.

Visual	Description
Average handling time trend	Shows the trend of average handling time for work queue items over time.
Top work queues by average handling time	Shows the top five work queues with the highest average handling time in descending order.
Average handling time	Shows the average handling time for items in a work queue.
Top work queue handling by processor	Shows the top five work queues with the highest number of items successfully processed per processor.
Top work queues by expiring items	Shows the top five work queues ranked by the number of expiring items in the work queue.
Top work queues by error frequency	Shows the top five work queues with the highest number of items in error state.

### ⓘ Note

If you filter work queue items by a specific item status, such as "Business exception", any matching item that has already expired won't be considered in the results. This is due to the fact that expired items are deemed unprocessable unless their expiration date is extended first, which takes precedence over lower-level exception type searches.

## Known limitations

The following are current limitations of the automation center and its underlying data structure.

- Cloud flow-based filtering currently only lists solution cloud flows that were created in the current environment. Filtering support for cloud flows that were imported as part of a solution will be coming soon.
- Visualizations are based on top-level cloud flow runs only.
- Only runs for solution-based cloud flows are available in the automation center.
- During initial preview, visibility of flows and their run history in automation center requires you to be the owner (co-ownership isn't sufficient) of the flows or to have environment wide access to the relevant data in the environment. The main Dataverse tables that power the data shown in the automation center are:
  - `workflow`: Solution-aware cloud flow and desktop flows
  - `flowrun`: [Cloud flow run history](#)

- `flowsession`: Desktop flow run history
- `flowevent`: Recommendations and notifications
- `workqueue`: Work queues
- `workqueueitem`: Work queue items
- Only 1st-level child cloud and desktop flow runs are shown under **Runs**.
- Top-level desktop flow runs aren't supported yet (for local attended or API-based scenarios)
- Co-owned or shared flows aren't supported yet (users don't see runs of flows that are shared with them).
- Child flow run-specific filters or sorting aren't supported yet.
- Users with broader access to run data (such as admins or members of the CoE team) might see *Private flow* as flow names. This name might appear if the corresponding cloud flow isn't explicitly shared with the user or the flow was deleted in the meantime.
- Users with broader access to run data might encounter increased latency during data load because of high cloud flow run volumes. Performance can be improved by selecting more filters and reducing date ranges.
- If there's a visual showing "*Too many results*", try to adjust your filter to limit the amount of data that is being returned.
- If you see Dataverse or cloud flow run-specific notifications, check the underlying [cloud flow run history documentation](#) to learn more.
- Older cloud flow run history might be missing for the selected date range filter. Missing run history might be due to your current environment's [time to live](#) (TTL) configuration, which is set to retain cloud flow runs for *n-days* only.
- Cloud flow run history in Dataverse is a preview feature as well, and comes with its own set of [known limitations](#) that might affect the data shown in the automation center.

## Related information

- [Recommendations within automation center](#)
- [Use Copilot in automation center](#)
- [Manage cloud flow run history in Dataverse](#)

---

## Feedback

Was this page helpful?



[Provide product feedback](#) 

# Automation center recommendations (preview)

Article • 05/20/2024

[This topic is prerelease documentation and is subject to change.]

The automation center offers targeted recommendations aimed at enhancing the reliability, efficiency, and general health of your automation. You can find actionable insights such as:

- real-time recommendation of automations starting to fail
- warnings of work queues potentially failing to meet their service level agreement (SLA) objectives
- identification of unused machines or machine groups in the environment
- many more

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

## Key capabilities

Key features of recommendations:

- Get proactive and reactive recommendations, grounded on best practices.
- Enhance the overall health, compliance, and performance of automation across your environment.
- Take corrective actions directly from the list of affected automation artifacts.
- Hiding recommendations for an hour, a day, a week or even indefinitely.

## Prerequisites

To see and use recommendations in automation center, the following are required:

- Premium Power Automate license

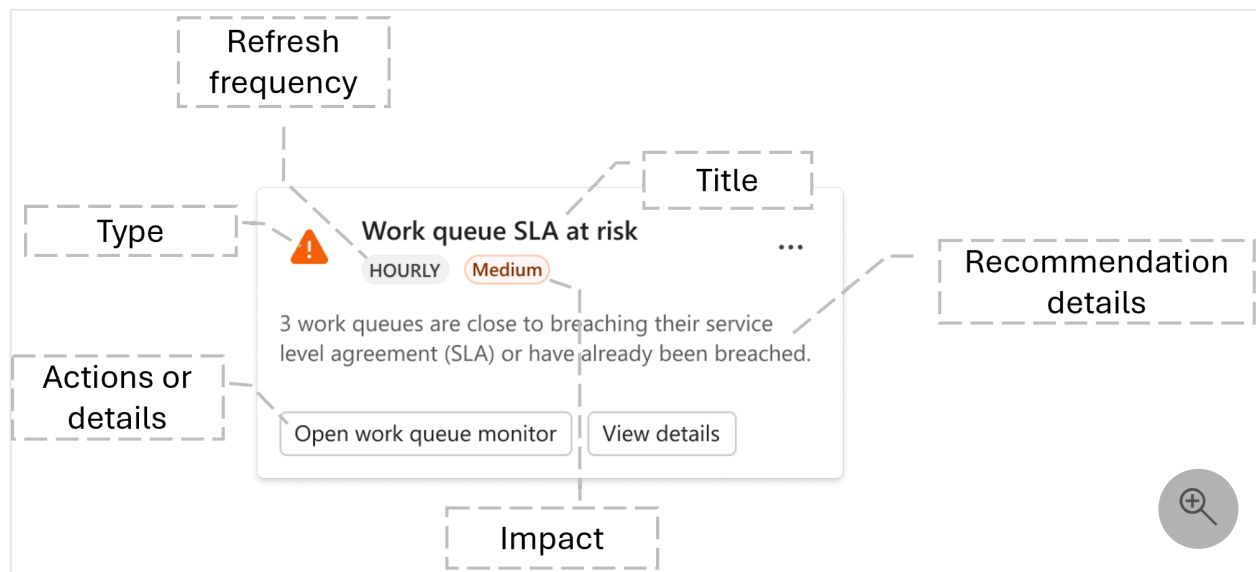
- Environment maker role (or other roles that include access to recommendation data)

## Recommendation details

Recommendations appear as cards in the carousel found at the top of the automation center's overview page. Each recommendation is uniquely generated per recommendation type, user, and refresh interval, and is stored in the `Flow Events` (`flowevent`) table in Dataverse. This design provides important permission granularity, ensuring that the recommendations each user receives align with their specific access rights to the underlying artifacts. If a user doesn't have permission to view the underlying flow, work queue, or any related artifact related to the recommendation, those recommendations aren't generated for them.

## Recommendation card

The recommendation card shown in the following image is the entry point to your recommendations. Here's a detailed breakdown of the card's components:

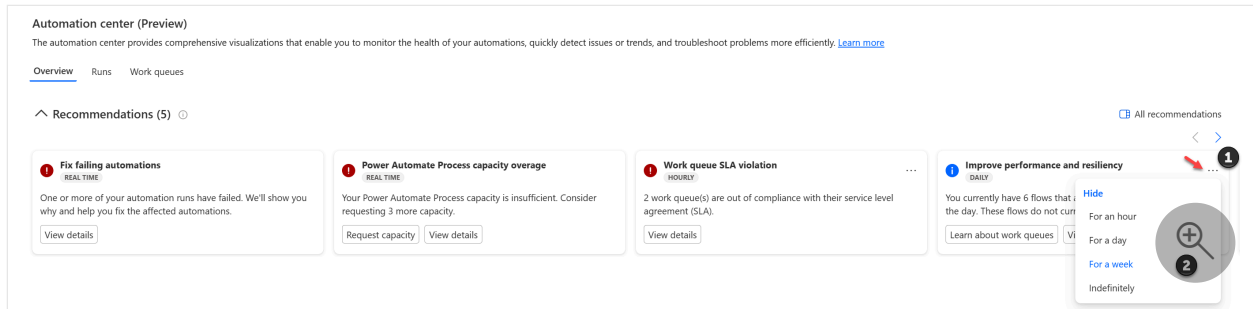


- **Type:** Indicated by an exclamation mark in a triangle, shows that this recommendation is a warning or alert.
- **Title:** "Work queue SLA at risk" – this value provides a concise title of the issue.
- **Refresh frequency:** "HOURLY" – this value specifies the refresh frequency of the recommendation data.
- **Impact:** "Medium" – this value indicates the severity or importance of the issue.
- **Recommendation details:** The short text that describes the recommendation.
- **Actions or details:** Call to action or detail that provides more in-depth information about the specific recommendation.

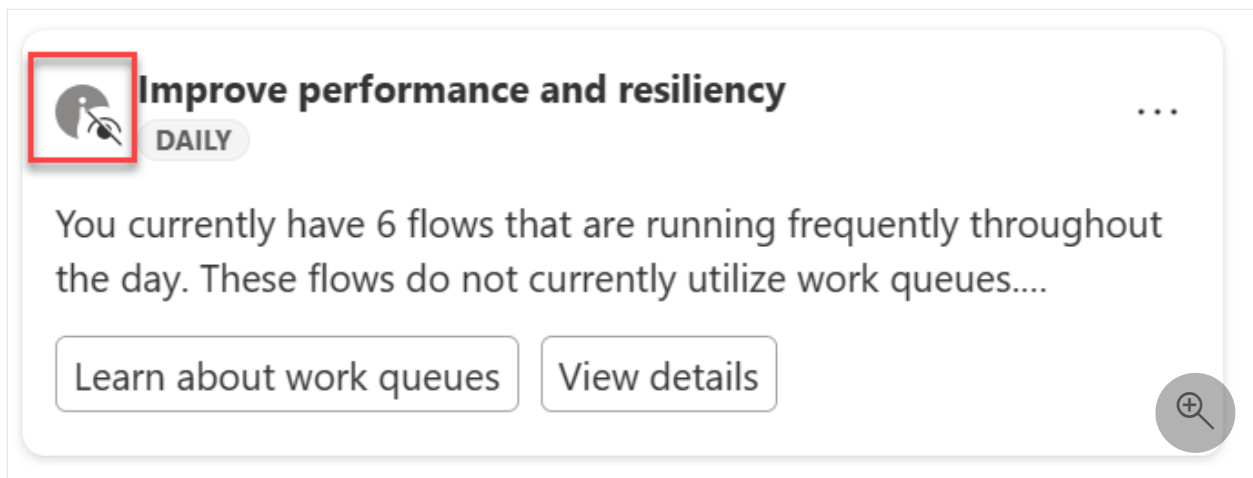
- **Card actions:** Ability to hide recommendations for varying durations such as an hour, day, week, or even indefinitely.

## Hide & show recommendation

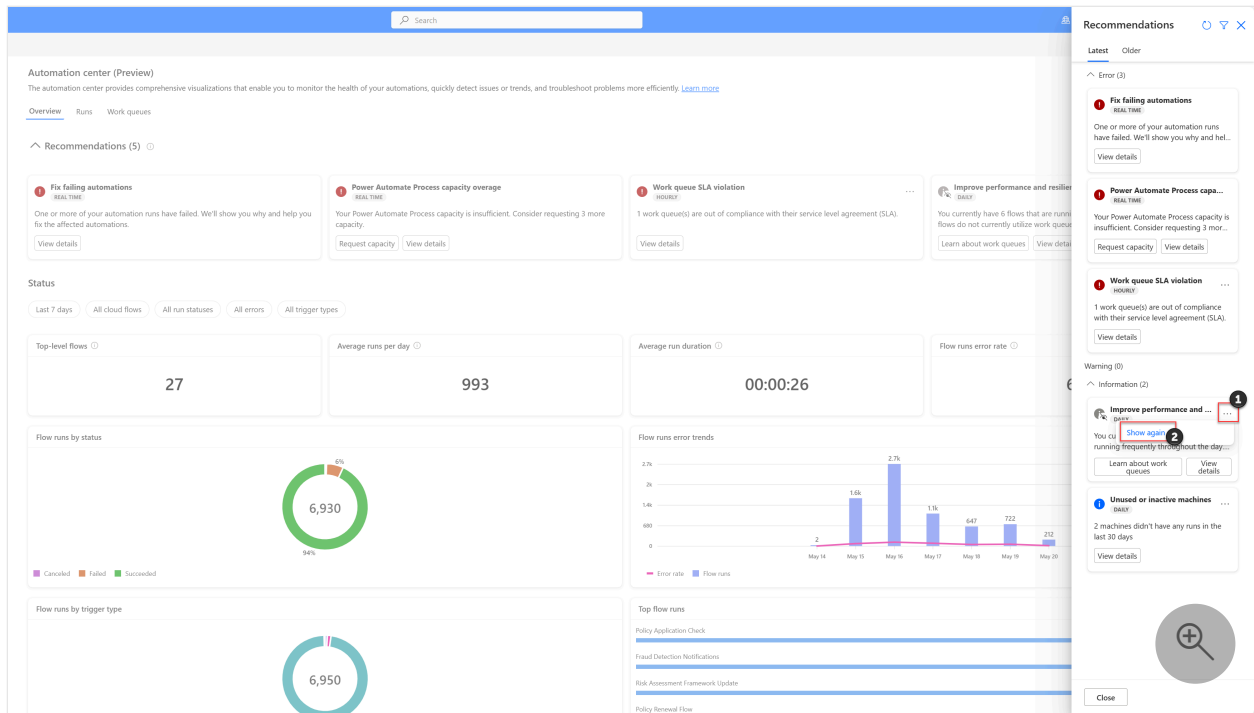
**Hide** Recommendations can be hidden and shown again. You can choose between varying durations such as an hour, day, week, or even indefinitely.



**Hidden indicator** Once a recommendation is hidden, you see a different icon in the card next to the title.

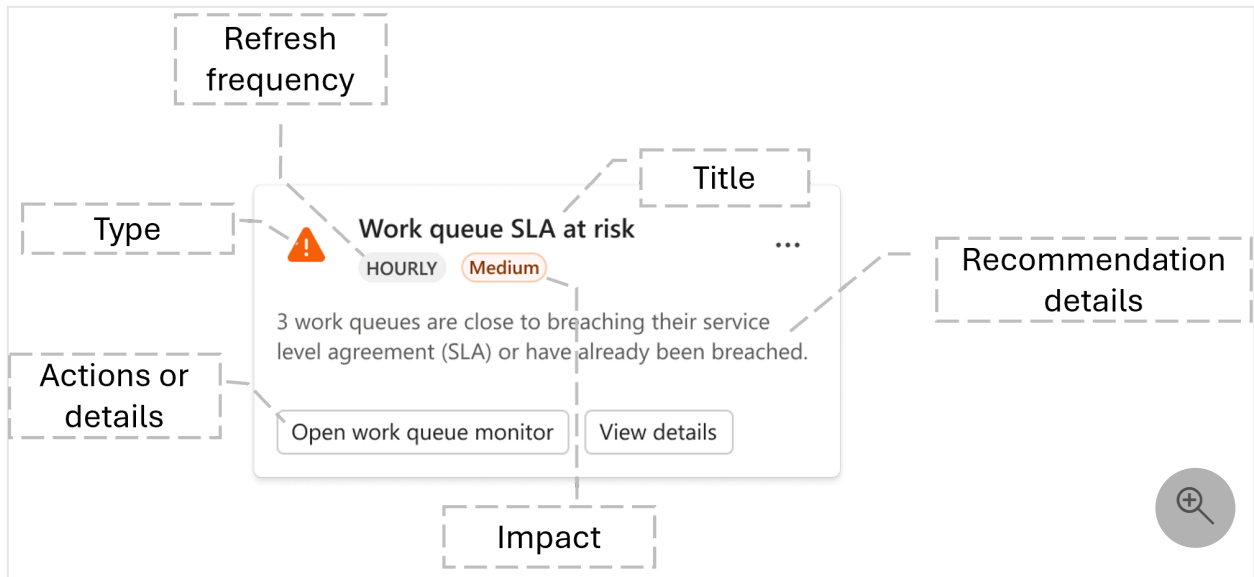


**Unhide** If you hide certain recommendations, you can easily make them visible again. Just select the ellipses (...) on the card, and then select the **Show again** option.



**Note**

Hidden recommendations are only hidden in the user experience. They are still generated on the backend.



## Recommendation details panel

The recommendation details panel shown in the following image provides a more detailed view with inline, actionable insights. Here's a detailed breakdown of the panel's components:

- **Type:** Indicated by an exclamation mark in a triangle, showing that this recommendation is a warning or alert.



- **Title:** "Work queue SLA at risk" – this value provides a concise title of the issue.
- **Refresh frequency:** "HOURLY" – this value specifies the refresh frequency of the recommendation data.
- **Recommendation timestamp:** Shows the date when the recommendation was generated.
- **Recommendation details:** Provides context and specifics about the recommendation, including an explanation and suggested actions.
- **Corrective actions or guidance:** Specific actions recommended to mitigate the issue.
- **Call to action or details:** Provides buttons for immediate actions or for further details.
- **Affected artifact details:** A table or chart listing affected recommendation artifacts such as flows, work queues, machines etc.

The screenshot shows a recommendation card with the following components:

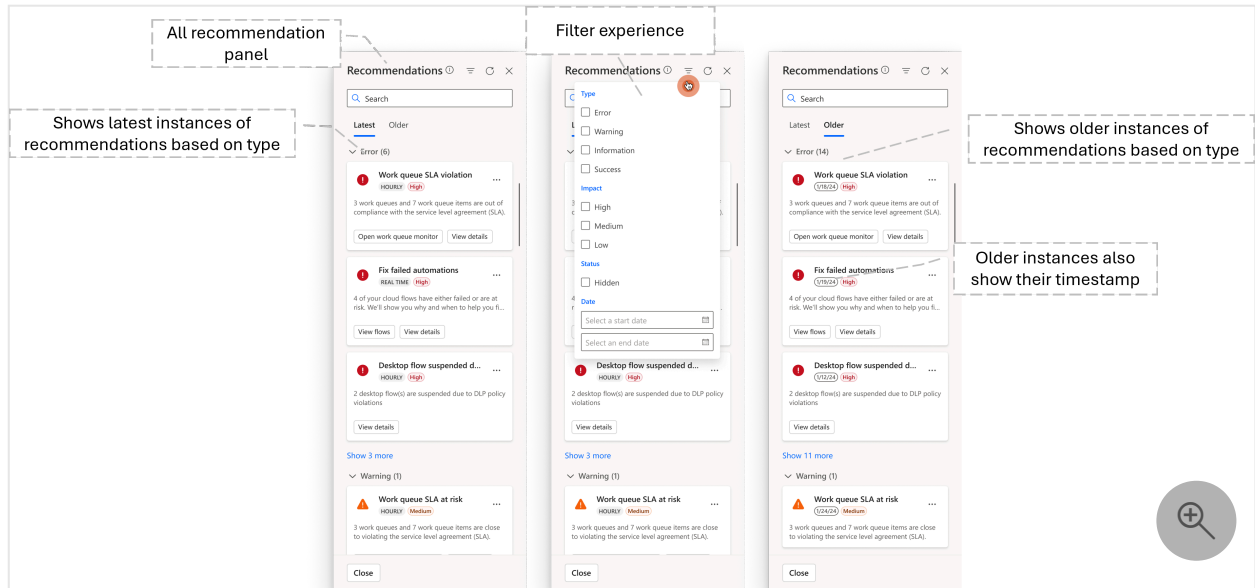
- Title:** Work queue SLA at risk
- Refresh frequency:** HOURLY
- Recommendation timestamp:** 23/04/2024
- Type:** Warning (indicated by a yellow triangle icon)
- Recommendation details:**
  - Recommendation:** Based on average handling time, volume, available machine capacity, and expiration dates, 3 work queues are at risk of not meeting their SLA targets. Investigate and adjust work queue capacity and prioritization.
  - Action:**
    - Align work queue volumes with machine and license capacity and prioritize processing of at-risk work queues.
    - Increase machine group capacity where needed, and closely monitor work queue item execution and expiration dates.
    - Consider moving to a hosted machine group for scalability and cost-effectiveness. Your machines scale automatically to match processing demand and you only pay for what you use.
- Corrective actions or guidance:** (Callout pointing to the Action section)
- Call to action or details:**
  - Items at risk
  - Go to work queue details
- Affected artifact details:**

Name	Expiring soon	Expired	Queued	Owner
Analytics Analytics	12	200	30	[Avatar]
Analytics Data Entry	46	16	1	[Avatar]
Claims handling queue	23	75	23955	[Avatar]
<input checked="" type="checkbox"/> Vendor Invoice Queue	2	13	116	[Avatar]

## All recommendations panel


The all recommendations panel shown in the following image is used for viewing latest and older recommendation with filtering capabilities. The recommendations are categorized by type (Error, Warning, Information, Success) and can be filtered by impact (High, Medium, Low), status (Hidden), and date range. This panel is divided into two main sections: one for displaying the most recent recommendations and another for showing older recommendations along with their timestamps. The most recent

recommendations are initially displayed under 'Latest', but are replaced with refreshed content based on the recommendation interval.



## Category

The **category** classifies the recommendations based on the specific area of automation they target.

 Expand table

Category	Description
Orchestration	Insights related to the orchestration of processes, work queues, and machines.
Monitoring	Recommendations related to real-time tracking of automation health, compliance, or performance.
Governance	Recommendations related to the rules, policies, and processing compliance.
Licensing	Recommendations related to the management of licenses and capacity.

## Type

The **type** indicates the severity or urgency of the recommendations.

 Expand table

Type	Description
Information	Provides best-practice recommendations you might want to consider.
Warning	Indicates a potential issue that might lead to a problem later if not addressed.

Type	Description
Error	Indicates a problem that needs to be resolved.

## Impact

The **impact** assesses the degree of effect an issue has on the overall automation health, compliance, or performance.

[Expand table](#)

Impact	Description
Low	The issue has a minor effect on automation health, compliance, or performance.
Medium	The issue has a moderate effect on automation health, compliance, or performance.
High	The issue has a significant effect on automation health, compliance, or performance.

## Refresh frequency

The **refresh frequency** provides information on how often the recommendation data is updated, ensuring users have the most recent and relevant information for decision making.

[Expand table](#)

Refresh frequency	Description
DAILY	A new instance of the recommendation data is regenerated once a day.
HOURLY	A new instance of the recommendation is regenerated every hour.
REAL TIME	The recommendation is an actual live-query to the underlying automation data.

## List of recommendations

The following list of recommendations aims to provide proactive guidance and actionable insights for optimizing and troubleshooting various aspects of your automations. From addressing work queue SLA violations and capacity overages to

improving system resilience and efficiency, each recommendation offers a detailed proposed solution or more details.

#### ⓘ Note

- Recommendations that don't have a real time refresh frequency hold data snapshots from when the recommendation was generated. As a result, if you revisit an older recommendation, the information displayed under artifact details may no longer be accurate or applicable.
- If you're a premium Power Automate user and it's your first time accessing the automation center, we will begin generating recommendations for you. These should be ready for your review in about an hour or two.
- Generation of recommendations is paused if you don't return to the automation center within 7 days, your premium license was unassigned by your IT team, or your trial expired.
- The recommendations shown as part of the automation center are intra-environmental recommendations targeted to makers, operators, and CoE team members. If you are looking for admin related, tenant-wide recommendations in Power Platform admin center, these are part of a separate feature called [Power Platform Advisor](#).

## Work queue SLA violation

#### ⓘ Note

Initially, this recommendation will consider all work queue items with past expiry dates for possible SLA violations. However, we will change this logic in a future update to exclude items in a `Processing` or `Processed` state.

 Expand table

Category or object	Details
Title	Work queue SLA violation
Card details	<i>{number of work queues}</i> work queues are out of compliance with their service level agreement (SLA).

Category or object	Details
Recommendation details	One or more work queue items are queued but expired. This usually indicates an SLA violation.
Type	Error
Impact	High
Refresh frequency	Hourly
Category	Orchestration
Recommended actions	<ul style="list-style-type: none"> <li>- Identify the root cause. Was it due to a technical issue, a lack of resources, or some other factor?</li> <li>- First identify the cause. Then notify all relevant stakeholders of the miss and the steps being taken to address it.</li> <li>- Determine which work is impacted by the SLA miss and prioritize it accordingly.</li> <li>- If necessary, allocate extra resources to address the SLA miss (adding more machine capacity, licenses, or other solutions to improve performance).</li> <li>- Monitor progress to ensure the SLA is being met and that work is completed within the agreed-upon time frame.</li> </ul>

## Work queue SLA at risk

### ⓘ Note

Initially, this recommendation identifies work queue items that expire within **one hour** as potentially violating the work queue's SLA. However, we will change this logic in a future update to include items that expire within **one day** instead, and exclude items in a `Processing` or `Processed` state.

[Expand table](#)

Category or object	Details
Title	Work queue SLA at risk
Card details	<i>{number of work queues}</i> work queues are close to breaching their service level agreement (SLA) or are already breached.
Recommendation details	Based on average handling time, volume, available machine capacity, and expiration dates, <i>{number of work queues}</i> work queues are at risk of not meeting their SLA targets. Investigate and adjust work queue capacity and

Category or object	Details
	prioritization. All work queue items that are either already expired, or expire within the next hour, will be included in this recommendation.
Type	Warning
Impact	Medium
Refresh frequency	Hourly
Category	Orchestration
Recommended actions	<ul style="list-style-type: none"> <li>- Align work queue volumes with machine and license capacity and prioritize processing of at-risk work queues.</li> <li>- Increase machine group capacity where needed, and closely monitor work queue item execution and expiration dates.</li> <li>- Consider moving to a hosted machine group for scalability and cost-effectiveness. Your machines scale automatically to match processing demand and you only pay for what you use.</li> </ul>

## Power Automate Process capacity overage

[Expand table](#)

Category or object	Details
Title	Power Automate Process capacity overage
Card details	Your Power Automate Process capacity is insufficient. Consider requesting <i>{number of capacities}</i> more capacity.
Recommendation details	Your current Power Automate Process capacity isn't enough to handle your workload. You need <i>{number of capacity}</i> additional Power Automate Process capacity to meet your needs.
Type	Error
Impact	Medium
Refresh frequency	Real time
Category	Licensing
Recommended action(s)	We recommend requesting additional hosted process capacity to avoid any potential issues and disruptions.

## Power Automate Hosted process capacity overage

 Expand table

Category or object	Details
Title	Power Automate Hosted process capacity overage
Card details	Your Power Automate Hosted Process capacity is insufficient. Consider requesting <i>{number of capacities}</i> more capacity.
Recommendation details	Your current Power Automate Hosted Process capacity isn't enough to handle your workload. You need <i>{number of capacities}</i> additional Power Automate Hosted Process capacity to meet your needs.
Type	Error
Impact	Medium
Refresh frequency	Real time
Category	Licensing
Recommended action(s)	We recommend requesting additional hosted process capacity to avoid any potential issues and disruptions.

## Desktop flow suspended due to DLP policy violation

 Expand table

Category or object	Details
Title	Desktop flow suspended due to DLP policy violation
Card details	<i>{number of flows}</i> desktop flow(s) are suspended due to DLP policy violations
Recommendation details	Investigate why suspended flows aren't in compliance with your organization's DLP (Data Loss Prevention) policy.
Type	Error
Impact	High
Refresh frequency	Hourly
Category	Governance
Recommended action(s)	<ul style="list-style-type: none"><li>- Your organization applied DLP policies that resulted in suspended flows that you built or co-own. Review the following action list to get your flows back on track:</li><li>- Identify the specific desktop flows that have been suspended and review</li></ul>

Category or object	Details
	<p>them to determine why they don't adhere to the DLP policy.</p> <ul style="list-style-type: none"> <li>- Analyze the data being processed by the flows and identify any potential risks or vulnerabilities.</li> <li>- Modify the desktop flows to ensure that they adhere to the DLP policy. This may involve implementing additional security measures or changing the way data is processed or stored.</li> <li>- Test the modified desktop flows to ensure that they're functioning correctly and that they adhere to the DLP policy.</li> </ul>

## Fix failing automations

[Expand table](#)

Category or object	Details
Title	Fix failing automations
Card details	One or more of your automation runs have failed. We'll show you why and help you fix the affected automations.
Recommendation details	There are one or more runs that need your attention. The recommendation considers only failed automations from the past week. Any failures older than one week are not included.
Type	Error
Impact	High
Refresh frequency	Real time
Category	Monitoring
Recommended action(s)	Review the list of runs and open flow or run details to troubleshoot.

## Unused or inactive machines

[Expand table](#)

Category or object	Details
Title	Unused or inactive machines
Card details	<i>{number of machines}</i> machines didn't have any runs in the last 30 days



Category or object	Details
Recommendation details	Remove inactive machines from this environment.
Type	Information
Impact	Medium
Refresh frequency	Daily
Category	Monitoring
Recommended action(s)	Consider cleaning up any machine that you know isn't active or used anymore.

## Improve performance and resiliency

 Expand table

Category or object	Details
Title	Improve performance and resiliency
Card details	You currently have <i>{number of flows}</i> flows that are running frequently throughout the day. These flows don't currently utilize work queues. Implementing work queues could potentially enhance your processing throughput, improve resiliency, and simplify troubleshooting.
Recommendation details	Consider using work queues for flows that run frequently throughout the day. This can improve your processing throughput, resilience, and your ability to troubleshoot issues.
Type	Information
Impact	Low
Refresh frequency	Daily
Category	Orchestration
Recommended action(s)	<ul style="list-style-type: none"> <li>- Use work queues to group and process multiple work items in a run.</li> <li>- Prioritize them based on their importance and expiration date, and improve processing throughput, overall efficiency, and resiliency.</li> <li>- You also get robust monitoring capabilities (including the ability to reprioritize or reprocess work as needed).</li> </ul>

# Known limitations

- Deletion of older recommendation isn't yet supported through the user experience in automation center. If you want to clean-up recommendations, consider using the Dataverse [bulk-delete](#) feature.
- 

## Feedback

Was this page helpful?

 Yes

 No

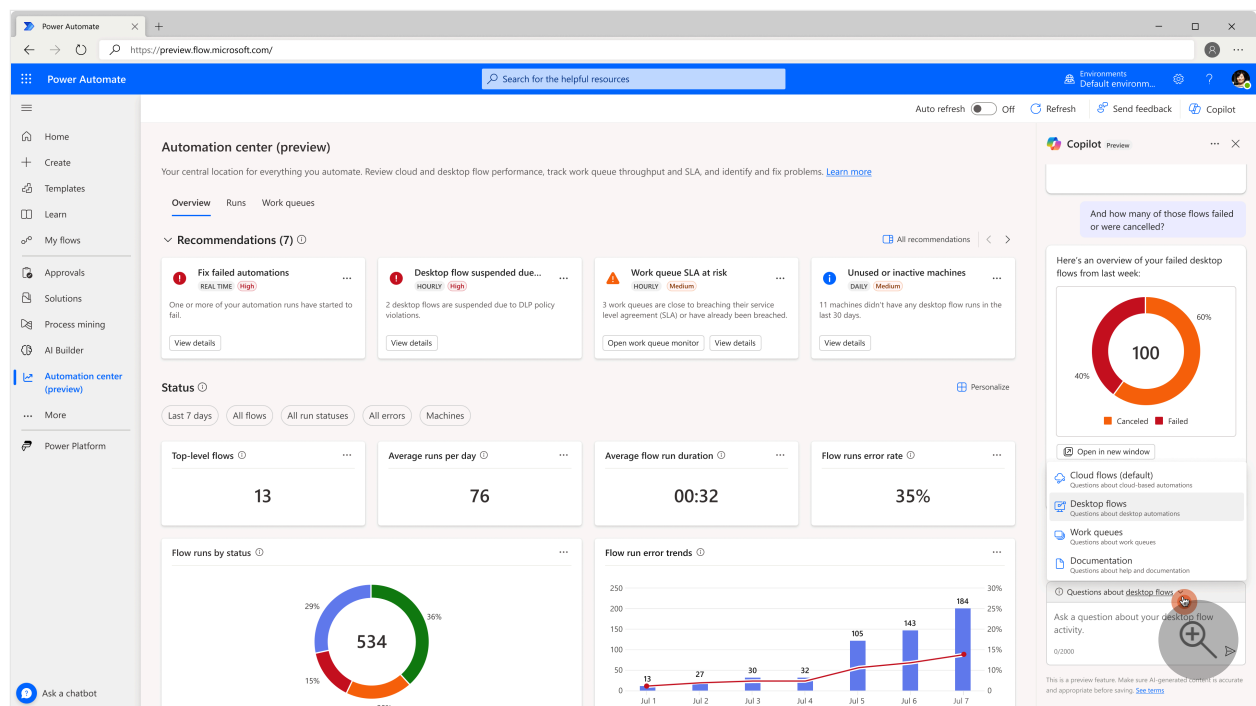
[Provide product feedback](#) 

# Use Copilot to analyze automation activity and ask product questions (preview)

Article • 05/20/2024

[This topic is prerelease documentation and is subject to change.]

Understanding automation activity and performance are key to achieving operational excellence and reliability goals, regardless of the size of the automation estate, team, or role within the organization. To reach those goals requires advanced and dynamic monitoring capabilities that provide you with valuable insights that highlight areas of success and identify potential bottlenecks, trends and areas for improvement. Having more detailed insights allows you to make informed decisions that optimize your automation processes, leading to increased efficiency and effectiveness.



## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.
- This capability is powered by [Azure OpenAI Service](#).

- Copilot is a new technology that is still being developed. It is optimized for use with English language and has limited support with other languages. As such, parts of it might appear in English rather than your preferred language.
- Read the [responsible AI FAQs for Copilot in automation center \(preview\)](#) to learn more about this new Copilot experience.
- More FAQs: [Responsible AI FAQs for Power Automate](#), [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

## Prerequisites

- A work or school account with access to a Power Automate [environment](#) located in the United States.
- During initial preview, you must have an environment in the United States region to use this feature. If you don't have access to an environment based in the United States, you can ask your administrator to [create a new environment in Power Platform admin center and select United States](#) as its region.
- Check [known limitations](#) for more information.

## How does it work?

Copilot in automation center is able to answer questions about the following four skills:

 Expand table

Index	Skill	Questions skill can answer
1	Cloud flow run logs	Cloud flow run status, trigger type, run duration, failure rate.
2	Desktop flow run logs	Desktop flow run status, used machine, run mode, failure rate.
3	Work queue data	Work queue items statuses, service level agreement (SLA) attainment, processor counts.
4	Documentation (generative answers)	General Power Automate feature questions such as <i>how to analyze activity with Copilot</i> .

The first three skills in the above table translate natural language queries (questions) entered by users into Microsoft Dataverse [FetchXML](#) query syntax. This translation allows users to easily retrieve information about their automation data by asking

questions in natural language. Additionally, Copilot determines the most suitable output visualization, such as a table, pie chart, bar chart, or line chart, to effectively present the insights and information to the user.

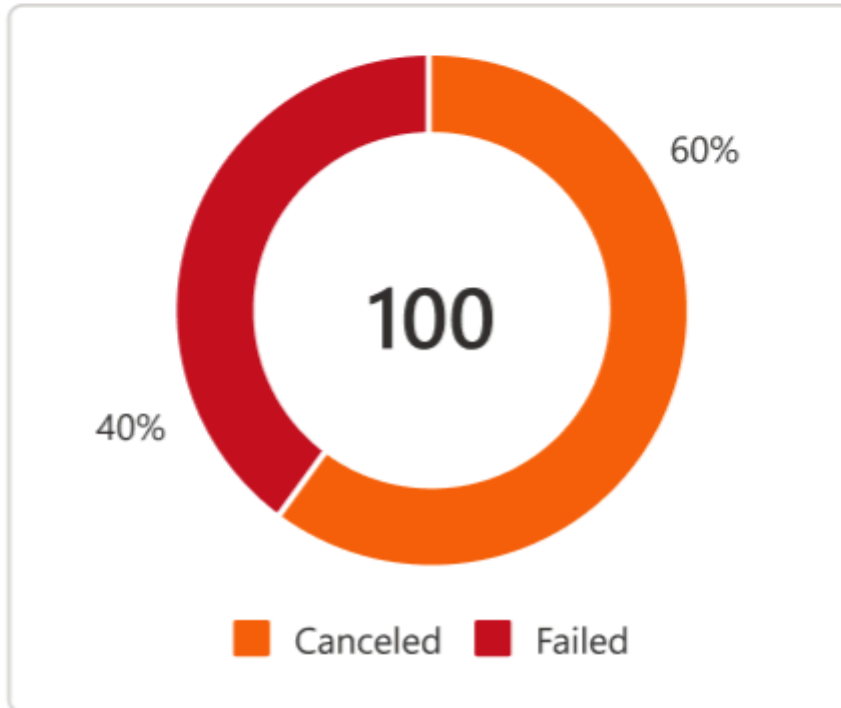
## Copilot skill selector

When Copilot opens (per session) the first time, the "cloud flow" skill is preselected. You can modify the skill by choosing the dropdown next to the phrase **Questions about** and selecting your preferred skill. During the initial preview phase, the conversation history is reset each time you change the skill.



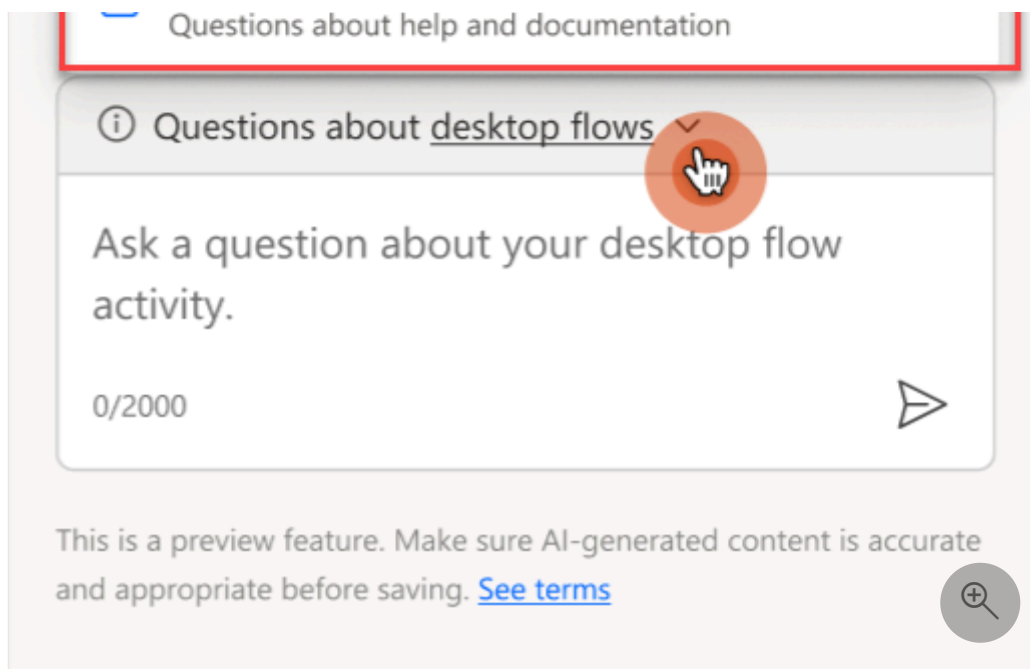
And how many of those flows failed or were cancelled?

Here's an overview of your failed desktop flows from last week:



[Open in new window](#)

- Cloud flows (default)**  
Questions about cloud-based automations
- Desktop flows**  
Questions about desktop automations
- Work queues**  
Questions about work queues
- Documentation**



## High-level process

1. Once the user inputs a valid prompt, Copilot generates a [FetchXML](#) query based on the input.
2. If the generated FetchXML is valid, the query is then executed against the Dataverse backend under the current user's security context to retrieve matching data. Retrieving the data as the user ensures that users only see data that they're already authorized to access.
3. Copilot then determines the most suitable output visualization, such as a table, pie chart, bar chart, or line chart, to effectively present the insights and data to the user.

## What are FetchXML queries?

Microsoft Dataverse [FetchXML](#) is a language used for retrieving data from a Dataverse database. FetchXML is designed to be easy to create, use, and understand. For example, you might want to ask Dataverse to give you a list of all flow runs for a specific flow. The FetchXML query is the way you phrase that question so the database understands it and can give you the right results.

## Prompt best-practices

- Be specific:
  - The more specific you are with your prompt, the better the AI understands and responds.

- If the AI isn't producing the desired output, don't worry. Try again by adjusting your prompt.
- Experiment with prompts:
  - If you're not getting the results you were expecting, try rephrasing your prompt or provide more context.
- Provide feedback:
  - If the AI produced great or unsatisfactory responses, let us know by selecting the thumbs up or down with an option to provide more feedback via the **Tell Microsoft what you liked about this feature** link that appears underneath.

## Prompt examples

This section provides example prompts you can use as a starter prompt for your own use cases. Some of these prompts might not be applicable or return incorrect results. Model understanding or the actual prompt and the data available to you based on your permissions might influence the accuracy. We recommend that you review and [validate the returned results and FetchXML query](#).

## Cloud flow runs

### ⓘ Note

[Cloud flow run history in Dataverse](#), which is built on the new [Elastic Table](#) feature, has different known limitations for querying and aggregating data compared to the desktop flow run history. These differences may impact the responses from Copilot. You can find out more about these known limitation [here](#).

- How many runs last month were triggered by another cloud flow?
- Who initiated flow runs during the last month?
- How many flows failed yesterday?

## Desktop flow runs

- Which flows ran the most last week?
- What were yesterday's top five flows by number of completed runs?
- What is the distribution of flow run statuses?

## Errors



- Show me the most frequent run errors last month.
- Show me a distribution of successful versus failed flows last quarter.
- What were the number of failed runs during the week before the last one?

## Work queues

- Show me number of items that are on hold.
- Show me the number of items that are at risk of breaching SLA.
- What's the average handling time per processor (machine) and queue?

## Machines

- Which bots had the most run failures today?
- Which machines are in maintenance mode?
- What are the machines with the most run failures?

## Makers

- Show me the top flows by number of runs together with their owner info.
- Who were the top 10 users running flows last month?
- When and by whom were desktop flows modified last week?

## Documentation (generative answers)

- How can I add a condition in Power Automate desktop?
- Can cloud flows handle approvals and decision-making processes?
- Where can I find deleted flows in Power Automate?

## Multi-turn prompts

In the context of AI, *multi-turn* prompts allow you to have an ongoing conversation with Copilot, where it remembers the context of the previous messages in the conversation. It's not just answering one-off questions; it's engaging in a dialogue with you, where each response is based on what was said before.

### ⓘ Note

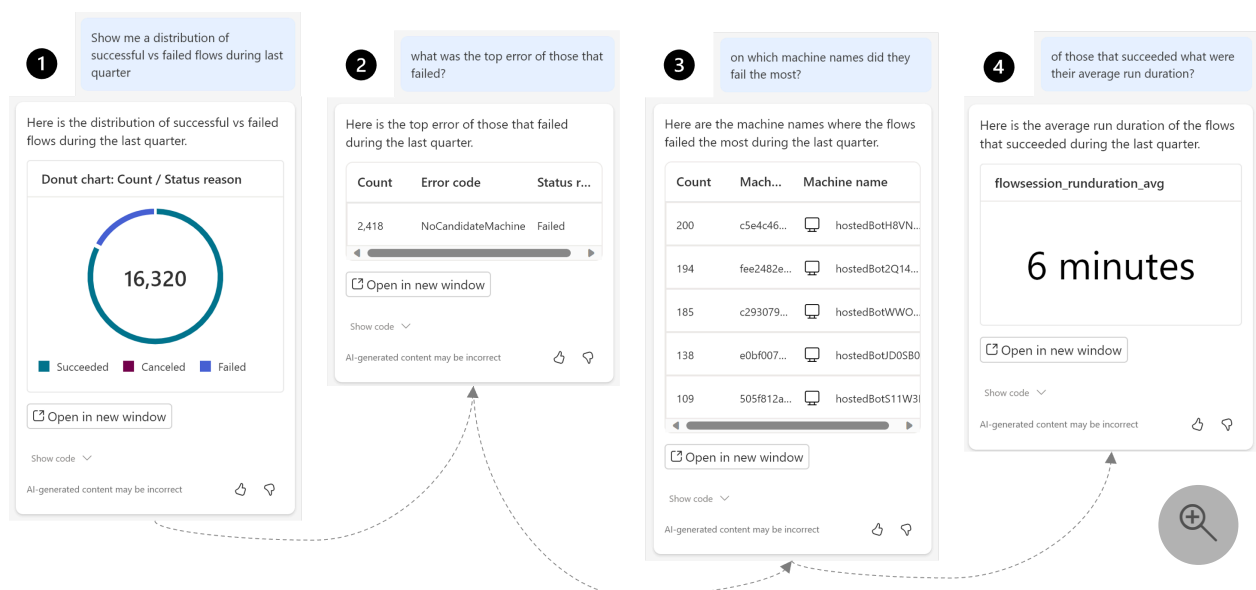
- Generative answers (documentation skill) does not support multi-turn conversations yet.

- When engaging in a multi-turn conversation, Copilot keeps track of the ten most recent questions only. This means that Copilot starts clearing the prompts that were entered first and only keeps the latest ten. To improve response quality, we suggest limiting your follow-up questions or more frequently restart the chat. For more information, see [Clear previous prompt context to start over.](#)

## Example

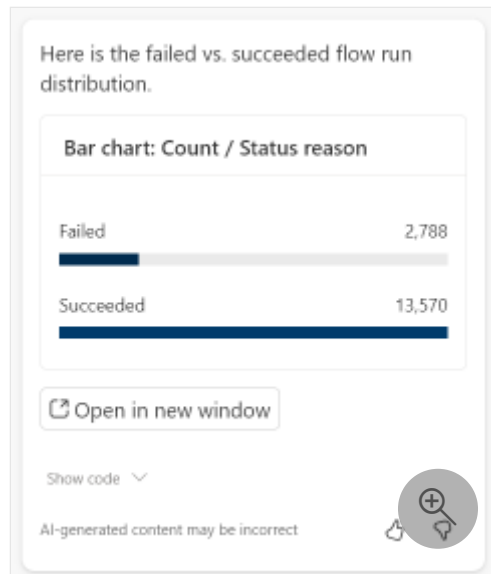
 Expand table

Turn	Prompt and reply
1	User: Show me a distribution of successful vs failed flows last quarter  Copilot: <i>Here's the distribution of successful vs failed flows during the last quarter.</i>
2	User: What was the top error of the runs that failed?  Copilot: <i>Here's the top error of the runs that failed.</i>
3	User: On which machine names did they fail the most?  Copilot: <i>Here are the machine names where the most failures occurred.</i>
4	User: What was the average run duration of the flows that succeeded?  Copilot: <i>Here's the average run duration of the flows that succeeded.</i>



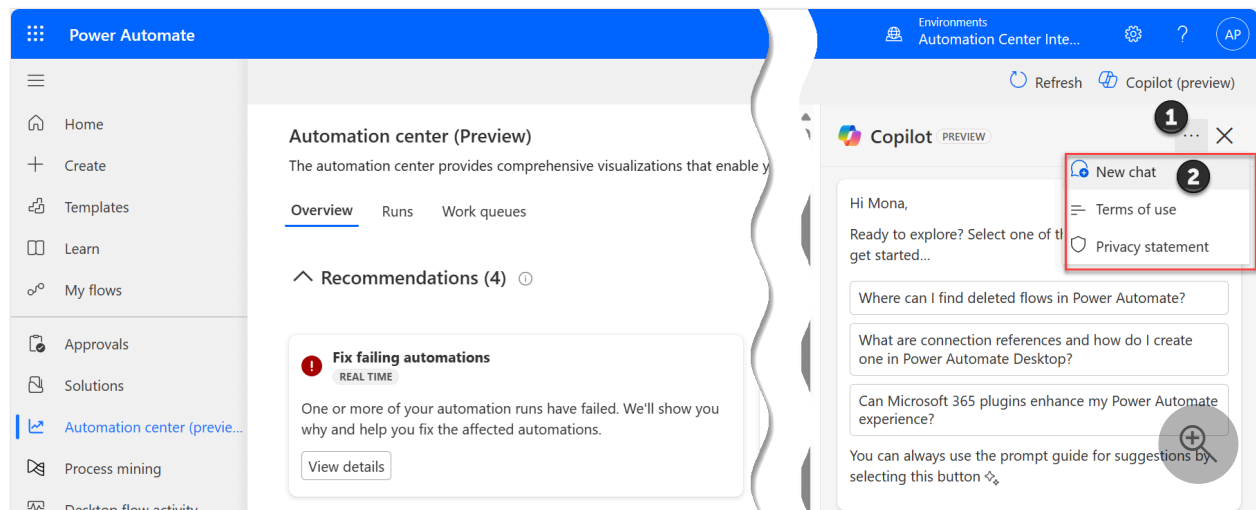
## Influencing the output format

You can influence Copilot's output format by asking for explicit output types like *"show me failed vs succeeded flow run distribution as a bar chart."* This prompt likely produces the following outcome:



## Clear previous prompt context to start over

If you wish to reset the conversation with Copilot, select the three dots **...** next to the copilot name, and then select **New chat**.



## Edit and rerun FetchXML queries returned by Copilot

You can fine-tune the queries returned by Copilot through in-place edits in the code area. Just change the code to match your new search criteria and select **Run**. To illustrate, let's consider the following prompt:

- *"How many flows were triggered by schedule in the last three days?"*

## Query results before any change

XML

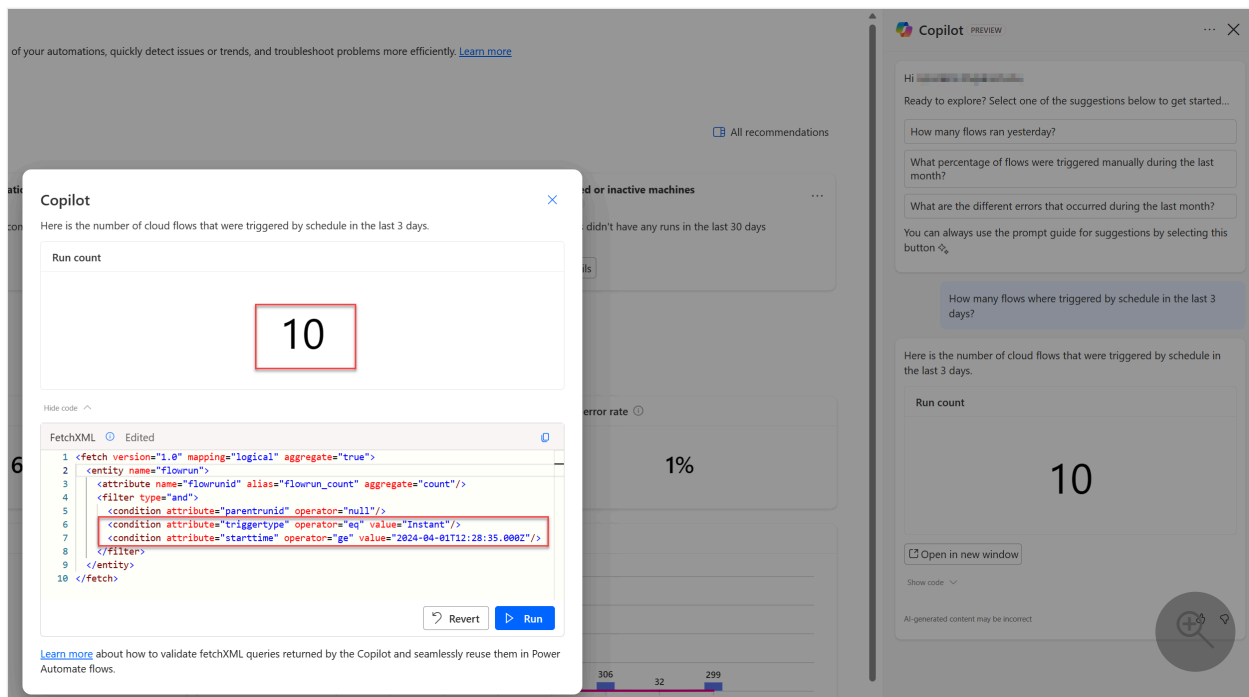
```
<fetch version="1.0" mapping="logical" aggregate="true">
  <entity name="flowrun">
    <attribute name="flowrunid" alias="flowrun_count" aggregate="count"/>
    <filter type="and">
      <condition attribute="parentrunid" operator="null"/>
      <condition attribute="triggertype" operator="eq" value="Scheduled"/>
      <condition attribute="starttime" operator="ge" value="2024-05-
05T12:28:35.000Z"/>
    </filter>
  </entity>
</fetch>
```

The screenshot shows the Copilot interface with a query window open. The query window displays the XML query from the previous block, with the filter conditions highlighted in red. The result of the query is shown as a large number '776' in a white box. The background shows a dashboard with various charts and a sidebar with suggestions.

## Changed query results

XML

```
<fetch version="1.0" mapping="logical" aggregate="true">
  <entity name="flowrun">
    <attribute name="flowrunid" alias="flowrun_count" aggregate="count"/>
    <filter type="and">
      <condition attribute="parentrunid" operator="null"/>
      <condition attribute="triggertype" operator="eq" value="Instant"/>
      <condition attribute="starttime" operator="ge" value="2024-04-
01T12:28:35.000Z"/>
    </filter>
  </entity>
</fetch>
```



## Validate FetchXML query results generated by Copilot

The following steps guide you through the process to validate (and potentially reuse) [FetchXML](#) queries in Power Automate cloud flows.

### Step 1: Make a copy of the FetchXML query

After you submit your query to Copilot, you get a reply that includes a link labeled **Show code**. To copy the code, select this link and then select the copy icon located in the upper-right corner of the **FetchXML** box.

### Step 2: Create a cloud flow and test the FetchXML query

1. Navigate to the [Power Automate portal](#) and select **My flows** from the left navigation menu.
2. Continue by selecting **+ New flow** on the command bar, and then select **Instant cloud flow** from the dropdown menu.
3. Enter a flow name, select **Manually trigger a flow**, and then select **Create**.
4. The cloud flow designer appears. Find and then select the **+ New Step** button.
5. On the search bar that appears, enter *Dataverse*, and then select the **Dataverse** connector from the results.
6. Various actions are displayed. Scroll through until you find and select the **List rows** action.
7. Within the **List rows** action, select the **Show advanced options** link.

8. A FetchXML query field appears. This field is where you input the copied FetchXML query that Copilot previously generated.
9. After pasting in your FetchXML, select **Save**.
10. Test your flow by selecting **Test**.
11. Follow the prompts on your screen to start your flow manually to review its results.

## Step 3: Understand the results

Let's assume you asked Copilot 'how many failed vs succeeded flows did we have last month?' This prompt produces a [FetchXML](#) query similar to the following example:

XML

```
<fetch version="1.0" mapping="logical" aggregate="true" count="3" page="1">
  <entity name="flowsession">
    <attribute name="flowsessionid" alias="flowsession_count"
aggregate="count" />
    <attribute name="statuscode" alias="flowsession_statuscode"
groupby="true" />
    <filter type="and">
      <condition attribute="completedon" operator="last-x-months"
value="1" />
    </filter>
  </entity>
</fetch>
```

If data matches the given FetchXML query, the **List rows** Dataverse action configured in [step 2](#) returns data in a format called [JSON](#) (JavaScript Object Notation), which is essentially a method used to present data in a well organized manner, making it easy to read and write digitally.

For distribution based questions like previously mentioned, data is grouped by one or more fields (`statuscode`), together with an aggregation (`count`) that returns the number for each group (that is, `failed`, `succeeded`, and so on).

Each record returned contains fields such as:

- `flowsession_count`: The number of times the workflow ran.
- `flowsession_regardingobjectid`: The unique identifier for the flow run.
- `flowsession_statuscode`: The status of the flow run (for example, failed).
- `workflow_name`: The name of the flow.

If you want to know how many times a specific flow ran, look at the `flowsession_count` column of the record where `workflow_name` is *your flow name*.

# Understand Copilot replies on problematic prompts

This table shows default responses that are returned when Copilot is unable to understand your question, intent, or generate a valid answer.

 Expand table

Copilot reply	Details
Sorry, something went wrong. Please try again.	An unexpected error occurred. Rephrase your question and try again.
Sorry, I couldn't find any results for that query. Please try again by refining your question, or consider using a sample suggestion from the prompt guide.	The question was understood and a valid query was generated, but there's no data available to be returned.
Sorry, I couldn't understand your question. Rephrase it and try again. I'm able to answer questions that are about the data on this page. For more examples of prompts that you can ask Copilot, you can visit the prompt example section on our documentation page.	Your question couldn't be translated into a valid FetchXML query. Rephrase your question and try again.
Sorry, Copilot is at capacity and temporarily unavailable – please try again in a little while.	There are resource constraints on the backend. Retry your question after a short time.
Sorry, your message contains potentially harmful content. Please ensure your input is appropriate and try again.	The backend service blocked your question because it might include potentially harmful content. Remove any potentially harmful content from your question and try again.
Sorry, I was not able to generate a valid answer based on your question. Please rephrase it and try again. I'm able to answer questions that are about the data on this page. For more examples of prompts that you can ask Copilot, you can visit the prompt example section on our documentation page.	The generated FetchXML is invalid or that the query failed when Copilot tried to execute it. Rephrase your question and try again.
Sorry, your search includes too many results. Please refine your query and try again. For examples on how to limit search results returned by Copilot, visit our documentation page.	The filters applied to your query exceed current aggregation <a href="#">limits in FetchXML</a> . Add more appropriate filters such as only yesterday's or last month's data to ensure the query returns data within those limits.

# Known issues and limitations

The following list contains known limitations of Copilot in automation center.

- Copilot is a new technology that is still being developed. It's optimized for use with English language and support with other languages is limited. As such, parts of it might appear in English rather than your preferred language.
- Copilot is currently only available in Dataverse environments based in the United States.
- Copilot might return wrong or incomplete data and FetchXML queries.
- Copilot is initially only capable to answer questions about desktop flow activity, cloud flow activity, work queues and general product feature questions of Power Automate.
- In multi-turn conversations, Copilot keeps context of the last 10 question only. If you encounter wrong or incomplete results, consider [resetting the conversation](#).
- Multi-turn conversations aren't supported for generative answers (documentation skill).
- For queries that return large result-sets, Copilot might not be able return or render the result.

## Related information

- [Get started with Copilot in cloud flows](#)
- [FAQs for Copilot in automation center \(preview\)](#)
- [FAQ for Copilot in desktop flow activity \(preview\)](#)
- [FAQ for Copilot in cloud flows](#)
- [FAQ for Copilot in Power Automate Process Mining](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 



# Capacity utilization within Power Automate (preview)

Article • 05/01/2024

The capacity utilization page provides you with insights into how your hosted robotic process automation (RPA) capacity, process capacity, or legacy unattended RPA capacity are being used within your environment. Within the Power Automate platform, each capacity is based on a purchased add-on or license. It's [assigned to the environment](#) and allows specific Power Automate objects to carry out specific operations.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

You manage the following capacity within the capacity utilization page:

 [Expand table](#)

Capacity	Consuming Power Automate object	Consumption mode	Operation enabled
Hosted Process capacity	Hosted machine	<a href="#">Autoallocation</a>	To be created, each hosted machine requires a Hosted Process capacity allocated.
Hosted Process capacity	Hosted machine group	Manual allocation of committed bots	Every Hosted Process capacity committed to a hosted machine group guarantees the availability of a bot during autoscaling.
Process capacity (or legacy unattended RPA capacity)	Machine	<a href="#">Autoallocation</a>	Every capacity allocated to a machine allows it to carry out another unattended desktop flow run simultaneously.
Process capacity	Cloud flow	Manual allocation	Every capacity allocated to a cloud flow enables it, along with all its associated cloud flows, to use premium connectors

Capacity	Consuming Power Automate object	Consumption mode	Operation enabled
			and execute actions up to a daily limit of 250k Power Platform Requests (stackable limit).

### ⓘ Note

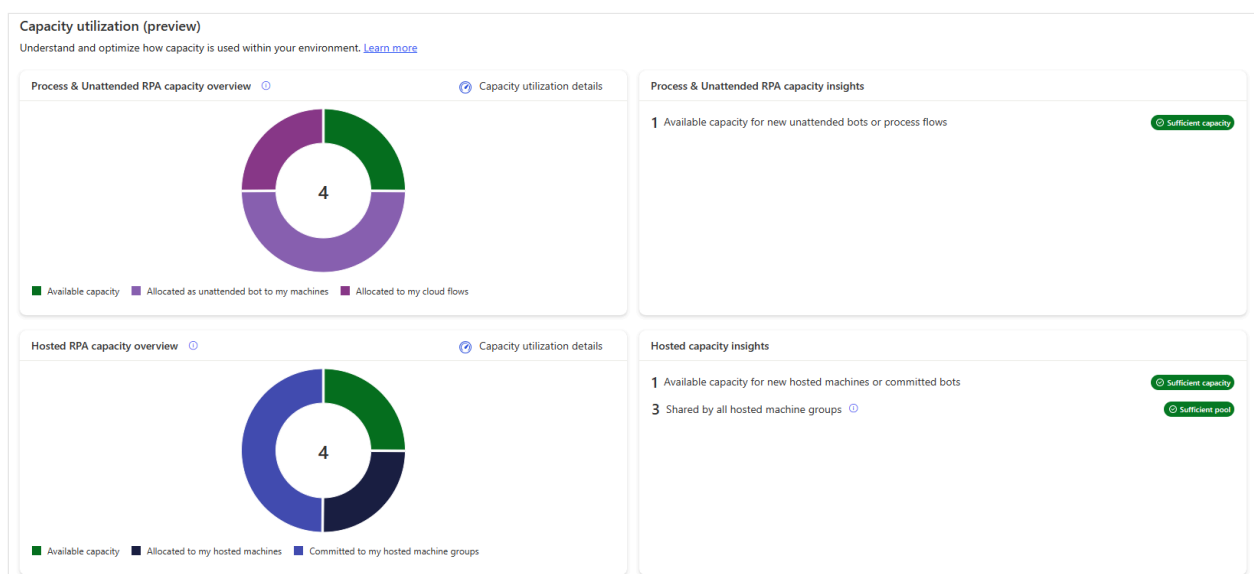
Process capacity and unattended RPA capacity (legacy) have been combined in a single pool. They can seamlessly be utilized by machines.

## Capacity utilization overview page

The capacity utilization page offers an overview of the environment-assigned capacities. It details their usage and provides suggestions and insights for more efficient management of automation and the desktop infrastructure.

The overview page provides insights for Hosted Process capacity, process capacity, or legacy unattended RPA capacity including:

- A breakdown of each capacity utilization (user's consumption / others' consumption / capacity available / capacity in overage).
- Insights and recommendation on compliance issues.



The two pie charts underscore the point that, within a given environment, capacity is a limited resource that users are sharing, necessitating prioritization of use cases.

# Per-capacity details pages

## Hosted Process capacity utilization

[Hosted Process capacity](#) allows you to run desktop flows with zero infrastructure. It's allocated to hosted machines or committed to hosted machine groups.

## Process (or legacy unattended RPA) capacity utilization

[Process capacity or legacy unattended RPA capacity](#) are needed to run desktop flows in unattended mode. Every capacity allocated to a machine allows it to carry out another unattended desktop flow run simultaneously. It can also be allocated to a cloud flow to license it independently from user license.

## Related information

[Process and unattended RPA capacity utilization \(preview\)](#)

[Hosted Process capacity utilization \(preview\)](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# Hosted Process capacity utilization (preview)

Article • 05/01/2024

The **Hosted Process capacity utilization** page provides you with insights into how your Hosted Process (previously Power Automate hosted RPA add-on) capacity is being used within your environment. As a reminder, within the Power Automate platform each Hosted Process capacity is based on a purchased [Hosted Process license](#). It's [assigned to the environment](#) and allows you to [run desktop flows with zero infrastructure](#).

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

A Hosted Process capacity can be allocated to a hosted machine or committed to a hosted machine group.

 Expand table

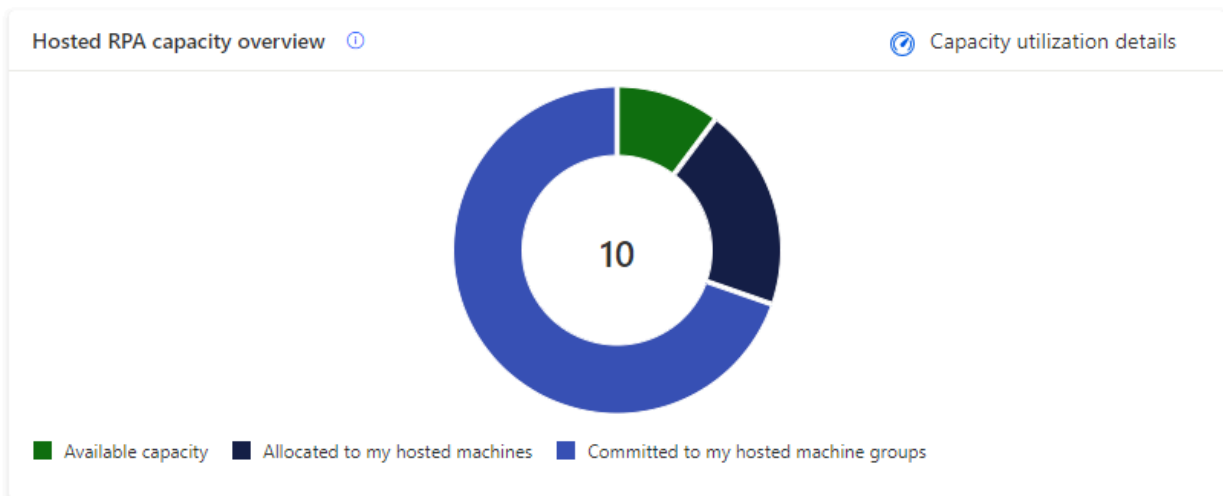
Consuming object	Description	Consumption mode
<a href="#">Hosted machine</a>	To be created, each hosted machine requires a Hosted Process capacity allocated.	Hosted Process capacity is autoallocated to hosted machine at its creation.
<a href="#">Hosted machine group</a>	Every Hosted Process capacity committed to a hosted machine group guarantees the availability of a bot during autoscaling (= committed bot). The commitment ensures that the necessary resources are always available for processing the desktop flows.	Manual allocation of committed bots on hosted machine group.

## Note

A hosted machine group with a commitment has a priority of usage on its committed bots over all concurrent hosted machine groups. More information: [Load balance hosted machine groups](#).


## Hosted Process capacity overview

The **Hosted Process capacity overview** pie chart helps you understand what's your share of the hosted capacity consumption within the environment compared to other makers. It lets you know if there's still capacity to scale-up in the future and alerts you when your objects are exceeding environment capacity.



[Expand table](#)

-	Legend	Description
■	Allocated to my hosted machines	Compliant capacity allocated to hosted machines, which the user owns or which are shared with them.
■	Committed to my hosted machine groups	Compliant capacity committed to hosted machine groups, which the user owns or which are shared with them.
■	Utilized by other makers	Compliant capacity allocated or committed to objects, which the user doesn't own and which weren't shared with them.
■	Available capacity	Available capacity for new hosted machines or new committed bots on hosted machine groups.
■	My overage utilization	Sum of capacities over-allocated to hosted machines and over-committed to hosted machine groups, which the user owns or which are shared with them.

-	Legend	Description
	Overage by other makers	Sum of capacities over-allocated and over-committed to objects, which the user doesn't own and which weren't shared with them.

## Hosted Process capacity insights

The 'Hosted capacity insights' card informs you of operation health and provides you with recommendations if there are compliance issues.

Hosted capacity insights

- 1 Available capacity for new hosted machines or committed bots Sufficient capacity
- 8 Shared by all hosted machine groups Sufficient pool

 Expand table

Badge	Message	Insight
Sufficient capacity	There's available capacity for new hosted machines or new committed bots on hosted machine groups.	Scale-up is possible in the future.
Fully utilized	There's no more capacity for new hosted machines or new committed bots on hosted machine groups.	The capacity utilization rate is optimal at 100% but there's no room for scaling-up.
Capacity overage	User has over-allocated capacity to their hosted machines or/and over-committed bots to their hosted machine groups.	Uncompliant capacity usage exceeding environment capacity.
Sufficient pool	There's a nonempty pool of capacity shared by all hosted machine groups.	All hosted machine groups theoretically have access to at least one bot.
Empty pool	The capacity pool shared by all hosted machine groups is empty.	Hosted machine groups can't spin-up bots when needed. All automations based on them are going to fail.

### ⓘ Note

- All hosted machine groups share a pool of hosted capacity made of the available capacity and the compliant committed capacity within the environment (which value can be retrieved on the overview pie chart).
- For example, one available capacity (non-allocated to a hosted machine and non-committed to a hosted machine group) is pooled between all the hosted machine groups with a first arrived first served behavior.
- Having a non-empty pool isn't always a guarantee of good health depending on the number of hosted machine groups relying on the pool, the intensity of runs they perform, and their relative schedule.

## Hosted Process utilization details

In this section, you learn how to oversee and manage all hosted machines and hosted machine groups you have access to (as owner or through sharing).

## Hosted machines

My utilization details ⓘ

Hosted machines Hosted machine groups

Name ↑	Owner ↑	State	Allocated bots	Attended runs (30 days) ↑	Unattended runs (30 days) ↑
Adatum machine	 David Beaulieu	Active	1	850	740
Contoso trial machine	 Corey Grey	Active	0	1000	800

### ⓘ Note

- Every hosted machine gets auto-allocated one hosted capacity at creation except for hosted machines based on trial user license and hosted machines provisioned with an error.
- Hosted machines can be, when necessary (in case of overage), prioritized based on their attended and unattended runs.

## Hosted machine groups

Hosted machines **Hosted machine groups**

Name ↑	Owner ↑	Committed bots ↑	Max bots ↑	Active bots ↑	Unattended runs (30 days) ↑
Adatum machine group	David Beaulieu	2	4	1	8600

**Note**

- The **Active bots** column refers to machines currently spin-up and consuming hosted capacity from the shared pool.
- Hosted machine groups can be, when necessary in case of overage, prioritized based on their unattended runs.

## Hosted Process capacity overage

Capacity overage in an environment occurs when the capacity utilized by hosted machines and hosted machine groups surpasses the assigned capacity of the environment. In such instances, specific hosted machines and/or hosted machine groups might be identified as exceeding capacity. To prevent disruption, it's crucial to promptly rectify the situation.

Capacity utilization (preview) > **Hosted RPA capacity**  
 Understand and optimize how capacity is used within your environment.

**Hosted RPA capacity overview** ⓘ

■ My overage utilization ■ Utilized by other makers ■ Overage by other makers

**Hosted capacity insights** 🔧 Fix capacity

- 0 Available capacity for new hosted machines or committed bots 🔗 Fully utilized
- 0 Shared by all hosted machine groups ⓘ
- 1 Over-committed capacity to my hosted machine groups 🔗 Capacity overage
- 1 Over-allocated capacity to my hosted machines 🔗 Capacity overage

## Hosted machine in overage

Hosted machines identified in overage risk being turned-off after a grace period.

**Hosted machines** Hosted machine groups

Name ↑	State	Allocated bots	Attended runs (30 days) ↑	Unattended runs (30 days) ↑
Contoso machine <div style="border: 1px solid gray; padding: 2px; font-size: 8px; margin-left: 10px;">                         This hosted machine is over-consuming 1 hosted RPA capacity.                     </div>	Active	1	5000	15000



# Hosted machine group in overage

Hosted machine groups don't honor their over-committed bots expected behavior.

My utilization details [ⓘ](#)

Hosted machines		Hosted machine groups			
Name ↑		Committed bots ↑	Max bots ↑	Active bots ↑	Unattended runs (30 days) ↑
Contoso machine group	Corey Grey	2	2	0	750

This hosted machine group has 2 over-committed bot(s).

## ⓘ Note

A hosted machine group can have a subset of its committed bots identified as in overage (= over-committed), in that case, only the compliant committed bots are honored.

## How to fix hosted capacity overage?

When you own some hosted machines or hosted machine groups in overage, or when the hosted pool is empty, the **Fix capacity** button appears in the **Hosted capacity insights** card:

Expand table

**Fix capacity - Button**

**Hosted capacity Insights** Fix capacity

0	Shared by all hosted machine groups <a href="#">ⓘ</a>	Empty pool
1	Over-committed capacity to my hosted machine groups	Capacity overage
0	Available capacity for new hosted machines or committed bots	Fully utilized

It provides a list of corrective actions:

### Fix capacity - Corrective actions

## Fix capacity ✕

There is no shared capacity for your hosted machine group(s) and they can't spin up bots without it. We recommend having 1 capacity shared per hosted machine group in your environment. [Learn more](#)

You have 1 over-committed bot(s). Over-committed bots are not applied meaning that affected hosted machine groups won't fulfill their expected committed behavior. [Learn more](#)

**Please try the following to fix the issue:**

- Request more hosted capacity for the environment
- Delete some hosted machines to free hosted capacity
- Reduce the committed bots on HMGs to free hosted capacity

 Request capacity

Cancel

The **Request capacity** action submits a request to the tenant administrator for assignation of capacity to the environment:

## Fix capacity - Request capacity

### Request capacity ×

! You need at least 1 Hosted capacity to fix the environment overage situation. ×

Ask your admin to purchase or allocate some Power Automate capacity to your environment.  
[Learn more](#)

**Request quantity \***  
Select the number of capacity you want to request.

^  
v

**Message your admin \***

**Capacity type \***

Process capacity (replacing Unattended RPA capacity)  Hosted RPA capacity

### ! Note

- The preset value in the request capacity modal dialog is equal to the total overage value in the environment (the user's overage and the other users' overage).
- This preset value ensures that when the additional capacity is assigned to the environment, the user who made the request have their hosted machines or hosted machine groups returned back to compliance.
- If the user submits a smaller request, when the additional requested capacity is provisioned to the environment, there's no guarantee that their own hosted machines or hosted machine groups will return to compliance. The extra capacity might be allocated to other in-overage hosted machines / hosted machine groups owned by different users.


**What are the rules governing which objects are identified as in overage?**









When the total Hosted Process capacity assigned to an environment is inferior to the combined capacity allocated to hosted machines and committed to hosted machine groups:

- First, the overage is identified on the committed capacity of hosted machine groups, starting from the most recently created committed bot setting to the oldest.
- Second, the overage is identified on the allocated capacity of hosted machines, starting from the most recently created machine to the oldest.






## Permissions required to view and edit capacity allocation

To view and edit capacity allocation, you need a security role with privileges to the **Flow Capacity Assignment** table. For example, the Environment Maker role can view and edit allocation of hosted capacity.

 **Security Role: Environment Maker** Working on solution: Default Solution

Details	Core Records	Sales	Service	Business Management	Service Management	Customization	Missing Entities	Business Process Flows	Custom Entities	
Table			Create	Read	Write	Delete	Append	Append To	Assign	Share
Flow Capacity Assignment										

**Key**

 None Selected	 User	 Business Unit	 Parent: Child Business Units	 Organization
---------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------

## Using Hosted Process capacity as process capacity

The Hosted Process capacity can be used as process capacity to enable standard machines to run desktop flows in unattended mode. In an environment with Hosted Process capacity, this Hosted Process capability enables the creation of overage process capacity allocation to machines and/or cloud flows. These in-overage machine or cloud flows operate as efficiently as any other process, without any performance issues. This mechanism is temporary and will be replaced by a more explicit behavior.

## Related information

[Capacity utilization within Power Automate](#)

---

# Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Process and unattended RPA capacity utilization (preview)

Article • 03/21/2024

The Process and Unattended RPA capacity utilization page provides you with insights into how your process capacity or legacy unattended RPA capacity is being used within your environment. As a reminder, within the Power Automate portal each Process capacity is based on a purchased [process license](#) and each legacy Unattended RPA capacity is based on an [unattended RPA add-on](#). Those capacities are [assigned to the environment](#) by the admin.

## Important

- This is a preview feature.
- Preview features aren't meant for production use and may have restricted functionality. These features are available before an official release so that customers can get early access and provide feedback.

Process capacity or legacy unattended RPA capacity can be allocated to a machine or to a cloud flow. When allocated to a machine, it becomes an unattended bot. Each unattended bot on a machine can carry one unattended desktop flow run at a time. So if a machine needs to execute multiple unattended runs simultaneously, it needs as many unattended bots as it has simultaneous unattended runs to perform. When allocated to a cloud flow, it becomes a Process plan based on which the cloud flow is licensed to run premium actions independently from the user license.

 Expand table

Before allocation	Consuming object	After allocation	Description	Allocation mode
Process capacity	<a href="#">Machine</a>	Unattended bot	Every unattended bot on a machine allows it to carry out an additional unattended desktop flow run simultaneously.	Capacity is auto-allocated to the machine at unattended desktop flow runtime or can be manually allocated by the user.
Process capacity	Cloud flow	Process plan	Every Process plan allocated to a cloud flow allows it to run premium	Capacity is manually allocated to the cloud flow by the user.

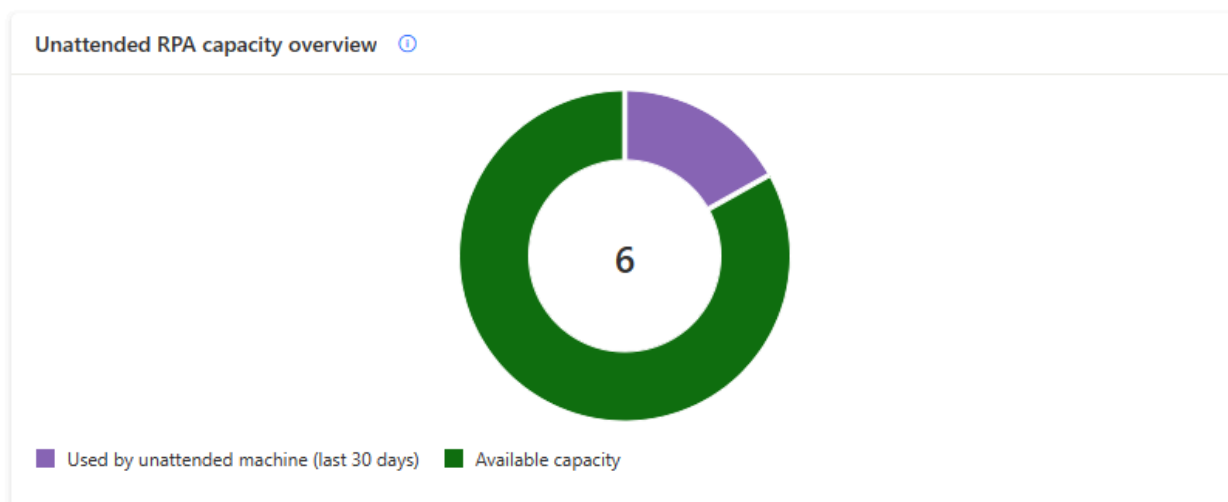
Before allocation	Consuming object	After allocation	Description	Allocation mode
			actions independently from the user license.	

### ⓘ Note

Process capacity and Unattended RPA capacity have been combined in a single capacity pool and can be used interchangeably within the Power Automate platform. They have exactly the same value and role.




## Process & Unattended RPA capacity overview

The **Process & Unattended RPA capacity overview** pie chart helps you understand the capacity consumption within the environment, lets you know if there's still capacity to scale-up in the future, and alerts you when the utilized capacity is exceeding environment capacity (= overage).



[Expand table](#)

-	Legend	Description
	Allocated as unattended bots to my machines	Compliant capacity allocated to machines, which the user owns or which are shared with them.
	Allocated to my cloud flows	Compliant capacity allocated to cloud flows, which the user owns or which are shared with them.
	Utilized by other makers	Compliant capacity allocated to objects, which the user doesn't own and which weren't shared with them.

-	Legend	Description
	Available capacity	Available capacity for new unattended bots on machines and new process plan on cloud flows.
	My overage utilization	Sum of capacities over-allocated to machines or/and to cloud flows, which the user owns or which are shared with them.
	Overage by other makers	Sum of capacities over-allocated to objects, which the user doesn't own and which weren't shared with them.

## Process and Unattended RPA capacity insights

The **Process and Unattended RPA capacity insights** card informs you of operation health and gives recommendations when there are compliance issues.

**Process & Unattended RPA capacity insights**

1 Available capacity for new unattended bots or process flows Sufficient capacity





 [Expand table](#)

Badge	Message	Insight
Sufficient capacity	There's available capacity for new unattended machines or for new process plans on cloud flows.	Scale-up possible in the future.
Fully utilized	There's no more capacity for new unattended bots or for new process plans on cloud flows.	The capacity utilization rate is optimal at 100% but there's no room for scaling-up.
Capacity overage	User has over-allocated capacity to their machines or/and to their cloud flows.	Uncompliant capacity usage exceeding environment capacity.

## Process and Unattended RPA utilization details



In this section, you learn how to oversee and manage all machines you have access to (as owner or through sharing).

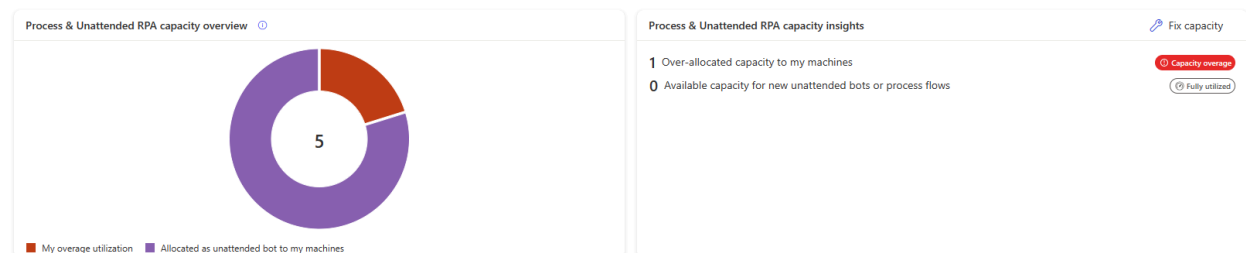
Machine name ↑	Owner ↑	Group	Unattended bots ↓	Enable auto-allocation ↑	Unattended runs (30 days) ↑
Machine A	 Carlos Slattery	-	1/1	✓	3500
Machine B	 Allan Munger	InvoGroup	1/2	✓	740
Machine C	 Robert Tolbert	-	1/2		800
Machine D	 Henry Brill	-	2/3	✓	450

### ! Note

By selecting a machine, you can edit its unattended bots setting and its auto-allocation setting. Machines can be, when necessary (in case of overage), prioritized based on their unattended runs. Cloud flows using process capacity will be added to the page in a future release

## Capacity overage

Capacity overage in an environment occurs when the capacity utilized by the unattended bots on machines and the process plans on cloud flows surpasses the assigned capacity of the environment. In such instances, specific machines and/or cloud flows might be identified as exceeding capacity. To return to compliance, it's important to promptly rectify the situation.



### ! Note

- Process capacity overage is only possible in an environment where some process capacity or unattended RPA capacity has been allocated
- Process capacity overage is also possible in an environment where some hosted RPA capacity has been allocated

# Machine in overage

Machines identified in overage aren't compliant.

My utilization details [🔗](#)

Machine	Group	Unattended bots	Enable auto-allocation	Unattended runs (30 days)
Machine A	-	1/1	✓	3500
Machine B	InvoGroup	1/2	✓	740
Machine C	-	1/2		800
Machine D	-	2/3	✓	450

*Note: Machine A has a tooltip: "This machine has 1 over-allocated unattended bot(s)." and a warning icon.*

## ⚠️ Note

A machine can have a subset of its unattended bots identified as in overage (= uncompliant)

# How to fix Process and Unattended RPA capacity overage

When some unattended machines are in overage, the **Fix capacity** button appears in the **Process & Unattended RPA capacity insights** card.

**Process & Unattended RPA capacity insights** [🔧 Fix capacity](#)

- 1** Over-allocated capacity to my machines 🔴 Capacity overage
- 0** Available capacity for new unattended bots or process flows 🟢 Fully utilized

The card provides potential corrective actions.

## Fix Capacity



You have 1 over-allocated capacity to your machine(s). To return to compliance, you should take corrective actions. [Learn more](#)

Please try the following to fix the issue:

- Request more process capacity for the environment
- Reduce the unattended bots on your machines to free some capacity
- Reduce the process capacity on your cloud flows to free some capacity

The **Request capacity** action submits a request to the tenant administrator for the consideration of assigning capacity to the environment.

## Request capacity



You need at least 1 Process capacity to fix the environment overage issue.

Ask your admin to purchase or allocate some Power Automate capacity to your environment. [Learn more](#)

Select the number of capacities you want to request.

Enter a message for your admin \*

Capacity type

- Process capacity / Unattended RPA capacity  Hosted RPA capacity

### Note

- The preset value in the request capacity modal dialog is equal to the total overage value in the environment (the user's overage and the other users' overage).
- This preset value ensures that when the additional capacity is assigned to the environment, the user who made the request have their machines or returned

back to compliance.


- If the user submits a smaller request, when the additional requested capacity is provisioned to the environment, there's no guarantee that their own machines will return to compliance. The extra capacity might be allocated to other in-coverage machines owned by different users.









## What are the rules governing which objects are identified as in overage?

When the total Process capacity assigned to an environment is inferior to the combined capacity allocated to machines and cloud flows: the overage is identified, on machines and cloud flows indistinctively, starting from the most recently created allocation to the oldest.






## Permissions required to view and edit capacity allocation

To view and edit capacity allocation, you need a security role with privileges to the **Flow Capacity Assignment** table. For example, the Environment Maker role can view and edit allocation of hosted capacity.

 **Security Role: Environment Maker** Working on solution: Default Solution

Details	Core Records	Sales	Service	Business Management	Service Management	Customization	Missing Entities	Business Process Flows	Custom Entities
Table		Create	Read	Write	Delete	Append	Append To	Assign	Share
Flow Capacity Assignment									

**Key**

 None Selected	 User	 Business Unit	 Parent: Child Business Units	 Organization
---------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------

## Related information

[Capacity utilization within Power Automate \(preview\)](#)

## Feedback

Was this page helpful?

 Yes

 No

Provide product feedback [↗](#)

# How to use process capacity

Article • 03/21/2024

## ⓘ Note

Process capacity and unattended RPA capacity have been combined in a single capacity pool and can be used interchangeably within the Power Automate platform. They have exactly the same value and role.

Within the Power Automate portal:

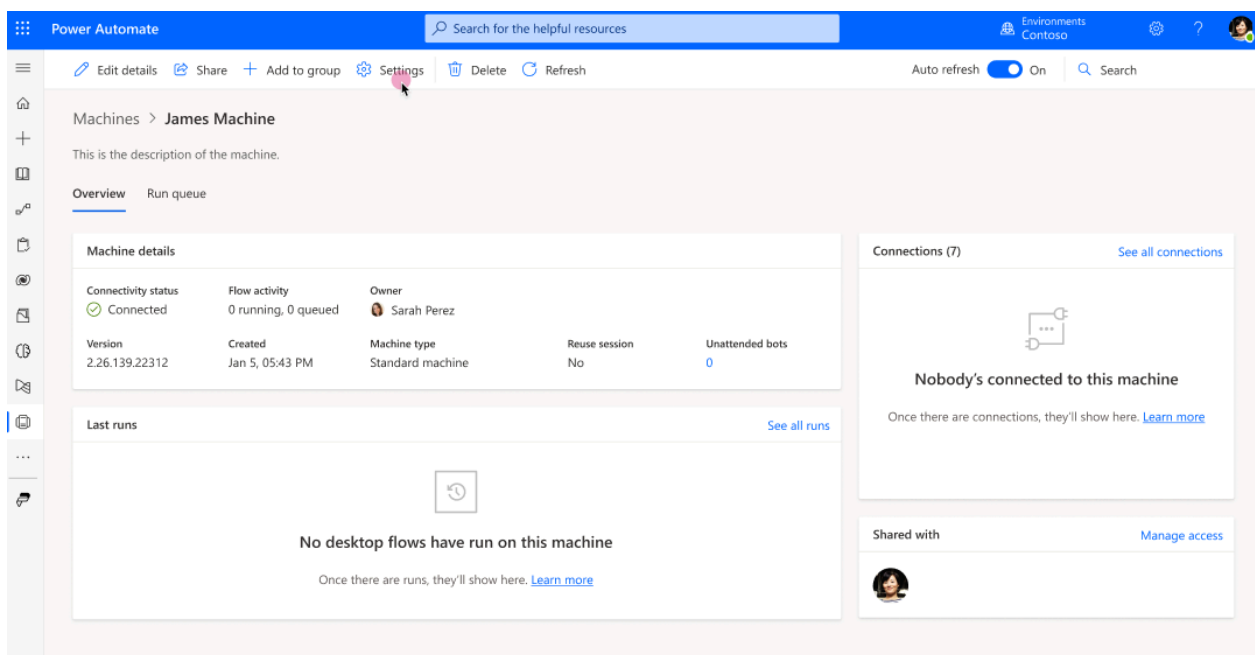
- Process capacity is based on a purchased [process license](#).
- Legacy unattended RPA capacity is based on an [unattended RPA add-on](#).

Process capacity or legacy unattended RPA capacity can be allocated to a machine or to a cloud flow.

## Allocate process capacity to a machine

When process capacity is allocated to a machine, it becomes an *unattended bot*. Each unattended bot on a machine can carry one unattended desktop flow run at a time. So if a machine needs to execute multiple unattended runs simultaneously, it needs as many unattended bots as it has simultaneous unattended runs to perform.

To allocate process capacity to a machine, go to the machine details page and select **Settings**.



The screenshot shows the Power Automate portal interface. At the top, there's a search bar and navigation icons. The main content area is titled 'Machines > James Machine'. Below the title, there are tabs for 'Overview' and 'Run queue'. The 'Overview' tab is active, showing a table of machine details. A red circle highlights the 'Settings' icon in the top navigation bar. The machine details table includes fields for Connectivity status, Flow activity, Owner, Version, Created, Machine type, Reuse session, and Unattended bots. The 'Connections (7)' section shows 'Nobody's connected to this machine'. The 'Last runs' section shows 'No desktop flows have run on this machine'. The 'Shared with' section shows a user profile.

Machine details	
Connectivity status	Flow activity
Connected	0 running, 0 queued
Version	Created
2.26.139.22312	Jan 5, 05:43 PM
Owner	Machine type
Sarah Perez	Standard machine
Reuse session	Unattended bots
No	0

Use the **Unattended bots** slider to allocate some process capacity to the machine and save.

The screenshot shows the Power Automate interface for a machine named 'James Machine'. The 'Settings' panel is open, showing the 'Unattended bots' slider set to 1. The 'Available capacity in the environment' is 3. The 'Machine max bot supported' is 2. The 'Machine details' table shows the following information:

Connectivity status	Flow activity	Owner	Reuse session	Unattended bots
Connected	0 running, 0 queued	Sarah Perez	No	0

The 'Last runs' section shows a message: 'No desktop flows have run on this machine. Once there are runs, they'll show here. [Learn more](#)'.

You now have a machine that can perform unattended RPA.

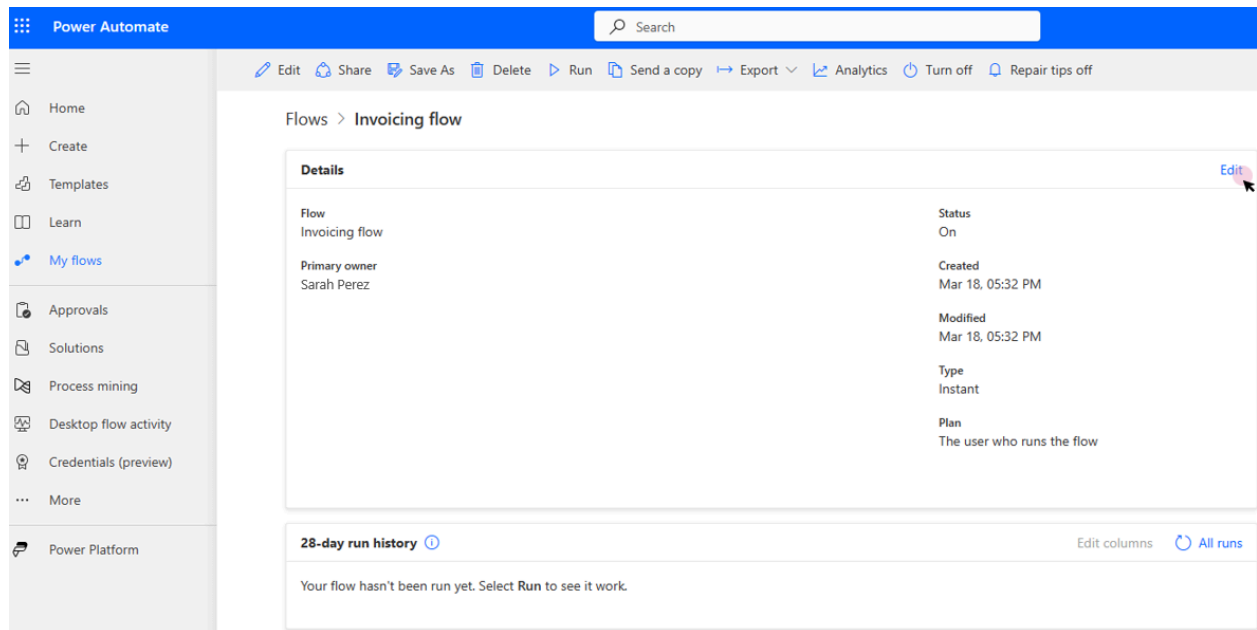
### ! Note

- **Machine max bot supported** depends on your machine and its OS. The maximum value this parameter can reach is 10 (for some Windows Servers).
- **Available capacity in the environment** shows how many unattended bots can still be created. Keep in mind that the process capacity is a shared resources between all users within an environment and so use only what you need.
- **Enable auto-allocation** allows unattended bots to automatically be allocated to a machine when an unattended run requires it. Multiple unattended bots can be auto-allocated in case of simultaneous unattended runs.
- For a global overview on how process capacity is used within the environment, use the **Manage capacity utilization** link. It also provides the option to request more capacity.

## Allocate process capacity to a cloud flow

When process capacity is allocated to a cloud flow, it becomes a *process plan* based on which the cloud flow is licensed to run premium actions independently from the user license.

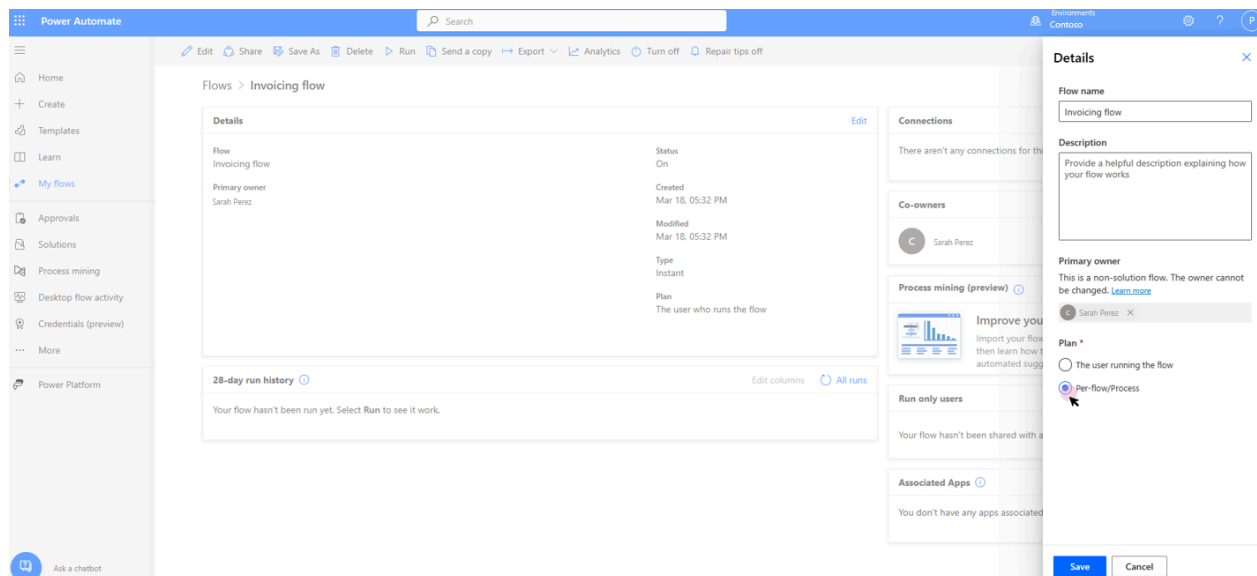
To allocate a Process capacity to a cloud flow, go to the cloud flow details page and select **Edit**.



### ⓘ Note

At creation, a cloud flow is by default based on the user plan.

Change the plan used by the flow to **Per-flow/Process** and save.



The cloud flow is now independent from the user license.

### ⓘ Note

The process capacity allocation to cloud flow will be updated in a future release.



# Related information

[Process capacity utilization](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Power Automate sign-up FAQ

Article • 08/21/2023

This article answers some common questions about how users in your organization can use Power Automate and how you can control the Power Automate service.

## Sign up for Power Automate

### What is Power Automate?

Power Automate is a public cloud service that helps you and your teams to set up automated workflows between your favorite apps and services. Power Automate allows you to synchronize, get notifications, collect data, and more.

### How can I sign up for Power Automate?

1. Open [Power Automate](#).
2. At the upper-right corner of the page, select **Try free**.
3. Enter your information.

[Sign up for Power Automate.](#)

### What is the Power Automate free license?

The Power Automate free license is used only for tracking purposes. Enabling or disabling it has no effect on your ability to create flows. If you disable the Power Automate free license, it becomes enabled again when you sign in. This behavior is expected.

### Can I block another person from signing up for Power Automate?

Power Automate is a fully public cloud service. Everyone in the world can sign up and use it to automate their day-to-day tasks. There isn't a requirement that someone have or use a Microsoft 365 account to use Power Automate. For that reason, there's no way to block someone from using it.

If a person signs up for Power Automate who is outside your organization, they can't incur costs to your company. When an individual signs up for Power Automate, the

relationship is between that individual and Microsoft. Many other cloud services from Microsoft, such as Bing, OneDrive, and Outlook.com, operate the same way. Your use of Power Automate doesn't imply that the service is provided by your organization.

A company can restrict the use of organization-only data inside of Power Automate through [data loss prevention \(DLP\) policies](#).

## How can people gain access to the paid features of Power Automate?

Individuals can gain access to the paid features of Power Automate in three ways:

1. They can individually sign up for a Power Automate trial license for 90 days at no cost.
2. You can assign a Power Automate license to them in the [Microsoft 365 admin center](#).
3. They're assigned a Microsoft 365 and Dynamics 365 plan that includes access to Power Automate. For the list of Microsoft 365 and Dynamics 365 plans that include Power Automate capabilities, refer to the [Power Automate pricing page](#).

## Can I block another person from using the paid features of Power Automate?

Any individual can try out the paid features of Power Automate for 90 days without incurring any costs. You can manage assignment of your organization's perpetual paid licenses in the Microsoft 365 admin portal.

As with the free offerings, if an individual signs up for the trial, the relationship is between the individual and Microsoft.

## Administrate Power Automate

### Why has the Power Automate icon appeared in the Microsoft 365 app launcher?

Power Automate is a fundamental part of the Microsoft 365 suite. It's enabled as a service as part of all Microsoft 365 SKUs. Because users everywhere in the world can use Power Automate, it appears in the app launcher for them.

# How do I remove Power Automate from the app launcher for my organization?

If a user was assigned a Power Automate license, unassign the user's license to remove the Power Automate icon from the app launcher. This action removes the Power Automate tile by default. A user may still choose to use Power Automate as an individual.

1. Sign in to the [Microsoft 365 admin center](#).
2. On the left side panel, select **Users > Active Users**.
3. Find and select the name of the user for whom you want to remove the license.
4. On the user details pane, select the **Licenses and Apps** tab.
5. Clear the license for Power Automate.
6. Select **Save changes**.

You can also [use PowerShell to remove licenses in bulk](#) and [use PowerShell to disable access to services](#).

## ⓘ Note

This action removes the Power Automate tile by default. A user might still choose to use Power Automate as an individual.

## Why did 10,000 licenses for Power Automate show up in my Microsoft 365 tenant?

Any person can try out Power Automate for free. These licenses represent the available capacity for new Power Automate users in your tenant. There isn't a charge for these licenses.

If at least one user in your tenant has signed up for a **Microsoft Power Automate Free** license, 10,000 licenses (minus any assigned) are available under **Billing > Licenses** for your organization.

You can assign more licenses to users in the Microsoft 365 admin portal.

## Is this free? Will I be charged for these licenses?

No user can incur any cost to your organization without your express consent. Free and trial licenses can't cause any charges to your organization.

## I removed the Power Automate free license. Why can users still access it?

The Power Automate free license is included only for tracking purposes. It isn't possible to prevent another person from using Power Automate for individual purposes.

## Why can't I see all Power Automate licenses in the Microsoft 365 admin portal?

Users can use Power Automate either as individuals or as a part of their organization. Licenses at the organization level are always visible in the Microsoft 365 admin portal. However, if a user signs up for a trial as an individual, then their Microsoft 365 admin doesn't manage the trial and it doesn't show up in the portal.

## How does an individual find out what plan they are on?

1. Sign in to [Power Automate](#).
2. At the upper-right corner of the page, select your profile picture.
3. Select **View account**.
4. Select the **Subscriptions** tile.
5. Under the **Licenses** section, search for **Power Automate**.

## Will Power Automate signup affect the identities in my organization?

If your organization already has a Microsoft 365 environment and all users in your organization have Microsoft 365 accounts, then identity management isn't affected.

If your organization already has a Microsoft 365 environment, but not all users in your organization have Microsoft 365 accounts, then we create a user in the tenant. We also assign licenses based on the user's work or school email address. The number of users you're managing at any time grows as users in your organization sign up for the service.

If your organization doesn't have a Microsoft 365 environment connected to your email domain, there's no change in how you manage identity. Users are added to a new, cloud-only user directory, and you can take over as the tenant admin and manage them.

## Power Automate created a tenant. How do I manage it?

First, join the tenant. Then, promote yourself to the admin role, if it hasn't already been claimed, by verifying domain ownership.

1. Sign up for Power Automate using an email address domain that matches the tenant domain you want to manage.

For example, if Microsoft created the contoso.com tenant, then join the tenant with an email address that ends with @contoso.com.

2. Go to <https://admin.microsoft.com>.
3. Select the app launcher icon in the upper-left corner of the page, and then select **Admin**.
4. Read the instructions on the **Become the admin** page, and then select **Yes, I want to be the admin**.

If this option doesn't appear, a Microsoft 365 administrator is already in place.

```
> [!TIP]
> If this option doesn't appear, an Office 365 administrator is already
in place.
```

## If I have multiple domains, can I control the Microsoft 365 tenant that users are added to?

If you do nothing, a tenant is created for each user email domain and subdomain.

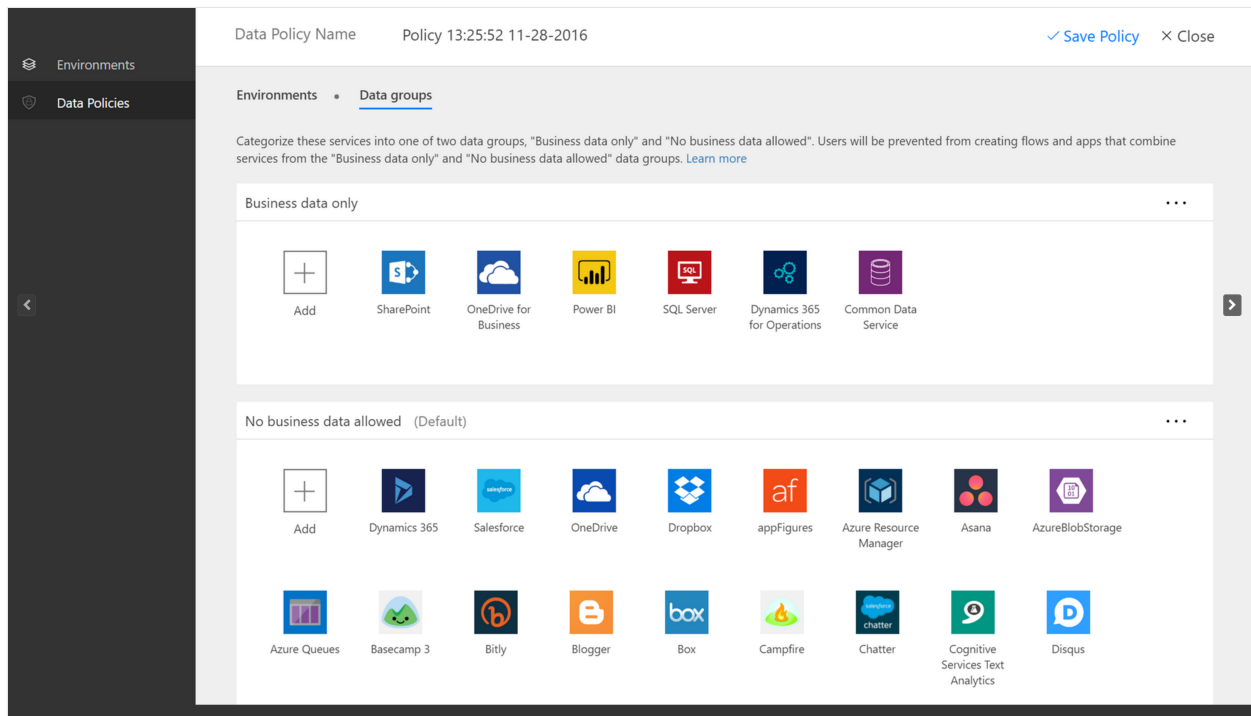
If you want all users to be in the same tenant regardless of their email domain, create a target tenant ahead of time or use an existing tenant. Add all the existing domains and subdomains that you want consolidated in that tenant. Then all the users with email addresses ending in those domains and subdomains automatically join the target tenant when they sign up.

### Important

There isn't a supported automated way to move users across tenants. [Learn about adding users and domains to Microsoft 365](#).

# How can I restrict my users' ability to access my organization's business data?

Power Automate allows you to create data zones for business and nonbusiness data, as shown in the following screenshot. After you implement these [data loss prevention policies](#), users can't design or run Power Automate flows that combine business and nonbusiness data.

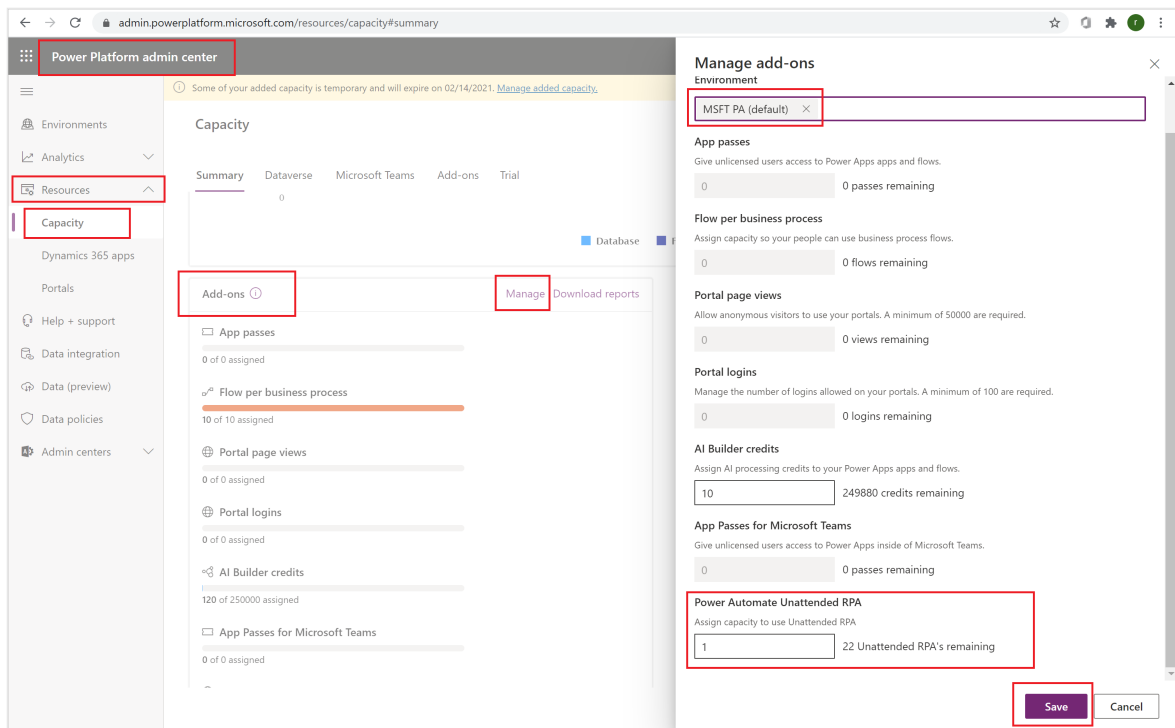


There isn't a supported automated way to move users across tenants. To learn about adding domains to a single Office 365 tenant, go to [Add your users and domain to Office 365](#).

## Manage Power Automate RPA licenses

### How can I apply unattended RPA licenses to my flow?

1. The tenant admin must purchase or get a trial version of the unattended RPA add-on capacity for the tenant in the [Microsoft 365 admin portal](#).
2. The environment admin must assign the available paid or trial unattended add-on capacities to a specific environment.



3. Makers can now run unattended desktop flows in the environment that has the unattended capacity.

The unattended add-on is environment-specific. If you have multiple environments that need to run unattended RPA, you need to assign add-on capacity to each of them.

Also, if you need to run multiple unattended desktop flows in parallel in a single environment, you need to assign the right number of unattended add-ons to the environment to support the flow runs.

1. The tenant admin must purchase or get trial a version of the **Power Automate Process** plan (previously Power Automate Unattended RPA add-on) capacity for the tenant. The tenant admin can do this from the [Microsoft 365 admin portal](#) . Just search the purchase services page for the license.
2. The environment admin must assign the available (paid or trial) capacities to a specific environment.



The screenshot displays the Power Platform admin center interface. On the left, the navigation menu includes 'Home', 'Environments', 'Analytics', 'Billing (Preview)', 'Resources', and 'Capacity'. The main area shows the 'Capacity' management page for an environment named 'MSFT PA'. A table lists various add-ons and their capacities, with 'Power Automate Process' highlighted. The 'Manage add-ons' panel on the right shows the 'Power Automate Process' add-on with a value of 1 and 24 bots remaining.

3. Makers can now run unattended desktop flows within the environment that has the Process license assigned.

### ! Note

The Process license is environment-specific. So, if you have multiple environments that need to run unattended RPA, you need to assign licenses to each of them. You need to assign one Process license per machine that is used for unattended desktop flows. If you need to run multiple unattended desktop flows in parallel on a machine, you will also need to assign one Process license for each additional Desktop Flow you want to run concurrently on the machine.

## What are the prerequisites for using RPA?

- You must have an environment that has Microsoft Dataverse enabled.
- You must have a work or school account. You can't start a trial with a personal account.
- The admin needs a paid or trial attended plan or a per-flow plan to start an unattended trial.

## How can I check which license I'm using?

Press Ctrl+Alt+A in Power Automate to check your license status. There isn't a way to check license status in the user interface. The admin needs a paid or trial Power Automate Premium (previously Power Automate per user with attended RPA) or a Power Automate Process plan (previously Power Automate per flow) before they can turn on to start an unattended trial.

## Can trials be disabled for a tenant?

Tenant admins can use PowerShell to disable all trial activations for a tenant.

## How can I start an unattended trial?

1. Select **Purchase services** in the Microsoft 365 admin center, and then search for **Power Automate Process**.
2. Select **Power Automate unattended RPA add-on Trial**.
3. Select **Get free trial**.

## Assign unattended RPA add-on capacity to an environment

Only admins can assign unattended trial capacity. Assign add-on capacity to each environment that needs to run RPA unattended. Make sure you assign enough capacity if you intend to run desktop flows in parallel.

1. [Get the add-on](#).
2. Sign in to the [Power Platform admin center](#) <sup>↗</sup>.
3. Select **Power Automate Process plan**
4. Select **Get free trial**.

## Assign Power Automate Process plan (previously Power Automate process flow) capacity to an environment

Before you can assign capacity, such as trial licenses, you must [get the Process licences](#).

1. Go to the [Power Platform admin center](#) <sup>↗</sup>.
2. Select **Resources > Capacity > Manage**.

Environments

Analytics

Resources

**Capacity**

Dynamics 365 apps

Portals

Help + support

Data integration

Data (preview)

Data policies

Admin centers

Some of your added capacity is temporary and will expire on 08/23/2021. [Manage added capacity.](#)

### Capacity

Summary Database Microsoft Teams Add-ons Trial

0.16% available

Database used 115.94 TB

File used 34.58 TB

Log used 39.29 TB

Org (tenant) default	10 GB
User licenses	153.96 TB
Additional capacity	36.15 TB
<b>Total</b>	<b>190.12 TB</b>

Add-ons

**Manage** Download reports

App passes

100 of 0 assigned

Flow per business process

11 of 11 assigned

Portal page views

5000000 of 5300000 assigned

Portal logins

100000 of 100000 assigned

AI Builder credits

1784788660 of 1784788664 assigned

3. Select the environment to which you want to assign the Power Automate Process licenses, assign the capacity, and then select **Save**.

Power Platform admin center

Capacity

Database Microsoft Teams **Add-ons** Trial

See where your org is using add-ons and assign them to environments. [Learn more](#)

Environment	App passes	Flow per busi...	Portal page vi...	Portal logins	AI Builder cre...	App Passes fo...
MSFT PA	0	0	0	0	0	0

Manage add-ons

0 3275000 credits remaining

**Power Pages anonymous capacity**  
Allow anonymous users access to Power Pages Website. A minimum of 200 are required.

0 0 remaining

**Power Pages authenticated capacity**  
Allow authenticated users access to Power Pages Website. A minimum of 25 are required.

0 0 remaining

**Power Pages page views (legacy)**  
Allow anonymous users access to your website. A minimum of 50000 are required.

0 0 views remaining

**Power Pages logins (legacy)**  
Allow external authenticated users access to your website. A minimum of 100 are required.

0 0 logins remaining

**App Passes for Microsoft Teams**  
Give unlicensed users access to Power Apps inside of Microsoft Teams.

0 0 passes remaining

**Power Automate Unattended RPA**  
Assign capacity to use Unattended RPA.

0 23 Unattended RPA's remaining

**Power Automate hosted RPA**  
Assign capacity to use hosted RPA.

0 323 hosted RPA's remaining

**Power Automate Process**  
Assign capacity add-ons to Cloud flows or to machines for unattended RPA.

1 24 bots remaining

Save Cancel

! Note

- You'll need to assign capacity to each environment that needs to run unattended RPA.
- You'll need to ensure you assign enough capacity if you'll run desktop flows in parallel.
- Only admins can assign the capacity.

# Enable experimental features in Power Automate

Article • 02/09/2023

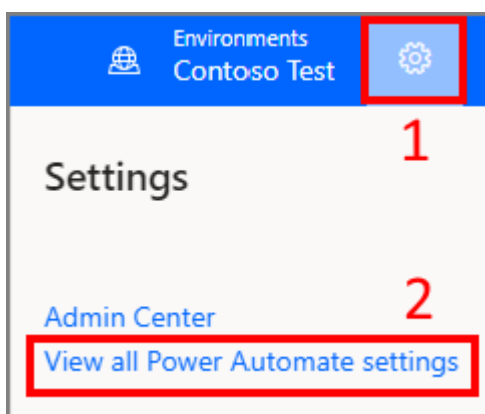
Experimental features provide you early access to functionalities and updates in Power Automate before they're available worldwide.

## ⊗ Caution

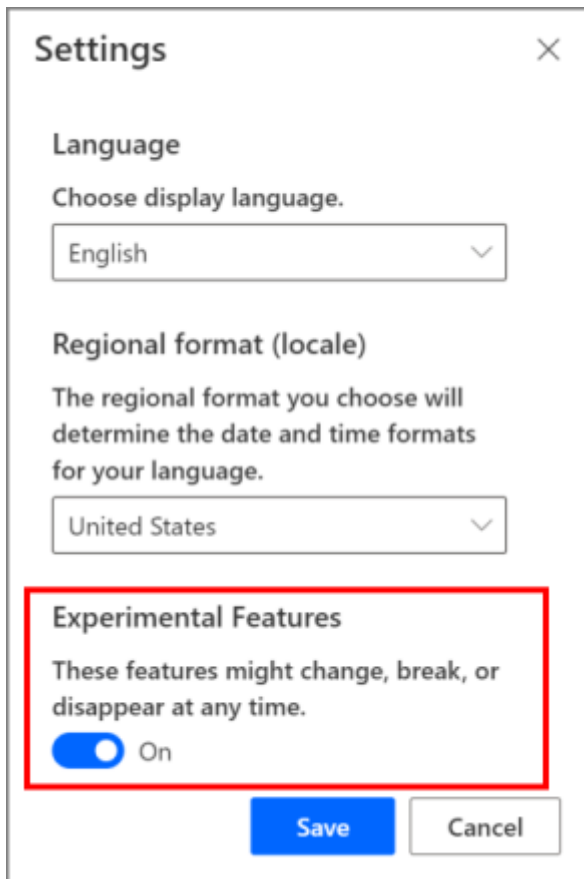
- Experimental features might change, break, or disappear at any time, and shouldn't be enabled in production environments.
- Microsoft doesn't provide support for experimental features. Microsoft Power Platform technical support team won't be able to help you with issues or questions. Use the [Power Automate community forums](#) for feedback and help with experimental features.

Follow these steps to enable experimental features in Power Automate.

1. Sign in to [Power Automate](#).
2. Select your environment from the top-right corner.
3. Select **Settings** (gear icon) > **View all Power Automate settings**.



4. Set **Experimental Features** to **On**, and then select **Save**.



You will now be able to access all experimental features in Power Automate.

ⓘ **Note**

Experimental features are available only for the account that turns on experimental features.

## See also

[New expression editor for actions \(experimental feature\)](#)

# Billing and metering questions

Article • 08/01/2023

This article answers frequently asked questions regarding billing and metering in Power Automate.

## Where can I find out what pricing plans are available?

See the [pricing page](#).

## Where can I find out what my plan is?

See this [subscription page](#).

## How do I switch plans?

1. Sign in to [Power Automate](#).
2. On the top right of the screen, select ? > **Pricing**, and then select the plan to which you want to switch.

## What happens if my usage exceeds the limits?

Power Automate throttles your flow runs.

## Where can I find more information regarding the usage limits?

- On the [pricing page](#).
- On the [limits and config page](#).

## What happens if I try to run flows too frequently?

Your plan determines how often your flows run. For example, your flows may run every 15 minutes if you're on the free plan. If a cloud flow is triggered less than 15 minutes

after its last run, it's queued until 15 minutes elapses.

## What counts as a run?

Whenever a cloud flow is triggered, whether by an automatic trigger or manually, this is considered a run. Checks for new data don't count as runs.

## Are there differences between Microsoft Accounts and work or school accounts for billing?

Yes. If you sign in with a Microsoft Account (such as an account that ends with @outlook.com or @gmail.com), you can use only the free plan. To take advantage of the features in the paid plan, sign in with a work or school email address.

## I'm trying to upgrade, but I'm told my account isn't eligible

To upgrade, use a work or school account, or create a [Microsoft 365 trial account](#).

## Why did I run out of runs when my flow only ran a few times?

Certain flows may run more frequently than you expect. For example, you might create a cloud flow that sends you a push notification whenever your manager sends you an email. That flow must run every time you get an email (from anyone) because the flow must check whether the email came from your manager. This action counts as a run.

You can work around this issue by putting all the filtering you need into the trigger. In the push notification example, expand the **Advanced Options** menu, and then provide your manager's email address in the **From** field.


## Other limits and caveats

- Each account may have as many as:
  - 15 custom connectors.
  - 20 connections per API and 100 connections total.



- Certain external connectors, such as Twitter, implement connection throttling to control quality of service. Your flows fail when throttling is in effect. If your flows are failing, review the details of the run that failed in the flow's run history.

## Licenses that can submit support tickets in Power Automate

If you have one of the following licenses, you can [submit a support ticket in Power Automate](#) 

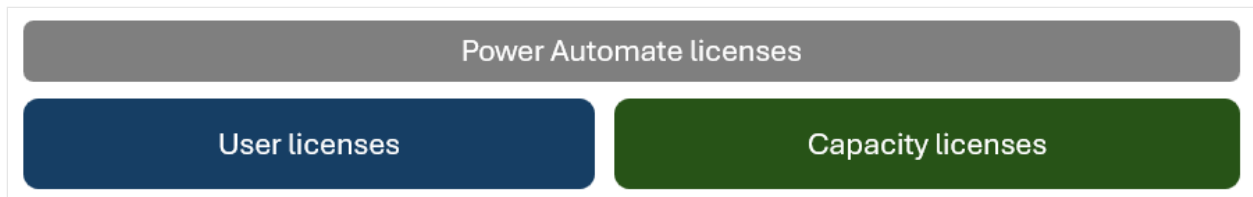
- Power Automate Process plan (previously Power Automate per flow)
- Power Automate Premium plan (previously Power Automate per user and Power Automate per user with attended RPA)
- PowerApps per user plan
- Dynamics Enterprise plan
- Dynamics Professional plan

# Types of Power Automate licenses

Article • 07/10/2024

Entitlements to use [Power Automate capabilities](#) (standard connectors, premium connectors, attended RPA, and more) are obtained via licenses and add-ons. This article focuses on licenses. Learn more in [Types of Power Automate add-ons](#).

The Power Automate licenses are categorized as follows:



[Expand table](#)

License type	License scope	Description
User license	User-centric: a user license is assigned to a user.	It entitles the user to access specific capabilities.
Capacity license	Automation-centric: a capacity license is allocated to a Power Automate automation (cloud flow, machine, hosted machine, hosted machine group).	It provides the automation entitlements (the same way a user license provides entitlements to a user).

You can purchase those licenses on the [Power Automate Pricing](#) page or from your [Microsoft 365 Admin Center](#) (if you're an admin). [Learn more on purchasing](#).

## 💡 Tip

- As alternative to licenses, an organization can enable its environments to use the [Pay-as-you-go model](#) and get started building flows without any license requirement or upfront costs.
- Within a Pay-as-you-go environment all premium capabilities (including RPA) are available

Extra details on the Power Platform licensing model can be found in the [Microsoft Power Platform Licensing Guide](#).

# User licenses

Power Automate user-licenses

Power Automate Premium      Power Automate Trial      Power Automate Free

To create, test, run, and monitor Power Automate automations (cloud flows or desktop flows), users need to be individually licensed. Hereunder the list of available Power Automate user licenses:

Power Automate Premium license

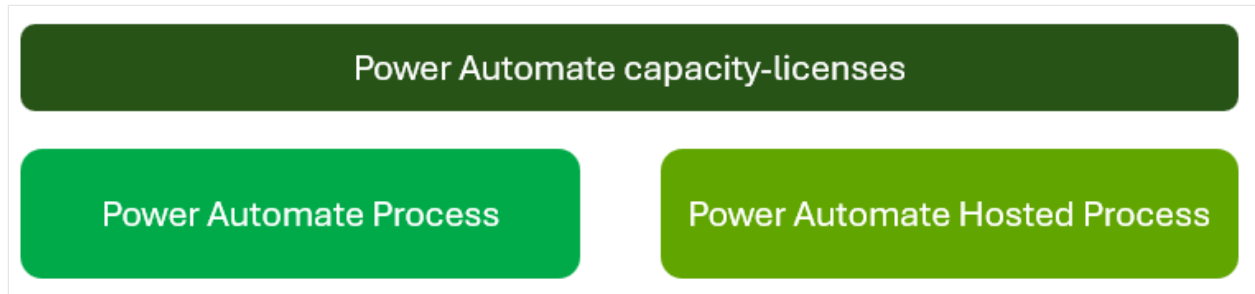
## Power Automate Premium

[Expand table](#)

<b>License name</b>	<b>Power Automate Premium</b>
<b>License type</b>	User license (paid)
<b>Entitlements</b>	<p>We recommend the Power Automate Premium license for all users, as it gives them the full set of capabilities to create both API based and desktop automations.</p> <p>This license allows users to create, run, and share unlimited cloud flows (within <a href="#">PPR limits</a> for API-based automation (with standard, premium, and custom connectors) and to automate their legacy applications simulating a human behavior such as keyboard or mouse keys and movement (with desktop flows through robotic process automation (RPA).</p> <p>More precisely regarding the <a href="#">premium RPA entitlements</a>, this license includes the ability for users to register their workstation, to create unlimited desktop flows, and to execute their desktop flows in attended mode on their registered machine through an attended bot borne by the license.</p> <p>Additionally, this license also includes full access to process mining capabilities and the provisioning of AI Builder credits, which support AI consuming scenarios like form processing, object detection, text classification, and more.</p>

<b>License name</b>	<b>Power Automate Premium</b>
<b>User category</b>	The Power Automate Premium license suits users looking to build automations and take advantage of the full spectrum of Power Automate capabilities.

## Capacity licenses




In addition to user licenses, organizations can upgrade their automation scenarios with capacity licenses, which are allocated to Power Automate automations (cloud flows, machines, hosted machines, hosted machine groups) and provide these automations autonomous entitlements (regardless of the user license owned by persons interacting with those automations).

Hereunder the list of available Power Automate capacity licenses:

Power Automate Process license

### Power Automate Process

 Expand table

<b>License name</b>	<b>Power Automate Process</b>
<b>License type</b>	Capacity license (paid)
<b>Allocated automation</b>	- Cloud flow - Standard machine
<b>Entitlements</b>	Allocated to a cloud flow, a Power Automate Process license entitles it to use standard, premium, and custom connectors while being accessed by unlimited users within the organization (regardless of their user license). Each Process license allocated to a cloud flow entitles it to 250k daily <a href="#">Power Platform Request</a> (stackable limit).

<b>License name</b>	<b>Power Automate Process</b>
	<p>Multiple cloud flows part of the same business process (invoicing process, ticketing process, etc.) can be associated together and covered by the same Process licenses.</p> <p>Allocated to a machine, a Process license becomes an unattended bot. Each unattended bot can carry one unattended desktop flow run at a time<sup>1</sup>.</p>
<b>Will benefit</b>	Organizations looking to automate their business processes at scale using cloud flows or RPA desktop automations or a combination of both.

1. When an unattended run is triggered, the unattended bot securely signs into the machine on user's behalf, executes the desktop flow actions on the target applications, and then signs out of the device.

Learn more about the [Power Automate Process](#) license.

### Important


#### Can my organization only purchase and use capacity licenses within an environment?

Capacity licenses are not meant to replace user licenses within an environment as some essential capabilities are only available to licensed users to create automations. Capacity licenses can grant higher [PPR](#) to such flows built using the premium user licenses:

- Allocation of a Process license to a machine (required by the unattended mode) still prerequires the machine to have been registered by a Power Automate Premium user.
- Multiple monitoring pages in the Power Automate portal are displayed only to Power Automate Premium users (workqueue page, machine list page, desktop flow list page, etc.).

## Compare Power Automate licenses

Hereunder a table detailing each license [entitlement](#):

 Expand table

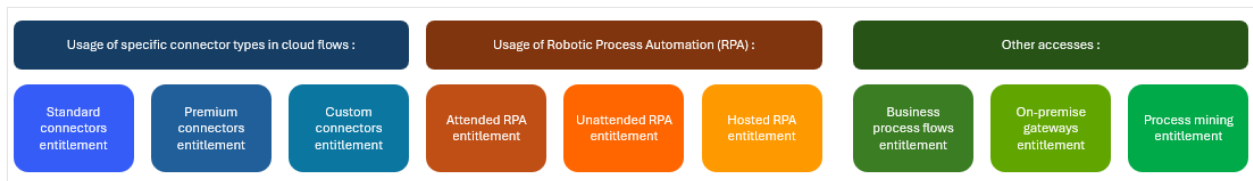
	<b>Premium license</b>	<b>Process license</b>	<b>Hosted Process license</b>
<b>Applied to</b>	User	- Cloud flow - Machine	- Hosted machine - Hosted machine group - Cloud flow - Machine
<b>Capacity Limits</b>			
<b>Daily PPR limit<sup>1</sup></b>	40k per user	250k per Process license <sup>2</sup>	250k per Hosted Process license <sup>2</sup>
<b>Process mining data storage</b>	50 MB per license <sup>4</sup>	Not included	Not included
<b>AI Builder credits</b>	5000 per month	5000 per month	5000 per month
<b>Dataverse database storage</b>	250 MB per license	50 MB per license	50 MB per license
<b>Dataverse file storage</b>	2 GB per license	200 MB per license	200 MB per license
<b>Standard connectors</b>	Included	Included	Included
<b>Connectors</b>			
<b>Premium connectors</b>	Included	Included	Included
<b>Premium connectors</b>	Included	Included	Included
<b>Custom connectors</b>	Included	Included	Included
<b>Desktop Automation</b>			
<b>Attended RPA</b>	One attended bot included	Not included	Not included
<b>Unattended RPA</b>	Not included	One unattended bot included	One unattended bot included <sup>3</sup>
<b>Hosted RPA</b>	Not included	Not included	One hosted bot included
<b>Other</b>			
<b>Process mining</b>	Included	Not included	Not included
<b>Business process flows</b>	Included	Included	Included
<b>On-premises</b>	Included	Included	Included

	Premium license	Process license	Hosted Process license
<b>gateways</b>			

1. The Power Platform requests are subjected to higher limits during the transition period. Learn more in [Request limits in Power Automate](#).
2. When multiple units of Process licenses are allocated to a cloud flow, their PPR limits are stacked.
3. As the Hosted Process license is a superset of the Process license, each hosted bot can also appear as an unattended bot, which allows to run in unattended mode on the hosted machine / hosted machine group.
4. Up to 100 GB per tenant.

## License entitlements

Licenses have entitlements and each entitlement gives access to a specific Power Automate capability. Hereunder the list of entitlements that licenses can provide:



### Connector types

## Entitlements to usage of connector types in cloud flows

A [connector](#) represents the underlying service (such as OneDrive, SharePoint, Salesforce, etc.) with which a cloud flow can interact. It provides a way for a user to connect its cloud flow to a third-party account (such as a Salesforce account) and use a set of prebuilt actions and triggers.

[Expand table](#)

Entitlement to	Entitlement description
Standard	The <a href="#">standard connectors</a> entitlement is needed to add a standard

Entitlement to	Entitlement description
connectors	connector to a cloud flow and trigger it.
Premium connectors	The <a href="#">premium connectors</a> entitlement is needed to add a premium connector to a cloud flow and trigger it.
Custom connectors	The <a href="#">custom connectors</a> entitlement is needed to create a connector with its own triggers and actions when an app / a service doesn't have a prebuilt connector.

## How can I show my current entitlements?

In the Power Automate portal, select **Settings > View my licenses**:

The screenshot shows a 'Licenses' window with the following sections:

- My licenses**
  - Power Automate Premium
- Environment capacities**
  - Process & Unattended RPA capacity
  - Hosted process capacity
- Capabilities**
  - Standard connectors
  - Premium connectors
  - Custom connectors
  - On-premise connectors
  - Robotic process automation (RPA) - attended
  - Robotic process automation (RPA) - unattended
  - Robotic process automation (RPA) - hosted
  - Business process flows
  - AI Builder
  - Process mining

At the bottom, there is a link: [Learn how to add capabilities](#)

### ⓘ Note

- The user license(s) display in the section *My licenses*.
- The capacity license(s) (and capacity add-ons) display in the section *Environment capacities*.



- The user entitlement (in context of environment capacities) display in the *Capabilities* section with a green check mark.

## Seeded licenses

Learn more about power automate capabilities included in [Seeded licenses](#)

## Legacy licenses

Learn more about power automate capabilities included in [Legacy licenses](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# The admin center

Article • 12/16/2022

The admin center is the central location where tenant admins and environment admins manage an organization's data policies and environments. Any changes you make in the admin center are immediately available to users within the organization.

Here's a quick video about the admin center.

<https://www.microsoft.com/en-us/videoplayer/embed/RWKZQe?postJsllMsg=true>

## Note

The Power Automate admin center is retired and Power Automate admins will be automatically redirected to the Microsoft **Power Platform admin center** to manage data policies and environments for Power Automate deployments.

## Access the admin center

Browse to <https://admin.powerplatform.microsoft.com/>.

## Environments

Learn more about using [environments](#) in the Microsoft Power Platform admin guide to manage users, permissions and roles.

## Data policies

Learn more about using [data policies](#) in the Power Platform admin guide to create rules that manage how business data is shared between services in flows.

## Activity logging

Learn more about the [logging activities](#) that Power Automate does to keep you informed about your users' activities.

# Administer environments and Power Automate resources

Article • 05/27/2023

## Administer environments

An *environment* is a space to store, manage, and share your organization's business data, apps, and flows. It also serves as a container to separate apps that might have different roles, security requirements, or target audiences. How you choose to use environments depends on your organization and the apps you build. For example:

- You can choose to only build your apps in a single environment. You might create separate environments that group the test and production versions of your apps.
- You might create separate environments that correspond to specific teams or departments in your company, each containing the relevant data and apps for each audience.
- You might also create separate environments for different global branches of your company.

You can create and manage environments using the [Power Platform admin center](#).

Learn all about [environments](#) in the Microsoft Power Platform admin guide.

## Tools

There are a number of tools available for administering environments and resources.

### Power Platform admin center (PPAC)

The Power Platform admin center, or PPAC, (<https://aka.ms/ppac>) provides an interactive experience for performing administrative tasks within Power Platform.

### PowerShell cmdlets

PowerShell cmdlets provide a way to automate administrative tasks using PowerShell. These cmdlets can be used in a sequence to automate multistep administrative actions.

[Power Automate commands](#) provide a way to view and modify environments, flows, and data related to Power Automate.

## Management and Admin connectors

Power Automate Management and Admin connectors provide the ability to use flows to manage and monitor Power Automate and the rest of Power Platform.

- **Power Automate Management connector** is designed to help with administrative management and monitoring ([Power Automate Management](#)).
- **Microsoft Flow for Admins** allows you to complete typical admin actions, such as disabling a flow and deleting a flow ([Power Automate for Admins](#)).
- **Power Apps for Admins connector** can be used to set permissions on Power Apps or set permissions to a certain connector being used by this app ([Power Apps for Admins](#)).
- **PowerApps for App Makers** can be used by the makers themselves. Some actions are an overlay to administrative tasks, such as settings permissions to an app as mentioned previously ([Power Apps for Makers](#)).
- **Power Platform for Admins** can be used to perform tasks against platform components, such as creating an environment, provisioning a Microsoft Dataverse database, or creating a DLP policy for a specific environment ([Power Platform for Admins](#)).


## COE Starter Kit

The [Center of Excellence \(COE\) Starter Kit](#) provides a template implementation using the Management and Admin connectors. It comes with a Power BI dashboard that can be leveraged to gain tenant-wide insights.

## Tips and tricks

### List Flows as Admin action deprecated in favor of List Flows as Admin (V2)

The [List flows as Admin action](#) on the [Power Automate Management connector](#) has been deprecated in favor of the [List Flows as Admin \(V2\) action](#). The [List Flows as Admin \(V2\) action](#) can list all flows in an environment. It has higher performance, since it returns only the identifying information about the flow. To accomplish this performance increase, the flow definition and some other metadata aren't returned. If the flow definition or additional metadata is needed, then a subsequent call can be made to the

[Get Flow as Admin action](#). This community forum post contains more information, migration guidance, and a Q&A (question and answer) format: [Transition to List Flows as Admin V2 from deprecated List Flows as Admin action](#)

# IP address configuration

Article • 07/03/2024

The [IP addresses](#) from which Power Automate requests are sent depend on the [region](#) where the [environment](#) that contains the flow is located. We don't currently publish FQDNs (fully qualified domain names) available for flow scenarios.

Some calls a cloud flow makes might come from IP addresses that are listed in the [Azure Logic Apps](#) documentation. Some examples of these calls include HTTP or HTTP + OpenAPI.

You should also consult the [Limits and Configuration](#) article for a supplemental listing for known IP addresses that Power Automate uses.

## ⓘ Note

If you're restricting inbound or outbound IP addresses on your network (for example, through a firewall), to ensure flows continue to work, update your network configuration to allow both the [IP addresses for Azure Logic Apps](#) and the [IP addresses for managed connectors](#) in the supported regions. To learn more, go to [Azure Logic Apps - Set up zone redundancy with availability zones](#).

## Logic Apps

Calls made from a cloud flow go directly through the Azure Logic Apps service. Some examples of these calls include HTTP or HTTP + OpenAPI. To learn which IP addresses are used by that service, go to the [Logic Apps documentation](#).


## Connectors

Calls made from a connector in a cloud flow (for example, the SQL API or the SharePoint API) come from these [IP addresses](#).

If you must authorize IP addresses for your Azure SQL database, you should use these addresses.

## Required services

The following table lists the services to which Power Automate connects. Ensure none of these services is blocked on your network.

 Expand table

Domains	Protocols	Uses
login.microsoft.com login.windows.net login.microsoftonline.com login.live.com secure.aadcdn.microsoftonline-p.com	https	Access to authentication and authorization endpoints.
graph.microsoft.com	https	Access to Microsoft graph - for getting user information such as a profile photo.
*.azure-apim.net	https	Access to the Runtime for connectors.
*.azure-apihub.net	https	Access to the Runtime for connectors.
*.flow.microsoft.com *.logic.azure.com	https	Access to the Power Automate site.
*.powerautomate.com	https	Access to Power Automate site.
*.powerapps.com	https	Access to the Power Apps site.
*.azureedge.net	https	Access to the Power Automate CDN.
*.microsoftcloud.com	https	Access to NPS (Net Promoter Score).
webshell.suite.office.com	https	Access to Office for header and search. Refer to <a href="#">the Office 365 URLs and ranges</a> for more details.
*.dynamics.com	https	Access to Dataverse tables
go.microsoft.com	https	Access to the Power Automate to check for updates
download.microsoft.com	https	Access to the Power Automate to check for updates
login.partner.microsoftonline.cn	https	Access to the Power Automate for desktop cloud discovery

Domains	Protocols	Uses
s2s.config.skype.com use.config.skype.com	https	Access to preview features managed through flighting and configuration endpoints.
s2s.config.ecs.infra.gov.teams.microsoft.us	https	Access to preview features managed through flighting and configuration endpoints for US government cloud.
*.api.powerplatform.com *.api.powerplatformusercontent.com	https	Access to several Power Platform APIs.
*.api.gov.powerplatform.microsoft.us	https	Access to several Power Platform APIs (US Government - GCC only).
*.api.high.powerplatform.microsoft.us	https	Access to several Power Platform APIs (US Government - GCC High only).
*.api.appsplatform.us	https	Access to several Power Platform APIs (US Government - DoD only).
*.api.powerplatform.partner.microsoftonline.cn	https	Access to several Power Platform APIs (21Vinaet - China only).

## Endpoints needed to use Power Automate mobile app

The following table lists the additional endpoints you need when using Power Automate mobile app.

 Expand table

Domains	Protocols	Uses
*.events.data.microsoft.com	https	Send telemetry for all production regions and supported US sovereign clouds from the mobile app.
collector.azure.cn	https	Send telemetry for the Mooncake region from the mobile app.
officeapps.live.com	https	Access to authentication and authorization endpoints for the mobile app.

## Approval email delivery



Refer to the [approvals email delivery article](#) for details about approvals email routing.

## Desktop flows services required for runtime

The following table lists endpoint data requirements for connectivity from a user's machine for desktop flows runs. You need to ensure that you authorize Global endpoints and the endpoints corresponding to your cloud.

### Global endpoints

 Expand table

Domains	Protocols	Uses
server.events.data.microsoft.com	https	Handles telemetry for users outside EMEA, US government, and Chinese clouds. Works as the fallback telemetry endpoint.
msedgedriver.azureedge.net chromedriver.storage.googleapis.com	https	Access to desktop flows WebDriver downloaders. WebDriver is used to automate your browser (Microsoft Edge and Google Chrome).

#### Note

If you don't want to allow the public endpoint `*.servicebus.windows.net`, you can allow the list of namespaces individually. To learn more about namespace endpoints, go to [Allow list of namespaces endpoints required for runtime](#).

### Public endpoints

 Expand table

Domains	Protocols	Uses
ocsp.digicert.com ocsp.msocsp.com mscrl.microsoft.com crl3.digicert.com crl4.digicert.com	http	Access to the CRL server for the public cloud. Needed when connecting through the on-premises data gateway.
*.servicebus.windows.net	https	Listens on Service Bus Relay over TCP. Needed for machine connectivity.

Domains	Protocols	Uses
*.gateway.prod.island.powerapps.com	https	Needed for machine connectivity.
emea.events.data.microsoft.com	https	Handles telemetry for EMEA users.
*.api.powerplatform.com	https	Access to several Power Platform APIs (mandatory for cloud connectors utilization in desktop flows).
*.dynamics.com	https	Access to Dataverse tables (mandatory for custom actions in desktop flows)(also valid for GCC).

## US Government endpoints

 Expand table

Domains	Protocols	Uses
ocsp.digicert.com crl3.digicert.com crl4.digicert.com	http	Access to the CRL server for US government cloud. Needed when connecting through the on-premises data gateway.
*.servicebus.usgovcloudapi.net	https	Listens on Service Bus Relay for US government cloud. Needed for machine connectivity.
*.gateway.gov.island.powerapps.us	https	Needed for machine connectivity for US government cloud (GCC and GCCH).
*.gateway.gov.island.appsplatform.us	https	Needed for machine connectivity for US government cloud (DOD).
tb.events.data.microsoft.com	https	Handles telemetry for US government users.
*.api.gov.powerplatform.microsoft.us	https	Access to several Power Platform APIs (mandatory for cloud connector action in desktop flows) (US Government - GCC only).
*.api.high.powerplatform.microsoft.us	https	Access to several Power Platform APIs (mandatory for cloud connector actions in desktop flows) (US Government - GCC High only).
*.api.appsplatform.us	https	Access to several Power Platform APIs (mandatory for cloud connector actions in desktop flows) (US Government - DoD only).

Domains	Protocols	Uses
*.microsoftdynamics.us	https	Access to Dataverse tables (mandatory for custom actions in desktop flows)(US Government - GCC High only).
*.crm.appsplatform.us	https	Access to Dataverse tables (mandatory for custom actions in desktop flows)(US Government - DoD only).
*.dynamics.com	https	Access to Dataverse tables (mandatory for custom actions in desktop flows)(also valid for public clouds).

## 21Vinaet endpoints (China)

[Expand table](#)

Domains	Protocols	Uses
crl.digicert.cn ocsp.digicert.cn	http	Access to the CRL servers for 21Vianet operated cloud. Needed when connecting through the on-premises data gateway.
apac.events.data.microsoft.com	https	Handles telemetry for users in China.
*.api.powerplatform.partner.microsoftonline.cn	https	Access to several Power Platform APIs (mandatory for cloud connector actions in desktop flows) (21Vinaet - China only).
*.dynamics.cn	https	Access to Dataverse tables (DesktopFlow modules feature) (21Vinaet - China only).

## Feedback

Was this page helpful?

[Provide product feedback](#) [↗](#)

# Support for customer-managed keys

Article • 07/24/2024

All customer data stored in Power Platform is encrypted at rest using Microsoft-managed keys (MMKs) by default. With customer-managed keys (CMKs), customers can bring their own encryption keys to protect Power Automate data. This allows customers to have an extra protective layer to manage their Power Platform assets. With this feature, you can rotate or swap encryption keys on demand. It also prevents Microsoft's access to your customer data, if you choose to revoke key access to Microsoft services at any time.

## Important

- *Before applying the enterprise policy, ensure no flows were created in this environment.*
- If you apply enterprise policy on an environment with existing flows, those flows and their data would continue to be encrypted with Microsoft-managed keys.
- Currently, customer-managed keys aren't leveraged to encrypt non-OAuth connections. Such non-Microsoft Entra based connections will continue to be encrypted at rest using Microsoft-managed keys.
- Create a support ticket if you plan to protect more than 25 environments in your tenant using CMK. The default limit of CMK enabled Power Automate environments per tenant is 25 and this can be extended by engaging the Support team.

Applying an encryption key is a gesture performed by Power Platform admins and is invisible to users. Users can create, save, and execute Power Automate workflows exactly the same way as if the data was encrypted by Microsoft-managed keys.

To learn more about the customer-managed key, and the step-by-step instructions to enable customer-managed keys, go to [Manage your customer-managed encryption key](#). This enables you to leverage the single enterprise policy created on the environment to secure Power Automate workflows.

With CMKs, your workflows and all associated at-rest data are stored and executed on a dedicated infrastructure, partitioned by the environment. This includes your workflow definitions, both cloud and desktop flows, and workflow execution history with detailed inputs and outputs.

# Power Automate CMK application warning messages

As of April 30, 2024, customer-managed key (CMK) support for Power Automate cloud flows is now enabled. Enablement is restricted to environments without flows present and processing for environments when flows are present in the environment results in warnings. This doesn't impact CMK application for other platform components.

If there are existing flows in the environment being enabled for CMK, a warning message similar to "Power Automate flows are still encrypted with the Microsoft Managed Key" displays. In some experiences, a failed status might display. To review the Power Automate warning, go to the Enterprise Policy experience.

## Known limitations

When an environment is enabled for customer-managed keys, then Power Automate data can't be sent to the analytics pipeline for [tenant-wide reporting in Power Platform admin center](#), [Data Export to Data Lake](#), or [Application Insights](#).

## Related information

- [Manage your customer-managed encryption key](#)

---

## Feedback

Was this page helpful?

Yes


No

[Provide product feedback](#) 

# View desktop flows analytics

Article • 06/20/2024

As an admin, you'll need to view the overall status of automation that runs in your organization. There are three options to monitor the analytics for automation that's built with desktop flows:

1. [Desktop flow activity](#) (directly in Power Automate)
2. The Power Platform [admin center](#) . (Note: Local attended runs aren't available in the Power Platform admin center. Users and admins can monitor them with Desktop flow activity at the environment level)
3. The [Center of Excellence \(CoE\) Starter Kit](#).

## Learn more

- Analyze the [desktop flows risk assessment](#) in your environment.
- Run [desktop flows](#).

---

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# Monitor desktop flows in the Center of Excellence

Article • 06/20/2024

For an overview of the desktop flows in your environment, visit the [Microsoft Power Platform Center of Excellence](#).

## Learn more

- Analyze the [desktop flows risk assessment](#) in your environment.
- Run [desktop flows](#).

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Machine group certificate renewal for admins

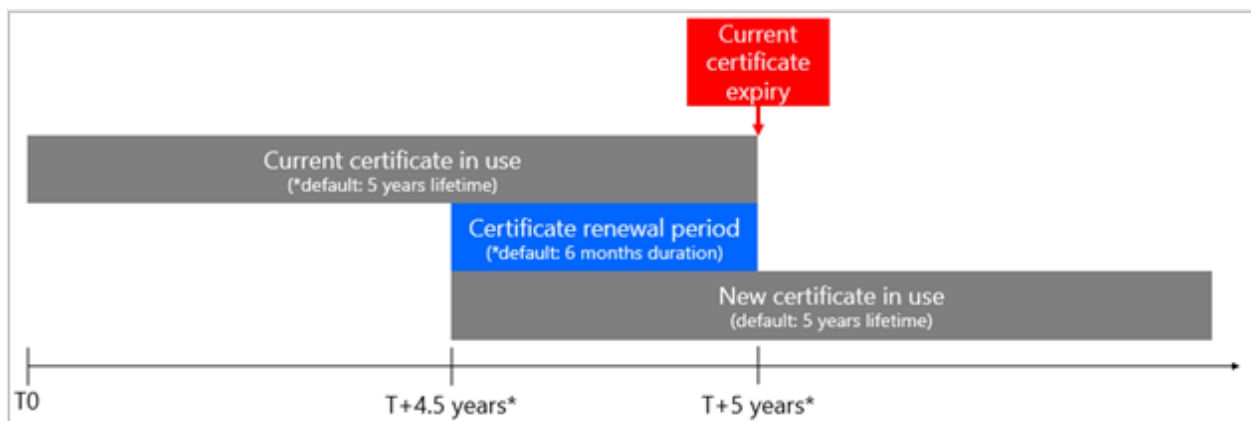
Article • 02/24/2023

The first Power Automate [machine](#) that joins a [machine group](#) issues a self-signed certificate used to:

- Encrypt Windows credentials in desktop flow connections.
- Identify machines with Power Automate.

This certificate is protected with a password only known to the customer.

## What happens during the machine group certificate renewal?



Machine group certificate renewal starts by default six months before the current certificate is set to expire and finishes when the current certificate has expired. Machine group certificate renewal won't affect your machine group's ability to run flows as it is quick, happens between runs, and supports machines on both the current and the new certificate during the renewal. During that time:

- The first machine from the group that connects with Power Automate will issue a new password-protected certificate.
- The next machines from the group that connect with Power Automate will update their certificate with the new one. This step can happen even if other machines (even the first one) are offline.
- Machines with the new certificate can still be successfully targeted by desktop flow connections that encrypt credentials with the current certificate.



- Desktop flow connections that target the machine or machine group will be updated automatically after being used in a cloud flow for a desktop flow run.

## How often does certificate renewal happen?

By default, machine group certificates expire once every five years. The renewal happens during the last six months before the expiry. To see information about how to customize this behavior, go to [How to customize certification expiration and renewal durations?](#).

## What if machines missed the machine group certificate renewal (offline, outdated Power Automated for desktop, etc.)?

If at least one machine of the group got updated to the latest certificate, other machines that missed the renewal period will be able to rejoin the group. First, regenerate the machine group password on the machine that got updated. Then, on other machines, open the Power Automate machine runtime app, select **re-join**, and enter the new machine group password.

If all the machines of a machine group missed the certificate renewal, you can't use this machine group. You need to delete it, re-create a new machine group, and join the machines. To find information about identifying machines that missed the group certificate renewal, go to [How to know if a machine has been updated with a new certificate or not?](#).

## What if desktop flow connections are unused during the machine group certificate renewal?

If a desktop flow connection is unused during the machine group certificate renewal, you need to fix this connection:

- Go to the Power Automate portal.
- Navigate to **Data > Connection**.
- Look for desktop flow connections with the status **Fix connection**, and open them to reenter the necessary information.

## What if some machines are expected to remain offline or unused for multiple months?

You'll need to put those machines online and run flows on them during the certificate renewal period.

1. Find machines that need to have Power Automate for desktop updated.

Your machines must be equipped with Power Automate version 2.23 or above. You can verify the version of your machine using the **Agent Version** column in the **Flow Machine** table in Dataverse.

2. Find the renewal period for each machine.

You can determine the renewal period for the machines of a given group by querying the **Key Creation Date** and **Group Key Expiry Grace Period** columns in the **Flow Machine Group** table in Dataverse. The time frame between the **Creation Data** and the **Creation Date + Grace Period** is when each machine of the group has to go online and retrieve the latest group security.

3. Get reminded to put the machines online during the renewal period.

You can be notified of machine security updates with a cloud flow and the following Dataverse trigger:

This trigger will be invoked each time the machine security is updated. To find information about which values to use in the trigger, go to [How to know if a machine has been updated with a new certificate or not?](#)

When a row is added, modified or deleted	
* Change type	Modified
* Table name	Flow Machines
* Scope	Organization
Select columns	keydeliverystatus
Filter rows	Odata expression to limit rows that can trigger the flow, eg. statecode eq 0
Delay until	Enter a time to delay the trigger evaluation, eg. 2020-01-01T10:10:00Z
Run as	Choose the running user for steps where invoker connections are used

[Hide advanced options](#)

Use:

- **PendingNewKey** for machines requiring a security update.

- **Default** for machines that successfully processed a security update.
- **KeyExpired** for machines that failed to get a new certificate during the renewal period.

### ! Note

You can use the additional advanced options to fine-tune the behavior of this trigger.

#### 4. Validate that machines have the new certificates.

You can verify your machines have retrieved the latest version of the machine group certificate using the **Machine Key Delivery Status** column in the **Flow Machine** table in Dataverse. If the value is empty or set to default, then your machine is up-to-date.

#### 5. Run desktop flows with each connection targeting those machines to avoid fixing them later.

In the Power Automate portal:

- Go to **Monitor > Machines**.
- Select the machine from the list.
- On the machine's detail page, locate the connections card and select **See all connections**.
- Run a desktop flow with each of these desktop flow connections.

The screenshot displays the 'Machines > LAPTOP-VGMMMD613' page in the Power Automate portal. At the top, there are navigation options: 'Edit details', 'Share', 'Add to group', and 'Delete machine'. Below this, the breadcrumb 'Machines > LAPTOP-VGMMMD613' is shown, along with 'Overview' and 'Run queue' tabs. The main content area is divided into three sections: 'Machine details', 'Connections', and 'Shared with'. The 'Machine details' section includes a table with the following data:

Status	Flow activity	Owner	Version	Created	Reuse session
Connected	0 running, 0 queued	System Administrator	2.27.177.22340	Dec 14, 07:13 PM	No

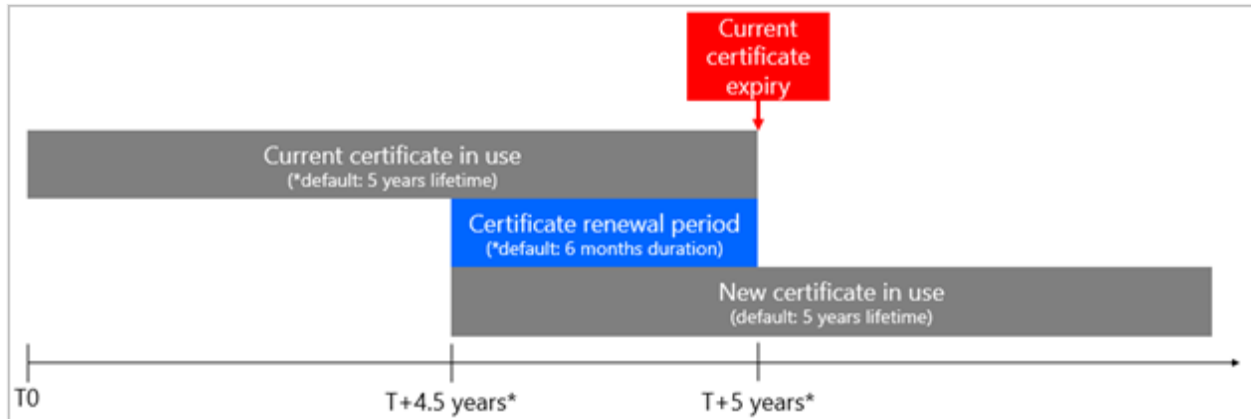
The 'Machine type' is listed as 'Standard machine'. The 'Connections' section shows a single connection to 'LAPTOP-VGM...' with a green checkmark, and a link to 'See all connections'. The 'Shared with' section shows the machine is shared with 'System Administrator'.

## How to know when the next certificate renewal is happening?

There are three parameters governing certificate renewal timelines, each available in a column on the **Flow Machine Group** record in Dataverse:

- The **Key Creation Date** column records the date on which the certificate was created.
- The **Key Validity Period** column documents the certificate’s lifetime.
- The **Key Grace Period** column represents the time window where a new certificate is created and machines and connections are migrated to a new key.

You can find out the precise date of the next certificate renewal using the following calculation: **Key Creation Date + (Key Validity Period – Key Grace Period)**



## How to know if a machine has been updated with a new certificate or not?

You can verify your machines have retrieved the latest version of the machine group certificate using the **Machine Key Delivery Status** column in the **Flow Machine** table in Dataverse:

- If the value is empty or set to **Default**, your machine is up-to-date.
- If the value is **Pending New Key**, the machine is within the renewal period and hasn't been updated yet. It will update when getting online or within 24 h if already online.
- If the value is **Key Expired**, the machine has missed the renewal period, and you must manually rejoin the machine to the group.

## How to customize certification expiration and renewal durations?

Power Automate enables you to customize the certificate lifetime and how early the renewal is triggered for any machine group. Upcoming renewals will use those Dataverse columns (updates may take 24 h to be picked up):

Table	Column	Usage	Boundaries
-------	--------	-------	------------

Table	Column	Usage	Boundaries
Flow Machine Group	Group Key Validity Period	Duration in minutes after which the next certificate issued will be expired.	Minimum: Three months (129,600 minutes) Maximum: Five years (2,628,000 minutes).
Flow Machine Group	Group Key Expiry Grace Period	Duration in minutes before the machine group certificate's expiration date where machines will renew their certificates.	Minimum: 45 days (64,800 minutes) Maximum: half of the Group Key Validity Period.

The current certificate remains valid until its expiry date is reached. Changes to the validity period will only apply to the next certificate.


Some special considerations must be kept in mind when changing the validity period and the grace period:

- If the new **Group Key Validity Period** value is shorter than the current certificate's lifetime or falls under the defined grace period, a certificate renewal will immediately be scheduled. It will start in the following 24 h, assuming some machines of the group are online. The certificate renewal period will last for the defined grace period.
- If the new **Group Key Validity Period** value is longer than the current one, nothing will happen immediately. The current certificate will be kept active until its rotation. The new certificate will take the new validity period into account.

## How to trigger a certificate renewal?

If you want to accelerate certificate renewal, you can edit the **Group Key Validity Period** to change the length of the renewal period. This value can't be higher than half the group key's **Validity Period** and can't be lower than 45 days.

If you need to invalidate certificates immediately, delete your machine groups in Power Automate and recreate them. You can do so by deleting the corresponding rows in the **Flow Machine group** table.

 **Warning**

Deleting machine groups will require fixing your desktop flow connections targeting these machine groups.

# Data loss prevention (DLP) policy creation

Article • 07/19/2024

An organization's data is critical to its success. Its data needs to be readily available for decision-making, but at the same time protected so that it isn't shared with audiences that shouldn't have access to it. To protect your business data, Power Automate gives you the ability to create and enforce policies that define which connectors can access and share it. The policies that define how data can be shared are referred to as data loss prevention (DLP) policies.

Administrators control DLP policies. If a DLP policy is blocking your flows from running, contact your administrator.

[Learn more about protecting your data with Power Platform data loss prevention \(DLP\) policies.](#)

## Data loss prevention for desktop flows

Power Automate allows you to create and enforce DLP policies that classify desktop flow modules and individual module actions as **Business**, **Non-business**, or **Blocked**. This categorization prevents makers from combining modules and actions from different categories into a desktop flow or between a cloud flow and the desktop flows it uses.

### Important

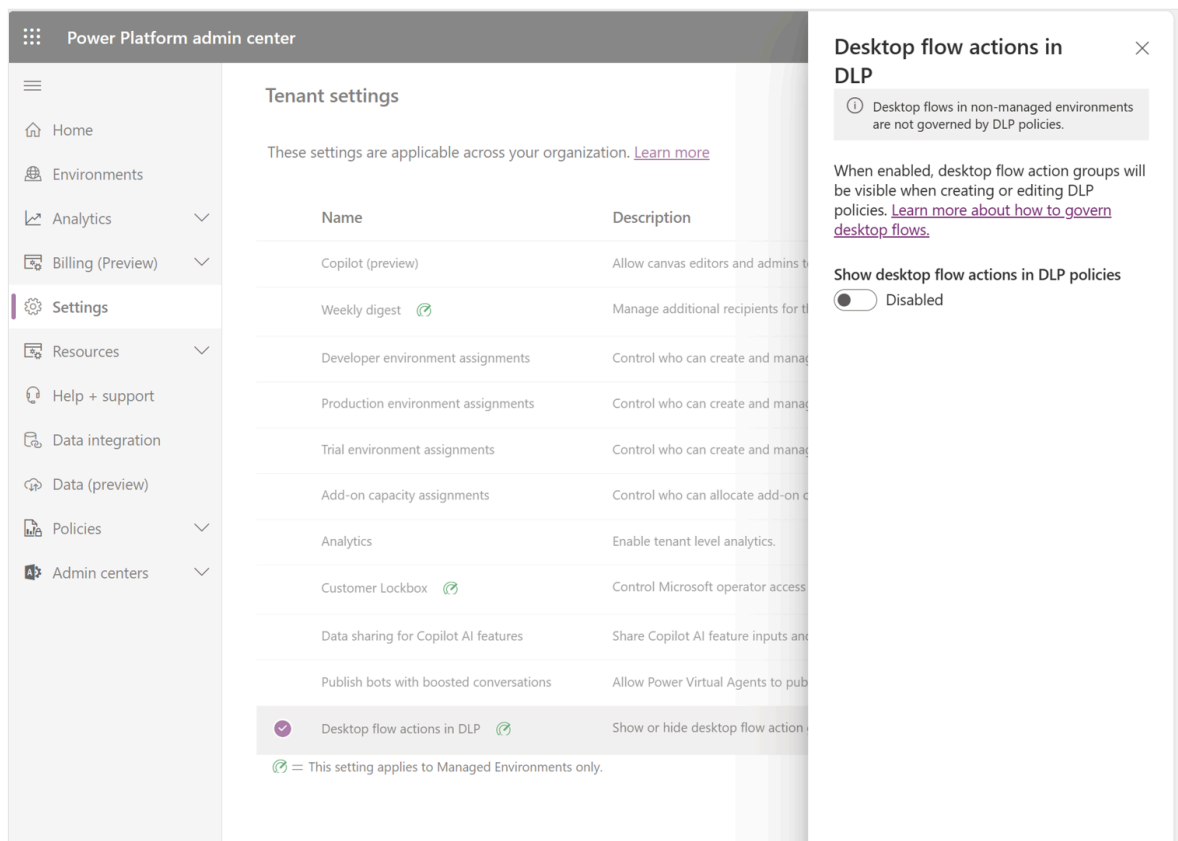
- Enforcement of DLP policies is available for [Managed Environments](#) only. Starting September 2024, only desktop flows that are located in Managed Environments will be evaluated by DLP policies.
- DLP for desktop flows is available for versions of Power Automate for desktop 2.14.173.21294 or later. If you're using an earlier version, uninstall it and update to the latest version.

## View desktop flow action groups

By default, desktop flow action groups don't appear when you're creating a DLP policy. You need to turn on the **Show desktop flow actions in DLP policies** setting in your tenant settings.

If you've opted for the public preview, the **Desktop flow actions in DLP** setting is already enabled and can't be changed.

1. Sign in to the [Power Platform admin center](#).
2. On the left side panel, select **Settings**.
3. On the **Tenant settings** page, select **Desktop flow actions in DLP**.
4. Turn on **Show desktop flow actions in DLP policies**, and then select **Save**.



You can now classify desktop flow action groups when you create a data policy.

## Create a DLP policy with desktop flow restrictions

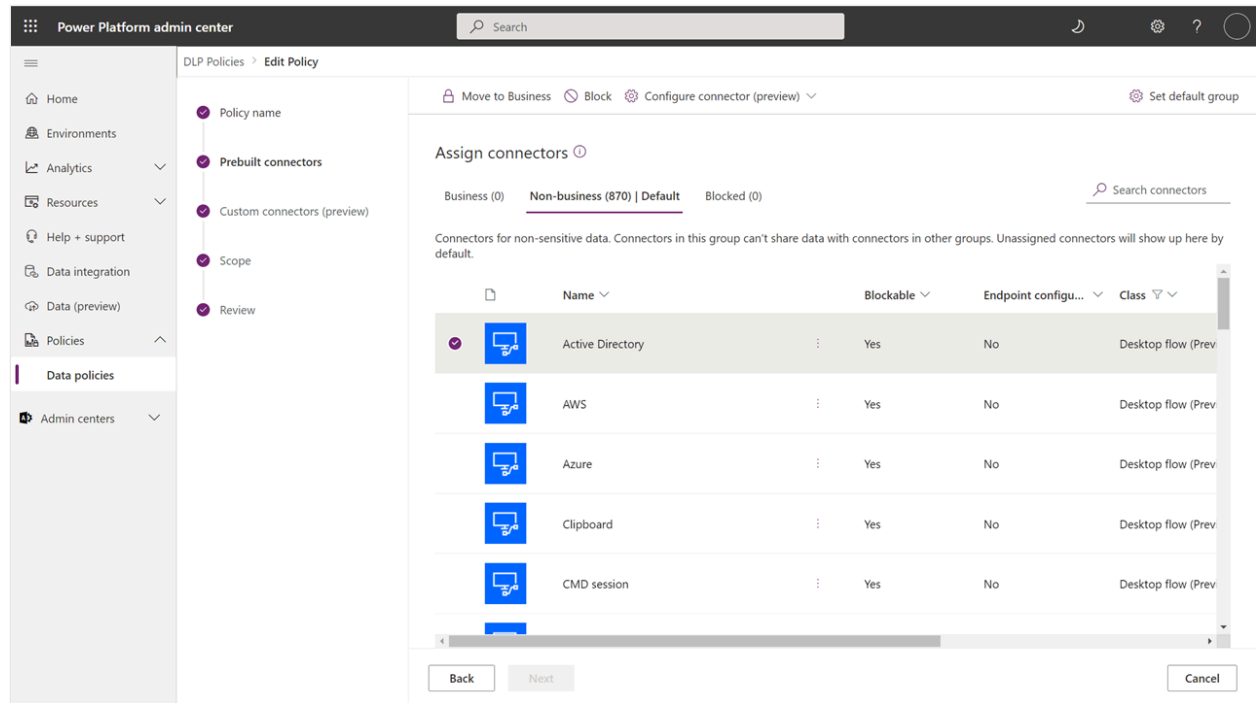
When admins edit or create a policy, desktop flow action groups are added to the default group, and the policy is applied after it's saved. The policy is suspended if the default group is set to **Blocked** and the desktop flows are running in the target environments.

You can manage your DLP policies for desktop flows the same way you manage cloud flow connectors and actions. Desktop flow modules are groups of similar actions as displayed in the Power Automate for desktop user interface. A module is similar to connectors that are used in cloud flows. You can define a DLP policy that manages both desktop flow modules and cloud flow connectors. Some basic modules, such as



**Variables**, can't be managed in the scope of DLP policy because almost all desktop flows need to use them. [Learn more about the fundamentals of DLP policies and how to create them.](#)

When your tenant is opted into the user experience in the Power Platform, your administrators automatically see the new desktop flow modules in the default data group of the DLP policy they're creating or updating.



### Warning

When desktop flow modules are added to DLP policies, your tenant's desktop flows are evaluated against them and they're suspended if they're non-compliant. If your administrator creates or updates the DLP policy without noticing the new modules, desktop flows can be unexpectedly suspended.

## Govern desktop flows outside of DLP

Granular control over the use of desktop flows on all machines as described in the previous sections applies only to Managed Environments. You have other options to govern desktop flows.

- **Ability to govern desktop flow orchestration:** The desktop flow connector can be governed in your policies like any other connector in all environments.
- **Ability to govern usage of Power Automate for desktop:** You can govern Power Automate for desktop flows through GPO. This governance allows you to turn on

or off desktop flows for actions such as to restrict to a set of environments or regions, limit use of account types, and restrict manual updates.

[Learn more about governance in Power Automate.](#)

## Desktop flow modules in DLP

The following desktop flow modules are available in DLP:

- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.ActiveDirectory ActiveDirectory
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.AWS AWS
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Azure Azure
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.WebAutomation Browser Automation
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Cmd CMD session
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Clipboard Clipboard
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Compression Compression
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Cryptography Cryptography
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.CyberArk CyberArk
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Database Database
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Email Email
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Excel Excel
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Exchange Exchange
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.FTP FTP
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.File File
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Folder Folder
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.GoogleCognitive Google cognitive
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Web HTTP
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.IBMCognitive IBM cognitive
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Display Message boxes

- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.MicrosoftCognitive  
Microsoft cognitive
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.MouseAndKeyboard  
Mouse and keyboard
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.OCR OCR
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Outlook  
Outlook
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Pdf PDF
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Runflow Run  
flow
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Scripting  
Scripting
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.System System
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.TerminalEmulation  
Terminal emulation
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.UIAutomation  
UI automation
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Services  
Windows Services
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.Workstation  
Workstation
- providers/Microsoft.ProcessSimple/operationGroups/DesktopFlow.XML XML

## PowerShell support for desktop flow modules

If you don't want to turn on the **Show desktop flow actions** in **DLP policies** setting, you can use the following PowerShell script to add all desktop flow modules to the **Blocked** group of a DLP policy. If you already turned on the setting, you don't need to use this script.

PowerShell

```
# Step #1: Retrieve a DLP policy named 'My DLP Policy'
$dlpPolicies = Get-DlpPolicy
$dlpPolicy = $dlpPolicies.value | where {$_.displayName -eq 'My DLP
Policy'}

# Step #2: Get all Power Automate for desktop flow modules
$desktopFlowModules = Get-DesktopFlowModules

# Step #3: Convert the list of Power Automate for desktop flow modules to a
format that can be added to the policy
$desktopFlowModulesToAddToPolicy = @(
    foreach ($modules in $desktopFlowModules) {
```

```

        $desktopFlowModulesToAddToPolicy += [pscustomobject]@{
            id=$modules.id
            name=$modules.Properties.displayName
            type=$modules.type
        }
    }
}

```

# Step #4: Add all desktop flow modules to the 'blocked' category of 'My DLP Policy'

```

Add-ConnectorsToPolicy -Connectors $desktopFlowModulesToAddToPolicy -
PolicyName $dlpPolicy.name -classification Blocked -Verbose

```

The following PowerShell script adds two specific desktop flow modules to the default data group of a DLP policy.

PowerShell

```

# Step #1: Retrieve a DLP policy named 'My DLP Policy'
$dlpPolicies = Get-DlpPolicy
$dlpPolicy = $dlpPolicies.value | where {$_.displayName -eq 'My DLP
Policy'}

# Step #2: Get all Power Automate for desktop flow modules
$desktopFlowModules = Get-DesktopFlowModules

# Step #3: Create a list with the 'Active Directory' and 'Workstation'
modules
$desktopFlowModulesToAddToPolicy = @()
$activeDirectoryModule = $desktopFlowModules | where
{$_.properties.displayName -eq "Active Directory"}
$desktopFlowModulesToAddToPolicy += [pscustomobject]@{
    id=$activeDirectoryModule.id
    name=$activeDirectoryModule.Properties.displayName
    type=$activeDirectoryModule.type
}
$clipboardModule = $desktopFlowModules | where {$_.properties.displayName
-eq "Workstation"}
$desktopFlowModulesToAddToPolicy += [pscustomobject]@{
    id=$clipboardModule.id
    name=$clipboardModule.Properties.displayName
    type=$clipboardModule.type
}

# Step #4: Add both modules to the default data group of 'My DLP Policy'
Add-ConnectorsToPolicy -Connectors $desktopFlowModulesToAddToPolicy -
PolicyName $dlpPolicy.name -Classification
$dlpPolicy.defaultConnectorsClassification -Verbose

```

## PowerShell script to opt out desktop flows

If you don't want to use the DLP for desktop flows feature, you can use the following PowerShell script to opt out.

PowerShell

```
# Step #1: Retrieve the DLP policy named 'My DLP Policy'

$policies = Get-DlpPolicy
$dlpPolicy = $policies.value | Where-Object { $_.displayName -eq "My DLP Policy" }

# Step #2: Get all Power Automate for desktop flow modules

$desktopFlowModules = Get-DesktopFlowModules

# Step #3: Remove Desktop Flow modules from all 3 connector groups of the policy

foreach ($connectorGroup in $dlpPolicy.connectorGroups) {
    $connectorGroup.connectors = $connectorGroup.connectors | Where-Object {
    $desktopFlowModules.id -notcontains $_.id }
}

# Step #4: Save the updated policy

Set-DlpPolicy -PolicyName $dlpPolicy.name -UpdatedPolicy $dlpPolicy
```

## After the policy is enabled

If your users don't have the latest Power Automate for desktop, DLP policy enforcement is limited. They don't see design-time error messages when they're trying to run, debug, or save desktop flows that violate DLP policies. Background jobs periodically scan desktop flows in the environment and automatically suspend any that violate DLP policies. Users can't run desktop flows from a cloud flow if the desktop flow violates any data loss prevention policy.

Makers who have the latest Power Automate for desktop can't debug, run, or save desktop flows that violate DLP policy. They also can't select a desktop flow that's in violation of a DLP policy from a cloud flow step.

## DLP enforcement and suspension

1. When you create or edit a flow, Power Automate evaluates it against the current set of DLP policies.
  - a. Enforcement of flows without a child flow, which is 99% of flows, is synchronous and occurs in real-time.

- b. Enforcement of a flow with a child flow is asynchronous, since the child flows need to be evaluated as well, and occurs within 24 hours.
2. When you create or change a DLP policy, a background job scans all active flows in the environment, evaluates them, and then suspends the flows that violate the policy. Enforcement is asynchronous and occurs within 24 hours. If a DLP policy change occurs when the previous DLP policy is being evaluated, then the evaluation restarts to make sure the latest policies are enforced.
3. Weekly, a background job does a consistency check of all active flows in the environment against the DLP policies to confirm that a DLP policy check wasn't missed.

## DLP reactivation

If the DLP enforcement background job finds a desktop flow that no longer violates any DLP policy, then the background job automatically removes the suspension. However, the DLP enforcement background job doesn't automatically unsuspend cloud flows.

## DLP enforcement change process

Periodically, DLP enforcement needs to change because new DLP capabilities or a bug fix are rolled out or an enforcement gap is filled. When changes can affect existing flows, apply the following staged DLP enforcement change management process:

1. **Investigating:** Confirm the need for a DLP enforcement change and investigate the specifics of the change.
2. **Learning:** Implement the change and gather data about the breadth of the effects of the change. Document DLP enforcement changes to explain the scope of the change. If the data suggests that customers will be greatly affected, then a communication may be sent to those customers to let them know that a change is coming. If the change has a broad impact on existing flows, then at a later stage in the learning phase, when the background DLP enforcement job finds a violation in an existing flow, Power Automate notifies the flow owners that the flow will be suspended, so that they have more time to respond.
3. **Notify only:** Turn on email notifications only for DLP violations so owners of existing flows get notified about the upcoming DLP enforcement change. When the background DLP enforcement job finds a violation in an existing flow, notify the flow owners that the flow will be suspended. This mechanism runs weekly.
4. **Design-time enforcement:** Turn on design-time enforcement of DLP violations so that owners of existing flows get notified about the upcoming DLP enforcement

change, but any flows that are changed get a full DLP policy evaluation at design time. This is also known as *soft enforcement*.

- **Design-time:** When a flow is updated and saved, use the updated DLP enforcement and suspend the flow if needed so the maker is immediately aware of the enforcement.
- **Background process:** When the background DLP enforcement job finds a violation in a flow, notify the flow owners that the flow will be suspended. This mechanism includes creation or changes to DLP policy and consistency checks.

5. **Full enforcement:** Turn on full enforcement of DLP violations, so DLP policies are fully enforced on all existing and new flows. The DLP policies are fully enforced when flows are saved during DLP enforcement background job evaluation. This is also known as *hard enforcement*.

## DLP enforcement change list

The following table lists DLP enforcement changes and the date the changes were effective.

[Expand table](#)

Date	Description	Reason for change	Stage	Design-time enforcement availability*	Full enforcement availability*
May 2022	Delegated authorization background job enforcement	DLP policies are enforced on flows that use delegated authorization while the flow is being saved, but not during background job evaluation.	Full	June 2, 2022	July 21, 2022
May 2022	Request apiConnection trigger enforcement	DLP policies weren't enforced correctly for some triggers. The affected triggers have <b>type=Request</b> and <b>kind=apiConnection</b> . Many of the affected triggers are instant triggers, which are used in instant, or manually triggered, flows. The affected triggers include the following.	Full	June 2, 2022	August 25, 2022

Date	Description	Reason for change	Stage	Design-time enforcement availability*	Full enforcement availability*
		<ul style="list-style-type: none"> <li>- <a href="#">Power BI</a>: Power BI button clicked</li> <li>- <a href="#">Teams</a>: From the compose box (V2)</li> <li>- <a href="#">OneDrive for Business</a>: For a selected file</li> <li>- <a href="#">Dataverse</a>: When a flow step is run from a business process flow</li> <li>- <a href="#">Dataverse (legacy)</a>: When a record is selected</li> <li>- <a href="#">Excel Online (Business)</a>: For a selected row</li> <li>- <a href="#">SharePoint</a>: For a selected item</li> <li>- Microsoft Copilot Studio: When Copilot Studio calls a flow (V2)</li> </ul>			
July 2022	Enforce DLP policies on child flows	<p>Enable the enforcement of DLP policies to include child flows. If a violation is found anywhere in the flow tree, the parent flow is suspended. After the child flow is edited and saved to remove the violation, the parent flows can be resaved or reactivated to run the DLP policy evaluation again. A change to no longer block child flows when the HTTP connector is blocked will roll out along with full enforcement of DLP policies on child flows. Once full enforcement is available, the enforcement will include child desktop flows.</p>	Full	February 14, 2023	March 2023
January 2023	Enforce DLP policies on child desktop flows	<p>Enable the enforcement of DLP policies to include child desktop flows. If a violation is found anywhere in the flow tree, the desktop parent flow is suspended.</p>	Full	-	August 2023



Date	Description	Reason for change	Stage	Design-time enforcement availability*	Full enforcement availability*
		After the child desktop flow is edited and saved to remove the violation, the parent desktop flows are automatically reactivated.			

\*Availability schedule might change and depends on the rollout.

## Flow suspension for DLP violation

Suspended flows show as suspended in the Power Automate maker portal and the Power Platform admin center. When a flow is returned through an API, PowerShell, or the [Power Automate Management connector list flows "as Admin" action](#), the flow has `State=Suspended`, `FlowSuspensionReason=CompanyDlpViolation`, and a `FlowSuspensionTime` value indicating when the flow was suspended.

## Known limitations

[Learn about DLP known issues.](#)

## Related information

- [Power Platform DLP policies](#)
- [Learn more about environments](#)
- [Learn more about Power Automate](#)
- [Learn more about the admin center](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# Power Automate mobile app supports Microsoft Intune

Article • 10/30/2023

The Power Automate mobile app for iOS and Android supports Intune's Mobile Application Management (MAM) without device enrollment. Using MAM allows IT administrators to create and enforce mobile data policies to safeguard organizational data.

## Why Intune support is important

Organizations are looking for more control over the data that resides on employee mobile devices. Organizations might want to restrict how that data moves to the device and ensure the data is removed, should the employee leave the organization.

## What is Microsoft Application Management (MAM)

MAM allows organizations to create policies that govern how apps are used within a tenant. This includes enforcing app data encryption, limiting the ability to copy or extract data to only approved applications, or enforcing a PIN on a device.

## Prerequisites

- An Intune [app protection policy](#).
- An Microsoft Entra group.
- Company Portal. One key benefit of using MAM is that devices don't need to be enrolled in Intune MAM. All that's required is the Company Portal, which is available from the App Store and the Google Play store.
- Version 2.31.0 of the Power Automate mobile app for iOS, Android, or Windows Phone.

**Create an app protection policy, assign apps to the policy, define settings, and add users to a Microsoft Entra group**

For the Power Automate mobile app to be managed, you must:

1. Create an app protection policy.
2. Assign the Power Automate mobile app to the app protection policy.
3. Assign the policy settings. For example, you might assign the policy to require a PIN to access the mobile device that runs the Power Automate mobile app.
4. Apply the app protection policy to a specific Microsoft Entra group.
5. Add all users to which the app protection policy applies to the Microsoft Entra group.

Follow these steps to create an [app protection policy](#) that requires Power Automate mobile app users to enter a PIN before they can access the app.

## Test the app protection policy

After you've created the app protection policy and assigned users to the Microsoft Entra group, it's time to use the Power Automate mobile app and confirm the policy works.

To confirm the policy works, follow these steps:

1. Install the Power Automate mobile app on a device whose platform matches one of the platforms you defined in the app protection policy.
2. Sign in to the mobile app with an account that's in the Microsoft Entra group that restricts use of the mobile app to users who have a PIN.

You'll then be prompted to:

1. Install the Company Portal.
2. Set your PIN if you don't already have a PIN that meets the app protection policy's criteria.

## Learn more

Learn to create an [app protection policy](#).

# Learn all about data groups

Article • 12/16/2022

## What is a data group?

Data groups are a simple way to categorize services within a [data loss prevention \(DLP\) policy](#). The two data groups available are the **Business data only** group and the **No business data allowed** group. Organizations are free to determine which services are placed into a particular data group. A good way to categorize services is to place them in groups, based on the impact to the organization. By default, all services are placed into the **No business data allowed** data group. You manage the services in a data group when you create or modify the properties of a DLP policy from the admin center.

Visit the Microsoft Power Platform documentation to learn more about [data groups and data loss prevention policies](#).

## Next steps

- [Learn more about data loss prevention \(DLP\) policies](#)
- [Learn more about environments](#)

# Sharing and connectors admin analytics reports

Article • 12/16/2022

Organizations need insights into how apps are used and who's using them. The Admin analytics sharing and connectors reports provide insights into how Power Automate is being used within your tenant.

Use the shared flows report to learn who your app champions are and then empower them to provide even more automated solutions for your organization. The connectors report identifies Microsoft, third-party, and custom connectors that are in use within your organization.

Visit the Microsoft Power Platform documentation to get the details how to:

- View the [shared flows reports](#).
- View the [connectors reports](#).
- [Filter views](#).

# Respond to personal data requests (Microsoft Entra ID)

Article • 10/30/2023

The European Union (EU) General Data Protection Regulation (GDPR) gives significant rights to individuals regarding their data. Refer to the Microsoft Learn [General Data Protection Regulation Summary](#) for an overview of GDPR, including terminology, an action plan, and readiness checklists to help you meet your obligations under GDPR when using Microsoft products and services.

You can learn more about GDPR and how Microsoft helps support it and our customers who are affected by it.

- The [Microsoft Trust Center](#) provides general information, compliance best practices, and documentation helpful to GDPR accountability, such as Data Protection Impact Assessments, Data Subject Requests, and data breach notification.
- The [Service Trust portal](#) provides information about how Microsoft services help support compliance with GDPR.

Power Automate provides tools and resources to help you respond to requests to correct, export, or delete personal data that resides in the Microsoft cloud. This article helps you respond to requests from users who authenticate using Microsoft Entra ID. [Respond to requests from users who authenticate using a Microsoft account.](#)

## Prerequisites

- A paid or [trial license](#) for Power Apps Plan 2
- The [Office 365 Global Administrator](#) or [Microsoft Entra Global Administrator](#) role

If you're a member of an [unmanaged tenant](#) and don't have a global administrator, you can export and remove your own personal data. You must have an Microsoft Entra account with a [Power Automate license](#).

## Respond to requests for Power Automate customer data

Requests from data subjects require one or more of the following actions, depending on the request:

1. **Discover:** Use search and discovery tools to find the user's personal data, including accounts and system-generated logs. Determine whether the request meets your organization's guidelines for responding to personal data requests.
2. **Access:** Retrieve personal data that resides in the Microsoft cloud.
3. **Correct:** Make changes to personal data as requested, if appropriate.

As a data processor, Microsoft doesn't offer the ability to edit system-generated logs. These logs reflect factual activities and constitute a history of all events within a service. [Learn more about system-generated logs in Power Automate.](#)

4. **Restrict:** Restrict the processing of personal data, either by removing licenses for various services or turning off the services where possible. You can also remove data from the Microsoft cloud and retain it on-premises or at another location.
5. **Delete:** Permanently remove personal data that resides in Microsoft's cloud.
6. **Export:** Provide an electronic copy of personal data in a machine-readable format to the data subject.


# Respond to personal data discovery requests (Microsoft Entra ID)

Article • 10/30/2023

The first step in responding to personal data requests is to find personal data that's subject to the request. This step helps you to determine whether a request meets your organization's requirements for honoring or declining the request.

The following table summarizes the Power Automate resources that may contain the personal data of a user who authenticates using Microsoft Entra ID.

 Expand table

Resource	Purpose
System-generated logs	Records that capture system events and history.
Run history	The history of each flow execution for the past 28 days, including the start time, end time, status, and all inputs and outputs. <a href="#">Learn more</a>  .
Activity feed	Recaps flow activities, including run status, failures, and notifications.
User jobs	Not visible to the user; system jobs that run on behalf of a user for flows to execute.
Flows	The workflow logic that exists for a cloud flow. <a href="#">Learn more</a> .
Flow permissions	Permissions that allow other users to share a flow. <a href="#">Learn more</a> .
User details	Not visible to the user; details that support flow execution.
Connections	Used by connectors to share data with APIs, systems, databases, etc. <a href="#">Learn more</a> .
Connection permissions	Permissions for connections. <a href="#">Learn more</a> .
Custom connectors	Custom connectors that a user has created and published that allow connections to custom or third-party systems. <a href="#">Learn more</a>
Custom connector permissions	Permissions for custom connectors. <a href="#">Learn more</a> .
Gateway	Gateways are on-premises data services that users can install to transfer data quickly and securely between Power Automate and a data source that isn't in the cloud. <a href="#">Learn more</a> .



Resource	Purpose
Gateway permissions	Permissions for gateways. <a href="#">Learn more.</a>

# Respond to personal data export requests (Microsoft Entra ID)

Article • 08/16/2023

The European Union (EU) General Data Protection Regulation (GDPR) gives significant rights to individuals regarding their data. Refer to the Microsoft Learn [General Data Protection Regulation Summary](#) for an overview of GDPR, including terminology, an action plan, and readiness checklists to help you meet your obligations under GDPR when using Microsoft products and services.

You can learn more about GDPR and how Microsoft helps support it and our customers who are affected by it.

- The [Microsoft Trust Center](#) provides general information, compliance best practices, and documentation helpful to GDPR accountability, such as Data Protection Impact Assessments, Data Subject Requests, and data breach notification.
- The [Service Trust portal](#) provides information about how Microsoft services help support compliance with GDPR.

## ⓘ Note

This article provides instructions for exporting personal data from the device or service and can help you meet your obligations under GDPR. For general information about GDPR, see the [GDPR section of the Microsoft Trust Center](#) and the [GDPR section of the Service Trust portal](#).

The right of data portability allows data subjects to request a copy of their personal data in an electronic format that can be transmitted to another data controller.

The following table summarizes where to find and export the personal data of a user who authenticates by using Microsoft Entra in Power Automate.

- **Website access:** Sign in to the [Power Apps admin center](#) or [Power Platform admin center](#).
- **PowerShell access:** Use [Power Apps Admin PowerShell cmdlets](#).

Customer data	Website access	PowerShell access
System-generated logs	<a href="#">Office 365 Service Trust Portal</a>	

Customer data	Website access	PowerShell access
Run history	Power Automate maker portal	
Flows	Power Automate maker portal	
Flow permissions	Power Automate maker portal and Power Automate admin center	
User details		Power Apps cmdlets
Connections	Power Automate maker portal	Power Apps cmdlets
Connection permissions	Power Automate maker portal	Power Apps cmdlets
Custom connectors	Power Automate maker portal	Power Apps cmdlets
Custom connector permissions	Power Automate maker portal	Power Apps cmdlets
Gateway	Power Automate maker portal	On-premises data gateway PowerShell cmdlets
Gateway permissions	Power Automate maker portal	On-premises data gateway PowerShell cmdlets

## Export a cloud flow

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **My flows**.
3. Select a flow, select ... **More**, and then select **Export**.
4. Select **Package (.zip)**.

The flow is downloaded as a zipped archive.

## Export run history

Run history lists all executions of a cloud flow. It includes a run's status, start time, duration, inputs, and outputs.

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **My flows**.

3. Select a flow.
4. In the **Run history** pane, select **See all**.
5. At the top of the page, select **Download CSV**.

The run history is downloaded as a .csv file, so that you can open it in Microsoft Excel or a text editor and analyze the results.

## Export a user's activity feed

The activity feed shows a history of a user's activities, flow execution failures, and notifications.

1. Sign in to [Power Automate](#) .
2. Select the bell symbol in the upper-right corner of the page, and then select **Show all activity**.
3. Copy the contents of the **Activity** page, and paste them into a document editor such as Microsoft Word.

## Export a user's connections

1. Sign in to [Power Automate](#) .
2. Select the gear symbol in the upper-right corner of the page, and then select **Connections**.
3. Copy the list, and paste it into a document editor such as Word.

## Export a user's connections using a PowerShell cmdlet

PowerShell

```
Add-PowerAppsAccount
```

```
#Retrieves all connections for the specified userID
```

```
Add-PowerAppsAccount
```

```
$userId = "{userID}"
```

```
Get-AdminConnection -CreateBy $userId | ConvertTo-Json | Out-File -FilePath  
"UserConnections.txt"
```

# Export a user's connection permissions using PowerShell cmdlets

PowerShell

```
Add-PowerAppsAccount  
Get-ConnectionRoleAssignment | ConvertTo-Json | Out-File -FilePath  
"ConnectionPermissions.txt"
```

PowerShell

```
Add-PowerAppsAccount  
  
#Retrieves all connection permissions for the specified userID  
Add-PowerAppsAccount  
$userId = "{userID}"  
Get-AdminConnectionRoleAssignment -PrincipalObjectId $userId | ConvertTo-  
Json | Out-File -FilePath "ConnectionPermissions.txt"
```

## Export a user's custom connectors

1. Sign in to [Power Automate](#).
2. Select the gear symbol in the upper-right corner of the page, and then select **Custom Connectors**.
3. Copy the list, and paste it into a document editor such as Word.

## Export a user's custom connectors using PowerShell cmdlets

PowerShell

```
Add-PowerAppsAccount  
Get-Connector -FilterNonCustomConnectors | ConvertTo-Json | Out-File -  
FilePath "CustomConnectors.txt"
```

PowerShell

```
Add-PowerAppsAccount  
  
#Retrieves all custom connectors for the specified userID  
Add-PowerAppsAccount  
$userId = "{userID}"
```

```
Get-AdminConnector -CreatedBy $userId | ConvertTo-Json | Out-File -FilePath  
"UserCustomConnectors.txt"
```

## Export a user's custom connector permissions using PowerShell cmdlets

PowerShell

```
Add-PowerAppsAccount  
Get-ConnectorRoleAssignment | ConvertTo-Json | Out-File -FilePath  
"CustomConnectorPermissions.txt"
```

PowerShell

```
Add-PowerAppsAccount  
  
#Retrieves all connection permissions for the specified userID  
Add-PowerAppsAccount  
$userId = "{userID}"  
Get-AdminConnectorRoleAssignment -PrincipalObjectId $userId | ConvertTo-Json  
| Out-File -FilePath "CustomConnectorPermissions.txt"
```

## Export a user's approval history

1. On the web or desktop, open [Microsoft Teams](#).
2. In Teams, follow one of these steps to open the **Approvals** app:
  - From the main search bar, search for **Approvals**.
  - In the left pane, select the ellipsis (...), and then search for or select **Approvals**.
3. On the **Received** tab, select **Export** in the upper-right corner to export received approvals.
4. Select the export dates, and then select **Export**.
5. On the **Sent** tab, select **Export** in the upper-right corner to export sent approvals.
6. Select the export dates, and then select **Export**.

Repeat the previous procedure for every environment that the user is part of. Use the environment switcher in the upper right of the **Approvals** app page to switch

environments.

Alternatively, open [Power Automate](#), select **Approvals** on the left navigation pane, and select the **History** tab. You can then manually copy approval contents for received and sent approvals. To ensure that you get the contents for both types of approvals, select the appropriate filter (**Received** or **Sent**) in the upper-right corner.

## Export a user's details using a PowerShell cmdlet

PowerShell

```
Add-PowerAppsAccount
```

```
Get-AdminFlowUserDetails -UserId {userID}
```

## Export gateway settings

[Learn more about responding to data export requests for on-premises data gateways.](#)

# Respond to personal data deletion requests (Microsoft Entra ID)

Article • 08/16/2023

The European Union (EU) General Data Protection Regulation (GDPR) gives significant rights to individuals regarding their data. Refer to the Microsoft Learn [General Data Protection Regulation Summary](#) for an overview of GDPR, including terminology, an action plan, and readiness checklists to help you meet your obligations under GDPR when using Microsoft products and services.

You can learn more about GDPR and how Microsoft helps support it and our customers who are affected by it.

- The [Microsoft Trust Center](#) provides general information, compliance best practices, and documentation helpful to GDPR accountability, such as Data Protection Impact Assessments, Data Subject Requests, and data breach notification.
- The [Service Trust portal](#) provides information about how Microsoft services help support compliance with GDPR.

## ⓘ Note

This article provides instructions for deleting personal data from the device or service and can help you meet your obligations under GDPR. For general information about GDPR, see the [GDPR section of the Microsoft Trust Center](#) and the [GDPR section of the Service Trust portal](#).

The right of erasure allows data subjects to request the removal of their personal data from an organization's customer data. This personal data includes system-generated logs but excludes audit logs.

In addition, when a user leaves your organization, an admin must determine whether to delete data and resources that the user created as part of their Power Automate flows. Other personal data is automatically deleted when the user's account is deleted from Microsoft Entra ID.

The following table shows which personal data is automatically deleted, and which data an admin must manually review and delete, for users who authenticate by using Microsoft Entra ID.



Requires manual review and deletion	Automatically deleted when the user is deleted from Microsoft Entra ID
<ul style="list-style-type: none"> <li>• Environment*</li> <li>• Environment permissions**</li> <li>• Flows</li> <li>• Flow permissions</li> <li>• User details</li> <li>• Connections*</li> <li>• Connection permissions</li> <li>• Custom connector*</li> <li>• Custom connector permissions</li> </ul>	<ul style="list-style-type: none"> <li>• System-generated logs</li> <li>• Run history</li> <li>• Activity Feed</li> <li>• Gateway</li> <li>• Gateway permissions</li> </ul>

\* Each of these resources contains "Created By" and "Modified By" records that include personal data. For security reasons, these records are retained until the resource is deleted.

\*\* For environments that include a Dataverse database, environment permissions (that is, which users are assigned to the Environment Maker and Admin roles) are stored as records in Dataverse. [Learn more about running data requests against Dataverse customer data.](#)

The following table summarizes where to find and delete a user's personal data in Power Automate.

- **Website access:** Sign in to the [Power Apps admin center](#) or [Power Platform admin center](#).
- **PowerShell access:** Use [Power Apps Admin PowerShell cmdlets](#).

Resources containing personal data	Website access	PowerShell access	Automated deletion
System-generated logs	<a href="#">Office 365 Service Trust Portal</a>		
Environment	Power Automate admin center	Power Apps cmdlets	
Environment permissions*	Power Automate admin center	Power Apps cmdlets	
Run history			Deleted through the 28-day retention policy
Activity feed			Deleted through the 28-day retention policy

Resources containing personal data	Website access	PowerShell access	Automated deletion
User jobs			
Flows	Power Automate maker portal**		
Flow permissions	Power Automate maker portal		
User details		Power Apps cmdlets	
Connections	Power Automate maker portal		
Connection permissions	Power Automate maker portal		
Custom connector	Power Automate maker portal		
Custom connector permissions	Power Automate maker portal		
Approval history	Power Apps maker portal*		

\* For environments that include a Dataverse database, environment permissions and model-driven app permissions are stored as records in Dataverse. [Learn more about running data requests against Dataverse customer data.](#)

\*\* An admin can access these resources from the Power Automate maker portal only if the admin has been assigned access from the Power Automate admin center.

## Run data deletion requests

### Important

To avoid data corruption, follow these steps in order.

1. [Reassign and copy the user's flows.](#)
2. [Delete the user's approval history.](#)
3. [Delete connections created by the user.](#)
4. [Delete the user's permissions to shared connections.](#)

5. Delete custom connectors created by the user.
6. Delete the user's permissions to shared custom connectors.
7. Delete or reassign environments created by the user.
8. Delete gateway settings.
9. Delete the user's details.
10. Delete the user from Microsoft Entra ID.

## Reassign and copy the user's flows

If a departing user or a user who has requested the deletion of their personal data has created flows that are widely used in your organization, don't delete them. Instead, copy them, assign the copies to new owners, and establish new connections. When the flows are copied, personal identifier linkages to the departing user are deleted.

1. Sign in to [Power Platform admin center](#).
2. Select the environment that contains the user's flows.
3. Select **Resources > Flows**, and then select a flow to reassign.
4. Select **Manage sharing**, and add yourself as an owner.
5. Select **Save**.
6. Sign in to [Power Automate](#).
7. Select **My flows > Team flows**.
8. In the list of flows, select the vertical ellipsis (⋮) for the flow that you want to copy, and then select **Save As**.
9. Establish any connections that are required, and then select **Continue**.
10. Enter a new name for the flow, and then select **Save**.
11. Turn on the copied flow.
12. Delete the original flow.
13. Select the ellipsis (...), and then select **Delete**.
14. Select **Delete** again when you're prompted.

## Delete the user's approval history

Approval responses include personal information in the form of approval assignments and comments.

1. Sign in to [Power Automate](#) or [PowerApps](#).
2. On the left navigation pane, select **Data**, and then select **Tables**.
3. Select the **All** tab.
4. Find the **Approvals** table, and select the vertical ellipsis (⋮).

5. Select **Edit** or **Edit in new tab**.

Alternatively, select **Edit data in Excel** to work in Excel and delete the records there.

6. If the **Owner** column doesn't appear, select the **+ <number> more** column heading, select **Owner**, and then select **Save**.

7. Select the **Owner** column heading, and then select **Filter by**.

8. Enter the name of the user whose data you want to delete, and then select **Delete records**.

9. Go back to the main table list that you found in step 3, and repeat steps 4 through 8 for each of the following tables:

- **Approval Requests**
- **Approval Response**
- **Basic Approval Model Data**
- **Await All Approval Model**
- **Await All Action Approval model**
- **Approval step**
- **Action Approval Model**

To learn more, go to [Responding to Data Subject Rights \(DSR\) requests for Microsoft Dataverse customer data](#).

## Delete connections created by the user

Connections include references to the user who created them. Users can delete their own connections by using PowerShell cmdlets. In addition, admins can use the cmdlets to delete users' connections. [Learn more about Power Apps PowerShell cmdlets](#).

The following PowerShell script deletes connections that were created by the user who runs the script:

PowerShell

```
Add-PowerAppsAccount
```

```
#Retrieves all connections for the calling user and deletes them
```

```
Get-AdminPowerAppConnection | Remove-Connection
```

The following PowerShell script deletes connections that were created by the user who has the specified `userID` value:

PowerShell

[Add-PowerAppsAccount](#)

```
$deleteDsrUserId = "{userID}"  
#Retrieves all connections for the specified userID and deletes them  
Get-AdminPowerAppConnection -CreatedBy $deleteDsrUserId | Remove-  
AdminConnection
```

## Delete the user's permissions to shared connections

Users can delete their own connection role assignments for shared connections by using PowerShell cmdlets. In addition, admins can use the cmdlets to delete users' connection permissions. [Learn more about Power Apps PowerShell cmdlets.](#)

The following PowerShell script deletes connection role assignments for the user who runs the script:

PowerShell

[Add-PowerAppsAccount](#)

```
#Retrieves all connection role assignments for the calling user and deletes  
them  
Get-ConnectionRoleAssignment | Remove-ConnectionRoleAssignment
```

The following PowerShell script deletes connection role assignments for the user who has the specified `userID` value:

PowerShell

[Add-PowerAppsAccount](#)

```
$deleteDsrUserId = "{userID}"  
#Retrieves all shared connections for the specified userID and deletes their  
permissions  
Get-AdminConnectionRoleAssignment -PrincipalObjectId $deleteDsrUserId |  
Remove-AdminConnectionRoleAssignment
```

### ⓘ Note

Owner role assignments can't be deleted unless the connection resource is deleted first.

## Delete custom connectors created by the user

Custom connectors include references to the user who created them. Users can delete their own custom connectors by using PowerShell cmdlets. In addition, admins can use the cmdlets to delete users' custom connectors. [Learn more about Power Apps PowerShell cmdlets.](#)

The following PowerShell script deletes custom connectors that were created by the user who runs the script:

PowerShell

[Add-PowerAppsAccount](#)

```
#Retrieves all custom connectors for the calling user and deletes them  
Get-Connector -FilterNonCustomConnectors | Remove-Connector
```

The following PowerShell script deletes connection role assignments for the user who has the specified `userID` value:

PowerShell

[Add-PowerAppsAccount](#)

```
$deleteDsrUserId = "{userID}"  
#Retrieves all custom connectors created by the specified userID and deletes them  
Get-AdminConnector -CreatedBy $deleteDsrUserId | Remove-AdminConnector
```

## Delete the user's permissions to shared custom connectors

Users can delete their own custom connector role assignments by using PowerShell cmdlets. In addition, admins can use the cmdlets to delete users' custom connector role assignments. [Learn more about Power Apps PowerShell cmdlets.](#)

The following PowerShell script deletes custom connector role assignments for the user who runs the script:

PowerShell

[Add-PowerAppsAccount](#)

```
#Retrieves all connector role assignments for the calling user and deletes
```

them

[Get-ConnectorRoleAssignment](#) | [Remove-ConnectorRoleAssignment](#)

The following PowerShell script deletes custom connector role assignments for the user who has the specified `userID` value:

PowerShell

[Add-PowerAppsAccount](#)

```
$deleteDsrUserId = "{userID}"  
#Retrieves all custom connector role assignments for the specified userID  
and deletes them  
Get-AdminConnectorRoleAssignment -PrincipalObjectId $deleteDsrUserId |  
Remove-AdminConnectorRoleAssignment
```

#### ⓘ Note

Owner role assignments can't be deleted unless the connection resource is deleted first.

## Delete or reassign environments created by the user

As an admin who is responding to a user's data deletion request, you have two options for each environment that the user created:

- If you determine that the environment isn't being used by anyone else in your organization, you can delete it.
- If you determine that the environment is still required, you can add yourself or another user in your organization as an Environment Admin.

#### ⓘ Important

if you delete an environment, you permanently delete all resources in it, including apps, flows, and connections. Always review the contents of an environment before you delete it.

**Delete the user's permissions in all environments or give other users access to the user's environments**

You can remove the user's role assignments in all environments in your organization. You can also grant admin access to an environment that the user created. [Learn more about managing environments.](#)

## Delete gateway settings

[Learn more about responding to data export requests for on-premises data gateways.](#)

## Delete the user's details

Before you perform this step, make sure that you've reassigned and deleted all the user's flows. Otherwise, the PowerShell cmdlet returns an error.

```
PowerShell
```

```
Add-PowerAppsAccount  
Remove-AdminFlowUserDetails -UserId {userID}
```

## Delete the user from Microsoft Entra ID

The final step is to delete the user's Microsoft Entra account.

### ⓘ Note

For information about viewing, deleting, and exporting personal data, see [Azure Data Subject Requests for GDPR](#). For general information about GDPR, see the [GDPR section of the Microsoft Trust Center](#) and the [GDPR section of the Service Trust portal](#).

## Delete the user from an unmanaged tenant

If the user is a member of an unmanaged tenant, you can close the user's account from the [Work and School Privacy portal](#).

To determine whether the user is a member of a managed or unmanaged tenant, follow these steps:

1. Open the following URL in a browser. Replace `foobar@contoso.com` with the user's email address.



```
https://login.microsoftonline.com/common/userrealm/foobar@contoso.com?api-  
version=2.1
```

2. If the response includes `"IsViral": true`, the user is a member of an **unmanaged tenant**.

```
{  
  "Login": "foobar@unmanagedcontoso.com",  
  "DomainName": "unmanagedcontoso.com",  
  "IsViral": true,  
}
```

Otherwise, the user is a member of a managed tenant.

# Respond to personal data requests (Microsoft account)

Article • 10/30/2023

The European Union (EU) General Data Protection Regulation (GDPR) gives significant rights to individuals regarding their data. Refer to the Microsoft Learn [General Data Protection Regulation Summary](#) for an overview of GDPR, including terminology, an action plan, and readiness checklists to help you meet your obligations under GDPR when using Microsoft products and services.

You can learn more about GDPR and how Microsoft helps support it and our customers who are affected by it.

- The [Microsoft Trust Center](#) provides general information, compliance best practices, and documentation helpful to GDPR accountability, such as Data Protection Impact Assessments, Data Subject Requests, and data breach notification.
- The [Service Trust portal](#) provides information about how Microsoft services help support compliance with GDPR.

Power Automate provides tools and resources to help you respond to requests to correct, export, or delete personal data that resides in the Microsoft cloud. This article helps you respond to requests from users who authenticate using a Microsoft account. [Respond to requests from users who authenticate using Microsoft Entra ID](#).

## Prerequisites

- A Microsoft account with a [free Power Automate license](#)

## Respond to requests

Requests from data subjects require one or more of the following actions, depending on the request:

1. **Discover:** Use search and discovery tools to find the user's personal data, including accounts and system-generated logs. Determine whether the request meets your organization's guidelines for responding to personal data requests.
2. **Access:** Retrieve personal data that resides in the Microsoft cloud.

3. **Correct:** Make changes to personal data as requested, if appropriate.

As a data processor, Microsoft doesn't offer the ability to edit system-generated logs. These logs reflect factual activities and constitute a history of all events within a service. [Learn more about system-generated logs in Power Automate.](#)

4. **Restrict:** Restrict the processing of personal data, either by removing licenses for various services or turning off the services where possible. You can also remove data from the Microsoft cloud and retain it on-premises or at another location.

5. **Delete:** Permanently remove personal data that resides in Microsoft's cloud. [Learn more about closing a Microsoft account.](#)

6. **Export:** Provide an electronic copy of personal data in a machine-readable format to the data subject.


# Respond to personal data discovery requests (Microsoft account)

Article • 05/03/2023

The first step in responding to personal data requests is to find personal data that's subject to the request. This step helps you to determine whether a request meets your organization's requirements for honoring or declining the request.

The following table summarizes the Power Automate resources that may contain the personal data of a user who authenticates using a Microsoft account.

 Expand table

Resource	Purpose
Run history	The history of each flow execution for the past 28 days, including the start time, end time, status, and all inputs and outputs. <a href="#">Learn more</a>  .
Activity feed	Recaps flow activities, including run status, failures, and notifications.
Flows	The workflow logic that exists for a cloud flow. <a href="#">Learn more</a> .
Connections	Used by connectors to share data with APIs, systems, databases, etc. <a href="#">Learn more</a> .

# Respond to personal data export requests (Microsoft account)

Article • 08/16/2023

The European Union (EU) General Data Protection Regulation (GDPR) gives significant rights to individuals regarding their data. Refer to the Microsoft Learn [General Data Protection Regulation Summary](#) for an overview of GDPR, including terminology, an action plan, and readiness checklists to help you meet your obligations under GDPR when using Microsoft products and services.

You can learn more about GDPR and how Microsoft helps support it and our customers who are affected by it.

- The [Microsoft Trust Center](#) provides general information, compliance best practices, and documentation helpful to GDPR accountability, such as Data Protection Impact Assessments, Data Subject Requests, and data breach notification.
- The [Service Trust portal](#) provides information about how Microsoft services help support compliance with GDPR.

## ⓘ Note

This article provides instructions for exporting personal data from the device or service and can help you meet your obligations under GDPR. For general information about GDPR, see the [GDPR section of the Microsoft Trust Center](#) and the [GDPR section of the Service Trust portal](#).

The right of data portability allows data subjects to request a copy of their personal data in an electronic format that can be transmitted to another data controller.

The following table summarizes where to find and export the personal data of a user who authenticates by using a Microsoft account in Power Automate.

- [Microsoft privacy dashboard](#)
- [Power Automate maker portal](#)

 Expand table

Personal data	Location
Product and service activity	Microsoft privacy dashboard

Personal data	Location
Flows	Power Automate maker portal
Run history	Power Automate maker portal
Activity Feed	Power Automate maker portal
Connections	Power Automate maker portal

## Export product and service activity

1. Sign in to the [Microsoft privacy dashboard](#) by using your Microsoft account.
2. Select **Download your data**, and then select **Create new archive**.
3. Select **App & service usage** and any other data that you want to download.
4. Select **Create archive**.
5. Select **Download** in the archive list to save the exported data to your local drive.

## Export a cloud flow

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **My flows**.
3. Select a flow, select ... **More**, and then select **Export**.
4. Select **Package (.zip)**.

The flow is downloaded as a zipped archive.

## Export run history

Run history lists all executions of a cloud flow. It includes a run's status, start time, duration, inputs, and outputs.

1. Sign in to [Power Automate](#).
2. On the left navigation pane, select **My flows**.
3. Select a flow.
4. In the **Run history** pane, select **See all**.
5. At the top of the page, select **Download CSV**.

The run history is downloaded as a .csv file, so that you can open it in Microsoft Excel or a text editor and analyze the results.

## Export a user's activity feed

The activity feed shows a history of a user's activities, flow execution failures, and notifications.

1. Sign in to [Power Automate](#).
2. Select the bell symbol in the upper-right corner of the page, and then select **Show all activity**.
3. Copy the contents of the **Activity** page, and paste them into a document editor such as Microsoft Word.

## Export a user's connections

1. Sign in to [Power Automate](#).
2. Select the gear symbol in the upper-right corner of the page, and then select **Connections**.
3. Copy the list, and paste it into a document editor such as Word.

# Respond to personal data deletion requests (Microsoft account)

Article • 05/03/2023

The European Union (EU) General Data Protection Regulation (GDPR) gives significant rights to individuals regarding their data. Refer to the Microsoft Learn [General Data Protection Regulation Summary](#) for an overview of GDPR, including terminology, an action plan, and readiness checklists to help you meet your obligations under GDPR when using Microsoft products and services.

You can learn more about GDPR and how Microsoft helps support it and our customers who are affected by it.

- The [Microsoft Trust Center](#) provides general information, compliance best practices, and documentation helpful to GDPR accountability, such as Data Protection Impact Assessments, Data Subject Requests, and data breach notification.
- The [Service Trust portal](#) provides information about how Microsoft services help support compliance with GDPR.

## ⓘ Note

This article provides instructions for deleting personal data from the device or service and can help you meet your obligations under GDPR. For general information about GDPR, see the [GDPR section of the Microsoft Trust Center](#) and the [GDPR section of the Service Trust portal](#).

The right to erasure allows data subjects to request the removal of their personal data, including system-generated logs but not audit logs, from an organization's customer data. Also, when a user leaves your organization, an admin must determine whether to delete data and resources that the user created as part of their Power Automate flows. Other personal data is automatically deleted when the user's Microsoft account is [closed](#).

The following table shows which personal data is automatically deleted, and which data requires an administrator to manually review and delete, for users who authenticate using a Microsoft account.

[Expand table](#)



Requires the user to review and delete	Automatically deleted
Product and service activity	Run history
Flows	Activity Feed
Connections	

## Delete personal data

The following steps describe how to self-serve data deletion requests.

### Delete product and service activity

1. Sign in to the [Microsoft Privacy Dashboard](#) with your Microsoft account.
2. Select **Activity history**.
3. Search or browse your activity history for the Microsoft applications and services that you use, including Power Automate.
4. Select **Delete** to remove specific product or service activity events.

F

**flow.microsoft.com**  
Microsoft Corporation (Sources: AsimovWeb) (AppId: flow.microsoft.com)

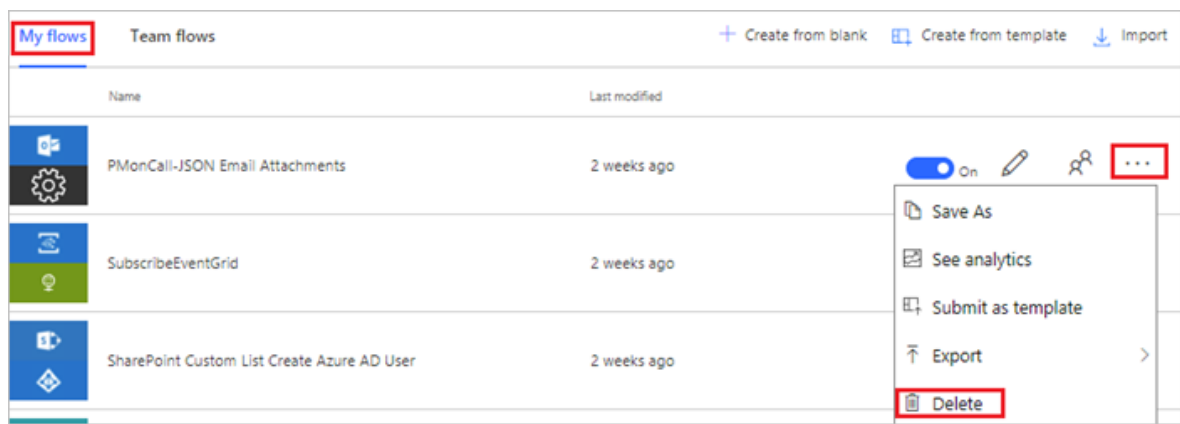
---

[View details](#)
[Delete](#)

ID: H4slAAAAAAAAEAFWOSwwCMBCE\_8tetSFWKnZvVREUQUGIh8ZD-pJgS0JbFCn57-YBQodImG93DjvCC3AEAQh1Iz-kFUUne1kPpJAtzGEwh5Au1gGNgsXqRim6ldRr5sj0qmkvXGIUmyGx17\_HTW\_HRfM1OTd5ZJD0opXvtMoZYMbMhjhgbmcTelZqAqJ0mFk\_XnGTXA770zm1-NBaWwftv0-Uuvf8WW15V4L-AWW70Unw

### List and delete flows

1. Sign in to [Power Automate](#), and then select **My flows**.
2. In the list of flows, select the flow menu (...) for the flow you want to delete, and then select **Delete**.



## Delete connections

Connections include references to the user who creates them. You can delete these references at any time.

1. Sign in to [Power Automate](#), select the gear icon in the upper-right corner of the window, and then select **Connections**.
2. Select the connection that you'd like to delete, select the menu (...), and then select **Delete**.
3. Select **Delete** when you're prompted to confirm you want to delete the connection.

### ⓘ Note

If other flows use the connection you're deleting, you're notified that a new connection is required. Otherwise, select **Delete** to continue.

## Learn more

- Get started with [Power Automate](#)
- Learn [what's new](#) with Power Automate

# Respond to requests to close a Microsoft account

Article • 05/03/2023

The European Union (EU) General Data Protection Regulation (GDPR) gives significant rights to individuals regarding their data. Refer to the Microsoft Learn [General Data Protection Regulation Summary](#) for an overview of GDPR, including terminology, an action plan, and readiness checklists to help you meet your obligations under GDPR when using Microsoft products and services.

You can learn more about GDPR and how Microsoft helps support it and our customers who are affected by it.

- The [Microsoft Trust Center](#) provides general information, compliance best practices, and documentation helpful to GDPR accountability, such as Data Protection Impact Assessments, Data Subject Requests, and data breach notification.
- The [Service Trust portal](#) provides information about how Microsoft services help support compliance with GDPR.

## Note

This article provides instructions for deleting personal data from the device or service and can help you meet your obligations under GDPR. For general information about GDPR, see the [GDPR section of the Microsoft Trust Center](#) and the [GDPR section of the Service Trust portal](#).

The right to erasure allows data subjects to request the removal of their personal data, including system-generated logs but not audit logs, from an organization's customer data. When a user decides to close their Microsoft account, their underlying data is also deleted.

The following personal data is automatically deleted when a user closes their Microsoft account:

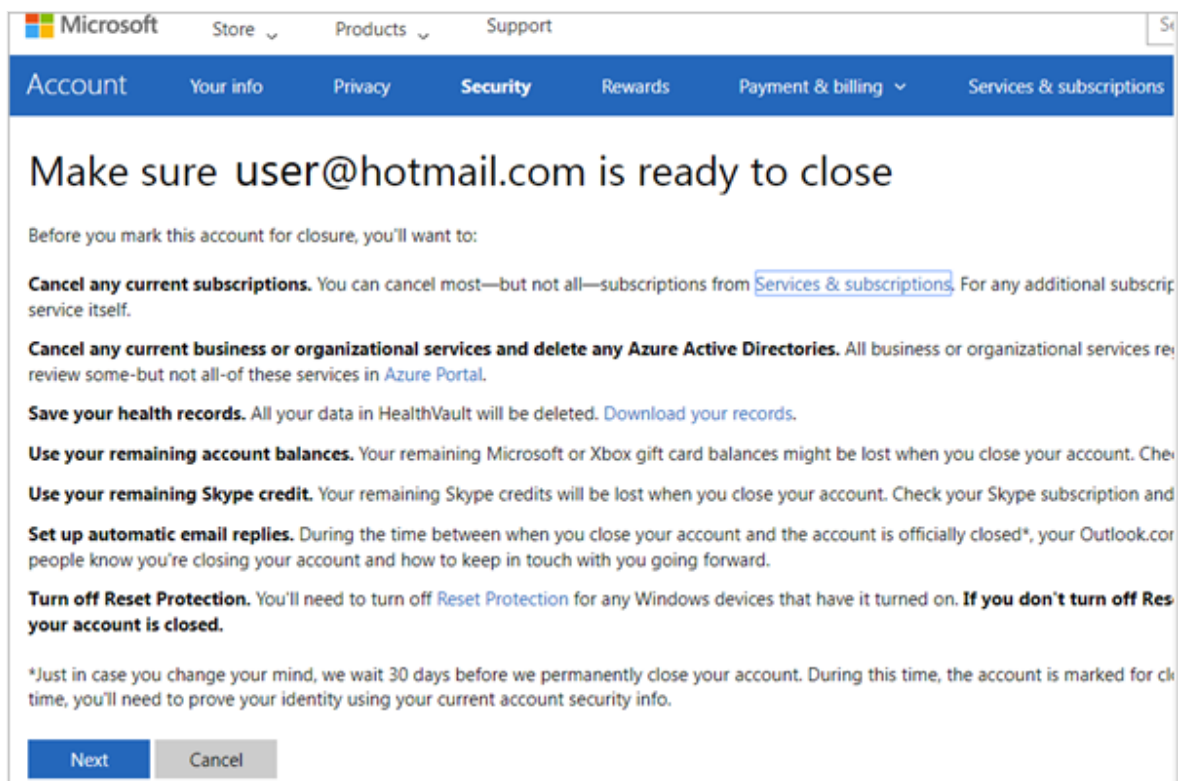
- Product and service activity
- Run history
- Flows
- Activity Feed
- User details

- Connections

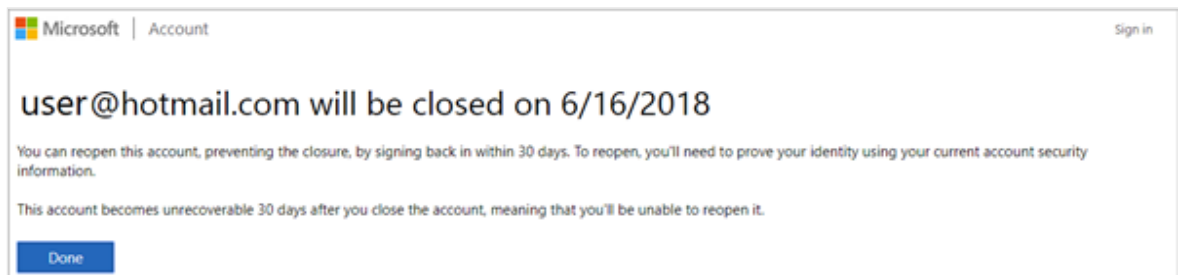
## Close a Microsoft account

The following steps describe how to self-serve account close requests.

1. Sign in to the [Microsoft Account Close Portal](#) with your Microsoft account.
2. Read the list of actions you should take before you close your Microsoft account, and perform all that apply to you.
3. When you've completed all the preclose actions that apply to you, select **Next**.



4. Acknowledge that you understand the consequences of closing your Microsoft account, and then select **Mark account for closure**.



Your account will be closed in 30 days. You may reopen it at any time during this 30-day period.

# Learn more

- Get started with [Power Automate](#)
- Learn [what's new](#) with Power Automate

# Power Automate US Government

Article • 06/20/2024

In response to the unique and evolving requirements of the United States public sector, Microsoft has created Power Automate US Government plans. This section provides an overview of features that are specific to Power Automate US Government. We recommend that you read this supplementary section as well as the Power Automate service [getting started](#) topic. For brevity, this service is commonly referred to as Power Automate Government Community Cloud (GCC), Power Automate Government Community Cloud – High (GCC High), or Power Automate Department of Defense (DoD).

The Power Automate US Government Service Description serves as an overlay to the general Power Automate Service Description. It defines the unique commitments and differences compared to the general Power Automate offerings that have been available to our customers since October 2016.

## About Power Automate US Government environments and plans

Power Automate US Government plans are monthly subscriptions and it can be licensed to an unlimited number of users.

The Power Automate GCC environment is compliant with the Federal requirements for cloud services, including FedRAMP High, and DoD DISA IL2. It is also compliant with the criminal justice systems (CJI data types) requirements.

In addition to the features and capabilities of Power Automate, organizations that use Power Automate US Government benefit from the following unique features:

- Your organization's customer content is physically separated from customer content in commercial offering of Power Automate.
- Your organization's customer content is stored within the United States.
- Access to your organization's customer content is restricted to screened Microsoft personnel.
- Power Automate US Government complies with all certifications and accreditations that US Public Sector customers require.

Beginning September 2019, eligible customers can choose to deploy Power Automate US Government to the **GCC High** environment, which enables single sign-on and seamless integration with Microsoft Office 365 GCC High deployments.

Microsoft has designed the platform and our operational procedures to meet the requirements aligning with the DISA SRG IL4 compliance framework. We anticipate the US Department of Defense contractor customer base and other Federal agencies currently leveraging Office 365 GCC High to use the Power Automate US Government GCC High deployment option. This option enables and requires the customer to leverage Microsoft Entra Government for customer identities, in contrast to GCC, which leverages the public Microsoft Entra ID. For the US Department of Defense contractor customer base, Microsoft operates the service in a manner that enables these customers to meet ITAR commitment and DFARS acquisition regulations, as documented and required by their contracts with the US Department of Defense. A Provisional Authority to Operate has been granted by DISA.

Beginning April, 2021, eligible customers may now choose to deploy Power Automate US Government to the "DoD" environment, which enables single sign-on and seamless integration with Microsoft 365 DoD deployments. Microsoft has designed the platform and operational procedures in accordance with the DISA SRG IL5 compliance framework. DISA has granted a Provisional Authority to Operate.

## Customer eligibility

Power Automate US Government is available to (1) US federal, state, local, tribal, and territorial government entities, and (2) other entities, which handle data that is subject to government regulations and requirements and where use of Power Automate US Government is appropriate to meet these requirements, subject to validation of eligibility. Microsoft's validation of eligibility includes confirmation of handling data subject to International Traffic in Arms Regulations (ITAR), law enforcement data subject to the FBI's Criminal Justice Information Services (CJIS) Policy, or other government-regulated or controlled data. Validation may require sponsorship by a government entity with specific requirements for the handling of data.

Entities with questions about eligibility for Power Automate US Government should consult their account team. Microsoft re-validates eligibility when it renews customer contracts for Power Automate US Government.

### Note

Power Automate US Government DoD is only available to DoD entities.

# Power Automate US Government plans

Access to Power Automate US Government plans is restricted to the offerings described in the following section; each plan is offered as a monthly subscription and can be licensed to an unlimited number of users:

- Power Automate Process plan (previously Power Automate per flow) for Government
- Power Automate Premium plan (Power Automate per user) for Government
- In addition to the standalone plans, Microsoft 365 US Government and Dynamics 365 US Government plans also include the Power Apps and Power Automate capabilities, allowing customers to extend and customize Microsoft 365 and customer engagement apps (Dynamics 365 Sales, Dynamics 365 Customer Service, Dynamics 365 Field Service, and Dynamics 365 Project Service Automation).

Additional information and details regarding the differences in functionality between these groups of licenses are described in more detail here: [Power Automate licensing information](#).

Power Automate US Government is available through the Volume Licensing and Cloud Solution Provider purchasing channels. The Cloud Solution Provider program is not currently available for GCC High customers.

## Differences between customer data and customer content

Customer data, as defined in the Online Service Terms, means all data, including all text, sound, video, or image files, and software that are provided to Microsoft by, or on behalf of, customers through the use of an Online Service.

Customer content refers to a specific subset of customer data that has been directly created by users, such as content stored in databases through entries in the [Dataverse](#) entities (for example, contact information). Content is generally considered confidential information, and in normal service operations, is not sent through the Internet without encryption.

For more information on how Power Automate protects customer data, see the [Microsoft Online Services Trust Center](#).



# Data segregation for Government Community Cloud

When provisioned as part of Power Automate US Government, the Power Automate service is offered in accordance with the National Institute of Standards and Technology (NIST) Special Publication 800-145.

In addition to the logical separation of customer content at the application layer, the Power Automate Government service provides your organization with a secondary layer of physical segregation for customer content by using infrastructure that is separate from the infrastructure used for commercial Power Automate customers. This includes using Azure services in Azure's Government Cloud. To learn more, see [Azure Government](#).

## Customer content located within the United States

Power Automate US Government runs in datacenters physically located in the United States and stores customer content at rest in datacenters physically located only in the United States.

## Restricted data access by administrators

Access to Power Automate US Government customer content by Microsoft administrators is restricted to personnel who are US citizens. These personnel undergo background investigations in accordance with relevant government standards.

Power Automate support and service engineering staff do not have standing access to customer content hosted in Power Automate US Government. Any staff who requests temporary permission elevation, which would grant access to customer content must first have passed the following background checks.

 Expand table


<b>Microsoft Personnel Screening and Background Checks</b> <sup>1</sup>	<b>Description</b>
U.S. citizenship	Verification of U.S. citizenship
Employment history check	Verification of seven (7) year employment history

<b>Microsoft Personnel Screening and Background Checks <sup>1</sup></b>	<b>Description</b>
Education verification	Verification of highest degree attained
Social Security number (SSN) search	Verification that the SSN the employees provides is valid
Criminal history check	A seven (7) year criminal record check for felony and misdemeanor offenses at the state, county, and local level and at the federal level
Office of Foreign Assets Control list (OFAC)	Validation against the Department of Treasury list of groups with whom U.S. persons are not allowed to engage in trade or financial transactions
Bureau of Industry and Security list (BIS)	Validation against the Department of Commerce list of individuals and entities barred from engaging in export activities
Office of Defense Trade Controls Debarred Persons list (DDTC)	Validation against the Department of State list of individuals and entities barred from engaging in export activities related to the defense industry
Fingerprinting check	Fingerprint background check against FBI databases
CJIS background screening	State-adjudicated review of federal and state criminal history by state CSA appointed authority within each state that has signed up for the Microsoft CJIS IA program
Department of Defense IT-2	Staff who request elevated permissions to customer data or privileged administrative access to DoD SRG L5 service capacities must pass DoD IT-2 adjudication, based on a successful OPM Tier 3 investigation.

<sup>1</sup> Applies only to personnel with temporary or standing access to customer content hosted in Power Automate US Governments (GCC, GCC High, and DoD).

## Certifications and accreditations

Power Automate US Government is designed to support the Federal Risk and Authorization Management Program (FedRAMP) accreditation at a High Impact level. This program infers alignment to DoD DISA IL2. FedRAMP artifacts are available for review by federal customers who are required to comply with FedRAMP. Federal agencies can peruse these artifacts in support of their review to grant an Authority to Operate (ATO).

 **Note**

Power Automate is authorized as a service within the Azure Government FedRAMP ATO. For more information, including how to access the FedRAMP documents, review the [FedRAMP Marketplace](#).

Power Automate US Government has features designed to support customers' CJIS Policy requirements for law enforcement agencies. Visit the Power Automate US Government products page in the Trust Center for more detailed information related to certifications and accreditations.

Microsoft designed this platform and its operational procedures to meet the requirements for the DISA SRG IL4 and IL5 compliance frameworks and has received the requisite DISA Provisional Authorities to Operate. Microsoft anticipates that the US Department of Defense contractor customer base and other Federal agencies currently leveraging Microsoft Office 365 GCC High to use the Power Automate US Government GCC High deployment option, which enables and requires customers to leverage Microsoft Entra Government for customer identities, in contrast to GCC, which leverages the public Microsoft Entra ID. For the US Department of Defense contractor customer base, Microsoft operates the service in a manner that enables these customers to meet ITAR commitment and DFARS acquisition regulations. Further, Microsoft expects its US Department of Defense customers who currently use Microsoft 365 DoD to use the Power Automate US Government DoD deployment option.

## Power Automate US Government and other Microsoft services

Power Automate US Government includes several features that allow users to connect to, and integrate with, other Microsoft enterprise service offerings such as Office 365 US Government, Dynamics 365 US Government, and Power Apps US Government.

Power Automate US Government runs within Microsoft datacenters in a manner consistent with a multi-tenant, public cloud deployment model; however, client applications including, but not limited to the web-user client, Power Automate mobile application (when available), and any third-party client application that connects to Power Automate US Government, are not part of Power Automate US Government's accreditation boundary. Government customers are responsible for managing them.

Power Automate US Government leverages the Office 365 customer administrator UI for customer administration and billing.

Power Automate US Government maintains the actual resources, information flow, and data management, while relying on Office 365 to provide the visual styles that are

presented to the customer administrator through their management console. For purposes of FedRAMP ATO inheritance, Power Automate US Government leverages Azure (including Azure for Government and Azure DoD) ATOs for infrastructure and platform services, respectively.

If you adopt the use of Active Directory Federation Services (AD FS) 2.0 and set up policies to help ensure your users connect to the services through single sign-on, any customer content that is temporarily cached will be located in the United States.

## Power Automate US Government and third-party services

Power Automate US Government provides the ability to integrate third-party applications into the service through [Connectors](#). These third-party applications and services might involve storing, transmitting, and processing your organization's customer data on third-party systems that are outside of the Power Automate US Government infrastructure and therefore are not covered by the Power Automate US Government compliance and data protection commitments.


### Tip

Review the privacy and compliance statements provided by the third parties when assessing the appropriate use of these services for your organization.

[Power Apps and Power Automate Governance Considerations](#) can help your organization bring awareness about the capabilities available across several related themes, such as architecture, security, alert and action, and monitoring.

## Configure mobile clients

Here are the steps that you must take to sign in with the Power Automate mobile client.

1. On the sign-in page, select  (a wifi icon with a gear sign) in the upper-right corner.
2. Select **Region settings**.
3. Select GCC: US Government GCC
4. Select OK.
5. On the sign-in page, select **Sign in**.

The mobile application will now use the US Government Cloud.

## Power Automate US Government and Azure Services

The Power Automate US Government services are deployed to Microsoft Azure Government. Microsoft Entra is not part of the Power Automate US Government accreditation boundary, but takes a reliance on a customer's [Microsoft Entra ID](#) tenant for customer tenant and identity functions, including authentication, federated authentication, and licensing.

When a user of an organization employing ADFS attempts to access Power Automate US Government, the user is redirected to a login page hosted on the organization's ADFS server.

The user provides credentials to their organization's ADFS server. The organization's ADFS server attempts to authenticate the credentials using the organization's Active Directory infrastructure.

If authentication is successful, the organization's ADFS server issues a SAML (Security Assertion Markup Language) ticket that contains information about the user's identity and group membership.

The customer's ADFS server signs this ticket using one half of an asymmetric key pair and then it sends the ticket to Microsoft Entra via encrypted TLS. Microsoft Entra ID validates the signature using the other half of the asymmetric key pair and then grants access based on the ticket.

The user's identity and group membership information remain encrypted in Microsoft Entra ID. In other words, only limited user-identifiable information is stored in Microsoft Entra ID.

















You can find full details of the Microsoft Entra security architecture and control implementation in the Azure SSP.

The Microsoft Entra account management services are hosted on physical servers managed by the Microsoft Global Foundation Services (GFS). Network access to these servers is controlled by GFS-managed network devices using rules set by Azure. Users do not interact directly with Microsoft Entra ID.

## Power Automate US Government service URLs

You use a different set of URLs to access Power Automate US Government environments, as shown in the following table. The table includes the commercial URLs too for contextual reference, in case they are more readily familiar to you.

 Expand table

Commercial version	US Government version
<a href="https://flow.microsoft.com">https://flow.microsoft.com</a> 	<a href="https://gov.flow.microsoft.us">https://gov.flow.microsoft.us</a> (GCC)  , <a href="https://high.flow.microsoft.us">https://high.flow.microsoft.us</a> (GCC High)  , and <a href="https://flow.appsplatform.us">https://flow.appsplatform.us</a> (DoD) 
<a href="https://admin.powerplatform.microsoft.com/">https://admin.powerplatform.microsoft.com/</a> 	<a href="https://gcc.admin.powerplatform.microsoft.us/">https://gcc.admin.powerplatform.microsoft.us/</a> (GCC)  , <a href="https://high.admin.powerplatform.microsoft.us/">https://high.admin.powerplatform.microsoft.us/</a> (GCC High)  , and <a href="https://admin.appsplatform.us">https://admin.appsplatform.us</a>  (DoD)
<a href="https://flow.microsoft.com/connectors">https://flow.microsoft.com/connectors</a> 	<a href="https://gov.flow.microsoft.us/connectors">https://gov.flow.microsoft.us/connectors</a> (GCC)  , <a href="https://high.flow.microsoft.us/connectors">https://high.flow.microsoft.us/connectors</a> (GCC High)  , <a href="https://flow.appsplatform.us/connectors/">https://flow.appsplatform.us/connectors/</a>  (DoD)
<a href="https://make.powerautomate.com">https://make.powerautomate.com</a> 	<a href="https://make.gov.powerautomate.us">https://make.gov.powerautomate.us</a> (GCC)  , <a href="https://make.high.powerautomate.us">https://make.high.powerautomate.us</a> (GCC High)  , and <a href="https://make.powerautomate.appsplatform.us">https://make.powerautomate.appsplatform.us</a> (DoD) 

For those customers who implement network restrictions, ensure access to the following domains is made available to your end-users' access points:

## GCC Customers:

- .microsoft.us
- .azure-apihub.us
- .azure.us
- .usgovcloudapi.net
- .microsoftonline.com
- .microsoft.com
- .windows.net
- .azureedge.net
- .azure.net
- .crm9.dynamics.com

- .powerautomate.us

Refer to the [IP ranges](#) for AzureCloud.usgovtexas and AzureCloud.usgovvirginia to enable access to Dataverse instances that users and administrators may create within your Tenant.

## GCC High Customers:

- .microsoft.us
- .azure-aihub.us
- .azure.us
- .usgovcloudapi.net
- .microsoftonline.us
- .azureedge.net
- .azure.net
- .crm.microsoftdynamics.us(GCC High)
- \*.high.dynamics365portals.us (GCC High)
- \*.crm.appsplatform.us (DoD)
- \*.appsplatformportals.us (DoD)

Also, refer to the [IP ranges](#) to enable you to access other Dataverse environments that users and administrators may create within your tenant and other Azure services that the platform leverages, including:

- GCC and GCC High: Focus on AzureCloud.usgovtexas and AzureCloud.usgovvirginia.
- DoD: Focus on USDoD East and USDoD Central.

## Connectivity between Power Automate US Government and Public Azure Cloud services

Azure is distributed among multiple clouds. By default, tenants are allowed to open firewall rules to a cloud-specific instance, but cross-cloud networking is different and requires opening specific firewall rules to communicate between services. If you are a Power Automate customer and you have existing SQL instances in azure public cloud, which you need to access, you must open specific firewall ports in SQL to the Azure Government Cloud IP space for the following datacenters:

- USGov Virginia
- USGov Texas
- US DoD East

- [US DoD Central](#)

Refer to the [Azure IP Ranges and Service Tags – US Government Cloud](#) document, focusing attention on AzureCloud.usgovtexas, and AzureCloud.usgovvirginia, and/or US DoD East, and US DoD Central as noted previously in this article. Also note that these are the IP ranges required for your end-users to have access to the service URLs.

## On-premises Data Gateway configuration

Install an [on-premises data gateway](#) to transfer data quickly and securely between a canvas app that's built in Power Automate and a data source that isn't in the cloud. Examples include on-premises SQL Server databases or on-premises SharePoint sites.

If your organization (tenant) has configured and successfully connected the on-premises data gateway for PowerBI US Government, then the process your organization followed to enable that also enables on-premises connectivity for Power Automate.

Formerly, US Government customers needed to contact support before configuring their first on-premises data gateway, because support would need to give permission to the tenant to allow gateway use. This is no longer necessary. If you encounter any issues configuring or using the on-premises data gateway, you may contact support for assistance.

## Power Automate US Government feature limitations

Microsoft strives to maintain functional parity between our commercially available service and those enabled through our US Government clouds. These services are referred to as Power Automate Government Community Cloud (GCC) and GCC High. Refer to the [Global Geographic Availability](#) tool to see where Power Automate is available throughout the world, including approximate availability timelines.

There are exceptions to the principle of maintaining product functional parity within the US Government clouds. For more information about feature availability, download this file: [Business Applications US Government - Availability Summary](#).

### See also

- [Desktop flows](#).
- [Dynamics 365 US Government](#).



- [Power Apps US Government.](#)
- 

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Power Automate regions overview

Article • 12/16/2022

In Power Automate, your flows are created within your Microsoft Power Platform environment. These environments are specific to a region, which corresponds to the location of the data centers where your Microsoft Power Platform environment is stored.

In other words, your flows are deployed in the [data center region](#) that hosts your Microsoft [Power Platform environment](#).

## More information about Microsoft Power Platform regions

[Overview of Power Platform regions](#)

[Azure geographies](#)

## Region mappings for Power Automate and gateways

The region where the gateway is installed must map to your Power Automate region. Cross geographic boundaries aren't supported.

Here's the mapping information:

<b>Power Platform region</b>	<b>Gateway region</b>
Asia	East Asia, Southeast Asia
Australia	Australia East, Australia Southeast, Australia Central
Canada	Canada Central, Canada East
Europe	North Europe, West Europe
France	France Central, France South
Germany	Germany North, Germany West Central
India	Central India, South India, West India, North India
Japan	Japan East, Japan West

<b>Power Platform region</b>	<b>Gateway region</b>
Korea	Korea South
Norway	Norway East, Norway West
Singapore	Southeast Asia, East Asia
South Africa	South Africa North
South America	Brazil South
Switzerland	Switzerland North, Switzerland West
United Arab Emirates	UAE Central, UAE North
United Kingdom	UK South, UK West, UK East
United States including Preview	Central US, East US, East US 2, East US 3, North Central US, South Central US, West US, West US 2, West US 3, West Central US

## Frequently asked questions

### What region should I use?

It's a good idea to create your flow in an environment that's in the region closest to your customers. When the data centers that host your environment are closer to the people accessing the information, you're likely to see better performance.

### How can I find out the region where my flow is deployed?

Administrators can identify the region by signing in to the Power Platform [admin center](#). The **Environments** tab lists all existing environments and their regions.

### Is Power Automate available in national clouds?

Yes. [Learn more](#).

### What outbound IP addresses are used in each region?

See [Limits and configuration](#).

# Limits of automated, scheduled, and instant flows

Article • 04/09/2024

This article contains information about the limits that apply to automated, scheduled, and instant flows, depending on which [Power Automate license](#) you have.

## Performance profiles

A flow's *performance profile* determines its Power Platform request limits. The following table describes the plans that are associated with each of the four performance profiles.

To learn more about how Power Automate consumes Power Platform requests, go to [Types of Power Automate licenses - Power Platform requests](#).

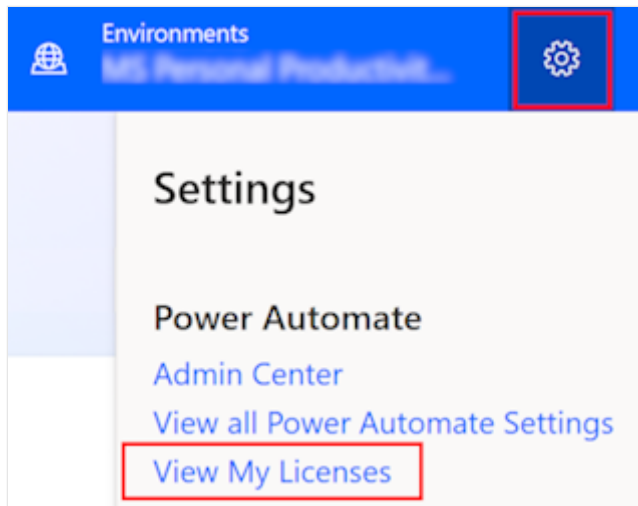
 Expand table

Performance profile	Plans
Low	<ul style="list-style-type: none"><li>- Free</li><li>- Microsoft 365 plans</li><li>- Power Apps Plan 1, Per App plans</li><li>- Power Automate Plan 1</li><li>- All license trials</li><li>- Dynamics 365 Team Member</li><li>- Microsoft Power Apps for Developer</li></ul>
Medium	<ul style="list-style-type: none"><li>- Power Apps triggered flows, manual flows, child flows, Power Apps Plan 2, Power Apps per user plan</li><li>- Power Automate Plan 2, Power Automate Premium (previously Power Automate per user), Power Automate Premium plans (previously Power Automate per user with Attended RPA plans)</li><li>- Dynamics 365 Enterprise plans, Dynamics 365 Professional plans</li><li>- <a href="#">Dynamics 365 non-licensed users, application users, users with special free licenses</a></li></ul>
High	<ul style="list-style-type: none"><li>- Power Automate Process plan, Power Automate per flow plan</li></ul>
Unlimited Extended	<ul style="list-style-type: none"><li>- Pay-as-you-go flows, Dynamics in context flows running under service principal</li></ul>

If a user has multiple plans, such as a Microsoft 365 plan and a Dynamics 365 plan, the flow has the performance profile of the higher of the plans. For the exact set of plans

that include Power Automate, refer to the [Power Platform licensing guide](#) .

To determine which plan you have, select **Settings** on the Power Automate title bar, and then select **View My Licenses**.



A cloud flow uses the plan of its owner. If a cloud flow has been shared with multiple people, then generally the owner is the flow's creator. If you're unsure, you can use the [Web API](#) to change the owner. If the original owner leaves the organization, the flow reverts to the Low performance profile.

## Flow definition limits

The following table describes the limits for a single flow definition.

[Expand table](#)

Name	Limit	Notes
Actions per workflow	500	Flows with a large number of actions may encounter performance issues while you edit them, even if they have fewer than 500. Consider using child flows to reduce the number of actions in a single flow or if you need more than 500.
Allowed nesting depth for actions	8	Add child flows if you need more than eight levels of nesting.
Switch scope cases limit	25	
Variables per workflow	250	

Name	Limit	Notes
Length of <code>action</code> or <code>trigger</code> name	80 characters	
Characters per expression	8,192	
Length of <code>description</code>	256 characters	
Maximum size of <code>trackedProperties</code>	16,000 characters	

## My flows limit

The following table describes the limit for the My flows and Team flows tabs.

[Expand table](#)

Name	Limit	Notes
Number of flows owned by a single user	600	Use flows under solutions if you need more than 600.

## Duration and retention limits

The following tables describe the duration and retention limits.

### Duration limits

The following table describes the duration limits for a single flow run.

[Expand table](#)

Name	Limit	Notes
Run duration	30 days	Run duration is calculated using a run's start time and includes flows with pending steps like approvals. After 30 days, any pending steps time out.
Run retention in storage	30 days	Run retention is calculated using a run's start time.

Name	Limit	Notes
Minimum recurrence interval	60 seconds	
Maximum recurrence interval	500 days	
Minimum postpone interval	5 seconds for Low, 1 second for all other performance profiles	

## Retention limits

The following table describes the limits on how long flows remain turned on before they expire and get turned off.

 Expand table

Name	Limit	Notes
Flows with errors	14 days	A cloud flow that has a trigger or actions that fail continuously will be turned off. Fix your trigger or actions and turn on the flow. These flows will have FlowSuspensionReason=AlwaysFailingDetected.
Not triggered (dormant) flows	90 days for Free, Trial, Community and Microsoft 365 Plans. No expiration limit for all others.	A cloud flow that has no successful triggers will expire and be turned off. After 90 days of inactivity, the flow creator and co-owners will receive an email. If no action is taken in next 30 days, the flow will be systematically turned off, and the creator and co-owners will be notified in an email. For enterprise scenarios, we recommend you buy a standalone Power Automate license listed on <a href="#">Power Automate pricing</a> to ensure your flow isn't turned off due to inactivity. You can turn your cloud flows back on anytime. These flows will have FlowSuspensionReason=NeverTriggeringDetected.
Consistently throttled flows	14 days	A cloud flow that's consistently throttled for 14 days will be turned off. The flow creator and co-creators will get an email when the flow starts throttling and when the flow is turned off. For enterprise scenarios, we recommend you buy a standalone Power Automate license listed on <a href="#">Power Automate pricing</a> to get higher action limits. You can turn your cloud flows back on anytime.
Premium flows	14 days	Flows that were created with premium features (premium connectors, custom connectors, HTTP connectors, on premises

Name	Limit	Notes
without premium licenses		gateway, and business process flows) but don't have a premium Power Automate license will be turned off after 14 days. This situation happens if the original owner leaves the organization, or if they have an expired trial or premium license. The flow owner and co-owners will get an email when the trial or premium license expires, or when the owner isn't found in Microsoft Entra ID (Microsoft Entra ID). The flow will continue to work for 14 days. If a premium license isn't assigned to the flow within 14 days, the flow is automatically turned off, and the owner and co-owners are notified through email. Newly created or edited premium flows without a premium license are saved but turned off. Once a premium Power Automate license is assigned to the owner or flow, you can turn on the flow. Admins can <a href="#">find these flows</a> . Assign a Power Automate Process license or a per user license to the owner to keep the flow running.

## Concurrency, looping, and debatching limits

The following table describes the concurrency, looping, and debatching limits for a single flow run.

[Expand table](#)

Name	Limit	Notes
Concurrent runs	<ul style="list-style-type: none"> <li>- Unlimited for flows with Concurrency Control turned off</li> <li>- 1 to 100 when Concurrency Control is turned on (defaults to 25)</li> </ul>	<p>This is the limit for how many runs a flow can have at the same time.</p> <p><b>Note:</b> Concurrency Control is set in the flow's trigger settings and is off by default. Turning on Concurrency Control can't be undone without deleting and re-adding the trigger.</p>
Waiting runs	<ul style="list-style-type: none"> <li>- Not applicable when Concurrency Control is off</li> <li>- 10 plus the degree of parallelism (1-100) when Concurrency Control is on</li> </ul>	<p>This limit describes the highest number of flow runs that can be queued when the flow is at its maximum number of concurrent runs.</p> <p><b>Note:</b> Additional triggers that arrive while the waiting runs limit is met might be re-tried by the connector. However, the retry attempts might not succeed if the maximum waiting limit continues to be met for an extended period of time. To ensure all triggers result in flow runs, leave the Concurrency Control setting off in the flow's trigger.</p>



Name	Limit	Notes
Apply to each array item	5,000 for Low, 100,000 for all others	This limit describes the highest number of array items that an "apply to each" loop can process. To filter larger arrays, you can use the query action.
Apply to each concurrency	1 is the default limit. You can change the default to a value between 1 and 50 inclusively.	This limit is highest number of "apply to each" loop iterations that can run at the same time, or in parallel.
Split on items	- 5,000 for Low without trigger concurrency - 100,000 for all others without trigger concurrency - 100 with trigger concurrency	For triggers that return an array, you can specify an expression that uses a 'SplitOn' property that splits or debatches array items into multiple workflow instances for processing, rather than use a "Foreach" loop. This expression references the array to use for creating and running a workflow instance for each array item. <b>Note:</b> When concurrency is turned on, the Split on limit is reduced to 100 items.
Until iterations	- Default: 60 - Maximum: 5,000	
Paginated items	5,000 for Low, 100,000 for all others	To process more items, trigger multiple flow runs over your data.

## Throughput limits

The following sections describe the time-bound limits for a single version of a cloud flow definition. These limits apply across all runs of the flow version and are calculated on sliding windows.

If a cloud flow exceeds one of the limits, flow activity is slowed. It automatically resumes when the sliding window has activity below the limit. However, if a cloud flow [consistently remains above the limits](#) for 14 days, it's turned off. Be sure to monitor email for notifications about such flows. If a cloud flow consistently exceeds the limits, you need to revise it to remain below the limits to prevent it from being turned off.

### Tip

Because these limits are for a single version, if you update your flow, it resets the limits.

## Power Platform request limits

As of October 2019, there are limits on the number of [Power Platform requests](#) an account can make across all its flows, Power Apps, and any applications that call Dataverse. No performance is guaranteed above these limits, although enforcement of the limits isn't as strict during the [licensing transition period](#). [Learn more about request limits and allocations](#).

These requests are counted for all types of actions, including connector actions, HTTP actions, and built-in actions, from initializing variables to a simple compose action. Both successful and failed actions count toward the limits. Retries and requests from pagination also count as action runs.

To view the number of actions your flow has run, select **Analytics** on the flow details page and check the **Actions** tab.

The following table describes the limits on requests.

[Expand table](#)

Name	Transition period limit	Notes
Power platform requests per 5 minutes	100,000	Distribute the workload across more than one flow as necessary.
Power platform requests per 24 hours	10,000 for Low; 200,000 for Medium; 500,000 for High; 10,000,000 for Unlimited Extended	These limits represent approximations of how many requests are allowed daily. They aren't guarantees. Actual amounts may be smaller, but will be greater than the <a href="#">documented request limits and allocations</a> during the <a href="#">licensing transition period</a> . The documented limits were substantially increased in late 2021. <a href="#">View detailed Power Platform request usage information in the Power Platform admin center (preview)</a> . Any potential enforcement of high usage based on the <a href="#">documented limits</a> wouldn't start until six months after reports have been made generally available. Distribute the workload across more than one flow as necessary.
Concurrent outbound calls	500 for Low; 2,500 for all others	You can reduce the number of concurrent requests or reduce the duration as necessary.



Tip

Individual connectors have their own limits, which often are reached before the limits mentioned previously. Be sure to check the [documentation for your connector](#).

## Runtime endpoint request limits

The runtime endpoint is the direct access URL for a given flow. It starts with something like: `https://prod-00.westus.logic.azure.com:443/`.

The following table describes the limits on runtime endpoint requests.

 Expand table

Name	Limit	Notes
Concurrent inbound calls	~1,000	You can reduce the number of concurrent requests or reduce the duration as necessary.
Read calls per 5 minutes	6,000 for Low; 60,000 for all others	This limit applies to calls that get the raw inputs and outputs from a cloud flow's run history. You can distribute the workload across more than one flow as necessary.
Invoke calls per 5 minutes	4,500 for Low; 45,000 for all others	You can distribute workload across more than one flow as necessary.

## Content throughput limits

The following table describes the content throughput limits, which refer to the amount of data that's read from or written to the run history of the cloud flow.

 Expand table

Name	Limit	Notes
Content throughput per 5 minutes	120 MB for Low; 1.2 GB for all others	You can distribute workload across more than one flow as necessary.
Content throughput per 24 hours	200 MB for Low; 2 GB for Medium; 10 GB for High	You can distribute workload across more than one flow as necessary.

## Gateway limits

Power Automate supports write operations, including inserts and updates, through the gateway. However, these operations have [limits on their payload size](#).

## Request limits

The following sections describe the limits for a single outgoing or incoming HTTP call.

### Timeout

Some connector operations make asynchronous calls or listen for webhook requests, so the timeout for these operations might be longer than these limits. For more information, refer to the technical details for the specific connector.

The following table describes the timeout limits.

 Expand table

Name	Limit	Notes
Outbound synchronous request	120 seconds (2 minutes)	Examples of outbound requests include calls made by HTTP triggers. <b>Tip:</b> For longer-running operations, use an asynchronous polling pattern or an "Until" loop. To work around timeout limits when you call another flow that has a callable endpoint, use the built-in action instead, which you can find in the connector picker under <b>Built-in</b> .
Outbound asynchronous request	Configurable up to 30 days	
Inbound request	120 seconds (2 minutes)	Examples of inbound requests include requests to trigger instant flows and flows with the <b>HTTP Request</b> trigger. Flows that contain a response action including <b>Respond to Copilot</b> , <b>HTTP Response</b> , and <b>Respond to a PowerApp or flow</b> will always return a response within this limit. Child flows that are started before the response action will continue running separately, and actions after the response action will continue running beyond this limit, enabling a flow to respond and continue running other operations.

If you test a cloud flow that runs for longer than 10 minutes, you may get a timeout message in Power Automate, even though the flow continues to run in the background. If this happens, reopen the view to receive the current status.

## Message size

The following table describes the limits on message size.

[Expand table](#)

Name	Limit	Notes
Message size	100 MB	To work around this limit, consider allowing chunking under the action content transfer settings. However, some connectors and APIs might not support chunking or even the default limit. <b>Note:</b> When sending files through a connector, the overall size of the payload and not just the file needs to be under 100 MB.
Message size with chunking	1 GB	This limit applies to actions that either natively support chunking or let you enable chunking in their runtime configuration.

## Character limits

The following table describes the limits on the number of characters in expressions and request URLs.

[Expand table](#)

Name	Limit	Notes
Expression evaluation limit	131,072 characters	The <code>@concat()</code> , <code>@base64()</code> , and <code>@string()</code> expressions can't be longer than this limit.
Request URL character limit	16,384 characters	

## Retry policy

The following sections describe the limits on retries when a flow fails.

### Default retry policy

The following table describes the default retry limits.

[Expand table](#)

Performance profile	Description
Low	This policy sends up to two retries at <i>exponentially increasing</i> intervals, which scale by 5 minutes up to an interval of approximately 10 minutes for the last retry.
Medium, High	This policy sends up to eight retries at <i>exponentially increasing</i> intervals, which scale by 7 seconds up to an interval of approximately 15 minutes for the last retry.

## Retry setting limits

The following table describes the limits on retry settings.

To change the default settings, use the retry policy parameter.

 Expand table

Name	Limit
Retry attempts	90
Retry maximum delay	1 day
Retry minimum delay	5 seconds

[Learn more about retry policies.](#)

## Turn off or delete flows

When you turn off a cloud flow, no new runs are started. All in-progress and pending runs continue until they finish.

When you delete a cloud flow, no new runs are started. All in-progress and pending runs are canceled. If you have thousands of runs, cancellation might take significant time to complete.

## Custom connector limits

The following table describes the limits on custom connectors that you can create from web APIs.

Name	Limit	Notes
Number of custom connectors	50 per user	
Number of requests per minute for a custom connector	500 requests per minute per connection	

You must have a premium or trial license to run any flow that uses a custom connector.

## SharePoint limits

There are [limitations](#) on how you can use Microsoft SharePoint with Power Automate and Power Apps.

### Tip

For detailed information about using SharePoint with Power Automate, go to the [SharePoint documentation](#).

## IP addresses

Requests from Power Automate use IP addresses that are associated with the [region of the environment](#) in which your flow exists.

Calls made from connectors in cloud flows come from [these IP addresses](#). Add them to your network's allowlist to facilitate communications from Power Automate.

## Allowlist of namespaces endpoints required for runtime

By default, administrators need to authorize endpoints, including `*.servicebus.windows.net`, to allow desktop flow runs. If you don't want to authorize this public endpoint, you can alternatively allow all the following namespace endpoints.

### Note

This list of namespace endpoints can evolve. Therefore, you should regularly check this page to keep your authorized endpoints up to date.

[Expand table](#)

URI	Power Platform Region	Is preview
prodnorwayeastmmrns-1-whuok7nwdzy2s.servicebus.windows.net	Norway	No
prodnorwaywestmmrns-1-0a47o5hk7gvoo.servicebus.windows.net	Norway	No
prdnorwayeastmmrns-V2-2-krfr46pug63oqdbm1ts0nj7y6s.servicebus.windows.net	Norway	No
prdnorwaywestmmrns-V2-2-zr6e9v54qli9y9uhjkko13uoh2.servicebus.windows.net	Norway	No
prodkoreacentralmmrns-1-4gkez6gmtnxxy.servicebus.windows.net	Korea	No
prodkoreasouthmmrns-1-o7ut2fobjmj7k.servicebus.windows.net	Korea	No
prdkoreacentralmmrns-V2-2-7oogvhdpr45v1f7q2deylnb9.servicebus.windows.net	Korea	No
prdkoreasouthmmrns-V2-2-7jvgkvqli22srx9w3epmrdq8j.servicebus.windows.net	Korea	No
prdnzamrns-1-8vyvi02tfal5rjlmfsqvqs7dtx9ph4xegxxh.servicebus.windows.net	South Africa	No
prdsouthafricawestmmrns-V2-2-vm94ckkkxsacbvjis6shh.servicebus.windows.net	South Africa	No
prdnzamrns-1-8vyvi02tfal5rjlmfsqvqs7dtx9ph4xegxxh.servicebus.windows.net	South Africa	No
prdsouthafricanorthmmrns-V2-2-h4fi6ckdkb13ngd42ov2.servicebus.windows.net	South Africa	No
prdeusmmrns-3-gh4xbnrswp4annlprgyqmdwyziat22jn2hmt.servicebus.windows.net	United States	Yes
prdeusmmrns-3-ju5nmbisb8h7216w1o1md66mv77e0uh0gbqt.servicebus.windows.net	United States	Yes
previeweastusmmrns-1-fmkqes4e4ximc.servicebus.windows.net	United States	Yes
previeweastusmmrns-2-HWd3f6eulXLM.servicebus.windows.net	United States	Yes
previewwestusmmrns-1-uwbsm24d2qrgi.servicebus.windows.net	United States	Yes



URI	Power Platform Region	Is preview
previewwestusmmrns-2-J5NRqQ0tPJ3n.servicebus.windows.net	United States	Yes
prdeusmmrns-11-u9pep9gw4ehrsognxtu72spfhrsmmgbom99.servicebus.windows.net	United States	No
prdeusmmrns-11-vi712adqt8zhhekoz48g0rj96ahcs2lngln.servicebus.windows.net	United States	No
prdeusmmrns-12-kkx3ko9h7a3q8fyzodjpc9s2n6l6emux4le.servicebus.windows.net	United States	No
prdeusmmrns-12-p04f5v86v08h7bckioz41ml1nchtggged6jn.servicebus.windows.net	United States	No
prdeusmmrns-13-mt5nm5ozm9y379uildo40xevuc7i6og9jib.servicebus.windows.net	United States	No
prdeusmmrns-13-nsa7ru2qzbhpdbjkqn1xe0tr35y03igcvpg.servicebus.windows.net	United States	No
prdeusmmrns-16-1httpeaxvd89sv9y92f3tsabapkcrsa2t8f.servicebus.windows.net	United States	No
prdeusmmrns-17-3zk2vbt7quh9qmf81la44igwcw2claddv8.servicebus.windows.net	United States	No
prdeusmmrns-17-w641qe2st5y4iif6hts0p9xzo17m6yxzhc2.servicebus.windows.net	United States	No
prdeusmmrns-18-cxlk5673wpp7ced81cdeykv71er75pkq2r0.servicebus.windows.net	United States	No
prdeusmmrns-19-738isaep1448wtnw0210lqytrtiz4hvrzjf.servicebus.windows.net	United States	No
prdeusmmrns-20-34ftg033c3iylghwgj16m3dqpcdd4nbigp0.servicebus.windows.net	United States	No
prdeusmmrns-20-fdacpnw20pftxqx9bmn7137pqrn5o1g4tnl.servicebus.windows.net	United States	No
prdwusmmrns-10-1agsripqec30708vj3ithv3dp8lg5kr5s3n.servicebus.windows.net	United States	No
prdwusmmrns-10-ebhaiy2tuf6jrr41h531fhdct7iu4v7idm4.servicebus.windows.net	United States	No

URI	Power Platform Region	Is preview
prdwusmmrns-14-8pj3mtexc3t96c6to5denqxm2rq7w01s6nw.servicebus.windows.net	United States	No
prdwusmmrns-14-u8lv1g6tp94vvp06h847g4zcsi9s8fob3wu.servicebus.windows.net	United States	No
prdwusmmrns-15-wrozqfemq1qibz5ykjjzjkpm5s80bogumtd.servicebus.windows.net	United States	No
prdwusmmrns-15-xebdresepogmc40q3nzn4w1wvtoaa20k.servicebus.windows.net	United States	No
prdwusmmrns-16-mpmqg4oagnzzci2711sd5ggamvhr9vayx8.servicebus.windows.net	United States	No
prdwusmmrns-18-cb9mb3sevtl0au7kvr5h7xft35nnzvaiby7.servicebus.windows.net	United States	No
prdwusmmrns-19-zv1krqy2m185ioa8vk8dvqmc8omimizwew3.servicebus.windows.net	United States	No
prdwusmmrns-21-naj2wt2tqebvv102pz8embfe50se1gdpb4i.servicebus.windows.net	United States	No
prdwusmmrns-21-t5svpy06ve482zb6oljzrqdohkrfx42xvxz.servicebus.windows.net	United States	No
prdwusmmrns-23-hisirbhw8e6hi1hdg37354tvv4rtyvosxui.servicebus.windows.net	United States	No
prdwusmmrns-23-pflxh92egchq0oxbef9hy49s5p5eucq5oij.servicebus.windows.net	United States	No
prdwusmmrns-25-8rz4j9842zpjqr8e7vrjykr3fnxypmad0.servicebus.windows.net	United States	No
prdwusmmrns-25-ct38n2ulxz7081mttf5sha5n2kq2skl1sux.servicebus.windows.net	United States	No
prdwusmmrns-26-cgqwgm01glorgvdrblvr9uzf80e45skb2xo.servicebus.windows.net	United States	No
prdwusmmrns-26-o3ljq2nytljdghu6h1wqbpyqaxbiqb4pte.servicebus.windows.net	United States	No
prdwusmmrns-27-der2ntjxpz5i2uqshm9vznltkhngn06xlyg.servicebus.windows.net	United States	No

URI	Power Platform Region	Is preview
prdwusmmrns-28-t4d8h0j42o6jjs2i2e3fm6fj30wy7j3k7ip.servicebus.windows.net	United States	No
prdwusmmrns-29-9zr3xphm5vb2snbr9d8fay99ejze0ggwvue.servicebus.windows.net	United States	No
prdwusmmrns-29-aerqzlinnqitgyqsa0lmh5lbrs1ady3nfck.servicebus.windows.net	United States	No
prdwusmmrns-34-mmpbgjlfm4ydo3amtopfs2moy9b2zo1xoo8.servicebus.windows.net	United States	No
prdwusmmrns-34-rp998x7g6h4lu5ksitso69xwvky5oh3cxfq.servicebus.windows.net	United States	No
prdwusmmrns-6-04hdqdf3chg2n2t4siaal0v5hwqas9zbt6vx.servicebus.windows.net	United States	No
prdwusmmrns-6-cwodfc8u8qqrqielru8w7ckyrj5le87q1ozi.servicebus.windows.net	United States	No
prdeusmmrns-22-wsbpw23z70wq24aypvkvtlgbhzp0xe70ne2.servicebus.windows.net	United States	No
prdeusmmrns-22-x6bcxy40pv2hpfprjx21ssdu8rvawtr8w8.servicebus.windows.net	United States	No
prdeusmmrns-24-suv0kt1lf0ok7hua0ccogywp15p6kcx04x2.servicebus.windows.net	United States	No
prdeusmmrns-24-y9wy0tcmmsgspsjhf8ur7z08mjztmffq9goe.servicebus.windows.net	United States	No
prdeusmmrns-27-8t7l05rslj7qwfsgxu18q3h7aypmztd5fdj.servicebus.windows.net	United States	No
prdeusmmrns-28-0cprxw2r4q5sw0c94hcsf0dme1y4svhlm8o.servicebus.windows.net	United States	No
prdeusmmrns-3-1fmod9del85tghiub70xfpgavep5tpqbixbq.servicebus.windows.net	United States	No
prdeusmmrns-3-xgpjelrz4vp0e5dt2nnl8l29tiu6r3ksg174.servicebus.windows.net	United States	No
prdeusmmrns-30-ft1ogu8rkhcami798vghm3lye1y9ca4nq6g.servicebus.windows.net	United States	No

URI	Power Platform Region	Is preview
prdeusmmrns-30-v63cua3zd53b7dznsybo56mdb5112f30wlr.servicebus.windows.net	United States	No
prdeusmmrns-32-1e8py596s9z03jv9brc4p1u89h9pr7ka52j.servicebus.windows.net	United States	No
prdeusmmrns-32-91xx20kvkw12y878prtg9uq2z3a4nxcb4sh.servicebus.windows.net	United States	No
prdeusmmrns-33-83pgwjs703eluiqyo20zgkqpi79y41w0zyj.servicebus.windows.net	United States	No
prdeusmmrns-33-t46vqpf8wplhrjsp9yqfn1tza0q1sft1tsm.servicebus.windows.net	United States	No
prdeusmmrns-4-c31zz9l8qalw7h1pvr18glfxqptzq6ph34dl.servicebus.windows.net	United States	No
prdeusmmrns-4-r2gcr4bg70k14spwohd1yeijpvstud3deq82.servicebus.windows.net	United States	No
prdeusmmrns-5-3jof0fvvl3astjtfo2gikxpimouynog68o6r.servicebus.windows.net	United States	No
prdeusmmrns-5-5x8c4o299zquku2yauz4yo813as2g22zhsf9.servicebus.windows.net	United States	No
prdeusmmrns-9-6nsicrn14urv2cjs87z4955gptr3s0x8plbv.servicebus.windows.net	United States	No
prdeusmmrns-9-rgbo8j4gzrecu7x89g76kxggt23lz58npwsm.servicebus.windows.net	United States	No
prdwusmmrns-7-7tmen1irly7syq5c0fthjskb0lf1613g6ymt.servicebus.windows.net	United States	No
prdwusmmrns-7-i48wrshewyk88q4s5kp39zrd498usidvd9z0.servicebus.windows.net	United States	No
prdwusmmrns-8-jrn8ds8r8py7w4gi2wk1vpymyqkxionli2s.servicebus.windows.net	United States	No
prdwusmmrns-8-wwr2q3m9lkv3f49ondkfj3x8yc2iradok3pz.servicebus.windows.net	United States	No
prodeastusmmrns-1-plck7l3prc43s.servicebus.windows.net	United States	No

URI	Power Platform Region	Is preview
prodeastusmmrns-2-uvq9wfvvrbqg.servicebus.windows.net	United States	No
prodwestusmmrns-1-3r77ocb7nmtak.servicebus.windows.net	United States	No
prodwestusmmrns-2-wt88pe23kbp8g.servicebus.windows.net	United States	No
prdeusmmrns-31-awy3sb1iblyim8xdejbyg4xtt4revfqjai3.servicebus.windows.net	United States	No
prdeusmmrns-31-bai0vj8wzgejcg6xzbukvfvcaqpiouccjmb.servicebus.windows.net	United States	No
prdwestusmmrns-V2-35-9yojrmcrrhkvb3kgvbwgdgc6rxzi4.servicebus.windows.net	United States	No
prdwestusmmrns-V2-36-ygezplol2wtqo6r23n0pn10t0sr6c.servicebus.windows.net	United States	No
prdwestusmmrns-V2-37-w100sq07i1bthsjwwraneco5ovjz1.servicebus.windows.net	United States	No
prdwestusmmrns-V2-38-83d3w34iag22wmmf614rz2oe25osj.servicebus.windows.net	United States	No
prdwestusmmrns-V2-39-pw2nf6u8c7wzajiy6nulledljqj4.servicebus.windows.net	United States	No
prdwestusmmrns-V2-40-7mkckny4vplgxa8t8nveqjyoddlsp.servicebus.windows.net	United States	No
prdwestusmmrns-V2-41-mc8mpw4prh91b6yb91no6auastbna.servicebus.windows.net	United States	No
prdwestusmmrns-V2-42-8qrayj6suic4dxzh0htqxjuzckfya.servicebus.windows.net	United States	No
prdwestusmmrns-V2-43-58oef00a78ogh9szchw8fhphy8n5x.servicebus.windows.net	United States	No
prdwestusmmrns-V2-44-4x62nyqh5gerut8wpiuaqtixris04.servicebus.windows.net	United States	No
prdwestusmmrns-V2-45-vkip2h4v74s1rfiq5tlgzqymw84ff.servicebus.windows.net	United States	No

URI	Power Platform Region	Is preview
prdwestusmmrns-V2-46-l2iuzacshf2fgehpn9mt9lcwhqst5.servicebus.windows.net	United States	No
prdwestusmmrns-V2-47-lsuvqs749alxtum82z2awd6u2tazu.servicebus.windows.net	United States	No
prdwestusmmrns-V2-48-7vp2cw6tbzunj61sj54ljvv5k1gq3.servicebus.windows.net	United States	No
prdwestusmmrns-V2-49-ukbo4afyvjnubzcov99qfjfrql2yb.servicebus.windows.net	United States	No
prdwestusmmrns-V2-50-1cs26o00qnou1t313cgu9qhx75z2k.servicebus.windows.net	United States	No
prdwestusmmrns-V2-51-ern8s3iyl7kz2tk23bg7tuw8glaba.servicebus.windows.net	United States	No
prdwestusmmrns-V2-52-ogiekpkhbmhj2vfz2epg7jdonhlx.servicebus.windows.net	United States	No
prdwestusmmrns-V2-53-914rc4oqybob24rim6678py209ezy.servicebus.windows.net	United States	No
prdwestusmmrns-V2-54-tgcafieng51kbhem2yvtn6oyg6iu5.servicebus.windows.net	United States	No
prdwestusmmrns-V2-55-mm7e6ozjd3if2hkmo2m1u08xxeft7.servicebus.windows.net	United States	No
prdwestusmmrns-V2-56-nzg387e1az6y3e5n8xew2wil5npdt.servicebus.windows.net	United States	No
prdwestusmmrns-V2-57-leae8gnt9eomqn7eag51qhl9vrkc1.servicebus.windows.net	United States	No
prdwestusmmrns-V2-58-5teg8uogvs3ymsuntyouhyihga77g.servicebus.windows.net	United States	No
prdwestusmmrns-V2-59-situ7t5ki2ouao7qgh8cxuf2x9p9s.servicebus.windows.net	United States	No
prdwestusmmrns-V2-60-0xvg3z3555dmlu76s9d9vy0ce93mq.servicebus.windows.net	United States	No
prdwestusmmrns-V2-61-t2k9lv1k4a8cj12ymqw1f2urlyqx.servicebus.windows.net	United States	No

URI	Power Platform Region	Is preview
prdeastusmmrns-V2-4-0x7gx7q02cuwgl01cj6yi1y643lr0.servicebus.windows.net	United States	Yes
prdeastusmmrns-V2-5-xavi5w8ktgelbvo0pw66j5ynmqsdmr.servicebus.windows.net	United States	Yes
prdeastusmmrns-V2-6-6bmlfsdr9ak2qt0gbsrv7elo5nw0x.servicebus.windows.net	United States	Yes
prdwestusmmrns-V2-4-867f0r3j4ezv0qq69iv8fz7a8fgv2c.servicebus.windows.net	United States	Yes
prdwestusmmrns-V2-5-a2nsev8iww4mjnoxcdl7se6ep7r0z3.servicebus.windows.net	United States	Yes
prdwestusmmrns-V2-6-7or97u45f1dgig81011b4gl4bnn1k1.servicebus.windows.net	United States	Yes
prdeastusmmrns-V2-64-7yxummj5gggu50cszggpmk9bhn6die.servicebus.windows.net	United States	No
prdeastusmmrns-V2-65-eirp8jk3iikdi5jfmtjclv405twx.servicebus.windows.net	United States	No
prdeastusmmrns-V2-66-8i47c1hfh2xeq2jzsgktsrb5nyv3x.servicebus.windows.net	United States	No
prdeastusmmrns-V2-67-wwuupsoh1mdkxkuboloyfjc2n4ypr.servicebus.windows.net	United States	No
prdeastusmmrns-V2-68-bnlo3xxsgqfv7afs2zjdhye672wa.servicebus.windows.net	United States	No
prdwestusmmrns-V2-66-l3nf5sxu8syzo5tc1ealcfso0h1yl.servicebus.windows.net	United States	No
prdwestusmmrns-V2-67-fqflahcd0nsvblzqc6as2rayw9d81.servicebus.windows.net	United States	No
prdwestusmmrns-V2-68-f13samd2h5a9se2lq52aqw3fj9nkl.servicebus.windows.net	United States	No
prdwestusmmrns-V2-62-p89r60qezeqi85kpxukus7p4bq4o.servicebus.windows.net	United States	No
prdwestusmmrns-V2-63-9zss4wcr5mz0h2s739jsa8xkf4b2a.servicebus.windows.net	United States	No

URI	Power Platform Region	Is preview
prdwestusmmrns-V2-64-16jpbysgs1kefka1hq8odxyeao3rg.servicebus.windows.net	United States	No
prdwestusmmrns-V2-65-qzuyklg01vkzintjoe4jd6c6k4v9m.servicebus.windows.net	United States	No
prdeastusmmrns-V2-58-j9soi0y9likgttodbaduxk95kca42.servicebus.windows.net	United States	No
prdeastusmmrns-V2-59-lxa51zcg2uqw76dl8cfytbrzfgmw.servicebus.windows.net	United States	No
prdeastusmmrns-V2-60-fddx9hsk2rqfs6qfp28b08co0tgxv.servicebus.windows.net	United States	No
prdeastusmmrns-V2-61-glul50ja90cs99b2i33afqwww9z.servicebus.windows.net	United States	No
prdeastusmmrns-V2-62-7z0dmfgz xu61bgp1n4ylxa6myf1bt.servicebus.windows.net	United States	No
prdeastusmmrns-V2-63-riflpzj44caie3ffb8ql37t4uw44.servicebus.windows.net	United States	No
prdeastusmmrns-V2-40-l40vv4fw7j84kkylaw7sgi5btmbsv.servicebus.windows.net	United States	No
prdeastusmmrns-V2-41-b4e1d5quo208oz41ev8uuidvgx4mo.servicebus.windows.net	United States	No
prdeastusmmrns-V2-42-f9xpybueng1ifjgkxsl6yiu5jfc6a.servicebus.windows.net	United States	No
prdeastusmmrns-V2-43-mm7zgyzthsh2gejykykq59caol9ui.servicebus.windows.net	United States	No
prdeastusmmrns-V2-44-xwxq5qhmd2xananbtfmk5wsuhto9j.servicebus.windows.net	United States	No
prdeastusmmrns-V2-45-jvitwflye80p003mqhy4tndv3opu0.servicebus.windows.net	United States	No
prdeastusmmrns-V2-46-02w3igz0m2f2ixhbeghwjpu6mgldw.servicebus.windows.net	United States	No
prdeastusmmrns-V2-35-pqmiztrnm758n2w2ixcgggyvw268r.servicebus.windows.net	United States	No



URI	Power Platform Region	Is preview
prdeastusmmrns-V2-36-qvceaidputc674iz1wfuk6yq5l7pu.servicebus.windows.net	United States	No
prdeastusmmrns-V2-37-67gv0wavysz7ged3iltaqdkqntn4.servicebus.windows.net	United States	No
prdeastusmmrns-V2-38-ep340abfrvn0i395xn3mouhjppg8.servicebus.windows.net	United States	No
prdeastusmmrns-V2-39-dajlhp88bld5c02r82xfzr7z8ge9n.servicebus.windows.net	United States	No
prdeastusmmrns-V2-47-urirei2x23vgwr8bjoh67et5j69ee.servicebus.windows.net	United States	No
prdeastusmmrns-V2-48-zsxyqwtlgr5oy3h3r91sjpkpntoc.servicebus.windows.net	United States	No
prdeastusmmrns-V2-56-l9qqe1of3zg3fmkv6aazxbxugyb0h.servicebus.windows.net	United States	No
prdeastusmmrns-V2-51-q732z9ssw5i8bf678wg404ncqj7.servicebus.windows.net	United States	No
prdeastusmmrns-V2-52-1hk7nyzldwyuxz8wft3wxpwz49v2x.servicebus.windows.net	United States	No
prdeastusmmrns-V2-53-h6vaxo6zz06g267jpyyn0cp3r81mt.servicebus.windows.net	United States	No
prdeastusmmrns-V2-54-xha5q7i13wba2buxtyn78hlxu6rp5.servicebus.windows.net	United States	No
prdeastusmmrns-V2-55-4bi6qgfm7olfcnuh6lr32121r5he.servicebus.windows.net	United States	No
prdeastusmmrns-V2-57-6tnrtyh5tvl593c33fe8rq4j9surl.servicebus.windows.net	United States	No
prdeastusmmrns-V2-49-bv9at1w8ykynukqwbrx4ltmrpyd3v.servicebus.windows.net	United States	No
prdeastusmmrns-V2-50-c9toid8pj41qyr0brftypow5ep83.servicebus.windows.net	United States	No
prdwukmmrns-2-655eda4qyw2sv8yoh48rvypa4cgywlbwcqhv.servicebus.windows.net	United Kingdom	No

URI	Power Platform Region	Is preview
prdwukmmrns-2-vn35h7uhr3nriaunptdudd0avl6nzhnglhr.servicebus.windows.net	United Kingdom	No
produksouthmmrns-1-cx4kejh3frvae.servicebus.windows.net	United Kingdom	No
produkwestmmrns-1-ndmh2gqzqj6e4.servicebus.windows.net	United Kingdom	No
prdukwestmmrns-V2-3-pix6zz16y94l8lbbcad1woq8gbdq4g.servicebus.windows.net	United Kingdom	No
produksouthmmrns-V2-3-mnju2mj25hyj4ig3gp5uqpedwdo8h.servicebus.windows.net	United Kingdom	No
prdukwestmmrns-V2-4-c07nmhjdwy1mqyy4mfs4eomli4x.servicebus.windows.net	United Kingdom	No
produksouthmmrns-V2-4-uagkjreb03usrqw5clyadknb5q529.servicebus.windows.net	United Kingdom	No
prodjapaneastmmrns-1-nafowbv7uqqzi.servicebus.windows.net	Japan	No
prodjapanwestmmrns-1-7fhv7yfs3b7oo.servicebus.windows.net	Japan	No
prdwjpmmrns-5-alkrftpxcxjdgdvullh28wv064it08xh7p.servicebus.windows.net	Japan	No
prdwjpmmrns-6-4zas09oyw0z88m15l32s4hqcfrlavchfpo8.servicebus.windows.net	Japan	No
prdwjpmmrns-6-r9onumpa34h1abopfbtz7387zvqmw9y52.servicebus.windows.net	Japan	No
prdwjpmmrns-7-59gnwfs0axi99oh46nieh0amw9lz8rvkm0ev.servicebus.windows.net	Japan	No
prdwjpmmrns-7-94nw9gtat4zpo97jcgudkgvc2ge48b2zdylb.servicebus.windows.net	Japan	No
prdwjpmmrns-9-mf0gib6ot7yzs53fon9908m9abwa7tqlqmbf.servicebus.windows.net	Japan	No
prdwjpmmrns-9-rysrv03djr8ojnp0e0lo60k6fp0ppa8aka9z.servicebus.windows.net	Japan	No
prdwjpmmrns-3-jrzvs2jn2wfqhqdm78w4opp4j07woaerh9a4.servicebus.windows.net	Japan	No

URI	Power Platform Region	Is preview
prdwjpmmrns-13-dz20gg7ban7335qy3uuu2bhdokzhqguluxi.servicebus.windows.net	Japan	No
prdwjpmmrns-5-183yd443d6abopy05eqhnx6ppzgdLz9cg0lw.servicebus.windows.net	Japan	No
prdwjpmmrns-2-z1iyi9x93h8a5p2rf0bxpa3xkr3s1st0shem.servicebus.windows.net	Japan	No
prdwjpmmrns-2-zwl9wqzfhhuJ8de04s6iyo320gmvbshaqwpr.servicebus.windows.net	Japan	No
prdwjpmmrns-15-mz0itgrmkb9x8qt7shqm1a3ad3t45qb3l75.servicebus.windows.net	Japan	No
prdwjpmmrns-3-h62j5nlty1v9x4auvdejpwe7ngo3lsgau6fb.servicebus.windows.net	Japan	No
prdejpmmrns-14-osbksh1kc2h9bc5zynk6485ttm162r7qmb8.servicebus.windows.net	Japan	No
prdejpmmrns-15-tovckjt2c987eih8021ez4pa1hrwcrd3043.servicebus.windows.net	Japan	No
prdejpmmrns-4-0bq94lkcwh89ljh00y238hjallak9rtw5mwo.servicebus.windows.net	Japan	No
prdejpmmrns-4-8ox2iqi1zw8g4g6npao62epqsif70pxqwhlt.servicebus.windows.net	Japan	No
prdejpmmrns-8-rja3avsyaksfqkfmsexjpt1f5gw0l5rjhek.servicebus.windows.net	Japan	No
prdejpmmrns-8-yqkn1hnj6urmthhsi2nd3r6tmacw06k6s0xl.servicebus.windows.net	Japan	No
prdwjpmmrns-10-i4t18vcq6bymi0q41ct6l9omrsmPu1xb66q.servicebus.windows.net	Japan	No
prdwjpmmrns-11-db2a6de90pl6bjuorg331y7hwlt3ksb9je.servicebus.windows.net	Japan	No
prdwjpmmrns-13-yctdcx8q7te9y7q36umn9nrp6cxdss5gd6t.servicebus.windows.net	Japan	No
prdejpmmrns-10-bstijlyba2qkct0t5sre5vfbtr0k3r2756i.servicebus.windows.net	Japan	No

URI	Power Platform Region	Is preview
prdejpmmrns-11-j5a9t7g5ye30tcbyr3qeylocw36g4fw5jiz.servicebus.windows.net	Japan	No
prdejpmmrns-12-pje8gv6enxkx01fuhiztlpxdf6hrn0y5c.servicebus.windows.net	Japan	No
prdejpmmrns-12-xzbymnq8jbxzff8rw0gd9amryk5y0sqkuhi.servicebus.windows.net	Japan	No
prdejpmmrns-14-j9jags4umi7jkuje9a7syf8wo9wrk9p1sma.servicebus.windows.net	Japan	No
prdjapanwestmmrns-V2-22-cc3hqdic1qtkcbjunlkau1xhcj.servicebus.windows.net	Japan	No
prdjapaneastmmrns-V2-16-3u0n4qybma9gm458dcljua1lgg.servicebus.windows.net	Japan	No
prdjapaneastmmrns-V2-17-ugpm8yigk1hcbkjptbqsz7tkzh.servicebus.windows.net	Japan	No
prdjapaneastmmrns-V2-18-wajxi5464611wdiz2icaoscdum.servicebus.windows.net	Japan	No
prdjapaneastmmrns-V2-19-6cnmts3o9an43slncs8kx8u3m.servicebus.windows.net	Japan	No
prdjapaneastmmrns-V2-20-nyln4xrnf62gfy4mp44f0peo2v.servicebus.windows.net	Japan	No
prdjapaneastmmrns-V2-21-pljfc1cnc4ie8xfki5d5q5af9o.servicebus.windows.net	Japan	No
prdjapaneastmmrns-V2-22-d184ecglhplm3grf2mb3tr19j4.servicebus.windows.net	Japan	No
prdjapanwestmmrns-V2-16-dwz439851f3hext8w186412q29.servicebus.windows.net	Japan	No
prdjapanwestmmrns-V2-17-5a65ic1lt0ml4rjy49pcycy4dt.servicebus.windows.net	Japan	No
prdjapanwestmmrns-V2-18-r9k6obl8niz7rri9q5zk84baz.servicebus.windows.net	Japan	No
prdjapanwestmmrns-V2-19-xyvj178qwp2jp572yqpx8hckb.servicebus.windows.net	Japan	No

URI	Power Platform Region	Is preview
prdjapanwestmmrns-V2-20-asapau6qmt86l1vw8ov5onqvtc.servicebus.windows.net	Japan	No
prdjapanwestmmrns-V2-21-3y18tudg2lxt46v7flp1enxdmx.servicebus.windows.net	Japan	No
prdsinmmrns-2-yg3uf3bg2tx76131363l5twjngscb68cdztl.servicebus.windows.net	India	No
prdcinmmrns-3-wnn89ixhem8i605q4edtwo9r8r0t2796kx3d.servicebus.windows.net	India	No
prdsinmmrns-2-rdf8f0ew8d30vxdo2y9l17npmi44q7s6w7z9.servicebus.windows.net	India	No
prdcinmmrns-3-t2y6tdtbryy4k4c1l4tffmdx0b7k4ikerkaa.servicebus.windows.net	India	No
prodsouthindiammrns-1-7kqjp7tvfvku.servicebus.windows.net	India	No
prodcentralindiammrns-1-h34hrnss44v7s.servicebus.windows.net	India	No
prdcentralindiammrns-V2-4-ee92anj5viy0erkmknu4ct03.servicebus.windows.net	India	No
prdcentralindiammrns-V2-5-m3oh8k94epa6ftlnj15v12ti.servicebus.windows.net	India	No
prdcentralindiammrns-V2-6-1kxdtzdle2v85f11noj58sda.servicebus.windows.net	India	No
prdsouthindiammrns-V2-4-e41a018a0nkeypn3wmmo4tc7hg.servicebus.windows.net	India	No
prdsouthindiammrns-V2-5-csu0sz9mtazr236ey7adgfpfrv.servicebus.windows.net	India	No
prdsouthindiammrns-V2-6-p0cf9pk42vxyzri7tmo2bcxue0.servicebus.windows.net	India	No
prodfrancecentralmmrns-1-xzhxhbzl7vhc6.servicebus.windows.net	France	No
prodfrancesouthmmrns-1-xorsknhtb2lm2.servicebus.windows.net	France	No
prdfrancecentralmmrns-V2-2-ey8pb34ahkh5lww22p4fbjy.servicebus.windows.net	France	No
prdfrancesouthmmrns-V2-2-	France	No

URI	Power Platform Region	Is preview
mpm8f0c4822ei4rs4lop2y3vi.servicebus.windows.net		
prdweummrns-26-ldz8cnwwyocr0ejev8xvyhieuzmdq1yxqk.servicebus.windows.net	Europe	No
prdweummrns-6-715t9odrb0d5xqu9mcvl95tl3vss0h4ywwql.servicebus.windows.net	Europe	No
prdweummrns-6-k903fojp2zajhe9m2uy026gmd8o92j7egocc.servicebus.windows.net	Europe	No
prdweummrns-7-ieo6v7w85hvc7kfspwkn5iwga4sfx906lb4n.servicebus.windows.net	Europe	No
prdweummrns-7-mxvjm5wdlp57s36i1tnari51ork5qz16q1f2.servicebus.windows.net	Europe	No
prdweummrns-9-igv6i1ythpy1wz7sayq1fvnxh5bkakwz06i3.servicebus.windows.net	Europe	No
prdweummrns-9-ngzlxpwmf83v36kz9qf7xlnexgbf5v8fpggk.servicebus.windows.net	Europe	No
prodnortheuropemmrns-1-jc3usmvyk4wcy.servicebus.windows.net	Europe	No
prodnortheuropemmrns-2-y9bgs3kphntyf.servicebus.windows.net	Europe	No
prodwesteuropemmrns-1-il3kcpbupz3gm.servicebus.windows.net	Europe	No
prodwesteuropemmrns-2-p1m53clst99fe.servicebus.windows.net	Europe	No
prdneummrns-10-dfsba8r6fetlj0naynlmekwrx8s8mgbb26.servicebus.windows.net	Europe	No
prdneummrns-10-xlb6mnb4oo6i2836ys0z23370t9qmg1z8v.servicebus.windows.net	Europe	No
prdneummrns-11-4h432bhqewib20lfte3c7xrlmuzr8a66pc.servicebus.windows.net	Europe	No
prdneummrns-11-fc9x0e1i5yf1rb37iug3bend5k0v32rq59k.servicebus.windows.net	Europe	No
prdneummrns-12-q8mb2fc6q3h1kuct9tvxhya46eyuso4e8iz.servicebus.windows.net	Europe	No
prdneummrns-12-qfegk9w902b6b3difrniu2h2hyo9lug1yxk.servicebus.windows.net	Europe	No

URI	Power Platform Region	Is preview
prdneummrns-15-2wuay5ujwfhkb3tkk4tt05g6qj7k5p3jkve.servicebus.windows.net	Europe	No
prdneummrns-15-xxqly3x8p04ydgllxhb8p7pyup7jnjl8apy5.servicebus.windows.net	Europe	No
prdneummrns-17-6ku1rh49w81ofdmrr3c5bo8ssui68zbozjl.servicebus.windows.net	Europe	No
prdneummrns-17-argn0agthuw69l4njzblsmbi697b77nz62l.servicebus.windows.net	Europe	No
prdweummrns-13-3d8l3g60vj020rzpvn0vb7hrk348wymi9fb.servicebus.windows.net	Europe	No
prdweummrns-13-xvjnyxshe38m9o8bwp8axrxoqlg4tjbyrle.servicebus.windows.net	Europe	No
prdweummrns-14-m17rqz9zbhu9d98ttthmxy4no6ou21268v.servicebus.windows.net	Europe	No
prdweummrns-14-oz7piy3p711feggc608fa8isdynis8sffv.servicebus.windows.net	Europe	No
prdweummrns-16-2rhp0evcj8avmcvwzdl9r4n8byctxnyb7p.servicebus.windows.net	Europe	No
prdweummrns-16-soafhbsvtlwquwzxi03onf8oa25f93kcboi.servicebus.windows.net	Europe	No
prdweummrns-19-yeh6wlbkp1av8roke94xgi3iqpx2a3xtvj9.servicebus.windows.net	Europe	No
prdweummrns-20-jfd262oyt2s5i2m9afvhmmn7oh8m9ylt87t.servicebus.windows.net	Europe	No
prdweummrns-20-kb4j7ljpdtkqjzsd1cf2y7ud79apid1azpx.servicebus.windows.net	Europe	No
prdweummrns-22-roua85rgg4d3omi9cnq0gm3q5ykjej2fp48.servicebus.windows.net	Europe	No
prdweummrns-23-pxf43dpsyd3m6dqldszf6735fqy419mxw8.servicebus.windows.net	Europe	No
prdweummrns-24-ho7hs6f61184mawfirly3xohh3hqtwm7cpv.servicebus.windows.net	Europe	No

URI	Power Platform Region	Is preview
prdweummrns-25- czz7mnkehsuki22mmitllf8mo7klfqwpkkg.servicebus.windows.net	Europe	No
prdneummrns-18- 6e9asgh3q54wug2g85c7dvtwysx5vg38qn4.servicebus.windows.net	Europe	No
previewnortheuropemmrns-1-ny3jbez7yclw4.servicebus.windows.net	Europe	Yes
previewwesteuropemmrns-1-pli5p5xheu4lc.servicebus.windows.net	Europe	Yes
prdneummrns-18- 6ycvn49mc7zhbshadks0tfjwjg6g1q9f6g2.servicebus.windows.net	Europe	No
prdneummrns-19- 0pfazhfb4vytcl52r6dryrgi71aufv5pw14.servicebus.windows.net	Europe	No
prdneummrns-21- rx2d4tdu9zyhb9br9n6v06xhlnyd9em854v.servicebus.windows.net	Europe	No
prdneummrns-21- y72fn30ujex4govc1yzvpvyp2j782gd2zwc.servicebus.windows.net	Europe	No
prdneummrns-22- xzhu3hmk0w19hprhbce39d18b5lioem8ywk.servicebus.windows.net	Europe	No
prdneummrns-23- 1jsqh281qvmjp09kut3auw06bad16ht2z6f.servicebus.windows.net	Europe	No
prdneummrns-24- est7ogob7mhkjygi9fncj64cp1f92olgx.servicebus.windows.net	Europe	No
prdneummrns-25- l16teela0xo5gj401u2bqjx8lvevpkv4yy5.servicebus.windows.net	Europe	No
prdneummrns-26- 6v8e6mten7nvn78qpgfrke2ogedjedwxdqe.servicebus.windows.net	Europe	No
prdneummrns-3- ijnvx1ne9xr4cdg4boj0ko17o6r0mo01fxry.servicebus.windows.net	Europe	No
prdneummrns-3- w7wi2kmzbqlyhbgz8or8ccsv6dt4kcq7wng4.servicebus.windows.net	Europe	No
prdneummrns-4- 6eadpq66lmsng2z3qfbt5h0dz8y1ev1g7f9f.servicebus.windows.net	Europe	No
prdneummrns-4- saphm2ye8z0dvr0cjfyfo7nq1e20umpb3ulp.servicebus.windows.net	Europe	No



URI	Power Platform Region	Is preview
prdneummrns-5-2ksg36axkdor8krdojxudtq9kaylps6amcf0.servicebus.windows.net	Europe	No
prdneummrns-5-qphyin8kfcgypsb7b6wjf6lxijd8v3xx2of9.servicebus.windows.net	Europe	No
prdneummrns-8-ieav13ew8673n0h1okr1ehlg65hr90vzwq57.servicebus.windows.net	Europe	No
prdneummrns-8-o2j51ngtrr5uevmw8af9jfpnz8ycydpghlv5.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-29-w9862tvv9uythyjg9r01qil6s.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-30-h9hg4sx9g24al243oy48041bv.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-31-hk40s1sgeyz3gnl94d18j6gjb.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-32-269lf3o8gruyxgq3oeytc9b1k.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-33-gwo4l5zh4e92fsvgkys9dpoi0.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-34-8fwip55lhldk5brxune2zp5el.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-42-oljf96sfrmuxqpeid4ts04opq.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-35-yvjsbpymqy15c64fim2e0sgin.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-36-u72st7yjqvbccejiks6mbw6xy.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-37-z6479bvg0redxmeionnp1glwe.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-38-srn8subki2xzoafw0u15manv2.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-39-mzwc5obnkbwgdmf43kunjqj0x.servicebus.windows.net	Europe	No

URI	Power Platform Region	Is preview
prdwesteuropemmrns-V2-40-tkypm6qg1h80di5f3z8sxb19o.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-41-l6alycm6v76vr7lk692e99m89.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-43-gniz6cwl3bj0wolnfpypxxcrni.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-43-bnzm7y7ovun3dvscvg1ps3.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-27-sdxs8kpou1ymj71wyp907zmlj.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-31-dcqi9v8o0haz0b2fsdbh9aau.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-27-sok4f6mpwbmm8sq92t7matlu.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-32-r619ji6q6pf4xqppmof6ccvb.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-33-credxaax6n3542hpbv0fjgrm.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-34-95vbolmzsywv1ieqgvw21980.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-35-3be6udc31v261pyu3s5f20ow.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-36-1fez4d7eu22p1vgtkw9wkvip.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-37-txqy5uktu2fco5w62eo9jfh5.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-38-vi70m67wn4q99j8btm80wzy6.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-39-11tdmg71hg91a27bojbrxsc.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-40-oczrsc5wx0vn68blgsahxibi.servicebus.windows.net	Europe	No

URI	Power Platform Region	Is preview
prdnortheuropemmrns-V2-41-kt2dvss1iymweq51myzovdjy.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-42-anpfzeh6iryjt397emkjcjgxx.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-44-s4z883nis6r7ojk64uy5do60.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-28-dz1xl3q5hieatveth3pxhfj87.servicebus.windows.net	Europe	No
prdwesteuropemmrns-V2-44-rex1ejrmnhnprn1jtkfocn3rvy.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-28-gwhxf94sdepv464u9sf4e2r5.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-29-cjwdz6e4eyw0tuvmu29fv4v5.servicebus.windows.net	Europe	No
prdnortheuropemmrns-V2-30-8d8fsnxlukj5kj0i72k7c97y.servicebus.windows.net	Europe	No
prnddemmrns-2-go7xeqf077mt2vuq4dyth0gwf9s2aemmjm9.servicebus.windows.net	Germany	No
prnddemmrns-2-yqlb2eueujjpuxauq3us19ia6pboepamtmdh.servicebus.windows.net	Germany	No
prodgermanynorthmmrns-1-q7unzu7nsvdxcg.servicebus.windows.net	Germany	No
prodgermanywestcentralmmrns-1-zqcmawxslzfbf.servicebus.windows.net	Germany	No
prdgermanynorthmmrns-V2-3-nx19493gwmdkl77m937j6hzi.servicebus.windows.net	Germany	No
prdgermanywestcentralmmrns-V2-3-kqsb9hxeqg46m8n14r.servicebus.windows.net	Germany	No
prdnchmmrns-2-6aufi5bwfag8r54td32bjj8bpl845eagkz2y.servicebus.windows.net	Switzerland	No
prdnchmmrns-2-d8hfqw2v8niumsl2jaqjrqq4lhp10rvjnjc9.servicebus.windows.net	Switzerland	No
prodswitzerlandnorthmmrns-1-2d2uums4njavc.servicebus.windows.net	Switzerland	No

URI	Power Platform Region	Is preview
prdschweizerlandnorthmrrns-V2-3-pvisj74nv8loqz4tmn17.servicebus.windows.net	Switzerland	No
prdschweizerlandwestmrrns-V2-3-x9re2bnt17mpe41zn2tp1.servicebus.windows.net	Switzerland	No
prodswitzerlandwestmrrns-1-n3jwwj2am7fgy.servicebus.windows.net	Switzerland	No
prdccammrns-2-8s6kb0vay4f0koa6jsws726gyns43uh4591e.servicebus.windows.net	Canada	No
prdecammrns-2-ginyhgugvgct78u1knii7f1m6vfrsubf8gr8f.servicebus.windows.net	Canada	No
prodcanadacentralmrrns-1-r7keih3ctpbo4.servicebus.windows.net	Canada	No
prodcanadaeastmrrns-1-vmq2eniku7w3e.servicebus.windows.net	Canada	No
previewcanadacentralmrrns-1-s4wweqcy62z32.servicebus.windows.net	Canada	Yes
previewcanadaeastmrrns-1-35pw2xpwwfyfq.servicebus.windows.net	Canada	Yes
prdcanadacentralmrrns-V2-6-c082k61uzumungk4r7r9b0q.servicebus.windows.net	Canada	No
prdcanadaeastmrrns-V2-6-cb9ej0r35j5bk52finxcr1nc9h4.servicebus.windows.net	Canada	No
prdcanadacentralmrrns-V2-3-vl607weynuziswx7c1h8ift.servicebus.windows.net	Canada	No
prdcanadacentralmrrns-V2-4-8fh11lit8oc1nkfr4bg5ujf.servicebus.windows.net	Canada	No
prdcanadacentralmrrns-V2-5-Inf39ay9gmssh4kdp5o8ce.servicebus.windows.net	Canada	Yes
prdcanadaeastmrrns-V2-3-j5vwggt3rb5dbv39942w21uh6i.servicebus.windows.net	Canada	Yes
prdcanadaeastmrrns-V2-4-0iq6u9cwl138ef5i67sjykca9.servicebus.windows.net	Canada	Yes
prdcanadaeastmrrns-V2-5-70iiq4ryuvmy6l3jyacmyj6k1d.servicebus.windows.net	Canada	Yes
prdsbrmmrns-2-69n5a3ojd4crv4qpj93l0vi9xwul5qygykqu.servicebus.windows.net	South America	No

URI	Power Platform Region	Is preview
prdsbrmmrns-2-gh3flzhrf9ax9glm87xs23dxrykcuoakpics.servicebus.windows.net	South America	No
prdsbrmmrns-3-4ex758s96an2i2hfd1ypws4s59qre3fruvb5.servicebus.windows.net	South America	No
prdsbrmmrns-3-ufhjfy24383anexi9oioic5z8ub5smb3ogo.servicebus.windows.net	South America	No
prodbrazilsouthmmrns-1-duxgufn3xsm6.servicebus.windows.net	South America	No
prodsouthcentralusmmrns-1-v2gwsxxmesfkw.servicebus.windows.net	South America	No
prdbrazilsoutheastmmrns-V2-4-w9t5y3wmh9rcrv5x6sh1z.servicebus.windows.net	South America	No
prdbrazilsoutheastmmrns-V2-5-2zrb3wwtelahcumgb63m.servicebus.windows.net	South America	No
prdbrazilsouthmmrns-V2-4-kvwoyt51n45knkl8fiigga5sl.servicebus.windows.net	South America	No
prdbrazilsouthmmrns-V2-5-etonhht5qkuj13txix4zdull3.servicebus.windows.net	South America	No
prdeaummrns-2-if84st2om5meh741f8vanxwcz07mnq6vpggz.servicebus.windows.net	Australia	No
prdeaummrns-2-z1cqmm14ao5gt1nqpqx9llazq1vd0dg8418w.servicebus.windows.net	Australia	No
prdseaummrns-3-5gveu7rksy51oh4rfx54fbc4qt5qc8502bh.servicebus.windows.net	Australia	No
prdseaummrns-3-aiqa1jis4kacxb46aqyb0n01gvih0zuwctd.servicebus.windows.net	Australia	No
prodaustraliaeastmmrns-1-broykyq53frty.servicebus.windows.net	Australia	No
prodaustraliasoutheastmmrns-1-g7yhvdys4yu2s.servicebus.windows.net	Australia	No
previewaustraliaeastmmrns-1-e5g6njcwtfobg.servicebus.windows.net	Australia	Yes
previewaustraliasoutheastmmrns-1-onma5d3r2tevi.servicebus.windows.net	Australia	Yes

URI	Power Platform Region	Is preview
prdaustraliaeastmmrns-V2-4-i1p40k20qtb1w763m2pfyw.servicebus.windows.net	Australia	No
prdaustraliaeastmmrns-V2-5-o70p1sirgcvbjjwfx821wih.servicebus.windows.net	Australia	No
prdaustraliasoutheastmmrns-V2-4-gk4psheqriftcd9c7y.servicebus.windows.net	Australia	No
prdaustraliasoutheastmmrns-V2-5-4kp3u28uu4godpvvfz.servicebus.windows.net	Australia	No
prdeasmrns-2-1lmgpyk311cxsmgr513wlgj053ezi6lj2eks.servicebus.windows.net	Asia	No
prdeasmrns-2-bmrhbmhmvn76dohg3wy43lmaj8i3y2lyfdif.servicebus.windows.net	Asia	No
prdeasmrns-6-dy3qfh1dr2jlqy20o7q5jpgx8i5f7f4lutsv.servicebus.windows.net	Asia	No
prdeasmrns-7-imtver1279xmke7qe3s57b3l80a6tf1bf117.servicebus.windows.net	Asia	No
prdeasmrns-7-r96lkkijqfqi4e7ujfnp4wb5s9msitwar29g.servicebus.windows.net	Asia	No
prdseasmrns-3-dj4e6cmp72khzsmxrna6i7tnw3i9z8la04.servicebus.windows.net	Asia	No
prdseasmrns-3-o8i3mkmfo6n3xt40j91ps6bh51kysnejk5r.servicebus.windows.net	Asia	No
prdseasmrns-4-02brgu6vvf454a96wtwaq4sza2uvgaze5m8.servicebus.windows.net	Asia	No
prdseasmrns-4-tvhxmw4xs4voyhiafd0wyj7rzj3nzs1x8in.servicebus.windows.net	Asia	No
prdseasmrns-5-97zxs33ra6s2esktyr6pnj4hp9ppnl4zkmu.servicebus.windows.net	Asia	No
prdseasmrns-5-yuj2dcu7yyw305zlob38zdrdynodyc2s27w.servicebus.windows.net	Asia	No
prdseasmrns-6-2ubnk0mpzbeng7m3465wmvxbdkqozp7e9ig.servicebus.windows.net	Asia	No

URI	Power Platform Region	Is preview
prdeastasiammrns-1-a7p5u2p76nykc.servicebus.windows.net	Asia	No
prodsoutheastasiammrns-1-2zisdacd3p4yq.servicebus.windows.net	Asia	No
prdsoutheastasiammrns-V2-10-ss3rst3qe8pnqi12byefko.servicebus.windows.net	Asia	No
prdsoutheastasiammrns-V2-11-fegbzmqqgpd67045gjyh51.servicebus.windows.net	Asia	No
prdsoutheastasiammrns-V2-12-9dnu834oklwjlpdn2t7ie.servicebus.windows.net	Asia	No
prdsoutheastasiammrns-V2-8-4e6rrq6ugt9l73sj7i6v5oq.servicebus.windows.net	Asia	No
prdsoutheastasiammrns-V2-9-ocus0ag2in80zkr49pln2kb.servicebus.windows.net	Asia	No
prdeastasiammrns-V2-10-7uot7yabvskiu79tz1mq5h5rbiz.servicebus.windows.net	Asia	No
prdeastasiammrns-V2-11-7nnmb84bu2gag1r11l4pgo3c0iv.servicebus.windows.net	Asia	No
prdeastasiammrns-V2-12-mex8iew1ulesrikd5719fkabs5o.servicebus.windows.net	Asia	No
prdeastasiammrns-V2-8-2jwmcicif6gd9asvgac6w4l3pma.servicebus.windows.net	Asia	No
prdeastasiammrns-V2-9-qkow6tk3o2itnbwr3ikwnxvi13r8.servicebus.windows.net	Asia	No
prduaecentralmmrns-1-6v46fkb43e56k.servicebus.windows.net	United Arab Emirates	No
prduaenorthmmrns-1-6rlrfzdyg6y2s.servicebus.windows.net	United Arab Emirates	No
prduaecentralmmrns-V2-2-gvau95gf8stxbizt653fwqkp9a.servicebus.windows.net	United Arab Emirates	No
prduaecentralmmrns-V2-3-hv31xuc13f25vrsive9474d9am.servicebus.windows.net	United Arab Emirates	No
prduaenorthmmrns-V2-2-xw6tohq9uramo9j1xadcey3uknhm.servicebus.windows.net	United Arab Emirates	No

URI	Power Platform Region	Is preview
prdsoutheastasiammrns-V2-1-3f5supeetlux990ykp28ojy.servicebus.windows.net	Singapore	No
prdsoutheastasiammrns-V2-2-5jgzzrf81e1tuk7j2tu8trq.servicebus.windows.net	Singapore	No
prdswedencentralmmrns-V2-1-p0cx598kocgtifk2llkf9uv.servicebus.windows.net	Sweden	No

## Other configuration details

For information about how to permit access to automated, scheduled, and instant flows, including required endpoints, refer to [IP address configuration](#).

## Flow suspension because of runtime limits

Suspended flows are shown as suspended in the Power Automate maker portal and the Power Platform admin center. When a flow is returned through an API, PowerShell, or a [Power Automate Management connector list flows 'as Admin' action](#), the flow has **State=Suspended** with appropriate **FlowSuspensionReason** and **FlowSuspensionTime** values.

The following are the **FlowSuspensionReason** values for runtime limits:

- AllActionsFailingDetected
- AlwaysFailingDetected
- ApiCallOverageDetected
- BillingConsumption
- BillingConsumptionMissingRPAlicense
- NeverTriggeringDetected



# Power Automate embed pay-as-you-go

Article • 01/03/2023

With the [Power Automate embed pay-as-you-go program](#), independent software vendors (ISVs) can integrate Power Automate into their solutions, making it frictionless for their customers to use premium Power Automate capabilities in their own flows. With this program, ISVs make their premium connectors available to all Power Automate makers and pay for these makers' consumption of these connectors through [pay-as-you-go meters](#).

Since ISVs pay for their customers' use of their premium connectors, there's no need for their customers to purchase standalone Power Automate licenses to build and run flows with the premium capabilities that the ISV offers.

With this approach, ISVs with premium connectors on Power Platform can make them available to any Power Automate user. After the ISV starts their participation in this embed program, users without premium licenses can build premium flows with connectors that the ISV provides. This enables any user to take advantage of the premium capabilities of Power Automate and build flows to enhance the products that they use from that ISV.

As customers build and run flows with these premium connectors, Microsoft sends aggregate tenant-level usage reports (flow runs involving these connectors) to the ISVs. No user data is shared as part of this program.

## ⓘ Note

If a customer already has premium Power Automate licenses, the ISVs aren't billed for their consumption, and no aggregated usage reports are shared with the ISVs.

If an ISV discontinues their participation in the program, customers get advanced notice to acquire a paid Power Automate license to keep their flows running.

# Frequently asked questions

FAQ

## Audience and strategy

### What is Power Automate?

Power Automate is a cloud-based service that makes it practical and simple for line-of-business users to build workflows that automate time-consuming business tasks and processes across applications and services.

### Who is the intended audience for Power Automate?

Power Automate has two distinct audiences:

- Line-of-business “Citizen Integrators” in enterprise organizations who partner with IT to move responsibility for business solutions closer to the business itself.
- IT decision makers who want to empower line-of-business partners to create their own solutions so IT professionals and integration specialists can focus their expertise on more advanced integration tools, such as Azure Logic Apps.

### How do Power Automate and Logic Apps relate to each other?

Power Automate provides features that help line-of-business users create automated workflows. Logic Apps is an Azure service that provides the same great features of Power Automate, plus features such as integration with Azure Resource Manager and the Azure Portal, PowerShell and xPlat CLI, Visual Studio, and additional connectors.

[Learn more about Logic Apps](#) [↗](#).

### How does Power Automate fit in Microsoft’s overall business application platform strategy?

Power Automate is part of a powerful and adaptable business application platform that includes Power Apps, Microsoft Dataverse, Dynamics 365, and Office 365. This platform allows our customers, our partners, and our ISV partners to create purpose-built

solutions for their own companies, their industry, for functional roles or even for specific geographies. Line-of-business users, who understand their business needs best, can now easily analyze, compose, and streamline data and processes. Professional developers can easily extend the automation, analytics and apps line-of-business to leverage Azure services like Functions, App Service, and Logic Apps. API connectors, gateways, and Microsoft Dataverse make it possible to get more value out of services or data already in use, either in the cloud or on-premises.

## Functionality

### What do I need to use Power Automate?

To use Power Automate, all you need is a web browser and an email address.

### What browsers and devices can I use with Power Automate?

You can run Power Automate on all modern devices, and browsers.

### Supported devices

Power Automate runs great on modern devices. If you need to manage Power Automate from a mobile device, try the Power Automate mobile app that's available on [iPhone](#) , [Android](#) , and [Windows Phone](#) .

### Supported browsers

We recommend that you use the most up-to-date browser that's compatible with your operating system. We support the following browsers:

- Microsoft Edge
- Safari
- Chrome
- Firefox

### Which email addresses are supported?

Power Automate supports email addresses that end with anything except .gov and .mil.

### Is Power Automate available on-premises?

Power Automate is a public cloud service only. However, you can securely connect to your own on-premises services through the on-premises data gateway.

## What services can Power Automate connect to?

Power Automate connects to more than 100 data sources out of the box, and we're adding more all the time. Some examples of data sources and services include the following:

- SharePoint
- Dynamics 365
- OneDrive
- OneDrive for Business
- Google Drive
- Google Sheets
- Trello
- Twitter
- Box
- Facebook
- Salesforce.com
- Mailchimp
- Customer APIs

You can find a full list of available connectors [here](#).

You can access data sources in your own IT infrastructure through the [on-premises data gateway](#).

## What are templates?

Templates are pre-built flows for popular and common scenarios. Using a template only requires you to have access to the services in the template and to fill out any required settings.

## What data sources will I be able to connect to?

You can connect to more than 100 standard services from Microsoft and third parties, such Office 365, Twitter, SharePoint, OneDrive, Dropbox, SQL Server, and more. You can also connect to premium services such as Salesforce and Microsoft Dataverse.

## How do I connect to a REST API in my flow?

You can connect to any REST API that uses JSON and supports at least one of more than 10 authentication methods by creating [a custom connector](#).

## How do I connect to SQL Server and other on-premises data sources?

You can connect to services on your local network using the [on-premises data gateway](#).

## Can I share the flows I create?

You can share flows in either of these ways:

- You can add co-workers or groups in your organization as owners on your flows, so they can also edit and manage the flow.
- For flows that can be run manually, you can also grant other people or groups in your organization permission to just run the flow.

## How many flows can I have?

You can create an unlimited number of flows, depending on the [type of license](#) you hold.

## Where do I get started with Power Automate?

Get started with the following resources:

- [Blog](#)
- [YouTube channel](#)
- [Topic](#)
- [Community](#)

## What operating systems does the mobile app for Power Automate support?

The Power Automate mobile app is available on [Android](#), [iOS](#), or [Windows Phone](#).

## Can flows be turned off or disabled?

Yes, each flow has an on/off switch that enables you to stop the flow from processing requests.

See the following table to understand how your flow responds when it's turned back on.

 [Expand table](#)

Trigger type	Description
Polling, such as the <b>Recurrence</b> trigger	When the flow is turned on again, all unprocessed/pending events are processed. Delete your flow if you don't want to process pending items.
Webhook	When the flow is turned on again, it only processes new events that are generated after the flow is turned on.

## What regions and languages does Power Automate support?

Power Automate is available in 42 languages and [six regions](#). To see the languages that are available:

1. Sign into the [Power Platform admin center > Environments](#)<sup>↗</sup>
2. Select your environment
3. Select **Settings** on the top menu bar.
4. Select **Product > Languages**

## How does Power Automate compare to SharePoint Designer 2013?

Power Automate is the successor to SharePoint Designer for many common business scenarios such as approvals, document review, and onboarding/offboarding. It will be the default tool for building business automation in SharePoint moving forward.

## How does Power Automate ensure that corporate data isn't accidentally released to social media services?

Administrators can create [data loss prevention policies](#) to ensure that only sanctioned services are used in Power Automate.

# Does Power Automate support service accounts?

While you can create flows with a service account, we don't recommend doing so if the credentials for the service account are shared.

## Licensing

### Will Power Automate still have a free or trial option?

Yes. You can use our free offering, which has limited user rights, or you can sign up for a free 90-day trial of Power Automate. You can activate your subscription at any time during your trial.

### What pricing plans do you offer?

Power Automate offers both free and paid service levels. [Learn more about pricing.](#)

## Learn more

- Take a [guided learning tour](#) of Power Automate
- Learn the basics of Power Automate in the [getting started guide](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# Power Automate Glossary

Article • 06/20/2024

The following terms are commonly used in Power Automate.

## A

**Action:** An action is the task that's started when a trigger is invoked. Flows can have one or many actions, depending on what's needed to complete a particular flow. With actions, you can perform operations such as **Create, Update, Delete, or Assign**.

[Add an action](#)

**Action items:** The **Action items** screen shows the status of approvals and business process flows. Action items is located on the left navigation pane in Power Automate.

**Approvals (approval requests):** Approvals refer to the actions in approving a cloud flow. It might be a basic approve or reject action. It could be a custom approval flow where the sender can request any sign off, including multiple choice. To create an approval workflow, add an approval action. After you add this action, your flow can manage the approval of documents or processes

[Introducing the Unified Action Center](#) 

**Automated flow:** Automated flows are triggered by a predetermined event. Automated flows run when an event triggers the flow to run. For example: when a row is created, deleted, or updated in Dataverse, the flow will run if that is the trigger you chose.

[Create a cloud flow in Power Automate](#)

## B

**Business process flow:** A business process flow ensures that everyone in your company follows the same process. You'll define a set of steps for people to follow. For example, you might want to create a business process flow so everyone handles customer service requests the same way. You might require people get approval for an invoice before submitting an order.

[Business process flows overview](#)

## C



**Conditions:** Conditions tell flow to perform actions based on predetermined logic set in the flow. If certain conditions are true, then one or more tasks will be completed. For example, users can create conditions that specify that you'll get an email when a tweet that contains a keyword is retweeted at least 10 times.

[Add a condition to a cloud flow](#)

**Connectors:** Connectors allow users to connect popular services (such as Twitter, Outlook, Gmail, and more) to Microsoft Power Automate, Microsoft Power Apps, and Azure Logic Apps. They contain a set of pre-built triggers ("when a new email arrives"...) and actions ("upload email attachment to SharePoint and My App") to be used in apps and workflows.

[Connectors documentation](#)

**Custom connectors:** Custom connectors allow users to connect a web service to Power Automate. Users teach Power Automate about the characteristics of the web service which include authentication, the triggers and actions that it supports, and the parameters and outputs for each of those actions. Custom connectors must be registered before they can be shared with your organization.

[Start to build with Power Automate](#)

## D

**Data loss prevention:** Data loss prevention provides you with the ability to create and enforce policies that define which connectors can access and share business data. This is a key feature to help ensure that your business data is protected.

[Data loss prevention policies](#)

## F

**Flow checker:** Flow checker is a diagnostic tool that points to specific occurrences within the flow where improvements may be required to run a cloud flow. For each identified issue, the flow checker appears in the designer's command bar. It will show a red dot when one or more errors are identified in your flow.

[Find and fix errors with Flow Checker](#)

**Flow types:** Automated, instant, scheduled, UI flows and business process flow.

[Get started with Power Automate](#)

**Flow designer:** The flow designer is the studio where makers create flows from blank or start from a template (that they can customize or add steps to).

## I

**Instant flow:** Instant flow allows users to trigger repetitive tasks from the mobile or desktop app manually. For example, by selecting a button on a mobile app, it will send a reminder email to your team before a meeting.

[Run instant flows](#)

**Item:** As a Power Automate trigger, an item represents a row in a Microsoft SharePoint list. What it actually is depends on the user's list. For example, it can be a row in Microsoft Excel, or a table in a Microsoft Word document.

## M

**Microsoft Dataverse:** A cloud-scale database used to store data for business applications such as Power Automate and Power Apps. It's an abstraction on top of underlying Azure cloud data management services to make it easier to build business applications.

[What is Microsoft Dataverse?](#)

**Microsoft Dataverse for Teams:** A common cloud data platform for Microsoft Teams. Microsoft Dataverse for Teams enables everyone to quickly build and deploy apps and intelligent chatbots in Teams with Microsoft Power Apps and Microsoft Copilot Studio.

**Multistep flows:** A multistep flow uses more than one action to accomplish a task.

## R

**Robotic Process Automation (RPA):** Automation using a software application that replicates the actions of a human being interacting with the user interface of a computer system.

## S

**Scheduled flows:** Scheduled flows run on a schedule defined by the maker. Scheduled flows can repeat on the following cadences: every second, minute, hour, day, week,

and/or month. For example, users can schedule an automation such as daily data upload to SharePoint or a database.

### [Run flows on a schedule](#)

**Steps:** There's a button at the bottom of each step (action) labeled **+New step** in the flow designer that lets the user add another action.

## T

**Templates:** Templates are prebuilt set of triggers and actions that are designed to help users easily create flows that meet their specific business needs. Templates can be customized. There are hundreds of flow templates that cater to many types of common automation scenarios.

### [Power Automate Templates](#)

**Trigger:** A trigger is an event that starts a cloud flow. For example, if you create a cloud flow: "when an email with an attachment arrives, automatically upload the file to OneDrive" - the arrival of the email with an attachment is the trigger of such flow.

Flows can have one or more triggers.

## U

**UI Flows (RPA):** UI flows enable users to automate repetitive tasks in Windows and web applications. UI flows record and playback user interface actions (clicks, keyboard input, etc.) for applications that don't have easy-to-use or complete APIs available.

### [Introduction to UI flows](#)

## W

**Workflow:** A sequence of actions that takes a task from initiation to completion.

## Learn more

- Take a [guided learning tour](#) of Power Automate
  - Learn the basics of Power Automate in the [getting started guide](#)
-

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗

# Classic Dataverse background workflows

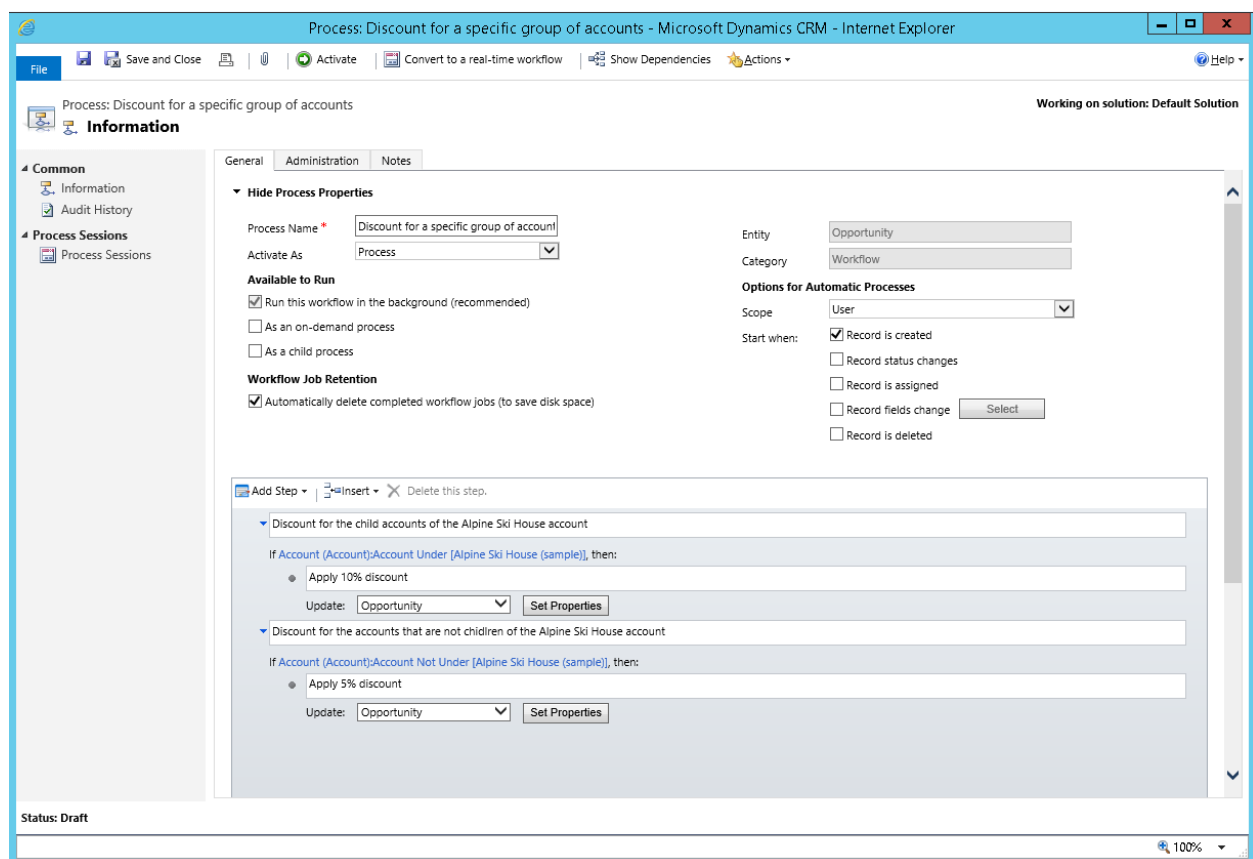
Article • 12/16/2022

Workflows automate business processes without a user interface. People usually use workflow processes to initiate automation that doesn't require any user interaction.

There are two types of workflows:

1. Real-time workflows. See the [Power Apps](#) documentation for more details about real-time workflows.
2. Background workflows.

To create background workflows, you must select the **Run this workflow in the background (recommended)** check box, as displayed in the following image.



See other topics here in the Power Automate documentation to learn more about background workflows.

## Learn more

- [Configure background workflow stages and steps.](#)
- [Monitor and manage background workflow processes](#)
- [Best practices for background workflow processes.](#)

- Replace background workflows with flows

# Configure background workflow stages and steps

Article • 12/16/2022

When you design workflows you have the option to contain the logic you want to perform in **stages** and **steps**.

**Stages** make the workflow logic easier to read, and explain the workflow logic. However, stages do not affect the logic or behavior of workflows. If a process has stages, all the steps within the process must be contained with a stage.

**Steps** are a unit of business logic within a workflow. Steps can include conditions, actions, other steps, or a combination of these elements.

## Actions that background workflow processes can perform

Background workflow processes can perform the actions listed in the following table.

Action	Description
<b>Create row</b>	Creates a new row for a table and assigns values you choose to columns.
<b>Update row</b>	You can update the row that the background workflow is running on, any of the rows linked to that row in an N:1 relationships, or any rows created by earlier steps.
<b>Assign row</b>	You can assign the row that the background workflow is running on, any of the rows linked to that row with an N:1 relationship, or any rows created by earlier steps.
<b>Send Email</b>	Sends an email. You can choose to create a new email message or use an email template configured for the table of the row that the background workflow is running on or any tables that have an N:1 relationship with the table, or the table for any rows created by earlier steps.
<b>Start Child Workflow</b>	Starts a background workflow process that has been configured as a child workflow.
<b>Change Status</b>	Changes the status of the row that the process is running on, any of the rows linked to that row with an N:1 relationship, or any rows created by earlier steps.
<b>Stop Workflow</b>	Stops the current workflow. You can set a status of either <b>Succeeded</b> or <b>Canceled</b> and specify a status message.

Action	Description
Custom Step	Developers can create custom background workflow steps that define actions. There are no custom steps available by default.

## Setting row values

When you create a row you can set values for the row. When you update a row you can set, append, increment, decrement, multiply, or clear values.

When you select **Set Properties**, a dialog box opens showing you the default form for the table.

At the bottom of the dialog box you can see a list of additional columns not present in the form.

For any column, you can set a static value and that will be set by the workflow.

On the right side of the dialog box, the **Form Assistant** gives you the ability to set or append dynamic values from the context of the current row. This includes values from related rows that can be accessed from the N:1 (many-to-one) relationships for the table.

The options available in the **Form Assistant** depend on the column you have selected in the form. When you set a dynamic value, you will see a yellow placeholder known as a 'slug' that shows where the dynamic data will be included. If you want to remove the value, just select the slug and delete it. For text columns, you can use a combination of static and dynamic data.

With dynamic values, you don't know for certain that a column or related table has the value you want to set. You can actually set a number of columns to try to set the value and sort them in order using the green arrows. If the first column doesn't have data, the second column will be tried and so on. If none of the columns has data, you can specify a default value to be used.

## Setting conditions for background workflow actions

The actions that you will apply often depend on conditions. Background workflow processes provide several ways to set conditions and create branching logic to get the results you want. You can check values of the row that the background workflow process



is running against, any of the rows linked to that row with an N:1 relationship, or values within the process itself.

<b>Condition Type</b>	<b>Description</b>
<b>Check Condition</b>	<p>A logical "if &lt;condition&gt; then" statement.</p> <p>You can check the current values for the row that the background workflow is running on, any of the rows linked to that row in an N:1 relationships, or any rows created by earlier steps. Based on these values you can define additional steps when the condition is true.</p> <p>In the "if &lt;condition&gt; then" statement, you can use the following operators: <b>Equals, Does Not Equal, Contains Data, Does Not Contain Data, Under and Not Under.</b></p> <p><b>Note:</b> The <b>Under</b> and <b>Not Under</b> are hierarchical operators. They can only be used on the tables that have a hierarchical relationship defined. If you're trying to use these operators on the tables that don't have the hierarchical relationship defined, you'll see the error message: "You're using a hierarchical operator on a table that doesn't have a hierarchical relationship defined. Either make the table hierarchical (by marking a relationship as hierarchical) or use a different operator."</p> <p>For more information about hierarchical relationships, see <a href="#">Define and query hierarchically related data</a>. A screenshot that follows the table is an example of the definition of the background workflow process that uses the <b>Under</b> and <b>Not Under</b> hierarchical operators.</p>
<b>Conditional Branch</b>	<p>A logical "else-if-then" statement. The editor uses the text "Otherwise, if &lt;condition&gt; then:"</p> <p>Select a check condition you have previously defined and you can add a conditional branch to define additional steps when the check condition returns false.</p>
<b>Default Action</b>	<p>A logical "else" statement. The editor uses the text "Otherwise:"</p> <p>Select a check condition, conditional branch, wait condition, or parallel wait branch that you have previously defined and you can use a default action to define steps for all cases that do not match the criteria defined in condition or branch elements.</p>
<b>Wait Condition</b>	<p>Enables a background workflow to pause itself until the criteria defined by the condition have been met. The background workflow starts again automatically when the criteria in the wait condition have been met.</p>

Condition Type	Description
Parallel Wait Branch	Defines an alternative wait condition for a background workflow with a corresponding set of additional steps that are performed only when the initial criterion is met. You can use parallel wait branches to create time limits in your background workflow logic. They help prevent the background workflow from waiting indefinitely until the criteria defined in a wait condition have been met.
Custom Step	Developers can create custom background workflow steps that define conditions. There are no custom steps available by default.

The following screenshot contains an example of the background workflow process definition with the **Under** and **Not Under** hierarchical operators. In our example, we apply two different discounts to two groups of accounts. In **Add Step**, we selected the **Check Condition** to specify the **if-then** condition containing the **Under** or **Not Under** operators. The first **if-then** condition applies to all accounts that are **Under** the Alpine Ski House account. These accounts receive a 10 percent discount on purchased goods and services. The second **if-then** condition applies to all accounts that are **Not Under** the Alpine Ski House account and they receive a 5 percent discount. Then, we selected **Update row** to define the action to be performed based on the condition.

The screenshot shows the 'Process: Discount for a specific group of accounts' configuration window in Microsoft Dynamics CRM. The process is named 'Discount for a specific group of account' and is set to run in the background. It is configured to run on 'Opportunity' records. The workflow includes two conditional steps:

- Step 1:** 'Discount for the child accounts of the Alpine Ski House account'. Condition: 'If Account (Account):Account Under [Alpine Ski House (sample)], then:'. Action: 'Apply 10% discount'. Update: 'Opportunity'.
- Step 2:** 'Discount for the accounts that are not children of the Alpine Ski House account'. Condition: 'If Account (Account):Account Not Under [Alpine Ski House (sample)], then:'. Action: 'Apply 5% discount'. Update: 'Opportunity'.

The interface also shows options for automatic processes, such as 'Record is created', 'Record status changes', 'Record is assigned', 'Record fields change', and 'Record is deleted'. The status of the process is 'Draft'.

## Next steps

Create custom business logic through processes

Workflow processes overview

Monitor and manage background workflow processes

Best practices for background workflow processes

# Monitor and manage background workflow processes

Article • 12/16/2022

To monitor and manage processes, you must locate the process, evaluate the status, and perform any actions necessary to address problems.

## Monitoring background workflows

Background workflows generate System Job rows to track their status. You can access information about these system jobs in several places within the application:

- [Settings](#) > **System Jobs**

This will include all types of system jobs. You will need to filter rows to those where **System Job Type** is **Workflow**.

- **From the background workflow process**

Open the background workflow definition and go to the **Process Session** tab. This will show only the system jobs for this background workflow.

- **From the row**

You can edit the table form so that the navigation will include the **Background Processes** relationship. This will show all the system jobs that have been started in the context of the row.

### ⓘ Note

If an asynchronous system job (workflow) fails several times consecutively, the system starts to postpone execution of that job for longer and longer time intervals so that the administrator or app maker can investigate and resolve the issue. Once the job starts succeeding again, it will resume executing normally.

## Actions on running background workflows

While a background workflow is running, you have options to **Cancel**, **Pause**, or **Postpone** the workflow. If you have previously paused a workflow, you can **Resume** it.

# Status of background workflow processes

When you view a list of background workflow processes, any individual process can have one of the following **State** and **Status Reason** values:

<b>State</b>	<b>Status Reason</b>
Ready	Waiting for Resources
Suspended	Waiting
Locked	In Progress
	Pausing
	Canceling
Completed	Succeeded
	Failed
	Canceled

## Deleting process log rows

If your organization uses background workflows or business process flows that run frequently, the amount of process log rows can become large enough to cause performance issues as well as consume significant amounts of storage. To delete process log rows not removed sufficiently by one of the standard bulk row deletion jobs, you can use the bulk delete system jobs feature to create a custom bulk row deletion job.

1. Go to **Settings > Data Management > Bulk Row Deletion**.
2. From the **Bulk Row Deletion** area, select **New**.
3. On the **Bulk Deletion Wizard** start page, select **Next**.
4. In the **Look for** list, select **System Jobs**.
5. The following conditions are used to create a bulk row deletion job to delete process log rows:
  - **System Job Type Equals Workflow**. This targets background workflow rows.
  - **Status Equals Completed**. Only completed workflows are valid to run the job against.
  - **Status Reason Equals Succeeded**. Delete successful, canceled, and failed jobs.

- **Completed On Older than X Days 30.** Use the Completed On column to only delete background workflow process log rows that are older than 30 days.

**Define Search Criteria** Help

Select search criteria to identify records to delete.

Look for: System Jobs Use Saved View: [new]

Clear | Group AND | Group OR

System Job Type	Equals	Workflow
Status	Equals	Completed
Status Reason	Equals	Succeeded;Canceled;Failed
Completed On	Older Than X Days	30

Preview Records

Back Next Cancel

6. Select **Next**.

7. Set the frequency that your bulk delete job will run. You can schedule your job to run at set intervals or create a one-time bulk deletion job [Using the Immediately option](#). In this example, a recurring job is set to run on May 21, 2018, and every 30 days thereafter.

**Select Options** Help

Specify the name of the bulk deletion system job, and scheduling and notification options.

**Name:**

**Bulk deletion job start time:**

Immediately

At scheduled time:

Run this job after every:  
 days

Send an email to me (No email address found) when this job is finished.  
 Also notify:

## Using the Immediately option

Notice that you have the option of performing an immediate synchronous bulk delete of the rows by selecting the **Immediately** option. This delete is performed with direct SQL Server execution rather than passing each row through the delete event pipeline, which can reduce the impact to system performance. This is a good option if you want to quickly clean up the extra background workflow rows instead of the bulk delete job waiting in the asynchronous queue for processing.

The **Immediately** option is enabled when the following conditions are true:

- Bulk delete job is for the System Jobs table.
- The search criteria has the condition System Job Type Equals Workflow.
- The user creating the bulk delete job has global depth for the delete privilege on the AsyncOperation table. The System Administrator security role has this privilege.

The synchronous bulk delete will only delete AsyncOperation rows in the completed state. A maximum of 1 million rows are processed for each invocation. You will need to execute the job multiple times if your environment has more than 1 million rows to remove.

## Troubleshoot issues

## Workflow run failure after change in owner

When a workflow owner user is deactivated, no longer has permissions to run workflows, or is changed by an administrator, runs that were previously started and are still in **Waiting** state will fail to run as they belong to the previous owner. In this situation, it is recommended to **Cancel** the waiting runs that belong to the previous owner. If you have runs that cannot be cancelled and need to be updated to the new owner, (contact support)[/power-platform/admin/get-help-support] for assistance.

## Next step

[Best practices for background workflow processes](#)



# Best practices for background workflow processes

Article • 12/16/2022

This topic contains best practices for creating and managing background workflow processes.

## Avoid infinite loops

It's possible to create logic in a background workflow that initiates an infinite loop, which consumes server resources and affects performance. The typical situation where an infinite loop might occur is if you have a background workflow configured to start when a column is updated and then updates that column in the logic of the workflow. The update action triggers the same background workflow that updates the row and triggers the background workflow again and again.

The workflows you create include logic to detect and stop infinite loops. If a background workflow process is run more than a certain number of times on a specific row in a short period of time, the process fails with the following error: **This workflow job was canceled because the workflow that started it included an infinite loop. Correct the workflow logic and try again.** The limit of times is 16.

## Use background workflow templates

If you have workflows that are similar and you anticipate creating more workflows that follow the same pattern, save your background workflow as a workflow template. This way, the next time you need to create a similar workflow, use the template to create the background workflow and avoid entering all the conditions and actions from scratch.

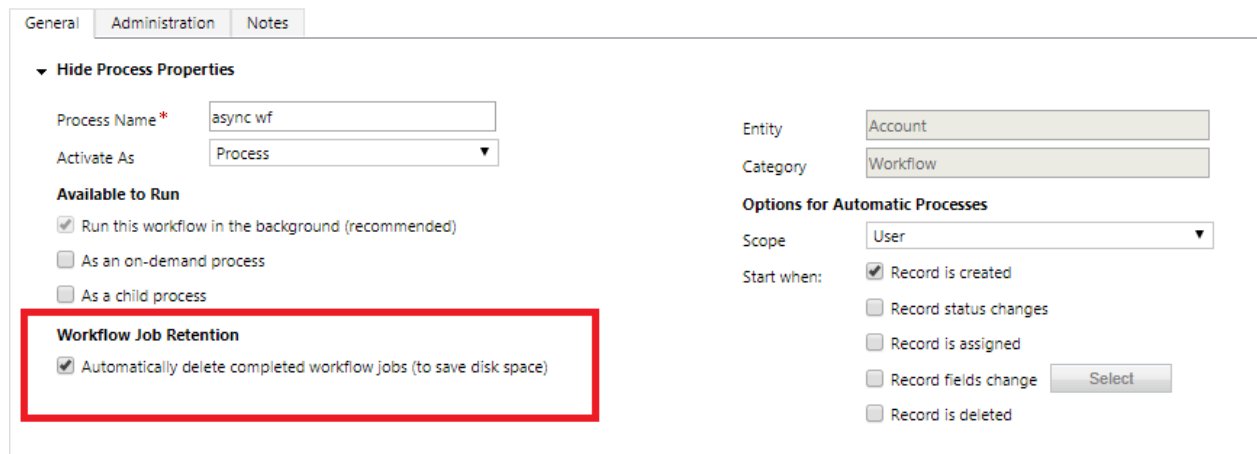
In the **Create Process** dialog box, choose **New process from an existing template (select from list)**.

## Use child workflows

If you apply the same logic in different workflows or in conditional branches, define that logic as a child workflow so you don't have to replicate that logic manually in each background workflow or conditional branch. This helps make your workflows easier to maintain. Instead of examining many workflows that might apply the same logic, you can just update one workflow.

# Automatically delete completed background workflow jobs

For background (asynchronous) workflows, we recommend selecting the **Automatically delete completed workflow jobs (to save disk space)** option in the background workflow definition. Selecting this check box allows the system to delete background workflow logs for successful executions to save space. Notice that logs from failed background workflow executions will always be saved for troubleshooting.



The screenshot shows a configuration interface for a workflow. It has three tabs: 'General', 'Administration', and 'Notes'. Under 'Hide Process Properties', there are fields for 'Process Name' (set to 'async wf') and 'Activate As' (set to 'Process'). Below that, under 'Available to Run', there are three radio buttons: 'Run this workflow in the background (recommended)' (checked), 'As an on-demand process', and 'As a child process'. A red box highlights the 'Workflow Job Retention' section, which contains a checked radio button for 'Automatically delete completed workflow jobs (to save disk space)'. To the right, there are fields for 'Entity' (Account) and 'Category' (Workflow). Below that, under 'Options for Automatic Processes', there is a 'Scope' dropdown (set to 'User') and a 'Start when:' section with several checked options: 'Record is created', 'Record status changes', 'Record is assigned', 'Record fields change', and 'Record is deleted'. A 'Select' button is next to the 'Record fields change' option.

## Limit the number of workflows that update the same table

Running more than one background workflow that updates the same table can cause resource lock issues. Imagine several workflows running where every opportunity update triggers an update to the associated account. Multiple instances of these workflows running and attempting to update the same account row at the same time can result in resource locking issues. Background workflow failures occur and an error message, such as **SQL Timeout: Cannot obtain lock on resource *resource name***, is recorded.

## Use Notes to keep track of changes

When you edit workflows you should use the Notes tab and type what you did and why. This allows others to understand the changes you made.

## Next steps

[Configure background workflow processes](#)

[Monitor and manage background workflow processes](#)

# Replace classic Microsoft Dataverse workflows with flows

Article • 02/09/2023

This topic compares Power Automate capabilities with classic workflow.

Power Automate has significant advantages over the classic background workflow model; you should consider using Power Automate to automate your processes instead of classic workflow.

Create flows instead of classic Microsoft Dataverse workflows to build new automation processes. Additionally, you should review your existing classic background workflow processes and consider replacing them with flows.

## Feature capability comparison

This table summarizes a comparison between Power Automate and classic workflows capabilities.

*We are continuously adding new capabilities to Power Automate. We'll update information in this table as Power Automate gains capabilities; check back often! For information about upcoming capabilities that will help you replace classic background workflows with flows, see [What's new and planned for Power Automate](#).*

Capability		Power Automate	Classic Workflow
Modeling	Conditional branching	Yes	Yes
	Looping	Yes	No
	Wait conditions on columns	No	Yes
	Parallel branch	Yes	No
	Out-of-the-box connectors to external systems (trigger and perform actions in external services)	Yes	No
Composition	Dynamic content	Yes	Yes
	Access to pre-image of event data	No	Yes
	Run child workflows	Yes	Yes
	Run Microsoft Dataverse actions (including custom)	Yes	Yes

	Run custom background workflow activities	No	Yes
	Group steps to run in a transaction	Yes (changesets)	No
	Approval workflows	Yes	No
Execution	Trigger on column changes	Yes	Yes
	Trigger conditionally on column values (For example, on a certain date in a date column)	No	No
	Trigger on multiple Dataverse table events	Yes	Yes
	Run on-demand	Yes	Yes
	Run-as scopes (for example, organization, business unit, user)	Yes	Yes
	Run on a schedule	Yes	No
	Run synchronously (real-time)	No	Yes
History	Auditing	Yes	Yes
	Run analytics	Yes	No
Authoring and portability	Solution support	Yes	Yes
	Modern designer	Yes	No
	AI-assisted authoring	Yes	No

## Example scenario: Replace a background workflow with a cloud flow

Imagine a sales scenario where you have put together a quotation for a customer and now you need to request approval from your management team before you send the quotation to the customer. With classic workflows, this isn't easy and most solutions to this require a developer to write custom background workflow activities to retrieve quote line items.

With flows, this scenario is easier to build, as demonstrated in the walkthrough later that covers some of the Power Automate capabilities. These capabilities include:

- Creating a cloud flow that runs on demand.
- Getting a list of rows that are related to a Dataverse table.
- Looping over a list of rows.

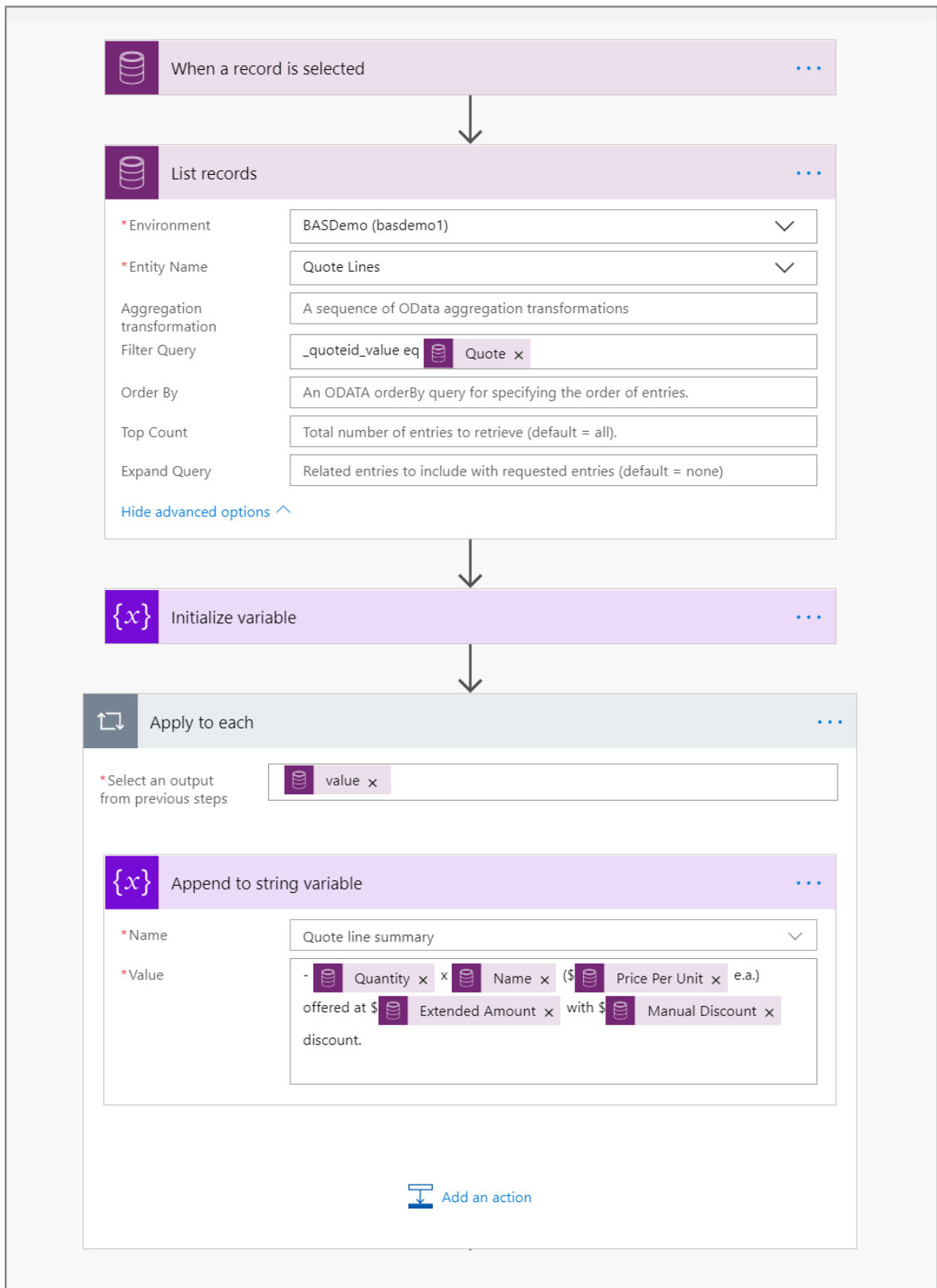
- Sending approval requests.

To allow the sales person to trigger the approval request on demand:

1. Sign in to [Power Automate](#) and [create a cloud flow in a solution](#).
2. From the list of triggers, select **Microsoft Dataverse – When a row is selected**, and then select **Quotes** as the table.

This trigger allows a cloud flow to run on-demand on a row or set of rows.

3. With the trigger configured, add actions to run in the flow. This provides the approver with the summary detail that they need to identify the quoted items and values. Begin by adding the **Microsoft Dataverse – List rows** action. The goal is to get the individual items from a Quote, so set the **Table name** to **Quote lines**. To ensure the list contains only those quote line items that belong to the Quote for which the flow was triggered, we'll specify an OData style filter criterion. In the **Filter Query** box, type *\_quoteid\_value eq* and then select **Quote** from the list of dynamic values that appear.
4. Because we want to summarize quote line items for the approval, add the **Initialize variable** action. Set **Name** to **Quote line summary**, and **Type** to **String** (from the drop-down list), and leave **Value** empty.
5. Add the **Append to string variable** action and then select the **Quote line summary** variable we created earlier. In the **Value** box, select **Quantity**, **Name**, **Price Per Unit**, **Extended amount**, and **Manual discount** from the list of dynamic values. The Power Automate designer identifies that these values are from a list of quote line items, and adds this action in an **Apply to each** loop to ensure information from each line item is added to this summary.



6. To request approval on the quote summary we've created, add the **Approval – Start and wait for an approval** action. Select an **Approval type** (for example, **Approve/Reject – First to respond**), give the approval request a **Title** (for example, the name of the quote for which approval is being requested, picked from the list of dynamic values), and enter the email address for the person who needs to review and approve the quote in the **Assigned to** box. In the **Details** box, add the **Quote line summary** variable, along with any other information that might be relevant using the dynamic value picker (for example, **Total Amount**).

7. To determine what happens once an approval is accepted or rejected, add the **Condition** action. Select **Outcome** from the list of dynamic values from the first field in the condition, **contains** from the drop-down list in the second field, and enter **Approve** in the third field of the condition. Finally, add actions based on the outcome of the approval (for example, send a notification email).

The screenshot displays a workflow editor interface. At the top, a 'Start and wait for an approval' step is configured with the following details:

- Approval type: Approve/Reject - First to respond
- Title: Quote for [Name] requires approval
- Assigned to: administrator@BASDemo.onmicrosoft.com
- Details: Here's a summary of the quote: [Quote line summary], Total: \$ [Total Amount]
- Item link: Add a link to the item to approve
- Item link description: Describe the link to the item

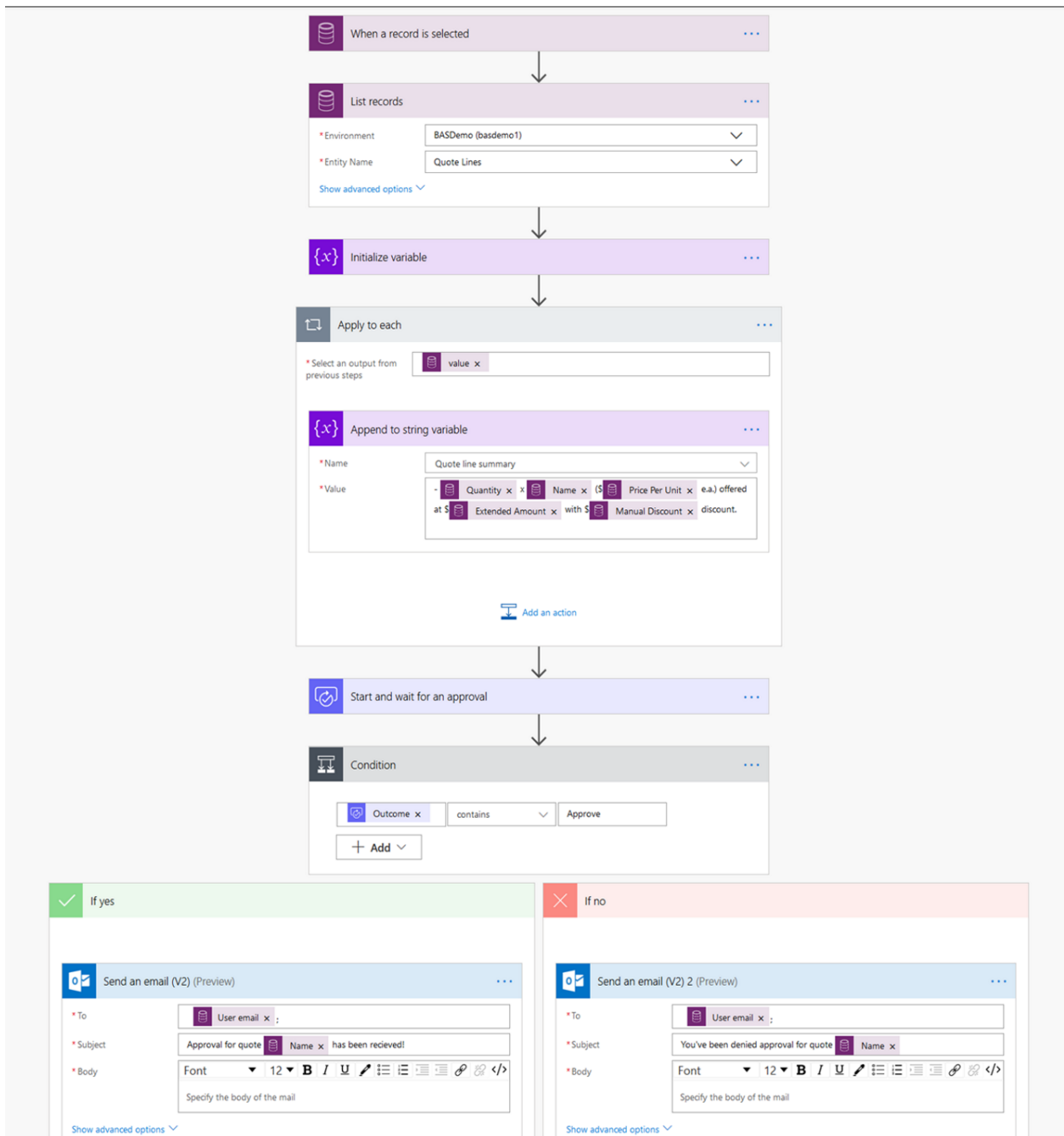
Below the approval step is a 'Condition' step configured as follows:

- Field: Outcome
- Operator: contains
- Value: Approve

The workflow then branches into two conditional paths:

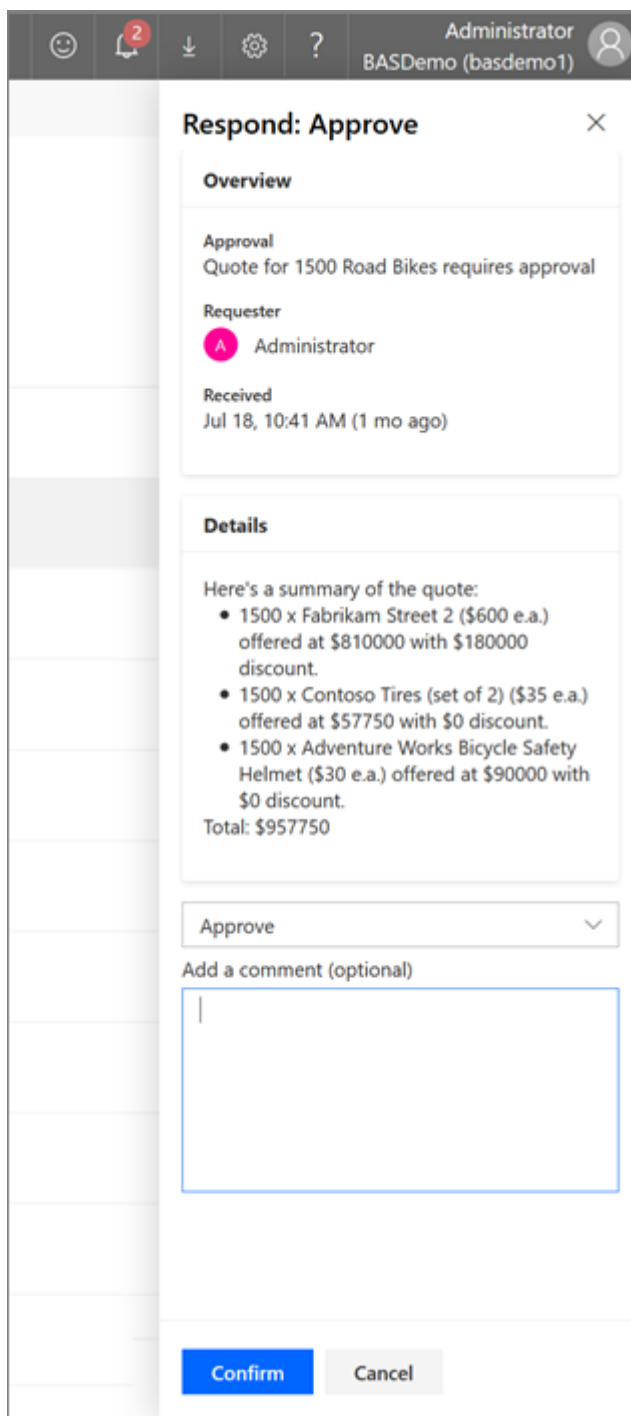
- If yes:** A 'Send an email (V2) (Preview)' action with:
  - To: User email
  - Subject: Approval for quote [Name] has been recieved!
  - Body: Specify the body of the mail
- If no:** A 'Send an email (V2) 2 (Preview)' action with:
  - To: User email
  - Subject: You've been denied approval for quote [Name]
  - Body: Specify the body of the mail

We now have the approval structure created so the approver has all of the information needed to make a decision on next steps. Here's the full example:



When you run this flow against your quote, it summarizes quote line items for that quote and sends an approval request that the approver can respond to from Power Automate, or the actionable email they receive. Here's an example of the display:





## Recommended patterns

- Workflows with complex else-if conditional logic

Instead of using conditions, we recommend using the [switch action](#).

- Workflows that run from plug-in/code

We recommend redesigning the flow to start with triggers:

- Use Microsoft Dataverse triggers to run flows based on events in it.

- To run flows based on events in an external service, leverage more than 260 out-of-the-box connectors.
- For scenarios where a connector you need isn't available out-of-the-box, easily create your own custom connector. More information: [Create a custom connector from scratch](#)
- Finally, if there are scenarios where you can't trigger your flow using one of the prebuilt connectors or by creating a custom connector, use the [When an HTTP request is received trigger](#) to invoke the flow.
- **Workflows that run recursively**

Use the [do-until](#) or [apply to each](#) loop in flows instead.
- **Workflows that need a list of rows**

Use the **list rows** action. When using this action, define the row filtering criteria using OData syntax to optimize the action by minimizing the number of rows you want to retrieve.
- **Workflows that sleep to run on a schedule**

Use the **recurrence** trigger to run business logic at periodic intervals.
- **Workflows for which runs were managed to ensure activities were executed in a single transaction**

Use the [changeset action](#) to ensure that all actions within it are performed as a single, atomic unit in which either all succeed, or fail as a group. If any one of the actions in a change set fails, changes made by completed operations are rolled back.
- **Monitor background workflow runs for failures**

In Power Automate, use the **run-after setting** on an action to configure it to run when the previous action fails. For example, send a Power Automate mobile notification when the **update a row** action fails, or times out.

## FAQs

- **I have a Dynamics 365 license. Can I use Power Automate?**

Every Dynamics 365 user is entitled to use Power Automate. [Review our licensing information.](#) ↗

- **How often can my flows be triggered?**

Dynamics 365 (or Microsoft Dataverse) flows run near real-time after the trigger because they use webhooks (no polling required).

- As with direct API access, there are throttles/limits in the system. More information: [Limits and configuration in Power Automate](#)
- Specifically, there is a limit of 100,000 actions per 5 minutes, per flow. A single loop in a cloud flow cannot process more than 100,000 items at once.
- Maximum of 6 GB of throughput per 5 minutes.

- **How long can a single flow run?**

A single flow run times out after 30 days.

- **How do I move my flows between environments?**

Just like classic workflows, you can create flows in solutions to support the full application lifecycle for processes.

- **Are Power Automate dependencies tracked in Microsoft Dataverse?**

Similar to other components in a solution, all dependencies for flows in solutions are tracked in Microsoft Dataverse.

- **What about synchronous workflows?**

We've seen feedback that synchronous workflows are a significant contributor to end-user performance issues. We recommend that you evaluate whether your objective, or parts of the background workflow, can be built using a cloud flow. If you can split actions out as asynchronous, the user can continue their activity while Power Automate completes the action.

- **Using Power Automate, will my data stay within region (that is, the same region as my Dynamics 365 or Microsoft Dataverse environment)?**

Yes, Power Automate always uses the same region as Microsoft Dataverse.

- **Do I need to make proxy/firewall changes?**

Refer to the [IP address configuration reference](#) to determine whether you need to make any proxy/firewall changes.

# Create a mobile task flow

Article • 12/16/2022

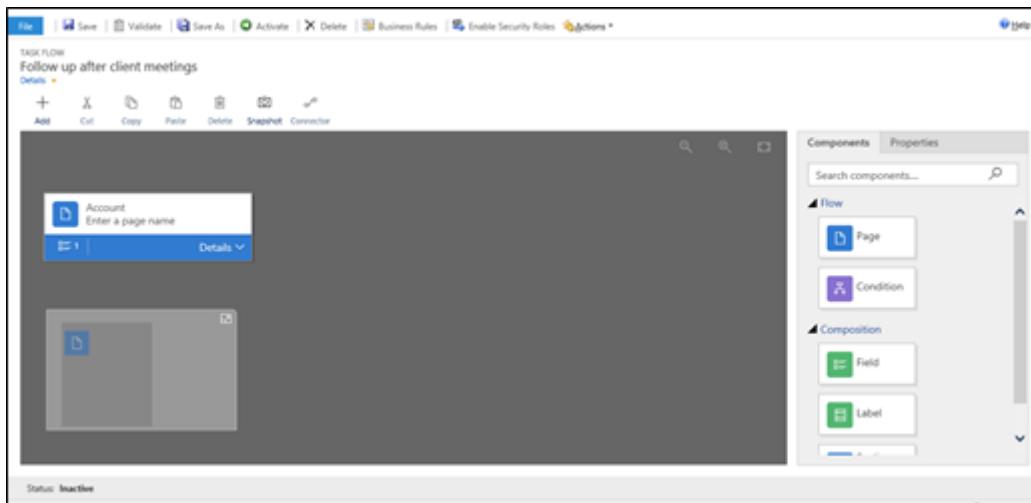
Design a cloud flow in Dynamics 365 for phones or Dynamics 365 for tablets based on common tasks your users perform. For example, if they need to regularly perform a series of follow-up steps after client meetings, create a task flow. When users tap the new task in their mobile app, it will lead them through from start to finish so they don't forget an important step.

Task flows can use multi-table forms and logic, and can have form logic that runs across the task flow pages.

## Create a task flow

1. Make sure that you have the System Administrator, or System Customizer security role or equivalent permissions. The Manager, Vice President, or CEO-Business Manager, security roles can also create mobile task flows.
2. Open [solution explorer](#) and select **Processes**.
3. On the **Actions** toolbar, select **New**.
4. In the **Create Process** dialog box, complete the required fields:
  - Enter a process name.
  - In the **Category** list, select **Business Process Flow**.
  - In the **Table** list, select the table you want.
5. Select the **Run process as a task flow (Mobile online)** option.
6. Select **OK**.

The task flow designer opens in a new window.



7. If your users will progress from one page to another in order, drag the **Page** component from the **Components** tab on the right side of the screen and drop it on the + sign in the appropriate spot. To add a name for a page, select the page, select the **Properties** tab, type a new name, and then select **Apply**.
8. To add a branch to the task flow, drag the **Condition** component from the **Components** tab and drop it on the + sign in the appropriate spot. To set properties for the condition, select the condition, set the properties in the **Properties** tab, and then select **Apply**.

#### ⓘ Note

As you add pages and conditions to the task flow, you'll see a minimap in the lower-left corner of the window that shows all the pages and conditions in the task flow.

9. To add a field, label, or section label to a page, drag **Field**, **Label**, or **Section Label** from the **Components** tab to the appropriate page. To change the properties for one of these items, select the item, set the properties in the **Properties** tab, and then select **Apply**.
10. To validate the task flow, select **Validate** on the action bar.
11. To save the process as a draft, select **Save** at the top of the screen. (As long as a process is a draft, people won't be able to use it.)
12. To activate the task flow so that people can use it, select **Activate**.

#### 💡 Tip

Here are a few tips to keep in mind as you work on your task flow in the designer window:

- To take a snapshot of everything in the task flow window, select **Snapshot** on the action bar.
- To connect a valid component to another valid component in the designer, select **Connector** on the action bar.
- You can make the images on the screen larger or smaller by selecting the **Increase the zoom level** or **Decrease the zoom level** buttons in the upper-right corner of the screen. Select the **Fit to canvas** button to blow the images up to the largest size that fits on the screen.

## Next steps

[Create a business process flow](#)

# Use Dataverse dialogs for guided processes (Deprecated)

Article • 12/16/2022

[Dialogs are deprecated](#). You should replace dialogs with business process flows or canvas apps. More information: [Replace dialogs with business process flows or canvas apps](#)

Dialogs are the synchronous or interactive processes in Dataverse that collect and process information by using step-by-step scripts to direct users through a process. For example, you can create dialogs to act as a guide for your service representatives for case resolution and case escalation. Similarly, you can create dialogs for standardizing sales processes such as opportunity qualification and lead scoring.

## Differences between workflows and dialogs

The following table provides information about the differences between Dataverse workflows and dialogs.

<b>Workflows</b>	<b>Dialogs</b>
Can be either started by a user or can be automated.	Must be started by a user.
Are asynchronous or real-time processes, and do not require user input to run to completion. Asynchronous processes run in the background while real-time processes run immediately.	Are real-time processes that require user input to run to completion. When you run these processes, a wizard-like interface is presented to you so you can make appropriate selections to run the processes.
The table that stores the details about a running asynchronous workflow is <code>AsyncOperation</code> while a <code>Process</code> is used for a real-time workflow.	The table that stores information generated by a running dialog is the <code>ProcessSession</code> table.
Triggers are supported for workflows. For a list of supported triggers, see <a href="#">Supported Types, Triggers, and Tables for Processes</a> .	Triggers are not supported for dialogs.

## See also

[Replace dialogs with business process flows or canvas apps](#)

# Replace dialogs with business process flows or canvas apps

Article • 12/16/2022

[Dialogs are deprecated](#), and should be replaced by business process flows or canvas apps. This article describes different capabilities of these options. You'll also learn about situations where a business process flow or canvas app embedded in a model-driven form can be used to replace an existing dialog.

## Feature capability comparison

This table lists the set of dialog capabilities and the equivalent capabilities in business process flows and canvas apps.

<b>Dialog capability</b>	<b>Capability in business process flows?</b>	<b>Capability in canvas apps?</b>
Page	Yes (business process stage)	Yes (app screen)
Prompt only	No	Yes (labels)
Prompt and response	Yes (table columns only)	Yes (labels and input fields)
Input arguments	Limited (steps in business process stage)	Yes (query string parameters)
Variables	No	Yes
Query variables	No	Yes
Conditional branching logic	Yes	Yes (navigate to any screen within app)
Reuse (launch as a child dialog)	No	Yes (navigate to any screen within app, launch a different app in a new window)
Run workflows on start/end	Yes	No (use a cloud flow instead)



<b>Dialog capability</b>	<b>Capability in business process flows?</b>	<b>Capability in canvas apps?</b>
Run workflows on input	Yes	No (use a cloud flow instead)
Run workflows on page transition	Yes	No (use a cloud flow instead)
Start using a URL	No	Yes
Session logging	Yes	No
SDK support	Yes	Yes

## Additional capabilities with business process flows

- Process analytics (views, charts, and time spent in a stage)
- Custom controls

## Additional capabilities with canvas apps

- App analytics (app usage & performance)
- Multi-table page composition
- Run flows
- Data connectors (standard and custom)
- Launch as a stand-alone app
- Configurable layout

## Choosing between a business process flow or canvas app

When you choose your dialog replacement, it is important to account for the user experience you want to deliver. Also keep in mind, almost any dialog can be modeled using a canvas app.

Business process flows are best suited to replace dialogs that model processes providing guidance across an overarching workstream that requires collaboration across groups of individuals and Dynamics 365 app context. For example, quote review and routing.

Alternatively, canvas apps can be used to replace dialogs that model prescriptive tasks such as a call script for lead prospecting or to simplify the user experience for other

tasks, such as updating an opportunity. Notice that these scenarios may even benefit from having a stand-alone canvas app.

## Dialog replacement using business process flow scenario

Imagine you have a dialog that, over a series of pages, requests key pieces of information from the user, generates a quote, sends an email to reviewers to accept or reject the quote, before emailing it to the customer. This type of process is modeled more effectively using a business process flow.

To replace the dialog, you begin by identifying the key stages in the process. These might include a *Prepare Content* stage to ensure all the products are listed and discounts are applied, a *Generate Quote* stage to create the quote and review it for accuracy of format, a *Primary Review* stage to send the quote for review and approval, a *Secondary Review* stage to review the quote under certain circumstances and finally, a *Deliver Quote* stage to send the quote to the customer.

Next, identify the key steps that users must follow in the process. For instance, the *Prepare Content* stage might contain a simple true or false step for the user to double check the products to be quoted, a mandatory lookup step to select a price list, and a numeric step to enter a discount before moving on to the next stage. The *Generate Quote* stage might have an [action step](#) to create a quote based on all the information previously captured in the *Prepare Content* stage and its related Dynamics 365 row. The *Primary Review* and *Secondary Review* stages might have several true or false steps to guide quote review, along with a required step to capture the approval status, and ensure the process can only be moved to the next stage once approval is received. Configure [column level security](#) on this step to make sure that only authorized reviewers can provide approval on the quote. Additionally, one can add a workflow to the *Primary Review* and *Secondary Review* stages, such that on enter, an email notification is sent to all reviewers.

Finally, configure your business process flow stages and steps, along with the conditional logic to guide the process flow. For this example, you might add a [conditional branch](#) following the *Primary Review* stage, such that, if a step indicates the need for a second level of review, the next stage in the process is the *Secondary Review* stage, else, it's the *Deliver Quote* stage.

To make this business process flow available to users, ensure the right users have privileges to the business process flow and then activate it.

For more information about how to create a business process flow, see [Tutorial: Create a business process flow to standardize processes](#).

## Dialog replacement using canvas app scenario

Suppose you have a dialog, which follows a call script that guides sales reps through cold calling leads. This process can easily be captured using a canvas app.

Begin with connecting to the data sources you'll need to read and write data. In this example, a [connection to Dynamics 365](#) is used for lead, account, and contact information.

Begin by identifying the number of screens needed. For this example, you may decide to have five screens.

- Screen 1. To select a lead from a list to call.
- Screen 2. For introductions, checking availability for a conversation, and scheduling a call-back at a later date.
- Screen 3. For determining BANT (budget, authority, need, and timeline).
- Screen 4. To capture next steps and schedule follow-up calls.
- Screen 5. Thank the lead for their time at the end of the call.

Next, build each screen. In the first screen, [build a gallery](#) of leads that need to be called. In the second, use labels to title the screen and provide the call script, while using controls like radio buttons to capture whether it is a good time for the person to talk. If it is, use conditional logic to enable a button to navigate to the next screen and if not, reveal a script on the same screen to attempt to schedule a call back with the customer. Similarly, define your call script across subsequent screens.

Finally, [define navigation across screens](#). In this example, in addition to navigating through the screens sequentially, you might want to navigate the user from the second screen to the last screen (the end of the script thanking the lead for their time) if the lead is not interested in having a conversation.

To make this app available to users, publish the app. Consider how such a scenario might be transformed through the availability of a standalone app that provides call scripts and supports quick data entry.

Imagine you want to embed this experience in Dynamics 365 Sales. To do this, begin with creating an iframe on a Dynamics 365 Sales form. Next, navigate to the **Apps** section from the Power Apps menu, select the app you just published, copy the web link under the **Details** tab and paste it as the URL for the iframe.

Taking this a step further, suppose you'd like for this app to be available right within the lead main form, and be in the context of the lead so that the app doesn't require the user to select a lead in the first screen. To pass relevant information to the app, you simply modify the iframe URL to append a query string containing this information, such as lead or account Ids, using JavaScript that runs on a certain event, such as on form load. Next, update the app to remove the first screen (for lead selection) and instead access the values passed to the app via the query string using the [Param function](#).

## Dialog replacement FAQ

Are dependencies on canvas apps be tracked?

- Dependencies on canvas apps are tracked in the same way as dependencies in Dynamics 365 apps.

Can I launch a canvas app as a popup from a button in the command bar?

- Yes. To do this, simply set the target URL to that of your canvas app, obtained from the app's **Details** section as described earlier.

Can workflows be called from a canvas app?

- This isn't supported. We recommend using a cloud flow instead.

Can I automatically convert dialogs to business process flows or canvas apps?

- There is no automated way to convert dialogs to business process flows or canvas apps.

## See also

- [Tutorial: Create a business process flow to standardize processes](#)
- [What are canvas apps in Power Apps?](#)

# Learning catalog for Power Automate

Article • 02/16/2022

Find the right online training, in person workshops, and events for your role as a user of Power Apps.

## Business and Technical Decision Makers

Do you decide whether to invest in new technologies?

[Business and Technical Decision Makers Learning Catalog](#)

## App Makers

Are you interested in quickly creating custom business apps without writing code?

[App Maker Learning Catalog](#)

[Get Started](#)

[Create Flows](#)

[Process advisor](#)

[Exam](#)

## Developers

Do you need to write code to integrate with other data sources, extend core system functionality, or build a complex application?

[Developer Learning Catalog](#)

## Administrators

Do you need to keep systems and data flowing, provisioned, and secure round-the-clock?

[Administrators Learning Catalog](#)

## Partner Sales and Marketing

Are you responsible for helping your customers buy the right solution?

[Partner Sales and Marketing Learning Catalog](#)

## Functional Application Consultants

Are you an implementation expert for a business domain?

[Functional Application Consultant Learning Catalog](#)

[Get started](#)

[Create Flows](#)

[Process advisor](#)

[Administer](#)

# App Maker Learning Catalog

Article • 07/18/2023

Are you interested in quickly creating custom business apps without writing code?

The following catalog is organized from core knowledge to specific domains, and from most basic to most advanced. If content exists in multiple formats, we'll let you know, so that you can choose the training format that best meets your needs.

## Get started

Content	Description	Format	Length
<a href="#">Get started with Power Automate</a>	Power Automate is an online workflow service that automates actions across the most common apps and services.	Free, self-paced online learning path	58 minutes
<a href="#">Get Started with Power Automate</a>	Get Started with Power Automate	Documentation	4 minutes to read
<a href="#">Overview of Power Automate</a>	Discover how you can work less and do more. With Microsoft Power Automate, previously Microsoft Flow, you will be able to automate your repetitive daily tasks.	YouTube video	1 minutes 24 seconds

## Create Flows

Content	Description	Format	Length
<a href="#">Automate a business process using Power Automate</a>	This learning path introduces you to Power Automate, teaches you how to build workflows, and how to administer flows.	Free, self-paced online learning path	3 hours 11 minutes
<a href="#">Get started with Power Automate buttons</a>	Do you want to create button flows to solve business problems? Then, take this learning path, which introduces you to Power Automate buttons and demonstrates how to create button flows.	Free, self-paced online learning path	4 hours 30 minutes
<a href="#">Introduction to business process</a>	Do you want to create business process flows? This module will discuss what business process flows are and how to use them to solve business solutions.	Free, self-paced online	31 minutes

Content	Description	Format	Length
<a href="#">flows in Power Automate</a>	You will discover why automating the business process is important to organizations and how to build business process flow solutions by using Microsoft Power Platform and Microsoft Dataverse. Additionally, you will learn how business process flows differ from regular Power Automate workflows and when to use each.	learning path	
<a href="#">Power Automate documentation</a>	Power Automate is a service that helps you create automated workflows between your favorite apps and services to synchronize files, get notifications, collect data and more.	Website landing page	
<a href="#">Power Automate Frequently Asked Questions</a>	Power Automate Frequently Asked Questions	5 minutes to read	

## Process mining

Content	Description	Format	Length
<a href="#">Optimize your business process with process mining</a>	Power Automate's process mining capability allows you to record existing business processes and analyze them in order to increase the efficacy by tracking time to complete tasks and mapping out the various actions involved. Understanding a process is the first step to automating a solution, and the process mining capability simplifies that exercise.	Free, self-paced online learning module	24 minutes

## Exam

Content	Description	Format	Length
<a href="#">Microsoft Power Platform Fundamentals</a>	This exam measures your ability to understand the business value of Microsoft Power Platform; understand the core components of Microsoft Power Platform; demonstrate the business value of Power BI; and demonstrate the business value of Power Automate.	Exam	cost varies by region



# Administrators Learning Catalog

Article • 09/20/2022

Do you need to keep systems and data flowing, provisioned, and secure round-the-clock?

The following catalog is organized from core knowledge to specific domains, and from most basic to most advanced. If content exists in multiple formats, we'll let you know, so that you can choose the training format that best meets your needs.

## Administer

Content	Description	Format	Length
<a href="#">Use the admin center to manage environments and data policies in Power Automate</a>	Tenant and environment admins use the Power Automate admin center to manage data policies and environments for Power Automate deployments.	Free, self-paced online learning path	36 minutes
<a href="#">Use best practices to secure and govern Power Automate environments</a>	Is the Microsoft Power Platform new to your organization? Are you looking to better understand how you can improve your organization's productivity, without compromising your security posture, while enabling governance? Take this learning path, to identify best practices for securing and governing Power Automate environments. We will share tools and templates that can be used to ensure you are productive as you secure and govern the Power Platform.	Free, self-paced online learning path	4 hours 35 minutes

# Developer Learning Catalog

Article • 09/20/2022

Do you need to write code to integrate with other data sources, extend core system functionality, or build a complex application?

The following catalog is organized from core knowledge to specific domains, and from most basic to most advanced. If content exists in multiple formats, we'll let you know, so that you can choose the training format that best meets your needs.

## Extend

Content	Description	Format	Length
<a href="#">Extending the Microsoft Dataverse</a>	Create client scripting, perform common actions with client script, and automate business process flow with client script is covered in this learning path. Learn about what client script can do, rules, and maintaining scripts. Discover when to use client script as well as when not to use client script.	Free, self-paced online learning path	4 hours
<a href="#">Extending the Microsoft Power Platform user experience in Model Driven apps</a>	Getting started with extending the Microsoft Dataverse can be overwhelming. This learning path looks at the tools and resources needed for extending the Microsoft Power Platform. We'll start with looking at the SDKs, the extensibility model, and event framework. This learning path also covers when to use plug-ins. Configuration of plug-ins as well as registering and deploying plug-ins.	Free, self-paced online learning path	2 hours 3 minutes

# Functional Application Consultant Learning Catalog

Article • 07/18/2023

Are you an implementation expert for a business domain?

The following catalog is organized from core knowledge to specific domains, and from most basic to most advanced. If content exists in multiple formats, we'll let you know, so that you can choose the training format that best meets your needs.

For functional consultants, our job-task analysis research showed that everyone must understand the core content set as well as a domain area.

## Get Started

Content	Description	Format	Length
<a href="#">Get started with Power Automate</a>	Power Automate is an online workflow service that automates actions across the most common apps and services.	Free, self-paced online learning path	58 minutes
<a href="#">Get Started with Power Automate</a>	Get Started with Power Automate	Documentation	4 minutes to read
<a href="#">Overview of Power Automate</a> <a href="#">↗</a>	Discover how you can work less and do more. With Microsoft Power Automate, previously Microsoft Flow, you will be able to automate your repetitive daily tasks.	YouTube video	1 minute 24 seconds

## Create Flows

Content	Description	Format	Length
<a href="#">Get started with Power Automate buttons</a>	Do you want to create button flows to solve business problems? Then, take this learning path, which introduces you to Power Automate buttons and demonstrates how to create button flows.	Free, self-paced online learning path	4 hours 30 minutes
<a href="#">Introduction to business process</a>	Do you want to create business process flows? This module will discuss what business process flows are and how to use them to	Free, self-paced online learning path	31 minutes

Content	Description	Format	Length
<a href="#">flows in Power Automate</a>	solve business solutions. You will discover why automating the business process is important to organizations and how to build business process flow solutions by using Microsoft Power Platform and Dataverse. Additionally, you will learn how business process flows differ from regular Power Automate workflows and when to use each.		
<a href="#">Power Automate documentation</a>	Power Automate documentation. Power Automate is a service that helps you create automated workflows between your favorite apps and services to synchronize files, get notifications, collect data and more.	Website landing page	
<a href="#">Power Automate Frequently Asked Questions</a>	Power Automate Frequently Asked Questions	Documentation	5 minutes to read

## Process mining

Content	Description	Format	Length
<a href="#">Optimize your business process with process mining</a>	Power Automate's process mining capability allows you to record existing business processes and analyze them in order to increase the efficacy by tracking time to complete tasks and mapping out the various actions involved. Understanding a process is the first step to automating a solution, and the process mining capability simplifies that exercise.	Free, self-paced online learning module	24 minutes

## Administer

Content	Description	Format	Length
<a href="#">Use the Admin center to manage environments and data policies in Power Automate</a>	Tenant and environment admins use Power Automate admin center to manage data policies and environments for Power Automate deployments.	Free, self-paced online learning path	36 minutes
<a href="#">Use best practices to secure and govern Power</a>	Is Microsoft Power Platform new to your organization? Are you looking to better understand how you can improve your organization's productivity, without compromising your security	Free, self-paced online	4 hours 35 minutes

<b>Content</b>	<b>Description</b>	<b>Format</b>	<b>Length</b>
<a href="#">Automate environments</a>	posture, while enabling governance? Take this learning path, to identify best practices for securing and governing Power Automate environments. We will share tools and templates that can be used to ensure you are productive as you secure and govern Microsoft Power Platform.	learning path	

# Partner Sales and Marketing Learning Catalog

Article • 09/20/2022

Are you responsible for helping your customers buy the right solution?

The following catalog is organized from core knowledge to specific domains, and from most basic to most advanced. If content exists in multiple formats, we'll let you know, so that you can choose the training format that best meets your needs.

## Get started

Content	Description	Format	Length
<a href="#">Microsoft Power Platform Fundamentals</a>	Learn about the components of Power Platform, ways to connect data, and how organizations can leverage this technology	Instructor-led in person or online training, cost varies by region and partner	2 days

# Business and Technical Decision Makers Learning Catalog

Article • 09/20/2022

Do you decide whether to invest in new technologies?

The following catalog is organized from core knowledge to specific domains, and from most basic to most advanced. If content exists in multiple formats, we'll let you know, so that you can choose the training format that best meets your needs.

## Get started

Content	Description	Format	Length
<a href="#">Microsoft Power Platform Fundamentals</a>	Learn about the components of Power Platform, ways to connect data, and how organizations can leverage this technology	Instructor-led in person or online training, cost varies by region and partner	2 days
<a href="#">Automate a business process using Power Automate</a>	This learning path introduces you to Power Automate, teaches you how to build workflows, and how to administer flows.	Free, self-paced online learning path	3 hours 11 minutes
<a href="#">Get started with Power Automate</a>	Power Automate is an online workflow service that automates actions across the most common apps and services.	Free, self-paced online learning path	58 minutes

# Power Automate webinars

Article • 02/10/2023

Register and watch our recorded sessions on-demand.

## **Automate Your Software for Digital Transformation**

by Rob Koplowitz and Charles Lamanna

[Register and watch now](#) ↗

## **Automate Workflows with Microsoft Power Automate**

by Jon Levesque

[Register and watch now](#) ↗

## **Explore the Total Economic Impact of Microsoft Power Automate**

by Stephanie Whitaker and Jonathan Lipsitz

[Register and watch now](#) ↗

## **Real-World Examples of Microsoft Power Automate in Action**

by Jon Levesque and Matthew Weston

[Register and watch now](#) ↗

## **Coca-Cola's Journey with Robotic Process Automation in Microsoft Power Automate**

by Lokeshwar Reddy Vangala and Pranav Rastogi

[Register and watch now](#) ↗

## **Automate Time-Consuming Tasks with Robotic Process Automation**

by Stephanie Whitaker, Nicolas Pouhaer, and Yiannis Mavridis

[Register and watch now](#) ↗

## **Improve workflow efficiency with process advisor in Power Automate**

by Mrigankka Fotedar and Glendyll Fabe

[Register and watch now](#) ↗

## **Automation 101 with Power Automate**

by Amina Bouabdallah, Priya Kodukula, and Jonathan Kendall

[Register and watch now](#) ↗

## **Automate document processing with AI Builder**

by Gwenael Bego and Joe Fernandez

[Register and watch now](#) ↗

## **T-Mobile Developer Demos RPA with Power Automate**

by Brian Hodel and Pranav Rastogi



[Register and watch now](#) ↗

**Mechanics video with Xerox - migrating and growing business with Power Automate**

by Debraj Ghosh, Stefan Buffner, and Shivani Agarwal

[Register and watch now](#) ↗

**Automate Mundane Tasks with Robotic Process Automation on Windows 11**

by John Anastasopoulos and Stephanie Whitaker

[Register and watch now](#) ↗

**Automation Through Conversation with Power Automate and Power Virtual Agents**

by Jack Rowbotham and Kent Weare

[Register and watch now](#) ↗

**Increase Business Impact & Scale with an Automation Center of Excellence**

by Pranav Rastogi and Apostolis Papaioannou

[Register and watch now](#) ↗

## See also

[More Power Automate webinars](#) ↗

[Power Apps webinars](#)

# Responsible AI FAQs for Power Automate

Article • 09/08/2023

An AI system includes not only the technology, but also the people who use it, the people affected by it, and the environment in which it's deployed. Microsoft's Responsible AI FAQs are intended to help you understand how AI technology works, the choices system owners and users can make that influence system performance and behavior, and the importance of thinking about the whole system, including the technology, the people, and the environment. You can use Responsible AI FAQs to better understand specific AI systems and features that Microsoft develops.

Responsible AI FAQs are part of a broader effort to put Microsoft's AI principles into practice. To find out more, see [Microsoft AI principles](#).

## AI-driven features in this app

This app contains a growing list of AI-driven features. To learn about the capabilities and impact of specific features, select a feature name from the list.

- [Get started with Copilot in cloud flows \(preview\)](#)
- [FAQ for Copilot in cloud flows](#)
- [Copilot in Process Mining ingestion \(preview\)](#)
- [Copilot in Process Mining process analytics \(preview\)](#)
- [FAQ for Copilot in Power Automate Process Mining](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

# FAQ for Copilot in cloud flows

Article • 07/02/2024

These frequently asked questions (FAQ) describe the AI impact of Power Automate's Copilot in cloud flows (preview) feature.

## What is Copilot in cloud flows (preview)?

The copilot in cloud flows experience in Power Automate is a new way to build automation (at this time cloud flows specifically) with the help of an AI assistant—the copilot. The copilot in Power Automate stays with you in your flow building journey and helps you build, set up, and run an automation on your behalf through a chat experience. It helps answer flow and product questions, too. It takes your input and provides either documentation, links, or answers in the copilot chat pane. As an alternative, it makes changes to the flow per your natural language description.

## What are the system's capabilities?

The system is a copilot embedded in the cloud flows designer with copilot. It helps you create or edit your flow. The system can:

- Create a new flow from scratch.
- Edit an existing flow according to instructions.
- Answer questions about the current flow being edited.
- Create a description for the current flow.
- Answer general documentation questions about Power Automate.
- Filter out questions not related to Power Automate or the current flow.

The copilot also provides buttons to prompt you to save or test your flow occasionally.

## What is the system's intended use?

The system's intended use is to help you build automation easily and quickly, to start getting value out of automation as soon as possible.

## How was copilot in cloud flows (preview) evaluated? What metrics are used to measure performance?

We have a robust set of metrics we're tracking to measure the performance of the model and resulting customer experience. We track copilot's SLA to make sure it's always available to you. We track the telemetry of thumb up and thumb down gestures present in the AI copilot for each AI output where you can submit feedback.

You can provide feedback for copilot when the results are biased or inappropriate. We track this feedback to ensure that copilot is compliant, appropriate, and bias-free.

## What are the limitations of copilot in cloud flows? How can users minimize the impact of the copilot limitations when using the system?

Copilot can render flows and edit flows in a limited manner at this time. It supports only a subset of connectors available with Power Platform. Copilot also isn't equipped to help with fixing flow errors currently. You're made aware of this limitation throughout the experience. We attempt to keep you from landing in a faulty state that causes data crashes or loss, as our support is limited. We block you from using the feature when there's a possibility it might break or corrupt your data.

If you want to turn off copilot in cloud flows within your organization, ask your Power Platform admin to turn off the feature. Admins contact Microsoft support to do this.

## What operational factors and settings allow for effective and responsible use of the system?

Copilot is available only in the new designer. When editing a flow, you can choose to use the new designer or the old designer.

If you're using the new designer, all changes done by copilot should be reviewed in the designer. You can undo your changes.

## Related information

- [Get started with Copilot in cloud flows \(preview\)](#)

- [Use Copilot to analyze desktop flow activity \(preview\)](#)
  - [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)
- 

## Feedback

Was this page helpful?

 Yes

 No

[Provide product feedback](#) 

# FAQ for Copilot in automation center (preview)

Article • 05/20/2024

Copilot in automation center enables makers, business analysts, and members of the CoE team to easily retrieve information about past flow runs, work queue performance, and general Power Automate product features (referred to as generative answers) by asking questions in natural language. For example, users can ask about the number of flows that ran yesterday, which machine ran the most flows, or how many flows are currently queued. In response, Copilot generates outputs that provide insights and answers to the questions asked.

## What can Copilot in automation center do?

Copilot in automation center is able to answer questions about the following four skills:

[Expand table](#)

Index	Skill	Questions skill can answer
1	Cloud flow run logs	Cloud flow run status, trigger type, run duration, failure rate
2	Desktop flow run logs	Desktop flow run status, used machine, run mode, failure rate
3	Work queue data	Work queue items statuses, SLA attainment, processor counts
4	Documentation (generative answers)	General Power Automate feature questions such as <i>how to analyze activity with Copilot</i>

The first three skills in the above, will translate natural language queries (questions) entered by users into Microsoft Dataverse FetchXML query syntax. This allows users to easily retrieve information about their automation data by asking questions in natural language. Additionally, Copilot determines the most suitable output visualization, such as a table, pie chart, bar chart, or line chart to effectively present the insights and information to the user.

The fourth skill uses the Azure OpenAI service to search for answers in Power Automate for desktop's public documentation based on user prompts.

## **What are Copilot in automation center's general intended use(s)?**

The purpose of this system is to enable users to retrieve information about their automation activity data, and general product features by asking questions in natural language.

## **What are Copilot in automation center's intended use(s) for generative answers?**

The intended use of Copilot's generative answers is to help users find quick and accurate answers to product related questions without having to navigate away from Power Automate for desktop.

## **How was Copilot in automation center evaluated? What metrics are used to measure performance?**

- The performance of Copilot in automation center was evaluated using a comprehensive set of metrics. The copilot interface includes thumbs up and thumbs down gestures, allowing users to submit feedback on the AI outputs. This feedback is closely monitored to ensure that Copilot remains compliant, appropriate, and free of bias.

## **How was Copilot's generative answers in automation center evaluated? What metrics are used to measure performance?**

- Copilot's generative answers capability has been evaluated against real-world scenarios in each phase of its design, development, and release. Using a combination of research and business impact studies, we've evaluated various quantitative and qualitative metrics about Copilot, including its accuracy, usefulness, and agent trust.
- We have a robust set of metrics we're tracking to measure the model's performance and resulting customer experience. We follow the feature's SLA to make sure it's always available to you. We track the telemetry of thumbs up and

thumbs down gestures present in the UI experience for each AI output that you can submit feedback for.

## **What operational factors and settings allow for effective and responsible use of Copilot in automation center?**

- Effective and responsible use of Copilot in automation center can be achieved by ensuring that the user has the appropriate rights to access the relevant data in Dataverse. This means that Copilot only answers questions based on data the user has permission to access. Additionally, it's important for users to understand the scope and limitations of Copilot, and to phrase their queries accordingly.
- For generative answers, you should constantly review the answers provided by Copilot's generative answers capability before using them.

## **What are the limitations of Copilot in automation center? How can users minimize the impact of Copilot in automation center's limitations when using the system?**

One of the limitations of Copilot in automation center is that it currently only supports answering questions about cloud and desktop flow activity, work queues, and Power Automate documentation, and not yet about other topics such as capacity. Additionally, the supported language is currently English and only available in Dataverse environments provisioned in the United States region. To minimize the impact of these limitations, users can ensure that their queries are specific to supported product areas and are phrased in English.

## **What are the limitations of Copilot in automation center's generative answers? How can users minimize the impact of Copilot's generative answers's limitations when using the system?**



- This feature is currently in preview for environments located in the United States and only supports English.
- The generative answers capability can only answer to product related features. It can't answer general questions or anything unrelated to the product.
- There's a limit of 200 characters to describe the question.

## Related information

- [Use Copilot in automation center \(preview\)](#)
  - [Use Copilot to analyze desktop flow activity \(preview\)](#)
  - [Get started with Copilot in cloud flows \(preview\)](#)
  - [FAQ for Copilot in cloud flows](#)
  - [FAQ for Copilot in Power Automate Process Mining](#)
  - [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)
- 

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# FAQ for Copilot in desktop flow activity (preview)

Article • 05/20/2024

Copilot in desktop flow activity enables administrators, CoE teams, business users, and makers to easily retrieve information about past flow runs by asking questions in natural language. For example, users can ask about the number of flows that ran yesterday, which machine ran the most flows, or how many flows are currently queued. In response, Copilot generates outputs that provide insights and answers to the questions asked.

## What can Copilot in desktop flow activity do?

Copilot in desktop flow activity is capable of translating natural language queries into Microsoft Dataverse FetchXML query syntax, specifically optimized for desktop flow activity such as desktop flow runs, machines, and errors. This allows users to easily retrieve information about their automation data by asking questions in natural language. Additionally, Copilot determines the most suitable output visualization, such as a table, pie chart, bar chart, or line chart, to effectively present the insights and information to the user.

## What is Copilot in desktop flow activity's intended use?

The purpose of this system is to enable users to retrieve information about their automation activity data by asking questions in natural language.

## How was Copilot in desktop flow activity evaluated? What metrics are used to measure performance?

The performance of Copilot in desktop flow activity was evaluated using a comprehensive set of metrics. The Copilot interface includes thumb up and thumb down gestures, allowing users to submit feedback on the AI outputs. This feedback is closely monitored to ensure that Copilot remains compliant, appropriate, and free of bias.

# What are the limitations of Copilot in desktop flow activity? How can users minimize the impact of Copilot in desktop flow activity's limitations when using the system?

One of the limitations of Copilot in desktop flow activity is that it currently only supports answering questions about desktop flow activity, and not yet about cloud flows activity. Additionally, the language currently supported with Copilot is English and only available in Dataverse environments provisioned in the United States region. To minimize the impact of these limitations, users can ensure that their queries are specific to desktop flow activity and are phrased in English.

## What operational factors and settings allow for effective and responsible use of Copilot in desktop flow activity?

Effective and responsible use of Copilot in desktop flow activity can be achieved by ensuring that the user has the appropriate rights to access the desktop flow activity data in Dataverse. This means that Copilot only answers questions based on the data the user has permission to access. Additionally, it's important for users to understand the scope and limitations of Copilot, and to phrase their queries accordingly.

## Related information

- [Use Copilot to analyze desktop flow activity \(preview\)](#)
- [Get started with Copilot in cloud flows \(preview\)](#)
- [FAQ for Copilot in cloud flows](#)
- [FAQ for Copilot in Power Automate Process Mining](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# FAQ for Copilot in Power Automate Process Mining

Article • 08/28/2023

## What is Copilot in Power Automate Process Mining?

Copilot in Process Mining enables users to streamline data ingestion and provides process insights through quick and easy natural language expression. With Copilot in ingestion, identify your process during data ingestion and auto map your data to the required data schema. Copilot can also surface insights on your process and recommend solutions through natural language in Power Automate process mining.

## What are the systems capabilities?

The system is a copilot embedded in process mining ingestion and the desktop application. It helps you get to actionable insights of your process faster. The system can:

- Discover your selected process in Bring Your Own Azure Data Lake.
- Give automapping recommendations to required data schema.
- Surface top insights in your process.
- Offer recommendations on automation.
- Answer questions on your process data.
- Answer general questions about processes.
- Filter out questions not related to the analyzed process or processes in general.

## What is the system's intended use?

The systems intended use is to help you ingest your data into process mining and help you surface actionable insights easily and quickly.

## How was Copilot in Process Mining evaluated? What metrics are used to measure performance?

We have a robust set of metrics we're tracking to measure the performance of the model and resulting customer experience. We track Copilot's Service Level Agreement (SLA) to make sure it's always available to you. We track the telemetry of thumbs up and thumbs down gestures present in the AI Copilot for each AI output that you can submit feedback for.

You can provide feedback for Copilot when the results are biased or inappropriate. We track this feedback to ensure that Copilot is compliant, appropriate, and bias-free.

## What are the limitations of Copilot? How can users minimize the impact of the Copilot limitations when using the system?

Copilot can support ingestion only in a process created through Azure Data Lake as a source. It supports only analytics driven through the Power Automate Process Mining desktop application. It is not equipped with transforming or preparing any ETL work on behalf of the users. You're made aware of these limitations throughout the experience with warnings that AI outputs must be validated. You will also only be surfaced copilot prompts and experiences in the sections of the products without limitations.

There is also an option to disable the Copilot within the admin center, and the user always has the option to close the Copilot and not engage with the feature.

## What operational factors and setting allow for effective and responsible use of the system?

Copilot is only available in the Azure Data Lake ingestion experience and within the Power Automate Process Mining desktop app. The user can always close Copilot and not elect to interact with Copilot.

## Related information

- [Copilot in Process Mining ingestion \(preview\)](#)
- [Copilot in Process Mining process analytics \(preview\)](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

---

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# FAQ for copilot generative answers in Power Automate for desktop

Article • 11/14/2023

These frequently asked questions (FAQ) describe the AI impact of the copilot generative answers functionality in Power Automate for desktop.

## What is copilot's generative answers capability?

Copilot's generative answers capability answers product-related questions. Users type their product-related questions or select one from a predefined list of prompts, and the copilot provides an answer.

## What can copilot's generative answers do?

Copilot's generative answers capability searches for answers to users' questions in Power Automate for desktop's public documentation using Azure OpenAI and Bing search.

## What are copilot's generative answers intended use(s)?

The intended use of copilot's generative answers is to help users find quick and accurate answers to product-related questions without having to navigate away from Power Automate for desktop.

## How was copilot's generative answers evaluated? What metrics are used to measure performance?

- Copilot's generative answers capability has been evaluated against real-world scenarios in each phase of its design, development, and release. Using a combination of research and business impact studies, we've evaluated various quantitative and qualitative metrics about copilot, including its accuracy, usefulness, and agent trust.
- We have a robust set of metrics we're tracking to measure the model's performance and resulting customer experience. We follow the feature's SLA to

make sure it's always available to you. We track the telemetry of thumbs-up and thumbs-down gestures present in the UI experience for each AI output that you can submit feedback for.

## What are the limitations of copilot's generative answers? How can users minimize the impact of copilot's generative answers's limitations when using the system?

- This feature is currently in preview for environments located in the United States and only supports English.
- The generative answers capability can only answer to product-related features. It can't answer general questions or anything unrelated to the product.
- If you want to turn off the copilot's generative answers capability in Power Automate for desktop, ask your Power Platform admin to turn off the feature.
- There's a limit of 200 characters to describe the question.

## What operational factors and settings allow for effective and responsible use of copilot's generative answers capability?

You should constantly review the answers provided by the copilot's generative answers capability before using them.

## Get the best out of copilot

When you're interacting with copilot, it's essential to keep in mind that the structure of the questions can significantly affect the response that copilot gives. To interact with copilot effectively, it's crucial to ask clear and specific questions and provide context to help the AI better understand your intent.

## Related information

- [Copilot generative answers in Power Automate for desktop](#)
  - [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)
-

# Feedback

Was this page helpful?

[Provide product feedback](#) ↗



# FAQ for Power Automate for desktop natural language to code in scripting actions

Article • 11/14/2023

## What is natural language to code in scripting actions?

Natural language to code is a new AI capability that we added in Power Automate for desktop. It lets you quickly generate code used in the scripting actions by describing it. This feature is available in the "Run PowerShell," "Run VBScript," "Run DOS command," "Run Python," and "Run JavaScript" actions. You can describe with natural language what you want to achieve, and copilot's AI capabilities generate the script for you. This feature makes it easy for users unfamiliar with scripting languages to automate their tasks.

## What can the natural language to code in scripting actions do?

Copilot's natural language to code in scripting actions can generate the code to be executed in the various scripting actions in Power Automate for desktop. To do so, the only thing that the user needs to do is to provide a description, and the AI responds with the generated code.

## What is/are natural language to code in scripting actions' intended use(s)?

The intended use is to allow users to create scripts quickly and with ease, by just providing a description of the script instead of developing it from scratch.

## How was natural language to code in scripting actions evaluated? What metrics are used to measure performance?

- There's a robust set of metrics we're tracking to measure the model's performance and resulting customer experience. We track the feature's SLA to make sure it's always available to you. We track the telemetry of thumbs-up and thumbs-down gestures present in the UI experience for each AI output that you can submit feedback for.
- You can provide feedback on this functionality when the results are biased or inappropriate. We track this feedback to ensure that copilot is compliant, appropriate, and bias-free.
- We tested the AI model through various internal processes and reviews to make sure that we provided the best possible quality and adhere to the highest of standards when it comes to security and reliability.

## **What are the limitations of natural language to code in scripting actions? How can users minimize the impact of natural language to code in scripting action's limitations when using the system?**

The natural language to code in scripting actions capability can only generate scripts. It can't answer general questions or anything unrelated to the specific scripting language where the user launched the functionality. Currently, all the scripting actions are supported, but they run a .NET action.

## **What operational factors and settings allow for effective and responsible use of natural language to code in scripting actions?**

- Natural language to code in scripting actions is only available and can only be accessed from these scripting actions in Power Automate for desktop's designer: Run PowerShell, Run VBScript, Run DOS command, Run Python, and Run JavaScript actions.
- Always review results from copilot.

## **Get the best out of copilot**

When you're interacting with copilot, it's essential to keep in mind that the structure of the questions can significantly affect the response that copilot gives. To interact with

copilot effectively, is crucial to ask clear and specific questions and provide context to help the AI better understand your intent.

## Related information

- [Natural Language to code in scripting actions](#)
  - [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)
- 

## Feedback

Was this page helpful?

Yes

No

[Provide product feedback](#) 

# FAQ for Power Automate for desktop suggested actions

Article • 07/26/2024

## What is the suggested actions functionality

Suggested actions are a new AI capability that we added in Power Automate for desktop that allows you to quickly view suggestions on what your next action should be while designing your flow in the designer.

## What can the suggested actions do?

Suggested actions can help you discover the next step of your automation by analyzing your flow and suggesting action candidates that you can include by selecting them.

## What is/are action suggestions intended use(s)?

The intended use of suggested actions is to allow users to quickly discover actions that can be used as the next building steps in their automations without searching the full list of actions in the designer.

## How can I use the suggested actions functionality?

You can access the new functionality by signing in with your work or school account in Power Automate for desktop and either creating a new flow or editing an existing one. When hovering over an action, select the plus icon, and the suggested actions panel opens.

## How was suggested actions evaluated? What metrics are used to measure performance?

We have a robust set of metrics we track to measure the performance of the model and resulting customer experience. We track the feature's SLA to make sure it's always

available to you. We track the telemetry of thumbs up and thumbs down gestures present in the UI experience for each AI output that you can submit feedback for.

You can provide feedback on this functionality when the results are biased or inappropriate. We track this feedback to ensure that AI feature is compliant, appropriate, and bias-free.

We meticulously tested the AI model through various internal processes and reviews in order to make sure that we provided the best possible quality and adhere to the highest of standards when it comes to security and reliability.

## What are the limitations of the suggested actions? How can the users minimize the impact of feature when using the system?

The suggested actions capability can only propose actions currently available in the Power Automate for desktop's standard library of actions. It can't propose actions that are custom-made by an organization (custom actions).

## Related information

[Configure actions and the actions pane](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 

# FAQ for generating a flow description using Copilot

Article • 04/11/2024

These frequently asked questions (FAQ) describe the AI impact of generating flow descriptions using Copilot functionality in Power Automate for desktop.

## What is generate flow description with Copilot capability?

The generate flow description with Copilot is a new AI capability that we added in the properties of desktop flows in both Power Automate for desktop and the desktop flows area in Power Automate ([make.powerautomate.com](https://make.powerautomate.com)). The feature is available by going to the flow details.

## What can the generate flow description with Copilot feature do?

The generate flow description with Copilot reads and analyzes the actions inside a flow and automatically creates a flow description. This saves the user valuable time from having to read through the whole flow to understand what it does.

## What is the generate flow description with Copilot intended use?

The intended use of the generate flow description using Copilot feature is for users to generate flow descriptions easily without having to go through the whole flow action by action to understand its functionality.

## How was generate description using Copilot evaluated? What metrics are used to measure performance?

- The generate flow description with Copilot capability has been evaluated against real world scenarios in each phase of its design, development, and release. Using a

combination of research and business impact studies, we've evaluated various quantitative and qualitative metrics about Copilot, including its accuracy, usefulness, and agent-trust.

- We have a robust set of metrics we're tracking to measure the performance of the model and resulting customer experience. We track the feature's SLA to make sure it's always available to you. We track the telemetry of thumbs up and thumbs down gestures present in the UI experience for each AI output that you can submit feedback for.

## What are the limitations of the generate flow description with Copilot capability? How can users minimize the impact of the generate flow description with Copilot limitations when using the system?

- This feature is currently in preview in environments that are located in United States only.
- This feature is currently in preview and it only supports English.
- This feature is currently only available for organizational or school user accounts.

## What operational factors and settings allow for effective and responsible use of the generate flow description with Copilot capability?

You should always review the descriptions generated by the Copilot's generate flow description capability before saving the flow properties.

## Related information

- [Power Automate for desktop console](#)
- [FAQ for Copilot data security and privacy in Microsoft Power Platform](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) ↗



# FAQ for Process Mining's Microsoft 365 personal recommendations

Article • 07/26/2024

The Microsoft 365 personal recommendations found on the Power Automate home page accelerate your journey to adopting automation and transforming your personal processes.

## What is Process Mining's Microsoft 365 personal recommendations?

The Microsoft 365 recommendations are created from your own graph data—specifically, job role, sent emails, calendar invites, and files. The system understands from your use of Microsoft 365 tools opportunities for automation by using natural language to flow. The system surfaces these recommendations as natural language text that surfaces within natural language to flow for flow creation.

## What can Process Mining's Microsoft 365 personal recommendations do?

The system is a recommendation engine that creates suggestions for automations. You can select these recommendations to create a cloud flow through cloud flow's natural language to flow capabilities.

## What is the system's intended use?

The system's intended use is to help you accelerate your adoption of cloud flows and automate your personal processes.

## How was Process Mining's Microsoft 365 personal recommendations evaluated? What metrics are used to measure performance?

We have a robust set of metrics we track to measure the performance of the model and resulting customer experience. We track the telemetry of recommendations selected and success of cloud flow creation.

# What are the limitations of the system? How can I minimize the impact of the limitations when using the system?

Microsoft 365 recommendations can only create recommendations from Microsoft 365 usage in the preceding seven days. It can't create recommendations without sufficient usage of Microsoft 365 products like emails, Teams usage, or calendar invites. You can always choose to not engage with the surfaced recommendations.

# What operational factors and settings allow for effective and responsible use of Process Mining's Microsoft 365 personal recommendations?

Microsoft 365 recommendations are currently only surfaced to new users of the Power Automate home page to get them started on their automation journey.

## Related information

[Overview of process mining](#)

---

## Feedback

Was this page helpful?

[Provide product feedback](#) 