

Tokyo Hyperautomation and Low-Code

Last updated: July 14, 2023

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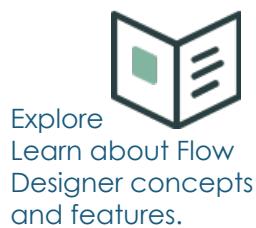
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Flow Designer

Flow Designer is a Now Platform® feature that enables process owners to automate work. Build multi-step flows from reusable components without having to code.



Explore
Learn about Flow Designer concepts and features.



Set up
user access, feature access, and system properties.



Administer
Maintain flows and execution details.



Build
flows, subflows, and actions to automate business processes.



Integrate
Integrate with other applications.



Reference
Get details about Flow Designer components such as actions, flow logic, and properties.

Request apps on the Store

Visit the [ServiceNow Store](#) website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the [ServiceNow Store version history release notes](#).

Troubleshoot and get help

- Ask or answer questions in the Now Platform community forum
- Search the Known Error Portal for known error articles
- Learn how to build apps on the developer site.

- Contact Customer Service and Support

Exploring Flow Designer

Flow Designer is the default Now Platform process automation builder used to create flows. Flow Designer replaces the legacy Workflow graphical editor.

Flow Designer in action

Watch this seven-minute video to learn how to create and test a flow in Flow Designer.

For developer training, see [Using Flow Designer](#) on the ServiceNow® Developer Site.

Flow Designer benefits

Flow Designer provides process owners and developers these benefits:

- Automates repetitive work to improve efficiency and experience.
- Describes a workflow in natural language to help non-technical users understand what it does.
- Displays flows as diagrams to help builders see available paths and connections.
- Enables creating and testing a workflow from a single interface to ensure it works as expected.
- Promotes process automation by enabling subject matter experts to develop and share reusable actions with flow authors.
- Reduces upgrade costs, with upgrade-safe Now Platform logic replacing complex custom script.
- Reduces development costs by providing a library of reusable actions.
- Scales with separate subscriptions for integration and Robotic Process Automation (RPA) functionality.

Flow Designer integrations

Expand the capabilities of Flow Designer with additional subscriptions and spokes.

Subscription	Description
Integration Hub	Build flows to integrate with external instances and third-party systems. Integration Hub is required to install integration applications delivered as spokes.
Robotic Process Automation (RPA) Hub	Build flows to run robots on Microsoft Windows systems.

Flow Designer components

Flow Designer consists of the following components:

Flows

A flow is an automated process consisting of a trigger and a sequence of reusable actions. The trigger specifies when to run the flow. The actions perform a sequence of operations on your data. For example, the **VTB Sample Flow** creates and assigns a VTB card whenever a priority 1 incident is created. Building and managing flows requires that you have some familiarity with the Now Platform tables and fields that the application or process uses. Process analysts can create flows using available actions or copy an existing flow to use it as a template. See [Building flows](#).

Flow execution details

A flow execution details page allows a flow author to view run-time information about an action or flow directly from the design environment. You can view details such as the current state, actions or steps run, output values generated, and errors produced. See [Flow execution details](#).

Flow error handler

A flow error handler enables a flow to catch and report errors from the flow execution details. Run a sequence of actions and subflows to

identify and correct issues. For example, have flows log output values, send notifications, and run corrective subflows when they produce an error. See [Flow error handler](#).

Subflows

A subflow is an automated process consisting of a sequence of reusable actions, data inputs, and outputs. In contrast to flows, subflows do not have a trigger but instead run when called from a flow, from another subflow, or from a script. Building and managing subflows requires that you have some familiarity with the Now Platform tables and fields that the application or process uses. Process analysts can create subflows using available actions or use an existing subflow as a template. See [Building subflows](#).

Actions

An action is a reusable operation that enables process analysts to automate Now Platform features without having to write code. For example, the **Create Record** action allows process analysts to generate records in a particular table with particular values when certain conditions occur. ServiceNow core actions like Create Record require some familiarity with Now Platform tables and fields. Action designers can create application-specific actions to pre-set configuration details. For example, creating a Create Incident Task action ensures that the process analyst uses the correct table and field configuration each time the action is used. You can add application-specific actions by activating the associated spoke. See [Flow Designer actions](#).

Spokes

A spoke is a scoped application containing Flow Designer actions and subflows for managing specific tables. For example, the **ITSM Spoke** contains actions for managing Incident and Problem records. You can activate additional spokes from the ServiceNow Store or activating the appropriate plugin. Building your own spoke requires familiarity with application development on the Now Platform. For a list of available spokes, see [Spokes](#).

Steps

A step is a single reusable operation within an action. For example, the **Create Record** step allows action designers to specify the table and field values to use during record creation. Step configuration requires subject matter expertise with application tables, fields, and business logic.

Application developers or IT generalists add steps to actions from the Action Designer design environment. Flow Designer provides a set of ServiceNow core steps to automate Now Platform processes. You can add application-specific steps by activating the associated spoke. See [Flow Designer steps](#).

Flow Designer environment

The Flow Designer environment consists of the following interfaces:

Flow Designer landing page

Access or create actions, flows, subflows, or their execution details.

Flow Designer design environment

Create and edit flows by defining a trigger and adding actions. Test flows to see if they complete successfully and to review the runtime values they generate. Activate flows to make them available for execution on your instance and to preserve their current actions, inputs, and sequence as a snapshot separate from further configuration changes.

Action Designer design environment

Create and edit actions by defining inputs and adding action steps. Test actions to verify if they complete successfully and review the runtime values they generate. Copy actions to use existing actions as templates. Publish actions to activate them, which makes them available to activated flows and to preserve their current action steps, variables, and sequence as a snapshot separate from further configuration changes.

Flow and action execution details

View run-time information about an action or flow directly from the design environment, such as the current state, actions or steps run, and values produced. Open related records from embedded Now Platform editors or in a new tab.

Process automation

While learning Flow Designer, make sure that you understand how existing Now Platform automation processes work. Avoid creating conflicting or duplicate business logic. If you're replacing an existing automation process, deactivate it before replacing it with Flow Designer

flows and actions. See the [Architecture Overview](#) to understand how Flow Designer works within the Now Platform.

- [Getting started with flows](#)

Create a sample flow with a trigger and base system actions that requires an approval.

- [Flow action numbering](#)

The action outline displays a whole number besides each action and flow logic block in a flow. You can update flows containing legacy action numbering from within Flow Designer.

- [Flow Designer landing page](#)

Access or create actions, flows, subflows, or their execution details.

- [Flow Designer data](#)

Each time you add an action to a flow, Flow Designer adds a data pill to store its results. The data pill name indicates its sequence in the flow and its data type.

- [Flow diagramming view](#)

Create and view flows as diagrams. See the paths a flow can follow and the connections between elements.

- [Flow execution details](#)

View run-time information about an action or flow directly from the design environment, such as the current state, actions or steps run, and values produced. Open related records from embedded Now Platform editors or in a new tab.

- [Flow roles](#)

Create flows and subflows that run with specific roles. Assigning roles enables you to create user-initiated flows that run with their own roles rather than the user's roles.

- [Domain separation and Flow Designer](#)

Domain separation is supported in Flow Designer. Flow Designer supports domain separation of business logic, which lets each tenant domain have its own flows, actions, and subflows. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

- [Architecture Overview](#)

Understand how Flow Designer works within the Now Platform to activate, trigger, and process flows and actions.

Getting started with flows

Create a sample flow with a trigger and base system actions that requires an approval.

Before you begin

Role required: admin

Note: While Flow Designer is designed to use the flow_designer and delegated_developer roles in most scenarios, this tutorial uses the admin role to illustrate functionality without requiring additional roles to set up records and approve requests.

The ITSM application is required to access the Task table.

Watch this 11-minute video for an introduction to using Flow Designer.

About this task

A flow can include these components:

- Trigger: An activity that initiates the flow, such as a record created in a specified table or a scheduled job.
- Conditions: Statements that determine when or how an action runs. For example, run an action only if a field is over a certain value.
- Actions: Operations executed by the system, such as a field value updated, approval requested, or a value logged.

To understand basic flows, create an expense approval flow. This flow:

1. Runs when an Expenses record is created.
2. Uses the total amount to determine which action to run.
3. Approves the request if it is under the specified dollar amount.
4. Requires manager approval if it is over a specified dollar amount.
Another approver can be manually added.

Procedure

1. Create a custom application for the flow. Creating flows and actions within an application enables you to publish flows and actions to an application repository and deploy them on other instances. While this example does not use delegated development, you can optionally delegate action and flow designer development by assigning developers to the application.
 - a. Navigate to **System Applications > Studio**.
 - b. Create a custom application called **Expenses Getting Started**.
2. In Studio, create an Expenses table.
 - a. Click **Create Application File**.
 - b. Under Data Model, select Table and click **Create**.
A Table form opens.
 - c. Complete the form with the following values.
 - Label: **Expenses**
 - Extends table: **Task**
 - d. Save the form.
 - e. Add three additional columns to the table.

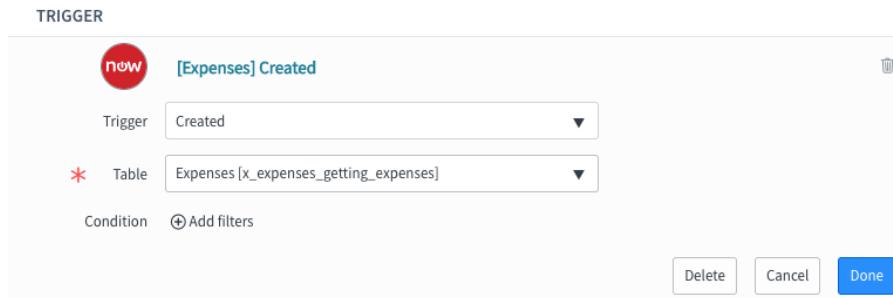
Column label	Type	Reference
Amount	Floating point number	None

Column label	Type	Reference
Destination	String	None
Requested for	Reference	User [sys_user]

3. Add four records to the Expenses table to use in Flow Designer tests.
When you test your flow in later steps, you can specify which record is used as the trigger, enabling you to test specific record values.
 - a. On the Expenses table record, click the **Show list** related link.
 - b. Click **New**.
 - c. Configure the form to add the **Amount**, **Destination**, and **Requested for** fields, and the **Approvers** related list.
 - d. Complete the **Destination** and **Requested for** fields. In the **Amount** field, add a value under 100.00.
Make sure that the user in the **Requested for** field in the test record has a manager assigned in the system. If the user in the test record does not have a manager, configure the User form to add the **Manager** field, and assign a manager to the user.
 - e. Submit the form.
 - f. Add another record to the table with an amount under 100.00.
 - g. Add two more records to the table with a value over 100.00 in the **Amount** field.
4. In Studio, create a new flow.
 - a. Click **Create Application File**.
 - b. Under Flow Designer, select Flow and click **Create**.
 - c. Select the **Flow** option, click **Next**.
 - d. In the **Flow Name** field, enter **Expense Approval**.
 - e. Click **Submit**.
An Expense Approval flow is created in the Expenses Getting Started scope.

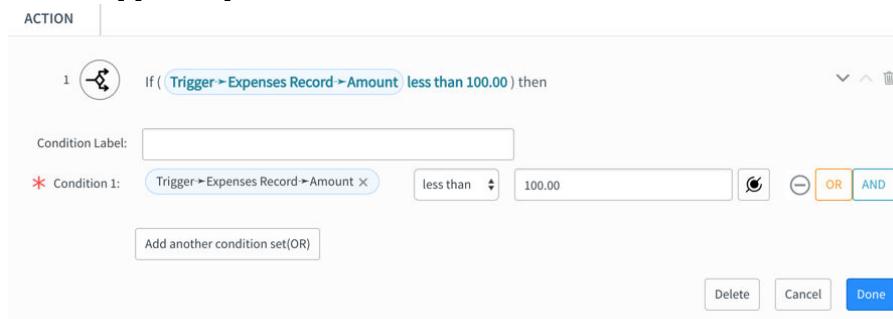
5. Create a trigger that runs the flow when a record is created in the Expenses table.

- Trigger: **Created**
- Table: **Expenses [x_expenses_getting_expenses]**

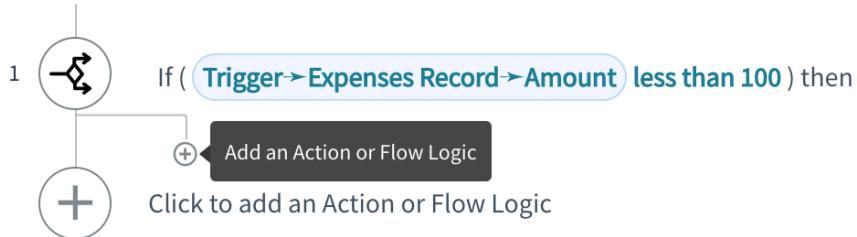


6. Add an if condition to the flow.

- Select **Flow Logic > If**.
- In the right-hand pane, expand the **Trigger - Record Created** category and the **[Expenses Record]** pill. Drag-and-drop the **[Amount]** pill into **Condition 1**. A data pill represents the value of a record or a field at a particular stage in your flow. Dragging the **[Amount]** data pill from the trigger populates the condition with the value of the field in the triggering record.
- Set Condition 1 to **[Trigger->Expenses Record->Amount] [less than] [100.00]**.

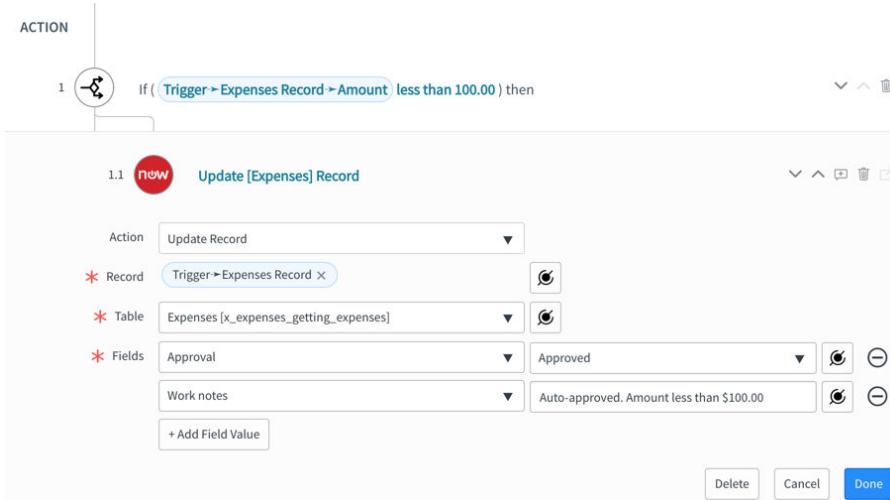


7. Underneath action 1, click **+** to add an action that runs when the If condition is met.



8. Create an Update Record action that approves the request.

- Action: **Update Record**
- Record: Expand the **Trigger - Record Created** category and drag the **[Expenses Record]** data pill from the right-hand pane.
- Table: Set to **Expenses [x_expenses_getting_expenses]**.
- Fields:
 - Approval: **Approved**
 - Work notes: Auto-approved. Amount less than \$100.00



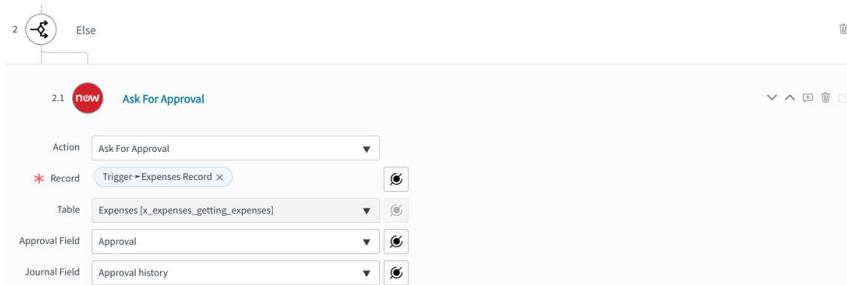
9. Add an else condition to the flow.

a. Select **Flow Logic > Else**.

10. Underneath action 2, click **+** to add an Ask for Approval action that runs when the Else condition is met.

a. Complete the fields in the Ask for Approval step.

- Action: **Ask for Approval**
- Record: Expand the **[Trigger - Record Created]** category and drag the **[Expenses Record]** data pill from the right-hand pane.
- Table: Set to **Expenses [x_expenses_getting_expenses]**.
- Approval Field: Set to **Approval**.
- Journal Field: Set to **Approval history**.



b. Define the rules in the Ask for Approval step.

- **[Approve]** when **[Anyone approves]** from the field **[Trigger->Expenses Record->Requested for->Manager]**, **[OR]**

- **[Anyone approves]** from the **[Manual User(s)]** list. Select to allow a manual approver to process an approval or rejection. A manual approver is a user manually added to the Approvers related list who can then approve the request. For example, you can manually add a subject matter expert to a task to approve the request. To learn more about adding manual approvers, see [Generate approvals using the approvers related list](#).

Select **Add another OR rule set** to define rejection rules. When defining approvals, make sure to include rejection rules to avoid creating flows that remain in a waiting state if there are no matching approval rules.

- **[Reject]** when **[Anyone rejects]** from the field **[Trigger->Expenses Record->Requested for->Manager]**, **[OR]**
- **[Anyone rejects]** from the **[Manual User(s)]** list.

The screenshot shows the 'Rules' configuration screen. It contains two main sections: 'Approve' and 'Reject'. Each section has a 'When:' condition and a 'User' selection area. The 'Approve' section's condition is 'Anyone approves' and the 'User' selection includes 'Trigger->Expenses Record->Requested for->Manager'. The 'Reject' section's condition is 'Anyone rejects' and the 'User' selection includes 'Trigger->Expenses Record->Requested for->Manager' and 'Manual User(s)'. Both sections have 'OR' and 'AND' logic operators and a 'Remove rule set' button.

- c. Define a due date to automatically approve, cancel, or reject an approval if the request is not approved or denied by the designated time. Adding a due date ensures that the flow does not remain in a waiting state.
- **[Approve]** if pending by **[Relative date] [1] [Days]** from **[Trigger->Expenses Record->Created]**.
 - Days schedule **[8-5 weekdays excluding holidays]**.

This due date automatically approves all requests that have not been approved or denied within one day from when the request was created.

The screenshot shows the 'Due Date' configuration screen. It includes fields for 'Due Date', 'Approve if pending by', 'Relative date' (set to 1 day), 'Days', 'From' (set to 'Trigger->Expenses Record->Created'), and a 'Days schedule' field containing '8-5 weekdays excluding holidays'. There are also 'Delete', 'Cancel', and 'Done' buttons at the bottom.

11. Click **Save**.

12. Test the flow using a record with an amount below the designated limit.
- From the flow, click **Test**.

The Test flow modal appears.

- b. In the **Record** field, select a record you created in earlier steps that has value in the **Amount** field under the 100.00 limit. This field is a reference to the table defined in the trigger.

Note: Testing a flow bypasses the trigger conditions and immediately runs it. To test a flow with a record-based trigger, you must select a specific record to act as the trigger.

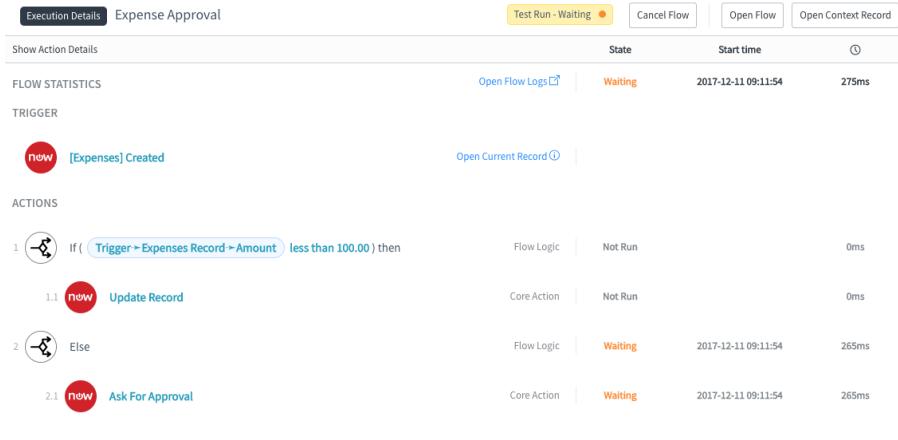
- c. Select **Run Test**.
- d. After the flow executes, click **Flow has been executed. To view the flow, click here**.

The Execution Details open.

Because the amount is less than 100.00, the first condition is met and the request is approved.

The screenshot shows the 'Expense Approval' flow execution details. The top bar includes tabs for 'Execution Details' (selected), 'Expense Approval', 'Test Run - Completed' (with a green dot), 'Open Flow', and 'Open Context Record'. Below this, there are sections for 'Show Action Details', 'FLOW STATISTICS' (Completed, 2017-12-11 08:54:52, 61ms), and 'TRIGGER' (now [Expenses] Created). The 'ACTIONS' section lists the flow logic: 1. If (Trigger = Expenses Record > Amount less than 100.00) then (Flow Logic Completed, 2017-12-11 08:54:52, 53ms) which includes an 'Update Record' action (Core Action Completed, 2017-12-11 08:54:52, 53ms). An 'Else' branch (Flow Logic Not Run, 0ms) leads to an 'Ask For Approval' action (Core Action Not Run, 0ms).

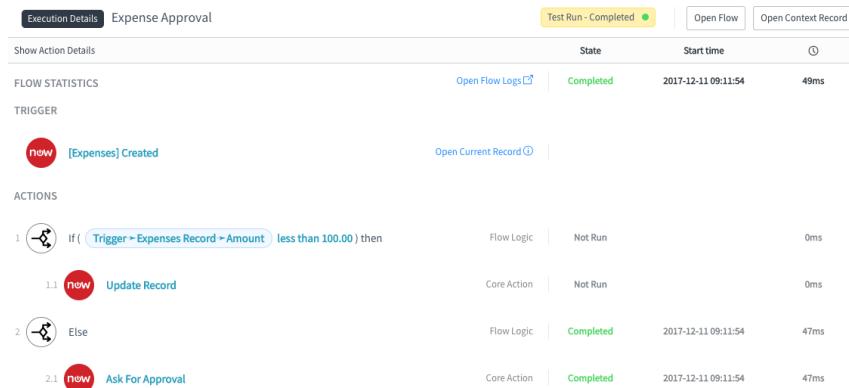
13. Navigate back to the flow and run the test again using a record with an amount over the designated amount.
14. After the flow executes, open the flow Execution Details. Because the amount is over the designated limit, the request must be approved. Until a manager or a manual approver approves the request, the state is **Waiting**.



The screenshot shows the 'Expense Approval' flow execution details. The flow has just started ('Waiting') and is currently running. It includes a trigger for '[Expenses] Created' and two actions: 'Update Record' and 'Ask For Approval'. The 'Ask For Approval' action is currently waiting for approval.

Action	Type	Status	Start Time	Duration
If (Trigger > Expenses Record > Amount less than 100.00) then	Flow Logic	Not Run		0ms
1.1 now Update Record	Core Action	Not Run		0ms
Else	Flow Logic	Waiting	2017-12-11 09:11:54	265ms
2.1 now Ask For Approval	Core Action	Waiting	2017-12-11 09:11:54	265ms

15. Approve the request. In an active flow, a user from the Approvers list would approve or reject the request. However, because the flow is being tested, an admin can approve the flow.
 - a. Navigate to the test record. The associated manager appears in the Approvers related list with **Requested** in the **State** field. Alternatively, you can edit the list to add manual approvers.
 - b. Change the value of the **State** field in the Approvers related list to **Approved**.
 - c. Navigate back to the flow Execution Details and refresh the browser. Because the request is approved, the flow completes.



The screenshot shows the 'Expense Approval' flow execution details after the request has been approved. The flow has completed successfully ('Completed'). The 'Ask For Approval' action is also marked as completed.

Action	Type	Status	Start Time	Duration
If (Trigger > Expenses Record > Amount less than 100.00) then	Flow Logic	Not Run		0ms
1.1 now Update Record	Core Action	Not Run		0ms
Else	Flow Logic	Completed	2017-12-11 09:11:54	47ms
2.1 now Ask For Approval	Core Action	Completed	2017-12-11 09:11:54	47ms

What to do next

Transform the Ask for Approval action into a reusable action using Action Designer. Actions enable flow designers to add complex actions to multiple flows with minimal configuration. See [Getting started with actions](#).

- [Build your first flow in Flow Designer](#)

Step through an example of how to build, test, and activate a sample flow in Flow Designer.

- [Build a flow from a template in App Engine Studio](#)

Step through an example of how to build, test, and activate a flow using a flow template in App Engine Studio.

- [Use the Flow Designer help panel](#)

Browse topics in the side help panel to learn more about building flows and actions, working with data and spokes, and stepping through guided tours in Flow Designer.

Build your first flow in Flow Designer

Step through an example of how to build, test, and activate a sample flow in Flow Designer.

Before you begin

- Role required: admin, flow_designer, or delegated_developer
- Make sure to familiarize yourself with any features that your business uses to automate operations on the Now Platform, such as [Flow Designer](#), [business rules](#), and [workflows](#). Learning about these concepts can help you avoid creating any conflicting logic in your processes.

About this task

To help you get started with building your first flow in Flow Designer, follow along with the steps below. The example flow will start, or trigger, every time a user on the instance creates a request for a Service Catalog item.

When a request is created, our flow will automatically run the following actions:

- Check if the catalog item's price is greater than \$1,000.
- If the price is greater than \$1,000, notify the requester's manager to approve the request.
- Otherwise, if the price is less than or equal to \$1,000, automatically approve and close the request.

Procedure

1. Use the filter navigator to go to **All > Self-Service > Service Catalog**.
2. From the Top requests box, select **Standard Laptop** and complete the record producer.
The system produces a Requested Item record that has a price of \$1100 or more (RITM0010001).
3. Use the filter navigator to go to **All > Process Automation > Flow Designer**.
4. On the Flow Designer landing page's main header, select **New > Flow**.
5. In the Flow properties window, fill in the following fields:

Field	Action
Flow name	Enter Approval flow for requested items

Then select **Submit** to open your flow in the Flow Designer design environment.

6. Under the TRIGGER section, select **Add a trigger**.
7. In the trigger picker, either enter **Service Catalog** in the search field, or locate the Service Catalog trigger under the APPLICATION category.
Then, select the Service Catalog trigger to add this trigger to your flow. Later, when we test this flow, we can simulate firing this trigger by creating a new Service Catalog Item Request record.

8. Click **Done** to finish adding the Service Catalog trigger to your flow.
9. Under the ACTIONS section, select **Add an Action, Flow Logic, or Subflow**.
Then, select **Flow Logic** to open the flow logic picker.
10. In the flow logic picker, select **If**
 11. Next to the Condition 1 input, click the pill picker icon () to open the dot-walker.
The dot-walker lets you access data from the trigger in your flow. Later, when you add actions to your flow, you can also use the dot-walker to access data from those actions. You can use the dot-walker to drill down into data that references other records in order to get the proper field placeholder value that you want to drop as a data pill in an action's input.
 12. Navigate, or dot-walk, to **Trigger - Service Catalog > Requested Item Record > Price** and select **Price** to add this data pill to the Condition 1 input.
 13. In the condition builder's next field, choose **greater than**, and then enter **1000** in the final field.
Now, you've successfully set up a condition that will check if the price of the catalog item that a user requests is greater than \$1,000.
 14. Click **Done** to finish adding the If flow logic to your flow.
 15. Under your If flow logic condition, select **Action**.
 16. In the action picker, either enter **Ask For Approval** in the search field, or locate the Ask For Approval action by selecting **ServiceNow Core > Ask For Approval** under the Default subcategory.
 17. Add the following values for the Ask For Approval action's inputs:

Input	Action
Record	Click the pill picker icon () to open the dot-walker. Then, navigate, or dot-walk, to Trigger - Service Catalog > Requested Item Record and

Input	Action
	select Requested Item Record to add this data pill to the input.
Table	Leave as Requested Item [sc_req_item].
Approval Field	Leave as Approval.
Journal Field	Leave as Approval history.
Rules	Leave the first field as Approve. Under When, select Anyone approves from the list. Then, click the pill picker icon () to open to dot-walker. Navigate, or dot-walk, to Trigger - Service Catalog > Requested Item Record > Opened by > Manager and select Manager to add this data pill to the field.
Due Date	Leave as None.

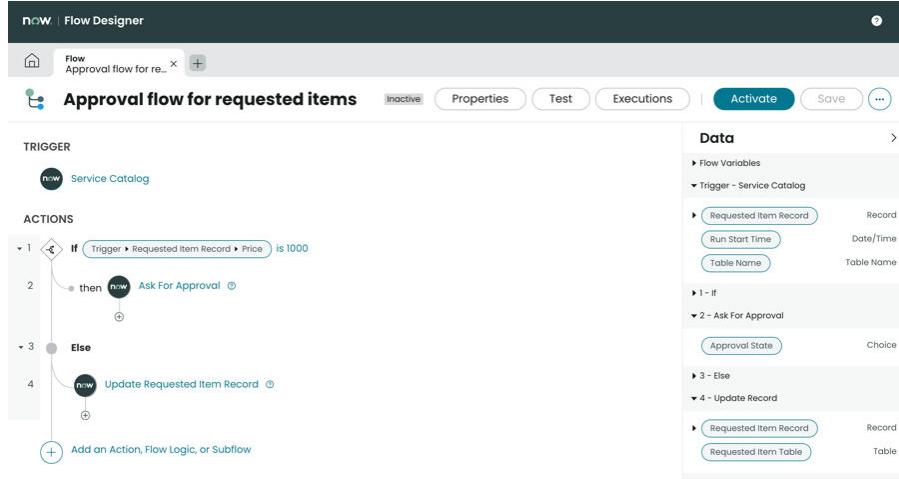
Now, you've successfully set up a conditional action that will automatically ask for approval from the requester's manager for any catalog item they request that has a price greater than \$1,000.

18. Click **Done** to finish adding the conditional Ask for Approval action within the If flow logic of your flow.
19. Select **Add an Action, Flow Logic, or Subflow**. Then, select **Flow Logic** and choose Else from the flow logic picker.
20. Under your Else flow logic, select the plus icon () and then select **Action**. From the action picker, select the **Update Record** action.
21. Add the following values for the Update Record action's inputs:

Input	Action
Record	Click the pill picker icon () to open the dot-walker. Then, navigate, or dot-walk, to Trigger - Service Catalog > Requested Item Record and select Requested Item Record to add this data pill to the input.
Table	Leave as Requested Item [sc_req_item].
Fields	Select + Add field value . Then, select the Approval field and choose Approved as the field's value. Next, select the State field and choose Closed Complete as the field's value. Finally, select the Close notes field and enter Request automatically approved, as requested item's value is less than \$1,000 for the field's value.

Now, you've successfully set up a conditional action that automatically approves and closes the catalog item request if the requested item's price is less than or equal to \$1,000.

22. To finish adding the conditional Update Record action within the Else flow logic of your flow, click **Done**.
 23. In the main header, click **Save** to save the changes you've made to your flow.
- Your flow should look similar to the following example:



24. To test your flow and see if it triggers and runs properly without any errors, go to the main header and click **Test**.
25. In the Test Flow window, select a Requested Item record that has a price greater than \$1000, then select **Run Test**.
For example, select the requested item record that you previously created from the service catalog (RITM0010001).

 You can select the Create new record icon () to create a new requested item.
26. Select **Your test has finished running. View the flow execution details.**
27. On the Execution Details page, see the values that populated for the trigger and each automated action in your flow. For more information, see [Flow execution details](#).
28. Navigate back to your flow.
29. In the main header, click **Activate** so that your flow's trigger fires whenever a user on your instance creates a new Service Catalog Item Request record.

What to do next

Your flow is now active and will run whenever it's triggered. Next, you can manage your flow every time it runs by viewing your flow's execution history. To view this history, open your flow in the Flow Designer design

environment and click **Executions** in the main header. The resulting page shows you the state of completion for each flow execution as well as how long it took for each flow execution to run, or its runtime. To troubleshoot a flow execution for errors, select an execution from this list to open the [Flow execution details](#).

Build a flow from a template in App Engine Studio

Step through an example of how to build, test, and activate a flow using a flow template in App Engine Studio.

Before you begin

Create an application in App Engine Studio. Once your application is built, you can use flow templates to create flows. For more information, see [Building applications in App Engine Studio](#).

Role required: admin, flow_designer, or delegated_developer

About this task

To help you get started with building a flow from a flow template, follow along with the steps below. The example flow will start, or trigger, every time a user on the instance creates a request for a Service Catalog item. When a request is created, our flow will automatically run the following actions:

- Check if the catalog item's price is greater than \$1,000.
- If the price is greater than \$1,000, notify the requester's manager to approve the request.
- Otherwise, if the price is less than or equal to \$1,000, automatically approve and close the request.

Procedure

1. Navigate to **All > App Engine Studio > App Engine Studio**.
2. From the My Apps page, open your application.
3. In your application, next to Automation, click the add icon (⊕).

4. From the gallery of automation templates, select **Create an approval for a requested catalog item**, then click **Begin**.
5. From the **Template catalog item** list, select the **Standard Laptop**.
6. In the **Ask for approval if the catalog item's price is greater than** field, enter 1000, then click **Done**.
7. In the **Name** field, enter Approval flow for requested items.
8. In the **Description** field, enter Approval flow for requested items, then click **Continue**.
9. Once your flow is created, click **Edit this flow**.
10. On the flow page, click the **If not approved** step, then click **Delete** to remove the step.
11. At the bottom of the flow, click the **Log** step, then click **Delete** to remove the step.
12. In the same way, delete the last two log actions at the bottom of the flow.
13. Select **Add an Action, Flow Logic, or Subflow**.
Then, select **Flow Logic** and choose Else from the flow logic picker.
14. Under your Else flow logic, select the plus icon (+) and then select **Action**.
From the action picker, select the **Update Record** action.
15. Add the following values for the Update Record action's inputs:

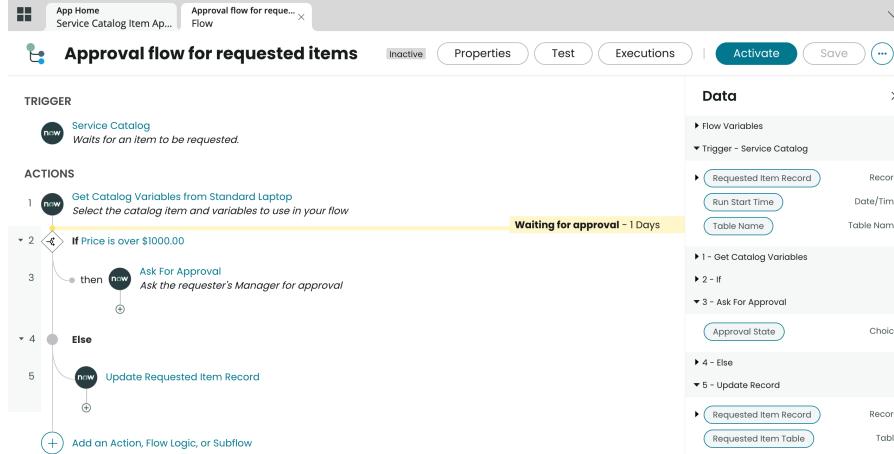
Input	Action
Record	Click the pill picker icon () to open the dot-walker. Then, navigate, or dot-walk, to Trigger - Service Catalog > Requested Item Record and select Requested Item Record to add this data pill to the input.

Input	Action
Table	Leave as Requested Item [sc_req_item].
Fields	Select + Add field value . Then, select the Approval field and choose Approved as the field's value. Next, select the State field and choose Closed Complete as the field's value. Finally, select the Close notes field and enter Request automatically approved, as requested item's value is less than \$1,000 for the field's value.

Now, you've successfully set up a conditional action that automatically approves and closes the catalog item request if the requested item's price is less than or equal to \$1,000.

16. To finish adding the conditional Update Record action within the Else flow logic of your flow, click **Done**.
17. In the main header, click **Save** to save the changes you've made to your flow.

Your flow should look similar to the following example:



18. To test your flow and see if it triggers and runs properly without any errors, go to the main header and click **Test**.

19. In the Test Flow window, select a Requested Item record that has a price greater than \$1000, then select **Run Test**.

For example, select the requested item record that you previously created from the service catalog (RITM0010001).



You can select the Create new record icon () to create a new requested item.

20. Select **Your test has finished running. View the flow execution details.**

21. On the Execution Details page, see the values that populated for the trigger and each automated action in your flow. For more information, see [Flow execution details](#).

22. Navigate back to your flow.

23. In the main header, click **Activate** so that your flow's trigger fires whenever a user on your instance creates a new Service Catalog Item Request record.

What to do next

Your flow is now active and will run whenever it's triggered. Next, you can manage your flow every time it runs by viewing your flow's execution history. To view this history, click **Executions** in the main header. The resulting page shows you the state of completion for each flow execution as well as how long it took for each flow execution to run, or its runtime. To troubleshoot a flow execution for errors, select an execution from this list to open the [Flow execution details](#).

Use the Flow Designer help panel

Browse topics in the side help panel to learn more about building flows and actions, working with data and spokes, and stepping through guided tours in Flow Designer.

Before you begin

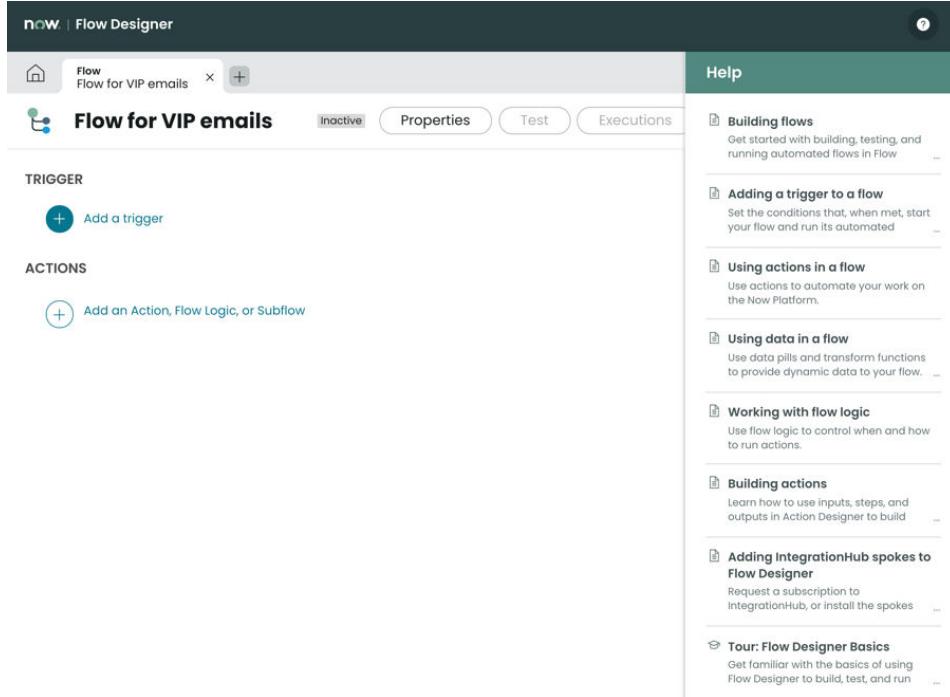
Role required: admin, flow_designer, or delegated_developer

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. In the Flow Designer landing page's main header, select the question mark icon () to open the help panel.
You'll see help topics that you can select and browse for more information about building flows and actions, working with data, and setting up Integration Hub spokes.
3. To close the help panel, select the question mark icon () again.
4. Open any flow from the list of flows to go to the Flow Designer design environment.
5. Next to the name for any action in the flow, select the Open help panel icon ().
The help panel opens with information about the action and how to use the action's inputs and outputs in your flow. If no help content is available for your selected action, then the panel displays No help content found for: and the action's name.
6. You can also access guided tours from the help panel by selecting the question mark icon () while in the Flow Designer design environment.
After opening the help panel, locate a help card beginning with Tour: and select that card to start the tour

Result

The help panel opens with help content about flows, actions, spokes, and guided tours.



Flow action numbering

The action outline displays a whole number besides each action and flow logic block in a flow. You can update flows containing legacy action numbering from within Flow Designer.

Current action numbering

The current number sequence increments each item in the action outline by a whole value of one. For example, if a flow logic block is step 2 in the action outline, then the actions within the flow logic block are steps 3, 4, and 5. Inline scripts reference the whole number value of actions and flow logic.

Legacy action numbering

The legacy number sequence increments each item within a flow logic block by a decimal value of 0.1. For example, if a flow logic block is step 2 in the action outline, then the actions within the flow logic block

are steps 2.1, 2.2, and 2.3. Inline scripts reference the decimal values of actions and flow logic.

Important: Inline scripts produce an error when they refer to actions using legacy action numbering. Update all inline script references to the use the new action numbering.

Automatic action numbering updates

Flow Designer automatically updates the action numbering of all flows during upgrade. Whenever you open a flow that contains inline scripts, Flow Designer checks the script for references to legacy action numbering. If the script contains legacy references, it displays a prompt to update the action numbering.

Prompt to automatically update action numbers in inline scripts

Allow Flow Designer to update action numbering in your scripts?

There are scripts that use legacy action numbering on actions. More Info

Do not show this again

Cancel

OK

The system attempts to match the actions referred to by the legacy action numbering to actions with the new numbering. Review the inline script changes to ensure that your inline scripts refer to the correct actions.

Note: If an upgraded flow does not have the correct numbering, move the actions and flow logic to the correct sequence.

Flow Designer landing page

Access or create actions, flows, subflows, or their execution details.

Flows

The Flows screen contains all the flows that your installation of Flow Designer can use. Selecting a flow opens the flow in a new tab. You can see the scope the flow was created in, the internal name of the flow, whether the flow is published or in draft status, whether the flow is active, and update information.

Subflows

The Subflows screen contains all the subflows that your installation of Flow Designer can use. Selecting a subflow opens the subflow in a new tab. You can see the scope the subflow was created in, the internal name of the subflow, whether the subflow is published or in draft status, whether the subflow is active, and update information.

Actions

The Actions screen contains all the actions that your installation of Flow Designer can use. Selecting an action opens the action in a new tab. You can see the scope the action was created in, where the action is accessible from, whether the action is active, and update information.

Executions

The Executions screen shows a history of actions and flows run, including the current state and duration of each run.

Connections

Manage your connections and credentials for Integration Hub spokes.

Help

The Help landing page contains links to Flow Designer documentation, videos, and Community forum discussions.

New

You can create a new flow, subflow, or action by selecting an option from the list.

Help panel



You can click the question mark icon (?) to open the Flow Designer help panel and browse topics and guided tours that can help you get started building flows and actions. For more information, see [Use the Flow Designer help panel](#).

	Name	Internal name	Application	Status	Active	Updated	Updated by
<input type="checkbox"/>	Benchmark Recommendation Evaluator	benchmark_recommendation_evaluator	Benchmarks Spoke	Published	true	2020-09-21 16:09:24	system
<input type="checkbox"/>	Default SLA flow	default_sla_flow	Global	Published	true	2020-04-23 05:42:24	admin
<input type="checkbox"/>	Inbound Email Flow Example: handling emails	inbound_email_flow_example_handling_email...	Global	Draft	false	2019-02-22 09:51:54	admin
<input type="checkbox"/>	Inbound Email Flow Example: logging a flow	inbound_email_flow_example_logging_a_pro...	Global	Draft	false	2019-02-19 10:17:24	admin
<input type="checkbox"/>	Register Business Application	register_business_application	Global	Published	true	2020-06-14 19:47:35	admin
<input type="checkbox"/>	Service Catalog Item Request	service_catalog_item_request	Global	Published	true	2020-01-30 20:12:14	admin
<input type="checkbox"/>	SLA notification and escalation flow	sla_notification_and_escalation_flow	Global	Published	true	2020-04-23 05:42:08	admin
<input type="checkbox"/>	VTB Sample Flow	vtb_sample_flow	Visual Task Board (VTB) Spoke	Draft	false	2020-09-21 16:09:24	system

Flow Designer data

Each time you add an action to a flow, Flow Designer adds a data pill to store its results. The data pill name indicates its sequence in the flow and its data type.

Flow designers use action result data pills to provide input for other flows, actions, or subflows. Flow designers can use the sequence value in the data pill name to ensure that they select the correct data pill as an input value. When a flow runs an action, it generates the data pill runtime value, which remains the same for the duration of the flow. For example, if a data pill for [Trigger->Incident record] gets populated with incident record values at the start of a flow, the data pill preserves these values for the rest of the flow.

Data pill population

Flow Designer populates data pill values as soon as the data becomes available regardless of where the data pill is located in the flow sequence. For example, suppose that you have a flow triggered by the creation of an incident record with the following actions.

1. **Update [Incident] Record** that adds a text string to **[Trigger->Incident Record->Short description]**.
2. **Log** the value of **[Trigger->Incident Record->Short description]**.
3. **Log** the value of **[1->Incident Record->Short description]**.

Action-1 and Action-2 both use the data pill **[Trigger->Incident Record->Short description]**. Since the trigger record is available as soon as the flow starts, these values are set before running these actions.

Delayed data pill population

When an action, flow logic, or step includes more than one data pill in the same input, the system delays running it until all data pill values have been populated. This delay might produce unexpected values or prevent flow logic from running at all.

For example, this flow produces unexpected values.

1. **Update [Incident] Record** that adds a text string to **[Trigger->Incident Record->Short description]**.
2. **Log** the value of **[Trigger->Incident Record->Short description]**.
3. **Log** the value of **[1->Incident Record->Short description]**.
4. **Log** the value of **[Trigger->Incident Record->Short description]** and **[1->Incident Record->Short description]**.

This flow produces the unexpected result of both data pills in Action-4 evaluating to the same value.

Data security and HTML sanitization

Flow Designer protects against cross-site scripting and code injection by evaluating all string data for HTML markup. The system only preserves

HTML markup that is present in its inclusion list. All other HTML markup is removed from string data.

The inclusion list supports these HTML elements and attributes, which cannot be modified.

HTML inclusion list

HTML element	Included Attributes
a	class, href, target, title
abbr	class, title
address	class
area	alt, class, coords, href, shape
article	class
aside	class
audio	autoplay, class, controls, loop, preload, src
b	class
bdi	class, dir
bdo	class, dir
big	class
blockquote	cite, class
br	class
caption	class
center	class
cite	class

HTML element	Included Attributes
code	class
col	align, class, span, valign, width
colgroup	align, class, span, valign, width
dd	class
del	class, datetime
details	class, open
div	class
dl	class
dt	class
em	class
emp	class
font	class, color, face, size
footer	class
h1	class
h2	class
h3	class
h4	class
h5	class
h6	class
header	class

HTML element	Included Attributes
hr	class
html	
i	class
img	alt, class, height, src, title, width
input	aria-label, class, type, value
ins	class, datetime
li	class
mark	class
nav	class
ol	class
p	class
pre	class
s	class
section	class
small	class
span	class
sub	class
sup	class
svg	class
strong	class

HTML element	Included Attributes
style	
table	align, border, class, valign, width
tag	class
tbody	align, class, valign
td	align, class, colspan, rowspan, valign, width
tfoot	align, class, valign
th	align, class, colspan, rowspan, valign, width
thead	align, class, valign
tr	align, class, rowspan, valign
tt	class
u	class
ul	class
video	autoplay, class, controls, height, loop, preload, src, width

Flow diagramming view

Create and view flows as diagrams. See the paths a flow can follow and the connections between elements.

Activation

Install Flow Diagramming from the [ServiceNow Store](#) website.

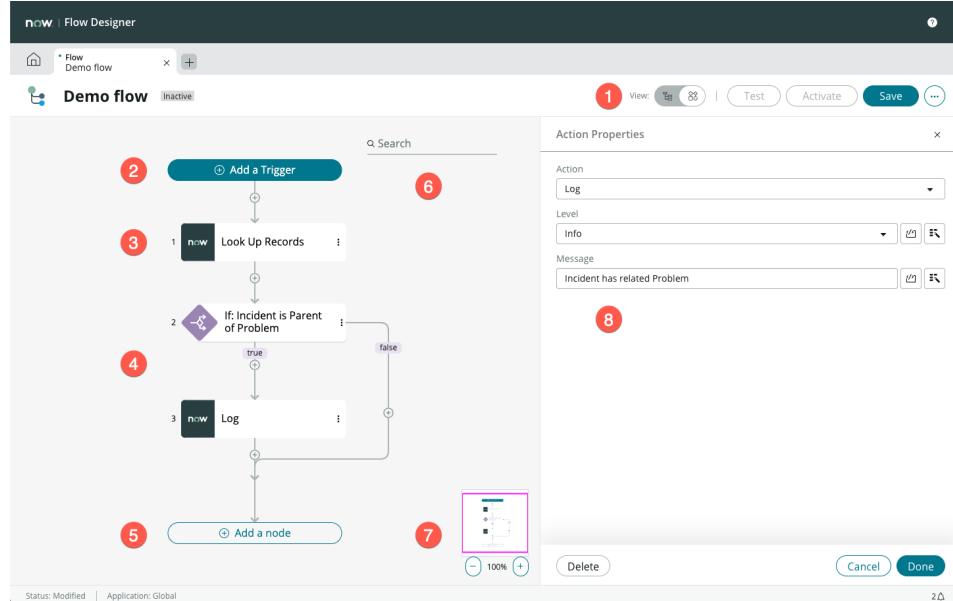
Benefits

Enable the flow diagramming view of a flow to gain these benefits.

- Add and edit Flow Designer components within specific paths of a flow.
- See the branches and paths a flow can follow.
- See the relationships between Flow Designer components.

Flow Diagramming components

Flow Diagramming user interface components



The Flow diagramming view consists of these components.

1. View selector

Switch between the flow diagramming view and the flow description view.

2. Add a trigger

Select and configure a flow trigger. Flow diagramming view does not support some trigger types.

3. Flow nodes

View and configure a flow component as a node. Each node displays these elements.

- The sequence of the flow component in the flow
- The icon representing the spoke or component type
- The name of the flow component
- The menu of available options for the flow component
- The paths available from this node

Note: The flow diagramming view only displays nodes for supported flow components.

4. Plus icons

Select and configure an action, flow logic, or subflow to insert along a specific path of the flow.

Note: The flow diagramming view only displays options for supported flow components.

5. Add a node

Select and configure an action, flow logic, or subflow at the end of the flow.

Note: The flow diagramming view only displays options for supported flow components.

6. Search nodes

Find all nodes that match your search criteria.

7. Preview and zoom controls

Set the current focus of the view by selecting a region of the thumbnail image. Zoom in and out to see specific portions of the flow structure.

8. Node properties

Configure the properties of the currently selected node.

Supported flow components

The flow diagramming view supports a limited selection of flow components. Flow Designer disables the flow diagramming view when a flow contains unsupported flow components.

Triggers

The flow diagramming view only displays flows with these trigger types.

- Record triggers
- Date triggers
- Inbound email
- Service Catalog
- SLA Task

Flow logic

The flow diagramming view only displays flows containing these flow logic types.

- Call a Workflow
- Do the following in parallel
- Dynamic Flows
- Else If
- End Flow
- For Each
- Get Flow Outputs
- If
- Set Flow Variables

- Wait for a duration of time

Flow execution details

View run-time information about an action or flow directly from the design environment, such as the current state, actions or steps run, and values produced. Open related records from embedded Now Platform editors or in a new tab.

Each time you test a flow, the system generates information about the configuration and run-time values produced as flow execution details. Process analysts can view flow execution details from the **Executions** tab. Select a flow execution to open its associated execution details page.

Each execution details page displays run-time information about the flow.

- Refresh flow data
- Flow state
- Related record options
- Flow Statistics

Sample execution details of the VTB Sample Flow

Step	Action	Type	Status	Start Time	Duration
1	Create Freeform VTB	Core Action	Completed	2020-11-16 13:29:10	379ms
2	Look Up Record	Core Action	Completed	2020-11-16 13:29:10	7ms
3	Create VTB Card	Core Action	Completed	2020-11-16 13:29:10	243ms

Reporting level

The reporting level determines what execution details a flow, subflow, or action generates during normal operations. By default, Flow Designer does not generate any execution details during normal operations. Flow Designer always generates flow execution details when you test an individual flow, subflow, or action. When your instance generates and stores more execution details, reporting has more performance impact on your instance.

Each reporting level generates progressively more flow execution details.

Off

The system does not generate any execution details during normal operations. The system only generates execution details when you test an individual flow, subflow, or action.

Flows Only

The system only generates execution details for flows and subflows. The system does not generate configuration or run time values for actions and steps.

Flows and Actions

The system generates execution details for flows, subflows, and actions. The system does not generate configuration or run time values for steps.

On (Flows Actions and Steps)

The system generates execution details for all flows, subflows, actions, and custom action steps.

Developer trace (Testing and support only)

The system generates execution details for all flows, subflows, actions, and steps.

If a flow runs while reporting is off, past execution details are never available for the flow, even if the reporting level later changes. If a flow runs while reporting is activated, execution details are always available for that flow execution, even if the reporting level changes. The reporting level has no effect on context and log records.

You can configure the default reporting level the system uses to generate execution details each time a flow is run. For more information, see [Activate flow reporting](#).

Refresh flow data

Update flow runtime data as needed. Set a flow preference to automatically refresh flow data when you run a test. See [Flow preferences](#).

Flow state

All active flows are in one of these states.

Completed

The flow successfully ran all actions. The flow statistics display configuration and run-time details for each action.

Waiting

The flow paused on an action that is waiting for some condition to be met before continuing. The flow statistics display configuration and run-time details for completed actions as well as any actions waiting for a condition to be met. Flows in the Waiting state display a **Cancel Flow** UI action in the header.

Presumed Interrupted

The flow has been running for more than 15 minutes and no longer has a valid transaction ID for the current node. Alternatively, the flow has been running for more than 8 hours on another node. The flow may have stopped because of an unexpected interruption such as its transaction being terminated or its node being restarted.

Error

The flow stopped with an error. The flow statistics display configuration and run-time details for completed actions and configuration details for the action that produced the error. Flows in the Error state display a **Go to error** UI action in the header.

Note: When an action results in an error, the flow stops executing at that point and results in an error state.

Related record options

From the Execution details page, you can access records related to the current flow.

Open Flow

Use this option to make configuration changes and publish a new instance of the flow. Changing the flow configuration does not change any currently active flow.

Open Context Record

Use this option to view the flow state, run duration, and related log entries from a standard form view. This option opens the context record in a new tab.

Open Flow Logs

Use this link to view detailed log information about each action. This link opens the log entries list in a new tab.

Open Current Record

For flows that have a record-based trigger, use this link to view the triggering record in a pop-up window.

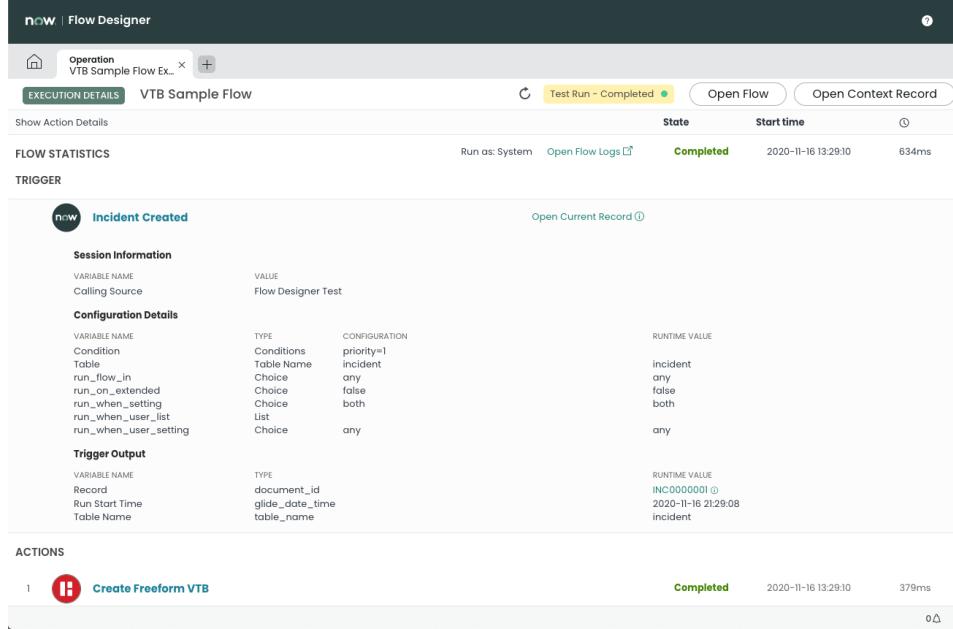
Open Action

Use this link to make configuration changes and publish a new instance of the action. Changing the action configuration does not change any currently active flow. This link is unavailable for ServiceNow-provided core actions.

Flow statistics

Use flow statistics to see configuration details and run-time values for each flow component. Clicking a trigger or action expands the row and displays configuration and run-time details about it.

Sample flow statistics of the VTB Sample Flow



The screenshot shows the ServiceNow Flow Designer interface with the following details:

- Session Information:**

VARIABLE NAME	VALUE
Calling Source	Flow Designer Test
- Configuration Details:**

VARIABLE NAME	TYPE	CONFIGURATION	RUNTIME VALUE
Condition	Conditions	priority=1	
Table	Table Name	incident	incident
run_flow_in	Choice	any	any
run_on_extended	Choice	false	false
run_when_setting	Choice	both	both
run_when_user_list	List		
run_when_user_setting	Choice	any	any
- Trigger Output:**

VARIABLE NAME	TYPE	RUNTIME VALUE
Record	document_id	INC0000001
Run Start Time	glide_date_time	2020-11-16 21:29:10
Table Name	table_name	incident
- ACTIONS:**

1 Create Freeform VTB	Completed	2020-11-16 13:29:10	379ms
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The following types of execution details are available.

Calling source

Identify the source that started a flow, subflow, or action.

Run as

Identify whether the flow was **Run as** the system or the user who triggered the flow.

Run with role(s)

Identify the specific roles granted to the user who triggered the flow.

Integration Metadata

View transaction data such as connection and credential used, MID Server used, target host, and payload size. Integration Metadata is only displayed for integration steps and requires a separate Integration Hub subscription. For more information, see [Integration steps](#).

Configuration Details

View the list of input variables to identify any configuration errors with the action. Each variable has its own row displaying its name, data type, configuration settings, and run-time value. The configuration settings display dynamic values as pills. The run-time values display generated records as a link.

Note: Variables that have transform functions only display one run-time value, which is the result of all transformations.

Output Data

View the list of output variables to identify any configuration errors with the action.

Logs

Use the log entries to identify potential processing or performance issues. Each log entry has its own row displaying the creation date, log level, and log message. If the action does not generate any logs, the statistics displays the string No Logs.

Note: Logs always display time in UTC format because logs must be saved as strings so that the instance can share the log data between its multiple nodes. Since each node can reside in a different time zone, UTC format is used as a common format to preserve correct time values.

Steps

Use the list of steps to identify any configuration errors with the action. Each step has its own row displaying the variable name, data type, configuration settings, and run-time value. Core actions do not display steps because users cannot change their configuration.

Change the com.snc.process_flow.reporting.serialized.val_size_limit system property to truncate run-time values in the flow execution details step configuration. To learn more, see [Flow Designer system properties](#).

Start time

View the local time when an action started.

Run duration

Use the run duration to identify potential processing or performance issues. Each action and step displays the duration in milliseconds. System quota rules prevent any action from running longer than a minute.

Retry Info

Use the retry info section to view the details of retry policy, such as type of retry strategy, elapsed time, and the next scheduled retry request. The Retry Info section appears only when the retry policy is enabled in the step. For more information, see [Retry policy](#).

Calling source

The calling source lists what started a flow, subflow, or action.

Source	Description
Flow Designer Test	The flow started because a user selected the Test option from the Flow Designer interface. The flow trigger conditions were ignored.
CRUD Trigger	The flow started when the record-based trigger conditions were met.
Date Trigger	The flow started when the schedule-based trigger conditions were met.
Metric Trigger	The flow started when the MetricBase trigger conditions of a MetricBase were met.
Service Catalog Trigger	The flow started when a Service Catalog item was requested.
Script	The flow started from an API method call in a script, such as a business rule.
Background Script	The flow started from an API method call in the Scripts - Background module.

Embedded text viewer

Flow Designer displays large text-based configuration and run-time output records, such as email output, XML payloads, or script steps using an embedded text viewer. The embedded text viewer can format text as HTML, plain text, or color-coded JavaScript. For script steps, the text viewer highlights code lines containing errors.

Sample text view of a script step

Viewing script [script] X

Error: missing ; before statement (Process Automation.05c45050db5e8300efc57416bf961939; line 4)

```
1 (function execute(inputs, outputs) {  
2     var vtbLane = new GlideRecord('vtb_lane');  
3     vtbLane.addQuery('board', inputs.vtbBoard.sys_id)  
4     sdgdfgsdfg df sdf sdf  
5         vtbLane.query();  
6         vtbLane.next();  
7  
8     var vtbCard = new GlideRecord('vtb_card');  
9     vtbCard.task = inputs.task.sys_id;  
10    vtbCard.board = inputs.vtbBoard.sys_id;  
11    vtbCard.lane = vtbLane.sys_id;  
12    vtbCard.insert();  
13  
14    outputs.vtbCard = vtbCard;  
15  
16 })(inputs, outputs);
```

Viewing results for each item in flow logic

Flow Designer displays a selector control to view the configuration and run-time results for each item processed by flow logic. Select a record number to see its configuration and run-time details.

Sample flow statistics for each item in flow logic

The screenshot shows the ServiceNow Flow Designer interface. At the top, there are tabs for 'Flow Designer' and two 'Email network group...' options. Below the tabs, the 'Execution Details' section shows a run titled 'Email network group when new user added' with a status of 'Completed'. The 'State' column shows 'Completed', 'Start time' shows '2017-11-10 10:01:32', and 'Duration' shows '488ms'. There are buttons for 'Open Flow Logs', 'Open Flow', and 'Open Context Record'. The main area displays the flow logic steps:

- TRIGGER:** [now] [Group Member] Created. State: Completed, Start time: 2017-11-10 10:01:32, Duration: 8ms. Action: Open Current Record.
- ACTIONS:**
 1. [now] Look Up Records. Core Action: Completed, Start time: 2017-11-10 10:01:32, Duration: 8ms.
 2. [loop] For Each Item in (1->Group Member Records) : 1 of 5. Flow Logic: Completed, Start time: 2017-11-10 10:01:32, Duration: 416ms.
 3. [now] Send Email. Core Action: Completed, Start time: 2017-11-10 10:01:32, Duration: 276ms.

Subflow execution details

Process analysts can view subflow execution details from multiple locations.

Parent flow execution details

A parent flow lists the flow execution details of each subflow that it calls as inline elements. Expand the subflow step to see the subflow execution details.

Subflow execution details

The system generates flow execution details for each subflow run. View subflow execution details directly from the list of flow executions.

Flow roles

Create flows and subflows that run with specific roles. Assigning roles enables you to create user-initiated flows that run with their own roles rather than the user's roles.

Role selection

A flow runs as either the system user or as the user who initiates the session. You can only assign roles to flows that run as the user who initiates

the session. When the flow runs as the system user, it runs with the system role, and individual role selection isn't available. For more information, see [Create a flow](#).

You can assign multiple roles to a flow. Selecting new roles replaces the flow's original roles. If roles aren't selected, the flow runs with the roles of the user who initiates the session.

The roles you can select for a flow depend on the roles you have and the application scope of the flow. Assign any roles you have access to in a particular scope, except high-security roles. You can't assign the following roles to a flow:

- admin
- security_admin
- application-specific admin roles, such as an application admin role for Human Resources.

Modified and copied flows

Other users can modify and copy your flow. To modify a flow, a user must have the same roles as the flow. Users missing any of the roles assigned to the flow, sees the flow as read-only.

When you copy a flow, the assigned roles are removed. The copied flow runs with either the system role or the roles of the user who initiated the session.

Missing roles

Sometimes a flow refers to a role that is not on the instance. The missing role may have been removed or may not exist on the instance. Either situation can occur when moving a flow between instances. When a role is unavailable, the **Run with role(s)** field displays the sys_id of the role instead of its name. While the role is missing, you cannot save changes to the flow. To save flow changes, either remove the role from the flow or add it to the instance.

Flow roles in execution details

You can see the "Run with" roles for a flow by viewing the flow execution details. Use the **Run As** field to determine which user ran the flow. Only

flows that ran as the initiating user can have roles assigned. These flows have a **Run with role(s)** field that displays the roles assigned to the flow.

Subflow roles

Flows and subflows each run with their own roles. Subflows don't inherit roles from a parent flow. When flow execution returns to a parent flow from a child flow, any special roles associated with the child flow are removed. The parent continues execution with its own roles.

Access control lists

Assigning a role to a flow doesn't guarantee that the flow can access a record or table. While roles are an important part of access control lists (ACLs), they are just one possible condition. If a flow cannot access the records you expect it to, review the record ACL rules for the table and fields. The ACL rules might require additional criteria to grant access. For more information, see [access control list rules](#).

Domain separation and Flow Designer

Domain separation is supported in Flow Designer. Flow Designer supports domain separation of business logic, which lets each tenant domain have its own flows, actions, and subflows. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard*

- Includes **Basic** level
- Business logic: Processes can be created or modified per customer by the service provider. The use cases reflect proper use of the application by multiple service provider customers in a single instance.
- The owner of the instance needs to be able to configure MVP business logic and data parameters per tenant as expected for the specific application.

Use case: As an admin, I need the ability to make comments mandatory on close of a record for one tenant, but not for another.

How domain separation works in Flow Designer

The system domain separates Flow Designer content according to these rules.

Flow Designer content inherits the domain of the user who creates them

Flows, actions, and subflows belong to the domain of the user who creates them. For example, when a service provider (SP) administrator in the TOP domain creates a flow, it belongs to the TOP domain.

Note: The domain selected from the domain picker overrides the domain the user belongs to. For example, when an SP administrator in the TOP domain selects the ACME domain from the domain picker, any content created belongs to the ACME domain.

Flow Designer content runs from the domain from which it is triggered or initiated

Flows, actions, and subflows run from the domain of the record or user who initiates them. For example, when a user from the child domain ACME triggers a flow belonging to the parent domain TOP, the flow runs in the context of the child domain ACME.

Domain assignment by trigger type

Trigger type	Domain assignment
API call	Domain of the user making API call
Email trigger	Domain of the email sender
Record trigger	Domain of the triggering record
Scheduled trigger	Domain of the flow
Service Catalog trigger	Domain of the requested item record

Flow Designer only runs content accessible from the current domain context

The system can only run content to which the current domain context allows access. See [Understanding domain separation](#) to understand data

separation and the domain hierarchy. For example, a user in the child domain ACME can trigger flows belonging to the parent domain TOP, but cannot trigger flows belonging to a sibling domain such as INITECH.

Flow Designer runs record operations from the current user domain context. A read operation such as the Lookup Records action returns records based on the currently selected domain and its children. For example, if the currently selected domain is the TOP domain, you will see records from the TOP domain and all its children such as the ACME and INITECH domains. If the currently selected domain is the ACME domain, you will see records from the ACME domain and its children, but you will not see records from the parent TOP domain.

Note: Record operations use the data or process separation rules applied to the table the record belongs to. For example, suppose you have process-separated the Business Rule table. If you add a business rule to the TOP domain, the business rule will be accessible to record operations in child domains such as the ACME domain because process separation allows access to records from parent domains.

Flows that call another application such as a decision table or workflow also run from the current user domain context.

Flow Designer runs all flows whose trigger conditions are met

A flow in one domain cannot override or prevent a flow from another domain from running. Flow Designer runs any flow that is visible to the current user and whose trigger conditions have been met. For example, a flow belonging to the TOP domain that is triggered by the creation of an incident record runs anytime an incident is created, regardless of whether the incident is created in the ACME or INITECH child domains.

Design considerations

Follow these design considerations when using domain separation with Flow Designer.

Ensure that tenant flows, actions, and subflows are run properly for domains

Since tenants cannot override Flow Designer content, a service provider (SP) administrator from the TOP domain must author and manage them

to ensure they run properly for domains. While you can create domain-specific flows, users working from domains higher in the hierarchy may trigger multiple child domain flows. For example, a user working in the TOP domain can trigger flows in child domains such as ACME and INITECH.

Note: Flow authors can see only Flow Designer content available from their current domain and any parent domains in the hierarchy. Flow Designer does not display content visible from Contains domains.

Provide a unique name for each flow, action, and subflow

Since all domains share Flow Designer content, have an SP administrator in the TOP domain uniquely name each flow, action, and subflow to ensure that a flow intended for one domain does not duplicate the name of a flow in another domain. For example, add the domain to the flow name such as Validate incidents - TOP, Validate incidents - ACME, and Validate incidents - INITECH.

Ensure that flows and actions only contain artifacts from current or parent domains

Flow Designer prevents the activation of any flow containing artifacts unavailable to the current or parent domains. For example, if you create a domain-specific flow that belongs to the ACME domain, it cannot contain actions or subflows belonging to the sibling domain INITECH.

Edit Flow Designer content in the domain to which it belongs

While users in a parent domain can see flows, actions, and subflows in a child domain, they must edit them in the domain they belong to. For example, an administrator in the TOP domain can see flows from the ACME domain but must switch to the ACME domain to edit it.

- [Generate group approvals for domain separated requests](#)

Configure Flow Designer to generate approvals for all members of a group or to restrict approvals to only group members who are visible from the domain of the request.

Generate group approvals for domain separated requests

Configure Flow Designer to generate approvals for all members of a group or to restrict approvals to only group members who are visible from the domain of the request.

Before you begin

Role required: admin

About this task

By default, Flow Designer generates approvals for all group members who can access the parent request regardless of domain visibility. This configuration allows requests from members of a child domain to generate approvals for members of a parent domain who are not otherwise visible from lower in the domain hierarchy. You can use this procedure to restrict the generation of approvals to only those group members who are visible from the domain of the parent request. For information about domain hierarchies, see [Understanding domain separation](#). For more information about visibility and contains domains, see [Visibility domains and contains domains](#).

Procedure

1. Add a system property.
2. For the system property name, enter
`com.glide.hub.flow.approval.group_member.use_query_no_domain`.
3. For the system property type, select **true | false**.
4. For the system property value, enter one of these values.

Option	Description
true	Generate approvals for all members of the group who have access to the domain of the parent request. Select this option to exclude domain visibility from the approval

Option	Description
	generation query. For example, generate approvals for users who belong to domains higher in the domain hierarchy. This is the default value.
false	Generate approvals only for group members who are visible from the domain of the parent request. Select this option to include domain visibility in the approval generation query. For example, do not generate approvals for users who belong to domains higher in the domain hierarchy.

Note: Flow Designer only generates approvals for users who can access the domain of the request.

Result

Flow Designer only generates approvals for group members who belong to the same domain or child domains of the parent request.

Architecture Overview

Understand how Flow Designer works within the Now Platform to activate, trigger, and process flows and actions.

A flow consists of a trigger and one or more actions. The trigger specifies when to start the flow, which can be record-based, schedule-based, or application-based. Record-based triggers run a flow after a record has been created, updated, or deleted. The flow can use the triggering record as input for actions. Schedule-based triggers run a flow at the specified date and time. The flow can use the execution time as input for actions. Application triggers are added when the associated application is activated. For example, the MetricBase trigger is present when the MetricBase application is active.

Flow processing

Flow processing occurs in this sequence.

1. When the flow trigger conditions occur or an API directly calls the flow, the system creates an entry in the event queue to start the flow.
2. The scheduler processes the event and starts the flow in the background.
3. The system builds a process plan from the flow.
4. The system runs the process plan using the record that triggered the flow.
5. The system stores the execution details in a context record.



1. Process flow triggers and API calls

Each time trigger conditions are met or an API directly calls a flow, Flow Designer creates an event entry. The system processes triggers after database operations. To learn more, see [Execution order of scripts and engines](#). Typically, [How business rules work](#) and [Workflow engine operation order](#) that run synchronously run before a triggered flow.

2. Process events in the queue

Each flow event contains a reference to the flow to start and a reference to either the triggering record or the execution time. The system processes these events using [Events](#) where a scheduler periodically works through the current items in the event queue in the order in which they were added. Depending on what other events are in the queue, the system may not immediately start a flow. Flow designers should expect some lag time between when the trigger conditions occur and when the flow actually starts.

3. Build the process plan

When Flow Designer pulls an event from the queue, it builds a process plan to actually run the flow. A process plan contains all the information necessary to execute a flow such as the sequence of published actions or subflows, the input values for each subflow or action, the action steps to run for each action, and the data provided by the trigger or subflow output.

Flow Designer uses a just-in-time compilation scheme to ensure that process plans contain the latest changes to flows, subflows, and actions. If no changes are detected, Flow Designer uses a cached copy of the process plan. Otherwise, it builds a new process plan.

By automatically checking for updated flows, subflows, and actions with process plans, Flow Designer enables you to apply changes from update sets and upgrades without having to edit current flows. If you move published actions to a target instance, every flow that uses the published action will automatically update the next time it is executed.

Warning: If changing subflows or actions used in activated flows, do not change the inputs and outputs used in the subflow or action. Changing inputs and outputs may cause errors when the activated flow is next triggered because it has not been configured to use the new inputs and outputs. Any currently running flows are unaffected by changes to inputs or outputs as the flow uses the compiled subflows and actions from the process plan.

4. Run the process plan

Flow Designer runs the process plan as the **System** user within the flow application scope.

When running a flow with a record-based trigger, Flow Designer stores the triggering record in memory as an instance that is represented in the interface as a data pill.

The instance contains the record values from when the flow started, which may be different than the current record stored in the database. For example, suppose that creating an incident record triggers a flow. Any changes a user makes to the incident record after the flow has started do not update the triggering record unless an action specifically looks up the current record value.

5. Store flow execution details

Flow Designer stores flow execution details in a flow context record, which contains this information.

- Flow outcome state
- Flow runtime duration
- Flow log messages
- Flow configuration and runtime values

Each time a flow runs, Flow Designer adds an entry to the **Flow Executions** list. Each entry has its own context record and matching execution details page.

Note: A flow execution context runs in a single thread. However, there may be times when you want to run flows within separate contexts even though this may consume more of your instance's resources. To run subflows in separate flow contexts within the same flow, see [Dynamic flows](#).

A flow can have one of these outcome states.

State	Description
Complete	The flow completed successfully.
In Progress	The flow is running. By default, a transaction quota rule prevents flows from running longer than an hour.
Waiting	The flow is waiting for another event to occur. For example, a user must update a task or approval, or a record must reach a specific state. When in the waiting state, the flow is quiesced and serialized into a context record.
Canceled	The flow was canceled by a user.
Error	The flow encountered an error and has stopped running. For example, an action is missing an input

State	Description
	value, or a quota transaction rule has stopped the flow.

Flow, subflow, and action life cycle

Flow Designer uses the flow or action status to describe the current state of configuration changes.

Flow and subflow status and activation state

The **Status** field indicates whether there is a process plan associated with the flow or subflow.

Flow status	Description
Modified	Indicates that there are unsaved changes to a flow or subflow. Modified flows or subflows have not been saved.
Draft	Indicates that there are saved changes to a flow or subflow, which have not been stored in a process plan. Draft flows have been saved but not activated. Draft subflows have been saved but not published.
Published	Indicates that there is a stored process plan for the flow or subflow. Published flows have either been activated or deactivated.

The **Active** field indicates whether the system runs a flow or subflow.

Active	Description
True	Indicates that the flow or subflow is active and runs when triggered or called. The flow has been activated or the subflow has been published. Active flows run when the trigger conditions are met or when called. Active subflows run when called.

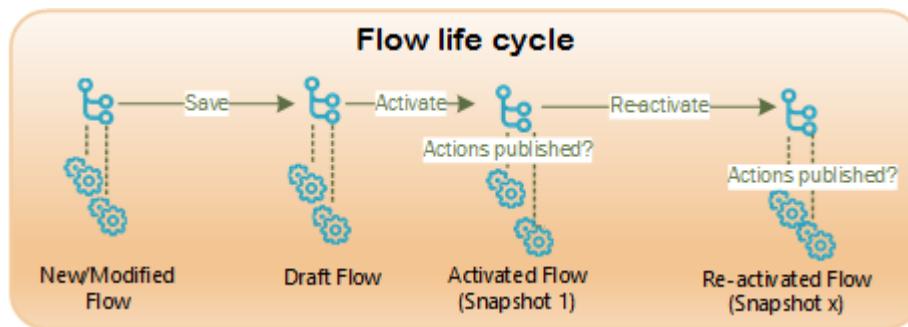
Active	Description
False	Indicates that the flow is inactive and does not run when triggered or called. An inactive flow has either never been activated or has been deactivated. An inactive subflow has never been published.

When working with flows, you can:

- **Save** a flow: Creates a draft of the flow.
- **Activate** a flow: Enables the flow trigger and transform the flow into a process plan.
- **Deactivate** a flow: Disables the flow trigger and prevents new flow executions. Currently running flows continue to run.

When working with subflows, you can:

- **Save** a subflow: Creates a draft of the subflow. If the subflow is modified after being published, the subflow moves into a draft state. Any active flows that use the subflow only run the published subflow.
- **Publish** a subflow: Enables you to activate a flow containing the subflow. Publishing adds the subflow to the list of available subflows in a flow.



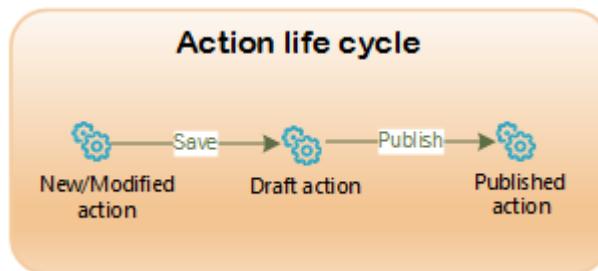
Action status

The Action Designer interface does not display the configuration status of actions. To view action status, navigate to the Action Types table [sys_hub_action_type_definition] and display the **Draft state** field.

Action Draft status	Description
Draft	Indicates that there are changes to an action that have not been published. Draft actions are only available to flows when the Show draft actions option is enabled. You cannot activate a flow containing draft actions.
Published	Indicates that the action has been published. Published actions are available to all flows and allow flows to be activated.

When working with actions, you can:

- **Save** an action: Creates a draft of the action that is only available to flows when **Show draft actions** is enabled. If the action is modified after being published, the action moves into a draft state. Any active flows that use the action only run the published action.
- **Publish** an action: Enables you to activate a flow containing the action. Publishing adds the action to the list of available actions in a flow. Only actions in a published state run during flow execution.



Application development

When designing an action or a flow, use these design considerations as a guide.

Use standard Now Platform application development capabilities to create, manage, protect, and deploy Flow Designer content. Flow and action designers typically perform the following application development tasks:

- Create a custom application to store flows and actions.
- Set application permissions to share or restrict access to application data.
- Grant application developers access to Flow Designer.
- Publish custom applications to the application repository to deploy flows and actions on other instances.

Collision avoidance

Flow Designer supports collision avoidance. Collision avoidance prevents a user from modifying an object that is being modified in a different update set. For example, User A is editing a flow in a particular update set. User B, who is working in a different update set, attempts to open the same flow. In this situation, the system detects a collision and alerts User B. User B can then choose to either **Cancel** or **Continue**. Selecting **Cancel** takes User B back to the Flow Designer homepage. Selecting **Continue** opens the flow in read-only mode.

For collision avoidance to work, both users must be in the same application scope, and it must be an application scope other than global. Additionally, the application being modified must be linked to source control. For more information, see [Collision avoidance](#).

Security

Control access to Flow Designer processes and records.

- Administrators can grant users access to Flow Designer by creating an application and assigning users as developers with the Flow Designer [delegated development](#) permission. Delegated development allows administrators to control whether flow designers can access

features normally restricted to admin users such as assigning user roles, creating access controls, or creating scripts. For more information, see [Developer permissions](#).

- Administrators can grant access to Flow Designer by directly assigning users the flow_designer user role, which includes the role to view flow execution details.

Warning: Directly granting a user the flow_designer role is equivalent to giving the user the admin role, because Flow Designer can run flows as the System user, which has access to all tables and all database operations.

- Flow and action designers can use standard [Application access settings](#) to manage how their content interacts with other applications.

Action limit

By default, flows can have no more than 50 actions. To change the default behavior, increase the value of the sn_flow_designer.max_actions system property. However, consider the performance impact that a large flow may have on your instance.

Trigger options for record updates

Flow designers can specify how often a flow can update a particular record with the **Run Trigger** option. Use the **Once** option when you want a flow to run only once. The first time a record is updated, the flow runs, but any further record updates do not trigger the flow. Use the **Always** option when you want the flow to run every time a record is updated and there is not already an active flow running for it. For example, you might set a flow that assigns an incident record to run only once, and set a flow that notifies the incident watch list to always run. The **Run Trigger** field is only available for these trigger types.

- Created or Updated
- Updated

Direct recursion prevention and indirect recursion limit

To prevent instance outages and consumption of system resources, Flow Designer ignores any request to start a flow or subflow that is the result of direct recursion. Direct recursion occurs under these conditions.

- An action calls the same flow that it is part of. For example, a script step makes an API call to a flow.
- An action or subflow produces a result matching the flow trigger. For example, a flow that runs when an incident record is updated contains an update record action that updates an incident record.

Flow Designer also limits the number of times a flow can be started from indirect recursion. Indirect recursion occurs under these conditions.

- The same flow is called multiple times in a chain of subflow calls. For example, if subflow A calls subflow B, and subflow B calls subflow A, then calling either subflow produces indirect recursion.
- The same flow is triggered multiple times in a chain of subflows. For example, suppose that there are two flows triggered by record creation. Suppose that creating record A triggers flow A and also creates record B. Furthermore, creating record B triggers flow B and creates record A. Creating either record type produces indirect recursion.

By default, the system stops triggering flow runs after the run count reaches the indirect recursion limit of three runs. Administrators can change the limit by setting the system property com.glide.hub.flow_engine.indirect_recursion_limit to an integer value equal to or greater than one. The system ignores any property value less than one and instead uses a limit of one. Consider the performance impact that increasing the indirect recursion limit may have on your instance.

Note: By default, a transaction quota rule prevents flows from running longer than an hour.

Flow and action testing

Testing a flow bypasses the trigger conditions and immediately runs it. Testing a flow with a record-based trigger requires selecting a specific record to act as the trigger. Flow designers should generate appropriate sample records prior to testing.

During the design phase, you can test an inactive flow and unpublished actions by setting **Show draft actions** on the flow. If testing with draft actions, use these guidelines.

- Design flows and actions on a non-production instance. Only deploy active, working flows to your production instance.
- Leave **Show draft actions** set to true until your draft is in a final state. Once final, publish each action, set **Show draft actions** to false, and activate the flow.

Warning: Disabling **Show draft actions** before publishing your actions removes all draft actions from your flow.

- Any change you make to an active flow or published action causes it to return to a draft state. If the flow is triggered, the system only runs the activated flow and published actions, and the flow execution details only display what was run. When there is a draft of an active flow, the trigger and actions listed in the flow execution details may be different than those listed in the draft flow.

Flow Designer set up

Configure Flow Designer user access, API access, and properties.

- [User access to Flow Designer](#)

Administrators can grant users access to Flow Designer by assigning delegated development permissions or directly assigning a user role. Administrators can also specify which features and content a user can access based on user roles. Application developers can access Flow Designer functionality through APIs for flows, subflows, and actions.

- [Restricted caller access to Flow Designer](#)

Track flows and actions that require access to cross-scope resources. Allow or deny flows and actions access to cross-scope resources.

User access to Flow Designer

Administrators can grant users access to Flow Designer by assigning delegated development permissions or directly assigning a user role. Administrators can also specify which features and content a user can access based on user roles. Application developers can access Flow Designer functionality through APIs for flows, subflows, and actions.

Access by user role

Administrators can grant access to Flow Designer by directly assigning users the flow_designer user role, which includes the role to view flow execution details.

Warning: Directly granting a user the flow_designer role is equivalent to giving the user the admin role, because Flow Designer can run flows as the System user, which has access to all tables and all database operations.

Administrators can also grant users one or more Flow Designer roles to enable them to create flows and subflows, view flow execution details, and create actions.

Flow Designer roles

Role title [name]	Description	Contains Roles
flow_designer	Enables a user to launch the Flow Designer design environment to create and edit flows and subflows.	flow_operator
flow_designer_scripting	Enables a user with the flow_designer or action_designer role to set and modify input values by writing inline scripts. For information, see Inline scripts .	none
flow_operator	Enables a user to view flow execution details, dashboards, and logs. Administrators can grant this role to users that want to be able to view flow results but	none

Role title [name]	Description	Contains Roles
	not create, change, or test them.	
flow_report_viewer	Enables a user to view reports for Flow Designer tables. For a list of relevant reporting tables, see Flow execution details retention .	none
action_designer	Enables a user to launch the Action Designer design environment to create and edit actions.	none
action_category_creator	Enables a user with the action_designer role to create action categories for actions and subflows.	none
fd_read	Enables a user to launch the Flow Designer and Action Designer design environments to view the configuration and execution details of flows, subflows, and actions.	fd_read_flows, fd_read_actions, fd_read_operations

Role title [name]	Description	Contains Roles
	<p>Note: Read only roles are incompatible with roles that provide write access such as flow_designer or action_designer. Avoid granting the same user both a read only and a write access role.</p>	
fd_read_flows	<p>Enables a user to launch the Flow Designer design environment to view the configuration and execution details of flows and subflows.</p> <p>Note: Read only roles are incompatible with roles that provide write access such as flow_designer or action_designer. Avoid granting the same user both a read only and a write access role.</p>	fd_read_operations
fd_read_actions	Enables a user to launch the Action Designer design environment to view	none

Role title [name]	Description	Contains Roles
	<p>the configuration of actions.</p> <p>Note: Read only roles are incompatible with roles that provide write access such as flow_designer or action_designer. Avoid granting the same user both a read only and a write access role.</p>	
fd_read_operations	<p>Enables a user to view flow and action execution details. Administrators can grant this role to users that want to be able to view flow results but not create, change, or test them.</p> <p>Note: Read only roles are incompatible with roles that provide write access such as flow_designer or action_designer. Avoid granting the same user both a read only and a write access role.</p>	none

Note: Some applications provide UI actions to view related flow or flow contexts. You need an application-specific user role to view such UI actions. For example, users require the itil or equivalent user role to view the **Flow Context** UI action available from Requested Item records.

API access

Application developers can access Flow Designer functionality through APIs for flows, subflows, and actions. Flow designers can enable individual flows, subflows, and actions to be client callable during design. For more information, see [API access to Flow Designer](#).

Delegated development access

Administrators can grant users access to Flow Designer by creating an application and assigning users as developers with the Flow Designer [delegated development](#) permission. Delegated development allows administrators to control whether flow designers can access features normally restricted to admin users such as assigning user roles, creating access controls, or creating scripts. For more information, see [Developer permissions](#).

Role-based content filtering

Specify the user roles necessary to access Flow Designer content. For example, flows, flow triggers, actions, and subflows. Manage content filtering by creating content definitions and content filtering rules. For more information, see [Content filtering for Flow Designer](#).

Note: Your users must have the flow_designer role to create and edit flows. You can specify the additional roles that a user must have to access particular features or content.

Role-based feature access

Specify additional user roles necessary to access the UI elements of Flow Designer. For example, specify a role to access the buttons to save, test, or activate a flow or to access the option to copy a code snippet. Manage feature access directly through the Feature Access List. For more information, see [Manage access to Flow Designer features](#).

Note: Your users must have the flow_designer role to create and edit flows. You can specify the additional roles that a user must have to access particular features or content.

- [API access to Flow Designer](#)

Application developers can access Flow Designer functionality through APIs for flows, subflows, and actions. Flow designers can enable individual flows, subflows, and actions to be client callable during design.

- [Manage access to Flow Designer features](#)

Restrict access to individual Flow Designer features by user role. Specify what additional roles a user must have to access an individual feature such as copy a flow.

- [Content filtering for Flow Designer](#)

Specify which content a user can access based on the user's role.

API access to Flow Designer

Application developers can access Flow Designer functionality through APIs for flows, subflows, and actions. Flow designers can enable individual flows, subflows, and actions to be client callable during design.

Available Flow Designer APIs

Trigger flows, subflows, and actions using these APIs from server or client scripts.

Server side

[FlowAPI](#): Trigger a flow, subflow, or action using synchronous or asynchronous methods, with or without execution details.

Client side

[GlideFlow](#): Perform client-side interactions with actions, flows, and subflows. Flow designers must enable a flow, subflow, and action to be called from the client.

FlowAPI quick methods

Use quick methods in the [FlowAPI](#) class to run an action, flow, or subflow from a server-side script without creating execution details or other related records. Use these methods to increase the speed of high-volume processing in a production environment, and to improve performance by eliminating record-keeping overhead. Methods include:

- `executeActionQuick()`, `executeFlowQuick()`, `executeSubflowQuick()`: Run an action, flow, or subflow from a server-side script synchronously from the current user session.
- `startActionQuick()`, `startFlowQuick()`, `startSubflowQuick()`: Run an action, flow, or subflow from a server-side script asynchronously.

XML and JSON streaming APIs

Build a large streaming or non-streaming JSON or XML payload to use in a REST or SOAP request to send bulk data to a third-party API. For example, you can use these APIs to create a JSON payload in the ServiceNow® Flow Designer Script step and pass the returned value to the REST step to send the request to a third-party service. For more information, see [JSONStreamingBuilder](#) and [XMLStreamingBuilder](#).

Client callable APIs

By default, the flows, subflows, and actions can only be called by the FlowAPI within a server script. Flow and action designers can make individual flows, subflows, or actions available to client calls by enabling the **Client callable** option during the design process.

Run as support

Flows and subflows can run as either the system user or the user who initiates the session. Set this behavior from the [flow properties](#). All API quick methods ignore the run as property, and always run as the system user.

Actions always run as the user who initiates the session.

Code snippets

Application developers can generate a JavaScript function that calls a specific flow, subflow, or action with the **Code Snippet** option. Use

the code snippet in scripts such as business rules or the **Scripts - Background** module to call specific Flow Designer elements. The system only generates code snippets for published flows, subflows, and actions. Flow Designer elements in the draft or modified status do not generate code snippets.

- [Create code snippets for flows, sub-flows, and actions](#)

Generate a code snippet to call a specific flow, subflow or action.

- [Create a client callable flow, subflow, or action](#)

Enable a client script to trigger a flow, subflow, or action.

Generate a code snippet to call a specific flow, subflow or action.

Before you begin

- Role required: flow_designer or admin
- Activate the flow or subflow you want to call.
- Publish the action you want to call.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Open a flow, subflow, or action.
3. Click the **More Actions** icon in the upper right corner of the flow designer.
4. Select **Create Code Snippet**.
5. A modal window appears containing the code snippet. The text of the snippet is selected by default. To copy the code, manually copy the code from the pop-up modal, or click the **Copy Code Snippet Clipboard** button.

What to do next

Edit the script to add any mandatory values, such as inputs.

Enable a client script to trigger a flow, subflow, or action.

Before you begin

- Role required: security_admin
- Consider the implications of making a flow, subflow, or action client callable, such as whether it exposes protected data or bypasses validation logic.

About this task

By default, the flows, subflows, and actions can only be called by the FlowAPI within a server script. Flow and action designers can make individual flows, subflows, or actions available to client calls by enabling the **Client callable** option during the design process.

Procedure

1. Elevate privileges to security_admin.
2. Navigate to **System Security > Access Control (ACL)**.
3. Click **New**.
4. Create an access control.

Field	Description
Type	client_callable_flow_object
Operation	execute
Admin overrides	Selected
Name	Enter a name for the ACL.
Requires role	Create a role to provide access to the APIs. For example, create a flow_api_access role.

5. Assign the role to the user you would like to grant access to.

6. Enable a client script to trigger the flow, subflow, or action.
 - a. Open the flow, subflow, or action you want to make client callable.
 - b. In the **More Actions** menu, select **Manage security**.
 - c. Select **Callable by Client API**.
 - d. Add the access control record created earlier to the **ACLs** field.
 - e. Click **Update**.

Result

The user with the designated permissions can trigger a client callable flow, subflow, or action from a client script using the GlideFlow API.

Manage access to Flow Designer features

Restrict access to individual Flow Designer features by user role. Specify what additional roles a user must have to access an individual feature such as copy a flow.

Before you begin

Create any custom roles that you want to use for feature access. When you specify which roles are required to access a feature, you can select the roles from a list of existing roles.

Role required: admin

About this task

Features are elements of the Flow Designer UI. When feature filtering is turned off, users with the flow_designer role have access to all of the Flow Designer features. When feature filtering is turned on, you can specify which roles a user must have to access individual features.

Note: Your users must have the flow_designer role to create and edit flows. You can specify the additional roles that a user must have to access particular features or content.

Procedure

1. Navigate to **All > Process Automation > Flow Administration > Feature Access List**.
2. For each feature on the list, click the edit icon () next to the feature.
3. Enter the role or roles that are required to access the feature.

Note: Add the flow_designer role to each feature on the Feature Access List. Your users must have the flow_designer role to access the Flow Designer features.

You can use these options to restrict access to Flow Designer action authoring features.

Action Authoring Features

Feature	Description
Copy action	Duplicate an action. For more information, see Copy action .
Error Evaluation	Enable actions to catch step failures and continue running. Identify when specific error conditions occur and return your own action status code, status message, and error state. For more information, see Error Evaluation .
Manage natural language title	Change the default title for an action by adding styled and dynamic text. For more information, see Manage natural language title .
Manage security	Manage access to Flow Designer actions.

Feature	Description
Executions	View the runtime information about an action from the design environment such as the current state, actions, or steps run, and values produced. For more information, see Executions .
Save	Save an action.
Publish	Publish an action to allow other users to use the action.
Configurations	Manage Flow Designer configurations.
"If step fails..." Step Option	Continue running the next step or go to an error evaluation. For more information, see "If step fails..." Step Option .
Code snippet	Generate a code snippet to call an action. For more information, see Code snippet .
Test	Test an action before publishing it for other users. For more information, see Test .
Properties	Configure how the system processes flows. For more information, see Properties .
Configure connections	Configure a connection through the Connections dashboard. For more information, see Configure connections .

You can use these options to restrict access to Flow Designer flow authoring features.

Flow Authoring features

Feature	Description
Manage natural language title	Change the default title for a flow by adding styled and dynamic text. For more information, see Manage natural language title .
Manage flow catalog variables	Create Service Catalog variables that are only available to a specific Service Catalog-triggered-flow. Flow-specific variables are available to the catalog tasks and actions in the flow. For more information, see Manage flow catalog variables .
Properties	Configure how the system processes flows. For more information, see Properties .
Copy flow	Duplicate a flow. For more information, see Copy flow .
Test	Test a flow before publishing it for other users. For more information, see Test .
Configure connections	Configure a connection through the Connections dashboard. For more information, see Configure connections .
Activate	Activate a flow to make it available to other users. For more information, see Activate .
Deactivate	Deactivate a flow to make it unavailable to other users.

Feature	Description
Configurations	Manage Flow Designer configurations.
Code snippet	Generate a code snippet to call a flow. For more information, see Code snippet .
Executions	View runtime information about a flow from the design environment such as the current state, actions, or steps run, and data pill values produced. For more information, see Executions .
Flow Error Handler	Enable flows to catch errors. Run a sequence of actions and subflows to identify and correct issues. For more information, see Flow Error Handler .
Manage security	Manage access to Flow Designer actions.
Stages	Configure when stages display to a user, define stage state labels, and add stages to a flow within Flow Designer. For more information, see Stages .
Diagramming View	Create and view flows as diagrams. You can see the paths a flow can follow and the connections between elements. For more information, see Diagramming View .

You can use these options to restrict access to Flow Designer subflow authoring features.

Subflow Authoring features

Feature	Description
Manage flow catalog variables	Create Service Catalog variables that are only available to a specific Service Catalog-triggered-flow. Flow-specific variables are available to the catalog tasks and actions in the flow. For more information, see Manage flow catalog variables .
Code snippet	Generate a code snippet to call a subflow. For more information, see Code snippet .
Save	Save a subflow.
Manage security	Manage the access to subflows.
Properties	Configure how the system processes subflows. For more information, see Properties .
Manage natural language title	Change the default title for a subflow by adding styled and dynamic text. For more information, see Manage natural language title .
Configure connections	Configure a connection through the Connections dashboard. For more information, see Configure connections .
Copy subflow	Duplicate a subflow. For more information, see Copy subflow .
Test	Test a subflow before publishing it for other users. For more information, see .

Feature	Description
Publish	Publish a subflow to allow other users to use the subflow. For more information, see Test .
Configurations	Manage Flow Designer configurations. For more information, see Configurations .

You can use these options to restrict access to Flow Designer flow template authoring features.

Flow Template Authoring features

Feature	Description
Save	Save a flow template.
Properties	Configure how the system processes flow templates. For more information, see Properties .
Deactivate	Deactivate a flow template to make it unavailable to other users.
Manage flow catalog variables	Create Service Catalog variables that are only available to a specific Service Catalog-triggered-flow. For more information, see Manage flow catalog variables .
Activate	Activate a flow template.

4. Continue adding roles to each feature on the list.
5. Click **OK**.
6. To turn on the feature access for your users, select the **Enable feature access filtering?** option.

After the feature access is enabled, your users must have the required roles before they can access the features. If a user doesn't have the required roles for a feature, the feature does not work for that user.

What to do next

Assign your users with the roles that they need to access your features.

Content filtering for Flow Designer

Specify which content a user can access based on the user's role.

Display only content that is relevant for a particular user, hiding content that is unnecessary or sensitive. Specify the Flow Designer content that you want to control access to and the role that a user must have to access it. For example, if a user with the hr_manager role in human resources is creating a flow, show only the set of actions and subflows that are relevant to HR cases.

Content filtering uses:

- Content definitions to specify types of content.
- Content filtering rules to determine who can access the content.

Flow Designer includes several default definitions and filtering rules. Set up content filtering by modifying pre-existing rules or creating your own.

Content definitions

Content definitions specify a type of Flow Designer resource. Resources are the key components of Flow Designer, such as triggers, actions, and subflows. Create definitions to include an entire resource, or refine your definitions through conditions. For example, you can create a definition that includes all flow triggers, or you can use conditions to include only triggers with a category of date.

You can further refine content definitions through tagging. Add tags to items in a resource list, then design your content definition to only include resources with that tag.

Content filtering rules

Content filtering rules specify the role that a user must have to access the content in a particular definition. Each rule associates a single user role with a single content definition. When a user accesses Flow Designer, content filtering rules determine what content the user may access based on the user's role.

Feature access

You can also filter access to Flow Designer features. Features are UI elements and sections. Access to both elements and sections can be managed by configuring content definitions and filtering rules. However, access to UI elements can also be managed through a simplified UI. For more information, see [Manage access to Flow Designer features](#).

Read-only flows

Users may be able to view a flow, subflow, or action containing content that they can't normally access. For example, a flow that's visible to a user might include an action the user wouldn't usually be able to view. When a flow contains restricted content, the entire flow becomes read-only. Users can run the flow but can't modify or copy it.

The creation of read-only flows doesn't apply to feature filtering. If a user doesn't have access to a feature, the feature doesn't render for that user. It doesn't affect the ability to copy or modify a flow. If a user doesn't have access to transform functions and uses a flow that already has a transform function applied, the transform function is read-only. The rest of the flow can still be copied and modified.

Access summary

Resource filtered	User has role	User does not have role
Flow	<ul style="list-style-type: none">The flow is visible to select during design.The flow can be copied.	<ul style="list-style-type: none">The flow is hidden and cannot be selected during design. For example, the flow is hidden when creating a Process Automation

Resource filtered	User has role	User does not have role
	<ul style="list-style-type: none"> The flow can be modified. 	<p>Designer activity definition.</p> <ul style="list-style-type: none"> The flow cannot be copied. The flow is read-only.
Trigger	<ul style="list-style-type: none"> The trigger is visible to select during design. Any flow that includes the trigger can be copied. Any flow that includes the trigger can be modified. 	<ul style="list-style-type: none"> The trigger is hidden and cannot be selected during design. Any flow that includes the trigger cannot be copied. Any flow that includes the trigger is read-only.
Subflow	<ul style="list-style-type: none"> The subflow is visible to select during design. Any flow that calls the subflow can be copied. Any flow that calls the subflow can be modified. 	<ul style="list-style-type: none"> The subflow is hidden and cannot be selected during design. Any flow that calls the subflow cannot be copied. Any flow that calls the subflow is read-only.
Flow logic	<ul style="list-style-type: none"> The flow logic is visible to select during design. 	<ul style="list-style-type: none"> The flow logic is hidden and cannot

Resource filtered	User has role	User does not have role
	<ul style="list-style-type: none"> Any flow that includes the flow logic can be copied. Any flow that includes the flow logic can be modified. 	<p>be selected during design.</p> <ul style="list-style-type: none"> Any flow that includes the flow logic cannot be copied. Any flow that includes the flow logic is read-only.
Action	<ul style="list-style-type: none"> The action is visible to select during design. Any flow that includes the action can be copied. Any flow that includes the action can be modified. 	<ul style="list-style-type: none"> The action is hidden and cannot be selected during design. Any flow that includes the action cannot be copied. Any flow that includes the action is read-only.
Step	<ul style="list-style-type: none"> The step is visible to select during design. Any action that includes the step can be copied. Any action that includes the step can be modified. 	<ul style="list-style-type: none"> The step is hidden and cannot be selected during design. Any action that includes the step cannot be copied. Any action that includes the step is read-only.

Resource filtered	User has role	User does not have role
UI elements and sections, excluding transform functions	<ul style="list-style-type: none"> The UI element or section is visible to use during design. Any flow, subflow, or action that includes the UI element or section can be copied. Any flow, subflow, or action that includes the UI element or section can be modified. 	<ul style="list-style-type: none"> The UI element or section is hidden and cannot be used during design. Any flow, subflow, or action that includes the UI element or section can be copied. Any flow, subflow, or action that includes the UI element or section can be modified.
Transform functions	<ul style="list-style-type: none"> Transform functions are visible to use during design. Any flow, subflow, or action that includes a transform function can be copied. Any flow, subflow, or action that includes a transform function can be modified. 	<ul style="list-style-type: none"> Transform functions are hidden and cannot be used during design. Any flow, subflow, or action that includes a transform function can be copied. The transform function is read-only. Any flow, subflow, or action that includes a transform function can be modified. The transform function is read-only.

- [Configure content filtering definitions](#)

Specify which content a user can access by creating content definitions.

- [Configure content filtering rules](#)

Use content filtering rules to specify the role a user must have to access content.

Specify which content a user can access by creating content definitions.

Before you begin

Content filtering requires some familiarity with user roles and Flow Designer tables and records.

Role required: flow_designer, action_designer, or admin

About this task

Filter Flow Designer content based on user role. Filtering content requires you to set up:

1. Content definitions to describe the content that you want to filter. Content definitions specify types of Flow Designer resources, such as actions and subflows.
2. Content filtering rules to state the role a user must have to access the resource in a particular definition.

Flow Designer includes several content definitions and filtering rules by default. Get started with content filtering by modifying the preexisting definitions and rules or creating your own.

Procedure

1. To modify or create a content definition, navigate to **Process Automation > Flow Administration > Content Definitions**.
2. Select the definition that you want to modify or click **New** to create one.
3. On the form, fill in the fields.

Flow Designer Resource form

Field	Description
Name	Name for the content definition.
Application	Application scope for the definition. This field is automatically set to the currently selected application scope. If no application scope is selected, the field is set to Global.
Table	Table containing the resource type that you're defining. For example, the Flow [sys_hub_flow] table includes all the flows and subflows available on your instance.
Conditions	Conditions used to filter the records in the table. For example, creating a condition where [Flow Type] [is] [SubFlow] returns only the subflows from the Flow table.
Resource Tags	Tags used to filter the resources in the table.

4. Click **Submit**.

Use content filtering rules to specify the role a user must have to access content.

Before you begin

Role required: flow_designer, action_designer, or admin

Content filtering requires some familiarity with user roles and Flow Designer tables and records.

Role required: flow_designer, action_designer, or admin

About this task

Filter Flow Designer content based on user role. Filtering content requires you to set up:

1. Content definitions to describe the content that you want to filter.
Content definitions specify types of Flow Designer resources, such as actions and subflows.
2. Content filtering rules to state the role a user must have to access the resource in a particular definition.

Flow Designer includes several content definitions and filtering rules by default. Get started with content filtering by modifying the pre-existing definitions and rules or creating your own.

Procedure

1. To modify or create a content filtering rule, navigate to **Process Automation > Flow Administration > Content Filtering Rules**.
2. Select the rule that you want to modify or click **New** to create one.
3. On the form, fill in the fields.

Flow Designer Resource Filter Rule form

Field	Description
Name	Name for the content filtering rule.
User Role	The role a user must have to access the content in the Resource Definition field.
Active	Option to enable the rule.
Application	Application scope for the rule. This field is automatically set to the currently selected application scope. If no application scope is selected, the field is set to Global.

Field	Description
Resource Definition	The name of the content definition that specifies the resource to filter.

4. Click **Submit**.

Restricted caller access to Flow Designer

Track flows and actions that require access to cross-scope resources.
Allow or deny flows and actions access to cross-scope resources.

The Restricted Caller Access Privileges table has dedicated source types to identify Flow Designer calling sources.

Flow

The system uses the flow source type to track operations run by ServiceNow Core actions. Restricted Caller Access Privileges records allow a flow to perform a specific operation on a specific cross-scope resource. Approving a flow to run an operation allows any other core action within the same flow to perform the same operation on the same cross-scope resource.

For example, suppose you have a flow that runs the Look Up Records action on a cross-scope table. When caller restriction is enabled for the cross-scope table, the Look Up Records action generates a request to perform a read operation. When you allow the flow to perform read-operations on the cross-scope table any other read operations performed by core actions can also run. For example, your flow could run the Look Up Record and Lookup Attachments actions on the same cross-scope table. Suppose you add the Look Up Records action for the same cross-scope table to another flow or subflow. Since this read operation comes from another flow, the core action generates a separate access privilege request for approval. If you configure the Look Up Records action to access another cross-scope table, that too generates a separate access privilege request for approval.

Flow Action

The system uses the flow action source type to track operations run by custom actions to a specific cross-scope resource. Restricted Caller

Access Privileges records allow a custom action to perform a specific operation on a specific cross-scope resource. Approving an action to run an operation allows the custom action to perform the operation on the cross-scope resource in any context.

For example, suppose you create a custom action that runs the Look Up Records step on a cross-scope table. When caller restriction is enabled for the cross-scope table, the Look Up Records step generates a request to perform a read operation. When you allow the custom action to perform read operations on the cross-scope table you can run the custom action from any context. For example, you can add the custom action to multiple flows or call the custom action from a script. As long as the custom action performs the operation on the allowed target cross-scope resource, the system allows the custom action to run. If you configure the custom action to access another cross-scope table, the custom action generates a separate access privilege request for approval.

Upgrade restricted caller access privileges for flows and actions

Allow instances upgraded from San Diego and earlier releases to generate restricted caller access privilege requests for flows and actions.

Before you begin

If you enable application administration for the target application, only application administrators of the target application can set access to an application. If application administration is not enabled, an admin user can set access to an application.

Role required: application admin or admin

Note: To learn about application-specific administrator roles and delegated development, see [Access control rules in application administration apps](#) and [Delegated development and deployment](#).

About this task

In San Diego and earlier releases, the Restricted Caller Access Privileges table did not recognize flows and actions as source types. Customers who wanted to generate Restricted Caller Access Privileges records for flows and actions could only do so indirectly. They could use a script include or business rule to call a flow or action. When the script include

or business rule ran it would generate an access privilege request to the cross-scope resource for approval.

Warning: Upgrading restricted caller access privileges to track flows and actions can cause service disruptions on instances that previously tracked cross-scope access from script includes or business rules. After upgrade, all flows and actions that attempt to access restricted resources will be blocked from running and instead generate their own restricted caller access privilege requests for approval. Someone must approve the access privilege requests before cross-scope flows and actions can run. Customers who already allowed indirect tracking of flows and actions using script calls may want to skip this task and continue calling flows and actions from scripts. Customers who want to replace their existing access privileges with the new Flow and Flow Action source types may want to schedule an outage to generate and approve the new access privilege requests.

Procedure

1. [Add a system property](#) .
Create this property.

Field	Value
Name	com.glide.hub.flow.restricted_caller_access.track_flows_as_source
Type	true false
Value	true

2. [Define cross-scope access to an application resource](#) .
Enable Caller Restriction for the tables you want flows and actions to request access to.
3. If you are replacing existing script-based access-permissions, identify the existing cross-scope flows and actions that need access permissions.

You must regenerate any existing access privileges for cross-scope flows and actions. The flow and action access privileges replace the existing script include and business rule access privileges.

4. Generate access privilege requests for any existing cross-scope flows and actions.

You can run cross-scope flows and actions by using or testing the cross-scope application.

Cross-scope flows and actions generate access privilege requests to the tables set to caller restriction.

5. [Allow flows and actions to access your application resources](#).

Identify access privilege requests with these source types.

- Flow
- Flow Action

Set the Status to **Allowed** for each operation you want a flow or action to perform on your restricted application resource.

Result

Flows and actions that attempt to access your restricted application resources generate an access privilege request.

What to do next

Review and approve access privilege requests from your application record.

Flow administration

Identify and troubleshoot potential issues by reviewing action and flow executions, their result state, and their runtime duration.

Flow Designer provides administrators and flow operators these modules to manage flows.

Today's Executions

Displays a list of flow context records for flows run today. Use this information to identify flows run today.

Active flows

Displays a list of flow context records for running flows where the **State** is **Waiting**. Use this information to identify flows that are waiting for a trigger or condition to continue.

Event Queue

Displays a filtered list of event records where the **Queue** is **flow_engine** and the **State** is **Ready**. Use this information to identify flows that are waiting on event processing.

Operations Dashboard

Displays a responsive dashboard containing a count of flows run and the average flow runtime. View statistics for today or over the last 30 days. Use this information to determine the health and performance of flow execution.

Settings

Displays the list of Flow and Action Settings records. Use this table to identify which actions and flows have had reporting disabled. Create records on this table to control whether reporting is done on an action or flow.

Properties

Displays the system properties used to configure how the system processes flows.

Complex Object Templates

Displays templates for complex objects that you can use in flows with Integration Hub integrations. To learn more about creating and using complex object templates, see [create an action](#) and the [Object data type](#).

Usage Overview

Displays transaction counts between your instance and third-party systems. The Usage Overview is not available in the base system and requires the ServiceNow® Integration Hub subscription.

- [Flow execution details retention](#)

Due to the large amount of data consumed by flow execution details, your instance uses data retention policies to delete this data after a set time period.

- [Activate flow reporting](#)

Choose whether to generate execution details for all items Flow Designer runs, just for individual items, or just when you test an item. Specify the level of detail the execution details contain.

Flow execution details retention

Due to the large amount of data consumed by flow execution details, your instance uses data retention policies to delete this data after a set time period.

Scheduled table cleanup

The time period used for scheduled table cleanup depends on the type of data stored. Once a record is older than its default retention period, it is deleted if it is in a completed state and the default skip_schedule_cleanup value is false.

To know the period until which a data recovery request is accepted, see, .

Flow reporting data tables

Table	Description	Default retention period
sys_flow_context	Parent table that stores all Flow Designer context records and their associated process plans. Context records store the state and references to the data used to run a flow or action. See the child tables for context	<ul style="list-style-type: none">• 2 weeks for completed flows• 6 weeks for flows in the error or cancelled state

Table	Description	Default retention period
sys_flow_context_chunk	<p>records in specific states.</p>	
sys_flow_context_chunk	<p>Child table that stores context records and runtime data for currently running flows and actions. This table replaces the sys_json_chunk table as the location to store data for active context records. A running flow or action can be in one of these states.</p> <ul style="list-style-type: none"> • Continue Sync • In Progress • Queued • Waiting <p>Danger: Do not change or delete data in this table. Flow Designer uses this table for flows and actions that are in an active state.</p>	<p>The system removes these records when the flow stops running and creates an entry in the sys_flow_context_chunk_archive table.</p>
sys_flow_context_chunk_archive	<p>Child table that stores context records and runtime data for flows and actions that have stopped running. This table replaces the</p>	<p>Removed when the associated sys_flow_context record is removed.</p>

Table	Description	Default retention period
	<p>sys_json_chunk table as the location to store data for inactive context records. A stopped flow or action can be in one of these states.</p> <ul style="list-style-type: none"> • Cancelled • Complete • Error <p>Note: Flow Designer uses this table for flows and actions that are in an inactive state.</p>	<ul style="list-style-type: none"> • 2 weeks for completed flows • 6 weeks for flows in the error or cancelled state
sys_flow_report_doc	<p>Parent table that stores references to Flow Designer context records that have execution detail reporting data available. See the child tables for the execution details of flows and actions in specific states.</p>	<p>The system removes these records when it removes the parent context record from sys_flow_context.</p>
sys_flow_report_doc_c_hunk	<p>Child table that stores the reporting data and execution details for currently running flows and actions. A running flow or action can be in one of these states.</p>	<p>The system removes these records when the flow stops running and creates an entry in the sys_flow_report_doc_c_hunk_archive table.</p>

Table	Description	Default retention period
	<ul style="list-style-type: none"> • Continue Sync • In Progress • Queued • Waiting <p>Danger: Do not change or delete data in this table. Flow Designer uses this table for flows and actions that are in an active state.</p>	
sys_flow_report_doc_chunk_archive	<p>Child table that stores the reporting data and execution details for flows and actions that have stopped running. A stopped flow or action can be in one of these states.</p> <ul style="list-style-type: none"> • Cancelled • Complete • Error 	<p>The system removes these records when it removes the parent context record from sys_flow_context_chunk_archive.</p> <ul style="list-style-type: none"> • 2 weeks for completed flows • 6 weeks for flows in the error or cancelled state

Table	Description	Default retention period
	Note: This table replaces the sys_json_chunk table as the location to store reporting data for inactive execution details.	
sys_json_chunk	Legacy table that stored compiled process plans for future, running, and completed flows and actions up to the San Diego release.	The system removed these records when it removed the parent record.
sys_flow_log	Table that stores replicated log entries from the Log [syslog] table. Enables users to correlate logs with flow contexts.	The system removes these records in 28 days when the table is rotated or when it removes the context record, whichever comes first. The table rotation on sys_flow_log is configurable. For more information, see Table rotation .

Unavailable flow data

A message displays at the top of the flow report to indicate that action reports are not available for a flow because of table cleanup. The **Show Action Details** link and Action states are not available in this case. A similar message is shown to indicate when reporting for a flow has been deactivated. In this case, a link to the report settings also displays.

Sample flow execution details with data removed by the report retention policy

The screenshot shows the Flow Designer interface with a completed flow run. At the top, there is a message: "The action details for this flow have been removed according to the report retention policy". A red arrow points to this message. Below it, the flow statistics show a "New Message" trigger and three actions: "Log", "Look Up Record", and "Look Up Records". A large red box highlights the third action, "Look Up Records", which contains the message "No action states or timings".

Recovery options

Contact Customer Service and Support to restore data from an instance backup.

Activate flow reporting

Choose whether to generate execution details for all items Flow Designer runs, just for individual items, or just when you test an item. Specify the level of detail the execution details contain.

Activate reporting for an individual flow, subflow, or action

Generate execution details for an individual flow, subflow, or action every time it runs, not just during testing.

Before you begin

Role required: admin

About this task

Important: To avoid performance issues on your production instance, activate and configure reporting on the non-production instance that you use for testing.

You can activate reporting for an individual flow, subflow, or action by creating a record on the Settings [sys_flow_execution_setting] table. Each Settings record specifies the flow, subflow, or action to generate execution details for and the level of detail to use. You can create as many Settings records as you like. The system generates execution details each time the flow, subflow, or action is directly run. Actions or subflows that run from a parent flow use the Settings record of the parent flow.

Note: You can call actions and subflows directly using the action API or script API.

Procedure

1. Navigate to **All > Process Automation > Flow Administration > Settings**.
The system displays the list of individual items for which flow reporting is activated.



2. In the **Flow/SubFlow/Action** field, select the lookup icon () to select the type item for which you want to activate reporting.
The system displays a dialog box to select the type and specific instance.
3. In the **Table name** field, select the matching table for the item.

Option	Description
Flow	Table for flows and subflows
Action Type	Table used for actions



4. In the **Document** field, select the lookup icon ().
The system displays a list of items of the matching type.

5. Select the individual flow, subflow, or action for which you want to activate reporting.
6. Select **OK** to close the dialog box.
7. In the **Reporting** field, select the level runtime data to generate and display in flow execution details. For example, **Flows, Actions, and Steps**.
For more information about reporting levels, see the entry for com.snc.process_flow.reporting.level in [Flow Designer system properties](#).
8. Select **Submit**.

Result

Flow Designer always generates execution details for the individual flow, subflow, or action.

Activate reporting for all items

Generate execution details for all items that Flow Designer runs rather than just generating execution details during testing.

Before you begin

Role required: admin

About this task

Important: To avoid performance issues on your production instance, activate and configure reporting on the non-production instance that you use for testing.

By default, the system only generates execution details when you run a test. You can activate reporting for all items that Flow Designer runs by setting the com.snc.process_flow.reporting.level system property.

Procedure

1. Navigate to **All > Process Automation > Properties**.

-
2. Set the property **Level of reporting data generated by the flow engine**.
 3. Select **Save**.

Result

Flow Designer generates execution details for all items you specified in the system property.

Building flows

Automate processes with a sequence of reusable actions such as manage records, ask for approvals, create tasks, and send notifications. Define trigger conditions to start a flow and variables to pass information between actions.

Flows consist of a trigger and a sequence of actions. When you add actions to a flow, the data collected or created appears in the data panel, which you can use in other actions.

Triggers

Each trigger type defines when a flow starts and the starting data available to it. There are triggers for record operations, dates, and application operations.

Flow Designer supports record-based, schedule-based, and application-based trigger types. For more information, see [Flow Designer trigger types](#).

Actions

Within **Actions**, flow designers can add [actions](#), [flow logic](#), and [subflows](#) to a flow.

Actions are reusable elements that perform repeatable operations. Add an action to a flow by opening the action picker. Configure an action by specifying its input values, which may be data from the flow trigger or the output of other actions. Enter values for inputs directly, or use data from the Data panel to configure an action's inputs. At the start of a flow, the data may be limited to the flow trigger or subflow inputs. As you add

actions to a flow, the output values of each action appear as data pills in the Data panel.

Action picker

In the ACTION section of a flow, select **Add an Action**, **Flow Logic**, or **Subflow > Action** to open the action picker. You can either enter text in the search window to search for an action, or browse the action categories to find an action that you want to add to your flow.

Search Actions	
Most Recent	Default
Popular	Add Worknote Link to Context
INSTALLED SPOKES	Ask For Approval
ServiceNow Core	Create or Update Record
Action Status	Create Record
Connect	Create Task
Continuous Integration a...	Delete Record
CSM Case Types	Get Email Header
Customer Service	Get Latest Response Text Fro...
Customer Service Case A...	Log
Customer Service	Look Up Email Attachments

Action numbering

Sequential numbers appear next to each item in the Flow Designer interface. Action numbers start with 1 and then increment by 1 as you add more items to the flow.

Note: If you upgraded from a prior release, your [inline scripts](#) may still contain references to legacy flow action numbering. See [Flow action numbering](#) to automatically update these references for your flow.

Core actions

Your instance comes with a collection of core actions, or frequently used Now Platform operations, that can be added to any flow.

Spoke actions

Some applications include spokes which add application-specific actions. Spoke actions are typically read-only but can be copied and customized.

Custom actions

Developers may also create their custom actions from the Action Designer interface.

Action limit

By default, flows can have no more than 50 actions. To change the default behavior, increase the value of the `sn_flow_designer.max_actions` system property. However, consider the performance impact that a large flow may have on your instance.

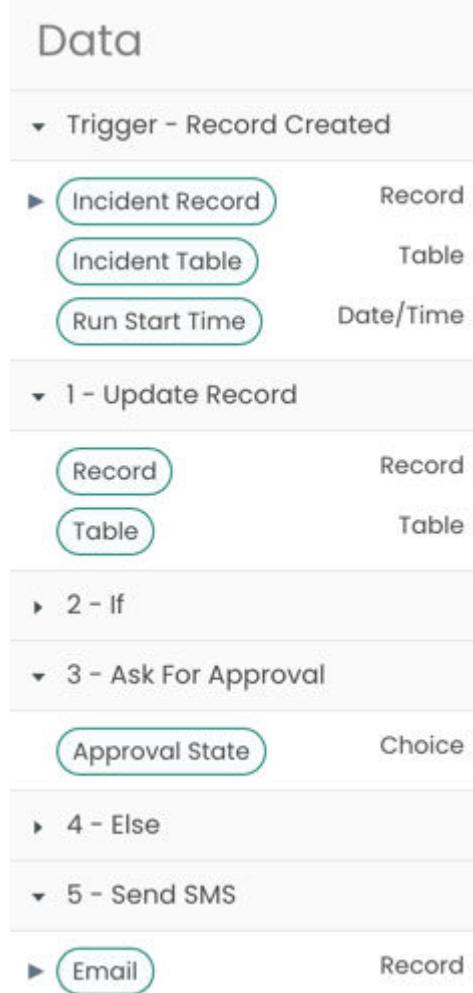
Missing actions

If an administrator added your flow from an update set, you might have some missing actions in your flow. This normally happens when your instance doesn't have the appropriate Integration Hub spokes installed. For more information on how to install the spokes you need to get these actions to appear, see [spokes](#).

Data panel

Flows store any data gathered or generated as variables in the data panel. Each variable has its own pill that Flow designers can use to drag the variable value to an action input or output. Flow Designer generates the pill name based on the contents and its data type. The system specifies the variable data type next to the pill.

Example flow data in the data panel



More Actions menu

Select the **More Actions** icon () to access additional options for your flow.

Stages

Access the stages for a flow.

Manage flow catalog variables

Manage the catalog variables available to Service Catalog-triggered-flows.

Flow Variables

Create flow variables to set and retrieve data throughout a flow.

Copy flow

Create a copy of the open flow in an application you specify.

Flow preferences

Enable or disable the **Show draft actions**, **Show triggered flows**, **Show store spokes**, and **Show inline script toggle** options.

Create code snippet

Generate a code snippet to call a specific flow, subflow, or action.

Manage security

Enable or disable the **Callable by Client API** option.

Change default flow title

Change the default title for your flow by adding styled or dynamic text. For more information, see [Create a natural language title](#).

Testing flows

You can test a flow directly from the Flow Designer interface. Each test runs your flow as if the trigger conditions were met. If the flow has record trigger, you can specify the record to use for your test. After the flow runs, use the flow execution details to verify that your flow is running properly.

Important: Always run tests on a non-production instance where flow record changes cannot interfere with your production data.

Flow execution details

Each time you test a flow, the system generates flow execution records, log messages, and reports. The flow context is a related record

containing the current state and runtime values of the flow. The system generates a context record each time a flow is run.

Optionally, you can configure the system to generate execution details anytime a flow is run, not just during testing. For more information, see [Activate flow reporting](#).

Flow properties

The flow properties contain information about your flow. In the main header, select **Properties** to view or edit your flow's properties.

Property	Description
Name	Enter a unique name for the flow
Protection	Choose whether the flow is read only by choosing from None or Read-only
Application	Select an application for the flow. This property is set when creating the flow and cannot be changed afterwards.
Description	Enter a description of the flow.
Run As	Option that you can select to specify that the flow runs as a system user or the user who initiates the session. Select the user who initiates the session option when updates should come from the user who triggered the flow. For example, use this option when you want the incident record comments to come from the current user, or if you want the approval emails to originate from the approver. Settings for the Run

Property	Description
	as option in a flow don't apply to child subflows. To create a flow that can run with a personal OAuth token, select the user who initiates the session option. If the user who is running the flow has a personal OAuth token, the flow runs with that token. For more information about creating a personal OAuth token, see OAuth 2.0 credentials .
Run with role(s)	Roles that the flow runs with. This option is only available when Run as is set to user who initiates the session .

Printing flows

Flow Designer supports multipage printing for flows, subflows, actions, and flow execution details. For a list of supported browsers, see [Browser support](#).

Roles

To access Flows, a user must have the flow_designer or admin roles.

Design considerations

Flows should be short, modular, reusable collections of work. If they take more than an hour to execute, they're probably too long and can be more efficient.

Any design considerations that apply to flows also apply to [subflows](#).

Prevent conflicting or duplicate business logic

Automations can be created with Flow Designer, business rules, workflows, and Integration Hub. Before you start using Flow Designer, make sure you understand how existing Now Platform automations work.

Deactivate automations before replacing them with Flow Designer flows and actions. See the [Architecture Overview](#) to learn how Flow Designer works within the Now Platform.

Review [Flows](#), [Sub-flows](#), and [Actions](#) documentation, if necessary.

Determine whether your flow needs a trigger or variable input

Flows always run when their trigger conditions are met. Triggers always provide the same data as input for flows. If you need variable input to initiate a flow instead, create a [subflow](#).

Reuse business logic

Create a set of reusable operations as a subflow that can then be used in multiple flows.

Grant flow roles to access role-protected data and preserve user information

Flow roles help keep permissions for your flows simple. Use flow roles to preserve user information and grant access to data, instead of running a flow as the system user. Adding flow roles also gives access to additional data that a user-initiated flow does not usually have. The roles granted only apply to the flow. They do not apply to the user who initiated the flow.

Use flow logic or a schedule-based trigger to control flow timing

Flow logic or schedule-based triggers help to optimize the performance of your flows. Do not use the `gs.sleep()` method to wait within a flow. The `gs.sleep()` method prevents the thread from performing other work. To run a flow at a specific time, use a schedule-based trigger. To pause a flow for a specific duration, use the [Wait for a duration](#) or [wait for condition](#) flow logic.

Avoid dependencies

Parallel branches that depend on each other stall a flow when a branch has to wait for output from another branch.

Scope loop counters

Script loops don't have a maximum number of iterations, so loops execute infinitely when there is not a valid exit condition.

To make sure that there is a valid exit condition, use scope loop counters in inline scripts or in script steps within an action. Add `var i=0; i < length; i++` and `get for (var i=0; i < length; i++)`

Limit For Each and Do Until loops to 1000 iterations

Iterations with 1000 or more loops can lead to memory issues.

- Set max records on Look Up Records to 1000.
- Avoid changing property `sn_flow_designer.max_iterations`, which defaults to 1000.
- For large amounts of data processing, consider batching into smaller batches.
- For bulk imports, consider [concurrent imports](#).

Use QuickAPI for faster executions (business rule alternative)

- [QuickAPI](#) executions are much faster, but there is less debugging capability.
- Foreground QuickAPI executions run in the user session as the user who called the flow.
- Background QuickAPI executions run in a background thread and are run in the 'system' user session.

Use Do Until loops instead of calling flows from themselves

A flow calling itself is not allowed and errors out. But if flow A is calling flow B, then flow B can call flow A up to three times.

Execute flows in the background

Executing flows in the background enables UI threads to be released rather than keeping users waiting for flow executions.

Avoid flow logic that waits after collecting a large output

Using a large payload immediately after it is retrieved can help prevent memory issues.

Minimize switching between environments

Constantly switching back and forth between instance and MID Server steps in a flow can lead to delays in processing. To minimize the risk of delays, limit switching between instance and MID to only one time.

Include sys_complex_object records generated by the flow in update sets

Missing [complex data](#) schemas can cause execution issues. Make sure you include sys_complex_object records generated by the flow in update sets.

Calling flows from a script

Start flows with a custom trigger by calling from a script.

Avoid deploying newer release flows to instances on older releases

Flow Designer does not support deploying flows to instances running on earlier releases. Sometimes the data model of the flow changes between releases, which can prevent the flow from running or produce unexpected results.

Turn flow reporting off in production

Minimize the amount of memory required to run flows by disabling [Flow reporting](#). Flow reporting stores configuration and runtime information for the Execution Details page. These reports are good for troubleshooting, but requires a large amount of data to be retained both in memory and in the database. By default, flow reporting is disabled, and the system only generates execution details when you manually test a flow or action. Instead you can use log files, which are still available when reporting is turned off.

Reduce the amount of memory consumed in flows with nested looping

When reporting is activated, set com.snc.process_flow.reporting.iteration.lastn to a value of "1" to reduce the amounts of the amounts of memory that previous loop iterations consume. The more iterations you report on, the more memory is required.

- [Create a flow](#)

Automate a process to run one or more actions when a trigger condition occurs.

- [Flow Designer stages](#)

Communicate the current stage of a request or flow with an end user.

- [Flow error handler](#)

Enable flows to catch errors. Run a sequence of actions and subflows to identify and correct issues. For example, have flows log output values, send notifications, and run corrective subflows when they produce an error.

- [Flow Template Builder](#)

Enable citizen developers to create their own flow templates. Flow Templates guide flow authors to create flows for common use cases. Use the flow template builder to define flows, actions, and flow template variables.

- [Flow variables](#)

Similar to Workflow scratchpad variables, create variables that you can use and modify directly in your flow. Access flow variables as data pills directly in the Data panel.

- [Inline scripts](#)

Enable users with coding experience to write inline scripts that set and modify input values during the configuration of an action or flow. Use inline scripts to modify input values that require small format conversions, data transformations, or math operations.

Create a flow

Automate a process to run one or more actions when a trigger condition occurs.

Before you begin

- [Set up an application in Guided Application Creator](#) to store Flow Designer content.

- Role required: flow_designer or admin

About this task

Users with the flow_designer or admin role should know the application table structure and be aware of any existing business logic associated with the target tables of a flow or subflow. Be sure to disable any conflicting business rules or workflows before creating a flow or subflow.

Creating a custom application to contain your Flow Designer content enables you to [deploy](#) the application using the application repository or the ServiceNow Store.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **New > Flow**.
3. On the Flow Properties screen, fill in the fields.

Field	Description
Name	Name to uniquely identify your flow. The system computes the internal name of the flow from the name.
Application	Application scope to create your flow in. Global is the default.
Description	Description of your flow.
Protection	Selection to specify if the flow is read-only. You can only select a value when you create the flow in an application scope that you own.
Run as	Option that you can select to specify that the flow runs as a system user or the user who initiates the session. Select the user who initiates the session option when updates should come from the user who triggered the flow. For example, use this option when you want the incident record comments to

Field	Description
	<p>come from the current user, or if you want the approval emails to originate from the approver. Settings for the Run as option in a flow don't apply to child subflows.</p> <p>To create a flow that can run with a personal OAuth token, select the user who initiates the session option. If the user who is running the flow has a personal OAuth token, the flow runs with that token. For more information about creating a personal OAuth token, see OAuth 2.0 credentials.</p> <p>When flows run as the user who initiates the session, the system limits flow actions by user ACL restrictions. Ensure that security restrictions don't prevent users who trigger the flow from performing flow actions. Flows run by the initiating user also respect user-specific settings such as date/time formats.</p> <p>Note: Inbound email flows ignore this setting and always run as the user who initiates the session. To test access controls for an inbound email flow, impersonate a typical inbound email user and manually trigger the flow.</p>
Run with roles	Roles that the flow runs with. This option is only available when Run as is set to user who initiates the session .

4. Click **Submit**.

Note: If this is your first time in Flow Designer, a welcome screen appears. You can choose to either take the welcome tour or skip the tour for now.

The system displays the Flow Designer design environment.

5. Add a trigger to your flow.

- Under the TRIGGER section, select **Add a trigger**.

- b. From the Trigger list, select a trigger that will start running your flow.
For more information on trigger types, see [Flow Designer trigger types](#).
The system displays a set of fields depending on the type of trigger that you've selected.
 - c. Set up your trigger by filling in the fields.
For a record-based trigger, for example, select a table and set field conditions that, when met, will start running your flow.
 - d. Click **Done**.
6. To add actions, flows, subflows, or flow logic, select **Add an Action**, **Flow Logic**, or **Subflow**.
- a. Select an option.

Option	Description
Action	<p>Select the desired action. Flow Designer includes Flow Designer actions that are available to flows and subflows. Alternatively, a user with the <code>action_designer</code> role can create additional actions to add to flows. The Integration Hub and spoke plugins install additional actions.</p> <p>To add draft actions from the More Actions menu, set Show draft actions to true.</p> <p>To view spokes that are available in the ServiceNow Store, set Show store spokes to true from the More Actions menu.</p> <p>Note: Under Not Installed Spokes, the system displays spokes that are available in the ServiceNow Store based on compatibility with the ServiceNow version and application dependency on Flow Designer.</p>
Flow Logic	Select an option to specify conditional or repeated operations.

Option	Description
Subflow	Select a published subflow and define the input values. In addition to adding a subflow as a flow action, you can enable the Show triggered flows option from the More Actions menu to select an activated flow and define the required inputs. Running a triggered flow ignores its trigger conditions and runs all actions.

To change the order of an action in a flow, drag the handle on the left side of the action to the desired location.

The system displays a set of fields depending on the option that you selected.

- b. To configure the action, flow logic, or subflow, fill in the fields.
- c. Select **Done**.
- d. Repeat adding actions until complete.

7. Click **Save**.

Flow Designer saves a draft of the flow, trigger, and actions.

What to do next

- Test your flow until you're ready to activate it.

Note: The system only triggers activated flows.

- Deploy or transfer your flow to another instance.
 - **Deploy** your flow from the application repository when your application is complete and ready for release.
 - **Transfer** your flow from an update set XML file when you want to test the flow on another instance. When you save a flow, Flow Designer generates a single update set file containing its subflows and actions.
- **Create a flow with an inbound email trigger**

Start a flow when your instance receives an email.

- [Create a flow with a MetricBase trigger](#)

Start a flow when a MetricBase trigger is met. MetricBase triggers track time series data and can monitor when a threshold is reached, when a trend is detected, or when a system stops reporting data.

- [Create a flow with a Service Catalog trigger](#)

Start a flow when a Service Catalog item is requested to automate the fulfillment process.

- [Create flow Service Catalog variables](#)

Create Service Catalog variables that are only available to a specific Service Catalog flow. Flow-specific variables are available to catalog tasks and actions in the flow.

- [Create a flow with an SLA Task trigger](#)

Configure your Service Level Agreement (SLA) definition to run a flow as the action plan.

- [Create a flow with roles](#)

Create a flow or subflow that runs with assigned roles. Assigning roles enables you to create a user-initiated flow that runs with its own roles rather than the user's roles.

- [Duplicate an action or subflow](#)

Duplicate an action or subflow within a flow.

- [Test a flow](#)

Before activating a flow so other users can access it, test to make certain it works the way you expect.

- [Activate a flow](#)

Activate a flow to make it available to other users.

- [Change a flow or action's default title](#)

Change the default title for a flow, subflow, or action by adding styled and dynamic text.

- [Edit a flow](#)

Edit an existing flow.

- [Delete a flow](#)

Delete a flow that you no longer need.

- [View activated flows for a table](#)

View flows with record-based triggers that run on a specific table.

Create a flow with an inbound email trigger

Start a flow when your instance receives an email.

Before you begin

Role required: flow_designer or admin

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **+ New > Flow**.
3. Define the flow properties, and then click **Submit**.
For more information, see [Create a flow](#).
4. In the Trigger section, click the plus icon (+) to add a trigger.
5. Select **Inbound Email**.
6. On the form, fill in the fields.

Field	Description
Email conditions	Conditions to qualify which emails start your flow. The condition builder uses fields from the Email [sys_email] table. For example, to trigger a flow for an inbound email in which a user replies to a system notification, set the condition to [Receive type] [is] [Reply] .

Field	Description
Reply Record Type	Table that is associated with the target email. For example, to trigger a flow from a reply email that a user sends from an incident record notification, select Incident [incident] .

7. Click **Done**.
8. Add actions, subflows, and flow logic to the flow.
9. (Optional) Add stages to the flow to report progress to the requester.
See [Flow Designer stages](#).
10. Test the flow. If the test is successful, activate the flow.
For more information, see [Test a flow](#) and [Activate a flow](#).

Result

When an inbound email meets the conditions that you set, the associated flow triggers and runs the actions.

Configure Flow Designer to allow an inbound email to be processed by multiple inbound email triggers in a specific order.

Before you begin

Role required: admin

About this task

Although you can process an inbound email with multiple inbound email actions, you can't process an inbound email with multiple flows by default. You can add a system property to let process owners use multiple triggers to process an inbound email.

Warning: Allowing multiple triggers to process an inbound email may increase maintenance and decrease system performance.

Procedure

1. [Add a property](#) with the following settings:

- Name: glide.hub.flow.inbound_email_trigger.show_advanced
- Type: true | false
- Value: true

After you activate the system property, the **Order** and **Stop processing** fields appear on the inbound email trigger.

2. Create multiple flows with an inbound email trigger.

For more information, see [Create a flow with an inbound email trigger](#).

3. Specify the processing order for each of the inbound email flows:

- a. Open each flow and enter a value in the **Order** field.

To give the flow higher priority over other flows, enter a lower number.

- b. Enable or disable stop processing for each flow in your sequence.

To allow an inbound email to be processed by the next flow in your sequence, clear the **Stop processing** option.

To end the sequence on a particular flow, leave the option selected in that flow.

Create a flow with a MetricBase trigger

Start a flow when a MetricBase trigger is met. MetricBase triggers track time series data and can monitor when a threshold is reached, when a trend is detected, or when a system stops reporting data.

Before you begin

Role required: flow_designer or admin

MetricBase triggers are not available on the base system. The MetricBase application requires a separate subscription and must be activated by ServiceNow personnel.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **+ New > New Flow**.
3. Define the flow properties.
For more information, see [Create a flow](#).
4. In the Trigger section, add a trigger and select **MetricBase**.
5. Complete the trigger fields.

Field	Description
MetricBase Trigger	Select or create a MetricBase trigger record to start the flow. For types of MetricBase triggers, see MetricBase triggers .
Table	Read-only table that contains the metric.
Condition	Click Add filters to set field-based conditions that determine when the flow runs.
Condition Script	Define a script in the Additional MetricBase Trigger Filtering and Moderation table to prevent duplicate metric events from re-triggering a flow. For example, if a metric hovers at a defined trigger threshold, create a script that defines whether to run the flow once when the metric is met, or every time the triggering threshold is exceeded.

6. Add actions, subflows, and flow logic to the flow.
7. Test the flow. Once behaving as desired, activate the flow.
For more information, see [Test a flow](#) and [Activate a flow](#).

Result

The MetricBase application monitors time series data on the Now Platform. When the selected trigger is met, the flow runs.

Create a flow with a Service Catalog trigger

Start a flow when a Service Catalog item is requested to automate the fulfillment process.

Before you begin

Role required: flow_designer or admin

About this task

Unlike a record trigger which runs on all records in a table, the Service Catalog trigger runs on all catalog item requests for a specific item when the catalog item is configured to run a specific flow. For example, you can define a flow that runs every time there is a request for a tablet. The requested item becomes the flow trigger record.

Procedure

1. If not already created, create the catalog item to associate with the flow.

- a. Navigate to **Service Catalog > Catalog Definition > Maintain Items**.

The Catalog Items [sc_cat_item] table opens.

- b. Click **New**.

- c. Complete the fields.

For a detailed description of catalog item fields, see [Create or edit a catalog item](#).

Note: If you plan to add stages to your flow, verify that there is not an existing workflow associated with the item that also has stages. Clear the values of the **Workflow** and **Execution Plan** fields to prevent conflicting stages from reporting to the requested item stage field.

2. Create the flow to associate with the catalog item.

When triggered, this flow processes the catalog item request.

- a. Navigate to **Process Automation > Flow Designer**.

- b. Click **+ New > New Flow**.
 - c. Define the flow properties.
For more information, see [Create a flow](#).
 - d. In the Trigger section, add a trigger and select **Service Catalog**.
Note: Service Catalog triggers do not support catalog variables as part of the trigger condition. Instead, get or create catalog variables in the main body of the flow.
 - e. (Optional) Create flow-specific catalog variables available only to flow actions.
See [Create flow Service Catalog variables](#).
 - f. Add actions, subflows, and flow logic to the flow.
Some actions enable you to manage catalog items. For example, the Create Catalog Task action generates a task for the requested item, and the Get Catalog Variables action enables you to access catalog variables as data pills in the flow. See [Create Catalog Task action](#) and [Get Catalog Variables action](#).
 - g. (Optional) Add stages to the flow to report progress to the requester.
See [Flow Designer stages](#).
 - h. Test the flow.
Once behaving as desired, activate the flow. For more information, see [Test a flow](#) and [Activate a flow](#).
Note: You can't activate a flow if it references catalog variables that are inactive or don't exist.
3. Add the flow to the **Flow** field of the catalog item you created.
 - a. Navigate to the catalog item.
 - b. In the **Flow** field, select the flow you created.
Note: The **Flow** field only displays flows with a Service Catalog trigger.
 - c. Click **Update**.

Result

When the catalog item is requested, the associated flow triggers and runs the actions.

What to do next

Create and deploy catalog item records to your instances.

Note: Service Catalog records are created in the global scope. They are not part of the source control or application repository transfer, and they are not part of the default Flow Designer update set.

Create flow Service Catalog variables

Create Service Catalog variables that are only available to a specific Service Catalog flow. Flow-specific variables are available to catalog tasks and actions in the flow.

Before you begin

Role required: flow_designer or admin

About this task

Flow Service Catalog variables display in the **Catalog Variables** field of the Create Catalog Task and Get Catalog Variables actions. They display in the **Flow:variablename** format and are only available to the flow in which they are defined.

For more information about Service Catalog actions, see [Create Catalog Task action](#) and [Get Catalog Variables action](#).

Procedure

1. Open or create a flow with a Service Catalog trigger.



2. Click  and select **Manage flow catalog variables**.
The Flow catalog variables table opens.

3. Click **New** to add a new variable available to the flow.
4. Complete the form.

Variable form

Field	Description
Application	Read-only field that indicates which applications can use this variable.
Map to field	Maps the variable to a specific field on the table for the record producer. This field appears if the variable belongs to a record producer.
Type	The variable type that you want to create. For more information, see Types of service catalog variables Types of service catalog variables .
Catalog item	Catalog item using the variable.
Order	Order that the variable is placed on the page for the catalog item. The variables are organized from top to bottom from least to greatest order value. For example, a variable with an order value of 1 is placed above other variables with higher-order values.
Active	Check box to make the variable available for use
Mandatory	Check box to make the variable mandatory as part of the ordering process.

Field	Description
	Note: This behavior is applicable only on page load, and can be changed via client APIs.
Read only	Option to make a variable read only or editable.
Hidden	Option to hide a variable.
Unique	Option to disallow duplicate values for this variable within a multi-row variable set. Note: <ul style="list-style-type: none"> This field appears only for a variable created in a multi-row variable set. This behavior is applicable only in Now Platform, Service Portal, and variable editor in Agent Workspace.
Selection Required	Check box to require users to select the check box variable. For example, use this option to require users to select an I agree check box for an agreement form. If users try to submit the agreement form without selecting the check box, an alert message is displayed to tell users that they must select the check box.

Field	Description
Global	If selected, the variable is available for all catalog tasks within service catalog workflows or execution plans by default. If deselected, the variable must be associated with individual catalog tasks.
Field	<p>Field that the variable maps to.</p> <p>This field appears if the variable belongs to a record producer.</p>
Record producer table	<p>Table that the record producer creates a record in.</p> <p>This field appears if the variable belongs to a record producer.</p>
Question	
Question	Question to ask users ordering the catalog item.
Name	<p>A name to identify the question.</p> <p>Note: If this field is empty, its value is auto-populated based on the Question field for all variable types except break, container split, and container end.</p>
Tooltip	Tooltip text to display when users point to the variable. Enter a brief note to describe the purpose of the 'Question'.

Field	Description
Example text	<p>Hint that is displayed in the question field before a user enters a value.</p> <p>Applicable for the following variables:</p> <ul style="list-style-type: none">• IP Address• Email• URL• Single Line Text• Wide Single Line Text• Multi Line Text• Date• Date/Time
Rich Text	<p>Formatted label to be displayed on a catalog item form.</p> <p>Applicable for the Rich Text Label variable.</p>
Annotation	
Show help	If selected, displays the help text and instructions for the variable.

Field	Description
	<p>Note:</p> <ul style="list-style-type: none">• It is not available for break and check box variables.• Help text and instructions are not available for a variable set.
Always Expanded	<p>If selected, the Help text and Instructions field value are expanded by default when the catalog item page loads.</p> <p>This check box appears only when the Show help check box is selected.</p>

Field	Description
	<p>Note:</p> <ul style="list-style-type: none"> This field is also applicable in Service Portal. This field is not applicable in the variable editor in Workspace and Catalog Item UIB component. If the Expand help for all questions check box is selected at the catalog item level, then the Always Expanded field setting at the variable level is overridden. If the Expand help for all questions check box is deselected at the catalog item level, then the Always Expanded field setting at the variable level is applicable.
Help tag	<p>If the Always Expanded check box is deselected, click the value specified in this field to display the Help text and Instructions field values.</p> <p>This field is not applicable in the variable editor in Workspace and Catalog Item UIB component.</p>

Field	Description
Help text	<p>Help information for a service catalog variable.</p> <p>This field is applicable in Now Platform, Service Portal, and variable editor in Workspace, and Catalog Item UIB component.</p> <p>However, in Workspace and Catalog Item UIB component, you can view either help text or instructions. If both instructions and help text are available, you can view only the instructions.</p> <p>This field is not applicable for Break, CheckBox, Container End, Container Split, Macro, and UI Page variables. In Workspace and Catalog Item UIB component, this field is additionally not applicable for a Masked variable.</p>
Instructions	<p>Information that requires rich text formatting or adding images to support help information.</p> <p>This field is applicable in Now Platform, Service Portal, and variable editor in Workspace, and Catalog Item UIB component.</p> <p>However, in Workspace and Catalog Item UIB component, you can view either help text or instructions. If both instructions</p>

Field	Description
	<p>and help text are available, you can view only the instructions.</p> <p>In Workspace and Catalog Item UIB component, this field is additionally not applicable for a Masked variable.</p> <p>Note: For HTML tables, use sizes that are within the width of the variable.</p>
Type Specifications (The fields in this section vary for each variable type)	
Variable Width	<p>Width for the variable on the catalog item page, to specify what percentage of the screen size that it can span. For details, see Configure a default width for service catalog variables.</p> <p>This field appears for all variable types except for break, container end, container start, container split, container layout, and label variables.</p>
Enable also request for	<p>Option to allow a catalog item request to be submitted for multiple users. After you select this option, the Also request for field is displayed along with Requested For variable in a catalog item.</p> <ul style="list-style-type: none">• This functionality is only applicable in Service Portal.

Field	Description
	<ul style="list-style-type: none"> This field is applicable only for the Requested For variable. <p>For information about delegated request experience, see Delegated request experience.</p>
Roles to use also request for	<p>Option to specify the roles that can submit a catalog item request for multiple users.</p> <ul style="list-style-type: none"> This functionality is only applicable in Service Portal. This field is applicable only for the Requested For variable. This field appears only when the Enable also request for check box is selected. <p>Note: If no role is specified, anyone who has access to the catalog item can submit the request.</p> <p>For information about delegated request experience, see Delegated request experience.</p>
Choice direction	<p>The direction in which the choice list is arranged.</p> <ul style="list-style-type: none"> Across: Arranges choices horizontally. Down: Arranges choices vertically. <p>This field appears for lookup multiple choice variables.</p>

Field	Description
	Note: The selected direction is also applicable in Service Portal.
Choice field	Table field to populate options for the variable. If no choices are defined for a field, then the variable loads field-related distinct values from the table. This field appears for select box variables.
Choice table	Table with values to populate in the Choice field . This field appears for select box variables.
Do not select the first choice	Check box to leave all options for the variable cleared on the catalog item page. If this check box is selected, the first choice for the variable selected by default. This field appears for multiple choice and numeric scale variables.
Dynamic ref qual	Dynamic qualifier. Select a dynamic filter to run a query against the reference field.

Field	Description
	This field appears for reference variables when Use reference qualifier is set to Dynamic .
Include none	<input type="checkbox"/> Check box to include the None option in a list of choices. This field appears for lookup multiple choice, lookup select box, multiple choice, and select box variables.
Layout	Layout for a container, whether one or two columns. This field appears for container start variables.
List table	Table with the values for the list collector. The table should have a display column specified. This field appears for list collector variables.
Lookup from table	Table from which values are obtained for users to select. The values from this table are populated in the Lookup value field . This field appears for lookup multiple choice and lookup select box variables.

Field	Description
Lookup value field	<p>Field in the lookup table that populates options for the variable.</p> <p>This field appears for lookup multiple choice and lookup select box variables.</p>
Lookup label field(s)	<p>Comma-separated list of fields in the lookup table whose values are used to display options.</p> <p>This field appears for lookup multiple choice and lookup select box variables.</p>
Lookup price field	<p>Field in the lookup table whose value is used to modify the price of the item being ordered.</p> <p>This field appears for lookup multiple choice and lookup select box variables.</p>
Lookup recurring price field	<p>Field in the lookup table whose value is used to modify the recurring price of the item being ordered.</p> <p>This field appears for lookup multiple choice and lookup select box variables.</p>
Macro	<p>UI macro to insert into the catalog item.</p>

Field	Description
	This field appears for macro, macro with label, and UI page variables.
Summary macro	Applicable only for Marco, and Macro with Label type variables.
Widget	Applicable only for Marco, and Macro with Label type variables.
Price if checked	<p>Price of the item.</p> <p>This field appears for check box variables.</p>
Recurring price if checked	<p>Price that increments for the item, when the user requests more than one order of the item.</p> <p>This field appears for check box variables. For more information about prices and recurring prices, see Using variables for price setup.</p>
Reference	<p>Reference table for the variable. The table should have a display column specified.</p> <p>This field appears for reference variables.</p>
Reference qual	<p>Qualifiers to restrict data that is available in the field.</p> <p>Supports reference qualifiers and advance qualifiers. For</p>

Field	Description
	<p>more information, see Reference qualifiers.</p> <p>Returns all matching results (no maximum).</p> <p>Note: For security reasons, the use of scripts in the Reference qual field is restricted to system administrators through the Allow javascript in Default Value business rule.</p> <p>This field appears for list collector, lookup multiple choice, lookup select box, reference and Requested For variables.</p> <p>It appears for reference variables when Use reference qualifier is set to Dynamic.</p>
Reference qualifier condition	Options to build conditions. This field appears for reference variables when Use reference qualifier is set to Simple .
Scale max	Highest value on the scale of available options for the variable. This field appears for numeric scale variables.

Field	Description
Scale min	Lowest value on the scale of available options for the variable. This field appears for numeric scale variables.
Unique values only	Check box to require a unique value for the field. When this check box is selected, two records cannot have the same value for that field. This field appears for lookup multiple choice, lookup select box, and select box variables.
Use confirmation	Check box to prompt users to reenter data to verify their entries. This field appears for masked variables.
Use encryption	Check box to store the answer in encrypted format in the database. If not encrypted, the answer is stored in plain text format. Encryption uses Triple DES with system encryption. This field appears for masked variables.
Use reference qualifier	Type of qualifier to use.

Field	Description
	This field appears for reference variables.
Validation Regex	<p>Regular expression that validates the variable value. This field is displayed only for Single Line Text and Wide Single Line Text variable types.</p> <p>To define regular expressions, see Define a regular expression for a variable.</p>
	<p>Note:</p> <ul style="list-style-type: none"> This field is also applicable in Service Portal. The <code>max_length</code> attribute value is valid even when the validation regex is set. You cannot add a catalog item with regex validation errors to the wishlist.
Variable attributes	Attributes that define the behavior and restrictions for a variable. For information on variable attributes, see Service catalog variable attribute .
Default Value	
Default value	Default value for the variable.
Permission	

Field	Description
	<p>If no role is specified in this tab for the read, write, or create actions, all users who can access the catalog item can perform these actions irrespective of their role. For example, if no role is specified for the Write roles field, all users who can access the catalog item can edit the variable value in the variable editor.</p> <p>A user with a role that does not match any of the following roles cannot set variable values even through scripting.</p> <p>These roles are not available for Label, Break, Container Split, Container End, Macro, Macro with Label, and UI Page variables.</p>
Read roles	Roles that can view the variable before or after requesting the catalog item or record producer. Only a user with the roles specified in this field can view the variable.
Write roles	Roles that can edit the variable in the variable editor after requesting the catalog item or record producer. If a user does not have the roles specified in this field, the variable is read-only in the variable editor.
Create roles	Roles that can create values for the variable before requesting the catalog item or record producer. If a user does not have the specified role, the variable is read-only before requesting the catalog item or record producer.
Availability	
Visible Elsewhere	If selected, the variable is visible in the item form before ordering the item, in VEditor after ordering

Field	Description
	the item, and in the cart view of the item.
Visible on Bundles	If selected, the variable is visible when the item is added to a bundle.
Visible on Guides	If selected, the variable is visible when it is added to an order guide, or when it is added to a catalog item that is included in the order guide. Note: If an order guide has too many items and variables, consider clearing this check box on as many items as possible, to improve loading performance on order guides.
Visible on Summaries	If selected, the variable is visible on any variable summarizer of the catalog item. In Service Portal, the variable is visible in the RITM ticket page and the Approval page. In Now Mobile, the variable is visible in the RITM and the Approval records.

5. Click **Submit**.

Result

Access the variable in the flow by adding a Create Catalog Task or Get Catalog Variables action.

Create a flow with an SLA Task trigger

Configure your Service Level Agreement (SLA) definition to run a flow as the action plan.

Before you begin

- Set up an application in Guided Application Creator to store Flow Designer content.
- Role required: flow_designer or admin

About this task

An SLA Task trigger only runs when a task record matches the conditions of a Service Level Agreement (SLA) definition. For example, you can run a flow whenever an incident record matches the **Priority 1 resolution (8 hour)** SLA Definition.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Select **+ New > New Flow**.
3. On the form, fill in the fields.

Flow Properties form

Field	Description
Name	Name to uniquely identify your flow. The system computes the internal name of the flow from the name.
Application	Application scope to create your flow in. Global is the default.
Description	Description of your flow.
Protection	Selection to specify if the flow is read-only. You can only select a value when you create the flow in an application scope that you own.

Field	Description
Run As	<p>Option that you can select to specify that the flow runs as a system user or the user who initiates the session. Select the user who initiates the session option when updates should come from the user who triggered the flow. For example, use this option when you want the incident record comments to come from the current user, or if you want the approval emails to originate from the approver. Settings for the Run as option in a flow don't apply to child subflows.</p> <p>The system runs flow actions as the user who initiates the flow. Verify that all users who can trigger a flow have the necessary security access to run its actions. The initiating user also determines user-specific settings such as date/time formats.</p> <p>Note: Inbound email flows ignore this setting and always run as the user who initiates the session. To test access controls for an inbound email flow, impersonate a typical inbound email user and manually trigger the flow.</p>

4. Select **Submit**.
The system displays the Flow Designer page.
5. Select **Select to add a Trigger > Application > SLA Task**.
6. Add actions, subflows, and flow logic to the flow.
Add **SLA Percentage Timer actions** to specify what to do when a task record attached to an SLA reaches specific percentages of completion.
7. Test the flow. Once behaving as desired, activate the flow.
For more information, see [Test a flow](#) and [Activate a flow](#).
8. [Create an SLA definition](#)
 - a. In the **Flow** field, select the SLA Task flow you previously created.

Note: The **Flow** field only displays flows with an SLA Task trigger.

- b. Click **Submit**.

Result

When the SLA Definition conditions are true, the system runs the specified SLA task flow.

Create a flow with roles

Create a flow or subflow that runs with assigned roles. Assigning roles enables you to create a user-initiated flow that runs with its own roles rather than the user's roles.

Before you begin

Role required: flow_designer or admin

About this task

Create a user-initiated flow that runs with its own roles and not the roles of the user. For more information about assigning roles to a flow, go to [Flow roles](#).

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **+ New > Flow** or **+ New > Subflow**.
3. On the Flow Properties form, define the Name, Protection, Application, and Description for the flow.
For more information, see [Create a flow](#).
4. In the **Run As** field, select **User who initiates session**.
Role selection is not available if the **System User** option is selected in the **Run As** field.
5. In the **Run with role(s)** field, select the roles that you want the flow to execute with.

6. Click **Submit**.

Note: If you have the Explicit Roles plugin (com.glide.explicit_roles) activated, add the snc_internal role to your flow.

What to do next

Continue to build and test your flow until you're ready to activate it. You can modify your flow's roles at any time by updating the Flow Properties form.

Duplicate an action or subflow

Duplicate an action or subflow within a flow.

Before you begin

Role required: admin or flow_designer

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. On the Flow Designer landing page, select the flow containing the action or subflow that you want to duplicate.
3. Under Actions, point to the action or subflow that you want to duplicate and then select the duplicate action icon ().

Result

Your selected action or subflow duplicates directly under itself. All configurations, including [transform functions](#), are copied over to the duplicated action or subflow.

Test a flow

Before activating a flow so other users can access it, test to make certain it works the way you expect.

Before you begin

Role required: flow_designer or admin

About this task

Testing a flow bypasses the flow trigger conditions to run it with the test data you provide. For example, testing a flow with a record **Created** trigger causes the system to act as if the selected record was created. For a list of data pills available by trigger type, see [Flow Designer trigger types](#).

Note: Because testing a flow creates or changes records on the instance, flow designers should always test flows on a non-production instance containing relevant demonstration data.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**, then double-click the row for the flow you want to test.
2. Save the flow.
3. Select **Test**.
The system displays the Test flow dialog. The contents of the Test flow dialog depend on the type of trigger.
4. If the flow has a record trigger, create or select a record to use for the test.



To create a record, select the **Create new record** button.

5. If the flow has a record **Updated** or **Created or Updated** trigger, specify which fields and values changed in the update.
To specify a field value change, select the **Create new changed**



field button for each field whose value you want to change.
Complete the changed field details for each changed field.

Field	Description
Field Name	The field updated by the test.

Field	Description
Previous Value	The field value prior to the update.
Current Value	The field value after the update.
Previous Display Value	The field display value prior to the update.
Current Display Value	The field display value after the update.

6. Select **Run Test**.

Note: Select the **Run test in background** option to test a flow asynchronously in the background.

The system tests the flow.

7. Select **Your test has finished running. View the flow execution details**.

Note: This link is created irrespective of your choice for the **Run test in background** option. If you have selected the **Run test in background** option, the execution details are displayed only after the execution is completed asynchronously in the background. Also, the execution details are associated with the flow only after execution is completed.

The system displays the flow execution details for the test.

What to do next

Review the [Flow execution details](#).

Activate a flow

Activate a flow to make it available to other users.

Before you begin

Role required: flow_designer or admin

About this task

When you save a flow, you can test it, but no other users on the instance can see or run it. To make the flow available to other users, activate it.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Locate the flow you want to activate from the list of saved flows and open it.
3. Click **Activate**.

Change a flow or action's default title

Change the default title for a flow, subflow, or action by adding styled and dynamic text.

Before you begin

Role required: admin, flow_designer, or action_designer

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. On the Flow Designer landing page, click **New** and then select **Flow**, **Subflow**, or **Action** from the list.
3. In the Flow Designer main header, click the more actions icon ().
4. Click **Change default title**.
5. On the Change default title screen, enter a title.
 - a. Use any combination of the following options to create a styled title:

Text style	Example input for new title	Example output in Flow Designer environment
Bold	A *bold* title	 A bold title
Italic	An _italic_ title	 An <i>italic</i> title
Underline	An ~underlined~ title	 An <u>underlined</u> title
Strikethrough	A ~~strikethrough~~ title	 A strikethrough title
Title (bold and colored)	A #titled# title	 A titled title

- b. Add dynamically generated text for your title from an input, output, action, or action step by clicking the data pill picker  and selecting the input, output, action, or action step that you want to include in your title.

Note: The value that is associated with the **Label** field for an input or output appears in the title.

6. Click **Submit**.

Result

When you change your action or subflow's default title, the new title appears in the Flow Designer environment.

Edit a flow

Edit an existing flow.

Before you begin

Role required: flow_designer or admin

Procedure

1. If necessary, navigate to **Process Automation > Flow Designer**, then double click the row for the flow you want to edit.
The Flow Designer landing page appears.
2. Take the appropriate actions to edit the flow.

Option	Description
Change the flow name, description, or roles	In the main header, click Properties , enter the values you want into the appropriate fields, then click Update . Note: You cannot change the scope of an automationHub flow after you have saved it.

Option	Description
To edit the trigger	In your flow, click the trigger description, fill in the fields as desired, then click Done . Note: Modifying triggers can result in the deletion of referenced action configurations.
To edit an existing action	In your flow, click the action description, fill in the fields as desired, then click Done .
To add a new action	To add an action at the end of a flow, click the plus icon in the ACTION section. Proceed as you would for adding an action to a new flow. To insert an action into an existing flow, point to the vertical line between the action icons where you want to insert the action. When the plus icon appears, click it. Add the action just as you would add it to a new flow.

3. To save your changes, click **Save**.

Delete a flow

Delete a flow that you no longer need.

Before you begin

Role required: flow_designer or admin

About this task

You can only delete records that are in the same application scope as the current session. If your instance uses domain separation, make sure that you are in the Global scope. For more information, see [Domain separation and Flow Designer](#).

Procedure

1. If necessary, navigate to **All > Process Automation > Flow Designer** to display the Flow Designer landing page.
2. Check the selection box for the row corresponding to the flow you want to delete.
3. Click **Actions on selected rows . . .**, then click **Delete**.

View activated flows for a table

View flows with record-based triggers that run on a specific table.

Before you begin

Role required: flow_designer or admin

Procedure

1. Navigate to a table.
2. Right-click the form header and select **Configure > Flow Designer Flows**.
The Flows table opens and displays all flows that have been activated to run on the specified table.

Flow Designer stages

Communicate the current stage of a request or flow with an end user.

When configuring stages in Flow Designer, you can:

- Create any number of stages.
- Change stage labels and names.

- Set the estimated duration for a stage.
- Import a copy of a pre-defined stage set from the Stage Sets table. To learn more about stage sets, see [Workflow stage sets](#). Any changes made to the copy do not affect the original stage set record.

While stages can be added to a flow with a scheduled trigger, the stages are never displayed to an end user because there is no associated record for the stage field. Only use stages in flows with record and Service Catalog triggers. Stages are not supported on subflows.

View the stages of a flow in the flow execution details.

Displaying stages in a stage field

A stage field is a field of type Workflow that displays the stages of a flow to a user. The Service Catalog table uses a **Stage** field to indicate the progress of a request as it is processed.

Stage fields display:

- Stages from flows with record or Service Catalog triggers.
- Stages from the associated flow. If the associated flow calls another flow, stages set on the child flow do not display.
- Stages from flows that have started.

State icons in stage fields cannot be modified. Limit the number of stages and the length of each stage name to prevent wrapping text and icons onto multiple lines.

Note: Only add one stage field per table. If there is more than one stage field, the system only displays stages from the first stage field defined in the table dictionary entry.

Stage field and trigger types

Associating a flow to a stage field depends on the flow trigger type.

Flow trigger type	Requirements
Record	<p>For a stage field to report stages on a record-based flow, a stage field must be present on the same table as the triggering record. When a flow has stages, Flow Designer communicates the status of each stage back to the triggering table and displays the current stage state as an icon. If more than one stage field exists on the table, only the first stage field defined in the table's dictionary definition is used.</p> <p>Note: Avoid creating stages for multiple flows that trigger from the same table. A stage field only displays the stages of the final flow to run. Add different conditions to each flow to ensure that the stages of one flow do not overwrite another flow.</p>
Service Catalog	<p>If using the Service Catalog trigger, the flow must be associated with the Service Catalog item through the Flow field. Remove any workflows associated with the item by clearing the Workflow and Execution Plan fields. The Stage field displays the current stage state on any list view of the Requested Items [sc_req_item] table.</p>

Stage states

During flow execution, each stage can be in one of five states.

State	Description
Pending	This stage has not yet started.
In progress	This stage is executing.

State	Description
Skipped	This stage was skipped and did not run. Typically, this state is reached when a conditional flow logic block is not executed.
Complete	This stage is complete.
Error	<p>This stage has reached an error condition.</p> <p>When designing a flow, you can manually set the flow to report an Error state. To set an Error state:</p> <ul style="list-style-type: none">• The flow must have at least one stage defined.• The Error can only be set within a stage. When an Error condition is reached, the current stage is set to Error.• The Error can only be set within a conditional flow logic block.

Each stage can have its own custom state labels. For example, suppose that you have a flow with two stages. Stage 1 could have the Pending state with the label Waiting, and Stage 2 could have a Pending state with a label of Not yet started. Flow Designer provides options to generate either the default states or approval states.

Design considerations

Follow these design considerations when creating flows with stages.

Avoid defining stages that depend on a For Each flow logic

Flow Designer prevents you from adding stages within a **For Each** block. You can only add stages before or after a **For Each** block.

Avoid having multiple flows with stages on the same table

A stage field always displays the stage information provided by the last flow to run on a table or record. If multiple flows run on the same records, then the stages defined in one flow can in theory overwrite the stages

from another flow. To avoid multiple flows overwriting each other's stages, define unique trigger conditions for each flow.

Avoid updating stage fields

If you manage stages with a flow, avoid directly updating stage fields with actions, business rules, script calls, or workflows. Manually updating the value of a stage field may produce unexpected or undesired results.

Ensure that each flow on a table has unique trigger conditions

Adding unique trigger conditions to each flow ensures the flows only run under those conditions and prevents the stages from one flow overwriting the stages of another flow. Specifying unique trigger conditions makes it easier to troubleshoot flows by limiting the number of flow executions that can produce record changes.

Use error stages to communicate with the user

The flow error state does not affect flow execution. A flow continues running even if it reaches an error stage. Use a conditional flow logic block to set the error stage and communicate to the user that the state of the current stage is Error. For example, if an approval is not approved within the required limit, you may want to communicate an error to the user.

Use the error stage to stop processing a flow

Use a conditional flow logic block to identify when a flow enters the error stage. Use the flow logic to stop processing the flow or take some kind of remediation action. For example, you may want to change the record state or assignment when a flow reaches an error state.

- [Configure stages and add them to a flow](#)

Configure when stages display to a user, define stage state labels, and add stages to a flow within Flow Designer.

Configure stages and add them to a flow

Configure when stages display to a user, define stage state labels, and add stages to a flow within Flow Designer.

Before you begin

While stages can be added to a flow with a scheduled trigger, the stages are never displayed to an end user because there is no associated record for the stage field. Only use stages in flows with record and Service Catalog triggers.

Role required: flow_designer or admin

Procedure

1. (Optional) If not already present, create a stage field on the table that triggers the flow. A stage field is a field of type Workflow that displays the stages of a flow to a user. The Service Catalog Requested Items [sc_req_item] table has a stage field by default.

For a stage field to report stages on a record-based flow, a stage field must be present on the same table as the triggering record.

To add a field to a table, see [Add and customize a field in a table](#).

2. (Optional) If adding stages to a flow with a Service Catalog trigger, select the flow in the **Flow** field of the Service Catalog Item [sc_cat_item] table. If using the Service Catalog trigger, the flow must be associated with the Service Catalog item through the **Flow** field. Remove any workflows associated with the item by clearing the **Workflow** and **Execution Plan** fields. This enables a request for a catalog item to initiate a flow specific to that catalog item.
3. Open the flow in Flow Designer.
4. Create and configure stages.



- a. Click **Stages**. The Flow Stages menu opens.

- b. Click **New Stage** to create and configure stage options.

Field	Description
Name	Display name for the stage. Must be unique.

Field	Description
Value	Internal name for the stage. Must be unique.
Duration	Estimated duration displayed to the user. If you want to update stages based on flow run times, consider adding one or more Wait for a duration flow logic blocks. For more information, see Wait for a duration flow logic .
Always Show	If selected, the stage always displays in the stage field, even if the stage is set within a flow logic block that might not execute.

- c. (Optional) Select a stage set to import stages from the Stage Sets table.

To learn more about stage sets, see [Workflow stage sets](#). Any changes made to the copy do not affect the original stage set record.

- d. Order stages from top to bottom in the order you want the stage field to display them.

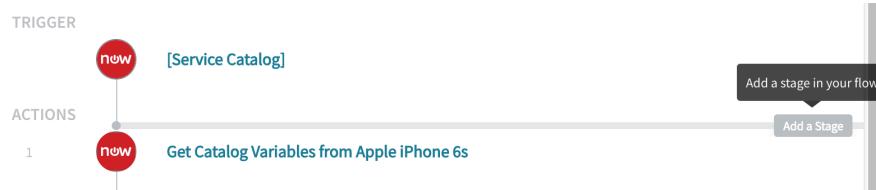
The stage at the top appears first in the stage field, and the stage at the bottom appears last in the stage field.

Note: If you create stages inline, the Flow Stages menu displays them in the order they were created, not in the order they appear in the flow.

5. Add stages to the flow. Point to a location in the flow, click **Add a Stage**, and select an existing stage.

Stages can be applied at the beginning of any Flow Designer action or flow logic block, or within an If block.

Important: Stages are unavailable from within a **For Each** flow logic block. You can only add stages before and after a **For Each** flow logic block.



6. (Optional) Create stages inline. Point to a location in the flow, click **Add a Stage**, and click **+** to create a new stage.

Important: When you create stages inline, stage fields display the stages in the order they were created, not in the order they appear in the flow. To configure or change the order of stages

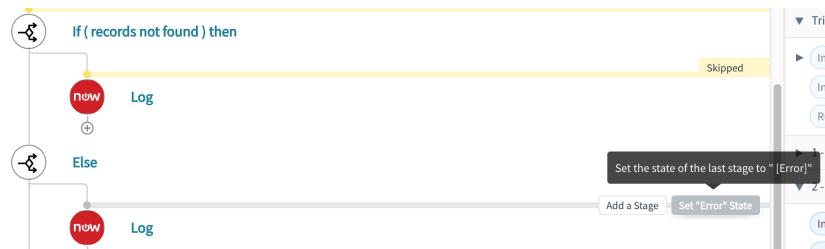
you create inline, open the More Actions menu .

7. (Optional) Set a stage to the Error state within a conditional flow logic block.

- a. Point to a location and select **Set "Error" State**.

To set a stage to the Error stage:

- The flow must have at least one stage defined.
- The Error can only be set within a stage. When an Error condition is reached, the current stage is set to Error.
- The Error can only be set within a conditional flow logic block.



When the flow reaches the indicated point, the currently executing stage is set to Error in the stage field.

Result

When the flow runs, the stage details appear in any field of type Workflow. In a flow with a record-based trigger, the Workflow field of the triggering table displays the current stage state. In a flow with a Service Catalog trigger, the **Stage** field of the Requested Items [sc_req_item] table displays the current stage state.

Flow error handler

Enable flows to catch errors. Run a sequence of actions and subflows to identify and correct issues. For example, have flows log output values, send notifications, and run corrective subflows when they produce an error.

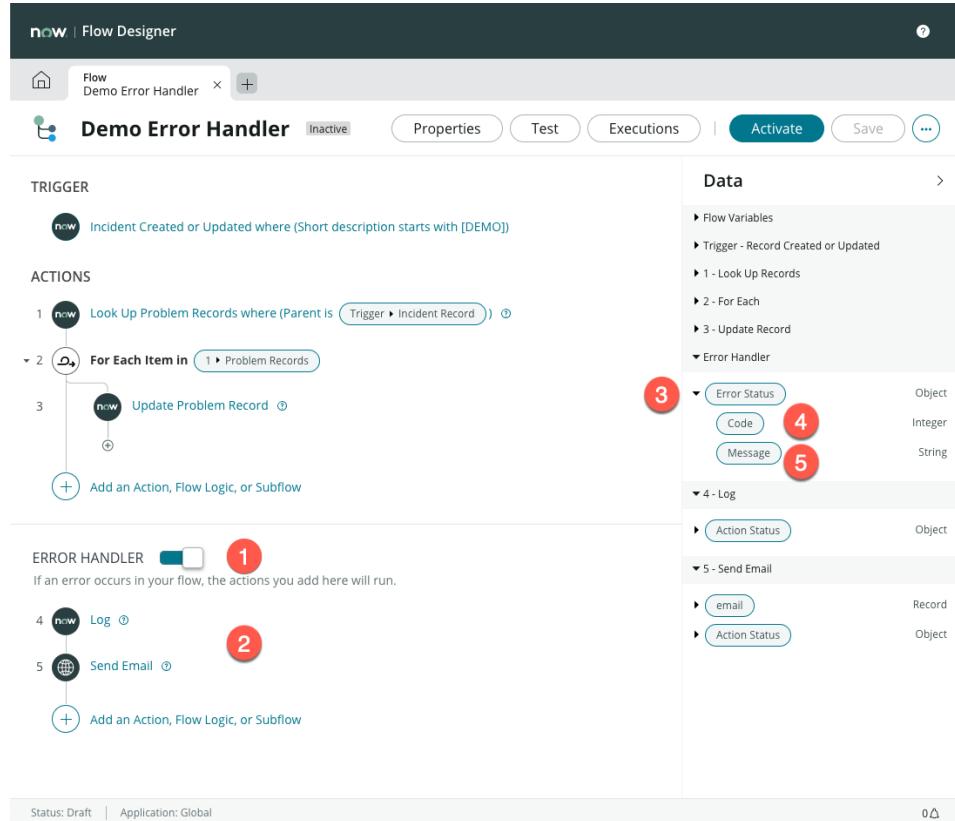
Benefits

Enable a flow error handler to gain these benefits.

- Automate the identification of flow errors as they happen. Capture and push flow error information rather than manually search for issues caused by flow errors.
- Automate the resolution of flow errors. Run actions and subflows to update records rather than manually updating records affected by flow errors.
- Build your own action error handling logic. Specify when actions return an error rather than always return an error.

Error Handler components

Error Handler user interface components



Flow error handling consists of these components.

1. Error Handler switch

Option to enable or disable flow error handling. When enabled, the flow displays the Error Handler section.

2. Error Handler section

Section of flow that runs when the flow catches an error. Use this section to automate the identification and resolution of flow errors. You can add up to 10 items in this section.

Note: The 10-item limit includes any combination of actions, flow logic, or subflows.

3. Error Status

Object data pill containing details about the error caught by the flow.

4. Error Status > Code

Integer data pill indicating whether the flow produced an error. By default, a value of 1 indicates that the flow produced an error. A value of 0 indicates that the flow ran successfully. You can define your own error codes when you create a custom action.

5. Error Status > Message

String data pill containing the error message produced by the action, step, or system operation.

Available error states

Enabling the Error Handler changes the states reported in the flow execution details. The Error Handler can produce these flow states.

Completed (error caught)

State generated when the flow caught an error and successfully ran the items in the Event Handler section. The flow generates this state even when the Event Handler section is empty. This state is only available when you enable a flow Error Handler. This state is only visible from a flow execution details page. Flow context records instead display the state as **Complete**.

Completed (error skipped)

State generated when a custom action continues running after a step failure. When an action generates this state, it passes it to the parent flow. This state is only available when you enable a flow Error Handler. This state is only visible from a flow execution details page. Flow context records instead display the state as **Complete**.

Error

State generated when an error remains uncaught.

- An error occurs in the flow while the Error Handler is disabled
- An error occurs in the Error Handler section

Design considerations

Follow these guidelines to achieve the benefits offered by flow error handling.

Avoid adding error handling items to the main section of the flow

A flow normally stops running when an action or subflow returns an error in the main section. A stopped flow cannot run any actions or subflows past the point where it returned an error. Adding error handling actions and subflows to the Error Handler section ensures they run them when there is an error.

Capture Error Status information

The Error Status object contains information about the action that produced an error. You can use this information to identify the cause of the error as well as record data that may need correction.

Suppress subflow error messages

You can enable the Error Handler for a subflow to prevent its errors from cascading to a parent flow. Leaving the subflow Error Handler section empty ensures that it always generates the **Completed (error caught)** state.

Use subflows to avoid the 10-item limit

Rather than force your error-handling-process to fit within a 10-item limit, call subflows, which can contain many more items. You can also use the subflow outputs to trigger automation in other flows.

Use subflows to take corrective actions

Rather than recreate the same sequence of actions in multiple flows, create reusable subflows to correct errors to your record data. When a flow error leaves your record data in an undesired state, use subflows to correct these records. You can use the error handler to identify such record data as a subflow output.

- [Add an error handler to a flow](#)

Run a sequence of actions and subflows when your flow catches an error. You can enable a flow error handler in Flow Designer when you want to identify and correct issues that are caused by flow errors.

- [Create a custom action to throw an error](#)

Create an action that intentionally throws an error to test flow error handling.

Related concepts

- [Action error evaluation](#)

Add an error handler to a flow

Run a sequence of actions and subflows when your flow catches an error. You can enable a flow error handler in Flow Designer when you want to identify and correct issues that are caused by flow errors.

Before you begin

Role required: flow_designer or admin

About this task

A flow error handler allows your flow to catch an error and run a set of actions, flow logic options, and subflows.

Important: A flow error handler cannot resume or restart a flow that produces an error.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. [Create a flow](#) or open an existing flow.
3. Enable the **ERROR HANDLER** switch.
Flow Designer adds an Error Handler section to the flow and the Data pane.
4. Add actions, flow logic options, or subflows to the Error Handler section.
You can add up to 10 actions, flow logic options, or subflows to this section. Consider using a subflow to capture the error information or to correct issues with the record data.

You can add flow logic options to the error handler. These options are described in the following table.

Supported flow logic options

Flow logic option	Description
If	Selectively apply one or more actions only when a list of conditions is met.
Wait for a duration of time	Use this flow logic option to pause the flow for a specified time period and resume the flow execution after the time period elapses.
End Flow	Use this flow logic option to stop a flow within Flow Designer .
Dynamic Flow	Identify and run a flow or subflow dynamically by using runtime data. Build templates to provide expected inputs for dynamically called flows or subflows.
Set Flow Variables	Assign a value to one or more flow variables. Change or update a variable's value during a flow.

The Error Status object contains the information about the flow error. You can also use the Action Status object that is returned by each action to build the conditional logic.

5. (Optional) Add stages in the Error Handler. For more information on how to add stages, see [Configure stages and add them to a flow](#).
6. Add a custom action to the main body of the flow that throws an error.
To learn how to create a custom action, see [Create a custom action to throw an error](#) .
7. Test your flow to ensure that the error handler works as expected.

-
8. When your flow error handling is working as expected, remove the custom action that throws an error from your flow.

Result

Your flow runs the actions, flow logic options, and subflows that you specify when the flow produces an error. The flow execution details display the Completed (error caught) state for both the flow and the action that returned an error.

Create a custom action to throw an error

Create an action that intentionally throws an error to test flow error handling.

Before you begin

Role required: flow_designer, action_designer, or admin

About this task

This custom action throws an error when the action input value is set to 1. Any other input value allows the action to run without throwing an error. You can add this custom action to a flow to test flow error handling.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
The system displays the Flow Designer landing page.
2. Select **New > Action**
The system displays the Action Properties dialog.
3. Enter these sample values.

Field	Value
Name	Throw an error
Application	Global
Accessible From	All application scopes

4. Select **Submit**.

The system displays the Action Designer interface.

5. From the Action Outline, select **Inputs > Create Input**

The system displays a new action input.

6. Configure the action input with these values.

Field	Value
Label	Error Code
Type	Integer
Mandatory	True

7. From the Action Outline, select **Add a new step**.

The system displays a list of available steps.

8. Select **Script step**.9. From the **Input Variables** section, select **Create Variable**.

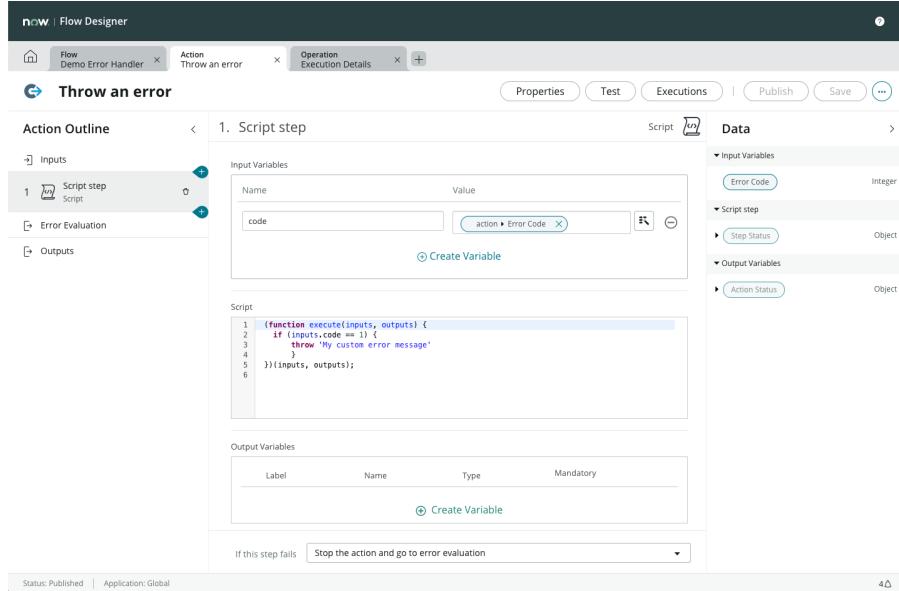
10. Configure the variable with these values.

Field	Value
Name	code
Value	Select the data pill [action->Error Code]

11. In **Script**, enter this JavaScript code.

```
(function execute(inputs, outputs) {  
    if (inputs.code == 1) {  
        throw 'My custom error message'  
    }  
})(inputs, outputs);
```

12. Click **Save**.



13. Select **Test.**

The system displays the Test Action dialog.

14. Enter the following test value:

Input	Value
Error Code	1

15. Select **Run Test.**

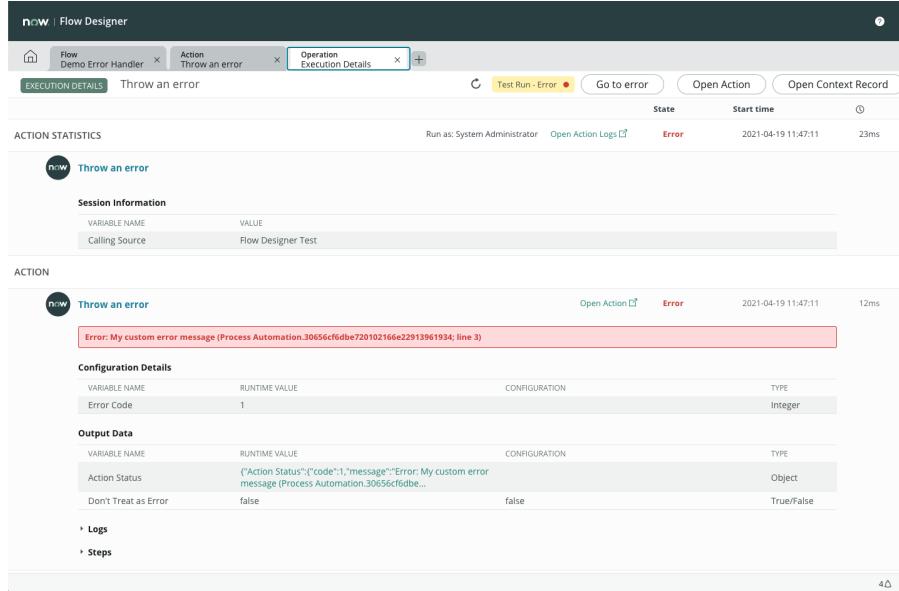
The system runs the action with the test values provided.

16. Select **Your test has finished running. View the action execution details.**

The system displays the action execution details.

17. Verify that the action ran the Script step and threw your custom error message.

The **Action Status** object should list an error on line 3 and display the text of your custom error message.



The screenshot shows the ServiceNow Flow Designer interface. At the top, there are tabs for 'Flow', 'Demo Error Handler', 'Action Throw an error', and 'Operation Execution Details'. Below the tabs, a banner says 'Test Run - Error' with a red dot. Buttons for 'Go to error', 'Open Action', and 'Open Context Record' are available. The main area displays 'ACTION STATISTICS' with a run by 'System Administrator' at 'Error' status on '2021-04-19 11:47:11' in '23ms'. Under 'ACTION', the 'Throw an error' action is selected. Its configuration details show 'Error Code' set to 1. The output data section shows 'Action Status' with the value '("Action Status":{"code":1,"message":"Error: My custom error message (Process Automation.30656cf6dbe...'). A note indicates 'Don't Treat as Error' is false. Navigation links 'Logs' and 'Steps' are visible.

18. Close the action execution details.
19. Select **Cancel** to stop testing the action.
20. Select **Publish** to make your custom action available to your flows.

Result

You have a custom action that throws an error when you set the action input **Error Code** to 1.

What to do next

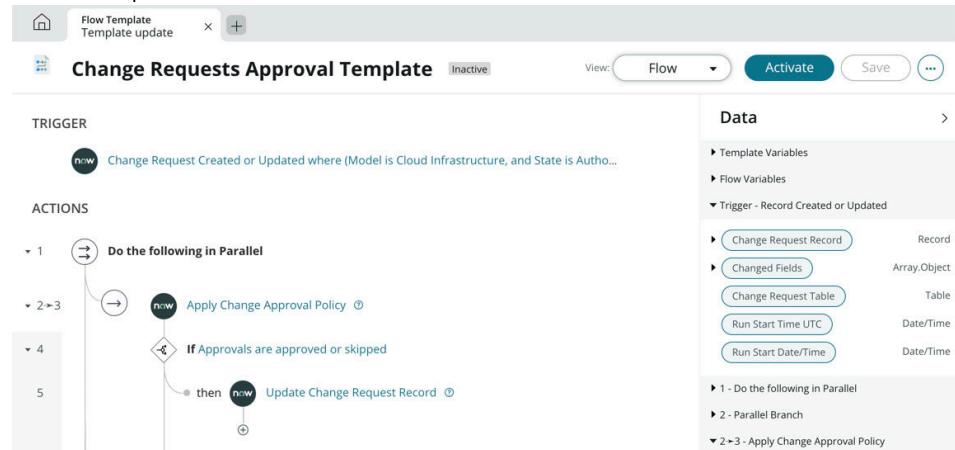
Add this action to a flow to test the contents of the Error Handler section.

Flow Template Builder

Enable citizen developers to create their own flow templates. Flow Templates guide flow authors to create flows for common use cases. Use the flow template builder to define flows, actions, and flow template variables.

Template authors can create templates from the flow with the required configurations, in Flow Designer. Template authors can view or edit an existing flow template in Flow Template Builder.

Flow Template Builder UI



In App Engine Studio, administrator can add automations in the required app by creating flows using these active templates.

The screenshot shows the ServiceNow App Engine Studio interface. At the top, it says "now | App Engine Studio" and has tabs for "HOME", "MY APPS" (which is highlighted with a red border), "TEMPLATES", and "RESOURCES". On the left, there's a sidebar with "Basic Info", "Data", "Experience", "Logic and automation" (which is also highlighted with a red border), "Security", and "Launch". The main area has a heading "ADD AUTOMATION" and a question "How do you want to add an automated workflow to your app?". It says "Select and customize one of these automation templates to automate your workflows. Or, build a new automated workflow from scratch." Below this are two options: "Build from scratch" (with a plus sign icon) and "Approval Brown bag flow template" (which is enclosed in a red box).

Create a template using

Create template from a flow in Flow Designer to guide flow authors through the creation of a flow with the same configuration and customized template input values for the components.

Before you begin

- Activate the App Engine Studio (`sn_app_eng_studio`) and (`sn_flow_template`) plugins.
- Create a flow in Flow Designer as per your requirement.
- Role required: App Template Author or admin

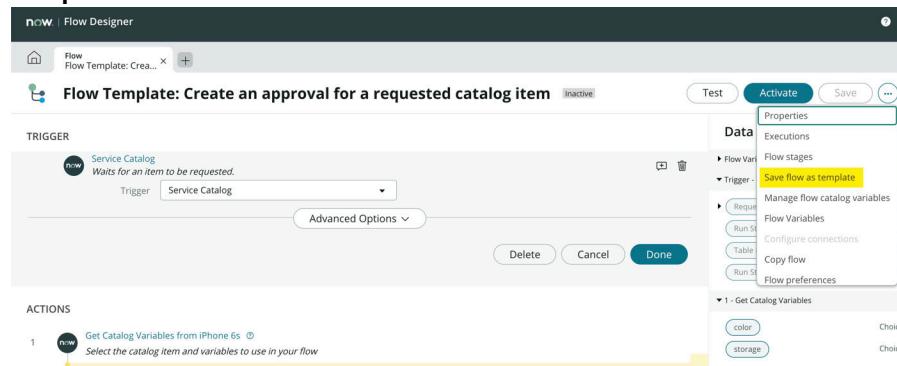
Note: Users with the App Template Author cannot create flow templates in the **Global** scope. They can create flow template in only those scopes to which they have access.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.

2. In Flow Designer, open the required flow.

3. Click the more actions icon () and select **Save flow as a template**.



4. In the Save flow as template dialog, enter **Template name** and select **Application** in which you want the template.

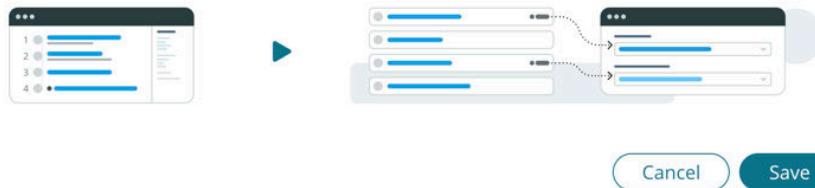
Save flow as template

Save a copy of a flow and configure it as a template. A flow template provides a reusable structure to guide other users in the creation of alternative versions.

* Template name	Flow Template: Create an approval for a requested catalog item
* Application	AES Flow Templates

How it works

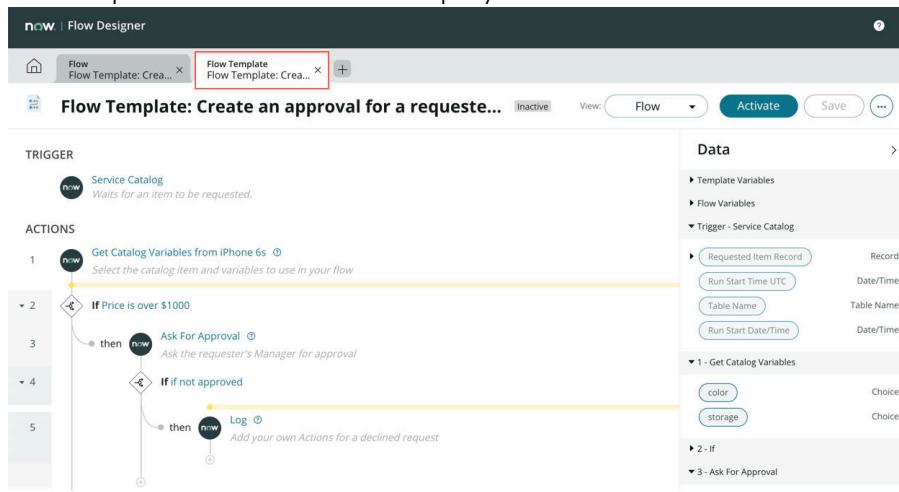
- Select the trigger and action inputs the template guides other users to configure.
- Create template variables to store user input as flow data.
- Preconfigure trigger and action inputs with data from template variables.



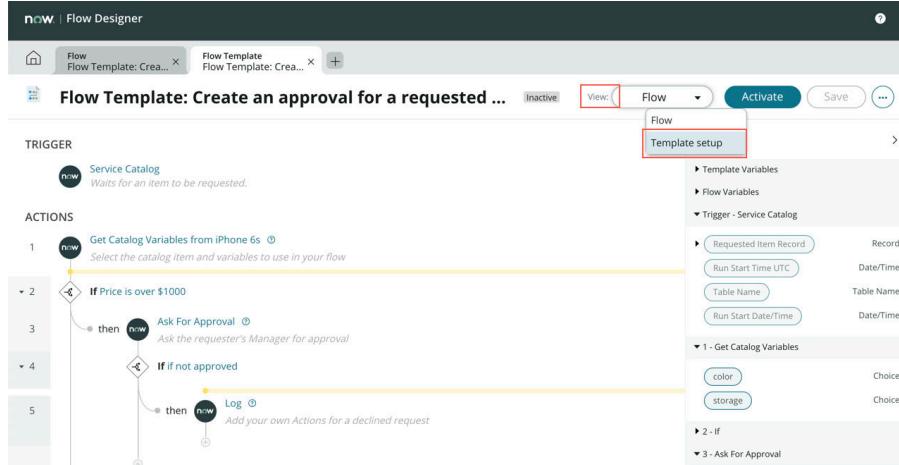
[Cancel](#) [Save](#)

5. Click **Save**.

The template is created and is displayed in .



6. In **View**, select **Template setup**.

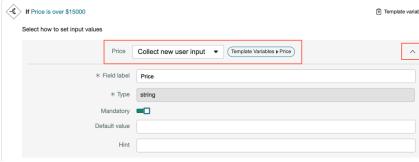
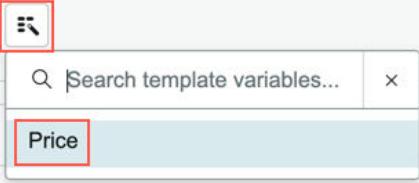
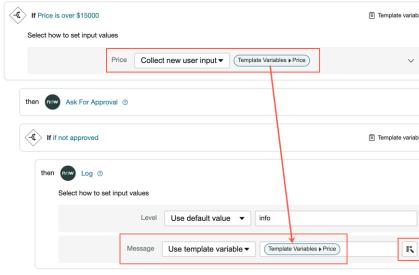


When **View** is changed to **Flow**, the template is displayed in the Flow Designer UI.

7. Click the required action and select the required inputs.

ACTIONS

Choice	Description
Use default value	Uses the default value provided in flow.
Collect new user input	Creates a template variable. Expand the template variable to

Choice	Description
	<p>configure the user input as per your requirement.</p>  <p>Note: Input variable once created, cannot be deleted.</p>
Use template variable	<p>Uses the template variable that has been collected in a previous action. Click the data picker to use the previously collected user input.</p> 
	<p>In this example, Price is collected as a user input and this user input is used in the Message input of the Log action.</p> 

Note: Supported template variable data types:

- String
- List
- Choice
- Reference
- Table Name
- URL
- Multi Line Small Text Area
- Two Line Text Area
- Price
- Email
- Integer

8. Click **Save**.

The flow template is created.

To verify if the template record is created, type `sys_app_template.list` in the left navigator pane and search for the template you had created.

9. Click **Activate**.

Note:

- While configuring the properties in Flow template properties dialog, ensure that you select the **Icon** first before you enter other fields and click **Update**.
- **Icon** in the Flow template properties supports only .SVG files.

Create a flow from a template in App Engine Studio

Create a flow from an existing App Engine Studio automation template. Follow the template guidance to provide values for template inputs that accept dynamic data.

Before you begin

- Create a template using and activate it.

Note: If the template is modified, the template must be activated again for the changes to be reflected in App Engine Studio.

- Role required: Template Runner

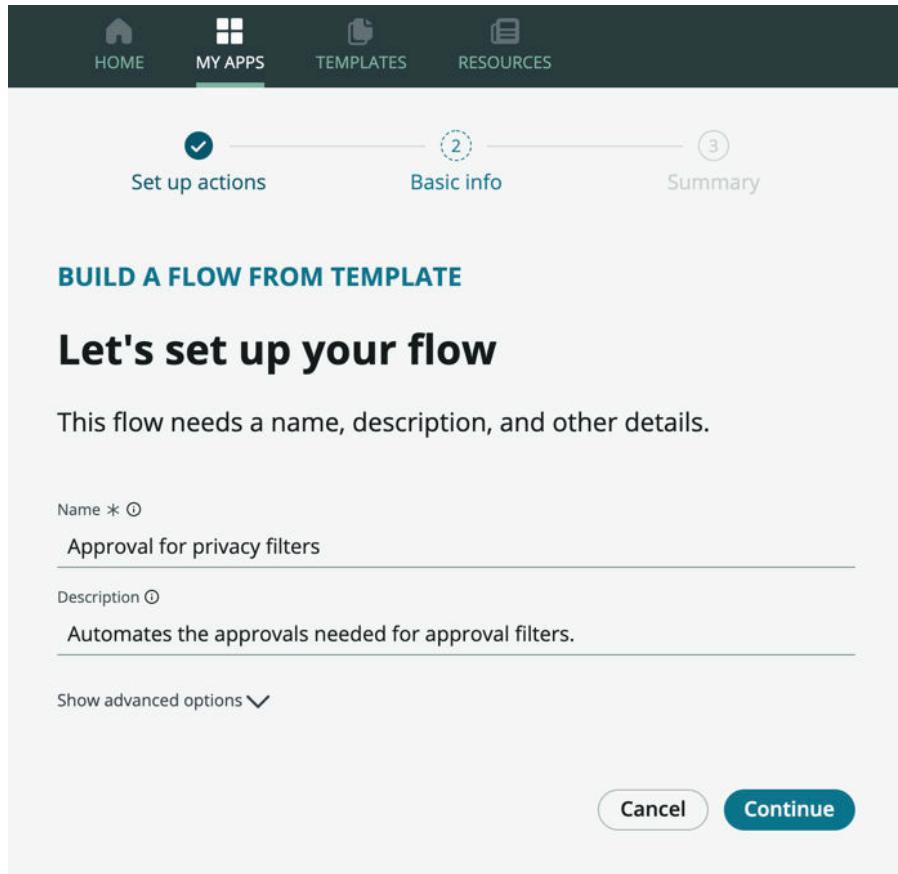
Procedure

1. Navigate to **All > App Engine > App Engine Studio**.
2. In **My recent apps**, click the required app. If you haven't created an app, you can create it.
The app is opened in App Engine Studio.
3. Click **Logic and automation**.
4. Click **Add**.



5. Select the required flow template.
6. In the template dialog, click **Begin**.
7. In the templates wizard, provide the inputs to create flow using the template.

The screenshot shows a ServiceNow interface for building a flow from a template. At the top, there's a dark header bar with four tabs: HOME, MY APPS (which is highlighted), TEMPLATES, and RESOURCES. Below the header, a progress bar indicates three steps: 1. Set up actions (highlighted in blue), 2. Basic info, and 3. Summary. The main content area has a title 'BUILD A FLOW FROM TEMPLATE' and a large heading 'Let's define what happens when your flow runs'. Underneath, there's a dropdown menu labeled 'Template catalog item * ⓘ' showing '3M Privacy Filter - Lenovo X1 Carbon'. Below it is a line of text 'Ask for approval if the catalog item's price is greater than * ⓘ' followed by a value '2'. At the bottom right are two buttons: 'Cancel' and 'Continue'.



After providing the required inputs, a confirmation message is displayed that the flow is created.

8. To edit the flow in Flow Designer, click **Edit this flow**.
The flow is opened in Flow Designer.

Note:

- Avoid editing flows that are created from a template. If you intend to edit the flow, ensure that you test the flow before publishing it.
- In App Engine Studio, template inputs are not displayed in the same order as you had created in Flow Designer. In this example, order in which fields appear in App Engine Studio is different from the order in which inputs are configured in Flow Designer.

Input fields configured in Flow Designer

The screenshot shows the 'Copy Flow' dialog with the title 'Select how to set input values'. It lists four input fields: 'name' (set to 'Use default value'), 'source_flow_sys_id' (set to 'Collect new user input'), 'scope_sys_id' (set to 'Collect new user input'), and 'description' (set to 'Collect new user input'). Each field has a 'Template Variables' button next to it.

Input fields displayed in App Engine Studio

The screenshot shows the 'BUILD A FLOW FROM TEMPLATE' wizard at step 1, 'Set up actions'. It displays five input fields: 'run_as' (with a help icon), 'protection' (with a help icon), 'source_flow_sys_id' (marked with an asterisk), 'description' (with a help icon), and 'scope_sys_id' (marked with an asterisk).

Flow variables

Similar to Workflow scratchpad variables, create variables that you can use and modify directly in your flow. Access flow variables as data pills directly in the Data panel.

Use flow variables to set and retrieve values throughout a flow. Flow variables are similar to subflow inputs and outputs. Both define data available to a flow or subflow. The main difference between them is when they are accessible. Flow variables are accessible throughout a flow. Inputs are only accessible at the start of a subflow, and outputs are only accessible when a subflow completes.

Creating flow variables

Create variables with the **Flow Variables** option on the More Actions menu. You can create several variables at a time by choosing a name and data type for each one. Flow variables appear as data pills in the Flow Variables section of the Data panel.

Assigning values to flow variables

Assign values to variables with the Set Flow Variables flow logic. Set Flow Variables has the following inputs:

- The name of the variable.
- The data value for the variable.

You can assign values to all of your variables with a single use of Set Flow Variables. Unlike other data pills, the values assigned to flow variables are mutable and can be changed at any time. Using Set Flow Variables overrides the current value of the variable. If no value is assigned to a variable, the default value is **null**.

Flow variable values are set in the order in which they are assigned from top to bottom. If you set the value of the same variable multiple times, the flow only uses the last value set. For example, these three variable definitions result in the variable having the runtime value of `last_value` set.

Last value set defines flow variable value

Order	Variable	Configuration
1	variable	first value set
2	variable	second value set
3	variable	last value set

Variable values can reference any data pill from earlier in the flow, including other variables. If you set variable values by reference to other data pills, you must maintain the order of the variable assignments. The referenced value must always come before the variable that uses the referenced value. Changing the order may produce null values. For example, these variable definitions only produce the expected runtime values when you maintain the order of the variable definitions.

Setting variable values by reference

Order	Variable	Configuration	Runtime Value
1	variable1	One	One
2	variable2	{variable1}, Two	One, Two
3	variable3	{variable1}, {variable2}, Three	One, Two, Three

Flow execution details

A summary of the Set Flow Variables flow logic appears in the execution details. The details show the name, type, configuration, and runtime values for all the variables set with the action. Execution details also provide information about the variables when they're used in actions or flow logic. In that case, it shows the type, configuration, and runtime values.

Supported data types

Flow Designer supports the following data types for flow variables:

- Decimal
- Floating-point number
- Integer
- JSON
- Reference
- String
- True/False
- [Create a flow variable](#)

Create a flow variable to store and retrieve a value throughout a flow.

Create a flow variable

Create a flow variable to store and retrieve a value throughout a flow.

Before you begin

Role required: flow_designer or admin

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **New > Flow**.
3. On the Flow Properties form, fill in the fields.
For more information, see [Create a flow](#).
4. Click **Submit**.
5. Click the more actions icon () and select **Flow Variables**.
6. In the upper-right side of the Flow Variables form, click the plus icon () to create a variable.
7. On the form, fill in the fields.

Flow Variables form

Field	Description
Label	Unique label for the variable. It can consist of any text. The label is visible to the user.
Name	Unique name for the variable. Displays the name used to identify the variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. The name is not visible to the user, it's what the system uses behind-the-scenes.
Type	Data type for the variable.

8. Click **Save**.

Result

The Data panel displays the variable in the Flow Variables section. It appears as a data pill, with its name and type.

What to do next

To assign a value to the variable, use the [Set Flow Variables flow logic](#). If you don't assign a value, the default value is null.

Inline scripts

Enable users with coding experience to write inline scripts that set and modify input values during the configuration of an action or flow. Use inline scripts to modify input values that require small format conversions, data transformations, or math operations.

You can also modify input values without scripting by using transform functions. For a list of available options, see [Transform functions](#).

Flow Designer displays a Script button when you configure these components.

- Action inputs when you configure the action for a flow
- Action outputs when you configure the action for a flow
- Flow logic inputs when you configure the flow logic for a flow
- Flow logic outputs when you configure the flow logic for a flow
- Step inputs when you configure the step for an action.
- Subflow inputs when you configure the subflow for a flow.
- Subflow outputs when you configure the subflow for a flow.

Inline scripts must return values in the same data type as the input expects. For example, an inline script for a Record input must return a GlideRecord object and an inline script for a Date input must return a date-time value. Always test actions and flows containing inline scripts, and verify that there are no runtime errors in the flow execution details.

Script writers should be familiar with Now Platform table structures and [field types](#). In addition, they should know how to work with record and system data using the ServiceNow API.

Benefits

Inline scripts offer these benefits.

- Enable simple data conversion or transformation without having to create custom actions or flows.
- Identify which input data a script affects.
- Restricted access to scripting features to users or groups who are knowledgeable with the available ServiceNow APIs.

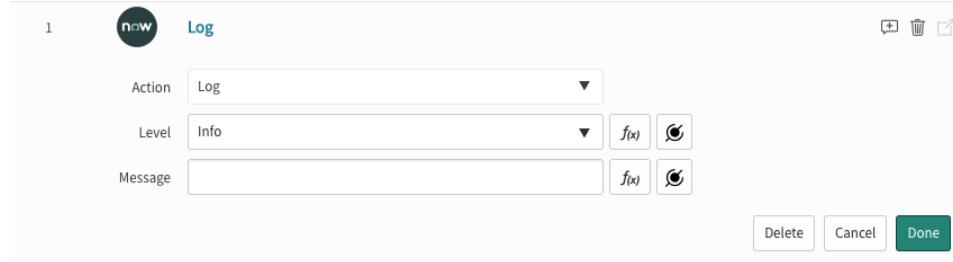
Access to inline script

You can grant users access to online scripting by either granting them the flow_designer_scripting role or the **Allow Scripting** delegated development permission. Both the role and the developer permission display a script button field for each Flow Designer input.

Script button

When you enable a user to create inline scripts, Flow Designer displays a script button next to flow and step inputs.

Script buttons display beside inputs



Clicking the **Script** button opens the Script editor, which replaces the standard input interface. Enter a script to compute the input value.

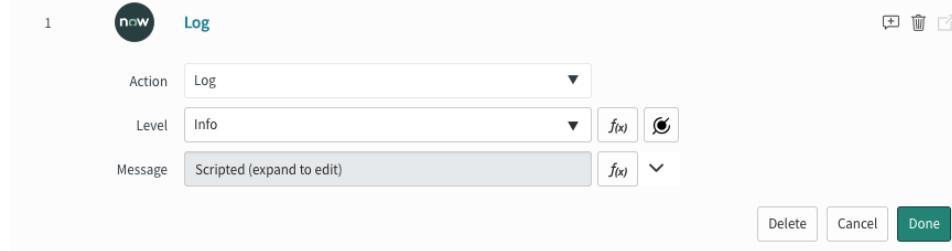
Ensure your script includes a `return` statement with the results of your script. For example, `return shortDesc;` returns the value of the `shortDesc` variable.

Script editor for input



Clicking the **Collapse Script** button hides the Script editor and displays a read-only version of the input. Clicking the **Expand Script** button displays the Script editor and allows you to edit the script.

Input containing script



Flow Designer data object

Script writers can use the `fd_data` object to access data from previous actions and steps. Use the `fd_data` object to dot-walk to a specific output of the flow. You can use the script editor type ahead suggestions to select a specific output value. For example, enter `fd_data` and select `_2_for_each.item` from the type ahead suggestions to create a dot-walk reference to `fd_data._2_for_each.item`. This reference accesses data from the second output of the flow, which in this example is a For Each flow logic item.

Important: The `fd_data` object always requires a dot-walk reference to a specific flow output. Without a dot-walk reference, the inline script cannot access Flow Designer data.

Design considerations

Follow these design guidelines to create reusable and maintainable inline scripts.

Write inline script for small non-reusable logic

Use inline script format or modify the data for specific inputs and use cases. For standard and reusable input data conversions and formatting operations, select a transform function instead.

Review available transform functions

Flow Designer provides a list of standard transform functions for data conversions and formatting operations. Rather than write and maintain

a custom script solution, select an existing transform function if one is available.

Create custom actions or subflows for reusable code rather than inline script

Create custom actions or subflows for reusable or complex data logic such as changing the data type of source data. You may also want to provide custom actions or subflows for flow designers who are not comfortable with code.

Avoid duplicating action and flow functionality

Avoid writing inline script that duplicates action and flow functionality. For example, rather than write inline script to perform record operations, use the create and update record baseline actions.

Avoid data type changes

Avoid runtime errors by verifying that your inline script provides information in the same data type as the input or output expects.

Create variables by declaring them with the var keyword

Use the `var` keyword to declare variables so that they remain within the proper JavaScript scope. When you create a variable by assigning it a value, JavaScript may attach it to the global object, which can result in variable values persisting outside of the local scope and causing errors.

Process records outputs with For Each flow logic and the flow data object

Inline script can only access the **records** output of a Look Up Records action from For Each flow logic. Add a Look Up Records action to the flow to generate the records output. Add a For Each flow logic to the flow to process each record in the records output. Create an inline script reference to the For Each flow logic using the `fd_data` and `item` objects. For example, this reference assumes that the For Each flow logic is the second item in your flow outline `fd_data._2_for_each.item`.

Use type ahead suggestions to generate references to flow and action data.

Create references to flow and action data using the `fd_data` object. The script editor displays type ahead suggestions for existing flow and action

data when you type `fd_data`. Select a suggestion to build references to flow and action data.

Note: Refer to record data in a For Each flow logic using the `item` object.

Scope loop counters

Script loops don't have a maximum number of iterations, so loops execute infinitely when there is not a valid exit condition.

To make sure that there is a valid exit condition, use scope loop counters in inline scripts or in script steps within an action. Add `var i=0; i < length; i++` and `get for (var i=0; i < length; i++)`

Licensing considerations

Inline scripts that call integration APIs are subject to Integration Hub licensing.

Code editor

The code editor provides text editor support for inline scripts.

The code editor has these features for the supported language services and [Inline scripts](#).

- Syntax coloring, indentation, line numbers, and automatic creation of closing braces and quotes
- Auto-suggestions and auto-completions

Code editor



The screenshot shows the ServiceNow code editor interface. At the top, there is a toolbar with icons for file operations and a search bar labeled "info". Below the toolbar is a dropdown menu labeled "Log Level" set to "info". The main area is titled "Log Message" and contains the following code:

```
1  /*
2   **Access Flow/Action data using the fd_data object. Script must return a value.
3   **example: var shortDesc = fd_data.trigger.current.short_description;
4   **return shortDesc;
5   */
6  return(math.sqrt(64));
```

On the right side of the code editor, there are two small buttons: a green "fix" button and a blue "undo" button.

Editing tips

- To insert a fixed space anywhere in your code, press Tab.
- To indent a single line of code, click in the leading white space of the line and then press Tab.
- To indent one or more lines of code, select the code and then press Tab. To decrease the indentation, press Shift+Tab.
- To remove one tab from the start of a line of code, click in the line and press Shift+Tab.
- To declare variables, use the `var` keyword so that they remain within the proper JavaScript scope.

Building subflows

Define a sequence of reusable actions that can be started from a flow, subflow, or script. Define inputs and outputs to pass data to and from the subflow.

Unlike flows, subflows lack a trigger. Use a subflow when:

- You only want to start a flow by calling it from another flow or script.
- You want to create a set of reusable operations for use in multiple flows.
- You want to specify the inputs available to the subflow when it starts.
- You want to specify the outputs available to the parent flow after the subflow ends.

All subflows consist of properties, one or more inputs, one or more outputs, a sequence of actions, and the data collected or created.

Subflow properties

The subflow properties specify the subflow name, application, category, description, in-flow annotation, roles, and status. Flow designers can update the subflow name, category, description, in-flow annotation, and roles at any time, but can only set the application during subflow creation. The subflow status is set when you save or publish a subflow.

Subflow inputs

Subflow inputs specify the data available to the subflow when it starts. Each input you define for a subflow becomes a configuration option in the Flow Designer interface. To use the subflow in a flow, flow designers must define a value for each mandatory input. The more inputs a subflow has, the more data flow designers must define and the more familiar they must be with the underlying data model to use the subflow effectively.

Inputs provide advanced options based on their data type. All inputs have advanced options to add a hint or provide a default value. Use advanced options to guide flow designers through adding and configuring a subflow to a flow. For example, create a choice input to provide flow designers with a pre-defined list of configuration options to choose from. For more information about the configuration options available to particular data types, see [field types](#).

Subflow outputs

Subflow outputs specify the data available to the parent flow after the subflow completes. Subflow outputs are defined as variables with a name and data type. Subflow designers assign values to an output using the **Assign Subflow Output** flow logic. Output values can be based on the subflow logic conditions, action results, or a manually set value. For example, an output may have one value when a condition is met and another value when a condition is not met. During runtime, the value of the output is determined by the condition that is met.

Consider the following example of a subflow with two conditions that both result in a value for a single output variable. The value of the variable depends on which condition is met during runtime.

Outputs

[Manager ID] [String]

Actions

- 1 Look Up [User] Record where (Created on Today)
- 2 If (**[1->User Record->Title]** contains Manager) then, Assign Subflow Outputs [Manager ID] to **[1->User Record->User ID]**

- 3 Else, Assign Subflow Outputs [Manager ID] to **[1->User Record->Manager->User ID]**

In this case, if the user's title contains "Manager" then the user ID is assigned as output. Otherwise, the subflow looks up the user's manager and assigns the user ID of the manager as output.

Flow Designer allows you to define a value for the same variable multiple times. However, if a variable is given two or more possible values without conditional logic, only the last value defined in the subflow is applied to the output at runtime.

Outputs

[Manager ID] [String]

Actions

- 1 Look Up [User] Record where (Created on Today)
- 2 Assign Subflow Outputs [Manager ID] to **[1->User Record->User ID]**
- 3 Assign Subflow Outputs [Manager ID] to **[1->User Record->Manager->User ID]**

In this example, action three overwrites the value of action two and **[1->User Record->Manager->User ID]** is applied to the [Manager ID] output at runtime because it was the last value defined. Typically, subflows should only include multiple values for one variable if conditional flow logic is used.

Subflow execution details

Process analysts can view subflow execution details from multiple locations.

Parent flow execution details

Flow Designer displays subflow execution details within the parent flow execution details. The parent flow execution details list each subflow as inline elements. You can expand a subflow step to see its execution details.

Subflow execution details

The system generates flow execution details for each subflow run. View subflow execution details directly from the list of flow executions.

Actions

Within **Actions**, flow designers can add actions, flow logic, flows, or other subflows.

An action is a reusable operation that enables process analysts to automate Now Platform features without having to write code. For example, the **Create Record** action allows process analysts to generate records in a particular table with particular values when certain conditions occur. ServiceNow core actions like Create Record require some familiarity with Now Platform tables and fields. Action designers can create application-specific actions to pre-set configuration details. For example, creating a Create Incident Task action ensures that the process analyst uses the correct table and field configuration each time the action is used. You can add application-specific actions by activating the associated spoke.

Flow logic

Subflows can contain flow logic to specify conditional or repeated actions, or to assign output variables to subflow data. The system provides these flow logic options.

Available flow logic

Flow logic	Description
For Each	<p>Applies actions to each record in a list of records. Flow designers must provide the list of records from the subflow data.</p> <p>Note: You can nest a For Each flow logic block inside of another flow logic block to repeat an action over a series of records. However, nested For Each loops that process many records. Nested loops cause the flow to run until it is stopped by the flow transaction quota rule, which prevents flows from running longer than an hour. For more information about transaction quotas, see Transaction quotas.</p>

Flow logic	Description
If	Applies actions when a list of conditions is met. Flow designers can specify conditions with subflow data. Once an If condition is added, you can add an Else or Else If flow logic option to define behavior when conditions are not met.
Assign Subflow Outputs	Assigns an output variable to subflow data. Only outputs defined in Subflow Outputs can be assigned a value. Assigning outputs enables you to create different output variable for each logical path in the subflow.

More Actions

Click the **More Actions** () button to access additional options for the subflow.

Copy action

Create a copy of the open subflow in an application you specify.

Configurations

Enable or disable the **Show draft actions**, **Show triggered flows**, **Show store spokes**, and **Show inline script toggle** options.

Code Snippet

Generate a code snippet for the action.

Manage security

Enable or disable the **Callable by Client API** option.

Manage natural language title

Create or edit a subflow title with styled or dynamic text. For more information, see [Manage natural language titles](#).

Testing subflows

You can test a subflow alone, or when added to a flow. When testing a subflow alone, you must define the inputs that the subflow uses in its actions. Because a subflow does not have a trigger, testing a subflow runs the actions using the defined input values.

Note: Because testing a subflow creates or changes records on the instance, flow designers should always test subflows on a non-production instance containing relevant demonstration data.

Roles

To access subflows, a user must have the flow_designer or admin role.

Design considerations

Design considerations that apply to [flows](#) also apply to subflows.

Reasons to use a subflow instead of a flow include:

Determine whether your flow needs a trigger or variable input

Flows always run when their trigger conditions are met. Triggers always provide the same data as input for flows. If you need variable input to initiate a flow instead, create a [subflow](#).

Reuse business logic

Create a set of reusable operations as a subflow that can then be used in multiple flows.

Configure different input values for each call

Configure a subflow's input values differently each time you call it. For example, design a subflow to accept different record types as an input run. Reuse this generic record subflow instead of writing a specific flow for each record type.

Improve performance and readability of large flows

Use subflows when a flow exceeds 25 actions. 50 is the maximum number of actions specified by the sn_flow_designer.max_actions system property, but limit a flow to 25 actions for the best performance.

Limit subflows to 20 inputs

The more inputs your subflow has, the more resources it takes to open and run it. Processing more than 20 inputs risks the subflow being slow to open and run.

Pass inputs and outputs with subflows

Call subflows if you want to pass inputs and outputs. Use subflows if you want to specify the inputs available to a subflow when it starts, or if you want to specify the outputs available to the parent flow after a subflow ends.

Trigger multiple flows on a single event vs. using parallel subflows

- Use parallel subflows if there are interrelated outputs or if some action must be taken when all are available. If not, then it's simpler to trigger multiple flows.
- To configure parallel subflows, launch each subflow without a wait and then use wait for condition to wait for each subflow to be terminal (complete, error, canceled)

Use dynamic flows if you have multiple subflows with similar functionality

Dynamic flows let you compartmentalize your processes by applying a template to handle the inputs of multiple similar subflows. Compartmentalization lets you distinguish between subflows that perform similar functions, such as subflows for [IntegrationHub](#) spokes.

Avoid the 10-item limit in the error-handling-process

Rather than force your error-handling-process to fit within a 10-item limit, call subflows, which can contain many more items. You can also use the subflow outputs to trigger automation in other flows.

Take corrective actions

Rather than recreate the same sequence of actions in multiple flows, create reusable subflows to correct errors to your record data. When a flow error leaves your record data in an undesired state, use subflows to correct these records. You can use the error handler to identify such record data as a subflow output.

- [Create a subflow in Flow Designer](#)

Reuse an entire flow's content as a subflow. Define the input data the subflow uses and the output data it generates. Call subflows from other flows or script.

- [Create a template value input](#)

Enable flow authors to set field values for a record being created or updated. Use a template value input to set different field values each time you add an action or subflow to a flow.

- [Get started with Dynamic Flow and Get Flow Outputs](#)

Create a sample flow that dynamically calls subflows for provisioning cloud services.

- [Test a subflow](#)

You can test a subflow alone, or when added to a flow. When testing a subflow alone, you must define the inputs that the subflow uses in its actions. Because a subflow does not have a trigger, testing a subflow runs the actions using the defined input values. Unless updated, subsequent tests use the same inputs defined in the initial test run.

- [Publish a subflow](#)

Publish a subflow to make it available to other users and to add it to activated flows.

Create a subflow in Flow Designer

Reuse an entire flow's content as a subflow. Define the input data the subflow uses and the output data it generates. Call subflows from other flows or script.

Before you begin

- Role required: flow_designer or admin
- [Set up an application in Guided Application Creator](#) to store Flow Designer content.

About this task

Users with the flow_designer or admin role should know the application table structure and be aware of any existing business logic associated with the target tables of a flow or subflow. Be sure to disable any conflicting business rules or workflows before creating a flow or subflow.

Creating a custom application to contain your Flow Designer content allows you to [deploy](#) it using the application repository or the ServiceNow Store.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **New > Subflow**.
The Subflow properties screen displays.
3. Fill in the following fields:

Field	Description
Name	Name of the subflow.
Application	Application scope to create the subflow in.
Category	Logical group for subflow.
Protection	Select whether the subflow is read-only. You can only select a value when you create the subflow in an application scope you own. The default value is None.
In-flow annotation	Help text that appears under the subflow title in Flow Designer to help flow designers understand what the subflow does when used in a flow.
Description	Description of the subflow.
Run as	Option that you can select to specify that the flow runs as a system user or the user who initiates the session. Select the user who initiates the session option when updates should come from the user who triggered the flow. For example, use this option when you want the incident record comments to come from the current user, or if you want the approval emails to originate from the approver. Settings for the Run as option in a flow don't apply to child subflows. Running as the initiating user also

Field	Description
	<p>ensures the actions taken during flow execution are limited by the user's ACL restrictions. Flows run by the initiating user will also respect user-specific settings like date/time format.</p> <p>Note: When choosing the option to run as the user who initiates the session, ensure that your security restrictions do not prevent your users from making any changes the flow executes.</p>
Run with roles	Roles that the flow runs with. This option is only available when Run as is set to user who initiates the session .

4. Create subflow inputs to specify the data available to the subflow when it starts running.
Each input you define for a subflow becomes a configuration option in the Flow Designer interface. To use the subflow in a flow, flow designers must define a value for each mandatory input. The more inputs a subflow has, the more data flow designers must define and the more familiar they must be with the underlying data model to use the subflow effectively.
 - a. Click **+** to open the Inputs & Outputs pane.
 - b. Click **+** to add a new input.
 - c. Define the name and type for the input.

Note: Subflow input names can't include any of the following reserved system names:

- sys_id
- sys_created_by
- sys_created_on
- sys_updated_on
- sys_updated_by
- sys_mod_count

d. To make the input a mandatory configuration option, select the **Mandatory** flag.

e. Click  to view the advanced options and define values.
Inputs provide advanced options based on their data type. All inputs have advanced options to add a hint or provide a default value. Use advanced options to guide flow designers through adding and configuring a subflow to a flow. For example, create a choice input to provide flow designers with a pre-defined list of configuration options to choose from. For more information about the configuration options available to particular data types, see [field types](#).

5. Create subflow outputs by defining the names and data types. Subflow outputs specify the data available to the parent flow after the subflow completes.

- a. Click  to add a new output.
- b. Define the name and the data type.
Output values are assigned in later steps.

Note: Subflow output names can't include any of the following reserved system names:

- sys_id
- sys_created_by
- sys_created_on
- sys_updated_on
- sys_updated_by
- sys_mod_count

The screenshot shows the 'INPUTS & OUTPUTS' section of the Flow Designer. On the left, under 'Inputs', there is one entry: 'Incident' of type 'Reference.Incident'. Under 'Outputs', there are two entries: 'Caller name' and 'Incident short description', both of type 'String'. On the right, a vertical sidebar titled 'Data' shows 'Subflow Inputs' containing 'Incident' (Record) and 'Subflow Outputs' containing 'Caller name' (String) and 'Incident short description' (String).

6. To add actions, flows, subflows, or flow logic, select **Add an Action**, **Flow Logic**, or **Subflow**.

a. Select an option.

Option	Description
Action	Select the desired action. Flow Designer includes Flow Designer actions that are available to flows and subflows. Alternatively, a user with the <code>action_designer</code> role can create additional actions to add to flows. The Integration Hub and spoke plugins install additional actions.

Option	Description
	<p>To add draft actions from the More Actions menu, set Show draft actions to true.</p> <p>To view spokes that are available in the ServiceNow Store, set Show store spokes to true from the More Actions menu.</p> <p>Note: Under Not Installed Spokes, the system displays spokes that are available in the ServiceNow Store based on compatibility with the ServiceNow version and application dependency on Flow Designer.</p>
Flow Logic	Select an option to specify conditional or repeated operations.
Subflow	Select a published subflow and define the input values. In addition to adding a subflow as a flow action, you can enable the Show triggered flows option from the More Actions menu to select an activated flow and define the required inputs. Running a triggered flow ignores its trigger conditions and runs all actions.

To change the order of an action in a flow, drag the handle on the left side of the action to the desired location.

The system displays a set of fields depending on the option that you selected.

b. To configure the action, flow logic, or subflow, fill in the fields.

c. Select **Done**.

d. Repeat adding actions until complete.

7. Assign subflow outputs to a value.

You can assign a subflow output to multiple values, enabling you to create conditional outputs based on flow logic.

a. Under **Actions**, click **+** and select **Flow Logic**.

- b. Click **Assign Subflow Outputs**.
- c. In the **Name** field, select an output you created in the Inputs & Outputs section. You can only assign values to outputs that have already been given a name and data type.
- d. In the **Data** field, enter a value or select a data pill from the data panel.
- e. Click **Done**.

What to do next

Test the subflow, and publish it when it is ready to be added to a flow or called from a script.

Note: You can only test or publish subflows that contain at least one action.

Create a template value input

Enable flow authors to set field values for a record being created or updated. Use a template value input to set different field values each time you add an action or subflow to a flow.

Before you begin

A template value input can only be created in a subflow action or action step that creates or updates a record, such as Create Catalog Task, Create Task, Create Record, and Update Record.

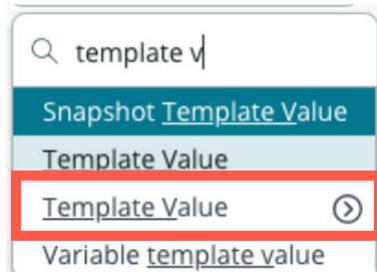
Role required: admin or action_designer

About this task

When creating or updating a record in a subflow action or action step, you can set static or dynamic input values. A static input value is the same in every flow you add it to. For example, setting the Urgency to the static value 1 - High generates an urgent catalog task in every flow. A dynamic input value allows a flow author to change the value during flow configuration. For example, a flow author could configure one flow to create a catalog task with an Urgency to 1 - High, but another flow could create a catalog task with an Urgency of 4 - Low.

Procedure

1. Open an action in Action Designer or a subflow in Flow Designer that you want to create a template value for.
2. Create an input.
 - a. In the **Label** field, enter a label to help flow designers understand the purpose of the field. This is the label for the field when the flow designer adds the subflow or action to a flow.
For example, enter Select fields.
 - b. In the **Type** field, select the Template Value option with the tables icon. Use the tables icon to select the table containing the record you will create or update.
For example, if you are adding a Create Catalog Task action in a subflow, set the Type to Template Value.Catalog Task [sc_task].



3. Add an action step or action that will use the template value.
The action step or action must create or update a record.
For example, add a Create Task action to a subflow that will create an incident task.
4. Drag the Template Value data pill into the **Field Values** or **Fields** field.
5. (Optional) You can set static values in addition to dynamic template values by selecting **+ Add Field Value**.

Note: Avoid setting static values that you want flow designers to set dynamic values from the template input. The flow always uses the static value from the subflow or action step over a value entered from a template. You can use static values to enforce business policies that you do not want flow designers to change.

Result

When the subflow or action is added to a flow, a flow author can set field values for the record being created or updated.

Get started with Dynamic Flow and Get Flow Outputs

Create a sample flow that dynamically calls subflows for provisioning cloud services.

Before you begin

Role required: flow_designer or admin

About this task

To understand how to use the Dynamic Flow and Get Flow Outputs flow logic together, the flow that you create in this task dynamically runs subflows that are related to provisioning cloud services. This flow does the following:

1. Triggers when a Cloud Instance Provisioning Request record is created.
2. Calls the appropriate subflow to create a Cloud Instance record.
3. Gets an output from the dynamically called subflow and updates the Cloud Instance Provisioning Request record with the output's value.

Procedure

1. Navigate to **All > System Applications > Studio**.
2. On the Select Application screen, click **Create Application**.
3. On the Guided App Creator welcome screen, click **Let's get started**.
4. In the **Name** field, enter `Cloud Instance Provisioning` and then click **Create**.
5. In the **Roles** field, enter `flow_designer` or `admin` and then click **Continue**.
6. From the list of app formats, select **Classic** and then click **Continue**.

7. Select **Create new table > Create table from scratch > Continue** to create two new tables for your application.

- Add the following fields for the first table and name the table Cloud Instance.

Field label	Field type	Reference
Owner	Reference	User [sys_user]
Instance Type	String	None
Instance URL	URL	None
Build Status	String	None

- Add the following fields for the second table and name the table Cloud Instance Provisioning Request.

Field label	Field type	Reference
Requested Instance Type	String	None
Requested by	Reference	User [sys_user]
Approval Status	String	None
Approved Instance	URL	None

8. After creating both tables, click **Done with tables**.

9. Select **Start > Create > Done with apps** to finish creating your application.

Create a subflow template

Create a sample subflow template for provisioning cloud services.

Before you begin

Role required: flow_designer or admin

Procedure

1. Under Business logic, process automation, and integrations, select **Go to Flow Designer**.
2. In the Flow Designer landing page main header, select **New > New Subflow**.
3. On the Subflow Properties screen, enter **TEMPLATE: Create Cloud Instance Record** in the **Name** field and then select **Submit**.



4. Under Inputs & Outputs, select the plus icon () to create two inputs for your subflow template.

Label	Type
Requested by	Reference.User
Requested Instance Type	String



5. Select the plus icon () to create one output for your subflow template.

Label	Type
Instance URL	URL

6. Under your output, select **Done**.

7. Select the add action, flow logic, or subflow to end of flow icon



() and then select **Action**.

8. From the list of ServiceNow Core actions, select **Log**.
9. In the data panel, drag the data pills for the Requested by and Requested Instance Type inputs you created earlier, and drop both of the pills into the **Message** field.
10. In the Subflow header, select **Save** and then select **Publish** to publish your subflow template.

Create a subflow for Jira cloud instance provisioning requests

Create a sample subflow for provisioning cloud services from Jira.

Before you begin

Role required: flow_designer or admin

Procedure

1. In the Subflow header, select the more actions icon () and select **Copy subflow**.
2. On the Copy Subflow screen, enter Create Cloud Instance Record - Jira in the **New Subflow Name** field, and then select **Copy**.
3. Under the **Log** action, add a [Create Record action](#).
4. In the **Table Name** field, select Cloud Instance and then fill in the following fields.

Field	Value
Owner	Select the data pill picker () and select Subflow - Inputs > Requested by .
Instance Type	Select the data pill picker () and select Subflow - Inputs > Requested Instance Type .
Instance URL	Enter <code>https://mycompany-</code> . Then, select the data pill picker () and select Subflow - Inputs > Requested by > Name . Finally, enter <code>.atlassian.net</code>
Build Status	Enter <code>In Progress</code> .

5. Under the create record action, select **Add an Action, Flow Logic, or Subflow > Flow Logic > Assign Subflow Outputs**.
6. Select the plus icon to add an output.
7. For **Name**, select **Instance URL**.
8. For **Data**, select the data pill picker () and then **2 - Create Record - > Cloud Instance Record > Instance URL**
9. In the Subflow header, select **Save** and then **Publish** to publish the subflow.

Create a subflow for Salesforce cloud instance provisioning requests

Create a sample subflow for provisioning cloud services from Salesforce.

Before you begin

Role required: flow_designer or admin

Procedure

1. In the Subflow header, select the more actions icon () and select **Copy subflow**.
2. On the Copy Subflow screen, enter **Create Cloud Instance Record** – **Salesforce** in the **New Subflow Name** field, and then select **Copy**.
3. Expand the **Create Cloud Instance Record** action and replace the **.atlassian.net** value for the **Instance URL** field with **.salesforce.com**.
4. In the Subflow header, select **Save**, accept the data change warning message, and then **Publish** to publish the subflow.

Create a flow that runs your subflows dynamically

Create a sample flow to run your provisioning cloud services subflows.

Before you begin

Role required: flow_designer or admin

Procedure

1. Under the Flow Designer header, select the **Create flow, subflow, or action** (+) icon and select **Flow**.
2. On the Flow Properties screen, enter **Process Cloud Instance Provisioning Request** in the **Name** field, and then select **Submit**.
3. Under Trigger, select the plus icon (+) to add a trigger to your flow, and then fill out the following fields.

Field	Value
Trigger	Select Created .
Table	Enter Cloud Instance Provisioning Request [x_cloud_instance_p_cloud_instance_provisioning_request].



4. Under Actions, select the plus icon **Flow Logic > Dynamic Flow**.
 5. Fill in the following fields.

Field	Value
Flow Template	Select TEMPLATE: Create Cloud Instance Record
Flow	Enter Create Cloud Instance Record – and then select the data pill picker () and select Trigger - Record Created > Cloud Instance Provisioning Request Record > Requested Instance Type .
Wait for completion	Enable this option to run your subflow dynamically first before other actions in your flow occur.
Requested by	Select the data pill picker () and select Trigger - Record Created > Cloud Instance

Field	Value
	Provisioning Request Record > Requested by.
Requested Instance Type	Select the data pill picker () and select Trigger - Record Created > Cloud Instance Provisioning Request Record > Requested Instance Type.

6. Under your **Dynamic Flow** flow logic, add the Get Flow Outputs flow logic, and then fill in the following fields.

7. For **Flow Template**, select **TEMPLATE: Create Cloud Instance Record**

8. For **Context**, select the data pill picker () and select **1 - Dynamic Flow - > Context**.

9. Under your **Get Flow Outputs** flow logic, select the plus icon



() and then select **Action > Update Record** to add an **Update Record action** to your flow.

10. Fill in the following fields.

Field	
Record	Select the data pill picker () and select Trigger - Record Created > Cloud Instance Provisioning Request Record.
Fields > Approved Instance	Select the data pill picker () and select 2 - Get Flow Outputs - > Instance URL.

Field	
Fields > Approval Status	Enter Approved.

11. Select **Save**.

Test your flow

Test your sample flow for provisioning cloud services.

Before you begin

Role required: flow_designer or admin

Procedure

1. In the Flow header, select **Test** to test your flow.
2. On the Test Flow screen, select the Create new record () icon to create a new record.
3. For **Requested By**, select the Lookup using list icon () and select any user from the list.
4. For **Requested Instance Type**, enter either **Jira** or **Salesforce**. The value you enter determines which subflow runs dynamically at runtime. Entering **Jira** runs the Create Cloud Instance Record - Jira subflow, and entering **Salesforce** runs the Create Cloud Instance Record - Salesforce.
5. Select **Submit**.
6. Select **Run Test**, and when the flow finishes running, select **Your test has finished running. View the flow execution details**. Your flow runs successfully if the values in the State column for each step in your flow shows **Completed** and each step's runtime value populates appropriately.
7. Select the tab for your **Process Cloud Provisioning Requests** flow and close the Test Flow modal.

-
8. In the Flow header, select **Activate** to make your flow accessible within the Cloud Instance Provisioning [Application scope](#).

Result

When a user in your instance creates a new record in the Cloud Provisioning Request table, your Process Cloud Provisioning Requests flow runs automatically. This flow dynamically creates the proper Cloud Instance record that is based on the requested instance type. It also generates a cloud instance URL, which populates in the Cloud Instance Provisioning Request record.

Test a subflow

You can test a subflow alone, or when added to a flow. When testing a subflow alone, you must define the inputs that the subflow uses in its actions. Because a subflow does not have a trigger, testing a subflow runs the actions using the defined input values. Unless updated, subsequent tests use the same inputs defined in the initial test run.

Before you begin

Role required: flow_designer or admin

[Create a subflow in Flow Designer](#) that contains at least one action and save it. Flow Designer only tests saved subflows that contain at least one action.

About this task

Because testing a subflow creates or changes records on the instance, flow designers should always test subflows on a non-production instance containing relevant demonstration data.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click the subflows tab and open a saved subflow.
3. Click **Test**.
The Test Subflow dialog opens.

4. Define input values for the subflow to use in its actions. The values defined are remembered on future test runs.

5. Click **Run Test**.

Note: Select the **Run test in background** option to test a subflow asynchronously in the background.

If you select the **Run test in background** option, the execution details are displayed only after the execution is completed asynchronously in the background. Also, the execution details are associated with the subflow only after execution is completed.

6. After the flow executes, click **Subflow has been executed. To view the subflow, click here**.

The Execution Details open.

What to do next

Review the [Flow execution details](#).

Once the subflow behaves as desired, you can [publish the subflow](#) and add it to a flow.

Publish a subflow

Publish a subflow to make it available to other users and to add it to activated flows.

Before you begin

Role required: flow_designer or admin

[Create a subflow in Flow Designer](#), [test the subflow](#), and verify that it is working as expected.

About this task

When you make changes to a published subflow, the changes remain in the draft state until you publish the subflow again. You must publish a changed subflow to make the changes available to activated flows.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click the subflows tab and open a tested subflow.
3. Click **Publish**.

Result

The subflow can be added to activated flows. If you update the subflow after it is published, you must click **Publish** again to see the changes when the parent flow is run. After publishing changes, all parent flows that use the subflow are automatically updated to use the current version.

Building custom actions

Automate a repeatable task with a sequence of related steps such as lookup a record, create a record, and log details about the record creation. Enable flow authors to add actions to multiple flows with minimal configuration.

Using Action Designer, you can:

- Create application-specific actions with pre-set configuration details, enabling process analysts to easily add actions to a flow with little configuration.
- Create scripted actions that appear code-less when added to a flow.
- Build integrations using Integration Hub.

Core actions

ServiceNow Core actions that come with your instance cannot be viewed or edited from the Action Designer interface. Some applications include spokes which include application-specific actions. Spoke actions are typically read-only but can be copied and customized.

Custom actions

Unlike core actions where flow designers must manually configure flow logic, custom actions always use the same configuration when added

to a flow. If your flow designers often use an action with the same configuration, you might create a reusable action.

A reusable action includes these components.

Inputs

Inputs are data variables used in your action. For example, if an action step creates a record in the incident table, your input might be a reference to the incident table. Once added as an input, the table and its fields are available to steps and outputs in the flow.

Each input you define for an action becomes a configuration option in the Flow Designer interface. To use the action in a flow, flow designers must define a value for each mandatory input. The more inputs an action has, the more data flow designers must define and the more familiar they must be with the underlying data model to use the action effectively.

Inputs provide advanced options based on their data type. All inputs have advanced options to add a hint or provide a default value. Use advanced options to guide flow designers through adding and configuring an action to a flow. For example, create a choice input to provide flow designers with a pre-defined list of configuration options to choose from. For more information about the configuration options available to particular data types, see [field types](#).

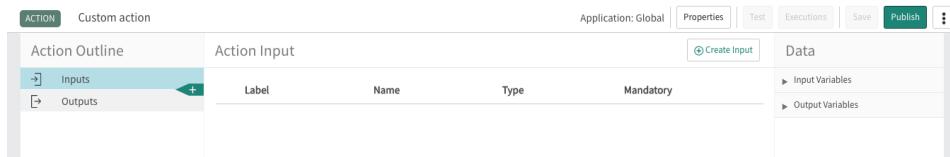
Outputs

Outputs are data variables that represent the results of the action. These results are available to other actions in a flow.

Steps

A step is a single reusable operation within an action. For example, the **Create Record** step allows action designers to specify the table and field values to use during record creation. Step configuration requires subject matter expertise with application tables, fields, and business logic. Application developers or IT generalists add steps to actions from the Action Designer design environment. Flow Designer provides a set of ServiceNow core steps to automate Now Platform processes. You can add application-specific steps by activating the associated spoke.

Action Designer design environment



Create and edit actions by defining inputs and adding action steps. Test actions to verify if they complete successfully and review the runtime values they generate. Copy actions to use existing actions as templates. Publish actions to activate them, which makes them available to activated flows and to preserve their current action steps, variables, and sequence as a snapshot separate from further configuration changes.

More Actions

Click the More actions icon () to access additional options for the action.

Copy action

Create a copy of the open action in an application you specify.

Configurations

Enable or disable the **Show inline script toggle** option.

Code Snippet

Generate a code snippet for the action.

Manage security

Enable or disable the **Callable by Client API** option.

Manage natural language title

Create or edit an action title with styled or dynamic text. For more information, see [Manage natural language titles](#).

Testing actions

After adding inputs and action steps, users with the action_designer or admin role can test an action. To test an action, provide the required inputs. Action designers should always test actions on non-production instances containing relevant demonstration data because testing an action can make significant changes to records on your instance.

Roles

To create custom actions, you must have the action_designer or admin role.

Action status

Every action has an Action Status data pill in the Data pane. This object data pill contains the current runtime details about the action. The Action Status object consists of a code and message.

Action Status > Code

Integer data pill containing the code returned by the first matching error condition or the last step run. You can return your own code when you create a custom error condition. See [Action error evaluation](#).

Action Status > Message

String data pill containing the message produced by a matching error condition or the last step run. You can return your own message when you create a custom error condition. See [Action error evaluation](#).

- [Getting started with actions](#)

Transform the Ask for Approval action into a reusable action that always requires manager approval.

- [Create an action](#)

Create a reusable component to automate one or more steps of a process.

- [Complex data](#)

Use a graphical interface to work with collections of complex structured data. Help design users understand the organization of structured data, and add, remove, or configure its individual elements.

Getting started with actions

Transform the Ask for Approval action into a reusable action that always requires manager approval.

Before you begin

Role required: admin

Note: While Action Designer is designed to use the action_designer and delegated_developer roles in most scenarios, this tutorial uses the admin role to illustrate functionality without requiring additional roles to set up records and approve requests.

Complete the steps in [Getting started with flows](#). This tutorial replaces the Ask for Approval action in the Expense Approval flow.

About this task

Actions are made up of:

- Inputs: Data variables used in your action.
- Steps: Operations on the inputs or results from a prior step that generate data that can be used in later steps.
- Outputs: Data variables that represent the results of the action. These results are available to other actions in a flow.

Unlike the core Ask for Approval action where flow designers must manually configure the approval rules, this custom action always uses the same approval rules when added to a flow. You might create a reusable action if your flow designers often use an action with the same configuration. For example, if your flow designers always use the request manager approval and due date options, this action automatically uses them and therefore requires less flow configuration.

Procedure

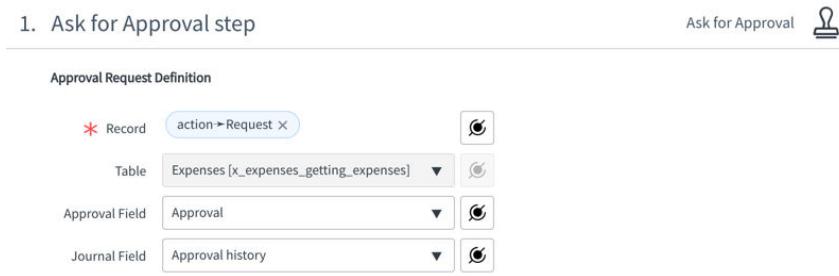
1. Open the Expenses Getting Started application in Studio.
Alternatively, you can navigate to **Process Automation > Flow Designer** and select **New Action** to access Action Designer in the platform. In the Action Properties, select your scoped application in the **Application** field.
2. Create an action.
 - a. Click **Create Application File**.
 - b. Under Flow Designer, select Action and click **Create**.
 - c. In the **Name** field, enter Ask for Manager Approval.
 - d. In the **Description** field, enter Approve or reject a request based on manager approval or rejection. Allow manual approvers to be added.
 - e. Click **Submit**.
An Ask for Manager Approval action is created in the Expenses Getting Started scope.
3. Define the inputs in the Ask for Manager Approval action.
 - a. Select **+ Create Input** and add the following values.
 - Name: **Request**
 - Type: **Reference**
 - Reference Table: **Expenses [x_expenses_getting_expenses]**

The screenshot shows the Action Designer interface. On the left, the 'Action Outline' panel displays a single step labeled 'Ask for Approval'. The 'Action Input' panel shows a table with one row. The row has columns for 'Name' (set to 'Request'), 'Type' (set to 'Reference'), and 'References Table' (set to 'Expenses [x_expenses_getting_expenses]'). A 'Create Input' button is visible at the bottom of the input table. The 'Data' panel on the right lists 'Input Variables' (Request, Record), 'Output Variables' (Approval state, Choice), and 'Ask for Approval step' (Approval State, Choice).

This input enables you to reference any field or record from the Expenses table. Use the data pills on the right-hand side to add the record or its fields to action steps.

4. Add an Ask for Approval step.

- Click the **+** underneath Inputs in the Action Outline.
- Select **Ask for Approval**.
- Complete the fields in the Ask for Approval step.
 - Record: Under the **Input Variables** category, drag the **[Request]** data pill from the right-hand pane.
 - Table: Set to **Expenses [x_expenses_getting_expenses]**.
 - Approval Field: Set to **Approval**.
 - Journal Field: Set to **Approval history**.



d. Define rules in the Ask for Approval step. You can use the data pill picker, or drag the data pills from the right-hand pane to select the data you need.

- [Approve]** when **[Anyone approves]** from the field **[action->Request->Requested for->Manager]**, **[OR]**
- [Anyone approves]** from the field **[Manual User(s)]**.

Select **Add another OR rule set** to define rejection rules:

- [Reject]** when **[Anyone rejects]** from the field **[action->Request->Requested for->Manager]**, **[OR]**
- [Anyone rejects]** from the field **[Manual User(s)]**.

* Rules

Add another OR rule set

Approve When:

OR

- Anyone approves
- action->Request->Requested for->Manager
- OR
- Anyone approves
- Manual User(s)

Remove rule set

OR

Reject When:

OR

- Anyone rejects
- action->Request->Requested for->Manager
- OR
- Anyone rejects
- Manual User(s)

Remove rule set

e. Define a due date in the Ask for Approval step.

- [Approve] if pending by [Relative date] [1] [Days] from [action->Request->Created].
- Days schedule [8-5 weekdays excluding holidays].

This due date automatically approves all requests that have not been approved or denied within one day from when the request was created.

Due Date

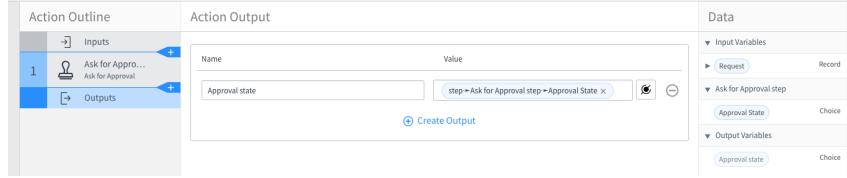
Approve if pending by Relative date 1 Days From action->Request->Created

Days schedule 8-5 weekdays excluding holidays

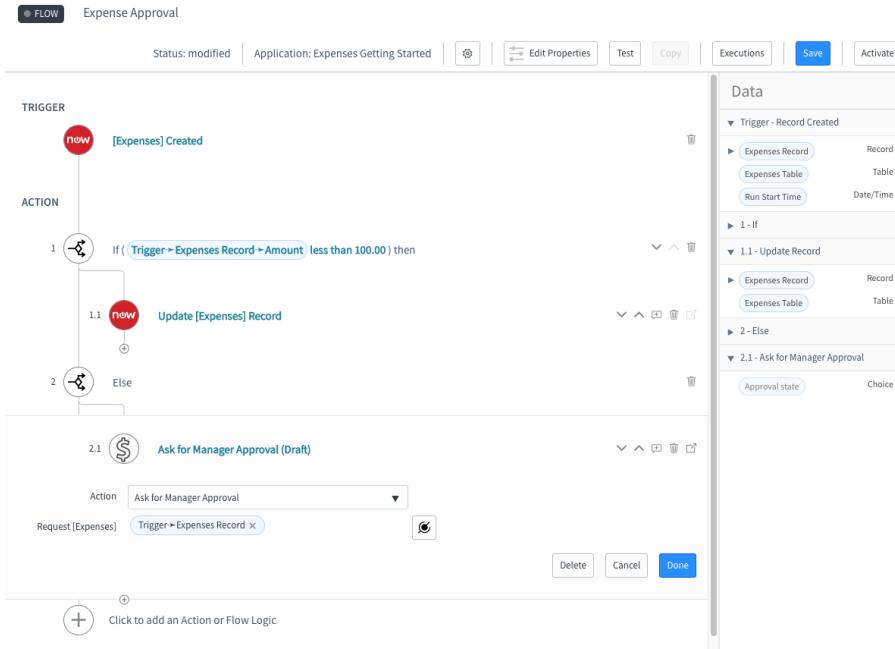
5. Define the outputs in the Ask for Manager Approval action. Adding an output makes data available to a flow. For example, this action outputs the approval state of the record.

a. Select + Create Outputs and add the following values.

- Name: **Approval state**
- Value: In the right-hand pane, expand the **Ask for Approval step** category and drag the **[Approval State]** data pill.



- b. Click **Save**.
6. Add a custom icon for your application that displays in Flow Designer. All actions in the application scope use the custom icon.
 - a. In Studio, navigate to **File > Settings**. The application settings open.
 - b. In the **Logo** field, select **Click to add....**
 - c. Upload an icon to use with your reusable actions.
7. Test the reusable action within your flow.
 - a. Return to the Expense Approval flow.
 - b. Remove the 2.1 Ask for Approval action from the flow. This action will be replaced by the reusable Ask for Manager Approval action.
 - c. Set **Show draft actions** to true.
 - d. Add the Ask for Manager Approval action to your flow.
 - e. In the right-hand pane, expand the **Trigger - Record Created** category and drag the **[Expenses Record]** data pill into the **Request [Expenses]** field.



8. Click **Save**.

9. Test the flow using a record with an amount below the designated limit.

- From the flow, click **Test**.
The Test flow modal appears.

b. In the **Record** field, select a record you created in earlier steps that has value in the **Amount** field under the 100.00 limit. Verify that you have not already run tests using this record.

c. Select **Run Test**.

d. After the flow executes, click **Flow has been executed. To view the flow, click here**.
The Execution Details open.

Because the amount is less than 100.00, the first condition is met and the request is approved. The Else condition is not evaluated.

Execution Details | Expense Approval | Test Run - Completed | Open Flow | Open Context Record

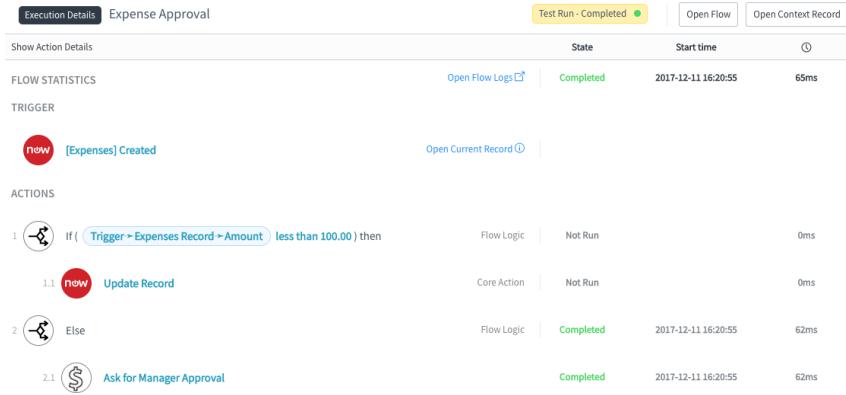
Show Action Details		State	Start time	Duration
FLOW STATISTICS		Open Flow Logs	Completed	2017-12-11 13:22:40
TRIGGER				59ms
	[Expenses] Created	Open Current Record		
ACTIONS				
1	If (Trigger > Expenses Record > Amount less than 100.00) then	Flow Logic	Completed	2017-12-11 13:22:40
1.1	now Update Record	Core Action	Completed	2017-12-11 13:22:40
2	Else	Flow Logic	Not Run	0ms
2.1	Ask for Manager Approval		Not Run	0ms

10. Test a record with an amount over the designated limit. Verify that you have not already run a test on the test record.
Because the amount is over the designated limit, the second condition is evaluated.

Execution Details | Expense Approval | Test Run - Waiting | Cancel Flow | Open Flow | Open Context Record

Show Action Details		State	Start time	Duration
FLOW STATISTICS		Open Flow Logs	Waiting	2017-12-11 16:20:55
TRIGGER				155ms
	[Expenses] Created	Open Current Record		
ACTIONS				
1	If (Trigger > Expenses Record > Amount less than 100.00) then	Flow Logic	Not Run	0ms
1.1	now Update Record	Core Action	Not Run	0ms
2	Else	Flow Logic	Waiting	2017-12-11 16:20:55
2.1	Ask for Manager Approval		Waiting	2017-12-11 16:20:55

11. Approve the request.
 - a. Navigate to the test record and change the value of the **State** field in the Approvers related list to **Approved**.
 - b. Navigate back to the flow execution details and refresh the browser.
Because the request is approved, the flow completes.



12. Navigate to the Ask for Manager Approval action and click **Publish**. Publishing an action enables you to activate any flow that uses it.
13. Navigate to the flow and set **Show draft actions** to false.
14. Click **Activate**. Activating a flow sets it to run every time the trigger conditions are met.

Result

The Expense Approval flow runs every time a record is created in the Expenses table. Now that the flow is activated and working as expected, you can publish it to the application repository and deploy it to other instances.

Create an action

Create a reusable component to automate one or more steps of a process.

Before you begin

- Set up an application in Guided Application Creator to store Flow Designer content.
- Role required: flow_designer, action_designer or admin

About this task

Action designers should know the application table structure and be aware of any existing business logic associated with the target tables of an action. Be sure to disable any conflicting business rules or workflows before creating an action.

Creating a custom application to contain your Flow Designer content enables you to [deploy](#) it using the application repository or the ServiceNow Store.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click the **Actions** tab and select **New Action**.
3. Fill in the Action Properties and click **Submit**.

Field	Description
Name	Enter a unique name for your action.
Accessible From	Accessible from all application scoped or only within the specified application scope.
Category	Defined category within the application scope for an action.
Protection	Select whether the action is read-only. You can only select a value when you create the action in an application scope you own. The default value is None.
Description	Description of the action.
Application	Application scope of the action.
In-Flow Annotation	Help text that appears under the action title in Flow Designer to help flow designers understand what the action does when used in a flow.

An empty action opens.

4. Define action inputs to make data available to the action steps and outputs.

- a. Select **+ Create Input** and complete the fields.

Field	Description
Name	<p>Name of the input. This value is used as the name of the data pill in the right-hand pane.</p> <p>Note: Action input names can't include any of the following reserved system names:</p> <ul style="list-style-type: none">• sys_id• sys_created_by• sys_created_on• sys_updated_on• sys_updated_by• sys_mod_count
Type	Data type of the input. For supported data types, see Flow Designer input and output data variables .
Reference Table	Reference table for the data type. Only required for the following data types: <ul style="list-style-type: none">• Records• Reference
Advanced options	Inputs provide advanced options based on their data type. All inputs have advanced options to add a hint or provide a default value. Use advanced options to guide flow designers through adding and configuring an action to a flow. For example, create a choice input to provide flow designers with a pre-defined list

Field	Description
	<p>of configuration options to choose from. For more information about the configuration options available to particular data types, see field types.</p> <p>Click to view the advanced options and define values.</p>

Inputs are represented as data pills in the right-hand pane. You can add inputs to steps and outputs in the flow by dragging and dropping data pills.

5. Add an action step to perform an operation on the action inputs.
 - a. Click the **+** underneath Inputs in the Action Outline.
 - b. Select the step you would like to perform.
 - c. Complete the fields in the step.
6. For **If this step fails**, select the action error evaluation behavior you want the step to take.

Option	Description
Stop the action and go to error evaluation	Stop running the action at the current step and go to error evaluation. The Step Status object contains the error information returned by the step.
Don't stop the action and go to the next step	Ignore the failure and continue running the action from the next step. The Step Status object contains the error information returned by the step. Action error evaluation runs regardless of whether the action continues running.

7. Add action outputs to make data available to a flow.

- a. Select **+ Create Outputs** and complete the fields.

Field	Description
Name	<p>Name of the output. This value is the name of the data pill in the right-hand pane when the action is added to a flow.</p> <p>Note: Action output names can't include any of the following reserved system names:</p> <ul style="list-style-type: none">• sys_id• sys_created_by• sys_created_on• sys_updated_on• sys_updated_by• sys_mod_count
Value	Data used previously in the action either in a step or input. Adding a variable to the output makes the value available to the flow.

8. Click **Save**.

Action Designer saves a draft of the action.

What to do next

[Test the action](#) until it is ready to be published.

Note: By default, the system only runs published actions.

- [Test an action](#)

Test an action before publishing it for other users.

- [Dynamic inputs](#)

Build dynamic choice and template inputs for an action. Dynamically display and assign values to the inputs during flow design.

- [Dynamic outputs](#)

Access action and subflow outputs as dynamically generated data pills during flow design. You can also build data gathering actions to generate complex objects from Now Platform and IntegrationHub outputs.

- [Action error evaluation](#)

Enable actions to catch step failures and continue running. Identify when specific error conditions occur and return your own action status code, status message, and error state.

- [Retry policy](#)

Automatically retry failed requests when a step encounters an intermittent issue such as a network failure or request rate limit. Set a retry policy to prevent having to manually trigger the step again.

Test an action

Test an action before publishing it for other users.

Before you begin

- [Create an action](#) and save it.
- Role required: flow_designer, flow_operator, action_designer, or admin.

About this task

A user with the flow_designer role should always test actions on non-production instances containing relevant demonstration data because testing an action creates or changes records on the instance.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click the **Actions** tab and select the action that you want to test.

3. Click **Test**.

The system displays the Test Action dialog box.

4. Fill in the fields for the action.

Note: Complete all mandatory fields in the Test Action dialog box.

5. Click **Run Test**.

Note: Select the **Run test in background** option to test an action asynchronously in the background.

If you select the **Run test in background** option, the execution details are displayed only after the execution is completed asynchronously in the background.

What to do next

Click Action has been executed. To view the action, click here to view the action execution details. See [Flow execution details](#) for information about the executions.

Note: Users must have the flow_operator or admin role to view the executions.

Dynamic inputs

Build dynamic choice and template inputs for an action. Dynamically display and assign values to the inputs during flow design.

Note: Dynamic inputs are not available in the base system. To use dynamic inputs in Flow Designer, you must [request an IntegrationHub Enterprise Pack subscription](#).

During flow design, dynamic inputs retrieve values and display them as inputs within an action dynamically. Dynamic input types include:

- Dynamic choice
- Dynamic template

A dynamic input must point to a data gathering action that collects the displayed data. For example, a data gathering action can retrieve values from a third-party system and populate a dynamic choice for an action that runs in an [Integration Hub spoke](#). To use a dynamic input in Flow Designer:

1. An action designer creates a data gathering action.
2. An action designer creates a parent action with a dynamic input that points to the child data gathering action.
3. A flow designer adds the parent action to a flow.

Data gathering actions

Data gathering action that collects data, typically from a third-party system via a REST call, and dynamically builds its output based on the returned payload. A data gathering action must:

- Have a [script step](#) that contains an output variable of type JSON.
- Have an action output named `output` of type JSON whose value is derived from the script step's JSON output variable.

Note: The action can have multiple outputs but can only have one of type JSON.

- Format the payload in the script step so that there is a property named `data`.
- Wait for up to 300 seconds (5 minutes) to gather data before it times out.

Note: To change the timeout period for a data gathering action, modify the value of the `sn_flow_designer.sync_action_execution_timeout_in_seconds` system property.

Dynamic choice

A dynamic choice displays gathered data as a list of choice values during flow design. For more information on building a dynamic choice, see [Create a data gathering action for a dynamic choice](#).

Dynamic template

A dynamic template displays a gathered list of fields whose associated values can be specified during flow design. Because this list populates dynamically, you don't have to change the flow if new fields are added to or removed from the table that is accessed in the data gathering action. For more information on building a dynamic template, see [Create a data gathering action for a dynamic template](#).

Design considerations

Consider dynamic inputs for third-party integrations

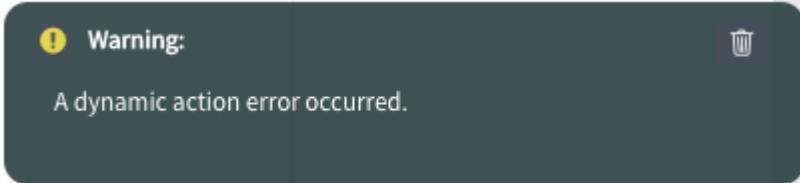
Dynamic inputs let you create flows that fetch data dynamically from external sources. In third-party integrations, dynamic inputs can provide data values that pertain to a particular endpoint. For more information on setting up third-party integrations with Flow Designer, see [IntegrationHub](#).

Be aware of the time required to retrieve large amounts of data

By default, dynamic inputs have up to 300 seconds to gather data before they time out. If your data gathering action needs more time to gather data, set the `sn_flow_designer.sync_action_execution_timeout_in_seconds` system property to a higher value. However, don't use long timeout values for interactive flows where an end user must enter or select a value.

Be aware of scripting errors

Because all data gathering actions use a script step, potential errors could occur from scripting. When using scripts to output JSON variables for your dynamic inputs, you may encounter errors that prevent inputs from receiving the JSON values they need. When a dynamic input scripting error occurs, the following warning message may appear. Message displayed for scripting error



- Get started with dynamic inputs

Create a sample action that builds a dynamic choice and dynamic template for use in a flow.

- [Create a data gathering action for a dynamic choice](#)

Create an action to collect input values to pass to a parent action as a dynamic choice.

- [Create a data gathering action for a dynamic template](#)

Create an action to collect input values to pass to a parent action as a dynamic template.

- [Dynamic input configuration options](#)

Use these options to configure your dynamic inputs for a parent action.

Create a sample action that builds a dynamic choice and dynamic template for use in a flow.

Before you begin

Role required: action_designer or admin

About this task

In this task, you create a custom action that dynamically generates a list of tables and associated fields in your instance. To accomplish this, you create two data gathering actions: one that collects a list of tables in your instance, and another that collects a list of fields for the selected table. Each data gathering action consists of the following:

- A REST step to gather table and field data from your instance
- A script step to construct the payload from the REST step's Response Body
- An output variable named `output` of type JSON

You then use these data gathering actions to build a dynamic choice and a dynamic template. Finally, you will create a custom action that calls the data gathering action during flow design.

Note: This task recreates the demo actions that are installed when you [request a ServiceNow IntegrationHub Enterprise Pack subscription](#) for your instance.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **New** and select **New Action**.
 - a. On the Action Properties screen, in the **Name** field, enter **Get ServiceNow Tables (Dynamic)**.
 - b. Click **Submit**.
3. In the Action Outline, click the Add a new step icon () under **Inputs** and select the **REST** step.
4. Under the REST step header, fill in the following fields.

Input	Value
Connection	Leave Use Connection Alias selected.
Connection Alias	Click the Create new record icon () to create a new Create an HTTP(s) connection , or use an existing connection for your instance. The Credential for the HTTP(s) connection must use Basic authentication credentials . Additionally, the Connection URL must be the base URL for your instance, including the forward slash at the end. For more information on connections and credentials, see Getting started with connections and Getting started with credentials .

Input	Value
Build Request	Leave the Manually option selected
Resource Path	Enter api/now/doc/table/schema Add the ?sysparm_limit=1 query parameter to the end of the Resource Path to limit the number of records returned by the query to one record.
HTTP Method	Enter GET

5. In the Action Outline, click the Add a new step icon () under your REST step and select the **Script** step.
 - a. In the Input Variables section, click **Create Variable**.
 - b. In the **Name** field, enter payload.
 - c. Next to the **Value** field, click the data pill picker () and select **REST Step > Response Body**.
 - d. In the **Script** field, enter the following code.

```
(function execute(inputs, outputs) {  
    var payload = JSON.parse(inputs.payload);  
    var tables = payload.result  
        .filter(function(table) { return table.value.indexOf('_') < 0; }) // Filter the tables we want  
        .map(function(table) {  
            return { label: table.label, name: table.value };  
        });  
    outputs.tables = { data: tables }; // Final, properly formatted output  
}(inputs, outputs);
```

- e. In the Output Variables section, click **Create Variable**.
 - f. In the **Label** and **Name** fields, enter `tables`.
 - g. In the **Type** field, select `JSON`.
6. In the Action Outline, click **Outputs**.
 - a. Click **Create Output**.
 - b. In the **Label** and **Name** fields, enter `output`.
 - c. In the **Type** field, select `JSON`.
 - d. Click **Exit Edit Mode**.
- e. Next to the **Value**, click the data pill picker () and select **Script Step > tables**.

7. In the Action header, click **Save** and then click **Test** to **test the action**.

- a. Click **Run Test**.
- b. Check the action's execution details.
Your data gathering action runs successfully if the runtime value for `tables` is a complex object containing an array of key-value pairs for `label` and `name` as shown in the following abbreviated example.

```
{  
    "data": [  
        {  
            "name": "sla",  
            "label": "Agreement"  
        },  
        {  
            "name": "announcement",  
            "label": "Announcement"  
        },  
        {  
            "name": "cmdb",  
            "label": "Base Configuration Item"  
        },  
        {  
            "name": "checklist",  
            "label": "Checklist"  
        }  
    ]  
}
```

```
    "label": "Checklist"  
}, ...
```

8. In the Action header, click **Publish** to make the Get ServiceNow Tables (Dynamic) action available to other flows and actions within the Global scope.

Related tasks

- [Create a data gathering action for a dynamic choice](#)
- [Create a data gathering action for a dynamic template](#)

Related reference

- [Dynamic input configuration options](#)

Create the Get ServiceNow Fields (Dynamic) action

Create a sample action that generates a list of fields for a dynamically selected table.

Before you begin

Role required: action_designer or admin

Procedure

1. In the main header, click the Create flow, subflow, or action icon  and select **Action**.
 - a. On the Action Properties screen, in the **Name** field, enter `Get ServiceNow Fields (Dynamic)`.
 - b. Click **Submit**.
2. In the Action Outline, select **Inputs**.
 - a. In the Action Input header, click **Create Input**.
 - b. In the **Label** and **Name** fields, enter `Table`.

- c. In the **Type** field, select **String**.
- d. To make the input required, toggle the **Mandatory** slider so that it is active.
3. In the Action Outline, click the Add a new step icon () under **Inputs** and select the **REST** step. Enter the following information.
4. Under the REST step header, fill in the following fields.

Input	Value
Connection	Leave Use Connection Alias selected.
Connection Alias	Click the Create new record icon () to create a new Create an HTTP(s) connection , or use an existing connection for your instance. The Credential for the HTTP(s) connection must use Basic authentication credentials . Additionally, the Connection URL must be the base URL for your instance, including the forward slash at the end.
Build Request	Leave Manually selected.
Resource Path	Enter <code>api/now/table/</code> and then click the data pill picker () . Select Inputs > Table .
HTTP Method	Enter <code>GET</code>

5. In the Action Outline, under the REST step, click the Add a new step icon () and select the **Script** step.
 - a. In the Input Variables section, click **Create Variable**.

- b. In the **Name** field, enter payload.

- c. Next to the **Value**, click the data pill picker () and select **REST Step > Response Body**.

- d. In the **Script** field, enter the following code.

```
(function execute(inputs, outputs) {
    var payload = JSON.parse(inputs.payload);
    var fields = Object.keys(payload.result[0])
        .map(function(property) {
            return {
                label: property.charAt(0).toUpperCase() + property.slice(1).replace(/_/g, ' '),
                name: property,
                value: '' // value is always empty
            };
        });
    outputs.fields = { data: fields }; // final properly formatted output
})(inputs, outputs);
```

- e. In the Output Variables section, click **Create Variable**.

- f. In the **Label** and **Name** fields, enter fields.

- g. In the **Type** field, select **JSON**.

6. In the Action Outline, click **Outputs**.

- a. On the Action Output header, click **Create Output**.

- b. In the **Label** and **Name** fields, enter output.

- c. In the **Type** field, select **JSON**.

- d. Click **Exit Edit Mode**.

- e. Next to the **Value** field, click the data pill picker () and then select **Script Step > fields**.

7. In the Action header, click **Save** and then click **Test** to test the action.

a. On the Test Action screen, in the **Table** field, enter `incident`.

b. Click **Run Test**.

c. Check the action's execution details.

Your data gathering action runs successfully if the runtime value for `fields` is a complex object containing an array of key-value pairs for `label`, `name`, and `value` as shown in the following abbreviated example.

```
{  
    "data": [  
        {  
            "name": "Parent",  
            "label": "parent",  
            "value": ""  
        },  
        {  
            "name": "Made sla",  
            "label": "made_sla",  
            "value": ""  
        },  
        {  
            "name": "Caused by",  
            "label": "caused_by",  
            "value": ""  
        },  
        {  
            "name": "Watch list",  
            "label": "watch_list",  
            "value": ""  
        }, ...  
    ]  
}
```

8. In the Action header, click **Publish** to make the Get ServiceNow Fields (Dynamic) action available to other actions within the Global scope.

Create the Create ServiceNow Record (Dynamic) action

Create a sample action to generate a record in a dynamically chosen table.

Before you begin

Role required: `action_designer` or `admin`

Procedure

1. Click the Create flow, subflow, or action icon (+) and then select **Action**.
 - a. On the Action Properties screen, in the **Name** field, enter **Create ServiceNow Record (Dynamic)**.
 - b. Click **Submit**.
2. In the Action Outline, click **Inputs**.
 - a. Click **Create Input**.
 - b. In the **Label** and **Name** fields, enter **Table**.
 - c. In the **Type** field, select **Dynamic Choice**.
 - d. To make the input required, toggle the **Mandatory** slider so that it is active.
 - e. Click the Toggle advanced inputs icon () to display the advanced options for the **Table** input.
 - f. Under Dynamic Options, in the **Action** field, select **Get ServiceNow Tables (Dynamic)**.
 - g. Click **Create Input** to create another action input.
 - h. In the **Label** and **Name** fields, enter **Fields**.
 - i. In the **Type** field, select **Dynamic Template**.
 - j. To make the input required, toggle the **Mandatory** slider so that it is active.
 - k. Click the Toggle advanced inputs icon () to display the advanced options for the **Table** input.
 - l. Under Dynamic Options, in the **Action** field, select **Get ServiceNow Fields (Dynamic)**.
 - m. Toggle the **Depends-On Another Input** slider to make it active.

- n. In the **Table** field, select **Table**.
3. In the Action Outline, under Inputs, click the Add a new step icon () and then select the **Script** step.
 - a. In the Input Variables section, click **Create Variable**.
 - b. In the **Name** field, enter `table`.
 - c. Next to the **Value** field, click the data pill picker () and select **Inputs > Table**.
 - d. Click **Create Variable** to create another input variable.
 - e. In the **Name** field, enter `fields`.
 - f. In the **Type** field, select **String**.
 - g. Next to the **Value** field, click the data pill picker () and select **Inputs > Fields**.
 - h. In the **Script** field, enter the following code.

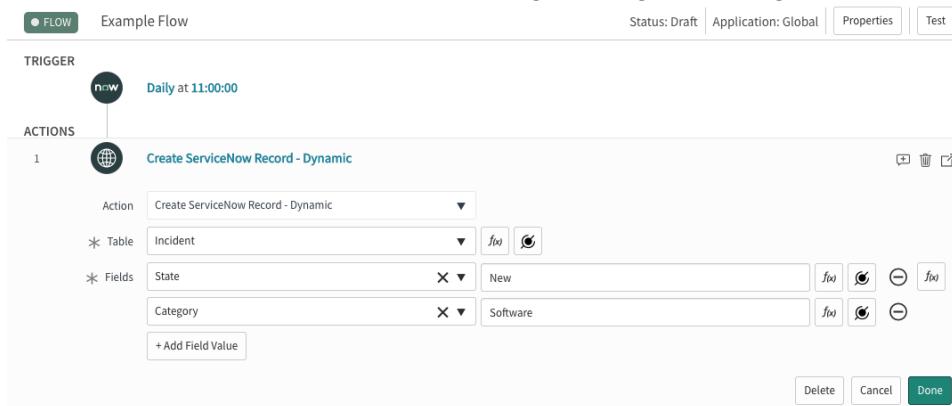
```
(function execute(inputs, outputs) {  
    var now_gr = new GlideRecord(inputs.table);  
    gr.applyEncodedQuery(inputs.fields);  
    gr.insert();  
})(inputs, outputs);
```

4. In the Action header, click **Save** and then click **Test** to **test the action**.
 - a. On the Test Action screen, in the **Table** input, select any dynamically-generated choice value.
 - b. Click **Add Field Value** and then select any field and enter any value.
 - c. Click **Run Test**.
 - d. Check the action's execution details.
Your action runs successfully if the runtime values for `Table` and `Field` match the values you entered for the test.

5. In the Action header, click **Publish** to make the Create ServiceNow Record (Dynamic) action available to flows within the Global scope.

Result

You can now add the Create ServiceNow Record (Dynamic) action to a flow in Flow Designer. This sample action dynamically generates a list of tables and associated fields in your instance whose values you can assign during flow design.



Create an action to collect input values to pass to a parent action as a dynamic choice.

Before you begin

Role required: action_designer or admin

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **New > New Action**.
3. In the **Name** field, enter a name for your action, choose the proper **Application** scope, and then click **Submit**.
4. In the Action Outline, click the add a new step icon (+) under **Inputs** and select the **REST** step.
Configure your REST step to get data from the proper **Base URL** and **Resource Path** with any applicable **Query Parameters** for the

HTTP Method GET. For more information on using the REST step in Integration Hub, see [REST step](#) and [REST in IntegrationHub](#).

5. In the Action Outline, click the add a new step icon () under your REST step and select the **Script** step.

This script step must transform the REST step's **Response Body** into a format that can be used as a dynamic choice for a parent action. Format the JSON output variable so that it contains a property named data with a structure similar to the following example.

```
{
  data: [
    {
      label: "Choice Option 1",
      name: "choice_option_1"
    },
    {
      label: "Choice Option 2",
      name: "choice_option_2"
    },
    {
      label: "Choice Option 3",
      name: "choice_option_3"
    }
  ]
}
```

6. In the Action Outline, click **Outputs** and create an output named output of type JSON.

7. Use the data pill picker () to assign the data pill for the JSON output variable from your script step to the action output's **Value**.

Note: The action can have multiple outputs, but there can only be one of type JSON.

8. Click **Save** and [test the action](#).

In the execution details, your data gathering action runs successfully if the runtime value for output contains the data property in the proper format.

9. Click **Publish** to make the action available to other flows and actions within the same application scope.

Result

You can now use your data gathering action to populate the options that appear for a dynamic choice input in a parent action.

The screenshot shows the 'Create ServiceNow Record - Dynamic' action configuration in the Flow Designer. The 'Inputs' section contains one step named 'Script step'. The 'Action Input' section defines a dynamic choice input for a 'table' label. Advanced options include a name of 'table', a max length of '8000', and a choice type of 'Dropdown with --None--'. The 'Dynamic Options' section notes a requirement for a subscription and lists the action 'Get ServiceNow Tables - Dynamic'.

Related tasks

- [Get started with dynamic inputs](#)
- [Create a data gathering action for a dynamic template](#)

Related reference

- [Dynamic input configuration options](#)

Create an action to collect input values to pass to a parent action as a dynamic template.

Before you begin

Role required: action_designer or admin

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.

2. Click **New > New Action**.
3. In the **Name** field, enter a name for your action, choose the proper **Application** scope, and then click **Submit**.
4. In the Action Outline, click the add a new step icon (+) under **Inputs** and select the **REST** step.
Configure your REST step to get data from the proper **Base URL** and **Resource Path** with any applicable **Query Parameters** for the **HTTP Method** GET. For more information on using the REST step in Integration Hub, see [REST step](#) and [REST in IntegrationHub](#).
5. In the Action Outline, click the add a new step icon (+) under your REST step and select the **Script** step.
This script step must transform the REST step's Response Body into a format that can be used as a dynamic choice for a parent action. Format the JSON output variable so that it contains a property named data with a structure similar to the following example.

```
{
  data: [
    {
      label: "Template Option 1",
      name: "template_option_1",
      value: ""
    },
    {
      label: "Template Option 2",
      name: "template_option_2"
    },
    {
      label: "Template Option 3",
      name: "template_option_3",
      value: "",
      type: "choice",
      choices: [
        { label: "Choice 1", value: "choice_1" },
        { label: "Choice 2", value: "choice_2" }
      ]
    }
  ]
}
```

```
    ]  
}
```

Note: The JSON output structure for a dynamic template can include the optional properties `type` and `choices`.

- `type`: Specify a valid [Field types](#) to render the appropriate UI control for the dynamic template.
- `choices`: If specifying `choice` for the `type` property, you can then specify an array of choice options that will render in a list for the dynamic template.

6. In the Action Outline, click **Outputs** and create an output named `output` of type JSON.

7. Use the data pill picker () to assign the data pill for the JSON output variable from your script step to the action output's **Value**.

Note: The action can have multiple outputs, but there can only be one of type JSON.

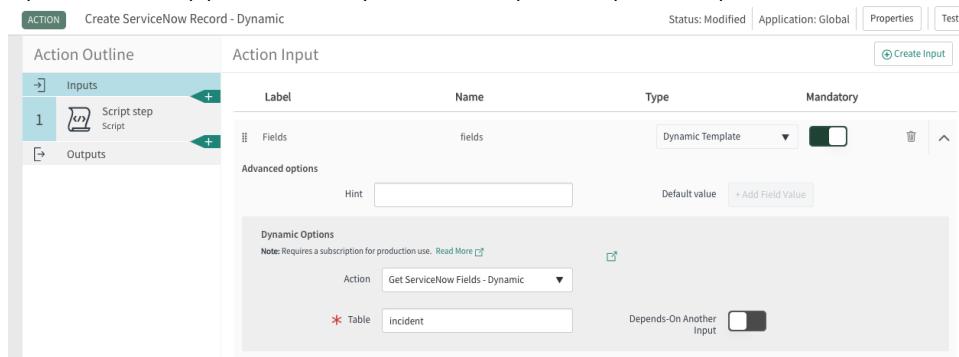
8. Click **Save** and [test the action](#).

In the execution details, your data gathering action runs successfully if the runtime value for `output` contains the `data` property in the proper format.

9. Click **Publish** to make the action available to other flows or actions within the same application scope.

Result

You can now use your data gathering action to populate the options that appear for a dynamic template input in a parent action.



The screenshot shows the 'Create ServiceNow Record - Dynamic' action configuration. In the 'Action Outline' section, there is one input step named 'Script step'. The 'Action Input' section shows a single input named 'fields' with a 'Label' of 'Fields'. The 'Type' is set to 'Dynamic Template' and the 'Mandatory' checkbox is checked. Below this, there are sections for 'Advanced options' (with a 'Hint' field) and 'Dynamic Options' (with an 'Action' dropdown set to 'Get ServiceNow Fields - Dynamic'). At the bottom, there is a note about 'Requires a subscription for production use' and a 'Table' field set to 'incident' with a 'Depends-On Another Input' checkbox.

Related tasks

- Get started with dynamic inputs
- Create a data gathering action for a dynamic choice

Related reference

- Dynamic input configuration options

Use these options to configure your dynamic inputs for a parent action.

Dynamic input configuration

Dynamic input options

Option	Description
Label	Enter a label that appears for the action input when the action is added to a flow.
Name	Enter a descriptive name for the dynamic choice or template.

Option	Description
Max length	Enter the maximum character length for one choice or template field value.
Hint	Enter a hint to display for the dynamic input.
Choice	Select one of the following options: <ul style="list-style-type: none">• Dropdown with --None--• Dropdown without --None--
Default Value	Enter a string value to use as a default for the dynamic input.
Action	Select a data gathering action that generates values as JSON output.
Depends-on Another Input	Enable this option to require an input value from the parent action to be passed as an input to the data gathering action. If enabled, select a dependent input from the parent action.

Related tasks

- [Get started with dynamic inputs](#)
- [Create a data gathering action for a dynamic choice](#)
- [Create a data gathering action for a dynamic template](#)

Dynamic outputs

Access action and subflow outputs as dynamically generated data pills during flow design. You can also build data gathering actions

to generate complex objects from Now Platform and IntegrationHub outputs.

Note: Dynamic outputs are not available in the base system. To use dynamic outputs in Flow Designer, you must [request an IntegrationHub Enterprise Pack subscription](#).

During the flow design, a dynamic output retrieves the complex object's schema values and displays them as data pills in the data panel.

A dynamic output must point to a data gathering action that collects the displayed data. For example, a data gathering action can retrieve values from a third-party system as part of an [Integration Hub spoke](#). To use a dynamic output in Flow Designer:

1. An action designer creates a data gathering action.
2. An action designer creates a parent action with a dynamic output that points to the child data gathering action.
3. A flow designer adds the parent action to a flow.

Data gathering actions

Data gathering action that collects data, typically from a third-party system via a REST call, and dynamically builds its output based on the returned payload. A data gathering action must:

- Have a [script step](#) that contains an output variable of type JSON.
- Have an action output named output of type JSON whose value is derived from the script step's JSON output variable.

Note: The action can have multiple outputs but can only have one of type JSON.

- Format the payload in the script step so that there is a property named data.
- Wait for up to 300 seconds (5 minutes) to gather data before it times out.

Note: To change the timeout period for a data gathering action, modify the value of the `sn_flow_designer.sync_action_execution_timeout_in_seconds` system property.

Dynamic object

A dynamic object is either a complex object or an array of complex objects. Action designers build the object structure dynamically with a data gathering action rather than hard-coding it. For more information on building a dynamic object, see [Create a data gathering action for a dynamic object](#).

Design considerations

Use dynamic outputs for third-party integrations

Use dynamic outputs to introspect and fetch data from external systems during the flow design. For example, you can specify service endpoints or call actions that interact with specific endpoint APIs. For more information on setting up third-party integrations with Flow Designer, see [IntegrationHub](#).

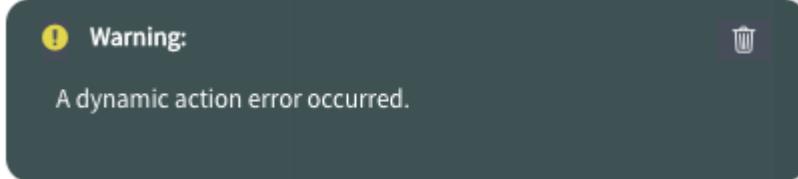
Note the time that is required to retrieve large amounts of data

By default, dynamic outputs have up to 300 seconds to gather data before the system stops them. If your data gathering action needs more time to gather data, set the `sn_flow_designer.sync_action_execution_timeout_in_seconds` system property to a greater value. Avoid long timeout values for interactive flows where an end user is expecting to enter or select a value.

Be aware of scripting errors

Because all data gathering actions use a script step, potential errors could occur from scripting. Review any scripts that are used to output JSON variables because script errors may prevent the outputs from receiving the JSON values that they need. When a dynamic output scripting error occurs, the following warning message may appear.

Message that is displayed for scripting error



- [Get started with dynamic outputs](#)

Create a sample action that builds dynamic objects for use in a flow.

- [Create a data gathering action for a dynamic object](#)

Create an action to collect output values. Then, pass the values to a parent action as a dynamic object.

- [Dynamic output configuration options](#)

Use these options to configure your dynamic outputs for a parent action.

Create a sample action that builds dynamic objects for use in a flow.

Before you begin

Role required: action_designer or admin

About this task

In this task, you create two data gathering actions: one that collects the schema for a record on your instance, and another that collects the schema for multiple records in the same table on your instance. The goal is to create both a complex object and a complex object array to use as dynamic outputs. Each data gathering action will consist of the following:

- A REST step to gather table schema data from your instance.
- A script step to construct the payload from the REST step's Response Body.
- An output variable named `output` of type JSON.

You use these data gathering actions to build two dynamic objects. Then, you create a custom action that calls the data gathering actions during the flow design.

Note: This task re-creates the demo actions that are installed when you [request an IntegrationHub Enterprise Pack subscription](#) for your instance.

Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Click **New** and select **New Action**.
 - a. On the Action Properties screen, in the **Name** field, enter Get ServiceNow Object Schema (Dynamic).
 - b. Click **Submit**.
3. In the Action Outline, click **Inputs**.
 - a. In the Action Input header, click **Create Input**.
 - b. In the **Label** and **Name** fields, enter Table.
 - c. In the **Type** field, select String.
 - d. To make this input required, toggle the **Mandatory** slider so that it is active.
4. In the Action Outline, click the add a new step icon () under Inputs and select **REST Step**.
5. Under the REST step header, fill in the following fields.

Field	Value
Connection	Leave the Use Connection Alias option selected.
Connection Alias	Click the create new record icon () to create a new

Field	Value
	Create an HTTP(s) connection, or use an existing connection for your instance. The Credential for the HTTP(s) connection must use Basic authentication credentials . Additionally, the Connection URL must be the base URL for your instance, including the forward slash at the end. For more information on connections and credentials, see Getting started with connections and Getting started with credentials .
Build Request	Leave the Manually option selected.
Resource Path	Enter api/now/processflow/table/ and then click the data pill picker (). Select Inputs > Table . Next, enter /schema.
HTTP Method	Enter GET
Query Parameters	Click the plus icon () to add a new query parameter. Then, in the Name field, enter get_choices and true in the Value field.

6. In the Action Outline, click the add a new step icon () under your REST step and select the **Script** step.
 - a. In the Input Variables section, click **Create Variable**.
 - b. In the **Name** field, enter payload.
 - c. Next to the **Value** field, click the data pill picker () and select **REST Step > Response Body**.

- d. In the **Script** field, enter the following code.

```
(function execute(inputs, outputs) {
    var payload = JSON.parse(inputs.payload);

    var columns = payload.result.data.columns;
    var schema = columns.map(function(column) {
        var value = {
            label: column.label,
            name: column.name,
            type: getCOType(column.definition.base_type),
        };
        if (column.definition.type === 'choice') {
            value.type = 'choice';
            value.choices = column.definition.choices;
        }
        if (column.definition.base_type === 'GUID') {
            value.children = [
                { label: 'Link', name: 'link', type: 'string' },
                { label: 'Value', name: 'value', type: 'string' }
            ];
        }
        return value;
    });
    outputs.schema = {
        data: {
            type: 'object',
            children: schema,
        },
    };

    function getCOType(type) {
        if (type === 'GUID') return 'reference';
        return type;
    }
}) (inputs, outputs);
```

- e. In the Output Variables section, click **Create Variable**.

- f. In the **Label** and **Name** fields, enter schema.

- g. In the **Type** field, select **JSON**.
 7. In the Action Outline, click **Outputs**.
 - a. In the Action Output header, click **Create Output**.
 - b. In the **Label** and **Name** fields, enter `output`.
 - c. In the **Type** field, select **JSON**.
 - d. In the Action Output header, click **Exit Edit Mode**.
 - e. Next to the **Value** field, click the data pill picker () and select **Script Step > schema**.
 8. In the Action header, click **Save** and then click **Test** to test the action.
 - a. On the Test Action screen, enter `incident` for the **Table** input.
 - b. Click **Run Test**.
 - c. Check the action's execution details.
Your data gathering action runs successfully if the runtime value for **fields** is a complex object in a format that is similar to the following abbreviated example.
- ```
{
 "data": {
 "type": "object",
 "children": [
 {
 "name": "active",
 "label": "Active",
 "type": "boolean"
 },
 {
 "name": "activity_due",
 "label": "Activity due",
 "type": "datetime"
 }, ...
]
 }
}
```
9. In the Action header, click **Publish** to make the Get ServiceNow Object Schema (Dynamic) action available to other flows and actions within the Global scope.

## Related tasks

- [Create a data gathering action for a dynamic object](#)

## Related reference

- [Dynamic output configuration options](#)

### **Create the Get ServiceNow Array.Object Schema (Dynamic) action**

Create a sample data gathering action to generate an array of objects.

#### **Before you begin**

Role required: action\_designer or admin

#### **Procedure**

1. In the main header, click the create flow, subflow, or action icon () and select **Action**.
  - a. On the Action Properties screen, in the **Name** field, enter Get ServiceNow Array.Object Schema (Dynamic).
  - b. Click **Submit**.
2. In the Action Outline, click **Inputs**.
  - a. In the Action Input header, click **Create Input**.
  - b. In the **Label** and **Name** fields, enter Table.
  - c. In the **Type** field, select String.
  - d. To make the input required, toggle the **Mandatory** slider so that it is active.
3. In the Action Outline, click the add a new step icon () under Inputs and select the **REST** step.

4. Under the REST step header, fill in the following fields.

| Field            | Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection       | Leave <b>Use Connection Alias</b> selected.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Connection Alias | Click the create new record icon (  ) to create a new <a href="#">Create an HTTP(s) connection</a> , or use an existing connection for your instance. The <b>Credential</b> for the HTTP(s) connection must use <a href="#">Basic authentication credentials</a> . Additionally, the <b>Connection URL</b> must be the base URL for your instance, including the forward slash at the end. |
| Build Request    | Leave <b>Manually</b> selected.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Resource Path    | Enter api/now/processflow/table/ and then click the data pill picker (  ). Select <b>Inputs &gt; Table</b> . Finally, enter /schema                                                                                                                                                                                                                                                     |
| HTTP Method      | Enter GET                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Query Parameters | Click the plus icon (  ) to add a new query parameter. Then, in the <b>Name</b> field, enter get_choices and true in the <b>Value</b> field.                                                                                                                                                                                                                                           |

5. In the Action Outline, click the **Add a new step** () icon under your REST step and select the **Script** step.

- a. In the Input Variables section, click **Create Variable**.

- b. In the **Name** field, enter payload.

c. Next to the **Value** field, click the data pill picker () and select **REST Step > Response Body**.

- d. In the **Script** field, enter the following code.

```
(function execute(inputs, outputs) {
 var payload = JSON.parse(inputs.payload);

 var columns = payload.result.data.columns;
 var schema = columns.map(function(column) {
 var value = {
 label: column.label,
 name: column.name,
 type: getCOType(column.definition.base_type),
 };
 if (column.definition.type === 'choice') {
 value.type = 'choice';
 value.choices = column.definition.choices;
 }
 return value;
 });
 outputs.schema = {
 data: {
 type: 'array.object',
 attributes: {
 child_type: 'object',
 },
 children: schema,
 },
 };

 function getCOType(type) {
 if (type === 'GUID') return 'string';
 return type;
 }
}) (inputs, outputs);
```

- e. In the Output Variables section, click **Create Variable**.

- f. In the **Label** and **Name** fields, enter schema.

- g. In the **Type** field, select **JSON**.
6. In the Action Outline, click **Outputs**.
  - a. On the Action Output header, click **Create Output**.
  - b. Enter `output` in the **Label** field and **Name** field.
  - c. Select **JSON** for the **Type** field.
  - d. Click **Exit Edit Mode**.
  - e. Next to the **Value** field, click the data pill picker () and select **Script Step > schema**.
7. In the Action header, click **Save** and then click **Test** to test the action.
  - a. On the Test Action screen, in the **Table** field, enter `incident`.
  - b. Click **Run Test**.
  - c. Check the action's execution details.  
Your data gathering action runs successfully if the runtime value for `fields.output` is a complex object that contains an array of key-value pairs for `label`, `name`, and `value` as shown in the following abbreviated example.

```
{
 "data": {
 "type": "array.object",
 "children": [
 {
 "name": "active",
 "label": "Active",
 "type": "boolean"
 },
 {
 "name": "activity_due",
 "label": "Activity due",
 "type": "datetime"
 }, ...
]
 }
}
```

8. In the Action header, click **Publish** to make the Get ServiceNow Array.Object Schema (Dynamic) action available to other actions within the Global scope.

### Create the Get ServiceNow Records (dynamic) action

Create a sample action to dynamically generate two action outputs, Record and Records which refresh dynamically when the value for the **Table** input changes.

#### Before you begin

Role required: action\_designer or admin

#### Procedure

1. In the main header, click the create flow, subflow, or action icon  and select **Action**.
  - a. In the Action Properties modal, in the **Name** field, enter Get ServiceNow Records (Dynamic).
  - b. Click **Submit**.
2. In the Action Outline, click **Inputs**.
  - a. In the Action Input header, click **Create Input**.
  - b. In the **Label** and **Name** fields, enter Table.
  - c. In the **Type** field, select Dynamic Choice.
  - d. To make the input required, toggle the **Mandatory** slider so that it is active.
  - e. Click the Toggle advanced inputs icon ( ) to display the advanced options for the Table input.
  - f. In the **Default value** field, enter incident.
  - g. Under Dynamic Options, in the **Action** field, select **Get ServiceNow Tables - Dynamic**.

- h. Click **Create Input** to create another action input.
  - i. In the **Label** and **Name** fields, enter `NumberOfRecords`.
  - j. In the **Type** field, select **Integer**.
  - k. To make the input required, toggle the **Mandatory** slider so that it is active.
  - l. Click the Toggle advanced inputs icon (  ) to display the advanced options for the **Table** input.
  - m. In the **Default value** field, enter 3.
3. In the Action Outline, click the add a new step icon (  ) under Inputs and select the **REST** step.
  4. Under the REST step header, fill in the following fields.

| Field            | Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection       | Leave <b>Use Connection Alias</b> selected.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Connection Alias | Click the create new record icon (  ) to create a new <a href="#">Create an HTTP(s) connection</a> , or use an existing connection for your instance. The <b>Credential</b> for the HTTP(s) connection must use <a href="#">Basic authentication credentials</a> . Additionally, the <b>Connection URL</b> must be the base URL for your instance, including the forward slash at the end. |
| Build Request    | Leave <b>Manually</b> selected                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Field            | Value                                                                                                                                                                                                                           |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Resource Path    | Enter api/now/table/ and then click the data pill picker (  ). Select <b>Inputs &gt; Table</b> .                                                                                                                                |
| HTTP Method      | Enter GET                                                                                                                                                                                                                       |
| Query Parameters | Click the plus icon (  ) to add a new query parameter. Then, enter sysparm_limit in the <b>Name</b> field. Next to the <b>Value</b> field, click the data pill picker (  ) and then select <b>Inputs &gt; NumberOfRecords</b> . |

5. In the Action Outline, click the add a new step icon ( ) under **Inputs** and select the **Script** step.
  - a. In the Input Variables section, click **Create Variable**.
  - b. In the **Name** field, enter payload.
  - c. Next to the **Value** field, click the data pill picker ( ) and select **REST Step > Response Body**.
  - d. In the **Script** field, enter the following code.

```
(function execute(inputs, outputs) {
 var response = JSON.parse(inputs.payload);
 var records = response.result;
 outputs.record = records[0];
 outputs.records = JSON.stringify(records);
})(inputs, outputs);
```

- e. In the Output Variables section, click **Create Variable**.
- f. In the **Label** and **Name** fields, enter record.

- g. Select **JSON** for the **Type** field.
  - h. Toggle the **Mandatory** slider so that it is active.
  - i. Click **Create Variable** to create another output variable for the script step.
  - j. In the **Label** and **Name** fields, enter records.
  - k. In the **Type** field, select **JSON**.
  - l. To make the input required, toggle the **Mandatory** slider so that it is active.
6. In the Action Outline, click **Outputs**.
- a. In the Action Output header, click **Create Output**.
  - b. In the **Label** and **Name** fields, enter Records.
  - c. In the **Type** field, select **Dynamic Object**.
  - d. Click the Toggle advanced inputs icon (  ) to display the advanced options for the **Records** output.
  - e. Under Dynamic Options, select **Get ServiceNow Array.Object Schema (Dynamic)** as the **Action**.
  - f. To make the Table input dependent on another input, toggle the **Depends-On Another Input** slider to make it active.
  - g. In the **Tablee** field, select **Table**.
  - h. In the Action Output header, click **Exit Edit Mode**.
  - i. Next to the **Value** field, click the data pill picker (  ) and select **Script Step > records**.
  - j. In the Action Output header, click **Edit Outputs > Create Output** to create another action output.
  - k. In the **Label** and **Name** fields, enter Record.
  - l. In the **Type** field, select **Dynamic Object**.

- m. Click the Toggle advanced inputs icon ( ) to display the advanced options for the Record output.
  - n. Under Dynamic Options, in the **Action** field, select **Get ServiceNow Object Schema (Dynamic)**.
  - o. To make the Table input dependent on another input, toggle the **Depends-On Another Input** slider to make it active.
  - p. In the **Table** field, select **Table**.
  - q. In the Action Output header, click **Exit Edit Mode**.
    - r. For the **Value**, click the data pill picker ( ) and select **Script Step > record**.
7. In the Action header, click **Save** and then click **Test** to **test the action**.
- a. On the Test Action screen, select any dynamically generated choice value for the **Table** input.
  - b. Click **Run Test**.
  - c. Check the action's execution details.  
Your action runs successfully if the runtime value for Record is a properly formatted complex object and the runtime value for Records is a properly formatted complex object array.
8. In the Action header, click **Publish** to make the Get ServiceNow Records (Dynamic) action available to flows within the Global scope.

## Result

You can now add the Get ServiceNow Records (Dynamic) action to a flow in Flow Designer. This sample action dynamically generates two action outputs, Record and Records, which can be accessed as data pills in the data panel. The data pills

refresh dynamically when the value for the **Table** input changes.

The screenshot shows the ServiceNow Flow Designer interface. At the top, it says "Example Flow" and "Status: Draft". Below that is a "TRIGGER" section with a "now" icon and "Daily at 11:00:00". Under "ACTIONS", there is a single step labeled "Get ServiceNow Records - Dynamic". This step has three inputs: "Action" set to "Get ServiceNow Records - Dynamic", "Table" set to "Incident", and "NumberOfRecords" set to "3". To the right of the actions is a "Data" panel. It shows a tree structure starting with "Trigger - Run Daily" under "Run Start Time". The "Get ServiceNow Records - Dynamic" step is expanded, showing "Records" and "Record" under "Dynamic Object". At the bottom of the panel are "Delete", "Cancel", and "Done" buttons.

Create an action to collect output values. Then, pass the values to a parent action as a dynamic object.

### Before you begin

Role required: action\_designer or admin

### Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. Select **New > New Action**.
3. In the **Name** field, enter a name for your action, choose the proper **Application** scope, and then click **Submit**.
4. In the Action Outline, click the add a new step icon (+) under Inputs and select the **REST** step.  
Configure your REST step to get data from the proper Base URL and Resource Path with any applicable Query Parameters for the HTTP Method **GET**. For more information on using the REST step in Integration Hub, see [REST step](#) and [REST in IntegrationHub](#).
5. In the Action Outline, click the add a new step icon (+) under your REST step and select the **Script** step.  
This script step must transform the response from the REST step's Response Body into a format that defines the schema of a dynamic object output for a parent action. Your script step must:
  - Have a single JSON output variable. The script step can have other output variables, but only one must be of type JSON.

- Format the JSON output variable so that it contains a property named `data`. For a complex object output, your `data` property must have a format similar to the following example:

```
{
 data: {
 type: "object",
 //Required

 children: [
 //Required - This is a collection of field definitions

 {
 name: "Name 1",
 //Required - Unique name

 label: "Label 1",
 //Required - Display name

 type: "string"
 //Required - Supported field type (See the Note below)

 },

 {
 name: "Name 2",
 label: "Label 2",
 type: "string"
 }
]
 }
}
```

For a complex object array output, your `data` property must have a format similar to the following example:

```
{
 data: {
 type: "object",
 //Required

 attributes: { child_type: "object" }
 //Required - Indicates that the array's c
```

```
children are of type object

 children: [
 //Required - This is a collection of field definitions

 {
 name: "Name 1",
 //Required - Unique name

 label: "Label 1",
 //Required - Display name

 type: "string"
 //Required - Supported field type (See the Note below)
 },
 {
 name: "Name 2",
 label: "Label 2",
 type: "string"
 }
]
}
```

**Note:** Supported [action data types](#) for the type property include:

- string
- integer
- datetime
- choice
- boolean
- object
- array.string
- array.integer
- array.datetime
- array.choice
- array.boolean
- array.object

6. In the Action Outline, click **Outputs**.

Create an output named `output` of type JSON. Then, use the data



pill picker ( ) to assign the data pill for the JSON output variable from your script step to the action output's **Value** field.

**Note:** The action can have multiple outputs, but there can only be one of type JSON.

7. Click **Save** and [test the action](#).

In the execution details, your data gathering action runs successfully if the runtime value for `output` contains the `data` property in the proper format.

8. Click **Publish** to make the action available to other flows or actions within the same application scope.

You can now use your data gathering action to populate the schema values for a dynamic object in a parent action.

The screenshot shows the ServiceNow Action Editor interface. At the top, there are tabs for 'ACTION' (selected), 'Get ServiceNow Records - Dynamic', and other options like 'Properties' and 'Test'. Below the tabs, the 'Action Outline' section shows two steps: '1 REST step REST' and '2 Script step Script'. The 'Action Output' section is where the dynamic output is configured. It includes a table with columns for 'Label', 'Name', 'Type', and 'Mandatory'. A row is selected with 'Label' as 'Records', 'Name' as 'records', 'Type' as 'Dynamic Object', and 'Mandatory' as checked. Below the table are sections for 'Advanced options' and 'Dynamic Options'. The 'Dynamic Options' section includes a note about requiring a subscription for production use, a dropdown for 'Action' set to 'Get ServiceNow Array.Object Schema - Dynamic', and a dropdown for 'Table' set to 'Table'. There is also a checkbox for 'Depends-On Another Input' which is unchecked.

## Related tasks

- [Get started with dynamic outputs](#)

## Related reference

- [Dynamic output configuration options](#)

Use these options to configure your dynamic outputs for a parent action.

## Dynamic output configuration

### Dynamic output options

| Option                   | Description                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------|
| Label                    | Enter a label that appears within the output data pill for the action.                              |
| Name                     | Enter a descriptive name for the dynamic object.                                                    |
| Action                   | Select a data gathering action that generates values as JSON output.                                |
| Depends-on Another Input | Enable this option to require an input value from the parent action to be passed as an input to the |

| Option | Description                                                                         |
|--------|-------------------------------------------------------------------------------------|
|        | data gathering action. If enabled, select a dependent input from the parent action. |

#### Related tasks

- [Get started with dynamic outputs](#)
- [Create a data gathering action for a dynamic object](#)

## Action error evaluation

Enable actions to catch step failures and continue running. Identify when specific error conditions occur and return your own action status code, status message, and error state.

### Benefits

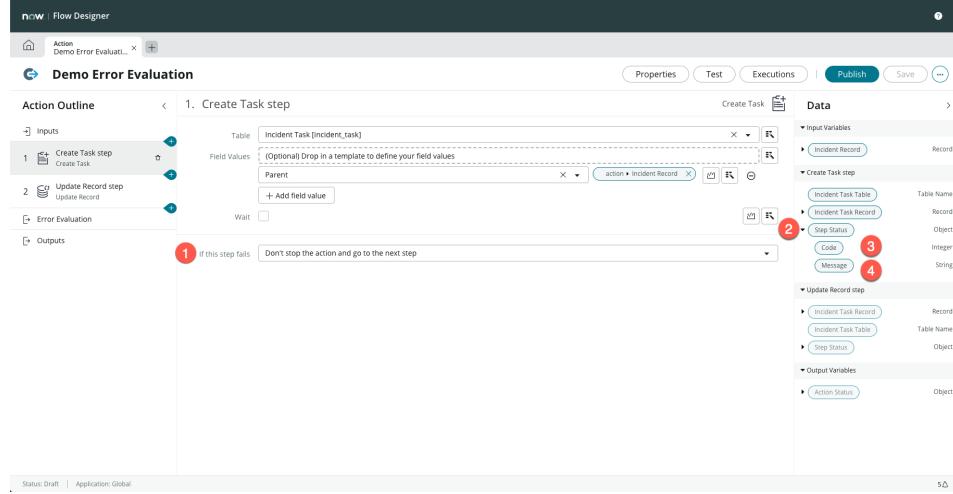
Enable action error evaluation to gain these benefits.

- Catch step failures and allow an action to continue running. Specify the failure behavior of each step you add to an action.
- Create your own error conditions. Specify when an action returns an error state as well as the status codes and messages they return.
- Provide more error handling information and options to flow designers. Use your own action status codes and messages to identify issues and provide details for corrective actions.

### Action error evaluation step components

Each step offers these error evaluation components.

## Error evaluation step components



### 1. If this step fails option

Option to continue running the next step or go to error evaluation. This option has no effect on the Step Status.

### 2. Step Status

Object data pill containing runtime details about the step. Each step in an action returns a Step Status.

### 3. Step Status > Code

Integer data pill indicating whether the step produced an error. A step returns a value of 1 when it produces an error for any reason. For example, a step can produce an error if it is missing mandatory input data or returns output in the wrong data type. A step returns a value of 0 when it runs successfully. You cannot customize these codes.

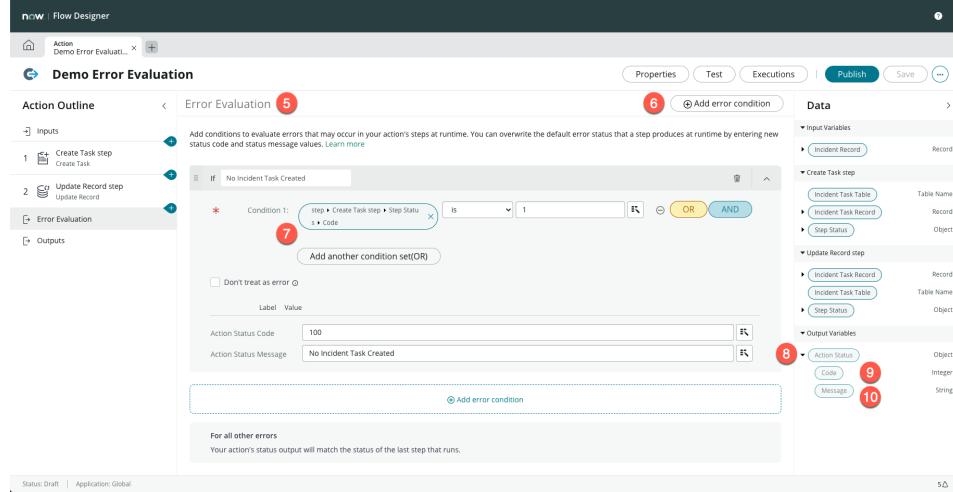
### 4. Step Status > Message

String data pill containing the error message produced by the step or system operation. You cannot customize the step status message.

## Action error evaluation configuration components

Action error evaluation consists of these configuration components.

## Error evaluation configuration components



### 5. Error Evaluation section

Section containing possible error conditions. When an action runs, it evaluates the available error conditions from top to bottom looking for a possible match. An action returns the Action Status specified by the first matching error condition. If there is no matching error condition, the Action status is set to the Step Status of the last step run.

**Note:** Data stream actions do not have an error evaluation section.

### 6. Add error condition option

Option to add an error condition. Each error condition is equivalent to an else if flow logic block. Only one error condition can be true at a time.

### 7. Error condition configuration

Options available to configure an error condition.

- Label you want to use to identify this error condition
- Conditions that must be met to match this error condition
- Error state you want the action to return to flow
- Action Status Code you want the action to return to flow

- Action Status Message you want the action to return to flow

## 8. Action Status

Object data pill containing runtime details about the action. An action always returns an Action Status.

## 9. Action Status > Code

Integer data pill containing the code returned by the first matching error condition or the last step run. You can return your own code when you create a custom error condition.

## 10. Action Status > Message

String data pill containing the message produced by a matching error condition or the last step run. You can return your own message when you create a custom error condition.

## Design considerations

Follow these guidelines to achieve the benefits offered by action error evaluation.

### Allow only independent steps to continue running

Allow a step to continue running if it does not return data required by a later step. If a step provides data necessary for later steps, then you know that the later steps cannot run successfully.

### Avoid more than 10 error conditions

While there is no limit to the number of error conditions you can create, each error condition requires evaluation. The more error conditions your action has to evaluate, the potentially slower your action can run.

### Identify specific step failures

You can use the Step Status to identify when a specific step fails. Identifying a specific step can be useful when your action contains multiple instances of the same type of step. You may also want to identify a specific step so that a flow error handler can take specific corrective actions for the failure.

### **Put specific error conditions before general error conditions**

Error evaluation stops when the action finds a matching error condition. Putting general error conditions first may prevent the action from ever matching specific error conditions.

### **Use descriptive error condition labels**

Identify an error condition without having to edit it. By default, you can only see error conditions when you edit them.

- [Add error condition](#)

Enable an action to return custom status information when specific conditions are met. Specify whether a flow considers your custom action status as an error or a successful run.

Enable an action to return custom status information when specific conditions are met. Specify whether a flow considers your custom action status as an error or a successful run.

### **Before you begin**

- Role required: flow\_designer, action\_designer, or admin
- [Create an action](#)

### **About this task**

An action always returns an Action Status object. When an action runs, it evaluates the available error conditions from top to bottom looking for a possible match. An action returns the Action Status specified by the first matching error condition. If there is no matching error condition, the Action status is set to the Step Status of the last step run.

### **Procedure**

1. Navigate to **All > Process Automation > Flow Designer**.
2. Select the **Actions** tab and select the custom action you want to edit.
3. From the Action Outline, select **Error Evaluation**.

4. Select **Add error condition** for each error condition you want to define.  
Action Designer adds an If block for configuration.
5. Configure each error condition.

| Field                | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If                   | Description of your error condition. You can use this label to identify the error condition when the condition builder is not visible. Each error condition is equivalent to an else if flow logic block. Only one error condition can be true at a time.                                                                                                                                                             |
| Condition N          | Condition builder to specify the matching criteria for the error condition. You can add conditions or condition sets to define the matching criteria. For each condition, select an action data pill to evaluate. For each data pill to evaluate, select an operator and matching value. <p><b>Note:</b> Action Designer only displays the operators and values available for the type of data pill you selected.</p> |
| Don't treat as error | Option to report the Action Status as an error or a success when returned to a flow.                                                                                                                                                                                                                                                                                                                                  |
| Action Status Code   | Integer value you want the action to return as part of the Action Status object. You can use this integer value as part of a <a href="#">Flow error handler</a> .                                                                                                                                                                                                                                                     |

| Field                 | Description                                                                                                                                                     |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Action Status Message | String value you want the action to return as part of the Action Status object. You can use this string value as part of a <a href="#">Flow error handler</a> . |

6. Order error conditions from top to bottom in the order you want the action to evaluate them.

7. Select **Save**.

## Result

Your custom action evaluates each error condition for matching conditions. The action returns the Action Status Code and Action Status Message for the first matching error condition. If there is no matching error condition, the Action status is set to the Step Status of the last step run.

## Retry policy

Automatically retry failed requests when a step encounters an intermittent issue such as a network failure or request rate limit. Set a retry policy to prevent having to manually trigger the step again.

### Features

Retry policies can be:

- Created to support connection timeouts or failed requests based on header, status, response body, error, and HTTP method.
- Applied to all actions that use a given connection alias.
- Applied directly to an action step.

Use retry policies to define:

- The conditions that must be met to retry a step.
- The time interval to wait before retrying a step.

- The maximum number of retry attempts the step makes before stopping.

Associate a default retry policy to a Connection & Credentials alias and apply the retry policy to all HTTP connections.

**Note:** You can only create retry policies for JDBC, REST, and SOAP steps.

### Create a retry policy

Automatically retry failed requests when a step encounters an intermittent issue such as a network failure or request rate limit. Set a retry policy to prevent having to manually trigger the step again.

#### Before you begin

- Role required: flow\_designer or admin

#### Procedure

1. Navigate to **All > IntegrationHub > Retry Policy > Create New**.
2. On the form, fill in the fields.

#### Retry Policy form

| Field           | Description                                                                                                                                                                                  |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name            | Name to uniquely identify the retry policy.                                                                                                                                                  |
| Connection Type | <b>HTTP</b>                                                                                                                                                                                  |
| Condition       | Conditions that must be met to trigger the retry policy. Conditions that trigger a retry policy include the <b>is</b> , <b>is not</b> , <b>contains</b> , and <b>contains not</b> operators. |
| Retry Strategy  | <ul style="list-style-type: none"><li>• <b>Exponential Backoff:</b> Option to exponentially increase</li></ul>                                                                               |

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <p>the time interval for the subsequent retry attempts. The multiplier is 2.</p> <ul style="list-style-type: none"> <li>• <b>Fixed Interval:</b> Option to specify a fixed time interval after which a retry attempt should be made.</li> <li>• <b>Honor "Retry-After" Header:</b> Option to specify a retry attempt based on the date and time value returned in the Retry After header value of the HTTP request. For more information about the header, see <a href="#">RFC 7231</a>, section <a href="#">7.1.3: Retry-After</a>.</li> </ul> <p><b>Note:</b> Honor "Retry-After" Header supports only REST and SOAP steps.</p> |
| Interval (seconds) | <p>Time interval in seconds after which a retry attempt should be made. This field applies only to <b>Exponential Backoff</b> and <b>Fixed Interval</b> retry strategies.</p> <p><b>Note:</b> If <b>Retry Strategy</b> is <b>Exponential Backoff</b>, the time interval exponentially increases after every retry attempt till the maximum numbers of attempts is reached.</p>                                                                                                                                                                                                                                                    |
| Count              | <p>Maximum number of retry attempts. This field applies only to <b>Exponential Backoff</b> and <b>Fixed</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Field                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <b>Interval</b> retry strategies. If no value is specified, the maximum number of retry attempts is based on the value provided in the glide.fdih.retry.max_count system property. Default value of the glide.fdih.retry.max_count system property is 0. For more information about system properties, see <a href="#">Available system properties</a> .                                                                                                               |
| Max Elapsed Time (seconds) | Maximum cumulative time in seconds after which the retry attempts are stopped. This field appears only when <b>Honor "Retry-After" Header</b> is selected from <b>Retry Strategy</b> .<br><b>Note:</b> If the maximum retry time is specified in the glide.fdih.retry.max_time_in_seconds property, the system property value takes precedence over this field value. Also, make sure that the max elapsed time is equal to or greater than the system property value. |

3. (Optional) Create a global system property with the following attributes. For more information on how to create a property, see [Add a system property](#). You can use this system property to specify the maximum time in seconds for a retry policy.

| Field | Value                                |
|-------|--------------------------------------|
| Name  | glide.fdih.retry.max_time_in_seconds |

| Field | Value                                                                         |
|-------|-------------------------------------------------------------------------------|
| Type  | integer                                                                       |
| Value | Default value: 86400 (seconds)<br>Maximum supported time:<br>604800 (seconds) |

4. Click **Submit**.

### Example: Retry policy with Retry Strategy as Exponential Backoff

#### Sample retry policy

Name: HTTP Retry Policy  
Application: Global

Connection Type: HTTP

Conditions:

- All of these conditions must be met:
  - HTTP Method is GET
  - Error is Connection Timeout
- OR all of these conditions must be met:
  - HTTP Method is GET
  - Status Code is 429

Retry Strategy: Exponential Backoff  
Interval (seconds): 10  
Count: 3

In this example, the policy is defined to attempt retry when one of these conditions is met:

- **HTTP Method is GET and Error is Connection Timeout**
- **HTTP Method is GET and Status Code is 429**

When the condition is met, retry attempts are made for a maximum number of three times. The time interval between the retry attempts is exponentially increased. The time intervals in this example are 10 seconds, 20 seconds, and 40 seconds.

## What to do next

- Create a Connection & Credential alias, if you do not have the required alias.
- Assign the retry policy as **Default Retry Policy** to the required Connection & Credential alias.

**Note:** A default retry policy is provided and is selected as **Default Retry Policy**. If you have created retry policies, you can select the required policy as **Default Retry Policy**.

- Create an HTTP(s) Connection in the Connections related list for the Connection & Credential alias. For more information, see [Connections and Credentials](#).
- Verify and view the details of the retry attempts by navigating to [System Logs > Outbound HTTP Requests](#).

## Complex data

Use a graphical interface to work with collections of complex structured data. Help design users understand the organization of structured data, and add, remove, or configure its individual elements.

Complex data allows you to encode and store structured data in a machine-readable format such as JavaScript Object Notation (JSON) or eXtensible Markup Language (XML). You can use the Flow Designer interface to view and understand the organization of structured data as well as create data structures. For example, you can create a contact data structure consisting of information you look up from a user record such as first name, last name, and email address.

You can create complex data from these Flow Designer interfaces.

### Complex data usage examples

| Flow Designer interface   | Example usage                                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Action inputs and outputs | Create an action that generates an object from record data. Populate the object using record data the action looks up. See |

| Flow Designer interface                     | Example usage                                                                                                                                                               |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             | Create a custom action to generate an object from a record                                                                                                                  |
| Script step input and output variables      | Write a script to create an array of objects from a list of records.<br>See <a href="#">Create a custom action to generate an array of objects from a list of records</a> . |
|                                             | Write a script to parse a JSON document into an output of type Object.                                                                                                      |
| Subflow inputs and outputs                  | Create a subflow that accepts an object as an input and uses it to call an external service.                                                                                |
| XML parser step Target field configurations | Parse an XML payload into a complex data object using the XML parser step.                                                                                                  |
| REST API Trigger Body field                 | Parse an inbound REST API request into a complex data object and use the values in a flow. See <a href="#">REST API trigger</a> .                                           |

## Benefits

Complex data offers these benefits.

- Parse and format data without having to write code. For example, create data variables to parse a response message or format a request message.
- Create arbitrary data structures. For example, create an issue data structure that combines information from existing interaction and incident records, or create a data structure to support a custom integration.

- View the organization of data structures. For example, an issue data structure might consist of a user object to describe who to contact about the issue and a history object to describe the work done to resolve it. You could configure a notification action with the path to the email address listed in the user object, and call an escalate issue subflow with the path to the status or reassign count from the history object.
- Allow access to data structure from API calls. For example, call an action or subflow from a script and use the predefined data structure as input values.
- Save and reuse data structures as templates. For example, save the user object as a template data structure for reuse in other actions and flows.

### Data structure

Data structure that is a collection of related data elements organized into a hierarchy. Each element in a data structure has its own data type and its own unique position in the hierarchy.

The Editor pane displays data structure hierarchy with indentation. The indentation level identifies whether an element is a parent, child, or sibling in the hierarchy. Parent elements have children indented underneath them, and siblings have the same indentation level.

**Note:** The Flow Designer interface allows you to create hierarchies with an unlimited number of child levels, but you may have to scroll horizontally to see them.

For example, this data structure consists of an Employee parent element with four child elements for ID Number, Name, Start Date, and Contact Email. The Contact Email element is also a parent element with one child.

### Sample inputs for an Employee object

| Action Input         |              | <a href="#">+ Create Input</a>      |
|----------------------|--------------|-------------------------------------|
| Label                | Type         | Mandatory                           |
| Employee             | Object       | <input checked="" type="checkbox"/> |
| ID Number            | Integer      | <input checked="" type="checkbox"/> |
| Name                 | String       | <input checked="" type="checkbox"/> |
| Start Date           | Date/Time    | <input checked="" type="checkbox"/> |
| Contact Email        | Array.String | <input checked="" type="checkbox"/> |
| Contact Email_child0 | String       | <input checked="" type="checkbox"/> |

The data panel displays data structure hierarchy as a tree of collapsible and expandable data pills just like it does with record variables. Parent elements have an arrow icon to collapse or expand the hierarchy.

For example, here is the Employee data structure as seen from the data panel.

### Sample data pill for an Employee object

| Data              |              |
|-------------------|--------------|
| ▼ Input Variables |              |
| Employee          | Object       |
| ID Number         | Integer      |
| Name              | String       |
| Start Date        | Date/Time    |
| Contact Email     | Array.String |

You can use the data panel or Data picker to select specific values from a data structure. Data structures are similar to data pills for records in that you can dot-walk or navigate to specific elements within the structure. When you select a data element, Flow Designer displays the path to it as a data pill just like any other data element selection. For example, if you

select the Start Date data element, the path is **[Input->Employee->Start Date]**.

You can use an element data path the same way you can an XPath or JPath. Sometimes you may even convert the data pill path into one of these path notations.

### Complex data types

You build data structures using one or more Array or Object variables. Only these variable data types support child variables.

An Array variable contains values for one type of item. The parent variable is always of an Array data type, and there is always only one child variable, which is one instance of the data type supported by the array. Create Array variables when an input or output accepts multiple values of the same data type.

For example, you could create a Contact Email array to list all the email addresses associated with a given person.

#### Sample data structure for the Contact Email array

| Component label      | Data Type    | Sample Data                                 |
|----------------------|--------------|---------------------------------------------|
| Contact Email        | Array.String | beth.anglin@example.com and beth@anglin.com |
| Contact Email_child0 | String       |                                             |

An Object variable contains any number and arrangement of child variables that each have their own data type and values. Nesting Object variables allows you to create complex data structures similar to a table schema where one table has related records in another table. Create Object variables when an input or output accepts one or more related properties.

For example, you can create an Employee object to define information about the people who work at a company.

### Sample data structure for the Employee object

| Component label | Data Type    | Sample Data                                 |
|-----------------|--------------|---------------------------------------------|
| Employee        | Object       |                                             |
| ID Number       | Integer      | 20190304000101                              |
| Name            | String       | Beth Anglin                                 |
| Start Date      | Date/Time    | March 4, 2019                               |
| Contact Email   | Array.String | beth.anglin@example.com and beth@anglin.com |

Only these variable data types can be parents.

### Parent data types

| Data type        | Description                                                                        |
|------------------|------------------------------------------------------------------------------------|
| Array.Array      | A container for arrays. Adds a read-only child item of type Array.                 |
| Array.True/False | A container for true/false values. Adds a read-only child item of type True/False. |
| Array.Choice     | A container for choice values. Adds a read-only child item of type Choice.         |
| Array.Date/Time  | A container for date/time values. Adds a read-only child item of type Date/Time.   |
| Array.Integer    | A container for integer values. Adds a read-only child item of type Integer.       |

| Data type    | Description                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------|
| Array.Object | A container for objects. Adds a read-only child item of type Object, which displays the <b>Add Child Item</b> option. |
| Array.String | A container for string values. Adds a read-only child item of type String.                                            |
| Object       | A container for other data elements. Displays the <b>Add Child Item</b> option.                                       |

Array and Object variables only support these child data types.

- Array
- True/False
- Choice
- Date/Time
- Integer
- Object
- String

**Note:** The data types in array and object variables are not Glide elements. There may not be complete compatibility between these items and Now platform types.

## Advanced options

Object variables have advanced options to save and load data structures. These options allow you to reuse a data structure defined in one location in another. For details on advanced options see [action variable data types](#).

## Data structure templates

Data structure templates allow you to reuse Object variables in multiple actions or subflows. For example, you can create a data structure to parse a response and then later reuse that same data structure to format a request. A template stores the list of child variables and their structure within an object. Each Object variable has an Advanced Option to save it as a template.

When you apply a template, you are creating a copy of the original structure. Any changes you make after applying a template do not affect the template, nor do they affect other actions that use the template.

### Array data pills

Objects that contain array data may require **For Each** flow logic to process. For example, a user object that contains an array of email addresses would require a **For Each** flow logic loop to send a notification to each email address.

### Object data pills

You can design actions that accept object data pills as input values. For example, you might create a notification action that accepts a user object as an input. If the user object consists of values for first name, last name, and addresses, then the notification action has access to all these values. To configure an action input with an object data pill, you must create an object earlier in the flow.

### Sample action that accepts an object data pill

**Action with complex data in it**

| Action                                                                                                                                                                           | Complex data action |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Action Inputs</b>                                                                                                                                                             |                     |
| Label                                                                                                                                                                            | Value               |
| User                                                                                                                                                                             |                     |
| First name                                                                                                                                                                       |                     |
| Last name                                                                                                                                                                        |                     |
| Addresses                                                                                                                                                                        |                     |
| Address 1                                                                                                                                                                        |                     |
| <input type="text" value="Drag and drop object data pill here"/> <input type="button" value="Delete"/> <input type="button" value="Cancel"/> <input type="button" value="Done"/> |                     |

You can use an object data pill or any of its child elements to configure an input. When you configure an input value with an object data pill, Flow Designer makes any child elements of the object read-only, and the action uses the values provided by the object. For example, you can create a flow where one action generates a user object and another action sends a notification to the user specified in the object.

### Sample action configured to use an object data pill

**Action with complex data in it**

| Action                                                                                                                                                                                     | Complex data action |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Action Inputs</b>                                                                                                                                                                       |                     |
| Label                                                                                                                                                                                      | Value               |
| User                                                                                                                                                                                       |                     |
| First name                                                                                                                                                                                 |                     |
| Last name                                                                                                                                                                                  |                     |
| Addresses                                                                                                                                                                                  |                     |
| Address 1                                                                                                                                                                                  |                     |
| <span style="border: 1px solid #ccc; padding: 2px;">2 ► User object</span> <input type="button" value="Delete"/> <input type="button" value="Cancel"/> <input type="button" value="Done"/> |                     |

When you configure the child elements of an object, you must manually provide data pills for each child element of the object. For example, you can manually configure the user object with record values from an earlier action.

## Script support

Create and reference complex data from a script. Use a script when your source data comes from a data stream, a REST step response, or a Look Up Records step. See [Script support for complex data](#) for more information about scripting with complex data.

## Design considerations

Follow these design guidelines to create reusable and maintainable data structures.

### Minimize the number of child levels in the hierarchy

The more child levels a data structure has, the more difficult it is to view and select a data variable from the hierarchy. While you can build data structures with any number of child levels, it becomes difficult to navigate and understand data structures with more than seven child levels. For the best user experience, avoid creating data structures that have so many child levels you must scroll horizontally to see and populate them.

### Create a separate object for each type of record data

Most Flow Designer data is record data whether it is from an instance or an external system. This design method ensures that you know what the object contains and where the data came from.

### Recreate record data structures

When building objects that receive or transmit record data, review the database dictionary entries for these records and create matching object data structures. For example, suppose that you want an object to contain data from Incident and Configuration Item tables. You might create a string element for the Short description field in the Incident table, and an array of strings element for the Class field in the Configuration Item table.

### Create objects to combine different types of records

If you need information from multiple types of records, create an object that contains all the information you need. You can then use the object to format or parse data in Flow Designer.

- [Create data structure](#)

Organize multiple data variables into a structure to process them as a unit and identify the individual items within it.

- [Save data structure](#)

Save the data structure of child variables within an Object variable for later reuse.

- [Load data structure](#)

Load a data structure of child variables within an Object variable.

- [Create a custom action to generate an object from a record](#)

Generate an object from a User record. Learn how to use an Action output to create an object from record values.

- [Create a custom flow to generate an object for each record in a list](#)

Generate an object for each User record in a list. Learn how to use flow logic to iterate through a list of records.

- [Script support for complex data](#)

Create and reference complex data from a script. Use a script when your source data comes from a data stream, a REST step response, or a Look Up Records step.

## Create data structure

Organize multiple data variables into a structure to process them as a unit and identify the individual items within it.

### Before you begin

- Role required: action\_designer, flow\_designer, or admin
- [Set up an application in Guided Application Creator](#) to store Flow Designer content.
- [Create an action](#) or [Create a subflow in Flow Designer](#)

## About this task

Data structure that is a collection of related data elements organized into a hierarchy. Each element in a data structure has its own data type and its own unique position in the hierarchy.

## Procedure

1. Create a data variable.

| Action or subflow input  | Click <b>Create Input</b>           |
|--------------------------|-------------------------------------|
| Action or subflow output | Click <b>Create Output</b>          |
| XML parser step          | See <a href="#">XML parser step</a> |

2. Set **Type** to **Object**.

The top level of a data structure hierarchy must be an Object variable.

3. Click the **Add Child Item** icon.

Flow Designer adds a child data variable to the bottom of the object list.

**Note:** You can insert a child item variable between existing variables by hovering your mouse pointer between two variables, and click the insert item icon (+) that appears.

**Note:** When hovering your mouse pointer between a child and sibling variable, you will see a add child icon (+ +). Click the left side of the icon to add a new sibling variable to the child's parent, or the right side to add another child variable under the current variable.

4. Set the child variable **Label** and **Type**.

To add another branch to the data structure hierarchy, set the Type to Object.

5. Repeat steps 3-4 for each data variable in the hierarchy.

## What to do next

Use the data structure to populate action, step, or subflow inputs. If you can reuse the data structure, save it as a template.

## Save data structure

Save the data structure of child variables within an Object variable for later reuse.

### Before you begin

- Role required: action\_designer, flow\_designer, or admin
- Set up an application in Guided Application Creator to store Flow Designer content.
- Create an action or Create a subflow in Flow Designer

### Procedure

1. [Create data structure](#).
2. Expand the Advanced options for the Object variable you want to save.
3. Click Save as Template.  
Flow Designer displays a pop-up dialog.
4. Enter the template name.
5. Click **Save**.  
If the template name already exists, Flow Designer displays a confirmation dialog to overwrite the existing template.

## What to do next

Load the data structure in another action or subflow. Make updates to the data structure and save them.

## Load data structure

Load a data structure of child variables within an Object variable.

### Before you begin

- Role required: action\_designer, flow\_designer, or admin
- Set up an application in Guided Application Creator to store Flow Designer content.
- Create an action or Create a subflow in Flow Designer

### Procedure

1. Create a data variable.
2. From **Type**, select **Object**.
3. Expand the Advanced options for the Object variable whose data structure you want to replace.
4. From **Structure**, select **Start from Template**.  
Flow Designer displays the **Template** field.
5. From **Template**, select the template containing the template you want to load.  
If the Object variable has no existing data structure, Flow Designer loads the data structure into it. If the Object variable has an existing data structure, Flow Designer displays a confirmation dialog to replace the existing structure.

## Create a custom action to generate an object from a record

Generate an object from a User record. Learn how to use an Action output to create an object from record values.

### Before you begin

Role required: admin

### About this task

Use this example to see demonstrations of these operations and steps.

- Create action inputs for the User record fields First name, Last name, and Email.
- Lookup a User record matching the action input values.
- Create an action output for a contact object.
- Save the contact object as a template.
- Map contact object values to User record field values.
- Test the action with a sample user.

### Procedure

1. Create an application to store your work.  
Use the [Guided Application Creator](#).  
For example, create My Application.
2. Navigate to **Process Automation > Flow Designer**.  
The system displays the Flow Designer landing page.
3. Select **New > Action**  
The system displays the Action Properties dialog.
4. Enter these sample values.

| Field           | Value                           |
|-----------------|---------------------------------|
| Name            | Create Contact Object From User |
| Application     | My Application                  |
| Accessible From | All application scopes          |

5. Select **Submit**.  
The system displays the Action Designer interface.
6. From the Action Outline, select **Inputs > Create Input**  
The system displays a new action input.
7. Configure the action input with these values.

| Field     | Value      |
|-----------|------------|
| Label     | First name |
| Type      | String     |
| Mandatory | True       |

8. From the Action Outline, select **Inputs > Create Input**

The system displays a new action input.

9. Configure the action input with these values.

| Field     | Value     |
|-----------|-----------|
| Label     | Last name |
| Type      | String    |
| Mandatory | True      |

10. From the Action Outline, select **Inputs > Create Input**

The system displays a new action input.

11. Configure the action input with these values.

| Field     | Value         |
|-----------|---------------|
| Label     | Email address |
| Type      | String        |
| Mandatory | False         |

12. From Action Outline, select **Outputs > Create Output**.

The system displays a new action output.

13. Configure the output variable with these values.

| Label   | Name    | Type   | Mandatory |
|---------|---------|--------|-----------|
| contact | contact | Object | False     |

14. From the row for the contact Object, select **Add Child Item**.

15. Configure the child item with these values.

| Label      | Name       | Type   | Mandatory |
|------------|------------|--------|-----------|
| First name | first_name | String | True      |

16. From the row for the contact Object, select **Add Child Item**.

17. Configure the child item with these values.

| Label     | Name      | Type   | Mandatory |
|-----------|-----------|--------|-----------|
| Last name | last_name | String | True      |

18. From the row for the contact Object, select **Add Child Item**.

19. Configure the child item with these values.

| Label         | Name          | Type   | Mandatory |
|---------------|---------------|--------|-----------|
| Email address | email_address | String | False     |

20. From the row for the contact Object, select **Toggle Advanced Inputs**.

21. From the Advanced Options, select **Save As Template**.  
The system displays the Save As Template dialog.

22. For **Enter a Name**, enter contact.

23. Click **Save**.

24. Select **Exit Edit Mode**.  
The System displays the output fields you created.

25. Configure the outputs with these values.

| Label         | Value                                           |
|---------------|-------------------------------------------------|
| First name    | [step->Look Up Record step->Record->First name] |
| Last name     | [step->Look Up Record step->Record->Last name]  |
| Email Address | [step->Look Up Record step->Record->Email]      |

**Note:** You can select data pills from the data panel or from the Data Pill Picker button.

26. Select **Save**.

27. Select **Test**.

The system displays the Test Action dialog.

28. Enter these test values.

| Input      | Value |
|------------|-------|
| First name | Abel  |
| Last name  | Tuter |

29. Select **Run Test**.

The system runs the action with the test values provided.

30. Select **Action has executed. To view the action, click here**.

The system displays the action execution details.

31. Review the runtime value for the action Output data.

The system displays output data in JSON format.

For example, sample contact object JSON for the user Abel Tuter.

```
{
 "contact": {
 "email_address": "abel.tuter@example.com",
 "last_name": "Tuter",
 "first_name": "Abel"
 }
}
```

```
}
```

## Result

You have a custom action that looks up a User record and converts it into a contact object.

## What to do next

Customize the action to use your own logic.

# Create a custom flow to generate an object for each record in a list

Generate an object for each User record in a list. Learn how to use flow logic to iterate through a list of records.

## Before you begin

- Role required: admin
- Create a custom action to generate an object from a record

## About this task

Use this example to see demonstrations of these operations and steps.

- Create a flow that runs on a daily schedule.
- Look up User records filtered by the Department provided as an input.
- Add flow logic that runs for each User record you looked up previously.
- Create a contact object for each User record using the custom action you created previously.
- Create a log message for each User record.

## Procedure

1. Navigate to **All > Process Automation > Flow Designer**.

The system displays the Flow Designer landing page.

2. Select **New > Flow**

The system displays the Flow Properties dialog.

3. Enter these sample values.

| Field       | Value                             |
|-------------|-----------------------------------|
| Name        | Create Contact Objects From Users |
| Application | My Application                    |
| Run As      | User who initiates session        |

4. Select **Submit**.

The system displays the Flow Designer interface.

5. Select **Click to add a Trigger > Date > Daily**.

6. Select **Done** to close the trigger.

7. Select **Click to add an Action, Flow Logic, or Subflow > Action > ServiceNow Core > Look Up Records**.

The system adds the action to the flow.

8. For **Table**, select **User [sys\_user]**.

9. For **Conditions**, add these values.

- **[Department][is][Development] [AND]**
- **[Email][is not empty]**

10. Configure these field values.

| Field    | Value  |
|----------|--------|
| Order by | Name   |
| Sort     | a to z |

| Field       | Value |
|-------------|-------|
| Max Results | 1000  |

11. Select **Done** to close the action.
12. Select **Click to add an Action, Flow Logic, or Subflow > Flow Logic > For Each**.  
The system adds the flow logic to the flow.
13. For **Items**, select **[1->User Records]**.  
**Note:** You can select the Action 1 **User Records** data pill from the data panel or from the Data Pill Picker button.
14. Select **Done** to close the flow logic.
15. Select the plus icon to add a child item to the For Each flow logic.
16. Select **Action > My Application > Create Contact Object**.
17. For **userRecord [User]**, select **[2->User Record]**.  
**Note:** You can select the Action 2 **User Record** data pill from the data panel or from the Data Pill Picker button.
18. Select **Done** to close the flow logic action.
19. Select the plus icon to add a child item to the For Each flow logic.
20. Select **Action > ServiceNow Core > Log**.
21. For **Message**, select **[2.1->contact]**.  
**Note:** You can select the Action 2.1 **contact** data pill from the data panel or from the Data Pill Picker button.
22. Select **Done** to close the flow logic action.
23. Select **Save**.

## Script support for complex data

Create and reference complex data from a script. Use a script when your source data comes from a data stream, a REST step response, or a Look Up Records step.

Use script to create complex data when data comes from these sources.

### Data sources requiring script

| Data source                        | Create/map complex data from |
|------------------------------------|------------------------------|
| Data Stream action response stream | Script Parser step           |
| REST step response                 | Script step                  |
| Look Up Records step               |                              |

### Data Stream action response stream

Data Stream actions use a parser script to map stream item values to complex object values. When writing a parser script, use JavaScript methods appropriate to the data stream format. For example, use the [JSON - Scoped](#) class to parse or encode a JSON data stream.

Parser scripts have access to the data stream input and output objects as well as a targetObject property. See [Data Stream actions](#) for more information about parsing a response stream to create complex data.

### REST step response

You can convert a REST step response into one or more complex objects by parsing it with a Script step. To access a response from a Script step, you must create an input script variable and map it to the response payload from the prior REST step. See [Script step](#) for more information about creating script input variables.

Write a script that maps REST response values to complex object values. When writing REST response script, use JavaScript methods appropriate to the response format such as the JSON parse() method.

**Note:** When you use complex data as the source of a string input, Flow Designer automatically converts it into a JSON string.

You do not need to use a Script step to create a REST request from complex data. You can generate complex data in a prior action or step and then map it to a string input of the REST step. At run time, the action or flow converts the complex data into a JSON representation.

### Look Up Records step

While flows can use **For each** flow logic to process a list of records, actions require a Script step. The Script step replaces the **For each** flow logic with JavaScript such as a `For` or `While` loop.

To access record data from a Script step, you must create an input script variable and map it to the record data from the prior look up step. See [Script step](#) for more information about creating script input variables.

See [Create a custom action to generate an array of objects from a list of records](#) for an example action that converts a list of user records into an array of contact objects.

**Note:** The Look Up Records action does not require a Script step to convert record data into complex data. You can create a custom action to convert a record into an object and apply **For each** flow logic to the custom action. See [Create a custom action to generate an object from a record](#) and [Create a custom flow to generate an object for each record in a list](#) for an example of creating a complex object without using script.

### Dot-walking object structures

You can reference elements from the structure of an object by dot-walking the path of the structure. All complex data paths start with the name of the data source, which is either the global object for inputs, the global object for outputs, or the name of the array or object you created in script.

Next in the path are the names of each structural element referenced separated by period characters (also known as dots). Listing the names of structural elements is identical to dot-walking a reference field where you list the table structure to a particular reference field.

**Note:** A dot-walk path always lists the name of a structural element rather than its label.

For example, suppose that you define a contact object as an Output variable. The object has the following structure.

### Sample Contact object

Output Variables

| Label                                                                                                               | Name              | Type         | Mandatory                           |                                                                                       |                                                                                       |                                                                                     |
|---------------------------------------------------------------------------------------------------------------------|-------------------|--------------|-------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| >Contact                                                                                                            | contact           | Object       | <input checked="" type="checkbox"/> |    |    |  |
| First name                                                                                                          | first_name        | String       | <input checked="" type="checkbox"/> |    |    |                                                                                     |
| Last name                                                                                                           | last_name         | String       | <input checked="" type="checkbox"/> |    |    |                                                                                     |
| Email Addresses                                                                                                     | email_addresses   | Array.Object | <input checked="" type="checkbox"/> |    |    |                                                                                     |
| Email Address                                                                                                       | email_address     | Object       | <input checked="" type="checkbox"/> |    |    |  |
| Type                                                                                                                | type              | Choice       | <input checked="" type="checkbox"/> |  |  |                                                                                     |
| Email                                                                                                               | email             | String       | <input checked="" type="checkbox"/> |  |  |                                                                                     |
| Telephone Numbers                                                                                                   | telephone_numbers | Array.Object | <input checked="" type="checkbox"/> |  |  |                                                                                     |
| Mailing Addresses                                                                                                   | mailing_addresses | Array.Object | <input checked="" type="checkbox"/> |  |  |                                                                                     |
| <a href="#"> Create Variable</a> |                   |              |                                     |                                                                                       |                                                                                       |                                                                                     |

| Place in structure | Label           | Name            | Type         |
|--------------------|-----------------|-----------------|--------------|
| Parent             | Contact         | contact         | Object       |
| Child              | First name      | first_name      | String       |
| Child              | Last name       | last_name       | String       |
| Child              | Email Addresses | email_addresses | Array.Object |
| Grandchild         | Email Address   | email_address   | Object       |

| Place in structure | Label             | Name             | Type         |
|--------------------|-------------------|------------------|--------------|
| Great grandchild   | Type              | type             | Choice       |
| Great grandchild   | Email             | email            | String       |
| Child              | Telephone         | telephone_number | Array.Object |
| Child              | Mailing Addresses | mailing_address  | Array.Object |

The dot-walk path to the **First name** structural element would be `outputs.contact.first_name` while the path to the **Email** structural element would be `outputs.contact.email_addresses[0].email` since you must specify an individual element of the array by its JavaScript index value.

**Note:** A dot-walk path omits the name of the repeated element within the array. For example, an array of objects does not have to specify the object element name. However, since objects are containers for other elements, you can specify a child element of the object within a dot-walk path.

## Design considerations

Keep these design considerations in mind when scripting with complex data.

### Use string inputs to convert complex data into a JSON string

When you map complex data to a string input, Flow Designer automatically converts it into a JSON string. Instead of writing a script, you can add a string input to a REST step and map it to complex data from a prior action or step.

### Save your objects as templates

Save your objects as templates so you can reuse them in other actions, flows, and Script steps.

### **Create script input variables to access prior data**

Create a script input variable for any data you want to access from the action input or a prior step. Map the script input variable to the input or step data pill. For example, map the script input variable to a list of user records you looked up in a prior step.

### **Create a script output variable to store complex data**

Create a script output variable to store any complex data your script creates. The script output variables must match the values defined in the script. For example, create a contacts array of objects to store multiple contact objects. Save the contact object as a template so you can reuse it.

### **Map the action output to the script output variable**

When you want a custom action to output complex data, add an action output and map it to the data pill for your Script step output variable. For example, create a contacts array and load the contact object template you saved earlier. Map the action output to the contacts array produced by your Script step.

- Create a custom action to generate an array of objects from a list of records

Generate an array of objects from a list of User records. Learn how to use a Script step to iterate through a list of records.

Generate an array of objects from a list of User records. Learn how to use a Script step to iterate through a list of records.

### **Before you begin**

Role required: admin

### **About this task**

Use this example to see demonstrations of these operations and steps.

- Create an action input for a Department record.
- Look up a maximum of three User records for the Department action input.

- Configure a Script step to process a list of User records.
- Create a script input variable containing the list of User records.
- Write script that creates an empty contacts array.
- Write script that iterates through the list of User records.
- Write script that creates a contact object and maps User record field values to the contact object.
- Write script that populates the contacts array with the current contact object.
- Create script output variables for the contacts array and child contact object.
- Save the contact object as a template.
- Output the generated contacts array of objects as a data pill.
- Test the action with a sample department.

### Procedure

1. Create an application to store your work.  
Use the [Guided Application Creator](#).  
For example, create My Application.
2. Navigate to **All > Process Automation > Flow Designer**.  
The system displays the Flow Designer landing page.
3. Select **New > Action**  
The system displays the Action Properties dialog.
4. Enter these sample values.

| Field       | Value                            |
|-------------|----------------------------------|
| Name        | Create Contacts Array Of Objects |
| Application | My Application                   |

| Field           | Value                  |
|-----------------|------------------------|
| Accessible From | All application scopes |

5. Select **Submit**.

The system displays the Action Designer interface.

6. From the Action Outline, select **Inputs > Create Input**

The system displays a new action input.

7. Configure the action input with these values.

| Field     | Value                                              |
|-----------|----------------------------------------------------|
| Label     | Department                                         |
| Type      | Reference.Department<br>[Reference.cmn_department] |
| Mandatory | True                                               |

8. From the Action Outline, select **Add a new step**.

The system displays a list of available steps.

9. Select **Look Up Records**

10. Configure the step with these values.

| Field       | Value                                |
|-------------|--------------------------------------|
| Table       | User [sys_user]                      |
| Conditions  | [Department][is][action->Department] |
| Order by    | Name                                 |
| Sort Type   | a to z                               |
| Max Results | 3                                    |

**Note:** This example limits the **Max Results** setting to three records just for demonstration purposes.

11. From the Action Outline, select **Add a new step**.  
The system displays a list of available steps.
12. Select **Script**.
13. For **Required Runtime**, select **Instance**.
14. From the Input Variables section, select **Create Variable**.
15. Configure the input variable with these values.

| Field | Value                                      |
|-------|--------------------------------------------|
| Name  | userRecords                                |
| Value | [step->Look Up Records step->User Records] |

**Note:** You can select the **User records** data pill from the data panel or from the Data Pill Picker button.

16. For **Script**, enter the following text.

```
(function execute(inputs, outputs) {
 //Create an empty array
 var contactsArray = [];
 var i = 0;
 //Iterate through the list of User records
 while(inputs.userRecords.next()) {
 //Create an empty object for each iteration
 var contactObject = {};
 //Query User records to assign object values
 contactObject.first_name = inputs.userRecords.getValue('first_name');
 contactObject.last_name = inputs.userRecords.getValue('last_name');
 contactObject.email_address = inputs.userRecords.getValue('email');
 //Add current object to array
 contactsArray[i] = contactObject;
 }
 outputs.contacts = contactsArray;
})
```

```
i += 1;
}
outputs.contacts = contactsArray;
) (inputs, outputs);
```

17. From Output Variables, select **Create Variable**.

18. Configure the output variable with these values.

| Label    | Name     | Type         | Mandatory |
|----------|----------|--------------|-----------|
| contacts | contacts | Array.Object | True      |

19. Expand the contacts Array.Object, and rename the child item as contact.

20. From the row for the contact Object, select **Add Child Item**.

21. Configure the child item with these values.

| Label      | Name       | Type   | Mandatory |
|------------|------------|--------|-----------|
| first name | first_name | String | True      |

22. From the row for the contact Object, select **Add Child Item**.

23. Configure the child item with these values.

| Label     | Name      | Type   | Mandatory |
|-----------|-----------|--------|-----------|
| last name | last_name | String | True      |

24. From the row for the contact Object, select **Add Child Item**.

25. Configure the child item with these values.

| Label         | Name          | Type   | Mandatory |
|---------------|---------------|--------|-----------|
| email address | email_address | String | True      |

26. From the row for the contact Object, select **Toggle Advanced Inputs**.

27. From the Advanced Options, select **Save As Template**.  
The system displays the Save As Template dialog.

28. For **Enter a Name**, enter contact.

29. Click **Save**.

30. From the Action Outline, select **Outputs > Create Output**.

31. Configure the Action Output with these values.

| Label    | Name     | Type         | Mandatory |
|----------|----------|--------------|-----------|
| contacts | contacts | Array.Object | True      |

32. Expand the contacts Array.Object.

33. From the row for the contact Object, select **Toggle Advanced Inputs**.

34. From the Advanced Options, select **Structure > Start from Template**.  
The system displays **Template**.

35. For **Template**, select the template you previously saved.  
For example, select **My application: contact**.

36. Select **Exit Edit Mode**.

The System displays the output fields you created.

37. For **contacts**, select **[step->Script step->contacts]**.

**Note:** You can select the Script step **contacts** data pill from the data panel or from the Data Pill Picker button.

38. Click **Save**.

39. Select **Test**.

The system displays the Test Action dialog.

40. Enter the following test value:

| Input      | Value       |
|------------|-------------|
| Department | Development |

**41. Select Run Test.**

The system runs the action with the test values provided.

**42. Select Your test has finished running. View the Action execution details.**

The system displays the action execution details.

**43. Review the runtime value for the action Output data.**

The system displays output data in JSON format.

For this example, the contacts object contains an array of contact objects with first name, last name, and email information for three users in the Development department.

```
{
 "contacts": [
 "contact": [
 {
 "email_address": "allyson.gillispi@example.com",
 "first_name": "Allyson",
 "last_name": "Gillispie"
 },
 {
 "email_address": "alva.pennington@example.com",
 "first_name": "Alva",
 "last_name": "Pennington"
 },
 {
 "email_address": "andrew.och@example.com",
 "first_name": "Andrew",
 "last_name": "Och"
 }
]
 }
}
```

**Result**

You have a custom action that looks up the Users for a given department and converts those users into an array of contact objects.

## What to do next

Customize this action to use your own logic.

## Flow Designer integrations

Expand the capabilities of Flow Designer with additional subscriptions and spokes.

### Now Platform integrations

Subscribing to Now Platform features and applications adds Flow Designer content.

| Integration                          | Content available                                                                                                                  |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| App Engine Studio                    | <ul style="list-style-type: none"><li>Build flows from App Engine Studio.</li><li>Create flows from flow templates.</li></ul>      |
| Integration Hub                      | <ul style="list-style-type: none"><li>Access integration steps from Action Designer.</li><li>Install integration spokes.</li></ul> |
| Process Automation Designer          | <ul style="list-style-type: none"><li>Call flows and actions from Flow Designer.</li><li>Gather process data with flows.</li></ul> |
| Robotic Process Automation (RPA) Hub | Build flows to run robots on Microsoft Windows systems.                                                                            |

## Flow Designer spokes

Add application-specific content to Flow Designer by installing spokes.

- [Spokes](#)

Add application-specific content to Flow Designer by installing spokes.

## Spokes

Add application-specific content to Flow Designer by installing spokes.

A spoke is a scoped application containing Flow Designer content dedicated to a particular application or record type. For example, the **ITSM Spoke** contains actions for managing Task records such as the **Create Task** action. Spokes are activated when their parent application is activated. For example, the **ITSM Spoke** is activated when the Incident, Problem, and Change applications are activated. Creating a spoke requires familiarity with application development as developers must add Flow Designer content to a scoped application.

### Default spokes available

| Spoke            | Description                                                                                                                                       | Plugin                             | Included with           |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------|
| Benchmarks Spoke | Provides read-only actions for the read-only Benchmark Recommendation Evaluator flow.                                                             | [com.sn_bm_client.spoke]           | Benchmarks application. |
| Connect spoke    | Provides actions to automate the creation of conversations, to add users to a conversation, and to send messages to a conversation. These actions | [com.glide.connect_v3plus.core.ah] | Now Platform            |

| Spoke                        | Description                                                                                                                  | Plugin                           | Included with                           |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------|
|                              | work with Connect API version 3 and later.                                                                                   |                                  |                                         |
| Customer Service Spoke       | Provides actions for flow designers to use when creating Customer Service Management business processes.                     | [com.snc.customer_service.spoke] | Customer Service Management application |
| External Related Files spoke | The External Related Files spoke stores information about files in third-party systems and helps you manage the information. | [com.sn.external.files]          | Now Platform                            |
| Field Service Spoke          | Provides actions for flow designers to use when creating Field Service Management business processes.                        | [com.snc.field_service.spoke]    | Field Service Management application    |
| ITSM spoke                   | Provides flow and actions associated with ITSM. Requires the ITSM                                                            | [com.snc.itsm.spoke]             | IT Service Management application       |

| Spoke                                        | Description                                                                                                                                                                                                                                                                                       | Plugin                    | Included with                        |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------------------|
|                                              | application suite.                                                                                                                                                                                                                                                                                |                           |                                      |
| Machine Learning solutions for Flow Designer | Provides actions to make predictions from trained Predictive Intelligence solutions.                                                                                                                                                                                                              | [com.snc.ml_flowdesigner] | Predictive Intelligence              |
| Robotic Process Automation (RPA) Spoke       | Provides RPA actions for flow designers to assign users to attended automation process, add work queue items to queue, update work items, fetch process jobs and execution status of a specific process job, trigger a specific bot process, and unassign users from attended automation process. | [com.sn_rpa_foundation]   | Robotic Process Automation (RPA) Hub |
| Security Operations spoke                    | Provides Security Operations actions for flow designers to manage Security Incident                                                                                                                                                                                                               | [com.snc.secops.spoke]    | Security Operations application      |

| Spoke                         | Description                                                                                               | Plugin                 | Included with |
|-------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------|---------------|
|                               | Response flow templates.                                                                                  |                        |               |
| Visual Task Board (VTB) Spoke | Provides VTB actions for flow designers to manage the boards, lanes, cards, board members, and assignees. | [com.glide.ui.vt.b.ah] | Now Platform  |

Additional spokes are available with an Integration Hub subscription. To see a list of Integration Hub spokes, see [Integration Hub available spokes](#). For more information about requesting an Integration Hub subscription, see [Request Integration Hub](#).

- [Benchmarks Spoke](#)

Provides read-only actions for the read-only Benchmark Recommendation Evaluator flow.

- [Connect spoke](#)

Provides actions to automate the creation of conversations, to add users to a conversation, and to send messages to a conversation. These actions work with Connect API version 3 and later.

- [Customer Service Spoke](#)

Provides actions for flow designers to use when creating Customer Service Management business processes. Requires the Customer Service Management [com.sn\_customerservice] plugin.

- [External Related Files spoke](#)

The External Related Files spoke stores information about files in third-party systems and helps you manage the information.

- [Field Service Spoke](#)

Provides actions for flow designers to use when creating Field Service Management business processes.

- [ITSM spoke](#)

Provides flow and actions associated with ITSM. Requires the ITSM application suite.

- [Machine Learning solutions for Flow Designer](#)

Provides actions to make predictions from trained Predictive Intelligence solutions.

- [Robotic Process Automation \(RPA\) Spoke](#)

With Robotic Process Automation, your flow designers can use actions to assign and unassign users to and from an attended automation process, add work items to a queue, update work items, fetch process jobs, get the status of a process job, and trigger a bot process.

- [Security Operations spoke](#)

Provides Security Operations actions for flow designers to manage Security Incident Response flow templates.

- [Visual Task Board \(VTB\) Spoke](#)

Provides VTB actions for flow designers to manage the boards, lanes, cards, board members, and assignees.

## Benchmarks Spoke

Provides read-only actions for the read-only Benchmark Recommendation Evaluator flow.

The Benchmarks Spoke is designed for the Recommendations feature of the [Benchmarks](#) application.

| Action                                 | Description                                                          | Action Inputs                                                                                                                                                   | Action Outputs                                                              |
|----------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Create Recommendation Activity Records | Create or update recommendation activity records.                    | Recommendation                                                                                                                                                  | N/A                                                                         |
| Delete Recommendation Evaluations      | Delete recommendation evaluations for the specified month.           | Activity record                                                                                                                                                 | N/A                                                                         |
| Evaluate Recommendation Condition      | Evaluate the conditions and script specified for the recommendation. | <ul style="list-style-type: none"> <li>• Record count</li> <li>• Threshold</li> <li>• Direction</li> <li>• Recommendation</li> <li>• Activity record</li> </ul> | <ul style="list-style-type: none"> <li>• Result</li> <li>• Score</li> </ul> |

## Connect spoke

Provides actions to automate the creation of conversations, to add users to a conversation, and to send messages to a conversation. These actions work with Connect API version 3 and later.

| Action                               | Description                                                     |
|--------------------------------------|-----------------------------------------------------------------|
| Add Group Users to Task Conversation | Create a task conversation, and add all users of a group to it. |
| Add User to Task Conversation        | Create a task conversation, and add a user to it.               |

| Action                            | Description                                         |
|-----------------------------------|-----------------------------------------------------|
| Send Message to Task Conversation | Send a message to all users of a task conversation. |

## Customer Service Spoke

Provides actions for flow designers to use when creating Customer Service Management business processes. Requires the Customer Service Management [com.sn\_customerservice] plugin.

| Action              | Description                                                                                                                                                                |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Get Case            | Retrieve a case record using the case number. If multiple records are found, only the first record is returned.                                                            |
| Create Case         | Create a case using one or more attributes. This action mimics the structure of the Case table (sn_customerservice_case) and exposes the fields present on the Case table. |
| Create Quick Case   | Create a case using the customer, description, channel, priority, and category attributes.                                                                                 |
| Create Task on Case | Create a case task and optionally associate it with a case.                                                                                                                |
| Update Case         | Update a case by providing the case reference and the fields that you want to update.                                                                                      |
| Assign Case         | Assign a case using matching rules. To use this action, you must first define the matching rules                                                                           |

| Action                | Description                                                                                                                               |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|                       | that match cases with resources (assignment groups, agents).                                                                              |
| Escalate Case         | Request case escalation. This action does not automatically approve escalation. Approval is based on the selected escalation template.    |
| Escalate Account      | Request account escalation. This action does not automatically approve escalation. Approval is based on the selected escalation template. |
| Add Work Note to Task | Add a work note to a task or to task extended objects (for example, a case or case task).                                                 |
| Add Comment to Task   | Add a comment to a task or to task extended objects (for example, a case or case task).                                                   |

## External Related Files spoke

The External Related Files spoke stores information about files in third-party systems and helps you manage the information.

### External Related Files spoke tables

| Table                                                 | Description                                                                                   |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| External Provider<br>[sn_ext_files_spoke_provider]    | Stores information about the external provider. For example, Box or DocuSign services.        |
| External Related Files<br>[sn_external_related_files] | Stores metadata information about the files in third-party systems. This table is extensible. |

| Table | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <p><b>Note:</b> If you extend the table, ensure that you perform the data separation for the scoped applications</p> <ul style="list-style-type: none"><li>• To store metadata information of files in a specific third-party system, create a table with a column that contains a reference field to the External Related Files table. For more information about reference fields, see <a href="#">Reference field type</a>.</li><li>• To establish a relationship between a specific ServiceNow table and External Related Files table, <a href="#">Create defined related lists</a>.</li></ul> |

### External Related Files spoke actions

| Action                      | Description                                           |
|-----------------------------|-------------------------------------------------------|
| Create External File Record | Creates a record in the External Related Files table. |
| Update External File Record | Updates a record in the External Related Files table. |
| Delete External File Record | Deletes a record in the External Related Files table. |

### External Related Files spoke user roles

| Role                              | Description                                                                                                                                                                    |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| sn_ext_files_spoke.doc_reader     | Read records in the External Related Files and External Provider tables.                                                                                                       |
| sn_ext_files_spoke.file_admin     | <ul style="list-style-type: none"><li>• Read, update, and delete records in the External Related Files table.</li><li>• Read records in the External Provider table.</li></ul> |
| sn_ext_files_spoke.provider_admin | Read, update, and delete records in the External Provider table.                                                                                                               |

## Field Service Spoke

Provides actions for flow designers to use when creating Field Service Management business processes.

| Action              | Description                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Get Work Order      | Retrieve a work order record using the work order number. If multiple records are found, only the first record is returned. |
| Create Work Order   | Create a work order and optionally associate it with a case.                                                                |
| Update Work Order   | Update a work order by providing the work order reference and the fields that you want to update.                           |
| Get Work Order Task | Retrieve a work order task record using the work order task number.                                                         |

| Action                 | Description                                                                                                 |
|------------------------|-------------------------------------------------------------------------------------------------------------|
|                        | If multiple records are found, only the first record is returned.                                           |
| Create Work Order Task | Create a work order task and optionally associate it with a work order.                                     |
| Update Work Order Task | Update a work order task by providing the work order task reference and the fields that you want to update. |
| Add Work Note to Task  | Add a work note to a task or to task extended objects (for example, a work order or work order task).       |

## ITSM spoke

Provides flow and actions associated with ITSM. Requires the ITSM application suite.

| Action                              | Description                                                                                                                                                                                                                                                |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Add Comment                         | Adds a comment to a task record.                                                                                                                                                                                                                           |
| Add Worknote                        | Adds a work note to a task record.                                                                                                                                                                                                                         |
| Apply Change Approval Policy        | Controls the approval process for a change request by creating user and group approvals according to a change approval policy record. Multiple actions can be used in a flow, where each action references the same or different Change Approval Policies. |
| Assign Incident to CI Support Group | Updates an incident record to assign it to the CI Support Group.                                                                                                                                                                                           |

| Action                                     | Description                                                                                                                                                                                                                 |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cancel Change Tasks from Flow              | Cancels all related pending and open change tasks that are created from Flow.                                                                                                                                               |
| Check Change for User Approval             | Checks if the specified user has already approved the change request.                                                                                                                                                       |
| Create Catalog Task on Request             | Creates a Catalog Task record from a Request record.                                                                                                                                                                        |
| Create Catalog Task on Request Item        | Creates a Catalog Task record from a Request Item record.                                                                                                                                                                   |
| Create Change Task on Change Request       | Creates a Change Task record from a Change Request record.                                                                                                                                                                  |
| Create Emergency Change Request            | Creates a Change Request record of type Emergency.                                                                                                                                                                          |
| Create Emergency Request from Incident     | Creates a Change Request record of type Emergency from an Incident record.                                                                                                                                                  |
| Create Incident                            | Creates an Incident record.                                                                                                                                                                                                 |
| Create Incident Task on Incident           | Creates an Incident Task record from an Incident record.                                                                                                                                                                    |
| Create Normal Change Request from Incident | Creates a Change Request record of type Normal from an Incident record.                                                                                                                                                     |
| Create Outage                              | Creates a cmdb_ci outage record for a configuration item. The <b>Task</b> field is populated only if the source is a task record. If the source is non-task record such as an alert record, the <b>Task</b> field is empty. |

| Action                                       | Description                                                                                                               |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Create Problem from Incident                 | Creates a Problem record from an Incident record.                                                                         |
| Create Request                               | Creates a Request record.                                                                                                 |
| Create Standard Change Request               | Creates a Change Request record of type Standard. For more information, see <a href="#">IT Service Management</a> .       |
| Create Task                                  | Creates a child task record for a Task table record. For example, creates an Incident Task record for an Incident record. |
| Create Task Outage Relationship              | Creates a Task Outage Relationship record where cmdb_ci outage record and task record are inputs to the action.           |
| Create Standard Change Request from Incident | Creates a Change Request record of type Standard from an Incident record.                                                 |
| Disregard Change Approvals                   | Sets all related pending approvals to no longer required.                                                                 |
| Update Assignee                              | Updates the Assigned to field of a Task table record.                                                                     |
| Update Assignment Group                      | Updates the Assignment Group field of a Task table record.                                                                |

## Machine Learning solutions for Flow Designer

Provides actions to make predictions from trained Predictive Intelligence solutions.

## Predictive Intelligence subscription

This spoke requires a subscription to Predictive Intelligence. For more information, see [Activate Predictive Intelligence](#).

### Key features

Predictive Intelligence for Flow Designer provides four frameworks that you can use to create machine-learning solutions in your instance. Each framework delivers a different solution type for training the system to predict, recommend, and organize data outcomes.

- Classification framework
- Similarity framework
- Clustering framework
- Regression framework

### Spoke requirements

- A sharedservice.worker user to train solutions
- A pre-trained solution for your Predictive Intelligence framework

### Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Predictive Intelligence (com.glide.platform\_ml) plugin
- Predictive Intelligence Reporting (com.glide.platform\_ml\_pa) plugin

**Note:** Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

### Spoke actions

Predictive Intelligence for Flow Designer provides actions to make predictions using existing models without having to write or maintain script. Available actions include:

| Action                          | Description                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Classification Batch Prediction | Obtain a predicted value from an active classification solution definition using multiple input records.                                                                             |
| Classification Prediction       | Obtain a predicted value from an active classification solution definition using a single input record.                                                                              |
| PI Confidence Check             | Compare an output value (number) from Predictive intelligence with a number specified by the user. For example: Compare the confidence value of a prediction with a specified value. |
| Regression Batch Prediction     | Obtain a predicted value from an active regression solution definition using multiple input records.                                                                                 |
| Regression Prediction           | Obtain a predicted value from an active regression solution definition using a single input record.                                                                                  |
| Similarity Prediction           | Obtain similar records that exist in the table specified by the user in their similarity solution definition.                                                                        |

### Spoke user roles

Predictive Intelligence for Flow Designer provides these user roles to control access to data:

| User role | Description                                           |
|-----------|-------------------------------------------------------|
| ml_admin  | Grants access to all Predictive Intelligence features |

## Robotic Process Automation (RPA) Spoke

With Robotic Process Automation, your flow designers can use actions to assign and unassign users to and from an attended automation process, add work items to a queue, update work items, fetch process jobs, get the status of a process job, and trigger a bot process.

### RPA actions

| Action                                            | Description                                                                                | Action inputs                                                                                                                                                                                                                                                                                                                                                                   | Action outputs                                                                                                                                                                                                 |
|---------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Add WorkItem to Queue Action                      | Adds WorkItem in a specified queue in the RPA Hub application and returns the WorkItem ID. | <ul style="list-style-type: none"><li><b>Queue Name:</b> Record</li><li><b>Name:</b> String</li><li><b>Content:</b> String</li><li><b>Type:</b> String</li><li><b>Priority:</b> String.Choice</li><li><b>Stage:</b> String</li><li><b>SLA:</b> Date/Time</li></ul> <p>The maximum limit for <b>Content</b> field (Request Content and Response Content) is 8000 characters.</p> | <ul style="list-style-type: none"><li><b>Action Status:</b> Object</li><li><b>WorkItemID:</b> GUID</li><li><b>IsNameExists:</b> Boolean</li><li><b>status:</b> String</li><li><b>message:</b> String</li></ul> |
| Assign User to Attended Automation Process Action | Assigns a user to the attended automation process.                                         | <ul style="list-style-type: none"><li><b>Process Name:</b> Record</li><li><b>Username:</b> Record</li></ul>                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"><li><b>Action Status:</b> Object</li><li><b>status:</b> String</li><li><b>Message:</b> String</li></ul>                                                                      |

| Action                               | Description                                                        | Action inputs                                                                                                             | Action outputs                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assign User to Attended Robot Action | Assigns a user to the attended robot.                              | <b>Username:</b> Record                                                                                                   | <ul style="list-style-type: none"> <li>• <b>Action Status:</b> Object</li> <li>• <b>status:</b> String</li> <li>• <b>Message:</b> String</li> </ul>                                                                                                                                                                             |
| Fetch Created Jobs Action            | Fetches the process jobs in RPA Hub.                               | <ul style="list-style-type: none"> <li>• <b>Process Number:</b> String</li> <li>• <b>Robots:</b> Array[String]</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Action Status:</b> Object</li> <li>• <b>Result:</b> String</li> <li>• <b>Jobs:</b> Array[String]</li> <li>• <b>startedRobots:</b> Array[String]</li> <li>• <b>pendingRobots:</b> Array[String]</li> </ul>                                                                           |
| Fetch Execution Status Action        | Fetches the execution status of a specific process job in RPA Hub. | <b>Process Job Number:</b> String                                                                                         | <ul style="list-style-type: none"> <li>• <b>Action Status:</b> Object</li> <li>• <b>ProcessJob:</b> Object             <ul style="list-style-type: none"> <li>• <b>Process Name:</b> String</li> <li>• <b>Robot Name:</b> String</li> <li>• <b>State:</b> String</li> <li>• <b>Started At:</b> Date/Time</li> </ul> </li> </ul> |

| Action                       | Description                                                      | Action inputs                   | Action outputs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------|------------------------------------------------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fetch WorkItem Status Action | Fetches the status of specific work queue items, asynchronously. | <b>Work Queue Item ID:</b> GUID | <ul style="list-style-type: none"> <li>• <b>Completed At:</b> Date/Time</li> <li>• <b>Message:</b> String</li> <li>• <b>status:</b> String</li> <li>• <b>message:</b> String</li> </ul><br><ul style="list-style-type: none"> <li>• <b>Action Status:</b> Object</li> <li>• <b>Code:</b> Integer</li> <li>• <b>Message:</b> String</li> <li>• <b>WorkItem:</b> Object</li> <li>• <b>sysId:</b> String</li> <li>• <b>name:</b> String</li> <li>• <b>type:</b> String</li> <li>• <b>priority:</b> String</li> <li>• <b>status:</b> String</li> <li>• <b>lockedBy:</b> String</li> <li>• <b>additionalComments:</b> String</li> <li>• <b>requestContent:</b> String</li> <li>• <b>responseContent:</b> String</li> </ul> |

| Action                                                | Description                                                                            | Action inputs                                                                                                           | Action outputs                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                       |                                                                                        |                                                                                                                         | <ul style="list-style-type: none"> <li>• <b>deferredTill:</b> Date/Time</li> <li>• <b>sla:</b> Date/Time</li> <li>• <b>created:</b> Date/Time</li> <li>• <b>startedOn:</b> Date/Time</li> <li>• <b>completedOn:</b> Date/Time</li> <li>• <b>lastStartedTime:</b> Date/Time</li> <li>• <b>status:</b> String</li> <li>• <b>message:</b> String</li> </ul> |
| Start Process Action                                  | Triggers a specific bot process (API based trigger) in RPA Hub and returns the status. | <ul style="list-style-type: none"> <li>• <b>Process Name:</b> Record</li> <li>• <b>Robots:</b> Array[String]</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Action Status:</b> Object</li> <li>• <b>Result:</b> String</li> <li>• <b>Robots:</b> Array[String]</li> <li>• <b>Process:</b> String</li> </ul>                                                                                                                                                              |
| Unassign User from Attended Automation Process Action | Unassigns the user from the attended automation process.                               | <ul style="list-style-type: none"> <li>• <b>Process Name:</b> Record</li> <li>• <b>Username:</b> Record</li> </ul>      | <ul style="list-style-type: none"> <li>• <b>status:</b> String</li> <li>• <b>message:</b> String</li> <li>• <b>Action Status:</b> Object</li> </ul>                                                                                                                                                                                                      |

| Action                                   | Description                                                                | Action inputs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Action outputs                                                                                                                                                                                |
|------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unassign User from Attended Robot Action | Unassigns the user from the attended robot and retires the attended robot. | <b>Username:</b> Record                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• <b>Action Status:</b> Object</li> <li>• <b>Status:</b> String</li> <li>• <b>Message:</b> String</li> </ul>                                           |
| Update WorkItem                          | Updates work queue items.                                                  | <ul style="list-style-type: none"> <li>• <b>Queue Name:</b> Record</li> <li>• <b>WorkItemID:</b> String</li> <li>• <b>Stage:</b> String</li> <li>• <b>DeferredTill:</b> Date/Time</li> <li>• <b>Name:</b> String</li> <li>• <b>Priority:</b> Choice</li> <li>• <b>Status:</b> Choice</li> <li>• <b>Request Content:</b> String</li> <li>• <b>Type:</b> String</li> <li>• <b>Remarks:</b> String</li> <li>• <b>SLA:</b> Date/Time</li> <li>• <b>Response Content:</b> String</li> </ul> <p>The maximum limit for <b>Request Content</b> and <b>Response</b></p> | <ul style="list-style-type: none"> <li>• <b>IsNameExist:</b> True/False</li> <li>• <b>Status:</b> String</li> <li>• <b>Message:</b> String</li> <li>• <b>Action Status:</b> Object</li> </ul> |

| Action | Description | Action inputs                             | Action outputs |
|--------|-------------|-------------------------------------------|----------------|
|        |             | <b>Content</b> fields is 8000 characters. |                |

### RPA subflow

| Subflow               | Description                                                                                     | Subflow inputs                                                                                                      | Subflow outputs                                                                                                                                     |
|-----------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Start Process Subflow | Triggers a specific bot process (API based trigger) in RPA Hub and returns process job details. | <ul style="list-style-type: none"> <li><b>Process Name:</b> Record</li> <li><b>Robots:</b> Array[String]</li> </ul> | <ul style="list-style-type: none"> <li><b>Process Jobs:</b> Array[String]</li> <li><b>Result:</b> String</li> <li><b>Message:</b> String</li> </ul> |

## Security Operations spoke

Provides Security Operations actions for flow designers to manage Security Incident Response flow templates.

### Security Incident Response flow templates

The Security Incident Response flow templates are created using the [Flow Designer](#).

**Note:** Each of the flows is triggered when the **Category** in a security incident is set or changed.

| Template                                                                   | Description                                                                  |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <a href="#">Security Incident Confidential Data Exposure flow template</a> | Perform a series of tasks designed to handle the exposure of sensitive data. |

| Template                                                | Description                                                                                                  |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Security Incident Denial of Service flow template       | Perform a series of tasks designed to handle Denial of Service (DOS) attacks.                                |
| Security Incident Lost Equipment flow template          | Perform a series of tasks designed to handle lost equipment.                                                 |
| Security Incident Malicious Software flow template      | Perform a series of tasks designed to handle malicious software on your network.                             |
| Security Incident Phishing flow template                | Perform a series of tasks designed to handle spear phishing emails on your network.                          |
| Security Incident Policy Violation flow template        | Perform a series of tasks designed to handle security policy violations.                                     |
| Security Incident Reconnaissance flow template          | Perform a series of tasks designed to handle reconnaissance on your network.                                 |
| Security Incident Rogue Server or Service flow template | Perform a series of tasks designed to handle activity from rogue servers or services affecting your network. |
| Security Incident Spam flow template                    | Perform a series of tasks designed to handle email spam on your network.                                     |
| Security Incident Unauthorized Access flow template     | Perform a series of tasks designed to handle unauthorized access to your network.                            |
| Security Incident Web/BBS Defacement flow template      | Perform a series of tasks designed to handle vandalism directed against one of your BBS or web sites.        |

## Visual Task Board (VTB) Spoke

Provides VTB actions for flow designers to manage the boards, lanes, cards, board members, and assignees.

### Board Management Actions

| Action                     | Description                                                                                                                                                                                       | Action Inputs                                                                                                                                                                                                               | Action Outputs |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Create Freeform VTB Action | Creates a Freeform VTB for any task type. The default lanes are: Todo, Doing, and Done. These lanes can be modified with actions: Add Lane, Rename Lane, Reorder Lane, and Delete Lane            | <ul style="list-style-type: none"><li>• Name</li><li>• Board Owner</li><li>• Default view</li><li>• Label visibility</li><li>• Picker visibility</li><li>• Background color</li></ul>                                       | Board record   |
| Create Flexible VTB Action | Creates a Flexible VTB bound to a single Task table. The default lanes are: Todo, Doing, and Done. These lanes can be modified with actions: Add Lane, Rename Lane, Reorder Lane, and Delete Lane | <ul style="list-style-type: none"><li>• Name</li><li>• Task table</li><li>• Filter</li><li>• Board Owner</li><li>• Default view</li><li>• Label visibility</li><li>• Picker visibility</li><li>• Background color</li></ul> | Board record   |

| Action                   | Description                                                                                                    | Action Inputs                                                                                                                                                                                                                            | Action Outputs |
|--------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Create Guided VTB Action | Creates a data-driven VTB bound to a single Task table along with the fields the lanes are derived.            | <ul style="list-style-type: none"> <li>Name</li> <li>Task table</li> <li>Lane field</li> <li>Filter</li> <li>Board Owner</li> <li>Default view</li> <li>Label visibility</li> <li>Picker visibility</li> <li>Background color</li> </ul> | Board record   |
| Add VTB Member Action    | Add a user to a VTB. Only members of the VTB can access the board. Any VTB member can add other members.       | <ul style="list-style-type: none"> <li>Board record</li> <li>User record</li> </ul>                                                                                                                                                      | N/A            |
| Remove VTB Member Action | Remove a user from a VTB. Only members of a VTB can access the board. Any VTB member can remove other members. | <ul style="list-style-type: none"> <li>Board record</li> <li>User record</li> </ul>                                                                                                                                                      | N/A            |

### Lane Management Actions

| Action       | Description                          | Action Steps                                                   | State           |
|--------------|--------------------------------------|----------------------------------------------------------------|-----------------|
| Add VTB lane | Add a lane to a Freeform or Flexible | <ul style="list-style-type: none"> <li>Board record</li> </ul> | VTB lane record |

| Action           | Description                                                                                                        | Action Steps                                                                             | State |
|------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------|
|                  | VTB. This action does not apply to Guided boards, which are constrained to fixed lanes based on fields configured. | <ul style="list-style-type: none"> <li>• Lane name</li> </ul>                            |       |
| Rename VTB Lane  | Rename an existing lane on a Freeform or Flexible VTB.                                                             | <ul style="list-style-type: none"> <li>• Lane record</li> <li>• New lane name</li> </ul> | N/A   |
| Reorder VTB Lane | Reorder lanes on any VTB.                                                                                          | <ul style="list-style-type: none"> <li>• Lane record</li> <li>• New lane name</li> </ul> | N/A   |
| Delete VTB Lane  | Delete an existing lane from a Freeform or Flexible VTB.                                                           | Lane record                                                                              | N/A   |

### Card Management Actions

| Flow/Action     | Description                                       | Action Steps                                                                           | State       |
|-----------------|---------------------------------------------------|----------------------------------------------------------------------------------------|-------------|
| Create VTB Card | Create a VTB card on a Freeform board for a task. | <ul style="list-style-type: none"> <li>• Lane record</li> <li>• Task record</li> </ul> | Card record |
| Assign VTB Card | Assign a user to a VTB card.                      | <ul style="list-style-type: none"> <li>• Card record</li> <li>• User record</li> </ul> | N/A         |

| Flow/Action                   | Description                                                                                                                                                                                                                                          | Action Steps                                                                           | State |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------|
| Move VTB Card                 | Move a VTB card from one lane to another lane.<br><b>Note:</b> For Flexible boards, use the Update Record action to change the state of the underlying task. For Guided boards, this action changes the field on the task associated with that card. | <ul style="list-style-type: none"> <li>• Card record</li> <li>• Lane record</li> </ul> | N/A   |
| Remove Assignee from VTB Card | Remove an assignee from a card.                                                                                                                                                                                                                      | Card record                                                                            | N/A   |

## Flow Designer reference

Get details about Flow Designer components like actions, flow logic, and properties.

- [Design considerations for Flow Designer](#)

Create, run, troubleshoot, and monitor your flows more effectively. Use these guidelines to optimize the performance of your flows.

- [Flow Designer actions](#)

Actions can be added to any flow, enabling process analysts to automate Now Platform features without having to write code.

- [Flow Designer flow logic](#)

Enable flows and subflows to specify conditional or repeated actions. Combine the elements of flow logic to create workflows in a graphical interface with little or no scripting.

- **Flow Designer input and output data variables**

Actions and subflows use variables to store input and output data. The variable data type determines what kind of data it stores and its advanced configuration options.

- **Flow Designer steps**

A step performs a single operation in an action. You can use Action Designer to add steps to a custom action.

- **Flow Designer system properties**

Configure how the system processes flows.

- **Flow Designer trigger types**

Each trigger type defines when a flow starts and the starting data available to it. There are triggers for record operations, dates, and application operations.

- **Flow preferences**

Enable or disable flow preferences to change options available to Flow Designer.

- **Supported Service Catalog variable types**

Flow Designer supports several Service Catalog variable types for both single-row and multi-row variable sets.

- **Transform functions**

Transform data pill values without the need to write a script. Use transform functions to reformat text, perform mathematical calculations, sanitize potentially unsafe SQL statements, and serialize complex objects to raw XML.

- **Types of flows and when to use them**

A decision matrix and basic definitions help you determine what type of flows to create.

## Design considerations for Flow Designer

Create, run, troubleshoot, and monitor your flows more effectively. Use these guidelines to optimize the performance of your flows.

### **Application development**

When designing an action or a flow, use these design considerations as a guide.

Use standard Now Platform application development capabilities to create, manage, protect, and deploy Flow Designer content. Flow and action designers typically perform the following application development tasks:

- Create a custom application to store flows and actions.
- Set application permissions to share or restrict access to application data.
- Grant application developers access to Flow Designer.
- Publish custom applications to the application repository to deploy flows and actions on other instances.

### **Flows**

Flows should be short, modular, reusable collections of work. If they take more than an hour to execute, they're probably too long and can be more efficient.

Any design considerations that apply to flows also apply to [subflows](#).

### **Prevent conflicting or duplicate business logic**

Automations can be created with Flow Designer, business rules, workflows, and Integration Hub. Before you start using Flow Designer, make sure you understand how existing Now Platform automations work. Deactivate automations before replacing them with Flow Designer flows and actions. See the [Architecture Overview](#) to learn how Flow Designer works within the Now Platform.

Review [Flows](#), [Sub-flows](#), and [Actions](#) documentation, if necessary.

### Determine whether your flow needs a trigger or variable input

Flows always run when their trigger conditions are met, and triggers always provide the same data as input for flows. If you need variable input to initiate a flow instead, create a [subflow](#).

### Reuse business logic

Create a set of reusable operations as a subflow that can then be used in multiple flows.

### Grant flow roles to access role-protected data and preserve user information

Flow roles help keep permissions for your flows simple. Use flow roles to preserve user information and grant access to data, instead of running a flow as the system user. Adding flow roles also gives access to additional data that a user-initiated flow does not usually have. The roles granted only apply to the flow. They do not apply to the user who initiated the flow.

### Use flow logic or a schedule-based trigger to control flow timing

Flow logic or schedule-based triggers help to optimize the performance of your flows. Do not use the `gs.sleep()` method to wait within a flow. The `gs.sleep()` method prevents the thread from performing other work. To run a flow at a specific time, use a schedule-based trigger. To pause a flow for a specific duration, use the [Wait for a duration](#) or [wait for condition](#) flow logic.

### Avoid dependencies

Parallel branches that depend on each other stall a flow when a branch has to wait for output from another branch. Instead of creating parallel branches within a flow, call a subflow and return the results to the main flow.

### Scope loop counters

Script loops don't have a maximum number of iterations, so loops execute infinitely when there is not a valid exit condition.

To make sure that there is a valid exit condition, scope loop counters in inline scripts or in script steps within an action. Add `var` to `for (i=0; i<length; i++)` :`for (var i=0; i< length; i++)`

### **Limit For Each and Do Until loops to 1000 iterations**

Iterations with 1000 or more loops can lead to memory issues from having to store execution details and context records.

- Set max records on Look Up Records.
- Avoid changing property `sn_flow_designer.max_iterations`, which defaults to 1000.
- For large amounts of data processing, consider batching into smaller batches.
- For bulk imports, consider concurrent imports.

### **Use QuickAPI for faster executions (business rule alternative)**

- QuickAPI executions are much faster, but there is less debugging capability.
- Foreground QuickAPI executions run in the user session as the user who called the flow.
- Background QuickAPI executions run in a background thread and are run in the 'system' user session.

### **Use Do Until loops instead of calling flows from themselves**

Direct recursion where a flow calls itself is not allowed and errors out. Indirect recursion where flow A calls flow B, which calls flow A is allowed up to three times. Instead of calling a flow recursively, use the Do Until flow logic to continue working on records until a certain condition is met.

### **Execute flows in the background**

Executing flows in the background allows UI threads to be released rather than pausing the user session until the flow execution completes. By default, flows run asynchronously in the background. Running flows in the background allows users to continue working in the UI while the flow runs.

### Avoid flow logic that waits after collecting a large output

Using a large payload immediately after it is retrieved can help prevent memory issues. Rather than store a large payload in memory, add actions to process the payload. The sooner you process a retrieved payload, the sooner the system can free up memory to process other actions.

### Minimize switching between environments

Constantly switching back and forth between instance and MID Server steps in a flow can lead to delays in processing. To minimize the risk of delays, limit switching between instance and MID to only one time.

### Include sys\_complex\_object records generated by the flow in update sets

Missing [complex data](#) schemas can cause execution issues. Make sure you include sys\_complex\_object records generated by the flow in update sets. Rather than manually build update sets, consider transferring flows from one instance to another by using the application repository.

### Call flows from a script when you need a custom trigger

If none of the existing triggers meet your business needs, you can create a script to start a flow when its custom trigger conditions are met. Rather than creating a flow with an unneeded trigger, consider instead creating a subflow, which does not have a trigger. Use your script to provide the necessary subflow inputs only when your script conditions are met. Calling a subflow rather than a flow avoids the possibility of the flow trigger conditions being met and running the flow unexpectedly.

### Avoid deploying newer release flows to instances on older releases

Flow Designer does not support deploying flows to instances running on earlier releases. Sometimes the data model of the flow changes between releases, which can prevent the flow from running or produce unexpected results.

### Turn flow reporting off in production

Minimize the amount of memory required to run flows by disabling [Flow reporting](#). Flow reporting stores configuration and runtime information for the Execution Details page. These reports are good for troubleshooting, but requires a large amount of data to be retained both in memory

and in the database. By default, flow reporting is disabled, and the system only generates execution details when you manually test a flow or action. Instead you can use log files, which are still available when reporting is turned off.

### **Reduce the amount of memory consumed in flows with nested looping**

When reporting is activated, set com.snc.process\_flow.reporting.iteration.lastn to a value of "1" to reduce the amounts of the amounts of memory that previous loop iterations consume. The more iterations you report on, the more memory is required.

## **Subflows**

Design considerations that apply to [flows](#) also apply to subflows.

Reasons to use a subflow instead of a flow include the following:

### **Determine whether your flow needs a trigger or variable input**

Flows always run when their trigger conditions are met. Triggers always provide the same data as input for flows. If you need variable input to initiate a flow instead, create a [subflow](#).

### **Reuse business logic**

Create a set of reusable operations as a subflow that can then be used in multiple flows.

### **Configure different input values for each call**

Configure a subflow's input values differently each time you call it. For example, design a subflow to accept different record types as an input run. Reuse this generic record subflow instead of writing a specific flow for each record type.

### **Improve performance and readability of large flows**

Use subflows when a flow exceeds 25 actions. 50 is the maximum number of actions specified by the sn\_flow\_designer.max\_actions system property, but limit a flow to 25 actions for the best performance.

### **Pass inputs and outputs with subflows**

Call subflows if you want to pass inputs and outputs. Use subflows if you want to specify the inputs available to a subflow when it starts, or if you want to specify the outputs available to the parent flow after a subflow ends.

### **Trigger multiple flows on a single event vs using parallel subflows**

- Use parallel subflows if there are interrelated outputs or some action must be taken when all are available. If not, then it's simpler to trigger multiple flows.
- To configure parallel subflows, launch each subflow without a wait and then use wait for condition to wait for each subflow to be terminal (complete, error, canceled)

### **Use dynamic flows if you have multiple subflows with similar functionality**

Dynamic flows let you compartmentalize your processes by applying a template to handle the inputs of multiple similar subflows. Compartmentalization lets you distinguish between subflows that perform similar functions, such as subflows for [IntegrationHub](#) spokes.

### **Avoid the 10-item limit in the error-handling-process**

Rather than force your error-handling-process to fit within a 10-item limit, call subflows, which can contain many more items. You can also use the subflow outputs to trigger automation in other flows.

### **Take corrective actions**

Rather than recreate the same sequence of actions in multiple flows, create reusable subflows to correct errors to your record data. When a flow error leaves your record data in an undesired state, use subflows to correct these records. You can use the error handler to identify such record data as a subflow output.

### **Triggers**

Follow these design considerations when creating record triggers.

### Determine whether your flow needs a trigger or variable input

Flows always run when their trigger conditions are met. Triggers always provide the same data as input for flows. If you need variable input to initiate a flow instead, create a [subflow](#).

### Add conditions to specify what record values start your flow

Starting a flow only when needed consumes fewer system resources than starting a flow, pausing it, and waiting to resume the flow until a specific record condition applies. Instead of creating a flow that starts with a Wait for condition action, redesign the flow to include the wait condition as part of the record trigger.

### Create unique conditions for record triggers on the same table

To prevent flows from overwriting each other, create unique conditions for each flow running on the same table. If multiple flows on the same table use the same filter, there is no way to know the order in which the flows run. Using conditions also helps to optimize flow performance by returning a more precise, smaller set of records.

### Ignore records added or updated by import and update sets

Record triggers ignore records added or updated by applying an update set or importing an XML file. These operations apply to the entire application or table rather than an individual record.

### Replace record triggers on Service Catalog tables with Service Catalog application triggers

Flow Designer no longer displays Service Catalog tables as options for record triggers. Instead, create flows that use the Service Catalog application trigger type.

### Wait conditions

Follow these design considerations when creating flows that wait for a condition.

### Use record triggers instead of wait conditions to start flows

If you only want a flow to run when certain record conditions are met, create a flow with a record trigger instead of starting and pausing a flow. A waiting flow consumes more system resources than a flow trigger.

### **Cancel flows whose resume conditions can never occur**

Prevent your flows from waiting indefinitely by specifying flow stop conditions with [End Flow flow logic](#). To free up system resources, you can also cancel any flow whose resume conditions can never be met. For example, cancel flows waiting for incident record updates where the related incident is closed.

### **Restrict wait conditions to fields present on the current table**

The Wait For Condition action can only monitor changes to the fields of the table to which the record belongs. The action cannot detect changes to fields in related records or catalog variables. For example, if an action waits for changes to an Incident record, then it cannot detect changes to a related record such as a catalog item or change task record. Avoid building wait conditions that dot-walk to another record as these fields actually belong to the related record. Avoid building wait conditions that rely on catalog variables.

### **Flows with stages**

Follow these design considerations when creating flows with stages.

#### **Avoid defining stages that depend on a For Each flow logic**

Flow Designer prevents you from adding stages within a **For Each** block. You can only add stages before or after a **For Each** block.

#### **Avoid having multiple flows with stages on the same table**

A stage field always displays the stage information provided by the last flow to run on a table or record. If multiple flows run on the same records, then the stages defined in one flow can in theory overwrite the stages from another flow. To avoid multiple flows overwriting each other's stages, define unique trigger conditions for each flow.

#### **Avoid updating stage fields**

If you manage stages with a flow, avoid directly updating stage fields with actions, business rules, script calls, or workflows. Manually updating the value of a stage field may produce unexpected or undesired results.

#### **Ensure that each flow on a table has unique trigger conditions**

Adding unique trigger conditions to each flow ensures the flows only run under those conditions and prevents the stages from one flow overwriting

the stages of another flow. Specifying unique trigger conditions makes it easier to troubleshoot flows by limiting the number of flow executions that can produce record changes.

#### **Use error stages to communicate with the user**

The flow error state does not affect flow execution. A flow continues running even if it reaches an error stage. Use a conditional flow logic block to set the error stage and communicate to the user that the state of the current stage is Error. For example, if an approval is not approved within the required limit, you may want to communicate an error to the user.

#### **Use the error stage to stop processing a flow**

Use a conditional flow logic block to identify when a flow enters the error stage. Use the flow logic to stop processing the flow or take some kind of remediation action. For example, you may want to change the record state or assignment when a flow reaches an error state.

#### **Do the following in parallel flow logic**

##### **Avoid creating data dependencies between paths**

Since a flow can run paths in any order, avoid creating data dependencies between separate paths. For example, do not have one path that creates a record and another path that updates the same record. The update record path may run before the create record path.

##### **Do not share data between paths**

Flow Designer prevents you from dragging data pills between paths because the system cannot determine which path will finish first to supply the output value.

#### **Dynamic flows flow logic**

##### **Use dynamic flows if you have multiple subflows with similar functionality**

Dynamic flows let you compartmentalize your processes by applying a template to handle the inputs of multiple similar subflows. Compartmentalization lets you distinguish between subflows that perform similar functions, such as subflows for [IntegrationHub](#) spokes.

### Ensure dynamically called subflow inputs match template flow inputs

The system throws an error and the main flow can't run properly when the inputs of a dynamic flow and flow template don't match.

### Use the correct context when getting flow outputs

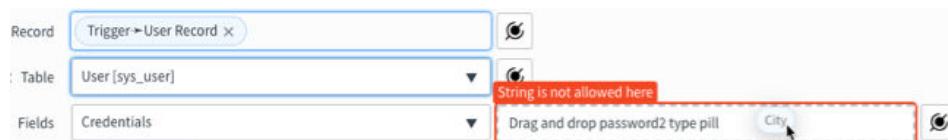
A context record uniquely identifies the flow run. If you run a dynamic flow multiple times, there are multiple context records to choose from. When you use dynamic flow multiple times within a flow, make sure to pick the right context record from the right run each time you get flow outputs.

### Password2 data pills

Follow these guidelines when designing flows containing Password (2 Way Encrypted) data.

#### Assign values using existing Password (2 Way Encrypted) data pills.

You can only assign a value to a password2 variable by selecting an existing password2 data pill. Selecting values from other field types is not supported. Flow Designer presents a warning message when invalid data pill types are selected.



**Note:** You cannot manually enter Password (2 Way Encrypted) values.

#### Use Password (2 Way Encrypted) variables only for valid field types

Flow Designer prevents selecting Password2 data pills as the value for invalid field types. The system presents a warning message when the field is an incompatible type.



Flow Designer only allows Password2 data pills to be dragged into the following field types:

- Email body fields
- HTML fields
- Password 2 Fields
- PowerShell Input Variables
- REST fields
- Variables
- REST payload body
- Query parameters
- Headers
- REST multi-part form values
- Form URL-encoded values
- SOAP fields
- Headers
- Envelope

**Note:** you cannot use Password (2 Way Encrypted) variables as conditions

Flow Designer performs a validation check when a user saves, publishes, or tests actions and flows. This check shows that an alert for any data pills dropped in restricted field types and prevents the action or flow from executing. Update the action or flow to remove the invalid data pill and then retry the action.

## **Set up encryption modules for decryption**

Only users with a valid encryption module access can decrypt and view the contents of password2 variables. To specify the encryption algorithm and which roles can access encrypted data, see [Password2 encryption with KMF](#) .

## **SLA Percentage Timer actions**

Follow these design considerations when creating flows that contain Service Level Agreement (SLA) Percentage Timer actions.

### **Add SLA Percentage Timer actions only to flows with an SLA Task trigger**

An SLA Percentage Timer action can only run when the flow starts from an SLA Task trigger. You cannot activate a subflow containing an SLA Percentage Timer action.

### **Create conditional flow logic for expected Status values**

Use the value of the **Status** field as a condition for flow logic. Build flow logic for expected **Status** values such as **Completed**, **Repair**, and **Skipped**. For example, add an **If** flow logic block to send a notification when the SLA Percentage Timer has a status of **Completed**.

### **Assign each SLA Percentage Timer action a unique cumulative Wait for percentage value**

Each SLA Percentage Timer action computes its own Scheduled End Date/Time using its Wait for percentage value. If you create multiple SLA Percentage Timer actions, give each action its own unique cumulative Wait for percentage value. For example, create three separate actions with different percentage complete values such as 25%, 50%, and 75% complete. Setting all three actions to the same percentage complete value such as 25% causes the timers to complete at the same time.

### **Copy existing flows to make customizations**

Reduce development time by copying the default SLA flows and customizing the copies with your own logic. Select a customized flow to run from the SLA definition. See [Create an SLA definition](#) .

## Dynamic inputs

### Consider dynamic inputs for third-party integrations

Dynamic inputs let you create flows that fetch data dynamically from external sources. In third-party integrations, dynamic inputs can provide data values that pertain to a particular endpoint. For more information on setting up third-party integrations with Flow Designer, see [IntegrationHub](#).

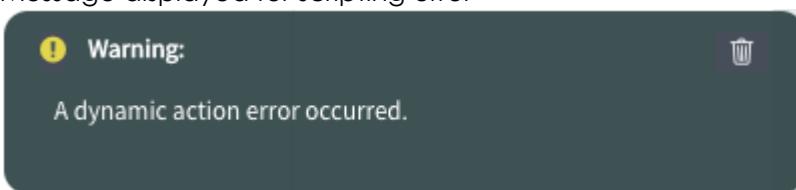
### Be aware of the time required to retrieve large amounts of data

By default, dynamic inputs have up to 300 seconds to gather data before they time out. If your data gathering action needs more time to gather data, set the `sn_flow_designer.sync_action_execution_timeout_in_seconds` system property to a higher value. However, don't use long timeout values for interactive flows where an end user must enter or select a value.

### Be aware of scripting errors

Because all data gathering actions use a script step, potential errors could occur from scripting. When using scripts to output JSON variables for your dynamic inputs, you may encounter errors that prevent inputs from receiving the JSON values they need. When a dynamic input scripting error occurs, the following warning message may appear.

Message displayed for scripting error



## Dynamic outputs

### Use dynamic outputs for third-party integrations

Use dynamic outputs to introspect and fetch data from external systems during the flow design. For example, you can specify service endpoints or call actions that interact with specific endpoint APIs. For more information on setting up third-party integrations with Flow Designer, see [IntegrationHub](#).

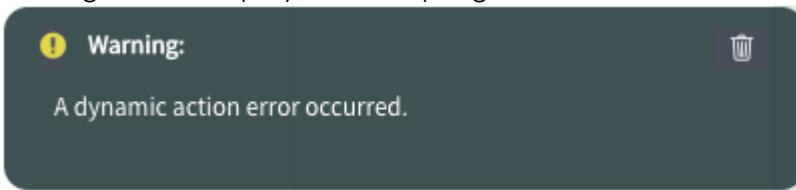
### Note the time that is required to retrieve large amounts of data

By default, dynamic outputs have up to 300 seconds to gather data before the system stops them. If your data gathering action needs more time to gather data, set the `sn_flow_designer.sync_action_execution_timeout_in_seconds` system property to a greater value. Avoid long timeout values for interactive flows where an end user is expecting to enter or select a value.

### Be aware of scripting errors

Because all data gathering actions use a script step, potential errors could occur from scripting. Review any scripts that are used to output JSON variables because script errors may prevent the outputs from receiving the JSON values that they need. When a dynamic output scripting error occurs, the following warning message may appear.

Message that is displayed for scripting error



### List.[Table] data

#### Add a reference qualifier to filter list records

Filter the records that the list variable displays as valid options by adding a reference qualifier. The reference qualifier acts as a required list filter and causes the list variable to display only records that match the reference qualifier conditions. For example, to only displays active incident records add the reference qualifier condition **[Active][is][true]**.

#### Avoid selecting default records for actions intended for ServiceNow Store

Avoid selecting default records for a list unless you know that all instances have access to the selected records. Spoke developers typically do not have access to the data of the customers who install their custom action. If you want to publish a custom action on the ServiceNow Store, you may need to provide default records as demo data.

## Use List variables in For Each flow logic

You can use a List variable to specify the records to process within For Each flow logic. The For Each flow logic ignores any non-record sys\_id present in the data. For example, if the List variable contains an email address, the flow logic ignores it.

### Approval rules

#### Provide a default value

Create or select an approval rule as a default value.

### Transform functions

#### Apply transform functions to valid types of data pills for the input

Be sure to check the type of data pill for the input before applying a transform function. Applying a transform function to an invalid data pill type results in the system skipping the transform. An error also occurs if transform functions produce results that the system cannot parse. For example, when transforming a string into a date, the system throws an error if the transform does not produce a valid date.

#### Confirm applied transform functions for multiple inputs with the same data pill

A transform function creates a new value at runtime for a specific input, and does not change the original data pill. If you use the same data pill across multiple actions or steps, transform functions must therefore be applied to each individual input.

#### View final transformed values in the flow execution details

Only the final transformed value, and not the value for each applied transform, appears in the [flow execution details](#).

#### Test transform functions to verify they produce expected results

Make sure that your transform functions produce the expected runtime values for the data pills. For more information, see [Test a flow](#) and [Test an action](#).

## Inline scripts

Follow these design guidelines to create reusable and maintainable inline scripts.

### **Write inline script for small non-reusable logic**

Use inline script format or modify the data for specific inputs and use cases. For reusable logic, create an action or subflow instead.

### **Create custom actions or subflows for reusable code rather than inline script**

Create custom actions or subflows for reusable or complex data logic such as changing the data type of source data. You may also want to provide custom actions or subflows for flow designers who are not comfortable with code.

### **Avoid duplicating action and flow functionality**

Avoid writing inline script that duplicates action and flow functionality. For example, rather than write inline script to perform record operations, use the create and update record baseline actions.

### **Avoid data type changes**

Avoid runtime errors by verifying that your inline script provides information in the same data type as the input or output expects.

### **Create variables by declaring them with the var keyword**

Use the `var` keyword to declare variables so that they remain within the proper JavaScript scope. When you create a variable by assigning it a value, JavaScript may attach it to the global object, which can result in variable values persisting outside of the local scope and causing errors.

### **Process records outputs with For Each flow logic and the flow data object**

Inline script can only access the **records** output of a Look Up Records action from For Each flow logic. Add a Look Up Records action to the flow to generate the records output. Add a For Each flow logic to the flow to process each record in the records output. Create an inline script reference to the For Each flow logic using the `fd_data` and `item` objects. For example, this reference assumes that the For Each flow logic is the second item in your flow outline `fd_data._2_for_each.item`.

### **Use type ahead suggestions to generate references to flow and action data.**

Create references to flow and action data using the fd\_data object. The script editor displays type ahead suggestions for existing flow and action data when you type fd\_data. Select a suggestion to build references to flow and action data.

**Note:** Refer to record data in a For Each flow logic using the **item** object.

### **Scope loop counters**

Script loops don't have a maximum number of iterations, so loops execute infinitely when there is not a valid exit condition.

To make sure that there is a valid exit condition, use scope loop counters in inline scripts or in script steps within an action. Add var to for (i=0; i < length; i++) and get for (var i=0; i < length; i++)

### **Complex data**

Follow these design guidelines to create reusable and maintainable data structures.

#### **Minimize the number of child levels in the hierarchy**

The more child levels a data structure has, the more difficult it is to view and select a data variable from the hierarchy. While you can build data structures with any number of child levels, it becomes difficult to navigate and understand data structures with more than seven child levels. For the best user experience, avoid creating data structures that have so many child levels that you must scroll horizontally to see and populate them.

#### **Create a separate object for each type of record data**

Most Flow Designer data is record data whether it is from an instance or an external system. This design method ensures that you know what the object contains and where the data came from.

#### **Recreate record data structures**

When building objects that receive or transmit record data, review the database dictionary entries for these records and create matching object data structures. For example, suppose that you want an object

to contain data from Incident and Configuration Item tables. You might create a string element for the **Short description** field in the Incident table, and an array of strings element for the **Class** field in the Configuration Item table.

### Create objects to combine different types of records

If you need information from multiple types of records, create an object that contains all the information you need. You can then use the object to format or parse data in Flow Designer.

### Scripting with complex data

Keep these design considerations in mind when scripting with complex data.

#### Use string inputs to convert complex data into a JSON string

When you map complex data to a string input, Flow Designer automatically converts it into a JSON string. Instead of writing a script, you can add a string input to a REST step and map it to complex data from a prior action or step.

#### Save your objects as templates

Save your objects as templates so you can reuse them in other actions, flows, and Script steps.

#### Create script input variables to access prior data

Create a script input variable for any data you want to access from the action input or a prior step. Map the script input variable to the input or step data pill. For example, map the script input variable to a list of user records you looked up in a prior step.

#### Create a script output variable to store complex data

Create a script output variable to store any complex data your script creates. The script output variables must match the values defined in the script. For example, create a contacts array of objects to store multiple contact objects. Save the contact object as a template so you can reuse it.

### Map the action output to the script output variable

When you want a custom action to output complex data, add an action output and map it to the data pill for your Script step output variable. For example, create a contacts array and load the contact object template you saved earlier. Map the action output to the contacts array produced by your Script step.

### Flow Designer and domain separation

Follow these design considerations when using domain separation with Flow Designer.

#### Ensure that tenant flows, actions, and subflows are run properly for domains

Since tenants cannot override Flow Designer content, a service provider (SP) administrator from the TOP domain must author and manage them to ensure they run properly for domains. While you can create domain-specific flows, users working from domains higher in the hierarchy may trigger multiple child domain flows. For example, a user working in the TOP domain can trigger flows in child domains such as ACME and INITECH.

**Note:** Flow authors can see only Flow Designer content available from their current domain and any parent domains in the hierarchy. Flow Designer does not display content visible from Contains domains.

#### Provide a unique name for each flow, action, and subflow

Since all domains share Flow Designer content, have an SP administrator in the TOP domain uniquely name each flow, action, and subflow. This ensures that a flow intended for one domain does not duplicate the name of a flow in another domain. For example, add the domain to the flow name such as Validate incidents - TOP, Validate incidents - ACME, and Validate incidents - INITECH.

#### Ensure that flows and actions only contain artifacts from current or parent domains

Flow Designer prevents the activation of any flow containing artifacts unavailable to the current or parent domains. For example, if you create

a domain-specific flow that belongs to the ACME domain, it cannot contain actions or subflows belonging to the sibling domain INITECH.

### **Edit Flow Designer content in the domain to which it belongs**

While users in a parent domain can see flows, actions, and subflows in a child domain, they must edit them in the domain they belong to. For example, an administrator in the TOP domain can see flows from the ACME domain but must switch to the ACME domain to edit it.

## **Deployment**

### **Avoid deploying newer release flows to instances on older releases**

Flow Designer does not support deploying flows to instances running on earlier releases. Sometimes the data model of the flow changes between releases, which can prevent the flow from running or produce unexpected results.

## **Flow error handling**

Follow these guidelines to achieve the benefits offered by flow error handling.

### **Avoid adding error handling items to the main section of the flow**

A flow normally stops running when an action or subflow returns an error in the main section. A stopped flow cannot run any actions or subflows past the point where it returned an error. Adding error handling actions and subflows to the Error Handler section ensures they run them when there is an error.

### **Capture Error Status information**

The Error Status object contains information about the action that produced an error. You can use this information to identify the cause of the error as well as record data that may need correction.

### **Suppress subflow error messages**

You can enable the Error Handler for a subflow to prevent its errors from cascading to a parent flow. Leaving the subflow Error Handler section empty ensures that it always generates the **Completed (error caught)** state.

### **Use subflows to avoid the 10-item limit**

Rather than force your error-handling-process to fit within a 10-item limit, call subflows, which can contain many more items. You can also use the subflow outputs to trigger automation in other flows.

### **Use subflows to take corrective actions**

Rather than recreate the same sequence of actions in multiple flows, create reusable subflows to correct errors to your record data. When a flow error leaves your record data in an undesired state, use subflows to correct these records. You can use the error handler to identify such record data as a subflow output.

### **Action error evaluation**

Follow these guidelines to achieve the benefits offered by action error evaluation.

#### **Allow only independent steps to continue running**

Allow a step to continue running if it does not return data required by a later step. If a step provides data necessary for later steps, then you know that the later steps cannot run successfully.

#### **Avoid more than 10 error conditions**

While there is no limit to the number of error conditions you can create, each error condition requires evaluation. The more error conditions your action has to evaluate, the potentially slower your action can run.

#### **Identify specific step failures**

You can use the Step Status to identify when a specific step fails. Identifying a specific step can be useful when your action contains multiple instances of the same type of step. You may also want to identify a specific step so that a flow error handler can take appropriate corrective actions for the failure.

#### **Put specific error conditions before general error conditions**

Error evaluation stops when the action finds a matching error condition. Putting general error conditions first may prevent the action from ever matching specific error conditions.

### Use descriptive error condition labels

Identify an error condition without having to edit it. By default, you can only see error conditions when you edit them.

### Flow Administrator

#### Turn flow reporting off in production

Minimize the amount of memory required to run flows by disabling [Flow reporting](#). Flow reporting stores configuration and runtime information for the Execution Details page. These reports are good for troubleshooting, but requires a large amount of data to be retained both in memory and in the database. By default, flow reporting is disabled, and the system only generates execution details when you manually test a flow or action. Instead you can use log files, which are still available when reporting is turned off.

#### Reduce the amount of memory consumed in flows with nested looping

When reporting is activated, set com.snc.process\_flow.reporting.iteration.lastn to a value of "1" to reduce the amounts of the amounts of memory that previous loop iterations consume. The more iterations you report on, the more memory is required.

#### View final transformed values in the flow execution details

Only the final transformed value appears in the [flow execution details](#), and not the value for each applied transform.

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## Flow Designer actions

Actions can be added to any flow, enabling process analysts to automate Now Platform features without having to write code.

An action is a reusable operation that enables process analysts to automate Now Platform features without having to write code. For example, the **Create Record** action allows process analysts to generate records in a particular table with particular values when certain conditions occur. ServiceNow core actions like Create Record require some familiarity with Now Platform tables and fields. Action designers can

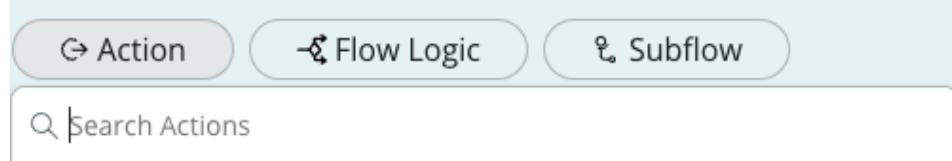
create application-specific actions to pre-set configuration details. For example, creating a Create Incident Task action ensures that the process analyst uses the correct table and field configuration each time the action is used. You can add application-specific actions by activating the associated spoke.

In Flow Designer, a process analyst adds actions to a flow and defines the configuration options.

### Search actions

You can use the **Search Actions** filter to find an action by name or spoke. As you enter data, Flow Designer displays a list of actions and spokes that match your search criteria.

Search Actions filter



### Most Recent

You can use the **Most Recent** option to display a list of the actions you recently selected. Each action displays the action name and the spoke to which it belongs underneath the name. You can use the information icon to see more information about the action such as its description, inputs, and outputs.

## Most Recent actions

The screenshot shows the ServiceNow Flow Designer interface with the 'Most Recent' tab selected. The interface includes a search bar and three navigation buttons: 'Action', 'Flow Logic', and 'Subflow'. The main area displays a list of actions categorized by spoke. A section titled 'INSTALLED SPOKES' is expanded, showing actions from ServiceNow Core and various AES components.

| Action Type      | Action Name               | Description                               |
|------------------|---------------------------|-------------------------------------------|
| INSTALLED SPOKES | ServiceNow Core           | One API - Make Service Execu...<br>Global |
|                  | AES Catalog Builder       | Look Up Record<br>ServiceNow Core         |
|                  | AES Flow Templates        | One API - Gather All Outputs<br>Global    |
|                  | AES Mobile Templates      | Wait For Condition<br>ServiceNow Core     |
|                  | AES Portal UI Template    | Look Up Records<br>ServiceNow Core        |
|                  | AES Workspace UI Template | Update Record<br>ServiceNow Core          |
|                  | Application Intake        | Unassign Bot User<br>Global               |
|                  | Collaboration Request     | <a href="#">Get Notification Details</a>  |

### Popular

You can use the **Popular** option to display a list of actions that your organization frequently uses. The system runs a scheduled job every seven days to generate the list of popular actions.

### Installed spokes

Flow Designer displays actions for each installed spoke. You can select a spoke name to see a list of available actions for the spoke. All instances have a ServiceNow Core spoke.

A ServiceNow core action is an action available to any flow regardless of the spokes installed. ServiceNow core actions cannot be viewed or edited from the Action Designer design environment. For example, the

**Ask for Approval** action is a ServiceNow core action that allows process analysts to use Now Platform approvals. Flow Designer provides a set of ServiceNow core actions to automate Now Platform processes. You can add application-specific actions by activating the associated spoke.

You can find any custom actions you created in the spoke to which they belong. Alternatively, use the Search Actions filter to search for actions by name.

- [Add Worknote Link to Context action](#)

Add a journal field entry containing a link to the current flow context record. Use the link to view the flow execution details of the current flow. You can add a flow context link to any record that has a journal field.

- [Ask for Approval action](#)

Request approval for a record with an approval field. You can configure a rule set for an approval, rejection, or cancellation. If a due date is added to an approval, the approval is automatically approved, rejected, or canceled if the approvers have not responded by the designated time.

- [Associate Record to Email action](#)

Associate a record with an Email [sys\_email] record so that you can track which record is affected by the email.

- [Create Catalog Task action](#)

Creates a record in the Catalog Task [sc\_task] table associated to a requested item in the Requested Items [sc\_req\_item] table. Adds the catalog task record as data to be used in the flow.

- [Create Flow Data action](#)

Collect data from agents interacting with a Workspace playbook. Use this data to create reusable activities for process owners using Process Automation Designer.

- [Create Record action](#)

Creates a record on any table. You can dynamically add and configure fields for the record.

- [Create or Update Record action](#)

Create or update a record in a ServiceNow table using a single action. Update a record that exists, or create a record using the values provided.

- [Create Task action](#)

Create a task on a ServiceNow task table. After you choose the task table, you can dynamically select the fields to configure the action. Defining the Parent field associates the task to a parent record.

- [Copy Attachment action](#)

Copies an attachment from the Attachments [sys\_attachment] table to a target record.

- [Delete Attachment action](#)

Removes one or all attachments associated with a record and deletes the attachment record from the Attachments [sys\_attachment] table.

- [Delete Record action](#)

Deletes a record on any table.

- [Get Attachments on Record action](#)

Access the list and count of the attachments associated with the provided source record as data pills in a flow. Use flow logic or scripting to process each attachment in the list of the attachments that the action returns.

- [Get Catalog Variables action](#)

Select variables from multiple template catalog items and variable sets using the Get Catalog Variables action.

- [Get Email Header action](#)

Access an email header value as a data pill in a flow.

- [Get Latest Response Text From Email action](#)

Provide the most recent reply or forward message in an e-mail chain to other actions in your flow.

- [Log action](#)

Logs a message in the Flow Designer log table.

- [Look up email attachments action](#)

Look up files that are attached to an email so that you can perform an action on the files.

- [Look Up Record action](#)

Look up a record from any table based on defined conditions.

- [Look Up Records action](#)

Look up multiple records on any table using defined conditions.

- [Lookup Attachment action](#)

Looks up an attachment associated with a record and returns the Attachment Sys ID as a data pill.

- [Move Attachment action](#)

Associates a record from the Attachment [sys\_attachment] table with a target record. Removes the attachment from any other associated records.

- [Move Email Attachments to Record action](#)

Move attachments from an email to a record so that the files are available to your users when they view the record.

- [Record Producer action](#)

Create a Task record from a Record Producer Catalog Item [sc\_cat\_item]. The Task record inherits values from the catalog item's variable values.

- [Send Email action](#)

Send an email to specified users or groups as an action in a flow.

- [Send Notification action](#)

Send a notification as specified by a notification record. The notification record determines the notification formats and recipients. To send a notification through an external service such as Microsoft Teams or Integration Hub.

- [Send SMS action](#)

Send an SMS text message to specified users or groups using an email-based SMS. Recipients must have an SMS device configured to receive the message.

- [SLA Percentage Timer action](#)

Identify when a task SLA record reaches a specific percentage value and perform other actions or flow logic that is based on the SLA percentage. For example, send a notification when an SLA percentage timer completes.

- [Submit Catalog Item Request action](#)

Create a requested item [sc\_req\_item] on a Service Catalog Request [sc\_request].

- [Update Multiple Records action](#)

Look up and update multiple records as a single action. Using this action removes the need to separately look up a list of records and then process the list with For Each flow logic. Set field values with a template or add and configure them using data pills.

- [Update Record action](#)

Update an existing record in a table. You can dynamically add and configure fields for the record.

- [Wait For Condition action](#)

Pause a flow until record values match a specific set of conditions.

## Add Worknote Link to Context action

Add a journal field entry containing a link to the current flow context record. Use the link to view the flow execution details of the current flow. You can add a flow context link to any record that has a journal field.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field               | Description                                                                                                                        |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Table               | Set to the table name associated with the record. For example, the Task table.                                                     |
| Record              | The record to be updated. Drag a record data pill or use the data pill picker to select a record. For example, the trigger record. |
| Journal Field       | The journal field to insert the link to the flow context record. For example, the work notes field of a task record.               |
| Additional Comments | The text to add to the journal field before the context record link. For example, the name of the flow run.                        |

## Ask for Approval action

Request approval for a record with an approval field. You can configure a rule set for an approval, rejection, or cancellation. If a due date is added to an approval, the approval is automatically approved, rejected, or canceled if the approvers have not responded by the designated time.

[Approvals](#) is a platform feature that enables users or groups to approve or reject a task.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field          | Description                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record         | Select a record under the data panel and drag the record pill into the Record field. If selecting a table with an approval field already configured, the <b>Approval field</b> is set to the correct field.                                                                                                                                                                                                        |
| Table          | Set to the table name associated with the record.                                                                                                                                                                                                                                                                                                                                                                  |
| Approval field | Select a field from the designated table to use for approval status.                                                                                                                                                                                                                                                                                                                                               |
| Journal field  | Select a field from the designated table to use for journal entries.                                                                                                                                                                                                                                                                                                                                               |
| Rules          | <p>Define the approval and rejection rules. Approval rules determine which users can approve or reject requests, and what happens after approval or rejection.</p> <p>Approval or rejection rules include:</p> <ul style="list-style-type: none"><li>• Anyone approves</li><li>• All users approve</li><li>• All responded and anyone approves</li><li>• % of users approve</li><li>• # of users approve</li></ul> |

| Field    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <p>In the field beside the approval rule, add the desired approvers. To add approvers:</p> <ul style="list-style-type: none"><li>• Select individual users or groups.</li><li>• Drag or select a field from a record.</li><li>• Select  to allow a manual approver to process an approval or rejection. A manual approver is a user manually added to the Approvers related list who can then approve the request. For example, you can manually add a subject matter expert to a task to approve the request. To learn more about adding manual approvers, see <a href="#">Generate approvals using the approvers related list</a>.</li></ul> <p>Define rejection rules by adding another OR rule set. When defining approvals, include rejection rules that run when there are no matching approvals. Such rejection rules prevent the flow from remaining in a waiting state. For example, if an approval can be approved by anyone, create a time-based rejection rule in case no one approves it.</p> <p><b>Note:</b> If you set an approval rule with no rejection rule (or vice versa) and the expected approval state is not met, the runtime value will be <b>canceled</b>.</p> |
| Due Date | <p>Define a due date to prevent the flow from remaining endlessly waiting for approval.</p> <ul style="list-style-type: none"><li>• None: The approval is not dependent on a specific date.</li><li>• Approve: Automatically approve the step if an action is still pending by the specified date.</li><li>• Reject: Automatically reject the step if an action is still pending by the specified date.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <ul style="list-style-type: none"><li>Cancel: Automatically cancel the step if an action is still pending by the specified date.</li></ul> <p><b>Note:</b> Relative dates always treat days as 24 hours regardless of the days schedule you select. For example, if you create a due date that expires in 1 relative day, the due date will occur in 24 hours based on the schedule you select. For an 8-5 weekdays excluding holidays schedule, a 24-hour duration is the equivalent of 2 complete business days and 6 hours into the third business day. When working with schedules where the business day is less than 24 hours, consider using relative hours instead of days.</p> |

## Example

**TRIGGER**

now [Incident] Created or Updated

**ACTION**

1 now Ask For Approval

Action: Ask For Approval

\* Record: Trigger > Incident Record

Table: Incident [incident]

Approval Field: Approval

Journal Field: Approval history

**Rules**

Approve When: Anyone approves

Reject When: Anyone rejects

Due Date: Approve if pending by Relative date 1 Days From Trigger > Incident Record > Assigned to > Created

Days schedule: 8-5 weekdays

## Output

| Field          | Description                   | Data Type |
|----------------|-------------------------------|-----------|
| Approval State | State of the approval request | Choice    |

## Design considerations

Follow these guidelines when asking for approvals.

### **Do not duplicate ask for approval actions in Do the following in parallel flow logic**

Flow Designer does not support making multiple approval requests to the same record using Do the following in parallel flow logic. Asking for approval on the same record creates a dependency between branches, which can produce unexpected results since there is no way to know which branch will complete first.

## **Associate Record to Email action**

Associate a record with an Email [sys\_email] record so that you can track which record is affected by the email.

### **Roles and availability**

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### **Fields**

| Field         | Description                                                      |
|---------------|------------------------------------------------------------------|
| Email Record  | Email [sys_email] record that the Target Record associates with. |
| Target Record | Record to associate to the email record                          |

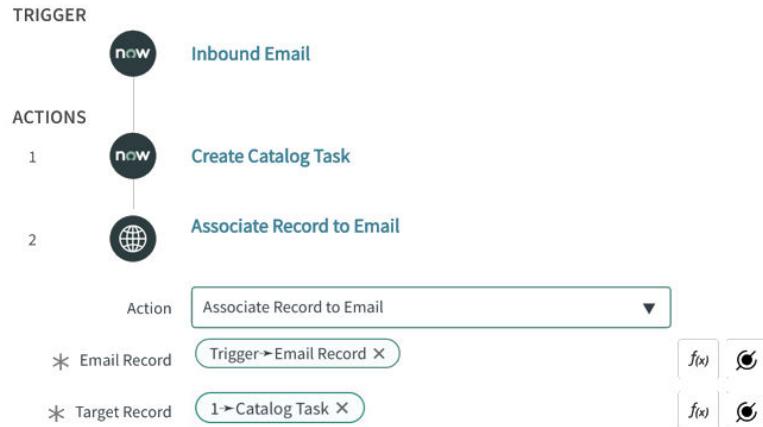
### **Output**

This action updates the **Target** field on the Email [sys\_email] record.

### **Example**

In the following example, a process owner adds the Associate Record to Email action under an inbound email trigger. The user has also added a Create Catalog Task action in the flow. In the **Email Record** field, the user selects to associate a record to the email that triggered the flow. In the **Target Record** field, the user selects to associate the Catalog Task [sc\_task] record that is created in the Create Catalog Task action.

### Using the Associate to Email action



## Create Catalog Task action

Creates a record in the Catalog Task [sc\_task] table associated to a requested item in the Requested Items [sc\_req\_item] table. Adds the catalog task record as data to be used in the flow.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Fields                          | Description                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------|
| Table Name                      | The Catalog Task [sc_task] table where the catalog task is created. This value is read only.            |
| Requested Item [Requested Item] | The requested item record from the Requested Items [sc_req_item] table that this catalog task fulfills. |

| Fields                               | Description                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Short Description                    | Short description for the catalog task.                                                                                                                                                                                                                                                                                            |
| Fields [Catalog Task]                | <p>To add the action to a flow, set fields in the catalog task record to the desired value. For example, to set the Urgency, select <b>Urgency</b> and set the desired value.</p> <p>If adding the action to a subflow, you can allow flow designers to dynamically set field values.</p>                                          |
| Wait                                 | <p>Pauses the flow until this task completes and is no longer active (active=false).</p> <p>Alternatively, you can add a wait condition by dragging-and-dropping a true/false field from the data panel into the <b>Wait</b> field. The flow only waits for the task to complete when this field is true.</p>                      |
| Template Catalog Item [Catalog Item] | Select an item from the Catalog Items [sc_cat_item] table to populate the <b>Catalog Variables</b> slushbucket with the associated variables.                                                                                                                                                                                      |
| Catalog Variables                    | <p>Select catalog variables to show on the catalog task form to provide more information or allow the fulfiller to modify the variables.</p> <p>You can define flow-specific variables that are displayed in the Available list. To define flow-specific variables, see <a href="#">Create flow Service Catalog variables</a>.</p> |

## Example

**TRIGGER**

**ACTIONS**

1 **Create Catalog Task**

| Action                               | Create Catalog Task                                                                                                                                                                                                                                                                                                                                                                     | ▼ |           |          |                    |                                |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------|----------|--------------------|--------------------------------|
| Table Name                           | Catalog Task [sc_task]                                                                                                                                                                                                                                                                                                                                                                  |   |           |          |                    |                                |
| * Requested Item [Requested Item]    | Trigger->Requested Item Record                                                                                                                                                                                                                                                                                                                                                          |   |           |          |                    |                                |
| Short Description                    | Order from vendor or move from in-stock inventory                                                                                                                                                                                                                                                                                                                                       |   |           |          |                    |                                |
| Fields [Catalog Task]                | <a href="#">+ Add Field Value</a>                                                                                                                                                                                                                                                                                                                                                       |   |           |          |                    |                                |
| Wait                                 | <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                     |   |           |          |                    |                                |
| Template Catalog Item [Catalog Item] | Apple iPhone 5                                                                                                                                                                                                                                                                                                                                                                          |   |           |          |                    |                                |
| Catalog Variables                    | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Available</th> <th style="text-align: left;">Selected</th> </tr> </thead> <tbody> <tr> <td>data_plan<br/>color</td> <td>storage<br/>carrier<br/>duration</td> </tr> </tbody> </table> <span style="margin-left: 10px;"> </span> <span style="margin-left: 10px;"> </span> |   | Available | Selected | data_plan<br>color | storage<br>carrier<br>duration |
| Available                            | Selected                                                                                                                                                                                                                                                                                                                                                                                |   |           |          |                    |                                |
| data_plan<br>color                   | storage<br>carrier<br>duration                                                                                                                                                                                                                                                                                                                                                          |   |           |          |                    |                                |

**Done**

## Create Flow Data action

Collect data from agents interacting with a Workspace playbook. Use this data to create reusable activities for process owners using Process Automation Designer.

## Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

## Inputs

| Input               | Type                                               | Description                                                                                                                                                                                                                                                                  |
|---------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition          | Reference.DataDefinition[sys_flow_data_definition] | Reference to the Data Definition record that defines the variables the system uses to collect data within the flow.                                                                                                                                                          |
| Assigned To         | Reference.User[sys_user]                           | User responsible for completing the task associated with the Process Automation Designer activity.                                                                                                                                                                           |
| Assignment Group    | Reference.Group[sys_user_group]                    | User group responsible for completing the task associated with the Process Automation Designer activity.                                                                                                                                                                     |
| Wait for user input | Choice                                             | Option to prompt users in Process Automation Designer that determines if the activity pauses for input in a user-facing view of the process. Options include: <ul style="list-style-type: none"><li><b>Yes</b> - Pause the activity and prompt end users for input</li></ul> |

| Input | Type | Description                                                                                               |
|-------|------|-----------------------------------------------------------------------------------------------------------|
|       |      | <ul style="list-style-type: none"><li>• <b>No</b> - Don't pause the activity for end user input</li></ul> |

## Outputs

| Output | Type                               | Description                                                                                                                      |
|--------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Record | Reference.Flow Data[sys_flow_data] | Reference to the Flow Data record created from end user input in a user-facing view of the Process Automation Designer activity. |

## Create Record action

Creates a record on any table. You can dynamically add and configure fields for the record.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field        | Description                                                                                                                                                    |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table        | Select a table from the list.                                                                                                                                  |
| Field Values | Set the field values that you want to create. For example, to set the short description to a certain value, select <b>Short description</b> and enter a value. |

| Field | Description                                                                                                                                                                                                                                                                                         |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <p><b>Important:</b> Enter or select values for required fields. This action returns an error if there are required fields missing values, or if the field value fails data policy validation.</p> <p>If adding the action to a subflow, you can <a href="#">Create a template value input</a>.</p> |

## Create or Update Record action

Create or update a record in a ServiceNow table using a single action. Update a record that exists, or create a record using the values provided.

### Identification of existing records

The Create or Update Record action identifies existing records by searching for matching values in the fields that you select as unique identifiers. For example, you can specify that the short description and priority fields uniquely identify an incident. When the action finds an incident with a matching short description and priority, it updates the matching record rather than creating a new record.

#### Note:

- If no field is selected as a unique identifier, the action creates a record with the field values provided.
- If more than one record matches the value of the unique identifiers, the action doesn't update any records and displays an error message in the flow execution details.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

## Fields

| Field                 | Description                                                                                                                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table Name            | Table in which a record is created or updated.                                                                                                                                                                                                                   |
| Fields                | Values of fields in the record to be created or updated.<br><br>If adding the action to a subflow, you can <a href="#">Create a template value input</a> . Dynamically set field values can trigger server-side validation rules but cannot trigger UI policies. |
| Determines uniqueness | Option for selecting the field as a unique identifier. This field appears when the required table name and fields are selected.                                                                                                                                  |

## Inputs

Provide a value for each input that your flow needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

### Table

Data type: Table Name

Table in which to create or update record.

### Fields

Data type: Template Values

Field values to set for record. For example, to set the short description to a certain value, select **Short description** and set the desired value.

## Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

### Record

Data type: Record

Reference to record created or updated.

### Table

Data type: Table Name

Table where record was created or updated.

### Error Message

Data type: String

Error message produced when the record operation fails.

### Status

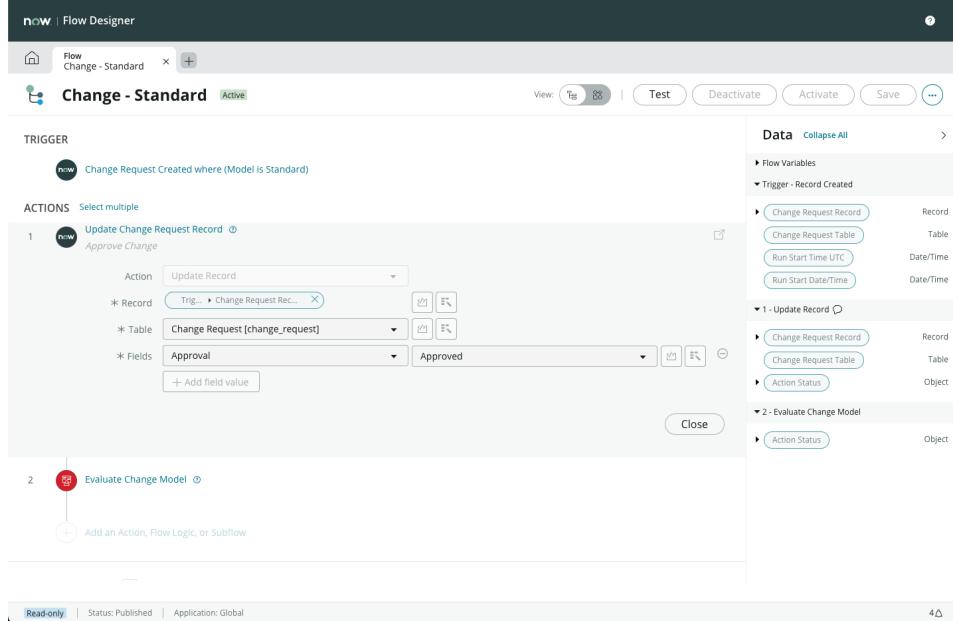
Data type: Choice

Completion status of the action. The flow execution details page displays one of these numeric values.

- Created [created]: The action created a record.
- Updated [updated]: The action updated a record.
- Error [error]: The action produced an error.

## Example: Update change request record

Inputs used for update change request record



The screenshot shows the ServiceNow Flow Designer interface. A flow named "Change - Standard" is active. The flow consists of two main steps:

- Action 1: Update Change Request Record**  
Triggered by "Change Request Created where (Model is Standard)". The action updates a record from the "Change Request [change\_request]" table, setting the "Approval" field to "Approved".
- Action 2: Evaluate Change Model**  
Triggers the "Evaluate Change Model" action.

The right side of the screen displays the "Data" panel with various objects like "Change Request Record", "Change Request Table", and "Action Status".

## Create Task action

Create a task on a ServiceNow task table. After you choose the task table, you can dynamically select the fields to configure the action. Defining the Parent field associates the task to a parent record.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field | Description                                                                   |
|-------|-------------------------------------------------------------------------------|
| Table | Select a task table. The action creates a new record in the table you select. |

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <ul style="list-style-type: none"><li>• Catalog Task [sc_task]</li><li>• Change Phase [change_phase]</li><li>• Change Request [change_request]</li><li>• Chat Queue Entry [chat_queue_entry]</li><li>• Feature Task [release_task]</li><li>• Follow On Task [cert_follow_on_task]</li><li>• Group approval [sysapproval_group]</li><li>• Guided Setup Task [gsw_task]</li><li>• IMAC [change_request_imac]</li><li>• Incident [incident]</li><li>• Incident Task [incident_task]</li><li>• KB Submission [kb_submission]</li><li>• Orphan CI Remediation [orphan_ci_remediation]</li><li>• Private Task [vtb_task]</li><li>• Problem [problem]</li><li>• Problem Task [problem_task]</li><li>• Reclassification Task [reclassification_task]</li><li>• Recommended Field Remediation [recommended_field_remediation]</li><li>• Remediate Duplicate Task [reconcile_duplicate_task]</li><li>• Release Phase [release_phase]</li><li>• Renew Lease Task [statemgmt_renew_lease_task]</li><li>• Request [sc_request]</li></ul> |

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <ul style="list-style-type: none"> <li>• Request new Knowledge Base</li> <li>• [kb_knowledge_base_request]</li> <li>• Requested Item [sc_req_item]</li> <li>• Required Field Remediation [required_field_remediation]</li> <li>• Security Case [sn_ti_case]</li> <li>• Security Incident [sn_si_incident]</li> <li>• Security Incident Response Task [sn_si_task]</li> <li>• Security Request [sn_si_scan_request]</li> <li>• Service Order [sm_order]</li> <li>• Service Order Task [sm_task]</li> <li>• Service Task [service_task]</li> <li>• Stale CI Remediation [stale_ci_remediation]</li> <li>• Standard Change Proposal [std_change_proposal]</li> <li>• Ticket [ticket]</li> </ul> |
| Field Values | <p>Set the values of fields in the task to be created. For example, to set the short description to a certain value, select <b>Short description</b> and set the desired value. To associate the task with a parent record, define the <b>Parent</b> field.</p> <p>If adding the action to a subflow, you can <a href="#">Create a template value input</a>.</p>                                                                                                                                                                                                                                                                                                                             |

| Field | Description                                                                                                                                                                                                                                                                                                                        |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wait  | <p>Waits to complete the action until the task completes and is no longer active (active=false).</p> <p>Alternatively, you can add a wait condition by dragging-and-dropping a true/false field from the data panel into the <b>Wait</b> field. The flow only waits for the task to complete when the condition field is true.</p> |

## Copy Attachment action

Copies an attachment from the Attachments [sys\_attachment] table to a target record.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

**Note:** Server-side validation rules, such as data policies, business rules, and dictionary-defined mandatory fields are enforced. UI policies do not apply.

### Fields

| Field                                 | Description                                                                                                                                                                       |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source Attachment Record [Attachment] | <p>Select an attachment record from the Attachments [sys_attachment] table.</p> <p>You can use the <a href="#">Lookup Attachment action</a> to find attachments by file name.</p> |

| Field         | Description                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------------------|
| Target Record | Select a record to attach the <b>Source Attachment Record</b> to, or drag a Record data pill from the data panel. |
| Table         | Select a table from the list to select a Target Record.                                                           |

## Delete Attachment action

Removes one or all attachments associated with a record and deletes the attachment record from the Attachments [sys\_attachment] table.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field                   | Description                                                                                                                                                                                                             |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source Record           | Drag a Record data pill from the data panel to delete one or all attachment records from.                                                                                                                               |
| Table                   | Automatically populates with the <b>Source Record</b> table.                                                                                                                                                            |
| Attachment File Name    | Enter the name of the attachment file to delete a single attachment associated with the selected record.<br><br><b>Note:</b> If a record has multiple attachments with same name, all matching attachments are deleted. |
| Delete All Attachments? | Select to delete all attachments associated with the selected record.                                                                                                                                                   |

## Delete Record action

Deletes a record on any table.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field  | Description                                                                                                |
|--------|------------------------------------------------------------------------------------------------------------|
| Record | The record to be deleted. Drag-and-drop a record data pill or use the data pill picker to select a record. |

## Get Attachments on Record action

Access the list and count of the attachments associated with the provided source record as data pills in a flow. Use flow logic or scripting to process each attachment in the list of the attachments that the action returns.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field         | Description                                                                                     |
|---------------|-------------------------------------------------------------------------------------------------|
| File Name     | Entire file name or part of the file name.                                                      |
| Source Record | Record as a data pill from the data panel or the record that the attachment is associated with. |

## Get Catalog Variables action

Select variables from multiple template catalog items and variable sets using the Get Catalog Variables action.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field                                                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Submitted Request [Requested Item]                                         | Submitted request from any ServiceNow table.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Template Catalog Items and Variable Sets [Catalog Items and Variable Sets] | Item from the Catalog Items [sc_cat_item] table and single row variable sets to populate the Catalog Variables list with the associated variables.                                                                                                                                                                                                                                                                                                                                                                           |
| Catalog Variables                                                          | <p>Catalog variables to be displayed in the data panel. Select variables, single-row variable sets, or multi-row variable sets.</p> <p><b>Note:</b> For optimal performance, avoid selecting Masked variables.</p> <p>For a list of supported Service Catalog types, see <a href="#">Supported Service Catalog variable types</a>.</p> <p>You can define flow-specific variables that are displayed in the Available list. To define flow-specific variables, see <a href="#">Create flow Service Catalog variables</a>.</p> |

| Field | Description                                                                                                         |
|-------|---------------------------------------------------------------------------------------------------------------------|
|       | <p><b>Note:</b> You can't choose the same variable name from multiple Template Catalog Items and Variable Sets.</p> |

## Get Email Header action

Access an email header value as a data pill in a flow.

### Roles and availability

Available as a Flow Designer core action. Process analysts use the flow\_designer role to add an action to a flow and define configuration details.

### Fields

| Field         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Email Record  | Record from the Email [sys_email] table.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Target Header | <p>Header from the email record. Upon completion of the action, the header value is added as a data pill in the flow.</p> <p><b>Note:</b> If multiple headers have the same name, the action gets the value of the first header that appears.</p> <p>This input requires a string value matching an email header name. ServiceNow provides several dedicated email headers.</p> <ul style="list-style-type: none"><li>• X-ServiceNow-Source</li><li>• X-ServiceNow-SysEmail-Version</li></ul> |

## Example

In the following example, a process owner adds the Get Email Header action under an inbound email trigger. In the **Email Record** field, the user selects to get an email header from the email that triggered the flow. In the **Target Header** field, the user selects to get the X-ServiceNow-Source header from the email.

The screenshot shows the ServiceNow Flow Designer interface. The flow is titled "Get Email Headers" and is set to "Inactive". The "TRIGGER" section shows an "Inbound Email" trigger. The "ACTIONS" section contains one step: "Get Email Header". This step has an "Action" dropdown set to "Get Email Header", an "Email Record" input set to "Trigger - Inbound Email", and a "Target header" input set to "X-ServiceNow-Source". To the right of the actions is a "Data" sidebar with sections for "Flow Variables", "Trigger - Inbound Email", and a detailed view of the "1 - Get Email Header" step, which includes "Header value" and "Action Status". Below the actions is an "ERROR HANDLER" section. At the bottom, status information indicates "Status: Draft" and "Application: Global".

Testing the flow with a sample email record produces the header value as a data pill.

## Get Latest Response Text From Email action

Provide the most recent reply or forward message in an e-mail chain to other actions in your flow.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

| Input        | Data type | Description                             |
|--------------|-----------|-----------------------------------------|
| Email Record | Record    | Email record whose most recent reply or |

| Input | Data type | Description                                                                                                                                                                            |
|-------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |           | forward message you want to provide to other actions in your flow. Select an Email [sys_email] record from the list, or add an Email [sys_email] record data pill from the Data panel. |

## Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

| Output               | Data type | Description                                                                                                                                                                                                                                                                                                                   |
|----------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Latest Response Text | String    | <p>Body text for the most recent reply or forward message in the Email [sys_email] record that you selected for the action's input.</p> <p><b>Note:</b> If you select an Email [sys_email] record with a Type of New for this action's input, the Latest Response Text output will be the entire body text of the e-mail.</p> |

## Log action

Logs a message in the Flow Designer log table.

## Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

## Fields

| Field       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Log level   | <p>Level of importance of the log message.</p> <ul style="list-style-type: none"><li>• Error</li><li>• Warn</li><li>• Info</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                        |
| Log message | <p>Message to display in the log. Enter text or drag data pills into the field.</p> <p><b>Note:</b> The Flow Designer design environment only supports entering 255 characters of text for a log message. The length limitation only applies to text entered directly into the input. Data pill values can exceed 255 characters in length. You can log values greater than 255 characters long by using either a data pill value or calling the <a href="#">GlideSystem - log(String message, String source)</a> method from a script.</p> |

## Look up email attachments action

Look up files that are attached to an email so that you can perform an action on the files.

## Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

## Fields

| Field                | Description                                                                                                                                                                                                                                      |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Email record [Email] | Record from the Email [sys_email] table. For example, select the email record from the flow trigger. After you select an email record, the related Email Attachment [sys_email_attachment] record and its fields become available as data pills. |

## Output

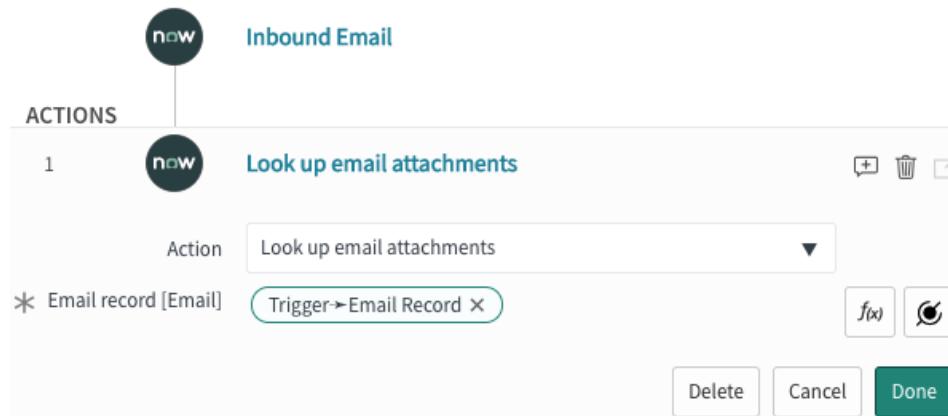
This action generates a list of Email Attachment [sys\_email\_attachment] records, which list the attachments that are associated with a given email record. To perform an action on an attachment, add flow logic that runs for each Attachment pill under the Email Attachment Record pill. For more information, see [For each flow logic](#).

## Example

In the following example, a process owner adds the Look up email attachments action under an inbound email trigger. In the **Email record [Email]** field, the user selects to look up files that are attached to the email that triggered the flow.

Email attachments action in a flow

TRIGGER



## Look Up Record action

Look up a record from any table based on defined conditions.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table                         | Select a table from the list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Conditions                    | <p>Conditions the returned record must meet.</p> <p>When building a condition that looks up the value of a reference field, use a data pill that explicitly provides the Sys ID value. Ensure the condition has the format <b>[reference field][is][Reference type data pill-&gt;Sys ID]</b>. For example, both the Change and Incident tables contain a reference field to the User table. To look up change records where the requester is the caller from an incident record, create the condition <b>[Requested by][is][Trigger-&gt;incident record-&gt;Caller-&gt;Sys ID]</b>.</p> |
| Order by                      | Determines how to sort results when more than one record matches the defined conditions. Select the field you want to use to sort results.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Sort Type                     | Select whether to sort alphabetically in ascending or descending order.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| If multiple records are found | <p>Determines what information to return when more than one record matches the defined conditions.</p> <ul style="list-style-type: none"><li>Return only the first record</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                     |

| Field               | Description                                                              |
|---------------------|--------------------------------------------------------------------------|
|                     | <ul style="list-style-type: none"><li>Fail the step</li></ul>            |
| Don't fail on error | Determines whether to fail the flow when the lookup can't find a record. |

## Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

### Record

Data type: Record

Record found based on the conditions you specified in the Conditions input.

### Table

Data type: Table

Name of the table associated with the returned record.

### Status

Data type: Choice

1 if a record was found successfully, and 0 if there was an error.

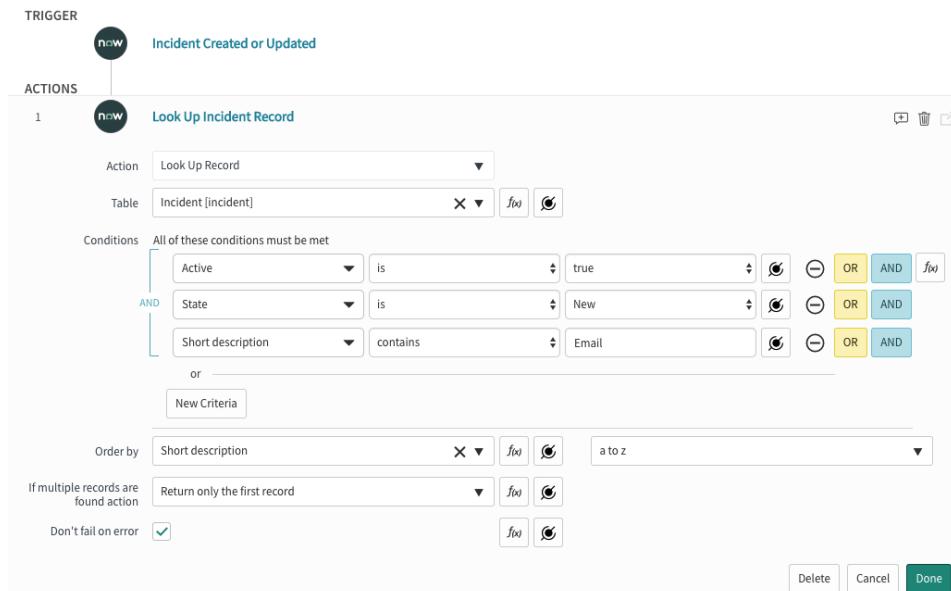
### Error Message

Data type: String

Message containing details about why the record could not be found.

**Note:** This output's value is only populated if the Status output's value is 0.

## Example



The screenshot shows a flow configuration in ServiceNow's Flow Designer. It starts with a trigger 'Incident Created or Updated' (now icon). An action 'Look Up Incident Record' is attached. The action configuration includes:

- Action: Look Up Record
- Table: Incident [incident]
- Conditions:
  - All of these conditions must be met
  - AND
    - Active is true
    - State is New
    - Short description contains Email
  - OR
  - New Criteria
- Order by: Short description (a to z)
- If multiple records are found action: Return only the first record
- Don't fail on error: checked

## Look Up Records action

Look up multiple records on any table using defined conditions.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Inputs

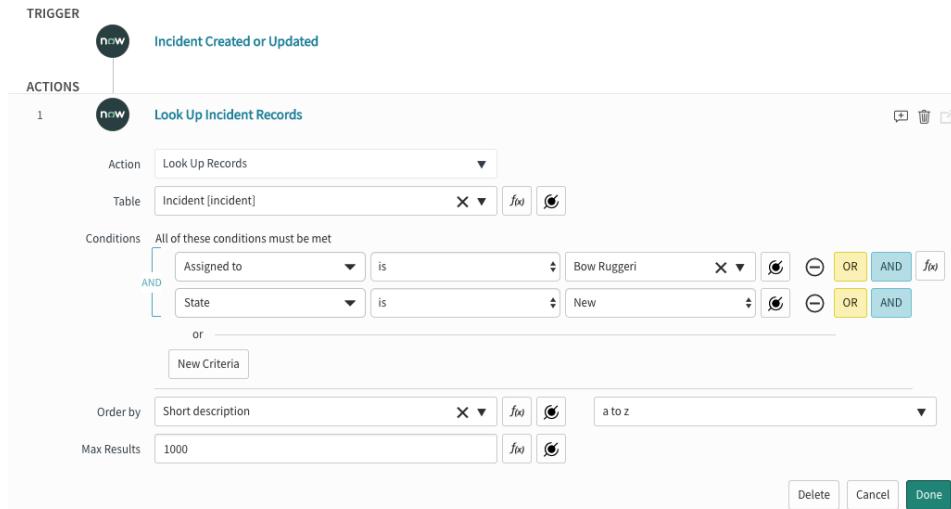
| Input      | Description                          |
|------------|--------------------------------------|
| Table      | Select a table from the list.        |
| Conditions | Conditions to search for in records. |

| Input       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | When building a condition that looks up the value of a reference field, use a data pill that explicitly provides the Sys ID value. Ensure the condition has the format <b>[reference field][is][Reference type data pill-&gt;Sys ID]</b> . For example, both the Change and Incident tables contain a reference field to the User table. To look up change records where the requester is the caller from an incident record, create the condition <b>[Requested by][is][Trigger-&gt;incident record-&gt;Caller-&gt;Sys ID]</b> . |
| Order by    | Select the field you want to use to sort results.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Sort Type   | Select whether to sort alphabetically in ascending or descending order.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Max Results | Maximum number of results returned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Outputs

| Output  | Type    | Description                                                                                                                                          |
|---------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Records | Records | List of record Sys IDs found based on the lookup criteria you provided.<br><br>For more information, see <a href="#">Records.[Table] data type</a> . |
| Table   | Table   | Table name for the records found                                                                                                                     |
| Count   | Integer | Number of records found                                                                                                                              |

## Example



## Lookup Attachment action

Looks up an attachment associated with a record and returns the Attachment Sys ID as a data pill.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

**Note:** Server-side validation rules, such as data policies, business rules, and dictionary-defined mandatory fields are enforced. UI policies do not apply.

## Fields

| Field         | Description                                                                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| File Name     | Enter the name of the attachment to look up.<br><br>If the record includes multiple attachments with the same file name, the system returns the first Sys ID encountered. |
| Source Record | Drag a Record data pill from the data panel, or select the record that the attachment is associated with.                                                                 |

## Move Attachment action

Associates a record from the Attachment [sys\_attachment] table with a target record. Removes the attachment from any other associated records.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

**Note:** Server-side validation rules, such as data policies, business rules, and dictionary-defined mandatory fields are enforced. UI policies do not apply.

## Fields

| Field                                 | Description                                                              |
|---------------------------------------|--------------------------------------------------------------------------|
| Source Attachment Record [Attachment] | Select an attachment record from the Attachments [sys_attachment] table. |

| Field         | Description                                                                                   |
|---------------|-----------------------------------------------------------------------------------------------|
| Target Record | Drag a Record data pill from the data panel to attach the <b>Source Attachment Record</b> to. |
| Table         | Automatically populates with the <b>Source Record</b> table.                                  |

## Move Email Attachments to Record action

Move attachments from an email to a record so that the files are available to your users when they view the record.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field         | Description                                        |
|---------------|----------------------------------------------------|
| Email Record  | Email [sys_email] record to move attachments from. |
| Target Record | Record to move attachments to.                     |

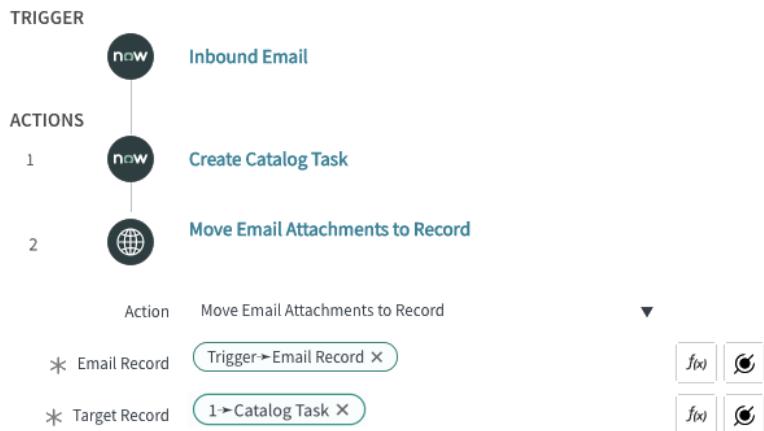
### Output

This action updates the Email Attachment [sys\_email\_attachment] record. The **Action** field changes to **Attached to Target Record**.

### Example

In the following example, a process owner adds the Move Email Attachments to Record action under an inbound email trigger. The user has also added the Create Catalog Task action in the flow. In the **Email Record** field, the user selects to move attachments from the email that triggered the flow. In the **Target Record** field, the user selects to move email attachments to the Catalog Task [sc\_task] record that is created in the Create Catalog Task action.

### Using the Move Email Attachments to Record action



## Record Producer action

Create a Task record from a Record Producer Catalog Item [sc\_cat\_item]. The Task record inherits values from the catalog item's variable values.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

| Input        | Data type | Description                                             |
|--------------|-----------|---------------------------------------------------------|
| Catalog Item | Record    | Reference to catalog item used to create a Task record. |

| Input               | Data type  | Description                                                                                                                                                                                             |
|---------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Catalog Item Inputs | String     | Catalog variables associated with the catalog item you choose. You can view associated catalog variables for Catalog Items from <b>Service Catalog &gt; Catalog Definitions &gt; Record Producers</b> . |
| Don't fail on error | True/False | Catalog variable indicating whether to fail on error.                                                                                                                                                   |

## Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

| Output        | Data type  | Description                                                                                            |
|---------------|------------|--------------------------------------------------------------------------------------------------------|
| Table         | Table Name | Table where Task record was created.                                                                   |
| Record        | Record     | Reference to Task record created.                                                                      |
| Error Message | String     | Error message produced when the record operation fails.                                                |
| Status        | Choice     | Completion status of the action. The flow execution details page displays one of these numeric values. |

| Output | Data type | Description                                                                                                                         |
|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------|
|        |           | <ul style="list-style-type: none"><li>Success [0]: The action succeeded.</li><li>Error [1]: The action produced an error.</li></ul> |

## Error messages

If an error occurs with this action, the following error messages appear in the [execution details](#) page.

| Error message                                                 | Description                                                                                                                                                                                                         |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record generation failed, check logs to get more information. | This error typically occurs when your flow or action contains logic to insert a record or records into other tables. When this logic exists, the Record Producer action aborts inserting the record into the table. |

## Design considerations

Follow these design considerations when creating flows that contain Record Producer actions.

### Escape quotation marks from string data pills with the String Replace transform function

Complex string variables are converted into JSON format when stored in the system. To prevent any JSON formatting errors, you can use a Replace String transform function to escape the quotation marks present in any string data pills you use for catalog variables. See [String transform functions](#).

### Use transform functions to validate data pills

Whenever you use a data pill to provide data for an action input, you can use a transform function to validate the data. See [Transform functions](#) for a list of available transform functions.

## Send Email action

Send an email to specified users or groups as an action in a flow.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Target Record     | Record that the email is associated to. When a user sends a reply to your email, the target record is updated with the reply email content.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Table             | Table of the target record.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Include Watermark | Option to apply a watermark to the email that is sent. To include a watermark, you must set a target record.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| To                | <p>The main recipients of the email. Enter a list of user email addresses separated by commas or white spaces. You can also drag data pills that contain email addresses into the field, such as a User or Group record. For example, if you want to send an email to the group assigned to the incident, drag the <b>[Assignment group]</b> data pill from the data panel.</p> <p>To send email to a group, you must provide a <b>Group email</b> address. To send email to group members, the group must have the <b>Include members</b> option enabled.</p> <p><b>Note:</b> The number of email recipients must be equal to or less than the maximum number set by the glide.email.smtp.max_recipients system property.</p> |

| Field   | Description                                                                                                                                                                                                                                                                     |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CC      | Additional recipients copied on this email. Enter a list of user email addresses separated by commas or white spaces. You can also drag data pills that contain email addresses into the field.                                                                                 |
| BCC     | Additional recipients of this email, who are visible only to the sender (blind copied). Enter a list of user email addresses separated by commas or white spaces. You can also drag data pills that contain email addresses into the field.                                     |
| Subject | Subject of the email. You can enter text or drag data pills into the field.                                                                                                                                                                                                     |
| Body    | The content of the message body. You can enter text or drag data pills into the field.<br><br><b>Note:</b> Flow Designer does not support the \${URI} parameter in the email message body. To create a link to a record, use data pills, or create a notification step instead. |

## Testing the email action

To verify that the email was generated when testing the action, review the email record in the Email [sys\_email] table. The **Headers** field indicates whether the email was successfully generated. For example:

```
X-ServiceNow-Source:FlowDesigner-9ad2747b0b710300f4eb8bf637673ale
Message-ID:<193756824.0.1508534586438@[10.0.66.70]>
X-ServiceNow-Generated:true
```

ACL restrictions apply to the Send Email action. If you configured your flow to run as the user who initiates the session, ensure that the user can access email. To test access controls for a Send Email action, impersonate a typical email sender and manually trigger the flow.

## Send Notification action

Send a notification as specified by a notification record. The notification record determines the notification formats and recipients. To send a notification through an external service such as Microsoft Teams or Integration Hub.

See [Integration Hub available spokes](#) for a list of available integrations.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field        | Description                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------|
| Record       | The record that triggers the notification. The notification has access to the data from this record.                  |
| Table        | The table containing the triggering record. The system automatically determines the table from the record you select. |
| Notification | The notification record you want to use to format the notification and generate its recipients.                       |

## Send SMS action

Send an SMS text message to specified users or groups using an email-based SMS. Recipients must have an SMS device configured to receive the message.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

## Fields

| Field      | Description                                                                                         |
|------------|-----------------------------------------------------------------------------------------------------|
| Recipients | Recipients of the SMS text message. Specify a user or group by dragging a pill from the data panel. |
| Message    | Content of the SMS text message. You can enter text directly or drag a pill from the data panel.    |

## Inputs

Provide a value for each input that your flow needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

### Recipients

Data type: String

Recipients of the SMS text message. Specify a user or group by dragging a pill from the data panel.

### Message

Data type: String

Content of the SMS text message. You can enter text directly or drag a pill from the data panel.

## Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

### Email

Data type: Record

The Email record created for the SMS message.

## SLA Percentage Timer action

Identify when a task SLA record reaches a specific percentage value and perform other actions or flow logic that is based on the SLA percentage. For example, send a notification when an SLA percentage timer completes.

### Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field               | Description                                                                                                                                                                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wait for percentage | The positive integer percentage of the total SLA duration used to compute an end time. For example, a 50% percentage results in the system computing an end date-time value that is 50% of the total SLA duration. If an SLA requires tasks to be completed within 24-hours, then 50% of that SLA would be 12 hours. |

### Scheduled End Date/Time

The **Scheduled End Date/Time** output data pill lists the computed time that the SLA percentage timer action is expected to end. The computed end date is determined by the input Task SLA record and the input Percentage. This date/time value is independent of any elapsed time field values in the Task SLA record.

- If the end date is in the future, the system creates a system event to continue running the action at that future date. While the system waits for the scheduled end date, it pauses the flow and action.
- If the end date is in the past, the system immediately sets the **Status** of the SLA Percentage Timer action.

## Status

The **Status** data pill contains the result of the SLA percentage timer.

### SLA Percentage Timer status descriptions

| Status    | Description                                                                                                                                                                                                              |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Completed | The timer action reached its scheduled end date/time. Flow designers can build specific flow logic for this action status.                                                                                               |
| Paused    | The timer was paused before its scheduled end date/time. If the timer resumes running, Flow Designer generates a new scheduled end date/time value. Flow designers can build specific flow logic for this action status. |
| Repair    | The flow is running in repair mode, and the scheduled end date/time is in the past. Flow designers can build specific flow logic for this action status.                                                                 |
| Skipped   | The timer did not run because the scheduled end date/time is in the past. Flow designers can build specific flow logic for this action status.                                                                           |
| Waiting   | The timer is running and has yet to reach the scheduled end date/time.                                                                                                                                                   |

Flow Designer sets the action status when the SLA state matches an [SLA condition](#) or when certain UI actions are selected.

### Action status set for SLA state

| SLA state                                                      | Action status set                                                                                                                                                                      | Flow run state                                                            |
|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| SLA attaches and the scheduled end date/time is in the future. | Set action status to <b>Waiting</b> .                                                                                                                                                  | The flow waits until the SLA timer completes, is cancelled, or is paused. |
| SLA attaches and the scheduled end date/time is in the past.   | <ul style="list-style-type: none"> <li>If the flow was started in Repair mode, set action status to <b>Repair</b>.</li> <li>Otherwise, set action status to <b>Skipped</b>.</li> </ul> | The flow runs the next action or flow logic in the flow sequence.         |
| SLA Cancels.                                                   | Set action status to a null value.                                                                                                                                                     | The flow stops with a state of <b>Cancelled</b> .                         |
| SLA Pauses.                                                    | Set action status to <b>Paused</b> .                                                                                                                                                   | The flow waits until the SLA Task flow is cancelled or is resumed.        |
| SLA reaches Scheduled End Date/Time.                           | Set action status to <b>Completed</b> .                                                                                                                                                | The flow runs the next action or flow logic in the flow sequence.         |
| SLA Resumes.                                                   | Set action status to <b>Waiting</b> .                                                                                                                                                  | The flow waits until the SLA timer completes, is cancelled, or is paused. |
| SLA Stops.                                                     | Set action status to a null value.                                                                                                                                                     | The flow stops with a state of <b>Cancelled</b> .                         |

### Total Duration

The **Total Duration** data pill lists the total number of seconds that the action ran. The total duration is computed from the action start time and

the time when the action reached the **Completed** status. Status values other than **Completed** produce a null value **Total Duration**.

### Design considerations

Follow these design considerations when creating flows that contain Service Level Agreement (SLA) Percentage Timer actions.

#### Add SLA Percentage Timer actions only to flows with an SLA Task trigger

An SLA Percentage Timer action can only run when the flow starts from an SLA Task trigger. You cannot activate a subflow containing an SLA Percentage Timer action.

#### Create conditional flow logic for expected Status values

Use the value of the **Status** field as a condition for flow logic. Build flow logic for expected **Status** values such as **Completed**, **Repair**, and **Skipped**. For example, add an **If** flow logic block to send a notification when the SLA Percentage Timer has a status of **Completed**.

#### Assign each SLA Percentage Timer action a unique cumulative Wait for percentage value

Each SLA Percentage Timer action computes its own Scheduled End Date/Time using its Wait for percentage value. If you create multiple SLA Percentage Timer actions, give each action its own unique cumulative Wait for percentage value. For example, create three separate actions with different percentage complete values such as 25%, 50%, and 75% complete. Setting all three actions to the same percentage complete value such as 25% causes the timers to complete at the same time.

#### Copy existing flows to make customizations

Reduce development time by copying the default SLA flows and customizing the copies with your own logic. Select a customized flow to run from the SLA definition. See [Create an SLA definition](#).

## Submit Catalog Item Request action

Create a requested item [sc\_req\_item] on a Service Catalog Request [sc\_request].

## Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

## Inputs

| Input                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Catalog Item         | Name of the requested catalog item.<br><br>Extra inputs may be added dynamically, depending on which catalog item is selected. For example, when the requested catalog item is a new email account, a field for <b>Preferred Email address</b> appears.<br><br><b>Note:</b> The following Service Catalog variable types are not supported. <ul style="list-style-type: none"><li>• list collector</li><li>• lookup multiple choice</li><li>• lookup select box</li></ul> |
| Quantity             | Number of items requested.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Special Instructions | Text describing any special instructions about the item request.                                                                                                                                                                                                                                                                                                                                                                                                          |
| Delivery Address     | Location where the requested item should be delivered.                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Input               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Requested for       | User that the item is requested for.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Don't fail on error | Option to determine whether to fail the flow if the action produces an error.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Wait for Completion | Option to force the flow to wait until the action has been completed before continuing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Enable timeout      | <p>Option to limit the amount of time that the flow waits for the action to be completed before continuing.</p> <p><b>Note:</b> Use the <b>Enable timeout</b> option to prevent this action from continuing to run. If the condition to continue is never met, a timeout value specifies when the system skips the Wait for Condition action and go to the next item in the flow. You must set a Duration value to enable a timeout. You can also select a Schedule if you want to compute the duration end date based on a specific work schedule.</p> <p>This field appears only when the <b>Wait for Completion</b> option is selected.</p> |
| Duration            | Amount of time that the flow waits before continuing when the <b>Enable timeout</b> option is selected. Enter the time to wait in hours, minutes, and seconds. If you leave                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Input    | Description                                                                                                                                                                                                                                                                                                                                                                                     |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <p>this field empty, the flow does not wait.</p> <p>This field appears only when the <b>Wait for Completion</b> option is selected.</p>                                                                                                                                                                                                                                                         |
| Schedule | <p>Schedule used to compute the timeout duration when the <b>Enable timeout</b> option is selected. For example, waiting for 10 hours as part of an 8-5 weekdays schedule causes the flow to wait for one or more business days. If you leave this field empty, the timeout runs without a schedule.</p> <p>This field appears only when the <b>Wait for Completion</b> option is selected.</p> |

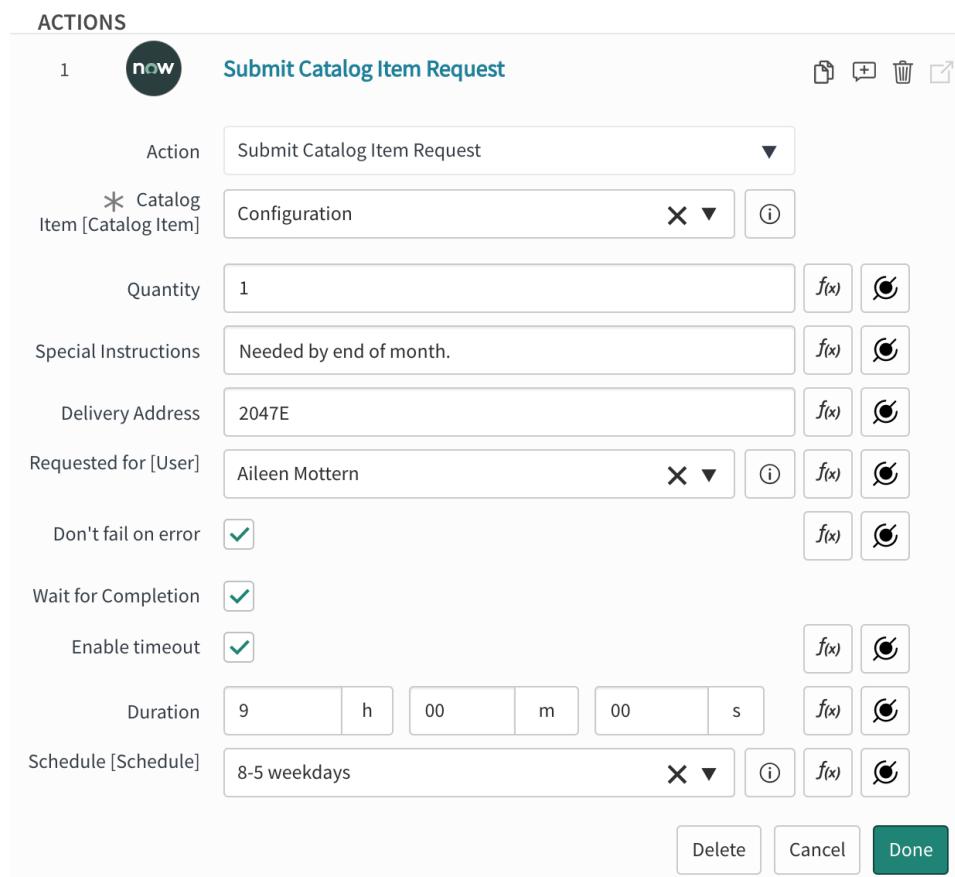
## Output

| Field          | Description                                                                                                                    | Data Type   |
|----------------|--------------------------------------------------------------------------------------------------------------------------------|-------------|
| Error Message  | Message that displays if the action produces an error.                                                                         | String      |
| Requested Item | Document ID for the requested item.                                                                                            | Document ID |
| Status         | <p>The completion status of the action as a numeric value.</p> <ul style="list-style-type: none"> <li>• 0 (success)</li> </ul> | Choice      |

| Field | Description                                                                          | Data Type |
|-------|--------------------------------------------------------------------------------------|-----------|
|       | <ul style="list-style-type: none"> <li>• 1 (error)</li> <li>• 2 (timeout)</li> </ul> |           |

## Example

ACTIONS



The screenshot shows the configuration of a 'Submit Catalog Item Request' action. The action is triggered by a 'now' button. The configuration includes:

- Action: Submit Catalog Item Request
- Catalog Item [Catalog Item]: Configuration
- Quantity: 1
- Special Instructions: Needed by end of month.
- Delivery Address: 2047E
- Requested for [User]: Aileen Mottern
- Don't fail on error: checked
- Wait for Completion: checked
- Enable timeout: checked
- Duration: 9 h 00 m 00 s
- Schedule [Schedule]: 8-5 weekdays

Buttons at the bottom include Delete, Cancel, and Done.

## Design considerations

Follow these design considerations when creating flows that contain Submit a Catalog Item Request actions.

### Escape quotation marks from string data pills with the String Replace transform function

Complex string variables are converted into JSON format when stored in the system. To prevent any JSON formatting errors, you can use a Replace String transform function to escape the quotation marks present in any string data pills you use for catalog variables. See [String transform functions](#).

### Use transform functions to validate data pills

Whenever you use a data pill to provide data for an action input, you can use a transform function to validate the data. See [Transform functions](#) for a list of available transform functions.

## Update Multiple Records action

Look up and update multiple records as a single action. Using this action removes the need to separately look up a list of records and then process the list with For Each flow logic. Set field values with a template or add and configure them using data pills.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field        | Description                                                                                                 |
|--------------|-------------------------------------------------------------------------------------------------------------|
| Table        | Select the table containing the records to look up and update.                                              |
| Conditions   | Define the filter conditions used to look up records.                                                       |
| Field Values | Set static or dynamic values of fields in the record. For example, to set the short description to a static |

| Field               | Description                                                                                                                                                                                                                                                                                                     |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <p>value, select <b>Short description</b> and set the desired value.</p> <p>To add dynamic values, see <a href="#">Create a template value input</a>.</p> <p><b>Important:</b> The system does not support updating multiple journal fields such as the additional comments or work notes of a task record.</p> |
| Order by            | Select the field you want to use to sort the records when more than one record matches the defined conditions.                                                                                                                                                                                                  |
| Sort Type           | Determine whether to sort the records alphabetically in ascending or descending order.                                                                                                                                                                                                                          |
| Don't fail on error | Specify whether to continue running the flow when there is an error.                                                                                                                                                                                                                                            |

## Example

**TRIGGER**

now Problem Updated where (State is Closed)

**ACTIONS**

1 now Update Multiple Incident Records

Action: Update Multiple Records

\* Table: Incident [incident]

Conditions: All of these conditions must be met

- Parent Number is Trigger > Problem Record > Number
- or
- New Criteria
- \* Fields: State is Resolved
- Resolution code is Trigger > Problem Record > Resolution code
- Resolution notes is Trigger > Problem Record > Fix notes
- + Add Field Value

Order by: Number

Sort Type: a to z

Don't fail on error: checked

Buttons: Delete, Cancel, Done

## Outputs

| Field         | Description                                                              | Data Type |
|---------------|--------------------------------------------------------------------------|-----------|
| Count         | Number of records updated. If no records are updated, the count is 0.    | Integer   |
| Error Message | Message that displays if the action produces an error.                   | String    |
| Status        | The completion status of the action as a numeric value.<br>• 0 (success) | Choice    |

| Field | Description | Data Type |
|-------|-------------|-----------|
|       | • 1 (error) |           |

## Update Record action

Update an existing record in a table. You can dynamically add and configure fields for the record.

### Roles and availability

- Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field        | Description                                                                                                                                                                                                                                                                  |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record       | The record to be updated. Drag-and-drop a record data pill or use the data pill picker to select a record.                                                                                                                                                                   |
| Table        | The table associated with the record. When you select a record, this field is automatically set to the table associated with the record.                                                                                                                                     |
| Field Values | Set the values of fields in the record to be updated. For example, to set the short description to a certain value, select <b>Short description</b> and set the desired value.<br>If adding the action to a subflow, you can <a href="#">Create a template value input</a> . |

## Wait For Condition action

Pause a flow until record values match a specific set of conditions.

## Roles and availability

Available as a Flow Designer ServiceNow core action. Users with the flow\_designer or admin role can add an action to a flow and define configuration details.

### Fields

| Field          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record         | Drag an input record or a record from a previous step.<br><b>Note:</b> If this record is deleted, the flow stops waiting and continues running.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Table          | Read-only. Set to the table associated with the record. Confirm that <a href="#">the system supports Wait for Condition</a> for your selected table.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Conditions     | Select the record values necessary to resume running the flow. For example, if the condition is <b>[State] [is] [Closed]</b> , the flow pauses until the condition is met. Once met, the flow moves on to the next step or action. Set static or dynamic conditions to filter records. To define a static condition applied each time the action runs, define the conditions with the condition builder. To enable flow designers to dynamically apply conditions, define an input of type Conditions and drag-and-drop the input data pill into the <b>Conditions</b> field. |
| Enable timeout | Option to limit the amount of time that the flow waits for the action to be completed before continuing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Field    | Description                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <p><b>Note:</b> Use the <b>Enable timeout</b> option to prevent this action from continuing to run. If the condition to continue is never met, a timeout value specifies when the system skips the Wait for Condition action and go to the next item in the flow. You must set a Duration value to enable a timeout. You can also select a Schedule if you want to compute the duration end date based on a specific work schedule.</p> |
| Duration | <p>Amount of time that the flow waits before continuing when the <b>Enable timeout</b> option is selected. Enter the time to wait in hours, minutes, and seconds. If you leave this field empty, the flow does not wait.</p>                                                                                                                                                                                                            |
| Schedule | <p>Schedule used to compute the timeout duration when the <b>Enable timeout</b> option is selected. For example, waiting for 10 hours as part of an 8-5 weekdays schedule causes the flow to wait for one or more business days. If you leave this field empty, the timeout runs without a schedule.</p>                                                                                                                                |

## Unsupported tables

The system does not support Wait for Condition for the following tables.

| Table Category | Table Names                                                                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Audit          | Sys Audit [sys_audit], Audit Deleted Record [sys_audit_delete], Audit Relationship Change [sys_audit_relation], Audit Roles [sys_audit_role], Audit Relationship |

| Table Category | Table Names                                                                                                                                                                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | Change [sys_audit_relation], Audit Deleted Record [sys_audit_delete]                                                                                                                                                                                                                                                   |
| Email          | Email [sys_email], Email Account [sys_email_account], Email Log [sys_email_log]                                                                                                                                                                                                                                        |
| Events         | Event [sysevent], Notification [sysevent_email_action], Stationery [sysevent_email_style], Email Template [sysevent_email_template], Inbound Email Actions [sysevent_in_email_action], Slow Event [sysevent_pattern], Event Registration [sysevent_registration], Script Action [sysevent_script_action]               |
| Import Sets    | Import Set [sys_import_set], Import Set Row [sys_import_set_row], Import Set Row Error [sys_import_set_row_error], Transform History [sys_import_set_run], Computer [imp_computer], Notification [imp_notification], Location [imp_location], User [imp_user]                                                          |
| JRobin         | JRobin Database [jrobin_database], JRobin Shard [jrobin_shard], Graph Line [jrobin_graph_line], JRobin Shard Fragments [jrobin_shard_location], Member [jrobin_graph_set_member], Round Robin Archive [jrobin_archive], Round Robin Data Source [jrobin_datasource], Round Robin Definition [jrobin_definition], Round |

| Table Category        | Table Names                                                                                                                                                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | Robin Graph [jrobin_graph], Round Robin Graph Set [jrobin_graph_set]                                                                                                                                                            |
| Logs                  | Log Entry [syslog], Service Portal Log Entry [sp_log]                                                                                                                                                                           |
| MID Server            | MID Server Property [ecc_agent_property], Mid Server Log [ecc_agent_log], Queue [ecc_queue], Configuration [ecc_queue_config], ECC Queue Statistics (by ECC Agent) [ecc_queue_stats_by_ecc_agent]                               |
| Performance Analytics | Job Log [pa_job_logs]                                                                                                                                                                                                           |
| Record Watcher        | Responders [sys_rw_action], Channel Responders [sys_rw_amb_action]                                                                                                                                                              |
| Reporting             | Summary Set [sys_report_summary], Report Summary Line [sys_report_summary_line]                                                                                                                                                 |
| Scheduled Jobs        | Schedule Item [sys_trigger], Broadcast Message [sys_broadcast_message], Broadcast Message Relationships [sys_broadcast_message_m2m], Progress Worker [sys_progress_worker], Progress Worker Domain [sys_progress_worker_domain] |
| SSO                   | SSO Properties [sso_properties], Digest Token Properties [digest_properties], SAML Update 1 Properties [saml2_update1_properties], SSO Federation [sso_federation]                                                              |

| Table Category     | Table Names                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System Cache       | Cache Flush [sys_cache_flush], Cache Entry [sys_db_cache]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| System Clone       | ServiceNow Instance [instance], Clone Security Token [clone_token], Preserved Data [clone_preserved_data]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| System Dictionary  | Dictionary Entry Override [sys_dictionary_override]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| System Events      | Event Processor [sys_event_processor]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| System Fields      | Field Class [sys.glide_object]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| System Performance | Component Status [sys_status], Cluster Message [sys_cluster_message], Node State [sys_cluster_state]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Text Index         | Ts Attachment [ts_attachment], Text Index Attribute Map [ts_attribute_map], Ts Chain [ts_chain], Chain Summary [ts_chain_summary], Text Index Column Attribute Map [ts_column_attribute_map], Text Index Configuration [ts_configuration], Text Index Configuration Attribute [ts_configuration_attribute], Ts Delete Doc [ts_deleted_doc], Ts Document [ts_document], Ts Field [ts_field], Text Search Groups [ts_group], Japanese User Token [ts_japanese_token_dictionary], Ts Phrase [ts_phrase], Global Searches [ts_query], Knowledge Searches [ts_query_kb], Text Search Stat [ts_search_stats], |

| Table Category  | Table Names                                                                                                                                                                                                                                                                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Text Search Summaries<br>[ts_search_summary], Stop Word<br>[ts_stop], Synonym Dictionary<br>[ts_synonym_dictionary], Synonym<br>Set [ts_synonym_set], Text<br>Search Table [ts_table], Text<br>Index Table Attribute Map<br>[ts_table_attribute_map], Service<br>Catalog Searches [sc_ts_query],<br>Ts Word [ts_word], Ts Word Roots<br>[ts_word_roots] |
| Update Sets     | Update Set [sys_update_set],<br>Update Version<br>[sys_update_version], Customer<br>Update [sys_update_xml], Update<br>Set Log [sys_update_set_log]                                                                                                                                                                                                     |
| Upgrades        | System Upgrades<br>[sys_upgrade_history], Upgrade<br>Details [sys_upgrade_history_log],<br>System Upgrade Metric<br>[sys_upgrade_metric], Upgrade<br>Blame Log [sys_upgrade_blame],<br>Upgrade Manifest<br>[sys_upgrade_manifest], Upgrade<br>State [sys_upgrade_state]                                                                                 |
| Usage Analytics | Usage Data for Applications<br>[ua_app_usage], UsageAnalytics<br>Count Configurations<br>[usageanalytics_count_cfg],<br>Application Metadata<br>[ua_app_metadata],<br>UsageAnalytics Count for<br>Tables [usageanalytics_count],<br>Subscription [license_details], Role<br>for Subscription [role_has_license]                                         |
| Users           | User Session [sys_user_session],<br>User Token [sys_user_token], User                                                                                                                                                                                                                                                                                   |

| Table Category | Table Names                                                                                                                                                                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | Preference [sys_user_preference],<br>Navigator History<br>[sys_ui_navigator_history]                                                                                                                                                               |
| Workflow       | Workflow Execution<br>[wf_workflow_execution], Workflow History [wf_history], Workflow Executing Activity [wf_executing], Workflow Queued Command [wf_command], Workflow Context [wf_context], Workflow Transition History [wf_transition_history] |

## Condition Evaluation

The Wait for Condition action only evaluates the wait condition when there are changes to the **Record** you select. A valid wait condition meets these criteria.

- Each condition evaluates a field from the table to which the record belongs.

**Note:** Avoid conditions that dot-walk to another table or depend upon catalog item variables from a related record.

- Each condition specifies a field value change rather than a relative time period.

**Note:** For conditions that depend on a specific duration, consider using [Wait for a duration flow logic](#) instead.

## Valid wait condition

In this example, the wait condition is valid because the **State** field belongs to the Incident table and the condition is a field value change to **Closed**.

The screenshot shows a Subflow titled "Wait for condition example". The Actions section contains two steps: "Create Incident Record" and "Wait For Condition". The "Wait For Condition" step has the following configuration:

- Action: Wait For Condition
- Record: 1 -> Incident Record
- Table: Incident [incident]
- Conditions: State is Closed

## Invalid wait condition

In this example, the wait condition is invalid because it is a time relative to the **Created** date. Actions that have a condition that relies on a time interval will not be met, so the action is never performed.

The screenshot shows a Subflow titled "Wait for condition example". The Actions section contains two steps: "Create Incident Record" and "Wait For Condition". The "Wait For Condition" step has the following configuration:

- Action: Wait For Condition
- Record: 1 -> Incident Record
- Table: Incident [incident]
- Conditions: Created relative before 6 Minutes...

## Output

| Field | Description                                                                                                                                      | Data Type |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| State | <p>The completion status of the action as a numeric value.</p> <ul style="list-style-type: none"><li>• 0 (success)</li><li>• 1 (error)</li></ul> | Choice    |

## Design considerations

Follow these design considerations when creating flows that wait for a condition.

### Use record triggers instead of wait conditions to start flows

If you only want a flow to run when certain record conditions are met, create a flow with a record trigger instead of starting and pausing a flow. A waiting flow consumes more system resources than a flow trigger.

### Cancel flows whose resume conditions can never occur

Prevent your flows from waiting indefinitely by specifying flow stop conditions with [End Flow flow logic](#). To free up system resources, you can also cancel any flow whose resume conditions can never be met. For example, cancel flows waiting for incident record updates where the related incident is closed.

### Provide at least one condition to resume a flow

The Wait For Condition action requires at least one condition to resume running a flow. If you want to pause a flow for a specific amount of time, use the [Wait for a duration of time flow logic](#) instead.

### Restrict wait conditions to fields present on the current table

The Wait For Condition action can only monitor changes to the fields of the table to which the record belongs. The action cannot detect changes to fields in related records or catalog variables. For example, if an action waits for changes to an Incident record, then it cannot detect

changes to a related record such as a catalog item or change task record. Avoid building wait conditions that dot-walk to another record as these fields actually belong to the related record. Avoid building wait conditions that rely on catalog variables.

## Flow Designer flow logic

Enable flows and subflows to specify conditional or repeated actions. Combine the elements of flow logic to create workflows in a graphical interface with little or no scripting.

The system provides these flow logic options.

| Flow logic option            | Description                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If                           | Selectively apply one or more actions only when a list of conditions is met.                                                                                                                                                                                                                                                                                        |
| For each                     | Apply one or more actions to each record in a list of records.                                                                                                                                                                                                                                                                                                      |
| Do the following until       | Apply one or more actions repeatedly until an end condition is met. You can use the flow data to specify the end conditions.                                                                                                                                                                                                                                        |
| Do the following in parallel | Run actions and subflows in separate paths within an isolated flow logic block.                                                                                                                                                                                                                                                                                     |
| Make a decision              | You can use the decision table branching logic in situations where multiple conditional paths are required, as an alternative to nested If, Else If, or Else flow logic. For example, if you want to determine what kind of car insurance you need, you can add inputs such as your age, accident history, and car model to the decision table to determine a level |

| Flow logic option           | Description                                                                                                                                                                     |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             | of insurance coverage. This logic can save you time and present a more readable format than nested if conditions or switch case statements.                                     |
| Wait for a duration of time | Use this flow logic to give your users time to act during automated processes or to wait for a specific date and time to complete actions                                       |
| Call a Workflow             | Run a published and active workflow from your flow. You can use the flow data as a workflow input. For example, you can specify the current record as a workflow input.         |
| End Flow                    | Stop running the current flow. Use End Flow within a branch of the flow to specify an exit condition. For example, end the flow when it reaches a specific If flow logic block. |
| Dynamic Flow                | Identify and run a flow or subflow dynamically by using runtime data. Build templates to provide expected inputs for dynamically called flows or subflows.                      |
| Get Flow Outputs            | Use this flow logic to access flow contexts and derive the runtime values for dynamic flow outputs.                                                                             |
| Set Flow Variables          | Assign a value to one or more flow variables. Change or update a variable's value during a flow.                                                                                |

| Flow logic option | Description                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Try               | Allow a flow to continue running when an error occurs within a flow logic block. Run a sequence of actions in response to errors within the flow logic block. |

## Flow logic inputs

Each flow logic option displays one or more fields that are used to determine its behavior. For example, the **Call Workflow** flow logic has an input where you are able to select a workflow to run. Use these inputs to define the behavior of the flow and enable optional functionality depending on your needs. See flow logic option documentation for a list of the available inputs and how they control the function of that element.

## Flow logic outputs

Flow logic options may also have outputs. These represent information that is returned by the flow logic. For example, the **Make a decision** flow logic has an output that contains a decision answer record representing the decision reached by the flow. See the documentation for a flow logic option to see definitions for its outputs.

- [Assign subflow outputs flow logic](#)

Specify the data the subflow returns when it completes running. Use subflow output as data for a parent flow or as input for another process.

- [Call a workflow flow logic](#)

Run a published and active workflow from your flow. You can use the flow data as a workflow input. For example, you can specify the current record as a workflow input.

- [Do the following until flow logic](#)

Apply one or more actions repeatedly until an end condition is met. You can use the flow data to specify the end conditions.

- [Do the following in parallel flow logic](#)

Run actions and subflows in separate paths within an isolated flow logic block.

- [Dynamic flows flow logic](#)

Identify and run a flow or subflow dynamically by using runtime data. Build templates to provide expected inputs for dynamically called flows or subflows.

- [End Flow flow logic](#)

Stop running the current flow. Use End Flow within a branch of the flow to specify an exit condition. For example, end the flow when it reaches a specific If flow logic block.

- [For Each flow logic](#)

Apply one or more actions to each record in a list of records.

- [If flow logic](#)

Selectively apply one or more actions only when a list of conditions is met.

- [Make a decision flow logic](#)

You can use the decision table branching logic in situations where multiple conditional paths are required, as an alternative to nested If, Else If, or Else flow logic. For example, if you want to determine what kind of car insurance you need, you can add inputs such as your age, accident history, and car model to the decision table to determine a level of insurance coverage. This logic can save you time and present a more readable format than nested if conditions or switch case statements.

- [Set Flow Variables flow logic](#)

Assign a value to one or more flow variables. Change or update a variable's value during a flow.

- [Try flow logic](#)

Allow a flow to continue running when an error occurs within a flow logic block. Run a sequence of actions in response to errors within the flow logic block.

- [Wait for a duration flow logic](#)

Use this flow logic to give your users time to act during automated processes or to wait for a specific date and time to complete actions.

## Assign subflow outputs flow logic

Specify the data the subflow returns when it completes running. Use subflow output as data for a parent flow or as input for another process.

**Important:** This flow logic sets values for flow outputs that have already been created. For instructions on creating flow outputs, see [Building subflows](#).

### Inputs

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name  | Name of the output. Select from the list of outputs available for the flow.                                                                                                                                                                                                                                                                                                                                                                                                           |
| Data  | Value for the output. Enter a string value, input a script, or use a data pill. Output values can reference any data pill from earlier in the flow, including other outputs. If you set outputs values by reference to other data pills, you must maintain the order of the output assignments. The referenced value must always come before the output that uses the referenced value. Changing the order may produce null values. To assign an empty value, leave this field empty. |

| Field | Description                                                                                                                                                                                               |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <p><b>Note:</b> Flow output values are set in the order in which they are assigned from top to bottom. If you set the value of the same output multiple times, the flow only uses the last value set.</p> |

## Outputs

This flow logic produces no outputs of its own, but it does set values in the **Subflow Outputs** section of the Data pane.

### Example: Set the output code of a Delete Record action

In this example, the flow uses the Sys ID of a dashboard to look up a record, delete the record, and then return the action status code of the delete operation. The subflow assigns the output value of the Output code flow variable.

#### Assign Subflow Outputs flow logic inputs

The screenshot shows the ServiceNow Flow Designer interface. The main area displays a flow with three steps: 1. Look Up PAR Dashboard Record where (Sys ID is ...), 2. Delete Record, and 3. Assign Subflow Outputs. The 'Assign Subflow Outputs' step has a dropdown menu open, showing 'Name' set to 'Output code'. In the 'Data' pane, there is a tree view under 'Flow Variables' with 'output\_code' selected and its type listed as Integer. The 'Actions' pane shows the 'Delete Record' action with a script block containing the following code:

```

1 /*
2 * Access FlowAction data using the fd_data object. Script must return a value.
3 * Available options display upon pressing ">" after fd_data
4 */
5 +++example: var shortDesc = fd_data.trigger.current.short_description;
6 +++return shortDesc;
7 /**
8 * var outputValue = (parseInt(fd_data._delete_record._action_status._code) == 0)?121:
9 * return outputValue;

```

## Design considerations

Follow these design considerations when assign output values from a subflow.

### Do not assign subflow output values within loops

Subflow outputs are intended to be static values generated at the completion of the subflow. Loops do not have access to subflow output values while the subflow is running. Assigning subflow output values within a loop can produce unexpected results such as the loop only receiving the last value set. If you need to generate dynamic values that change within a For each or Do until loop, use flow variables instead.

#### Related concepts

- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [Dynamic flows flow logic](#)
- [End Flow flow logic](#)
- [For Each flow logic](#)
- [If flow logic](#)
- [Make a decision flow logic](#)
- [Set Flow Variables flow logic](#)
- [Try flow logic](#)
- [Wait for a duration flow logic](#)

## Call a workflow flow logic

Run a published and active workflow from your flow. You can use the flow data as a workflow input. For example, you can specify the current record as a workflow input.

## Inputs

| Input             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Select a Workflow | <p>Published and active workflow that you can select to run. The workflow that you select determines the records that are associated with it. If the workflow has inputs, Flow Designer displays them as additional flow inputs.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"><li>To prevent the workflow from running outside of Flow Designer, modify it to remove its start conditions.</li><li>You cannot select a workflow that runs on the Requested Item table. Instead, create a new flow with a Service Catalog trigger.</li></ul> |
| Wait?             | <p>Workflow that you set to true so that the flow waits for workflow completion before continuing. Only workflows that wait for completion can return certain output values to the flow. Set to false to continue running the flow separately from the workflow.</p> <p><b>Note:</b> If the workflow is canceled or its context record is deleted prior to the workflow finishing, the flow stops waiting and instead continues running.</p>                                                                                                             |

| Input   | Description                                                                                                               |
|---------|---------------------------------------------------------------------------------------------------------------------------|
| Current | Current record that the workflow processes. Select a data pill that contains a record from the associated workflow table. |

## Outputs

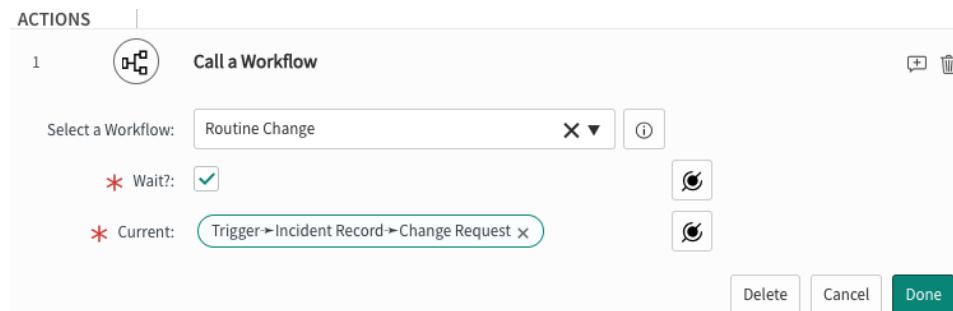
The flow execution details only display workflow output values that are generated while the flow is running. If you configure the flow to wait for the workflow to finish, the flow execution details can display all workflow output values. If the flow does not wait, the flow execution details only display the workflow output values that were generated before the **Call a Workflow** flow logic completes. If **Call a Workflow** completes before the workflow finishes, the workflow output values stop updating and only display the last known value.

| Output       | Description                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| State        | State of the workflow. This value comes from the workflow context record. The state will be <b>Complete</b> if the workflow executes successfully. If the workflow is canceled, the workflow state is set to <b>Canceled</b> . If the context record is deleted prior to the workflow finishing, the workflow state is set to <b>Invalid</b> . |
| Context      | Reference to the workflow context record.                                                                                                                                                                                                                                                                                                      |
| Result       | String that contains the result from the workflow. This value comes from the workflow context record.                                                                                                                                                                                                                                          |
| Return value | String that contains the return_value from the workflow.                                                                                                                                                                                                                                                                                       |

| Output | Description                                        |
|--------|----------------------------------------------------|
|        | This value comes from the workflow context record. |

### Example: Calling the Routine Change workflow

In this example, the flow calls the **Routine Change** workflow. The **Wait?** option is checked, so the flow pauses until this workflow completes. The **Current** field is filled using a data pill representing the record that triggered this flow.



### Execution details

#### Call Workflow execution details

| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | State           | Start time                  | ①                           |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------|-----------------------------|---------------|------|---------------|---------------|--------|------------|------|------|--------------|-------------|-----------------------------|-----------|----------|-------------|--|-----------------------------|-------------------------|-----------|--|-----------------------------|
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Call a Workflow | Open Workflow Execution     | Completed                   |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| 2018-08-06 13:59:48 1488ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                             |                             |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| <b>Workflow Configuration</b> <table border="1"> <thead> <tr> <th>VARIABLE NAME</th> <th>TYPE</th> <th>CONFIGURATION</th> <th>RUNTIME VALUE</th> </tr> </thead> <tbody> <tr> <td>wait</td> <td>True/False</td> <td>true</td> <td>true</td> </tr> <tr> <td>current</td> <td>Document ID</td> <td>Trigger -&gt; Knowledge Record</td> <td>KB0010001</td> </tr> <tr> <td>Workflow</td> <td>Document ID</td> <td></td> <td>Knowledge - Instant Publish</td> </tr> </tbody> </table>                            |                 |                             |                             | VARIABLE NAME | TYPE | CONFIGURATION | RUNTIME VALUE | wait   | True/False | true | true | current      | Document ID | Trigger -> Knowledge Record | KB0010001 | Workflow | Document ID |  | Knowledge - Instant Publish |                         |           |  |                             |
| VARIABLE NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | TYPE            | CONFIGURATION               | RUNTIME VALUE               |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| wait                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | True/False      | true                        | true                        |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Document ID     | Trigger -> Knowledge Record | KB0010001                   |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| Workflow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Document ID     |                             | Knowledge - Instant Publish |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| <b>No inputs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                             |                             |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| <b>Workflow Output</b> <table border="1"> <thead> <tr> <th>VARIABLE NAME</th> <th>TYPE</th> <th>CONFIGURATION</th> <th>RUNTIME VALUE</th> </tr> </thead> <tbody> <tr> <td>Result</td> <td>String</td> <td></td> <td></td> </tr> <tr> <td>Return Value</td> <td>String</td> <td></td> <td></td> </tr> <tr> <td>State</td> <td>String</td> <td></td> <td>finished</td> </tr> <tr> <td>Workflow Context Record</td> <td>Reference</td> <td></td> <td>Knowledge - Instant Publish</td> </tr> </tbody> </table> |                 |                             |                             | VARIABLE NAME | TYPE | CONFIGURATION | RUNTIME VALUE | Result | String     |      |      | Return Value | String      |                             |           | State    | String      |  | finished                    | Workflow Context Record | Reference |  | Knowledge - Instant Publish |
| VARIABLE NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | TYPE            | CONFIGURATION               | RUNTIME VALUE               |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | String          |                             |                             |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| Return Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | String          |                             |                             |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| State                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | String          |                             | finished                    |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| Workflow Context Record                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Reference       |                             | Knowledge - Instant Publish |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |
| <b>No Logs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |                             |                             |               |      |               |               |        |            |      |      |              |             |                             |           |          |             |  |                             |                         |           |  |                             |

1. The header displays a link so that you can view the workflow progress in the Workflow Editor, the flow logic state, the start time, and the runtime duration.

2. The **Workflow Configuration** section displays how the flow logic was configured for this flow and the runtime values that were generated.
3. The **Workflow Output** section displays the output that is generated by the workflow while the flow is running.

**Note:** If you cancel the workflow or delete the context record prior to the workflow finishing, the flow logic state is set to **Complete**.

#### Related concepts

- [Assign subflow outputs flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [Dynamic flows flow logic](#)
- [End Flow flow logic](#)
- [For Each flow logic](#)
- [If flow logic](#)
- [Make a decision flow logic](#)
- [Set Flow Variables flow logic](#)
- [Try flow logic](#)
- [Wait for a duration flow logic](#)

## Do the following until flow logic

Apply one or more actions repeatedly until an end condition is met. You can use the flow data to specify the end conditions.

You can use **Do the following until** flow logic to create a loop that repeatedly applies actions. This flow logic requires a condition specifying when to stop the loop.

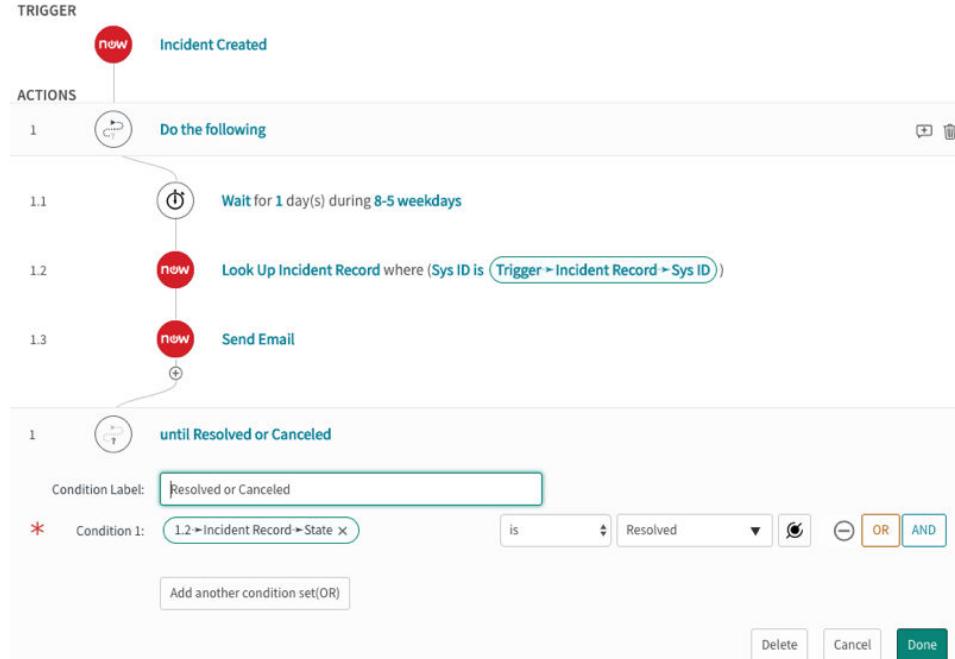
**Note:** When you set a data pill value from inside the Do the following branch of this flow logic, the data pill value is only available to other actions in the same branch. Referencing a data pill value that was set inside a Do the following branch from outside of the flow logic branch produces a null value.

## Inputs

| Input           | Description                                                                                                                                                                                                                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Condition label | Descriptive label for the loop.                                                                                                                                                                                                                                                                          |
| Condition       | Conditions under which the loop terminates. You could, for example, end a loop when the state of an incident changes.<br><br><b>Note:</b> Avoid using the same record you used to trigger the flow in your condition, because the flow populates its values when the flow starts and they remain static. |

### Example: Send a daily email until an incident is resolved

In this example, the flow sends a daily email about the incident, until the incident is in a closed or canceled state. Inside the **Do the following** branch, there is a step for looking up the incident record. This is necessary because the record that triggers the flow is only loaded when it is triggered. By adding this look up step, you can get the current state of the incident each time the loop runs.



## Outputs

This flow logic produces no outputs.

## Execution details

Execution details for Do the following until

| Hide Action Details          |                          | 1                                  | State                  | Start time | Runtime                   |
|------------------------------|--------------------------|------------------------------------|------------------------|------------|---------------------------|
| 1                            | Do the following 1 of 1  | 2                                  | Flow Logic             | Completed  | 2018-08-14 12:58:46 151ms |
| 1.1                          | now Update Record 1      |                                    | Core Action            | Completed  | 2018-08-14 12:58:46 145ms |
| <b>Configuration Details</b> |                          |                                    |                        |            |                           |
| VARIABLE NAME                | TYPE                     | CONFIGURATION                      | RUNTIME VALUE          |            |                           |
| Record                       | Document ID              | Trigger > Incident Record          | INC0010026             |            |                           |
| Table                        | Table Name               | incident                           | incident               |            |                           |
| Fields                       | Template Value           | short_description=Test             | short_description=Test |            |                           |
| <b>Output Data</b>           |                          |                                    |                        |            |                           |
| VARIABLE NAME                | TYPE                     | CONFIGURATION                      | RUNTIME VALUE          |            |                           |
| Record                       | Document ID              | step > Update Record step > Record | INC0010026             |            |                           |
| table_name                   | Table Name               |                                    |                        |            |                           |
| No Logs                      |                          |                                    |                        |            |                           |
| 1                            | until Until first update |                                    |                        |            |                           |

1. The header shows the state, start time, and runtime for the flow logic.

2. This flow logic can run actions or subflows multiple times until its condition is met. Use the arrow icons to select an iteration and its values.
3. The Actions section shows details on the actions, flows, or subflows that are run during this loop iteration.

#### Related concepts

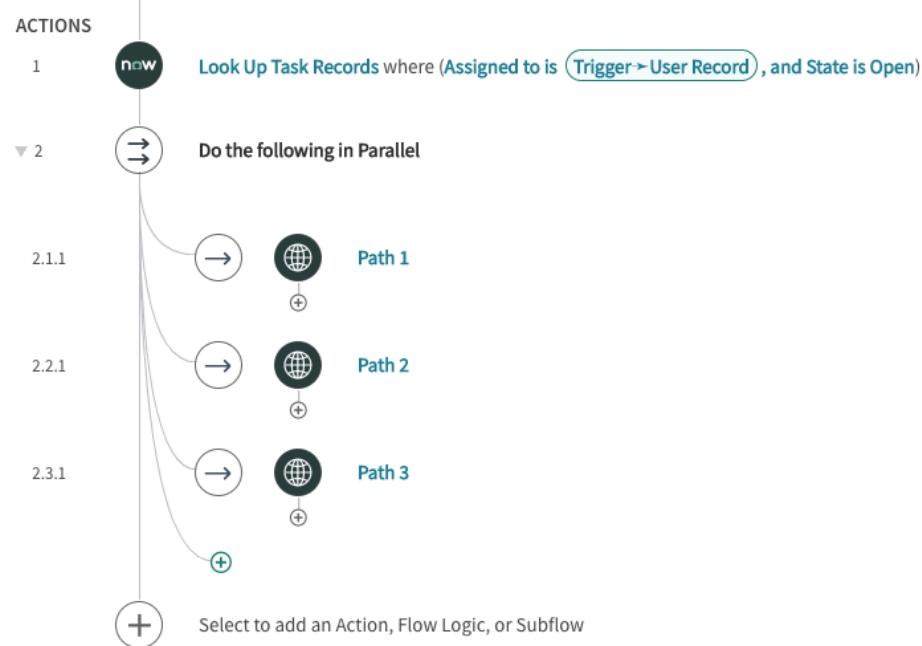
- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
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- [Wait for a duration flow logic](#)

## Do the following in parallel flow logic

Run actions and subflows in separate paths within an isolated flow logic block.

With this flow logic, you can run actions and subflows in separate paths. If any action within the Do the following in parallel flow logic block must wait, other actions run until all paths within the block finish processing.

Paths in a Do the following in parallel flow logic block



**Note:** Paths in a Do the following in parallel flow logic block do not run in multiple threads, since a flow execution context runs in a single thread. However, there may be times when you want to run flows within separate contexts even though this may consume more of your instance's resources. To run subflows in separate flow contexts within the same flow, see [Dynamic flows](#).

### Inputs

Do the following in parallel flow logic does not have field inputs. Instead, it displays a plus (+) icon that enables you to create a path with actions or subflows.

The actions and subflows in each path run until all tasks within the flow logic block have completed.

### Outputs

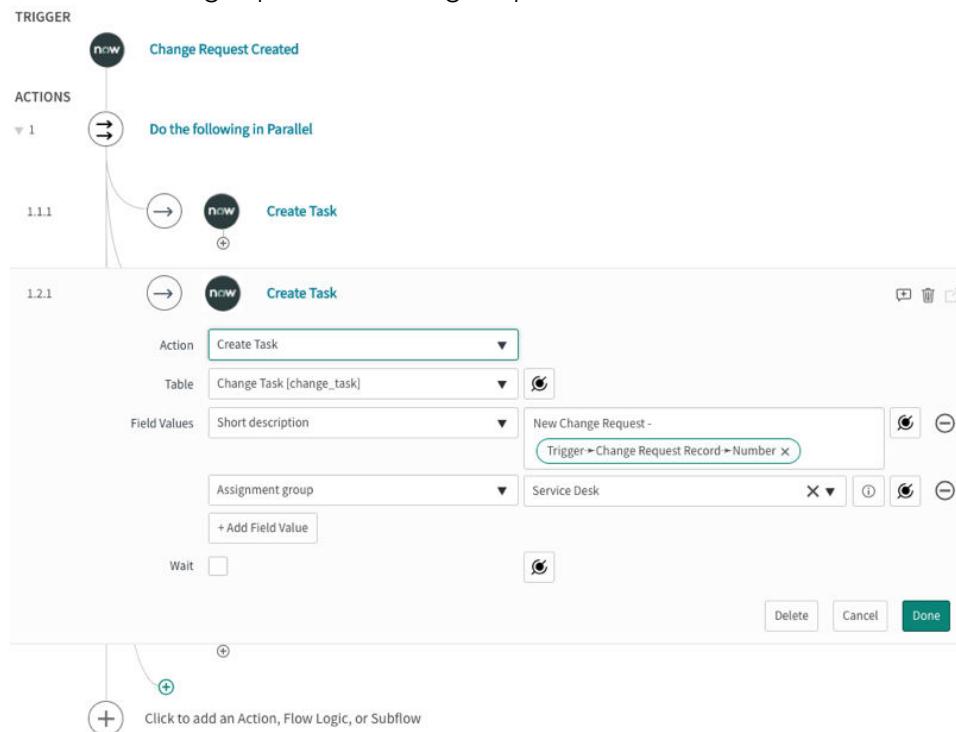
This flow logic has no outputs, but actions and subflows in each path may have outputs. While the flow is running, outputs from a path are only

accessible to other actions in the same path. After the Do the following in parallel flow logic completes, its final outputs are accessible to the rest of the flow.

### Example: Create two tasks in parallel when a change request is created

In this example, a flow triggers when a new change request is created. Using **Do the following in Parallel**, two tasks are created in separate paths and are assigned to different groups. The flow uses the **Number** field data pill from the triggering change request to display the number in the short description for the task record.

#### Do the following in parallel flow logic inputs



### Execution details

Do the following in parallel execution details

| EXECUTION DETAILS   |                              | Test Flow   | Test Run - Completed | Open Flow           | Open Context Record |
|---------------------|------------------------------|-------------|----------------------|---------------------|---------------------|
| Show Action Details | 1                            | State       | Start time           | Runtime             |                     |
| ▼ 1                 | Do the following in Parallel | Flow Logic  | 2018-09-05 15:20:44  | 0ms                 |                     |
| ▼ 1.1.1             | Log                          | Core Action | Completed            | 2018-09-05 15:20:44 | 0ms                 |
| ▼ 1.2.1             | Log                          | Core Action | Completed            | 2018-09-05 15:20:44 | 0ms                 |

1. The header shows the state, start time, and runtime for the flow logic.
2. The Configuration Details section shows the state, start time, and runtime for each path in the flow logic block.

### Design considerations

#### Avoid creating data dependencies between paths

Since a flow can run paths in any order, avoid creating data dependencies between separate paths. For example, do not have one path that creates a record and another path that updates the same record. The update record path may run before the create record path.

#### Do not share data between paths

Flow Designer prevents you from dragging data pills between paths because the system cannot determine which path will finish first to supply the output value.

#### Related concepts

- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Dynamic flows flow logic](#)
- [End Flow flow logic](#)

- For Each flow logic
- If flow logic
- Make a decision flow logic
- Set Flow Variables flow logic
- Try flow logic
- Wait for a duration flow logic

## Dynamic flows flow logic

Identify and run a flow or subflow dynamically by using runtime data. Build templates to provide expected inputs for dynamically called flows or subflows.

The Dynamic Flow flow logic calls a flow or subflow during runtime by using the data that you specify during the flow design. You can use Dynamic Flow to select which flow to run when multiple flows have similar names or purposes.

To use Dynamic Flow, the flow designer does the following:

1. Creates and publishes a flow or subflow to use as a template.
2. Adds Dynamic Flow to a parent flow.
3. Selects the flow template for Dynamic Flow.
4. Enters the flow name for Dynamic Flow.
5. Enters the required inputs specified by the flow template.

### Dynamic flow templates

The template for Dynamic Flow can be a flow or a subflow. The template's inputs must match the inputs of any flow or subflow that you call dynamically. An input matches when it has the same **Label** and **Name** field values in each flow or subflow.

After you build a template, consider copying it to create similarly named and similarly performing flows or subflows. Make sure that you name each flow or subflow with a standard naming convention that can

be generated by Dynamic Flow. For more information on creating a template for Dynamic Flow, see [Getting started with Dynamic Flow](#) and [Get Flow Outputs](#).

## Inputs

The following inputs always appear when you add the Dynamic Flow flow logic to a flow.

| Input                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flow Template</b> | Template whose inputs the dynamic flow copies and displays. The inputs for the template must match the inputs of the subflow that you want to run.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Flow</b>          | Name or Sys ID of the flow or subflow that you want to run. Flow names must be the display name not the flow internal name. For example, enter the name <code>My dynamic flow</code> not <code>my_dynamic_flow</code> . Generate a flow or subflow name dynamically by entering a string and concatenating it with data pill values.<br><br>You can call a flow or subflow that is associated with another application scope by entering a <code>scope-name.flow-name</code> format. The user running the flow or subflow must have access to the application scopes that you specify. If you do not specify an application scope, the dynamic flow runs in the parent flow's scope. |

| Input                      | Description                                                                                                                            |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
|                            | <b>Note:</b> If the system can't find the flow or subflow, it skips the <b>Dynamic Flow</b> flow logic step and logs an error message. |
| <b>Wait for completion</b> | Option to force the parent flow to wait until the dynamic flow finishes running before proceeding with the next action.                |

**Note:** You see more inherited inputs after you select a **Flow Template**.

## Get flow outputs

Dynamic Flow outputs appear in the data panel as Record type data pills that are named as Context. You can use these flow contexts to derive the runtime values for dynamic flow outputs with the Get Flow Outputs flow logic. To use Get Flow Outputs, the flow designer does the following:

1. Adds a Dynamic Flow to a flow.
2. Adds Get Flow Outputs after the dynamic flow.
3. Specifies the value for the **Context** input by clicking the data pill picker () and selecting **Dynamic Flow > Context**.

For more information on using Get Flow Outputs, see [Getting started with Dynamic Flow and Get Flow Outputs](#).

## Design considerations

### Use dynamic flows if you have multiple subflows with similar functionality

Dynamic flows let you compartmentalize your processes by applying a template to handle the inputs of multiple similar subflows. Compartmentalization lets you distinguish between subflows that perform similar functions, such as subflows for [IntegrationHub](#) spokes.

### Ensure dynamically called subflow inputs match template flow inputs

The system throws an error and the main flow can't run properly when the inputs of a dynamic flow and flow template don't match.

### Use the correct context when getting flow outputs

A context record uniquely identifies the flow run. If you run a dynamic flow multiple times, there are multiple context records to choose from. When you use dynamic flow multiple times within a flow, make sure to pick the right context record from the right run each time you get flow outputs.

#### Related concepts

- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [End Flow flow logic](#)
- [For Each flow logic](#)
- [If flow logic](#)
- [Make a decision flow logic](#)
- [Set Flow Variables flow logic](#)
- [Try flow logic](#)
- [Wait for a duration flow logic](#)

## End Flow flow logic

Stop running the current flow. Use End Flow within a branch of the flow to specify an exit condition. For example, end the flow when it reaches a specific If flow logic block.

End Flow logic can be contained within a conditional flow logic block, such as an **If**, **Else If**, or **Else** flow logic block. Use this flow logic to stop

a flow when certain conditions are met. You cannot add actions or flow logic after you use the **End Flow** flow logic. All branches of a flow are ended when a flow reaches the **End Flow** flow logic, including the **Wait for a duration** logic. Any branches that run in parallel also stop their progress when you use the **End Flow** flow logic.

## Inputs

This flow logic has no inputs.

## Execution Details

When a flow ends, the flow state becomes **Complete**.

Related concepts

- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [Dynamic flows flow logic](#)
- [For Each flow logic](#)
- [If flow logic](#)
- [Make a decision flow logic](#)
- [Set Flow Variables flow logic](#)
- [Try flow logic](#)
- [Wait for a duration flow logic](#)

## For Each flow logic

Apply one or more actions to each record in a list of records.

The **For Each** flow logic applies one or more actions to a list of records. The flow applies the actions contained within the flow logic to each record in the list.

**Note:** When you set a data pill value from inside the For each item branch of this flow logic, the data pill value is only available to other actions in the same branch. Referencing a data pill value that was set inside a For each branch from outside of the flow logic branch produces a null value.

Iterating over a large number of records can be resource intensive, especially when the For Each logic block includes complex actions for each iteration. To avoid performance issues, turn off reporting using the com.snc.process\_flow.reporting.level system property. For more information, see [Flow Designer system properties](#).

## Inputs

| Input | Description                                                                                                                                                                                                                                                                                                                                                          |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Items | <p>List or Records data pill specifying the records to process in sequence.</p> <ul style="list-style-type: none"><li>• Array data pill</li><li>• List data pill</li><li>• Records data pill</li></ul> <p>For example, you could use the additional Assignee list for an incident record. For information on data pills, see <a href="#">Flow Designer data</a>.</p> |

## Outputs

| Output              | Description                 |
|---------------------|-----------------------------|
| [Table name] Record | Current record in the loop. |

**Note:**

To optimize performance, avoid iterating over lists with more than 1000 records. To iterate over lists with more than 1000 records, divide the list into smaller sections and use multiple flows.

You can nest a **For Each** flow logic block inside of another flow logic block to repeat an action over a series of records. However, avoid nested For Each loops that process many records. Nested loops may cause the flow to run until it is stopped by the flow transaction quota rule, which prevents flows from running longer than an hour. For more information about transaction quotas, see [Transaction quotas](#).

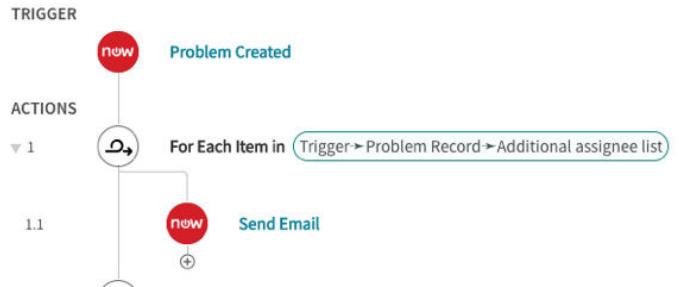
By default, when viewing a flow's execution details, the last 50 iterations for a For Each flow logic's actions appear in the step details. To view more action iterations for a For Each flow logic in the execution details, change the value of the following property at **Process Automation > Flow Administration > Properties**: Number of recent iterations to report for Do Until and For Each loops. For example, if we have 100 iterations and the number is 5, we would report iterations 96-100. If the number is -1 we report all iterations. If the number is 0 we report 1 iteration.

**Example: Send an email to each person assigned to a problem**

This sample flow starts when a problem record is created. The flow uses **For Each** flow logic to send an email to each additional assignee listed in the trigger record. The **Additional Assignee** field of the triggering problem record contains the list of records you want to process.

When the loop is created, a new entry appears in the data panel on the right called **1 - For Each**. In that entry, you see an **Additional assignee list Record** data pill that contains the user information for the users in that field.

### Inputs used in for each flow logic



| Data                              |           |
|-----------------------------------|-----------|
| ▼ Trigger - Record Created        |           |
| ▶ Problem Record                  | Record    |
| ▶ Problem Table                   | Table     |
| ▶ Run Start Time                  | Date/Time |
| ▼ 1 - For Each                    |           |
| ▶ Additional assignee list Record | Record    |

The plus icon (⊕) below this email action is used to add additional actions, such as logging, to the loop.

### Execution details

#### Execution details for a flow

|             |                                                         | State                                                                                                                                                            | Start time                | Runtime                   |
|-------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------|
| 1           | For Each Item in Trigger > Incident Record > Watch list | 1 of 4 2 1                                                                                                                                                       | Flow Logic   Completed    | 2018-08-03 13:21:13 333ms |
| 3           | Configuration Details                                   | VARIABLE NAME items TYPE Records CONFIGURATION Trigger > Incident Record > Watch list RUNTIME VALUE                                                              |                           |                           |
| No Logs     |                                                         |                                                                                                                                                                  |                           |                           |
| 1.1         | now Send Email 1.0s                                     | Core Action   Completed                                                                                                                                          | 2018-08-03 13:21:13 239ms |                           |
| 4           | Configuration Details                                   | VARIABLE NAME To CC BCC Subject Body TYPE String String String String HTML CONFIGURATION 1 > Watch list Record > Email RUNTIME VALUE adela.cervantsz@example.com |                           |                           |
| Output Data |                                                         |                                                                                                                                                                  |                           |                           |
|             | VARIABLE NAME email                                     | TYPE Reference CONFIGURATION step > Email step > Email RUNTIME VALUE d2f4a684db7b5300efc65404ce96197f                                                            |                           |                           |
| No Logs     |                                                         |                                                                                                                                                                  |                           |                           |

The flow execution details tab provides runtime information on the flow logic.

1. The header shows the state, start time, and runtime for the flow logic.
2. This flow logic can run actions or subflows multiple times. Use the arrow keys to cycle through each of these instances to see their values.
3. The **Configuration Details** section shows which records the flow has evaluated.

- 
4. After the **For Each** section are the actions taken within it. The values for these actions change as you cycle through the actions that are taken by this flow logic.

#### Related concepts

- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [Dynamic flows flow logic](#)
- [End Flow flow logic](#)
- [If flow logic](#)
- [Make a decision flow logic](#)
- [Set Flow Variables flow logic](#)
- [Try flow logic](#)
- [Wait for a duration flow logic](#)

## If flow logic

Selectively apply one or more actions only when a list of conditions is met.

Use this flow logic by specifying conditions that are based on the current record. Actions or subflows can be added to the flow within the if flow logic. The flow only applies the actions within this flow logic if the conditions evaluate to true. Conditions are based on data in records, such as a records state or urgency.

**Note:** When you set a data pill value from inside the Then branch of this flow logic, the data pill value is only available to other actions in the same branch. Referencing a data pill value that was set inside a Then branch from outside of the flow logic branch produces a null value.

## Inputs

| Input           | Description                             |
|-----------------|-----------------------------------------|
| Condition label | Descriptive label for the branch.       |
| Condition       | Conditions under which the branch runs. |

### Example: Perform an action on if an incident has a high urgency

In this example, the action is triggered when the incident record has a high urgency value.

The screenshot shows the configuration of a flow logic step. The step is labeled "If Urgent then". The condition label is set to "Urgent". The condition itself is "Trigger > Incident Record > Urgency is 1 - High". There are buttons for "Delete", "Cancel", and "Done".

## Execution details

### Execution details for if flow logic

The screenshot shows the execution details for the flow logic step. The state is "Flow Logic, Evaluated - True", the start time is "2018-08-03 11:30:55", and the runtime is "489ms". The configuration details section shows a variable "condition\_name" with type "String", configuration "Urgent", and runtime value "Trigger > Incident Record > Urgency =1". A note at the bottom says "No Logs".

1. The header shows the state, start time, and runtime for the flow logic.
2. The Configuration Details section shows the details about the variables that are used by the flow, including the type, configuration, and runtime values for each variable. Use the condition variable to see if the branch conditions were met.

### Related concepts

- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [Dynamic flows flow logic](#)
- [End Flow flow logic](#)
- [For Each flow logic](#)
- [Make a decision flow logic](#)
- [Set Flow Variables flow logic](#)
- [Try flow logic](#)
- [Wait for a duration flow logic](#)

## Make a decision flow logic

You can use the decision table branching logic in situations where multiple conditional paths are required, as an alternative to nested If, Else If, or Else flow logic. For example, if you want to determine what kind of car insurance you need, you can add inputs such as your age, accident history, and car model to the decision table to determine a level of insurance coverage. This logic can save you time and present a more readable format than nested if conditions or switch case statements.

The **Make a decision** flow logic requires that you create an external decision table for its branch paths. Each decision table answer produces a separate branch path within Flow Designer. Decision tables accept any number of inputs and support any number of decisions. You can configure the Make a decision flow logic to return a single or multiple answers and to display the answers as branch paths or record data pills. For more information on decision tables, see [Decision Tables](#).

**Note:**

- When the **Use Branches** check box is cleared, the Make a decision data pills in other flow components is supported only if there are no branches.
- The Make a decision data pill can be used in the answer branches only when the **Use Branches** check box is selected.
- When you set a data pill value from inside an answer branch of this flow logic, the data pill value is only available to other actions in the same branch. Referencing a data pill value that was set inside an answer branch from outside of the flow logic branch produces a null value.

**Inputs**

| Input          | Description                                                                                                                                                                                                                                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Decision Label | Descriptive label for the decision that you want to make. For example, you can create the Recommended Insurance Policy label if you want to determine the level of insurance coverage that you need. This value overrides the default action label.                                            |
| Decision Table | Reference to a Decision Table [sys_decision] record. This record provides the decision input answers that are available to the flow. To create a new decision table, click the create new record icon (  ). |

| Input     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           | <p><b>Note:</b> If you have Decision Designer installed, clicking the create new record icon (+) opens Decision Designer in a new browser tab. For more information, see <a href="#">Decision Builder</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Execution | <p>Decision answers you want the flow to run.</p> <ul style="list-style-type: none"> <li>• <b>First decision that matches:</b> Run only the first matching decision answer. This option produces these outputs.                     <ul style="list-style-type: none"> <li>• Answer record</li> <li>• Answer table</li> </ul> </li> <li>• <b>Run all decisions that match:</b> Run all matching decision answers. This option produces these outputs.                     <ul style="list-style-type: none"> <li>• Answer table</li> <li>• Ordered IDs</li> <li>• Answer records</li> <li>• Count</li> </ul> </li> </ul> <p><b>Note:</b> Set the <b>Use Branches</b> option to specify how Flow Designer displays matching decision answers.</p> |

| Input             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use Branches      | <p>Option to display each possible decision answer in its own branch flow logic block. Use the branch flow logic block to specify what Flow Designer content to run where the condition matches a specific decision table answer. Each branch flow logic block is equivalent to an If flow logic block for each answer.</p> <p>Disable branches when you want to return one or more answer records instead of branch flow logic blocks.</p> <p><b>Warning:</b> When you clear and confirm the <b>Use Branches</b> option, Flow Designer removes the flow logic blocks for each branch and removes the <b>Include Otherwise</b> check box. Reselecting the <b>Use Branches</b> check box does not restore any removed branch flow logic blocks.</p> |
| Include Otherwise | <p>Option to add the <b>otherwise</b> branch to the list of available answers. This option is only available when <b>Use Branches</b> is selected. You can use this branch to specify the actions and subflows to run when the decision table does not generate an answer. An Otherwise branch is equivalent to an Else flow logic block.</p>                                                                                                                                                                                                                                                                                                                                                                                                      |

| Input                 | Description                                                                                                                                                                                                                                                                    |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | <b>Note:</b> If you specify a decision table default answer, this branch will never run because the decision table always selects an answer.                                                                                                                                   |
| Decision table inputs | List of Decision Input [sys_decision_input] records that are associated with your decision table. Flow Designer displays a separate input for each record. For example, if you have decision inputs for Units Ordered and Location of Sale, an input displays for each record. |

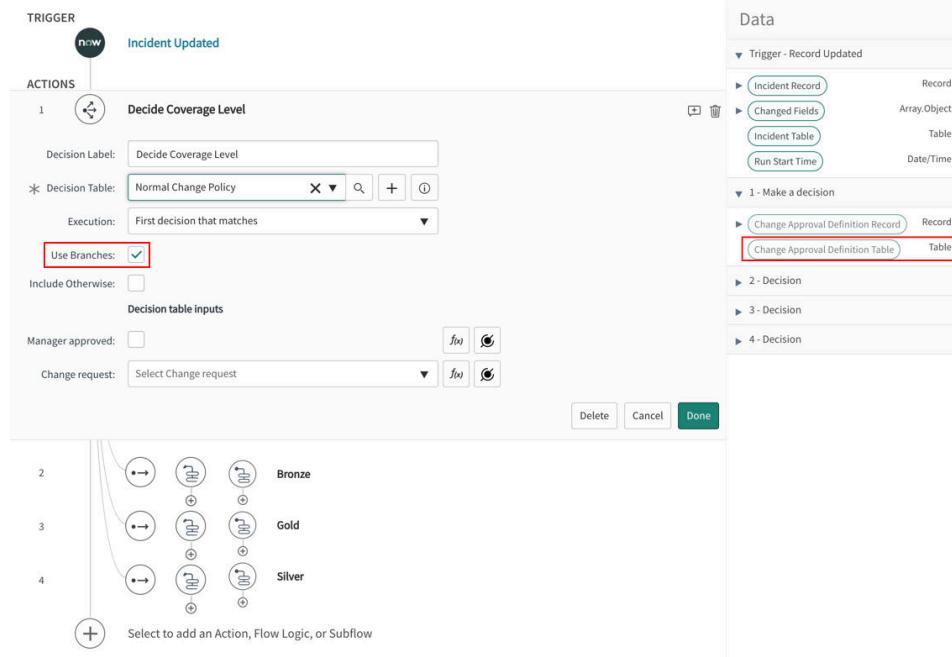
## Outputs

| Field        | Description                                                                                                                                                                                                                          | Data Type  |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Answer table | Table containing the answer records. Each Decision [sys_decision_question] table record refers to a matching answer record.                                                                                                          | Table Name |
| Ordered IDs  | List of matching answer record sys_id values generated by the decision table. Flow Designer only generates this output when the <b>Use Branches</b> option is false and the <b>Execution</b> option is <b>Run all decisions that</b> | List       |

| Field          | Description                                                                                                                                                                                                          | Data Type         |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|                | <b>match.</b> You can use this output as the input for a For Each flow logic block or a Look Up Record action. Flow Designer sorts the list by the Order value listed in the Decision [sys_decision_question] table. |                   |
| Answer records | Answer records returned by the decision table. Returns a single record when <b>Execution is First decision that matches.</b> Returns a list of records when Execution is <b>Run all decisions that match.</b>        | Record or Records |
| Count          | The number of answer records returned by the decision table. Only displayed when Execution is <b>Run all decisions that match.</b>                                                                                   | Integer           |

### Example: Use make a decision flow logic to determine insurance coverage

In this example, the flow uses a decision from the **Insurance Coverage** decision table, which an administrator had configured to determine the insurance coverage that was based on three inputs. The flow displays all the inputs that were used by the decision table in Flow Designer. These inputs can be entered manually, or by dragging data pills into the inputs from the data panel on the right side of the screen. Below this section, the branches for each answer are shown in the decision table.



## Execution details

### Make a decision flow execution details

| Hide Action Details                                                                                         |                                    | State                                | Start time                         | ⋮      |
|-------------------------------------------------------------------------------------------------------------|------------------------------------|--------------------------------------|------------------------------------|--------|
| FLOW STATISTICS                                                                                             | Executed as: System Open Flow Logs | Completed                            | 2018-10-03 14:42:43                | 1657ms |
| TRIGGER                                                                                                     |                                    |                                      |                                    |        |
|  Incident Updated          | Open Current Record                |                                      |                                    |        |
| ACTIONS                                                                                                     |                                    |                                      |                                    |        |
| ▼ 1  Decide Coverage Level | Flow Logic                         | Completed                            | 2018-10-03 14:42:43                | 1647ms |
| Decision Table Configuration                                                                                |                                    |                                      |                                    |        |
| VARIABLE NAME                                                                                               | TYPE                               | CONFIGURATION                        | RUNTIME VALUE                      |        |
| decision_table                                                                                              | Reference                          | 76bb78b3db30a300efc65404ce9619a6 Ⓜ   |                                    |        |
| execution                                                                                                   | Choice                             | first_match                          | first_match                        |        |
| answer_table                                                                                                | Table Name                         | decision_answer                      |                                    |        |
| include_otherwise                                                                                           | True/False                         | false                                | false                              |        |
| Decision Table Input                                                                                        |                                    |                                      |                                    |        |
| VARIABLE NAME                                                                                               | TYPE                               | CONFIGURATION                        | RUNTIME VALUE                      |        |
| Accidents in last 5 years                                                                                   | True/False                         | false                                | false                              |        |
| Car Model Year                                                                                              | Integer                            | 2017                                 | 2017                               |        |
| Driver Age                                                                                                  | Integer                            | 40                                   | 40                                 |        |
| No Logs                                                                                                     |                                    |                                      |                                    |        |
| ▼ 1.1  Gold Coverage     | Flow Logic                         | Evaluated - True                     | 2018-10-03 14:42:43                | 1551ms |
| Decision Table Output                                                                                       |                                    |                                      |                                    |        |
| VARIABLE NAME                                                                                               | TYPE                               | CONFIGURATION                        | RUNTIME VALUE                      |        |
| answer                                                                                                      | Document ID                        | ff8c34f3db30a300efc65404ce9619d2 Ⓜ   |                                    |        |
| No Logs                                                                                                     |                                    |                                      |                                    |        |
| 1.1.1  Update Record     | Core Action                        | Completed                            | 2018-10-03 14:42:43                | 1546ms |
| Configuration Details                                                                                       |                                    |                                      |                                    |        |
| VARIABLE NAME                                                                                               | TYPE                               | CONFIGURATION                        | RUNTIME VALUE                      |        |
| Record                                                                                                      | Document ID                        | Trigger -> Incident Record           | INC0000059 Ⓜ                       |        |
| Table                                                                                                       | Table Name                         | incident                             | incident                           |        |
| Fields                                                                                                      | Template Value                     | work_notes=Recommend Gold Coverage   | work_notes=Recommend Gold Coverage |        |
| Output Data                                                                                                 |                                    |                                      |                                    |        |
| VARIABLE NAME                                                                                               | TYPE                               | CONFIGURATION                        | RUNTIME VALUE                      |        |
| Record                                                                                                      | Document ID                        | step -> Update Record step -> Record | INC0000059 Ⓜ                       |        |
| table_name                                                                                                  | Table Name                         |                                      |                                    |        |
| No Logs                                                                                                     |                                    |                                      |                                    |        |
| ▼ 1.2  Bronze Coverage   | Flow Logic                         | Evaluated - False                    | 2018-10-03 14:42:43                | 0ms    |
| 1.2.1  Update Record     | Core Action                        | Not Run                              |                                    | 0ms    |
| ▼ 1.3  Silver Coverage   | Flow Logic                         | Evaluated - False                    | 2018-10-03 14:42:43                | 1ms    |
| 1.3.1  Update Record     | Core Action                        | Not Run                              |                                    | 0ms    |

2 Ⓜ

The **Flow execution details** tab provides runtime information about the flow logic.

1. The header shows the state, start time, and runtime for the flow logic.
2. The action shows details about the decision table configuration and inputs.
3. Each possible answer for the decision table is represented as a branch. The state field indicates whether the branch was evaluated and the evaluation result. This section also displays details about the actions that are taken within a branch. Branches that evaluate to true are highlighted in green.

#### Related concepts

- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [Dynamic flows flow logic](#)
- [End Flow flow logic](#)
- [For Each flow logic](#)
- [If flow logic](#)
- [Set Flow Variables flow logic](#)
- [Try flow logic](#)
- [Wait for a duration flow logic](#)

## Set Flow Variables flow logic

Assign a value to one or more flow variables. Change or update a variable's value during a flow.

**Important:** This flow logic sets values for flow variables that have already been created. For instructions on creating flow variables, see [Create a flow variable](#).

## Inputs

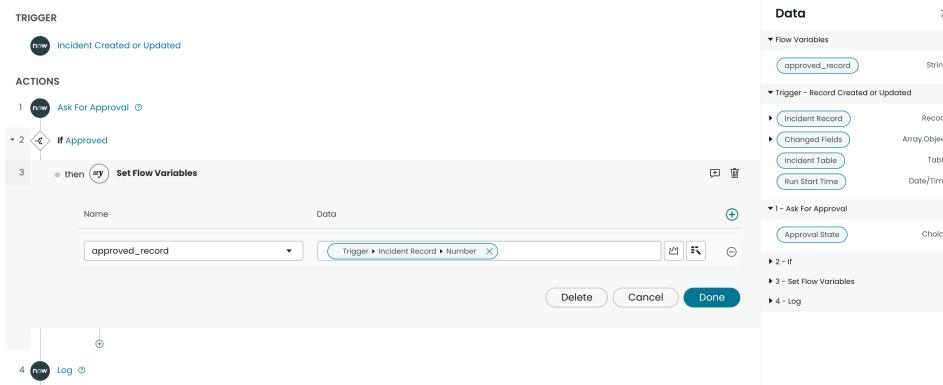
| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name  | Name of the variable. Select from the list of variables available for the flow.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Data  | <p>Value for the variable. Enter a string value, input a script, or use a data pill. Variable values can reference any data pill from earlier in the flow, including other variables. If you set variable values by reference to other data pills, you must maintain the order of the variable assignments. The referenced value must always come before the variable that uses the referenced value. Changing the order may produce null values. To assign an empty value, leave this field empty.</p> <p><b>Note:</b> Flow variable values are set in the order in which they are assigned from top to bottom. If you set the value of the same variable multiple times, the flow only uses the last value set.</p> |

## Outputs

This flow logic produces no outputs.

## Example: Use Set flow variables flow logic to store a record number

In this example, the flow asks for approval for an incident record. If the record is approved, a flow variable is used to store the approved record number.



## Execution details

### Set flow variables flow logic execution details

| FLOW STATISTICS              |                             | Run as: System Administrator | Open Flow Logs | Completed                          | 2020-11-09 14:10:26                | 47ms                |
|------------------------------|-----------------------------|------------------------------|----------------|------------------------------------|------------------------------------|---------------------|
| <b>TRIGGER</b>               |                             |                              |                |                                    |                                    |                     |
|                              | Incident Created or Updated |                              |                | Open Current Record                |                                    |                     |
| <b>ACTIONS</b>               |                             |                              |                |                                    |                                    |                     |
| 1                            | Ask For Approval            |                              |                | Core Action                        | Completed                          | 2020-11-09 14:10:26 |
| 2                            | If Approved                 |                              |                | Flow Logic                         | Evaluated - True                   | 2020-11-09 14:10:26 |
| 3                            | Set Flow Variables          |                              |                | Flow Logic                         | Completed                          | 2020-11-09 14:10:26 |
| <b>Configuration Details</b> |                             |                              |                |                                    |                                    |                     |
| VARIABLE NAME                | approved_record             | TYPE                         | String         | CONFIGURATION                      | Trigger > Incident Record > Number | RUNTIME VALUE       |
|                              |                             |                              |                |                                    |                                    | INC00000059         |
| <b>No Logs</b>               |                             |                              |                |                                    |                                    |                     |
| 4                            | Log                         |                              |                | Core Action                        | Completed                          | 2020-11-09 14:10:26 |
| <b>Configuration Details</b> |                             |                              |                |                                    |                                    |                     |
| VARIABLE NAME                |                             | TYPE                         |                | CONFIGURATION                      |                                    | RUNTIME VALUE       |
| Level                        | Choice                      | String                       |                | info                               |                                    | info                |
| Message                      |                             |                              |                | (Flow Variables > approved_record) |                                    | INC00000059         |

1. The header shows how the flow was run, the state, the start time, and the runtime.
2. The Configuration Details section shows the variables that were assigned values with the flow logic. It displays the variable name, type, configuration, and runtime value for each flow variable.

- 
3. Actions that use a flow variable display the variable's type, configuration, and runtime value.

#### Related concepts

- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [Dynamic flows flow logic](#)
- [End Flow flow logic](#)
- [For Each flow logic](#)
- [If flow logic](#)
- [Make a decision flow logic](#)
- [Try flow logic](#)
- [Wait for a duration flow logic](#)

## Try flow logic

Allow a flow to continue running when an error occurs within a flow logic block. Run a sequence of actions in response to errors within the flow logic block.

### Inputs

Try flow logic does not have field inputs. Instead, it displays a plus (+) icon that enables you to add a sequence of actions, flow logic, or subflows to attempt to run and evaluate for errors. When an error occurs, the flow runs the sequence of actions, flow logic, or subflows within the error section of the flow logic block.

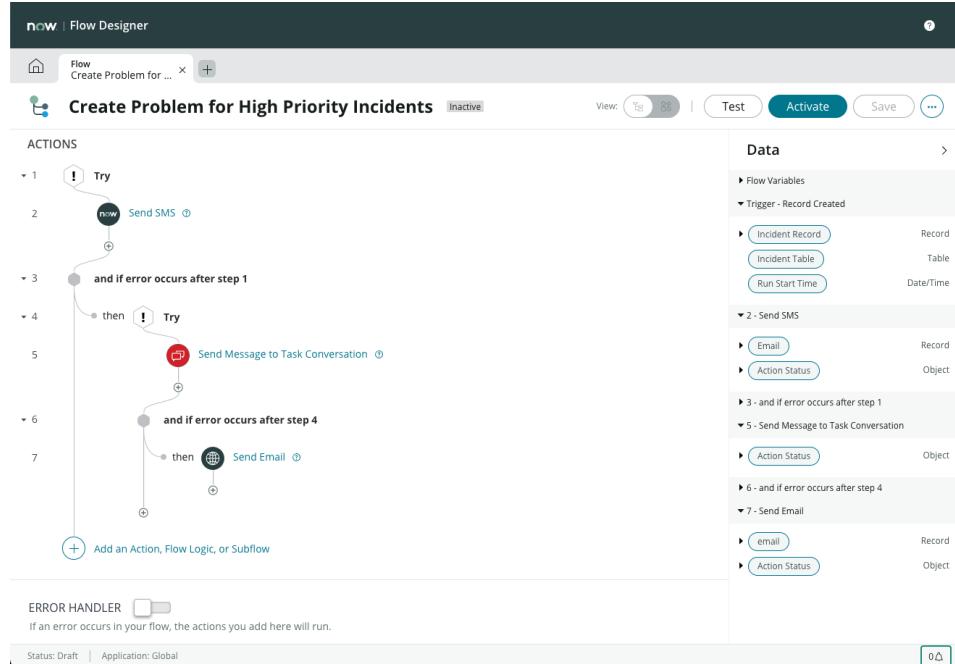
## Outputs

This flow logic has no outputs, but the actions, flow logic, and subflows within the Try block may have outputs. When an error occurs within the Try flow logic block, the failing action returns an action status of **Completed (error caught)**.

### Example: Create a Problem record for critical priority incidents

In this example, the flow attempts to send one of three possible notifications when a critical priority network incident is created. The flow first tries to send an SMS message, and if that fails, it tries to send a Connect message. If the Connect message fails, it sends an email.

#### Try flow logic for multiple notification methods



## Execution details

### Try flow logic execution details

now Flow Designer

Flow Create Problem for ... Operation Create Problem for ... +

EXECUTION DETAILS Create Problem for High Priority Incidents Test Run - Completed (error caught) Open Flow Open Context Record

Show Action Details State Start time ⓘ

FLOW STATISTICS Run as: System Administrator Open Flow Logs State Completed (error caught) Start time 2021-10-21 13:30:32 Duration 412ms

TRIGGER Incident Created Open Current Record ⓘ

ACTIONS

| Step | Action                            | Type        | Status                   | Start Time          | Duration |
|------|-----------------------------------|-------------|--------------------------|---------------------|----------|
| 1    | Try                               | Flow Logic  | Completed                | 2021-10-21 13:30:32 | 14ms     |
| 2    | Send SMS                          | Core Action | Completed (error caught) | 2021-10-21 13:30:32 | 14ms     |
| 3    | and if error occurs after step 1  | Flow Logic  | Completed                | 2021-10-21 13:30:32 | 377ms    |
| 4    | Try                               | Flow Logic  | Completed                | 2021-10-21 13:30:32 | 376ms    |
| 5    | Send Message to Task Conversation | Core Action | Completed                | 2021-10-21 13:30:32 | 376ms    |
| 6    | and if error occurs after step 4  | Flow Logic  | Not Run                  |                     | 0ms      |
| 7    | Send Email                        | Core Action | Not Run                  |                     | 0ms      |

ERROR HANDLER

### Related concepts

- Assign subflow outputs flow logic
- Call a workflow flow logic
- Do the following until flow logic
- Do the following in parallel flow logic
- Dynamic flows flow logic
- End Flow flow logic
- For Each flow logic
- If flow logic
- Make a decision flow logic

- Set Flow Variables flow logic
- Wait for a duration flow logic

## Wait for a duration flow logic

Use this flow logic to give your users time to act during automated processes or to wait for a specific date and time to complete actions.

### Inputs

| Input         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Duration Type | <ul style="list-style-type: none"><li>• <b>Explicit Duration:</b> Wait for a specific time period, such as 5 minutes.</li><li>• <b>Relative Duration:</b> Wait for a specific time period from a selected Duration data pill or date/time value, such as 5 minutes after the flow start.</li><li>• <b>Percentage Duration:</b> Type to specify a certain percentage of time duration between the start of the flow logic and specified end time.<br/><b>Note:</b> The percentage value must be from <b>0</b> through <b>100</b> only.</li></ul> |
| Wait for      | Set this value manually or select a Duration data pill from the data pill picker (  ). For example, use a Look Up Record action to select an SLA Definition record and return the value of the <b>Duration</b> field.                                                                                                                                                                                                                                        |

| Input                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               | <ul style="list-style-type: none"> <li>• <b>Explicit Duration:</b> Wait duration in hours, minutes, and seconds.</li> <li>• <b>Relative Duration:</b> Wait duration in hours, minutes, and seconds before or after a specific time. Select <b>Relative Duration</b> to specify a wait duration from a specific date.                     <p><b>Note:</b> Past dates don't affect the wait duration.</p> <p>You can enter a wait value of up to 999 hours.</p> <p><b>Note:</b> The actual wait duration can vary due to the instance processing time. The flow always waits for the time that you specify for this field, but other work in the queue may add to the wait time.</p> </li> </ul> |
| Wait for Percentage           | Wait duration as a percentage of the time period between the start of flow logic and specified end time. If you select a past date for the end time, the wait duration is set to <b>0</b> . This field appears when <b>Percentage Duration</b> is selected from the Duration Type list.                                                                                                                                                                                                                                                                                                                                                                                                        |
| During the following schedule | Select the schedule used to calculate the <b>Scheduled End date/time</b> value from the selected wait duration. For example, waiting for a 10-hour duration as part of an 8-5 weekdays schedule causes the flow to wait for one or more business days. If you leave this                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Input | Description                                                                                                                    |
|-------|--------------------------------------------------------------------------------------------------------------------------------|
|       | field blank, the timer runs without a schedule. For information on creating schedules, see <a href="#">Define a schedule</a> . |

## Outputs

| Output    | Description                                                                                         |
|-----------|-----------------------------------------------------------------------------------------------------|
| Duration  | Total time that the flow ran in milliseconds. You can drag this data pill into the duration fields. |
| Date/time | Date/time that the flow completed. You can drag this data pill into the date/time fields.           |

### Example: Close an incident if it has been in the resolved state for 10 days

In this example, a flow starts when the incident state changes to Resolved.

#### Flow trigger

TRIGGER

now Incident Updated

Trigger Updated

\* Table Incident [incident]

Condition All of these conditions must be met

Incident state changes to Resolved OR AND

Run Trigger Once

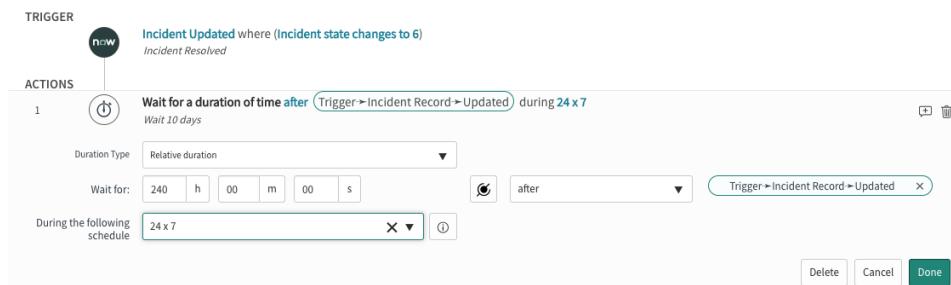
Advanced Options

Delete Cancel Done

## Example: Wait 10 days after the last update to a record

In this example, the flows waits for 10 days after the incident record has been resolved.

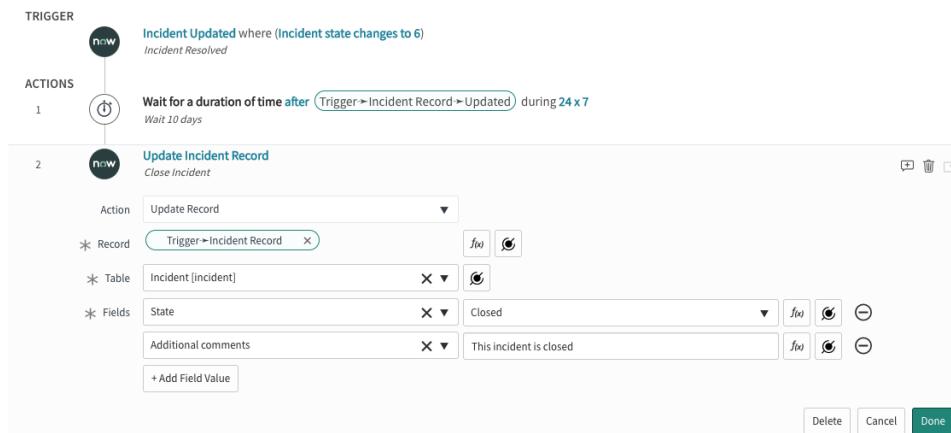
### Wait for Duration flow logic



## Example: Update a record after 10 days

In this example, the flows closes the incident record 10 days after it was resolved.

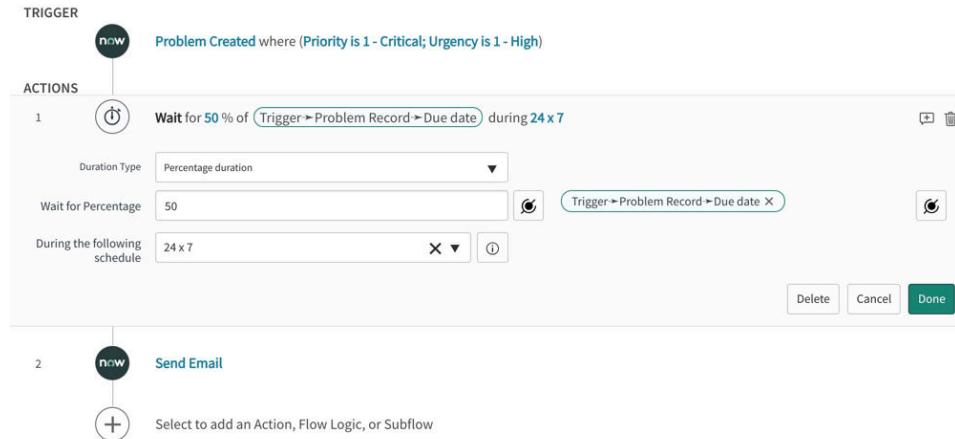
### Action used to close the incident



## Example: Wait for a duration of 50% of the time between the start of the flow logic and the due date

In this example, the flows send a notification email to the relevant manager when a critical problem is created and 50% of the time between the problem record creation and the problem due date has lapsed.

### Wait for percentage time duration flow logic



### Relative Duration type

When the duration type is **Relative Duration**, the flow logic first evaluates the relative date and time, the schedule, and finally, the duration. Schedules, dates, and times set in the past don't affect the wait duration. This table provides examples of how the flow processes the wait duration in these scenarios.

| Duration Setting | Relative Date/Time | Schedule    | Effect                                                         |
|------------------|--------------------|-------------|----------------------------------------------------------------|
| Set to 0.        | None               | None        | Duration ends immediately.                                     |
| Greater than 0.  | Past date          | None        | Duration ends immediately.                                     |
| Greater than 0.  | Future date        | None        | Flow waits for the date/time, and then waits for the duration. |
| Greater than 0.  | Past date          | Future date | Flow waits for schedule, and then waits for the duration.      |

| Duration Setting | Relative Date/Time | Schedule    | Effect                                                                            |
|------------------|--------------------|-------------|-----------------------------------------------------------------------------------|
| Greater than 0.  | Future date        | Past date   | Flow waits for the date/time, and then waits for the duration.                    |
| Greater than 0.  | Future date        | Future date | Flow waits for the future date, then for the schedule, and then for the duration. |

The timer waits for the next instance of a selected schedule. For example, if you set a schedule for Monday through Friday from 8 a.m. to 5 p.m., and the timer is initiated on Saturday, the timer waits until Monday at 8 a.m. before starting.

## Execution details

### Execution details for Wait for a duration flow logic

| Hide Action Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1 State     | Start time                         | ①                                  |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------|------------------------------------|---------------|------|---------------|-------------------------|---------------|---------------------|-------------------|-------------------|------------|----------|------------------------------------|------------------------------------|-------------------------------|-----------|--|--|
| Timer was scheduled to end on Tuesday, August 14, 2018, 13:50:26 PDT                                                                                                                                                                                                                                                                                                                                                                                                                           | Flow Logic  | Completed                          | 2018-08-14 13:50:06 0ms            |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| <b>Configuration Details</b> <table border="1"> <tr> <td>VARIABLE NAME</td> <td>TYPE</td> <td>CONFIGURATION</td> <td>RUNTIME VALUE</td> </tr> <tr> <td>Duration Type</td> <td>Choice</td> <td>explicit_duration</td> <td>explicit_duration</td> </tr> <tr> <td>Duration</td> <td>Duration</td> <td>0 hour(s) 0 minute(s) 20 second(s)</td> <td>0 hour(s) 0 minute(s) 20 second(s)</td> </tr> <tr> <td>During the following schedule</td> <td>Reference</td> <td></td> <td></td> </tr> </table> |             |                                    |                                    | VARIABLE NAME | TYPE | CONFIGURATION | RUNTIME VALUE           | Duration Type | Choice              | explicit_duration | explicit_duration | Duration   | Duration | 0 hour(s) 0 minute(s) 20 second(s) | 0 hour(s) 0 minute(s) 20 second(s) | During the following schedule | Reference |  |  |
| VARIABLE NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | TYPE        | CONFIGURATION                      | RUNTIME VALUE                      |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| Duration Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Choice      | explicit_duration                  | explicit_duration                  |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| Duration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Duration    | 0 hour(s) 0 minute(s) 20 second(s) | 0 hour(s) 0 minute(s) 20 second(s) |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| During the following schedule                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Reference   |                                    |                                    |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| <b>Output Data</b> <table border="1"> <tr> <td>VARIABLE NAME</td> <td>TYPE</td> <td>RUNTIME VALUE</td> </tr> <tr> <td>Scheduled End date/time</td> <td>Date/Time</td> <td>2018-08-14 13:50:26</td> </tr> <tr> <td>Total Duration</td> <td>Duration</td> <td>20 Seconds</td> </tr> </table>                                                                                                                                                                                                     |             |                                    |                                    | VARIABLE NAME | TYPE | RUNTIME VALUE | Scheduled End date/time | Date/Time     | 2018-08-14 13:50:26 | Total Duration    | Duration          | 20 Seconds |          |                                    |                                    |                               |           |  |  |
| VARIABLE NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | TYPE        | RUNTIME VALUE                      |                                    |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| Scheduled End date/time                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Date/Time   | 2018-08-14 13:50:26                |                                    |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| Total Duration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Duration    | 20 Seconds                         |                                    |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| <b>No Logs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                    |                                    |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |
| 2  now Update Record                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Core Action | Completed                          | 2018-08-14 13:50:36 2855ms         |               |      |               |                         |               |                     |                   |                   |            |          |                                    |                                    |                               |           |  |  |

1. The header shows the state, start time, and runtime for the flow logic.

**Note:** The runtime value in the header only includes the time that it takes to execute the flow logic and doesn't include the wait duration that is specified in the flow.

- 
2. The Configuration Details section shows details about the variables that are used by the flow, including the type, configuration, and runtime values for each variable.

#### Related concepts

- [Assign subflow outputs flow logic](#)
- [Call a workflow flow logic](#)
- [Do the following until flow logic](#)
- [Do the following in parallel flow logic](#)
- [Dynamic flows flow logic](#)
- [End Flow flow logic](#)
- [For Each flow logic](#)
- [If flow logic](#)
- [Make a decision flow logic](#)
- [Set Flow Variables flow logic](#)
- [Try flow logic](#)

## Flow Designer input and output data variables

Actions and subflows use variables to store input and output data. The variable data type determines what kind of data it stores and its advanced configuration options.

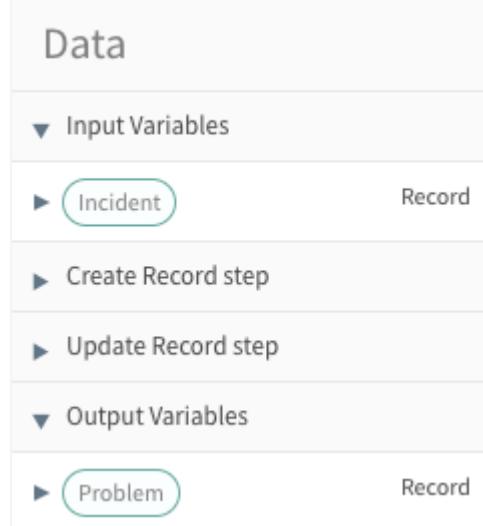
### **Data variables available in Action Designer**

The Action Designer UI displays action inputs as data pills in the Input Variables section of the Data pane. Action outputs are listed as data pills in the Output Variables section of the Data pane.

Action Designer does not display step input variables in the data pane. The output variables produced by each step are available in the data pane as part of the step that created them. For more information on

using input and output variables to create a custom action, see [Building custom actions](#).

Sample Action Designer data panel



Each data pill consists of a label and a data type description. For example, the Incident input variable uses the Record data type to store an incident Sys ID. The Problem output variable uses the Record data type to store a problem Sys ID. You can expand data pills to see the contents and hierarchy of any child elements.

### Data variables available in Flow Designer

The Flow Designer UI displays the flow trigger as a data pill in the data pane, and displays subflow inputs as data pills in the Subflow Inputs section of the Data pane. Subflow outputs are listed as data pills in the Subflow Outputs section of the Data pane.

Flow Designer does not display action input variables in the data pane. The output variables produced by each action are available in the data pane as part of the action that created them. For more information on using input and output variables to create a flow, see [Building flows](#).

### Supported variable data types

Flow Designer supports variable data types to store Now Platform record data and complex data. Variables that store record data must have

a data type matching the Now Platform [field type](#) of the source data. Variables for [complex data](#) must match the type of complex data stored, either an array or an object.

- [Approval rules data type](#)

Store the conditions for approving or rejecting an approval requests.

- [Array.Boolean data type](#)

Store a sequence of true or false values in an array.

- [Array.Choice data type](#)

Store a sequence of choice list values in an array.

- [Array.Datetime data type](#)

Store a sequence of date-time values in an array.

- [Array.Integer data type](#)

Store a sequence of numeric integer data in an array.

- [Array.Object data type](#)

Store a sequence of JavaScript objects in an array.

- [Array.String data type](#)

Store a sequence of alphanumeric text values in an array.

- [Choice data](#)

Store choice list values for a specific choice field.

- [Conditions data type](#)

Store a set of conditions for a specific type of record. You must select a source table to define the conditions.

- [Datetime data type](#)

Store date-time values.

- [Integer data type](#)

Store numeric integer data.

- [List.\[Table\] data type](#)

Stores a list of record Sys IDs associated to a specific table. This variable is intended to store the contents of a Now Platform List field.

- [Object data type](#)

Store a JavaScript object.

- [Password \(2 Way Encrypted\) design considerations](#)

Store encrypted password data that can be decrypted.

- [Records.\[Table\] data type](#)

Stores one or more Sys ID references to records in a specific table.

- [Reference.\[Table\] data type](#)

Store a single Sys ID reference to a record in a specific table.

- [String data type](#)

Store alphanumeric text values using JavaScript data conventions.

- [Table name data type](#)

Store a table name value as specified in the database dictionary. Table names are always alphanumeric strings.

- [True/false data type](#)

Store true or false values using JavaScript data conventions.

## Approval rules data type

Store the conditions for approving or rejecting an approval requests.

## Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## Design considerations

### Provide a default value

Create or select an approval rule as a default value.

## Array.Boolean data type

Store a sequence of true or false values in an array.

### Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

### Advanced options for Array variables

| Option   | Description                                                                                                                          |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|
| Hint     | Provides guidance to flow or action designers on how to configure the data.                                                          |
| Max rows | Specifies the maximum number of entries to display in the Flow Designer interface. The array can store more values than it displays. |

### Advanced options for Boolean variables

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## Array.Choice data type

Store a sequence of choice list values in an array.

### Basic options

| Option | Description                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------------------|
| Label  | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text. |

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

### Advanced options for Array variables

| Option   | Description                                                                                                                          |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|
| Hint     | Provides guidance to flow or action designers on how to configure the data.                                                          |
| Max rows | Specifies the maximum number of entries to display in the Flow Designer interface. The array can store more values than it displays. |

### Advanced options for Choice variables

| Option     | Description                                                           |
|------------|-----------------------------------------------------------------------|
| Name       | Displays the name used to identify the data variable in script calls. |
| Max length | Specifies the maximum length a user can enter for a choice value.     |

| Option  | Description                                                                                                                                                                                                                                                                                     |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Use this option to restrict the length of input values stored during action design.                                                                                                                                                                                                             |
| Hint    | Provides guidance to flow or action designers on how to configure the data.                                                                                                                                                                                                                     |
| Choice  | <p>Specifies whether the choice list has a value for no selection. Options include:</p> <ul style="list-style-type: none"><li>• Dropdown with --None--</li><li>• Dropdown without --None--</li></ul> <p><b>Note:</b> The Dropdown with --None-- option requires selecting a default choice.</p> |
| Default | Specifies the choice used when a flow or action designer does not select a choice.                                                                                                                                                                                                              |
| Choices | Specify the choices available to select. Use the add button (+) to create a choice. Each choice must have a <b>Name</b> , <b>Value</b> , and <b>Order</b> . See <a href="#">Choice list field type</a> for more information about choice lists.                                                 |

## Array.Datetime data type

Store a sequence of date-time values in an array.

## Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options for Array variables

| Option   | Description                                                                                                                          |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|
| Hint     | Provides guidance to flow or action designers on how to configure the data.                                                          |
| Max rows | Specifies the maximum number of entries to display in the Flow Designer interface. The array can store more values than it displays. |

### Advanced options for Datetime variables

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## Array.Integer data type

Store a sequence of numeric integer data in an array.

### Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

### Advanced options for Array variables

| Option   | Description                                                                                                                          |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|
| Hint     | Provides guidance to flow or action designers on how to configure the data.                                                          |
| Max rows | Specifies the maximum number of entries to display in the Flow Designer interface. The array can store more values than it displays. |

### Advanced options for Integer variables

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## Array.Object data type

Store a sequence of JavaScript objects in an array.

### Basic options

| Option | Description                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------------------|
| Label  | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text. |

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

### Advanced options for Array variables

| Option   | Description                                                                                                                          |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|
| Hint     | Provides guidance to flow or action designers on how to configure the data.                                                          |
| Max rows | Specifies the maximum number of entries to display in the Flow Designer interface. The array can store more values than it displays. |

### Advanced options for Object variables

| Option    | Description                                                                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Structure | Specifies how to structure the object hierarchy. Options include: <ul style="list-style-type: none"><li>• Create Structure Manually</li></ul> |

| Option           | Description                                                                                                                                                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <ul style="list-style-type: none"> <li>Start from Template</li> </ul> <p><b>Note:</b> Creating the structure manually enables the <b>Save as Template</b> option. Starting from a template enables the <b>Template</b> option</p> |
| Save as Template | Stores a manually created object structure for later reuse.                                                                                                                                                                       |
| Template         | Specifies the existing object structure to apply to this object.                                                                                                                                                                  |

**Note:** For more information on using complex object variables, see [Complex data](#).

## Array.String data type

Store a sequence of alphanumeric text values in an array.

### Basic options

| Option | Description                                                                                                                                                                                                                                               |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label  | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name   | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |

| Option    | Description                                                                            |
|-----------|----------------------------------------------------------------------------------------|
| Type      | Indicates the type of data stored by the data variable.                                |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action. |

### Advanced options for Array variables

| Option   | Description                                                                                                                          |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|
| Hint     | Provides guidance to flow or action designers on how to configure the data.                                                          |
| Max rows | Specifies the maximum number of entries to display in the Flow Designer interface. The array can store more values than it displays. |

### Advanced options for String variables

| Option        | Description                                                                                                                                           |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Max length    | Specifies the maximum length a string value can have when entered from the user interface. The variable can store longer strings than it can display. |
| Hint          | Provides guidance to flow or action designers on how to configure the data.                                                                           |
| Default value | Specifies the value used when a flow or action designer does not provide a value.                                                                     |

## Choice data

Store choice list values for a specific choice field.

### Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

### Advanced options for Choice variables

| Option     | Description                                                                                       |
|------------|---------------------------------------------------------------------------------------------------|
| Name       | Displays the name used to identify the data variable in script calls.                             |
| Max length | Specifies the maximum length a user can enter for a choice value. Use this option to restrict the |

| Option  | Description                                                                                                                                                                                                                                                                              |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | length of input values stored during action design.                                                                                                                                                                                                                                      |
| Hint    | Provides guidance to flow or action designers on how to configure the data.                                                                                                                                                                                                              |
| Choice  | Specifies whether the choice list has a value for no selection. Options include: <ul style="list-style-type: none"><li>• Dropdown with --None--</li><li>• Dropdown without --None--</li></ul> <p><b>Note:</b> The Dropdown with --None-- option requires selecting a default choice.</p> |
| Default | Specifies the choice used when a flow or action designer does not select a choice.                                                                                                                                                                                                       |
| Choices | Specify the choices available to select. Use the add button (+) to create a choice. Each choice must have a <b>Name</b> , <b>Value</b> , and <b>Order</b> . See <a href="#">Choice list field type</a> for more information about choice lists.                                          |

## Conditions data type

Store a set of conditions for a specific type of record. You must select a source table to define the conditions.

## Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## Datetime data type

Store date-time values.

## Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## Integer data type

Store numeric integer data.

## Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## List.[Table] data type

Stores a list of record Sys IDs associated to a specific table. This variable is intended to store the contents of a Now Platform List field.

### Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

### Advanced options for List variables

| Option | Description                                                                 |
|--------|-----------------------------------------------------------------------------|
| Hint   | Provides guidance to flow or action designers on how to configure the data. |

| Option                         | Description                                                                                                                                                                                         |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Default value                  | Specifies the value used when a flow or action designer does not provide a value.                                                                                                                   |
| Add [Record Label]             | Select one or more records to include as default values for the list. If you filter the list with a reference qualifier, you can only select records that match the reference qualifier conditions. |
| Reference qualifier conditions | Select the filter conditions applied to the list of records. Flow designers can only select records that match the reference qualifier conditions.                                                  |

## Design considerations

### Add a reference qualifier to filter list records

Filter the records the list variable displays as valid options by adding a reference qualifier. The reference qualifier acts as a required list filter and causes the list variable to display only records that match the reference qualifier conditions. For example, to only displays active incident records add the reference qualifier condition **[Active][is][true]**.

### Avoid selecting default records for actions intended for ServiceNow Store

Avoid selecting default records for a list unless you know that all instances have access to the selected records. Spoke developers typically do not have access to the data of the customers who install their custom action. If you want to publish a custom action on the ServiceNow Store, you may need to provide default records as demo data.

### Use List variables in For Each flow logic

You can use a List variable to specify the records to process within For Each flow logic. The For Each flow logic ignores any non-record sys\_id present in the data. For example, if the List variable contains an email address, the flow logic ignores it.

## Object data type

Store a JavaScript object.

### Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

### Advanced options for Object variables

| Option    | Description                                                                                                                                                                 |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Structure | Specifies how to structure the object hierarchy. Options include: <ul style="list-style-type: none"><li>• Create Structure Manually</li><li>• Start from Template</li></ul> |

| Option           | Description                                                                                                                                          |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <b>Note:</b> Creating the structure manually enables the <b>Save as Template</b> option. Starting from a template enables the <b>Template</b> option |
| Save as Template | Stores a manually created object structure for later reuse.                                                                                          |
| Template         | Specifies the existing object structure to apply to this object.                                                                                     |

**Note:** For more information on using complex object variables, see [Complex data](#).

## Password (2 Way Encrypted) design considerations

Store encrypted password data that can be decrypted.

### Basic options

| Option | Description                                                                                                                                                                                                                                               |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label  | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name   | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |

| Option    | Description                                                                            |
|-----------|----------------------------------------------------------------------------------------|
| Type      | Indicates the type of data stored by the data variable.                                |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action. |

### Advanced options

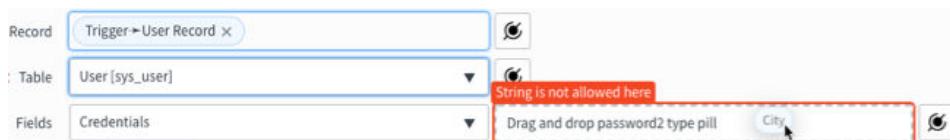
| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

### Design considerations

Follow these guidelines when designing flows containing Password (2 Way Encrypted) data.

#### Assign values using existing Password (2 Way Encrypted) data pills.

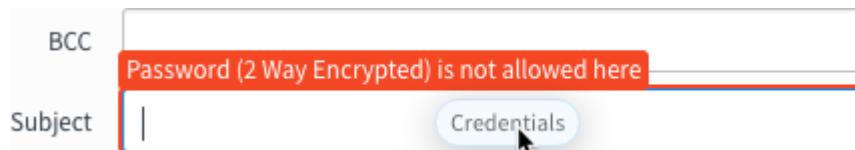
You can only assign a value to a password2 variable by selecting an existing password2 data pill. Selecting values from other field types is not supported. Flow Designer presents a warning message when invalid data pill types are selected.



**Note:** You cannot manually enter Password (2 Way Encrypted) values.

### Use Password (2 Way Encrypted) variables only for valid field types

Flow Designer prevents selecting Password2 data pills as the value for invalid field types. The system presents a warning message when the field is an incompatible type.



Flow Designer only allows Password2 data pills to be dragged into the following field types.

- Email body fields
- HTML fields
- Password 2 Fields
- PowerShell Input Variables
- REST fields
  - Variables
  - REST payload body
  - Query parameters
  - Headers
  - REST multi-part form values
  - Form URL-encoded values
- SOAP fields
  - Headers
  - Envelope

**Note:** you cannot use Password (2 Way Encrypted) variables as conditions

Flow Designer performs a validation check when a user saves, publishes, or tests actions and flows. This check shows that an alert for any data pills dropped in restricted field types and prevents the action or flow from executing. Update the action or flow to remove the invalid data pill and then retry the action.

### **Set up encryption modules for decryption**

Only users with a valid encryption module access can decrypt and view the contents of password2 variables. To specify the encryption algorithm and which roles can access encrypted data, see [Password2 encryption with KMF](#).

## **Records.[Table] data type**

Stores one or more Sys ID references to records in a specific table.

### **Basic options**

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## Reference.[Table] data type

Store a single Sys ID reference to a record in a specific table.

### Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options for Reference variables

| Option                         | Description                                                                                                                                                                                                                           |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hint                           | Provides guidance to flow or action designers on how to configure the data.                                                                                                                                                           |
| Default value                  | Specifies the value used when a flow or action designer does not provide a value.                                                                                                                                                     |
| Reference qualifier conditions | Specifies the conditions used to filter records from the target table. The system only displays records from the target table that match the reference qualifier conditions. Use the condition builder to add one or more conditions. |

## String data type

Store alphanumeric text values using JavaScript data conventions.

### Basic options

| Option | Description                                                                                                                                                                            |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label  | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                               |
| Name   | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label |

| Option    | Description                                                                            |
|-----------|----------------------------------------------------------------------------------------|
|           | into a valid name by removing or replacing any special characters.                     |
| Type      | Indicates the type of data stored by the data variable.                                |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action. |

### Advanced options for String variables

| Option        | Description                                                                                                                                           |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Max length    | Specifies the maximum length a string value can have when entered from the user interface. The variable can store longer strings than it can display. |
| Hint          | Provides guidance to flow or action designers on how to configure the data.                                                                           |
| Default value | Specifies the value used when a flow or action designer does not provide a value.                                                                     |

## Table name data type

Store a table name value as specified in the database dictionary. Table names are always alphanumeric strings.

## Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## True/false data type

Store true or false values using JavaScript data conventions.

## Basic options

| Option    | Description                                                                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Label     | Displays the label used to identify the data variable in the Flow Designer interface. The label can consist of any text.                                                                                                                                  |
| Name      | Displays the name used to identify the data variable in script calls. The name can only consist of alphanumeric and underscore characters. The system automatically converts the label into a valid name by removing or replacing any special characters. |
| Type      | Indicates the type of data stored by the data variable.                                                                                                                                                                                                   |
| Mandatory | Indicates whether the data variable must contain a value when configured in an action.                                                                                                                                                                    |

## Advanced options

| Option        | Description                                                                       |
|---------------|-----------------------------------------------------------------------------------|
| Hint          | Provides guidance to flow or action designers on how to configure the data.       |
| Default value | Specifies the value used when a flow or action designer does not provide a value. |

## Flow Designer steps

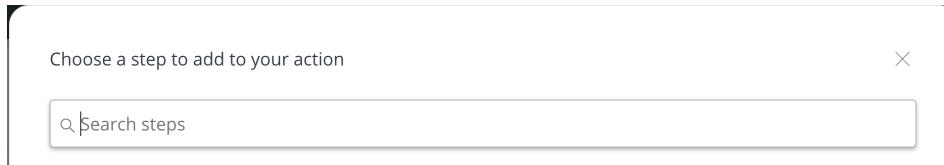
A step performs a single operation in an action. You can use Action Designer to add steps to a custom action.

A step is a single reusable operation within an action. For example, the **Create Record** step allows action designers to specify the table and field values to use during record creation. Step configuration requires subject matter expertise with application tables, fields, and business logic. Application developers or IT generalists add steps to actions from the Action Designer design environment. Flow Designer provides a set of ServiceNow core steps to automate Now Platform processes. You can add application-specific steps by activating the associated spoke.

### Search steps

You can use the **Search steps** filter to find a step by name or spoke. As you enter data consisting of at least three characters, Flow Designer displays a list of steps that match your search criteria.

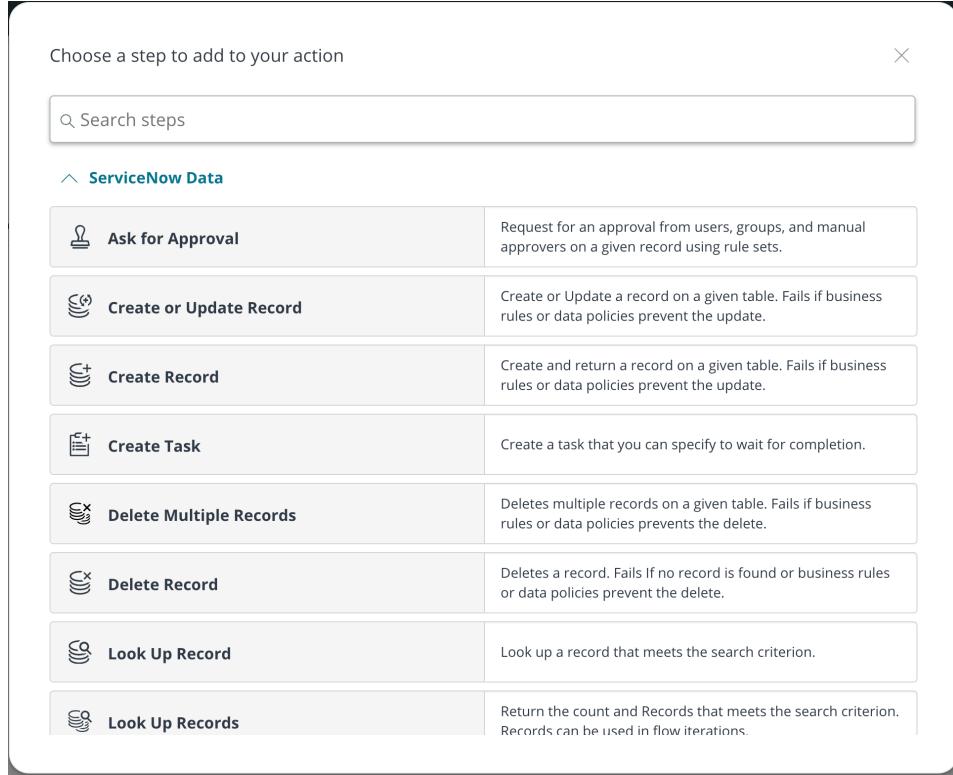
#### Search Actions filter



### ServiceNow data

ServiceNow Data steps are available to all actions regardless of the spokes installed. Use these steps to perform record operations on your data.

### ServiceNow Data steps



The screenshot shows a modal window titled "ServiceNow Data steps". At the top, there is a search bar with the placeholder "Search steps" and a close button (X). Below the search bar, a section titled "ServiceNow Data" is expanded, showing a list of eight data steps:

| Icon | Name                    | Description                                                                                               |
|------|-------------------------|-----------------------------------------------------------------------------------------------------------|
| 💡    | Ask for Approval        | Request for an approval from users, groups, and manual approvers on a given record using rule sets.       |
| ⌚    | Create or Update Record | Create or Update a record on a given table. Fails if business rules or data policies prevent the update.  |
| ⌚+   | Create Record           | Create and return a record on a given table. Fails if business rules or data policies prevent the update. |
| 📝    | Create Task             | Create a task that you can specify to wait for completion.                                                |
| ☒    | Delete Multiple Records | Deletes multiple records on a given table. Fails if business rules or data policies prevents the delete.  |
| ☒    | Delete Record           | Deletes a record. Fails If no record is found or business rules or data policies prevent the delete.      |
| ⌚🔍   | Look Up Record          | Look up a record that meets the search criterion.                                                         |
| ⌚🔍   | Look Up Records         | Return the count and Records that meets the search criterion. Records can be used in flow iterations.     |

### Utilities

Utility steps enable you to build payloads, compress data, run scripts, and send notifications.

### Utilities steps

The screenshot shows a modal window titled "Choose a step to add to your action". At the top right is a close button (X). Below it is a search bar with the placeholder "Search steps". Underneath the search bar is a section header "Utilities" preceded by a collapse arrow. A list of eight steps is displayed in a grid:

|                                            |                                                                                |
|--------------------------------------------|--------------------------------------------------------------------------------|
| <b>Create App From Payload</b>             | Creates an app from a payload and variables                                    |
| <b>Create Templated Object</b>             | Create a new templated object                                                  |
| <b>Email</b>                               | Send an email.                                                                 |
| <b>Get Latest Response Text From Email</b> | This step provides the latest response text from body text of the email thread |
| <b>Log</b>                                 | Log a message.                                                                 |
| <b>Notification</b>                        | Trigger a notification.                                                        |
| <b>Payload Builder</b>                     | Generate a flat JSON or XML payload                                            |
| <b>Script</b>                              | Executes a custom Javascript.                                                  |

### Integrations

Enable custom actions to integrate with external systems by activating Integration Hub, which adds integration steps to the Action Designer interface.

### Integrations steps

The screenshot shows a modal window titled "Integrations steps" with a search bar at the top. Below the search bar is a section titled "Integrations" which contains the following steps:

|                            |                                                                                              |
|----------------------------|----------------------------------------------------------------------------------------------|
| <b>Get Connection Info</b> | Provide connection and credential information to other steps in your action.                 |
| <b>JDBC</b>                | Execute SQL statements on relational databases.                                              |
| <b>JSON Parser</b>         | Parse JSON data and map to complex objects.                                                  |
| <b>PowerShell</b>          | Run powershell scripts on remote machines from your ServiceNow machine through a MID Server. |
| <b>REST</b>                | Perform a REST web service request                                                           |
| <b>SFTP</b>                | Use SSH File Transfer Protocol to manage file transfers from source to target systems.       |
| <b>SOAP</b>                | Perform a SOAP web service request                                                           |
| <b>SSH</b>                 | Run SSH scripts/commands on remote hosts through a MID Server                                |

- Ask for Approval step

Request approval for a record with an approval field. You can configure a rule set for an approval, rejection, or cancellation. If a due date is added to an approval, the approval is automatically approved, rejected, or canceled if the approvers have not responded by the designated time.

- Create Record step

Creates a record on any table. You can dynamically add and configure fields for the record.

- Create or Update Record step

Create or update a record in a ServiceNow table by determining if it exists. Add records that do not exist, and update existing ones. Identify

existing records by selecting unique fields. Set field values dynamically and enforce server-side validation rules (data policy, business rules, dictionary-defined mandatory fields). UI policy does not apply.

- [Create Task step](#)

Create a task on a ServiceNow task table. After you choose the task table, you can dynamically select the fields to configure the action. Defining the Parent field associates the task to a parent record.

- [Delete Multiple Records step](#)

Look up and delete multiple existing records as a single action. Using this action removes the need to separately look up a list of records and then delete the list with **For Each** flow logic.

- [Delete Record step](#)

Deletes a record on any table.

- [Get Connection Info step](#)

Provide the connection and credential details from another step, such as a REST step, to other steps in your action.

- [JDBC step](#)

Create a reusable action to send SQL commands to a relational database.

- [Get Latest Response Text From Email step](#)

Provide the most recent reply or forward message in an e-mail chain to other steps in your action.

- [Log step](#)

Logs a message in the Flow Designer log table.

- [Look Up Record step](#)

Look up a record from any table based on defined conditions.

- [Look Up Records step](#)

Look up multiple records on any table using defined conditions.

- [Notification step](#)

Trigger a notification as a step within an action by selecting a record (such as an incident, change request, problem, or user record) to trigger a notification and defining the associated notification.

- [Payload Builder step](#)

Enable action designers to easily create name-value pairs in JSON and XML payloads using dynamic data.

- [PowerShell step](#)

Run PowerShell scripts on remote machines from your ServiceNow instance through a MID Server.

- [REST step](#)

Send an outbound REST web service request to an external system.

- [Script step](#)

Add custom JavaScript to execute within a reusable action. While most core actions and steps fit common use cases, you can build a Script step to execute behavior not satisfied by the core steps.

- [Send Email step](#)

Send an email to specified users or groups as an action in a flow.

- [SFTP step](#)

Create a reusable action to manage files and directories on an SFTP server and to move files from one SFTP server to another.

- [SSH step](#)

The SSH step executes SSH commands on an external \*nix system through a ServiceNow® MID Server. The step also stores scripts and commands for the \*nix systems.

- [SOAP step](#)

Enable action designers to send outbound SOAP web service requests to external systems.

- [Update Multiple Records step](#)

Look up and update multiple records as a single step. Using this step removes the need to separately look up a list of records and then process the list with a Script step. Set field values with a template or add and configure them using data pills.

- [Update Record step](#)

Update an existing record in a table. You can dynamically add and configure fields for the record, or use a template to set field values.

- [Wait For Condition step](#)

Pause a flow until record values match a specific set of conditions.

- [ZIP step](#)

Manage the attachments in a record by performing archive operations such as zip and unzip. You can also view the details of a zipped file.

## Ask for Approval step

Request approval for a record with an approval field. You can configure a rule set for an approval, rejection, or cancellation. If a due date is added to an approval, the approval is automatically approved, rejected, or canceled if the approvers have not responded by the designated time.

[Approvals](#) is a platform feature that enables users or groups to approve or reject a task.

### Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

## Fields

| Field          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record         | Select a record under the data panel and drag the record pill into the Record field. If selecting a table with an approval field already configured, the <b>Approval field</b> is set to the correct field.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Table          | Set to the table name associated with the record.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Approval field | Select a field from the designated table to use for approval status.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Journal field  | Select a field from the designated table to use for journal entries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Rules          | <p>Define the approval and rejection rules. Approval rules determine which users can approve or reject requests, and what happens after approval or rejection.</p> <p>Approval or rejection rules include:</p> <ul style="list-style-type: none"> <li>• Anyone approves</li> <li>• All users approve</li> <li>• All responded and anyone approves</li> <li>• % of users approve</li> <li>• # of users approve</li> </ul> <p>In the field beside the approval rule, add the desired approvers. To add approvers:</p> <ul style="list-style-type: none"> <li>• Select individual users or groups.</li> <li>• Drag or select a field from a record.</li> <li>• Select  to allow a manual approver to process an approval or rejection. A manual approver is a user manually added to the Approvers related list who</li> </ul> |

| Field    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <p>can then approve the request. For example, you can manually add a subject matter expert to a task to approve the request. To learn more about adding manual approvers, see <a href="#">Generate approvals using the approvers related list</a>.</p> <p>Define rejection rules by adding another OR rule set. When defining approvals, include rejection rules that run when there are no matching approvals. Such rejection rules prevent the flow from remaining in a waiting state. For example, if an approval can be approved by anyone, create a time-based rejection rule in case no one approves it.</p> <p><b>Note:</b> If you set an approval rule with no rejection rule (or vice versa) and the expected approval state is not met, the runtime value will be <b>canceled</b>.</p> |
| Due Date | <p>Define a due date to prevent the flow from remaining endlessly waiting for approval.</p> <ul style="list-style-type: none"><li>None: The approval is not dependent on a specific date.</li><li>Approve: Automatically approve the step if an action is still pending by the specified date.</li><li>Reject: Automatically reject the step if an action is still pending by the specified date.</li><li>Cancel: Automatically cancel the step if an action is still pending by the specified date.</li></ul>                                                                                                                                                                                                                                                                                   |

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <p><b>Note:</b> Relative dates always treat days as 24 hours regardless of the days schedule you select. For example, if you create a due date that expires in 1 relative day, the due date will occur in 24 hours based on the schedule you select. For an 8-5 weekdays excluding holidays schedule, a 24-hour duration is the equivalent of 2 complete business days and 6 hours into the third business day. When working with schedules where the business day is less than 24 hours, consider using relative hours instead of days.</p> |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Example

The screenshot shows the ServiceNow Action Designer interface. On the left, the 'Action Outline' panel displays a single step: '1 Ask for Approval'. The main area, titled '1. Ask for Approval step', contains the configuration for this step. It includes sections for 'Approval Request Definition' (specifying Record, Table, Approval Field, and Journal Field), 'Rules' (with conditions for Approve, Reject, and Due Date), and 'Data' (Input Variables like Incident, Approval State, and Output Variables). The 'Data' section also shows the mapping of 'Approval State' to 'Choice'.

## Output

| Field          | Description                   | Data Type |
|----------------|-------------------------------|-----------|
| Approval State | State of the approval request | Choice    |

## Create Record step

Creates a record on any table. You can dynamically add and configure fields for the record.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

## Fields

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table        | Select a table from the list.                                                                                                                                                                                                                                                                                                                                                                                               |
| Field Values | <p>Set static or dynamic values of fields in the record. For example, to set the short description to a static value, select <b>Short description</b> and set the desired value.</p> <p>To add dynamic values, see <a href="#">Create a template value input</a>.</p> <p><b>Important:</b> The system does not support updating multiple journal fields such as the additional comments or work notes of a task record.</p> |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Create or Update Record step

Create or update a record in a ServiceNow table by determining if it exists. Add records that do not exist, and update existing ones. Identify existing records by selecting unique fields. Set field values dynamically and enforce server-side validation rules (data policy, business rules, dictionary-defined mandatory fields). UI policy does not apply.

## Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

## Fields

| Field                 | Description                                                                                                                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table Name            | Table in which a record is created or updated.                                                                                                                                                                                                                   |
| Fields                | Values of fields in the record to be created or updated.<br><br>If adding the action to a subflow, you can <a href="#">Create a template value input</a> . Dynamically set field values can trigger server-side validation rules but cannot trigger UI policies. |
| Determines uniqueness | Option for selecting the field as a unique identifier. This field appears when the required table name and fields are selected.                                                                                                                                  |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Create Task step

Create a task on a ServiceNow task table. After you choose the task table, you can dynamically select the fields to configure the action. Defining the Parent field associates the task to a parent record.

### Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

### Fields

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table | Select a task table. <ul style="list-style-type: none"><li>• Catalog Task [sc_task]</li><li>• Change Phase [change_phase]</li><li>• Change Request [change_request]</li><li>• Chat Queue Entry [chat_queue_entry]</li><li>• Feature Task [release_task]</li><li>• Follow On Task [cert_follow_on_task]</li><li>• Group approval [sysapproval_group]</li><li>• Guided Setup Task [gsw_task]</li><li>• IMAC [change_request_imac]</li><li>• Incident [incident]</li><li>• Incident Task [incident_task]</li><li>• KB Submission [kb_submission]</li><li>• Orphan CI Remediation [orphan_ci_remediation]</li></ul> |

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <ul style="list-style-type: none"><li>• Private Task [vtb_task]</li><li>• Problem [problem]</li><li>• Problem Task [problem_task]</li><li>• Reclassification Task [reclassification_task]</li><li>• Recommended Field Remediation [recommended_field_remediation]</li><li>• Remediate Duplicate Task [reconcile_duplicate_task]</li><li>• Release Phase [release_phase]</li><li>• Renew Lease Task [statemgmt_renew_lease_task]</li><li>• Request [sc_request]</li><li>• Request new Knowledge Base</li><li>• [kb_knowledge_base_request]</li><li>• Requested Item [sc_req_item]</li><li>• Required Field Remediation [required_field_remediation]</li><li>• Security Case [sn_ti_case]</li><li>• Security Incident [sn_si_incident]</li><li>• Security Incident Response Task [sn_si_task]</li><li>• Security Request [sn_si_scan_request]</li><li>• Service Order [sm_order]</li><li>• Service Order Task [sm_task]</li><li>• Service Task [service_task]</li><li>• Stale CI Remediation [stale_ci_remediation]</li><li>• Standard Change Proposal [std_change_proposal]</li></ul> |

| Field        | Description                                                                                                                                                                                                                                                                                                                                              |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <ul style="list-style-type: none"> <li>Ticket [ticket]</li> </ul>                                                                                                                                                                                                                                                                                        |
| Field Values | <p>Set static or dynamic values of fields in the record. For example, to set the short description to a static value, select <b>Short description</b> and set the desired value.</p> <p>To add dynamic values, see <a href="#">Create a template value input</a>.</p> <p>To associate the task with a parent record, define the <b>Parent</b> field.</p> |
| Wait         | <p>Waits to complete the step until the task completes and is no longer active (active=false).</p> <p>Alternatively, you can add a wait condition by dragging-and-dropping a true/false field from the data panel into the <b>Wait</b> field. The flow only waits for the task to complete when the condition field is true.</p>                         |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | <p>Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a>.</p> |

## Delete Multiple Records step

Look up and delete multiple existing records as a single action. Using this action removes the need to separately look up a list of records and then delete the list with **For Each** flow logic.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

### Fields

| Field                           | Description                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Table                           | Select the table containing the records to delete.                                                                  |
| Conditions                      | Define the filter condition used to look up records.                                                                |
| Order by                        | Select the field that you want to use to sort the records when more than one record matches the defined conditions. |
| Sort Type                       | Determine whether to sort the records alphabetically in ascending or descending order.                              |
| Run Business Rules and Workflow | Determine whether to call any business rules and workflows associated with the table.                               |
| Don't fail on error             | Specify whether to continue running the flow when there is an error.                                                |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

### Example

1. Delete Multiple Records step

**Note:** The example is for illustration purposes only.

### Outputs

| Field         | Description                                                           | Data Type |
|---------------|-----------------------------------------------------------------------|-----------|
| Count         | Number of records deleted. If no records are deleted, the count is 0. | Integer   |
| Error Message | Message that is displayed if the step produces an error.              | String    |

| Field  | Description                                                                                                                                    | Data Type |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Status | <p>The completion status of the step as a numeric value.</p> <ul style="list-style-type: none"><li>• 0 (success)</li><li>• 1 (error)</li></ul> | Choice    |

## Delete Record step

Deletes a record on any table.

### Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

### Fields

| Field  | Description                                                                                                |
|--------|------------------------------------------------------------------------------------------------------------|
| Record | The record to be deleted. Drag-and-drop a record data pill or use the data pill picker to select a record. |
| Table  | Read-only. Set to the table associated with the record.                                                    |

### Action error evaluation fields

| Field              | Description                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action |

| Field | Description                                                    |
|-------|----------------------------------------------------------------|
|       | error condition, see <a href="#">Action error evaluation</a> . |

## Get Connection Info step

Provide the connection and credential details from another step, such as a REST step, to other steps in your action.

**Note:** The Get Connection Info step is not available in the base system and requires the subscription to Integration Hub Starter Pack Installer (com.glide.hub.integrations) or later. For more information about the ServiceNow® Integration Hub subscription packages, see [Integration Hub usage and subscription](#). After the required plugin is activated, the step is visible under Integrations.

### Roles and availability

After setting up your Integration Hub Starter subscription, the Get Connection Info step is available as an Action Designer action step. Users with the `action_designer` role can create a custom action with the Get Connection Info step.

### Inputs

Provide a value for each input that your step needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

| Input | Data type | Description                                                                                                                                                    |
|-------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type  | Choice    | Choose from: <ul style="list-style-type: none"><li>Connection Alias - Associates to connection information required to connect to the remote system.</li></ul> |

| Input | Data type | Description                                                                                                                                                                                                                                                                                                                                 |
|-------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       |           | <ul style="list-style-type: none"><li>• Credential Alias<ul style="list-style-type: none"><li>- Associates to credential data required to connect to the remote system.</li></ul></li></ul> <p>Depending on which option you choose, the following input requires that you choose the appropriate Connection Alias or Credential Alias.</p> |

## Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your action.

| Output           | Data type | Description                                                                                     |
|------------------|-----------|-------------------------------------------------------------------------------------------------|
| Runtime Alias ID | String    | Sys ID of the Connection Alias or Credential Alias record used to connect to the remote system. |
| Connection ID    | String    | Sys ID of the Connection record used to connect to the remote system.                           |
| Connection URL   | String    | URL used to connect to the remote system.                                                       |
| Credential ID    | String    | Sys ID of the Credential record                                                                 |

| Output           | Data type                  | Description                                                                         |
|------------------|----------------------------|-------------------------------------------------------------------------------------|
|                  |                            | used to connect to the remote system.                                               |
| Credential Value | Password (2 Way Encrypted) | 2-way encrypted password used to authenticate when connecting to the remote system. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## JDBC step

Create a reusable action to send SQL commands to a relational database.

**Note:**

- This step requires an Integration Hub subscription. For more information, see [Legal schedules - IntegrationHub overview](#). After the required plugin is activated, the step is visible under Integrations.
- The JDBC step runs only on a ServiceNow® MID Server with JDBC step capabilities. Activate the plugin, Integration Hub Standard Pack Installer (com.glide.hub.integrations.standard) or later to use the JDBC capability for the MID Server.

## Roles and availability

The JDBC step is available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

## Sanitizing inputs

Escape all user inputs to eliminate the possibility of a malicious user from executing malicious SQL statements that can result in SQL injection on your target database. When you use data pills in JDBC step SQL statements, sanitize them first using [Sanitize SQL transform functions](#). This transform function category automatically appears when a data pill is dropped into the SQL Statement input.

## SQL operations inclusion list

By default, you can run the following SQL operations.

- SELECT
- INSERT
- UPDATE
- DELETE
- SHOW
- DESCRIBE

To enable only some of these SQL operations that the JDBC step can perform, create a MID Server property, mid.property.jdbc\_operations and enter the SQL operations, separated by comma. To learn more about MID Server properties, see [MID Server properties](#).

## Fields

| Field              | Description                |
|--------------------|----------------------------|
| Connection Details |                            |
| Connection         | Type of connection to use. |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p>                                                                                                            |
| Connection Alias | Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Connection list. |
| Credential Alias | Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a> ,                                                                                                                                                                                                                                                                                 |

| Field         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <p><a href="#">connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                                                                                                                                                                 |
| MID Selection | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p> |
| MID Cluster   | <p>Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                                  |
| Database Type | <p>Database type for this connection. The choices are:</p> <ul style="list-style-type: none"> <li>• <b>MySQL</b></li> <li>• <b>Oracle</b></li> <li>• <b>SQLServer</b></li> <li>• <b>Custom</b></li> </ul> <p>The default choice is <b>Custom</b>. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                                                           |
| JDBC Driver   | <p>Driver to use for this connection when it's not a default database type such as DB2 Universal and Sybase. The database Type is <b>Custom</b>. This field is</p>                                                                                                                                                                                                                                                                                 |

| Field              | Description                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Custom</b> is selected from the Database Type list.                                                                                                                                                                                       |
| Connection URL     | URL that the MID Server uses to connect to the specified database. The URL is created automatically when you save the form, and is read-only for the default databases. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Custom</b> is selected from the Database Type list. |
| MID Application    | Application that the MID Server must support to be eligible for selection. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                                                                        |
| Capabilities       | Capability of the MID Server. Select <b>JDBC</b> . This field is available when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                                                                                                |
| Connection Timeout | Maximum elapsed time, in seconds, for the activity to wait while attempting to connect to the target database. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                                    |
| Query Timeout      | Maximum elapsed time, in seconds, that the query is allowed to run without a response. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                                                            |
| JDBC Configuration |                                                                                                                                                                                                                                                                                                                                      |
| SQL Statement      | <p>SQL statement that the step executes.</p> <p><b>Note:</b> When you use data pills in step SQL statements, sanitize them first using a preprocessing <a href="#">Script step</a>. For more information, see <a href="#">Sanitizing inputs using the escape functions</a>.</p>                                                      |

| Field                             | Description                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum Rows                      | Maximum number of rows to be returned from the SQL statement. The default value is <b>1000</b> .                                                                                                                                      |
| Maximum Payload Size (KB)         | Maximum allowable payload size, in KB, to be returned from the SQL statement. The default payload size is <b>5120 KB</b> . The maximum payload size is <b>5 MB</b> .                                                                  |
| Retry Policy                      |                                                                                                                                                                                                                                       |
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                           |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                 |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

- [Test JDBC step](#)

Test the JDBC step before testing or publishing an action that contains the JDBC step.

Test the JDBC step before testing or publishing an action that contains the JDBC step.

### Before you begin

Role required: admin

### About this task

It is mandatory that you test the JDBC step before testing the action. Testing ensures that the relevant complex object output schema is created from table columns, which can be used as data pills in subsequent steps.

### Procedure

1. Navigate to **All > Process Automation > Flow Designer**.
2. [Create an action](#) with a **JDBC step**.
3. Click **Test JDBC Step**.  
The **Test JDBC Step** pop-up window is displayed.
4. If the JDBC step takes an action input or output of the previous step as its input, provide required input values in the **Step input pills** field to test the JDBC step.

**Note:** Input values in the **Step input pills** fields are not needed when records are updated, inserted, or deleted.

5. Click **Run Test**.
  - When a SELECT query is executed, **Sample Result** is displayed in the **Test JDBC Step** pop-up window. **Sample Result** includes column names, column types, and the values of the first row.
  - When an UPDATE, INSERT, or DELETE query is executed, a message is displayed mentioning the number of rows affected.
6. To use the sample result as the JDBC step output, click **Use Result**.  
**Note:** **Use Result** is not displayed when records are updated, inserted, or deleted.

7. To retrieve schema of a different table when a SELECT query is executed in the JDBC step, enter the required value in the **Step input pills** field and click **Run Test**.

### Result

When a SELECT query is executed in the JDBC step, **ResultSet** is displayed under **Outputs**. The relevant complex object output is populated. To learn more about complex objects, see [Complex data](#).

### What to do next

Test and publish the action.

## Get Latest Response Text From Email step

Provide the most recent reply or forward message in an e-mail chain to other steps in your action.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

### Inputs

Provide a value for each input that your step needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

| Input        | Data type | Description                                                                                                                                                         |
|--------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Email Record | Record    | Email record whose most recent reply or forward message you want to provide to other steps in your action. Select an Email [sys_email] record from the list, or add |

| Input | Data type | Description                                                |
|-------|-----------|------------------------------------------------------------|
|       |           | an Email [sys_email] record data pill from the Data panel. |

## Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your action.

| Output               | Data type | Description                                                                                                                                                                                                                                                                                                               |
|----------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Latest Response Text | String    | <p>Body text for the most recent reply or forward message in the Email [sys_email] record that you selected for the step's input.</p> <p><b>Note:</b> If you select an Email [sys_email] record with a Type of New for this step's input, the Latest Response Text output will be the entire body text of the e-mail.</p> |

## Action error evaluation fields

| Field              | Description                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action |

| Field | Description                                                    |
|-------|----------------------------------------------------------------|
|       | error condition, see <a href="#">Action error evaluation</a> . |

## Log step

Logs a message in the Flow Designer log table.

### Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

### Fields

| Field       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Log level   | Level of importance of the log message. <ul style="list-style-type: none"><li>• Error</li><li>• Warn</li><li>• Info</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                        |
| Log message | Message to display in the log. Enter text or drag data pills into the field.<br><br><b>Note:</b> The Flow Designer design environment only supports entering 255 characters of text for a log message. The length limitation only applies to text entered directly into the input. Data pill values can exceed 255 characters in length. You can log values greater than 255 characters long by using either a data pill value or calling the <a href="#">GlideSystem - log(String message, String source)</a> method from a script. |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Look Up Record step

Look up a record from any table based on defined conditions.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

### Fields

| Field      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table      | Select a table from the list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Conditions | <p>Set static or dynamic conditions to filter records. To define a static condition applied each time the action runs, define the conditions with the condition builder. To enable flow designers to dynamically apply conditions, define an input of type Conditions and drag-and-drop the input data pill into the <b>Conditions</b> field.</p> <p>When building a condition that looks up the value of a reference field, use a data pill that explicitly provides the Sys ID value. Ensure the condition has the format <b>[reference field][is][Reference</b></p> |

| Field                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               | <b>type data pill-&gt;Sys ID].</b> For example, both the Change and Incident tables contain a reference field to the User table. To look up change records where the requester is the caller from an incident record, create the condition <b>[Requested by][is][Trigger-&gt;incident record-&gt;Caller-&gt;Sys ID]. [Requested by][is][action-&gt;incident-&gt;Caller-&gt;Sys ID]</b> where <b>incident</b> is an input variable for an incident record. |
| Order by                      | Determines how to sort results when more than one record matches the defined conditions. Select the field you want to use to sort results.                                                                                                                                                                                                                                                                                                                |
| Sort Type                     | Select whether to sort alphabetically in ascending or descending order.                                                                                                                                                                                                                                                                                                                                                                                   |
| If multiple records are found | Determines what is returned if more than one record matches the defined conditions. <ul style="list-style-type: none"><li>• Return only the first record</li><li>• Fail the step</li></ul>                                                                                                                                                                                                                                                                |
| Don't fail on error           | Determines whether to fail the flow if a record can't be found.                                                                                                                                                                                                                                                                                                                                                                                           |

## Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

### Record

Data type: Record

Record found based on the conditions you specified in the Conditions input.

**Table**

Data type: Table

Name of the table associated with the returned record.

**Status**

Data type: Choice

1 if a record was found successfully, and 0 if there was an error.

**Error Message**

Data type: String

Message containing details about why the record could not be found.

**Note:** This output's value is only populated if the Status output's value is 0.

**Action error evaluation fields**

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Example

### 1. Look Up Record step

Look Up Record

Table: Incident [incident]

Condition: All of these conditions must be met

- AND: Active is true
- AND: State is New
- AND: Short description contains Email

or

New Criteria

Order by: Short description

Sort Type: a to z

If multiple records are found: Return only the first record

Don't fail on error:

## Look Up Records step

Look up multiple records on any table using defined conditions.

### Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

### Fields

| Field      | Description                                                                                                                                                                                                                     |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table      | Select a table from the list.                                                                                                                                                                                                   |
| Conditions | Set static or dynamic conditions to filter records. To define a static condition applied each time the action runs, define the conditions with the condition builder. To enable flow designers to dynamically apply conditions, |

| Field       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | <p>define an input of type Conditions and drag-and-drop the input data pill into the <b>Conditions</b> field.</p> <p>When building a condition that looks up the value of a reference field, use a data pill that explicitly provides the Sys ID value. Ensure the condition has the format <b>[reference field][is][Reference type data pill-&gt;Sys ID]</b>. For example, both the Change and Incident tables contain a reference field to the User table. To look up change records where the requester is the caller from an incident record, create the condition <b>[Requested by][is][Trigger-&gt;incident record-&gt;Caller-&gt;Sys ID]. [Requested by][is][action-&gt;incident-&gt;Caller-&gt;Sys ID]</b> where <b>incident</b> is an input variable for an incident record.</p> |
| Order by    | Select the field you want to use to sort results.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Sort Type   | Select whether to sort alphabetically in ascending or descending order.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Max Results | Maximum number of results returned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | <p>Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a>.</p> |

## Outputs

| Output  | Type    | Description                                                                                                                                                |
|---------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Records | Records | <p>List of record Sys IDs found based on the lookup criteria you provided.</p> <p>For more information, see <a href="#">Records.[Table]</a> data type.</p> |
| Table   | Table   | Table name for the records found                                                                                                                           |
| Count   | Integer | Number of records found                                                                                                                                    |

## Example

### 1. Look Up Records step

Look Up Records

Table  X ▾ fx ✖ ✖

Conditions All of these conditions must be met

AND

Assigned to is Bow Ruggeri X ▾ ✖ fx ✖

State is New X ▾ ✖ fx ✖

OR

New Criteria

Order by Short description X ▾ fx ✖

Sort Type a to z ▼

Max Results 1000

## Notification step

Trigger a notification as a step within an action by selecting a record (such as an incident, change request, problem, or user record) to trigger a notification and defining the associated notification.

**Notifications** is a platform feature. Before triggering a notification as an action step in Flow Designer, ensure that the notification is set up for use in the platform.

- When you [Create an email notification](#), set the **Send when** field in the **When to send** tab of the Notification form to Triggered.
- Verify that your users have an active primary email channel and that all their notifications are active.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

### Fields

| Field        | Description                                                                                                                                                                                                                                                                                                                             |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record       | Drag-and-drop an input record or a record from a previous step. This is the record that will trigger a notification.<br><br><b>Note:</b> Some notifications are not associated with a specific record or table, such as the <b>Passwords Require Updating</b> notification. If configuring such a notification, leave this field blank. |
| Table name   | Read-only. Set to the table of the triggering record.                                                                                                                                                                                                                                                                                   |
| Notification | Select the notification to be triggered. The notifications that can be selected are associated with the table of the specified record. If no record was selected, you can select a notification that does not have an associated                                                                                                        |

| Field | Description                                                                                |
|-------|--------------------------------------------------------------------------------------------|
|       | record or table. To create notifications, see <a href="#">Create an email notification</a> |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

### Example

The screenshot shows the Action Designer interface with a single step named "1. Notification step". The step is configured to send an incident priority raise notification to the "incident" record. The "Notification" tab is selected, showing the recipient as "incident" and the message as "Incident Priority Raised". The "Data" tab is also visible, showing input variables like "Record" and "Table Name" set to "action>incident", and output variables like "Input Variables", "Record", "Notification step", and "Output Variables".

## Payload Builder step

Enable action designers to easily create name-value pairs in JSON and XML payloads using dynamic data.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

## Fields

| Fields           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name Value Pairs | <p>The name-value pairs to include in the payload. Click the plus icon to add name-value pairs. Drag data pills into either field to produce dynamic payloads.</p> <p>The <b>Name</b> becomes a key in JSON and an element in XML. For example, suppose you create this name-value pair.</p> <ul style="list-style-type: none"><li>• <b>Name:</b> short_description</li><li>• <b>Value:</b> [action]-&gt;[short_description]</li></ul> <p>When the system formats the name-value pair as JSON:</p> <div style="border: 1px solid black; padding: 5px;"><code>"short_description": "[action]-&gt;[short_description]"</code></div> <p>When the system formats the name-value pair as XML:</p> <div style="border: 1px solid black; padding: 5px;"><code>&lt;short_description&gt;[action]-&gt;[short_description]&lt;/short_description&gt;</code></div> |
| Omit if empty    | <p>The option to exclude a name-value pair if the value is empty or null.</p> <p><b>Note:</b> This field is only visible after clicking the down arrow to display advanced options.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Fields                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Format           | <p>The payload file format.</p> <ul style="list-style-type: none"> <li>• <b>JSON:</b> Select to format the payload as a JSON document.</li> <li>• <b>XML:</b> Select to format the payload as an XML document.</li> </ul>                                                                                                                                                                                                                                     |
| Namespace               | <p>The XML namespace to apply to each element. For example, when the namespace is set to incident:</p> <pre>&lt;incident:short_description&gt;[action]-&gt;[short_description]&lt;/incident:short_description&gt;</pre> <p><b>Note:</b> This field is only visible when the <b>Output Format</b> is set to <b>XML</b>.</p>                                                                                                      |
| Include Outer Structure | <p>The option to include or exclude a top level container appropriate to the output format. When the <b>Output Format</b> is JSON, curly braces contain the name-value pairs. When the <b>Output Format</b> is XML, a specified XML element contains the name-value pairs.</p> <p>For example, when the system formats the name-value pair as JSON:</p> <pre>{ "short_description": "[action]-&gt;[short_description]" }</pre> |

| Fields               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | <p>When the system formats the name-value pair as XML:</p> <pre>&lt;xml&gt;   &lt;short_description&gt;[action]-&gt;[short_description]&lt;/short_description&gt; &lt;/xml&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Send Empty Structure | <p>The option to send valid JSON or XML structures when the payload is empty. Enable this option to include JSON or XML structural text in the payload.</p> <p>For example, when the system formats an empty structure as JSON:</p> <pre>{ }</pre> <p>When the system formats an empty structure as XML:</p> <pre>&lt;xml&gt;&lt;/xml&gt;</pre> <p>Disable this option to produce an empty payload.</p> <p>Empty payloads can occur when you select the <b>Omit if empty</b> option for every name-value pair, and all name-value pairs in the payload produce empty values.</p> |
| Parent Node          | <p>The name of the XML element that contains the name-value pairs. The default parent node element is <code>xml</code>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Fields  | Description                                                                                                                                             |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | <b>Note:</b> This field is only visible when the <b>Output Format</b> is set to <b>XML</b> and the option to <b>Include Outer Structure</b> is enabled. |
| Preview | The read-only payload the step produces.                                                                                                                |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## PowerShell step

Run PowerShell scripts on remote machines from your ServiceNow instance through a MID Server.

PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications. ServiceNow supports PowerShell 3.0 to 5.1. PowerShell 3.0 does not support Windows 2003 Server.

**Note:** This step requires an Integration Hub subscription. For more information, see [Legal schedules - IntegrationHub overview](#).

## Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

## Fields

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection       | <p>Type of connection to use.</p> <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p> |
| Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel.</p>             |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <p><b>Note:</b> This field is available when <b>Use Connection Alias</b> is selected from the Connection list.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Credential Alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a>, <a href="#">connections</a>, and <a href="#">aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel.</p> <p><b>Note:</b> This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p> |
| Host             | <p>Specify the fully-qualified domain name of the target host where the system runs the action step. For example, host.domain.com.</p> <p><b>Note:</b> This field is only visible when the <b>Connection</b> is <b>Define Connection Inline</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Port             | <p>Specify the communications port on which the target host listens for connections. For example, 5985. Leave blank to use the default port.</p> <p><b>Note:</b> This field is only visible when the <b>Connection</b> is <b>Define Connection Inline</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| MID Selection    | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li><b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <ul style="list-style-type: none"> <li><b>Specific MID Server:</b> Uses the MID Server you select.</li> <li><b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                                                                                                                                                             |
| MID Application | <p>Specify the application the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected application. If you use a data pill for this field, the pill must reference the MID Application's name, not the MID Application record. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p> |
| Capabilities    | <p>Capabilities the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected capabilities. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                      |
| MID Server      | <p>Data pill containing a sys_id reference to a MID Server [ecc_agent_list] record. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                                          |
| MID Cluster     | <p>Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                                                                          |
| Remoting Type   | <p>The location where the PowerShell script runs such as the MID or a remote server.</p>                                                                                                                                                                                                                                                                                                                                                                                                   |

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <ul style="list-style-type: none"> <li><b>Explicit Remoting (Most Common):</b> Establish a connection with and run the script on a remote server.</li> <li><b>Implicit Remoting (Advanced):</b> Run a script on a MID Server while importing necessary modules from a remote server. If selected, define the <b>Remote name prefix</b> and <b>Modules to import</b> fields. For optimal performance, only import modules necessary to the step. If blank, all available modules are imported from the server.</li> <li><b>Run on a MID Server or have your script establish a remote session:</b> Run a script directly on a MID Server, or define remoting specifications within the script. This value is the default.</li> </ul> <p><b>Note:</b> To invoke a function in a PowerShell script command or PowerShell script file, the command must define the function param block if the function has input parameters. This requirement applies to explicit and implicit remoting. For additional information on param block, see Microsoft's documentation on Windows Powershell parameters at <a href="https://technet.microsoft.com/">https://technet.microsoft.com/</a>.</p> |
| Remote name prefix | <p>The file path, excluding file names, to the modules to load from the remote server.</p> <p><b>Note:</b> This field is only visible when the <b>Remoting Type</b> is <b>Implicit Remoting (Advanced)</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Modules to import  | <p>The comma-separated list of modules to import from the remote server at the defined file path.</p> <p><b>Note:</b> This field is only visible when the <b>Remoting Type</b> is <b>Explicit Remoting (Most Common)</b> or <b>Implicit Remoting (Advanced)</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Credential   | Button to test the configured credential. For more information, see <a href="#">Test a credential for the PowerShell step</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Script type       | The type of script to run on the PowerShell host. <ul style="list-style-type: none"> <li>• <b>Inline script:</b> Enter the script to run in the <b>Command</b> field of the step.</li> <li>• <b>MID Server Script File:</b> Select the PowerShell script to run from the MID Server Script Files [ecc_agent_script_file] table. This is the default value and separates scripting logic from the action, enabling you to update the script without having to modify and redeploy the action.</li> </ul>                                                                                    |
| MID Server Script | Pre-defined PowerShell script from the MID Server Script Files table [ecc_agent_script_file]. <p><b>Note:</b> This field is only available if the <b>Script type</b> is <b>MID Server Script File</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                 |
| Script path       | Read-only path to the selected MID Server script. <p><b>Note:</b> This field is only visible when the <b>Script type</b> is <b>MID Server Script File</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Input variables   | The optional name-value pairs that represent the values of PowerShell script variables. You can use action inputs and data from other steps within the PowerShell script. Define the following fields for each variable: <ul style="list-style-type: none"> <li>• <b>Name:</b> The name of the script variable to pass a value to. The name cannot match a reserved or prohibited PowerShell variable. Some variable names are reserved for internal processing and should not be used as input variables.<br/>See <b>Reserved variables in PowerShell scripting variables</b>.</li> </ul> |

| Field   | Description                                                                                                                                                                                                                                                                                                                                                                                    |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | <ul style="list-style-type: none"><li>• <b>Type:</b> The type of PowerShell variable. Select plain text, encrypted, or boolean. If encrypted is selected, the value appears in plain text in this field and is only encrypted when it passes to the ECC Queue.</li><li>• <b>Value:</b> The value to map to the variable. Manually enter a value, or drag a data pill into the field.</li></ul> |
| Command | The inline PowerShell script to run on the target host.<br><b>Note:</b> This field is only visible when the <b>Script type</b> is <b>Inline script</b> .                                                                                                                                                                                                                                       |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## PowerShell scripting variables

To access input variables from the **Command** field, you must call them using special syntax. The syntax you use depends on the value of a system property. If the **Remoting Type** is **Run on a MID Server or have your script establish a remote session**, some reserved variables are available in addition to input variables.

### Input variable syntax

By default, prefix variable names with a \$ character. For example, if an input variable is named **message**, use \$message to access the variable in script.

If the mid.powershell.command.script.parameter\_passing parameter is set to false, prefix the variable name with \$env:SNC\_. For example, if an input variable is named **message**, use \$env:SNC\_message to access the variable in script. To learn more about the mid.powershell.command.script.parameter\_passing parameter, see [MID Server parameters](#).

### Reserved variables

When the **Remoting Type** is **Run on a MID Server or have your script establish a remote session**, the following variables are available for use in script. Reserved variables cannot be used as custom input variable names.

| Reserved variable | Description                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| \$computer        | Host IP address defined in the Connection alias record.                                                                                                                                                               |
| \$cred            | Credential object that contains the credentials defined in the connection record. Use this variable with any PowerShell cmdlet that supports the credential parameter. For example, New-PSSession -credential \$cred. |
| \$log_info        | If the mid.property.powershell.log_info property is set to true, adds logging information to a PowerShell script.                                                                                                     |

The following variable names are reserved for internal processing and should not be used as input variables.

- script
- useCred
- isMid
- isDiscovery
- debug
- user

- password
- executingScriptDirectory
- midScriptDirectory
- hresult
- [Configure logging for the PowerShell step](#)

Add log messages to the scripts in your PowerShell step. Use log levels for improved logging and debugging.

- [Test a credential for the PowerShell step](#)

Test a configured credential in the PowerShell step. Confirm the credential is working before building the rest of your step.

## REST step

Send an outbound REST web service request to an external system.

**Note:** REST step is not available in the base system and requires the ServiceNow® Integration Hub subscription. After the required plugin is activated, the step is visible under Integrations.

[Outbound REST web service](#) is a platform feature that enables you to retrieve, create, update, or delete data on a web services server that supports the REST architecture.

### Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

### Fields

| Field      | Description                |
|------------|----------------------------|
| Connection | Type of connection to use. |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <ul style="list-style-type: none"> <li><b>Define Connection Inline:</b> Define connection information within the action step.</li> <li><b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li> </ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p>                                                                                                                                           |
| Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel.</p> <p><b>Note:</b> This field is available when <b>Use Connection Alias</b> is selected from the Connection list.</p> |
| Credential Alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <p>Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel.</p> <p><b>Note:</b> This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p> |
| Use MID            | <p>Option to use a ServiceNow® MID Server to run the REST step. Select this check box to display the <b>MID Application</b> and <b>Capabilities</b> fields.</p> <p><b>Note:</b> The system doesn't log REST request, response, and parameter runtime data sent via a MID server in the same way that <a href="#">Outbound web services logging</a> occurs. Instead, you can view this data in the <a href="#">flow execution details</a>.</p>                                                                                                                                 |
| Base URL           | <p>Base URL for the REST request.</p> <ul style="list-style-type: none"> <li>If <b>Use Connection Alias</b> is selected, this field displays the base URL associated with the alias. You can override the base URL by clicking the lock icon () and entering your own.</li> <li>If <b>Define Connection Inline</b> is selected, enter a base URL for the connection.</li> </ul>                                                                                                            |
| Connection Timeout | <p>Number of milliseconds the system waits for a successful host connection. If the step does</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <p>not make a successful connection during this time, the connection request times out. If <b>Define Connection Inline</b> is selected, enter a timeout value for the connection. Leave this field empty to use the system default connection timeout value.</p>                                                                                                                                                                                                                  |
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Connection list, and <b>Use MID</b> is checked.</p> |
| MID Application | <p>Capabilities the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected capabilities. This field is available when <b>Define Connection Inline</b> is selected from the Connection list, <b>Use MID</b> check box is enabled, and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                       |
| Capabilities    | <p>Capabilities the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected capabilities. This field is available when <b>Define Connection Inline</b> is selected from the Connection list, <b>Use MID</b> check box is enabled, and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                       |

| Field         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MID Server    | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Connection list, <b>Use MID</b> check box is enabled, and <b>Specific MID Server</b> is selected from the MID Selection list.                                                                                                                                                                                      |
| MID Cluster   | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Connection list, <b>Use MID</b> is checked, and <b>Specific MID Cluster</b> is selected from the MID Selection list.                                                                                                                                                                                      |
| Build Request | <p>Option to create the request manually, or import an OpenAPI Specification.</p> <ul style="list-style-type: none"> <li>• <b>Manually:</b> Create action inputs and complete the REST step form manually.</li> <li>• <b>From OpenAPI specification:</b> Import an OpenAPI Specification to generate action inputs and complete the REST step form. For more information, see <a href="#">OpenAPI support in the REST step</a>.</li> </ul> |
| API Source    | <p>Option to select an OpenAPI Specification used to construct the request, or select <b>Import OpenAPI</b> to import a new OpenAPI Specification. You can import specifications by providing a URL to the YAML or JSON, or copying and pasting content.</p> <p><b>Note:</b> This field is available when you select <b>From OpenAPI specification</b> from the Build Request list.</p>                                                    |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| API Operation    | <p>Option to select an operation from the list. Available operations are provided by the OpenAPI Specification in the <b>API Source</b> field.</p> <p><b>Note:</b> This field is available when you select <b>From OpenAPI specification</b> from the Build Request list.</p>                                                                                                                                                         |
| Resource Path    | Path for the resource.                                                                                                                                                                                                                                                                                                                                                                                                                |
| HTTP Method      | <p>HTTP method used to process the request.</p> <ul style="list-style-type: none"> <li>• <b>GET</b></li> <li>• <b>POST</b></li> <li>• <b>PUT</b></li> <li>• <b>PATCH</b></li> <li>• <b>DELETE</b></li> </ul>                                                                                                                                                                                                                          |
| Query Parameters | <p>Name-value pairs to pass to the REST endpoint. You can create these parameters manually, or drag input variables into the parameter fields, and then assign a value.</p> <p>Support REST step requests that contain duplicate query parameter names. If you create a REST request that contains duplicate query parameter names, Flow Designer adds the query parameters to the request in the same order as you defined them.</p> |

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <p><b>Note:</b> When importing an OpenAPI Specification, the system adds all parameters and headers present in the specification to the REST step. Review the final REST step values and remove parameters you do not want to send in the request. For example, if the API accepts content type headers for both JSON and XML, the system adds both headers to the REST step. Remove one of the headers depending on the content type you want to receive in the response.</p>                                                                                                                                                                                                                                                                                                                                                                   |
| Headers      | <p>Headers to send with the request. You can create headers manually, or drag input variables into the parameter fields, and then assign a value.</p> <p>Support REST step requests that contain duplicate request headers. If you create a REST request that contains duplicate request headers, the headers are sent in the same order as you defined them.</p> <p><b>Note:</b> When importing an OpenAPI Specification, the system adds all parameters and headers present in the specification to the REST step. Review the final REST step values and remove parameters you do not want to send in the request. For example, if the API accepts content type headers for both JSON and XML, the system adds both headers to the REST step. Remove one of the headers depending on the content type you want to receive in the response.</p> |
| Request Type | Format of the request. Options include.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Field                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        | <ul style="list-style-type: none"> <li>• <b>Text:</b> A request in JSON, XML, or other text format.</li> <li>• <b>Binary:</b> A request in a binary file format.</li> <li>• <b>Multipart:</b> A request consisting of multiple content types.</li> <li>• <b>Form URL-Encoded:</b> A request in a URL-encoded query.</li> </ul> <p><b>Note:</b> This field is editable when the <b>HTTP Method</b> is <b>POST</b>, <b>PUT</b>, <b>PATCH</b>, or <b>DELETE</b>.</p> |
| Request Body [Text]    | <p>Body of the request in JSON or XML format. The flow execution details display the response body as either a link to the embedded text viewer or the sys_id of the attachment record containing the response.</p> <p><b>Note:</b> This field is editable if you select <b>Text</b> from the Request Type list.</p>                                                                                                                                              |
| Attachment             | <p>Attachment record that contains the request. You can look up or create this record in a prior step and define it as an input variable. Create it by using the <b>JSONStreamingBuilder</b> and <b>XMLStreamingBuilder</b> APIs in the Script step.</p> <p><b>Note:</b> This field is available when you select <b>Binary</b> from the Request Type list.</p>                                                                                                    |
| Name, Part Type, Value | <p>Content of a multipart request. For each part, specify its name, part type, and value.</p> <ul style="list-style-type: none"> <li>• <b>Name:</b> The name of the part. It can be any valid string.</li> <li>• <b>Part Type:</b> The type of the part. Select either <b>Text</b> or <b>File</b>.</li> </ul>                                                                                                                                                     |

| Field               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <ul style="list-style-type: none"> <li><b>Text:</b> The text for the part. Once <b>Text</b> is selected, you can specify the content type.</li> <li><b>File:</b> The file for the part. When <b>File</b> is selected, the <b>Value</b> must be the sys_id of the attachment record containing the content. You can look up this record in a prior step or define it as an input value. Once <b>File</b> is selected, you can specify the file name and content type.</li> <li>For <b>Set Filename</b>, select <b>From Attachment</b> to use the attached record's file name, or select <b>From Filename input</b> to enter your own.</li> <li>For <b>Set Content Type</b>, select <b>From Attachment</b> to use the attached record's content type, or select <b>From Content Type input</b> to enter your own.</li> <li><b>Value:</b> The content of the part. For text, the value is the text content. For a file, the value is the sys_id of the attachment record containing the content.</li> </ul> <p><b>Note:</b> These fields are available when you select <b>Multipart</b> from the Request Type list.</p> |
| Name, Value         | <p>Content of a form URL-encoded request. Specify each part of the URL-encoded request with a name-value pair.</p> <p><b>Note:</b> This field is available when you select <b>Form URL-Encoded</b> from the Request Type list.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Enable Retry Policy | <p>Option to enable the retry policy. For more information, see <a href="#">Retry policy</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Field                             | Description                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Override Default Policy for Alias | Option to override the default retry policy. This check box is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                                                                                                                                                               |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement.                                                                                                                                                                  |
| Save As Attachment                | Option to specify whether to save the response as a record in the Attachment [sys_attachment] table.                                                                                                                                                                                                                                                                                                   |
| Attachment File Name              | Name of the attachment created by the REST response. For example, rest-response.txt.<br><b>Note:</b> This field is available when <b>Save As Attachment</b> is selected.                                                                                                                                                                                                                               |
| Attachment File Record            | Target record to which the attachment is associated. The target record must be a data pill of type <b>Record</b> . For example, a specific incident record. You can look up this record in a prior step or define it as an input variable. The flow execution details display the sys_id of the associated record.<br><b>Note:</b> This field is available when <b>Save As Attachment</b> is selected. |

### Action error evaluation fields

| Field              | Description                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or |

| Field | Description                                                                                |
|-------|--------------------------------------------------------------------------------------------|
|       | message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

### REST response size limits

By default, the system limits the size of REST responses that are not saved as attachments to 5 MB. Direct REST responses that exceed this limit generate an error. To support larger response sizes, either save the response as an attachment or increase the response size limit with the glide.pf.rest.response\_payload\_max\_size system property. This system property supports a maximum value of 1024, which limits the REST response to 10 MB in size.

## Script step

Add custom JavaScript to execute within a reusable action. While most core actions and steps fit common use cases, you can build a Script step to execute behavior not satisfied by the core steps.

### Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

**Note:** Integration Hub See [Request Integration Hub](#) for information about Integration Hub usage and subscriptions.

### Fields

The Script step includes separate input and output variables that enable you to map JavaScript data to Flow Designer data. By defining input and output variables within the step, you can define what Flow Designer data is available within your script, and which scripting variables are available to other steps in your action.

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Required Runtime        | <p>The runtime environment required to support the script. Choices include:</p> <ul style="list-style-type: none"><li>• <b>Instance:</b> The action step runs the script from instance. Select this option when the script needs access to the ServiceNow API or instance data. This is the default value.</li><li>• <b>MID:</b> The action step runs the script from the MID Server. Select this option when the script needs access to <a href="#">MID Server script files</a> and APIs. Selecting this option displays the <b>Select MID Server Using</b> field.</li><li>• <b>Vanilla (Core JavaScript):</b> The action step runs the script from either the instance or MID Server. Select this option when the script only needs the core JavaScript APIs and not the ServiceNow API or instance data.</li></ul> <p>The runtime you select determines the JavaScript objects and methods displayed in the <a href="#">Context-sensitive help</a>.</p> <p><b>Note:</b> This field is only visible when Integration Hub is activated.</p> |
| Select MID Server Using | <p>Specify the MID Server selection process to use. Choices include:</p> <ul style="list-style-type: none"><li>• <b>Any MID.</b> The system runs the action step from any available MID Server.</li><li>• <b>Use Connection Alias.</b> The system runs the action using the connection alias you specify. Selecting this option displays the <b>Connection Alias</b> field.</li><li>• <b>Use Inline Selection.</b> The system runs the action using the connection details you specify in the</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <p>action. Selecting this option displays the <b>Host</b>, <b>MID Application</b>, and <b>Capabilities</b> fields.</p> <p><b>Note:</b> This field is only visible when Integration Hub is activated, and you select <b>MID</b> from <b>Required Runtime</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a>, <a href="#">connections</a>, and <a href="#">aliases</a>. Only aliases of connection type Basic are supported.</p> <p><b>Note:</b> This field is only visible when Integration Hub is activated, and you select <b>Use Connection Alias</b> from <b>Select MID Server Using</b>.</p> |
| Host             | <p>The fully-qualified domain name of the MID Server where the system runs the action step. For example, mid-server.domain.com.</p> <p><b>Note:</b> This field is only visible when Integration Hub is activated, and you select <b>Use Inline Selection</b> from <b>Select MID Server Using</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| MID Selection    | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Field               | Description                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | <ul style="list-style-type: none"> <li><b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>MID</b> is selected from the Required Runtime list, and <b>Use Inline Selection</b> is selected from the Select MID Server Using list.</p>                                                                                                     |
| MID Cluster         | Data pill for the MID Cluster you want to use. This field is available when <b>MID</b> is selected from the Required Runtime list, and <b>Use Inline Selection</b> is selected from the Select MID Server Using list.                                                                                                                                                                             |
| MID Application     | Specify the application the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected application. This field is only visible when Integration Hub is activated, <b>Auto-Select MID Server</b> is selected from the MID Selection list, and you select <b>Use Inline Selection</b> from <b>Select MID Server Using</b> . |
| Capabilities        | Capabilities the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected capabilities. This field is only visible when Integration Hub is activated, <b>Auto-Select MID Server</b> is selected from the MID Selection list, and you select <b>Use Inline Selection</b> from <b>Select MID Server Using</b> .           |
| Specific MID Server | Data pill of the required MID Server. This field is only visible when Integration Hub is activated, <b>Specific MID Server</b> is selected from the MID Selection list, and you select <b>Use Inline Selection</b> from <b>Select MID Server Using</b> .                                                                                                                                          |
| Input variables     | Name-value pairs that represent data from the action, enabling you to use action inputs and data from other steps within a script.                                                                                                                                                                                                                                                                |
| Script              | Script that executes within the action. To access input and output variables in your script, use the                                                                                                                                                                                                                                                                                              |

| Field | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <p>global objects inputs and outputs. For example, <code>inputs.myVariable</code>.</p> <p><b>Note:</b> Script step input and output names can't include any of the following reserved system names:</p> <ul style="list-style-type: none"><li>• <code>sys_id</code></li><li>• <code>sys_created_by</code></li><li>• <code>sys_created_on</code></li><li>• <code>sys_updated_on</code></li><li>• <code>sys_updated_by</code></li><li>• <code>sys_mod_count</code></li></ul> <p>The Script step always converts data stored in the inputs and outputs global objects into strings. If your Script step needs to work with JSON data, you can use the <code>inputs</code> global object to convert the JSON data into a string. Alternatively, you can define a JavaScript variable as a string rather than a JavaScript object. For example, this script illustrates two ways you can output JSON data.</p> <div style="border: 1px solid black; padding: 5px;"><pre>(function execute() inputs, outputs) {<br/>    outputs.json_object_1 = inputs.json_input;<br/>    var array_of_objs = '[{"name1":"value1"}<br/>, {"id":"abcd"}]';<br/>    outputs.json_object_2 = array_of_objs;<br/>} (inputs, outputs);</pre></div> <p>By default, Flow Designer run scripts on the instance. To run script from a MID Server requires an Integration Hub subscription.</p> <p>Flow Designer runs script from the domain from which it is triggered or initiated. See <a href="#">Domain separation and Flow Designer</a>.</p> |

| Field            | Description                                                                                                                                  |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                  | For available classes and methods, see the <a href="#">JavaScript API context-sensitive help</a> or the <a href="#">API reference</a> .      |
| Output variables | Map JavaScript output to Flow Designer data pills. Define output variables when you want other steps in the action to use the script output. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

### Example

This example builds a JSON payload that can be easily updated or changed and added to a subsequent REST step.

**Note:** REST step is not available in the base system and requires the ServiceNow® Integration Hub subscription.

The screenshot shows the Action Designer interface with a 'Script step' selected. The 'Input Variables' section contains two variables: 'title' (String) and 'startTime' (Date/Time). The 'Script' section contains the following code:

```

1+ function execute(inputs, outputs) {
2+ var payload = {
3+ "snippet": "Meeting scheduled",
4+ "title": inputs.title,
5+ "start": inputs.startTime
6+ }
7+
8+
9+ outputs.Payload = JSON.stringify(payload);
10} (inputs, outputs);
11

```

The 'Output Variables' section contains one variable: 'Payload' (String).

By creating an output variable that represents the payload, you can drag the **[Payload]** data pill into the REST step **Body** field.

## Send Email step

Send an email to specified users or groups as an action in a flow.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

### Fields

| Field         | Description                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Target Record | Record that the email is associated to. When a user sends a reply to your email, the target record is updated with the reply email content. |
| Table         | Table of the target record.                                                                                                                 |

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Include Watermark | Option to apply a watermark to the email that is sent. To include a watermark, you must set a target record.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| To                | <p>The main recipients of the email. Enter a list of user email addresses separated by commas or white spaces. You can also drag data pills that contain email addresses into the field, such as a User or Group record. For example, if you want to send an email to the group assigned to the incident, drag the <b>[Assignment group]</b> data pill from the data panel.</p> <p>To send email to a group, you must provide a <b>Group email</b> address. To send email to group members, the group must have the <b>Include members</b> option enabled.</p> <p><b>Note:</b> The number of email recipients must be equal to or less than the maximum number set by the <code>glide.email.smtp.max_recipients</code> system property.</p> |
| CC                | Additional recipients copied on this email. Enter a list of user email addresses separated by commas or white spaces. You can also drag data pills that contain email addresses into the field.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| BCC               | Additional recipients of this email, who are visible only to the sender (blind copied). Enter a list of user email addresses separated by commas or white spaces. You can also drag data pills that contain email addresses into the field.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Subject           | Subject of the email. You can enter text or drag data pills into the field.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Body              | The content of the message body. You can enter text or drag data pills into the field.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Field | Description                                                                                                                                                                              |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <p><b>Note:</b> Flow Designer does not support the \${URI} parameter in the email message body. To create a link to a record, use data pills, or create a notification step instead.</p> |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

### Testing the email step

To verify that the email was generated when testing the action, review the email record in the Email [sys\_email] table. The **Headers** field indicates whether the email was successfully generated. For example:

```
X-ServiceNow-Source:FlowDesigner-9ad2747b0b710300f4eb8bf637673a1e
Message-ID:<193756824.0.1508534586438@[10.0.66.70]>
X-ServiceNow-Generated:true
```

ACL restrictions apply to the Send Email action. If you configured your flow to run as the user who initiates the session, ensure that the user can access email. To test access controls for a Send Email action, impersonate a typical email sender and manually trigger the flow.

## SFTP step

Create a reusable action to manage files and directories on an SFTP server and to move files from one SFTP server to another.

**Note:**

- The SFTP step is not available in the base system and requires a subscription to Integration Hub in Automation Engine Professional (com.glide.hub.integrations.professional). For more information about the ServiceNow® Integration Hub subscription packages, see [Integration Hub usage and subscription](#). After the required plugin is activated, the step is visible under Integrations.
- The SFTP step runs only on a ServiceNow® MID Server with SSH capabilities. Activate the plugin, Integration Hub in Automation Engine Professional (com.glide.hub.integrations.professional) to use the JDBC capability for the MID Server. For more information, see [Request an Integration Hub plugin](#).

**Roles and availability**

The SFTP step is available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

**Prerequisite**

Activate the Managed File Transfer Extensions for the SFTP Step (com.glide.hub.action\_step.sftp\_mft) plugin.

**SFTP commands**

- [Copy File](#)
- [Copy Directory](#)
- [Create Directory](#)
- [Get File List](#)
- [Remove File](#)
- [Remove Files](#)
- [Delete Directory](#)
- [Rename File or Directory](#)

- [Set File Attributes](#)
- [Copy Attachments To SFTP Server](#)
- [Copy Files To This Instance](#)

**Note:** The SFTP commands can be performed on a maximum of 10,000 files at a time.

- [Copy File](#)

Copies a file from the source SFTP server to target SFTP server.

- [Copy Directory](#)

Copies a directory from the source SFTP server to the target SFTP server.

- [Create Directory](#)

Creates a new directory on an SFTP server.

- [Get File List](#)

Returns a list of files from a given directory and its subfolders on an SFTP server.

- [Remove File](#)

Removes a file on an SFTP server, including subfolders, when configured.

- [Remove Files](#)

Remove files on an SFTP server, including subfolders, when configured.

- [Delete Directory](#)

Deletes directory on an SFTP server, including subfolders, when configured.

- [Rename File or Directory](#)

Renames a file or directory on an SFTP server.

- [Set File Attributes](#)

Sets common file attributes, such as timestamps, size, permissions, and UID/GID, for a file or directory on an SFTP server.

- [Copy Attachments To SFTP Server](#)

Copies the specified attachments from ServiceNow instance to an SFTP server.

- [Copy Files To This Instance](#)

Attaches the specified files in the SFTP server to the specified record in ServiceNow instance.

Copies a file from the source SFTP server to target SFTP server.

## Fields

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections       | Type of connection to use to connect to the source SFTP server. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> |
| Source Connection |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Source Connection Alias | Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Source Connection list. |
| Target Connection       | Type of connection to use to connect to the target SFTP server. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials</li></ul>                                                                                                                                                                                                                                                                                                                                                                       |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <p>and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</p> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p>                                                                                                                                                                                                                                      |
| Target Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>.</p> |
| Source Credential alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to</p>                                                                                                                                                                                                    |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a> , <a href="#">connections</a> , and <a href="#">aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.                                                          |
| Host            | Name or IP address of the SFTP server that contains the files you wish to copy.                                                                                                                                                                                                                                                                                                                                                             |
| Port            | Port number to communicate with the server.                                                                                                                                                                                                                                                                                                                                                                                                 |
| MID Selection   | Option to select the specific MID Server or MID Cluster. <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list. |
| MID Application | Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.                                                                                                                                                                                                        |

| Field           | Description                                                                                                                                                                                                                           |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capabilities    | Capability of the MID Server. Select <b>SSH</b> . This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list. |
| MID Server      | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.                |
| MID Cluster     | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.     |
| Command Details |                                                                                                                                                                                                                                       |
| Source Path     | Full path to the file in the source server you wish to copy. For example, /root/doc/tempwsdl.rtf.                                                                                                                                     |
| Target Path     | Full path to the file in the target server you wish to copy the contents. For example, /root/doc/attribute.rtf. In this case, the contents of the tempwsdl.rtf are copied to the file, attribute.rtf.                                 |
| Retry Policy    |                                                                                                                                                                                                                                       |

| Field                             | Description                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                           |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                 |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Copies a directory from the source SFTP server to the target SFTP server.

**Note:** If you wish to use the Managed File Transfer feature while copying a directory, activate the ServiceNow IntegrationHub Action Step - MFT (com.glide.hub.action\_step.mft) plugin.

## Fields

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections             | <p>Type of connection to use to connect to the source SFTP server.</p> <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p> |
| Source Connection       | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information</p>                                                                                                                                                                                                                                                                                                                   |
| Source Connection Alias |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <p>changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a>, <a href="#">connections</a>, and <a href="#">aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Source Connection list.</p>                                                                                                                                                                                                                                                                                                                                      |
| Target Connection       | <p>Type of connection to use to connect to the target SFTP server.</p> <ul style="list-style-type: none"> <li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li> <li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li> </ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials</a>, <a href="#">connections</a>, and <a href="#">aliases</a>.</p> |
| Target Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <p>Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a>, <a href="#">connections</a>, and <a href="#">aliases</a>.</p>                                                                                                                                                                                                                                                                                                                                            |
| Source Credential alias | <p>Credential alias that the system uses to run the action step. Users with the <code>flow_designer</code> or <code>admin</code> role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a>, <a href="#">connections</a>, and <a href="#">aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| Host                    | <p>Name or IP address of the SFTP server that contains the files you wish to copy.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Port                    | <p>Port number to communicate with the server.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| MID Application | <p>Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                               |
| Capabilities    | <p>Capability of the MID Server. Select <b>SSH</b>. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                               |
| MID Server      | <p>Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                                             |

| Field           | Description                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MID Cluster     | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.                                                                                                                   |
| Command Details |                                                                                                                                                                                                                                                                                                                                                     |
| Source Path     | Full path to the file in the source server you wish to copy. For example, /root/doc/tempwsdl.rtf.                                                                                                                                                                                                                                                   |
| Target Path     | Full path to the file in the target server you wish to copy the contents. For example, /root/doc/attribute.rtf. In this case, the contents of the tempwsdl.rtf are copied to the file, attribute.rtf.                                                                                                                                               |
| Include Files   | <p>List of target files to remove. This is a comma separated list that accepts wild cards, such as *.txt.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>If no value is provided, subfolders in the specified directory are deleted.</li> <li>If a value is provided, subfolders are not deleted even if they are empty.</li> </ul> |
| Exclude Files   | List of target files that should not be removed. This is a comma                                                                                                                                                                                                                                                                                    |

| Field                        | Description                                                                                                                                                                                                                                                                                         |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | <p>separated list that accepts wild cards, such as *.txt.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>If no value is provided, subfolders in the specified directory are deleted.</li> <li>If a value is provided, subfolders are not deleted even if they are empty.</li> </ul> |
| Include Subfolders           | Option to copy subfolders in the source directory.                                                                                                                                                                                                                                                  |
| Managed File Transfer        |                                                                                                                                                                                                                                                                                                     |
| Target File Name             | Name of the target file.                                                                                                                                                                                                                                                                            |
| Target Directory Name        | Name of the target directory.                                                                                                                                                                                                                                                                       |
| Datetime Format \${DateTime} | Format in which the date and time should be appended to the file name upon copying to the target server.                                                                                                                                                                                            |
| Preserve File Attributes     | Option to preserve the file attributes upon copying files to the target directory.                                                                                                                                                                                                                  |
| Apply Move Conditions        | Option to specify conditions while moving files.                                                                                                                                                                                                                                                    |
| Minimum File Size (Bytes)    | <p>Minimum size requirements to move files.</p> <p><b>Note:</b> This field is available when <b>Apply Move Conditions</b> is enabled.</p>                                                                                                                                                           |

| Field                     | Description                                                                                                                      |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Maximum File Size (Bytes) | Maximum size requirements to move files.<br><b>Note:</b> This field is available when <b>Apply Move Conditions</b> is enabled.   |
| File is Newer than        | Files created after this date are moved.<br><b>Note:</b> This field is available when <b>Apply Move Conditions</b> is enabled.   |
| File is Older than        | Files created before this date are moved.<br><b>Note:</b> This field is available when <b>Apply Move Conditions</b> is enabled.  |
| Move Order                | Order in which the files should be moved.<br><b>Note:</b> This field is available when <b>Apply Move Conditions</b> is enabled.  |
| Sort Order                | Order in which the files should be sorted.<br><b>Note:</b> This field is available when <b>Apply Move Conditions</b> is enabled. |
| Duplicate File Action     | Action to be performed when a duplicate file exists in the target directory.                                                     |

| Field                                  | Description                                                                                                                                                                                                                           |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | <b>Note:</b> This field is available when <b>Apply Move Conditions</b> is enabled.                                                                                                                                                    |
| Retry Policy                           |                                                                                                                                                                                                                                       |
| Enable Retry Policy                    | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                           |
| Override Default Policy for Alias      | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                 |
| Retry Policy                           | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |
| Managed File Transfer Error Cleanup    |                                                                                                                                                                                                                                       |
| Upon Failure, Remove Files on Target   | Option to remove files from the target SFTP server when the copy command fails.                                                                                                                                                       |
| Upon Success, Remove Files from Source | Option to remove files from the source SFTP server when the copy command is executed successfully.                                                                                                                                    |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Creates a new directory on an SFTP server.

## Fields

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections       | Type of connection to use to connect to the source SFTP server. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> To learn more about connections and credentials, see <a href="#">Introduction</a> |
| Source Connection |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <p>to credentials, connections, and aliases.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Source Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Source Connection list.</p> |
| Source Credential alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>.</p>                                                                                                                                                                                                                                                                  |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <p><a href="#">connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p>                                                                                                                                                                                                 |
| Host            | <p>Name or IP address of the SFTP server where you wish to create directory.</p>                                                                                                                                                                                                                                                                                                                                                                          |
| Port            | <p>Port number to communicate with the server.</p>                                                                                                                                                                                                                                                                                                                                                                                                        |
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| MID Application | <p>Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                               |
| Capabilities    | <p>Capability of the MID Server. Select <b>SSH</b>. This field is available when <b>Define Connection Inline</b></p>                                                                                                                                                                                                                                                                                                                                      |

| Field                             | Description                                                                                                                                                                                                                       |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.                                                                                                            |
| MID Server                        | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.            |
| MID Cluster                       | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list. |
| Command Details                   |                                                                                                                                                                                                                                   |
| Source Path                       | Path of the directory you wish to create.                                                                                                                                                                                         |
| Retry Policy                      |                                                                                                                                                                                                                                   |
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                       |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                             |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default                                                                              |

| Field | Description                                                                      |
|-------|----------------------------------------------------------------------------------|
|       | retry policy and select another existing retry policy based on your requirement. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Returns a list of files from a given directory and its subfolders on an SFTP server.

**Note:** This SFTP command runs only on a ServiceNow® MID Server.

### Fields

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections       |                                                                                                                                                                                                                                                                                                                                                                                      |
| Source Connection | Type of connection to use to connect to the source SFTP server. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials</li></ul> |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <p>and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</p> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Source Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Source Connection list.</p> |
| Source Credential alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <p>record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| Host            | <p>Name or IP address of the SFTP server that contains the files you wish to list.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Port            | <p>Port number to communicate with the server.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p>                                                                                             |
| MID Application | <p>Option to use a MID Server to run the SFTP step. This field is</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Field           | Description                                                                                                                                                                                                                           |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.                                                                 |
| Capabilities    | Capability of the MID Server. Select <b>SSH</b> . This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list. |
| MID Server      | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.                |
| MID Cluster     | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.     |
| Command Details |                                                                                                                                                                                                                                       |
| Source Path     | Path of the directory that contains the files you wish to list.                                                                                                                                                                       |
| Include Files   | List of target files to include. This is a comma separated list that accepts wild cards, such as *.txt.                                                                                                                               |

| Field                             | Description                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Exclude Files                     | List of target files to exclude. This is a comma separated list that accepts wild cards, such as *.txt.                                                                                                                               |
| Include Subfolders                | Option to specify if files from subfolders are included in the list.                                                                                                                                                                  |
| Retry Policy                      |                                                                                                                                                                                                                                       |
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                           |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                 |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Removes a file on an SFTP server, including subfolders, when configured.

## Fields

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections             | <p>Type of connection to use to connect to the source SFTP server.</p> <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p> |
| Source Connection       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Source Connection Alias | Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information                                                                                                                                                                                                                                                                                                                              |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a> , <a href="#">connections</a> , and <a href="#">aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Source Connection list.                                                                                                                                                                                                                                                                                                                                |
| Source Credential alias | Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a> , <a href="#">connections</a> , and <a href="#">aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list. |
| Host                    | Name or IP address of the SFTP server that contains the file you wish to remove.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Port                    | Port number to communicate with the server.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| MID Application | <p>Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                               |
| Capabilities    | <p>Capability of the MID Server. Select <b>SSH</b>. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                               |
| MID Server      | <p>Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                                             |

| Field                             | Description                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MID Cluster                       | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.     |
| Command Details                   |                                                                                                                                                                                                                                       |
| Source Path                       | Path of the directory that contains the file you wish to remove.                                                                                                                                                                      |
| Retry Policy                      |                                                                                                                                                                                                                                       |
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                           |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                 |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |

## Action error evaluation fields

| Field              | Description                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or |

| Field | Description                                                                                |
|-------|--------------------------------------------------------------------------------------------|
|       | message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Remove files on an SFTP server, including subfolders, when configured.

## Fields

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections             | Type of connection to use to connect to the source SFTP server. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a> . |
| Source Connection       | Connection & Credential alias record that the system uses to run the action step. Users with the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Source Connection Alias |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a> , <a href="#">connections</a> , and <a href="#">aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Source Connection list. |
| Source Credential alias | Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a> , <a href="#">connections</a> , and <a href="#">aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection</b>        |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <b>Inline</b> is selected from the Source Connection list.                                                                                                                                                                                                                                                                                                                                                                                                |
| Host            | Name or IP address of the SFTP server that contains the file you wish to remove.                                                                                                                                                                                                                                                                                                                                                                          |
| Port            | Port number to communicate with the server.                                                                                                                                                                                                                                                                                                                                                                                                               |
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| MID Application | <p>Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                               |
| Capabilities    | <p>Capability of the MID Server. Select <b>SSH</b>. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                               |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                         |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MID Server              | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.                                                                                                                              |
| MID Cluster             | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.                                                                                                                   |
| Command Details         |                                                                                                                                                                                                                                                                                                                                                     |
| Source Path             | Path of the directory that contains the files you wish to remove.                                                                                                                                                                                                                                                                                   |
| Apply Remove Conditions | Option to specify conditions to remove files.                                                                                                                                                                                                                                                                                                       |
| Include Files           | <p>List of target files to remove. This is a comma separated list that accepts wild cards, such as *.txt.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>If no value is provided, subfolders in the specified directory are deleted.</li> <li>If a value is provided, subfolders are not deleted even if they are empty.</li> </ul> |
| Exclude Files           | List of target files that should not be removed. This is a comma                                                                                                                                                                                                                                                                                    |

| Field                             | Description                                                                                                                                                                                                                                                                                         |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | <p>separated list that accepts wild cards, such as *.txt.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>If no value is provided, subfolders in the specified directory are deleted.</li> <li>If a value is provided, subfolders are not deleted even if they are empty.</li> </ul> |
| Include Subfolders                | Option to specify if files from the subfolders should be removed.                                                                                                                                                                                                                                   |
| Retry Policy                      |                                                                                                                                                                                                                                                                                                     |
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                                                                                         |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                                                               |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement.                                                               |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Deletes directory on an SFTP server, including subfolders, when configured.

## Fields

| Field             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections       | Type of connection to use to connect to the source SFTP server. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> To learn more about connections and credentials, see <a href="#">Introduction</a> |
| Source Connection |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <a href="#">to credentials, connections, and aliases.</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Source Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Source Connection list.</p> |
| Source Credential alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>.</p>                                                                                                                                                                                                                                                                  |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <p><a href="#">connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p>                                                                                                                                                                                                 |
| Host            | <p>Name or IP address of the SFTP server that contains the directory you wish to delete.</p>                                                                                                                                                                                                                                                                                                                                                              |
| Port            | <p>Port number to communicate with the server.</p>                                                                                                                                                                                                                                                                                                                                                                                                        |
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| MID Application | <p>Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                               |
| Capabilities    | <p>Capability of the MID Server. Select <b>SSH</b>. This field is available when <b>Define Connection Inline</b></p>                                                                                                                                                                                                                                                                                                                                      |

| Field               | Description                                                                                                                                                                                                                       |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.                                                                                                            |
| MID Server          | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.            |
| MID Cluster         | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list. |
| Command Details     |                                                                                                                                                                                                                                   |
| Source Path         | Path of the directory you wish to remove.                                                                                                                                                                                         |
| Include Subfolders  | Option to specify if the subfolders should be deleted.<br><b>Note:</b> If this option is selected, all subfolders are deleted.<br>Else, only empty subfolders are deleted.                                                        |
| Retry Policy        |                                                                                                                                                                                                                                   |
| Enable Retry Policy | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                       |

| Field                             | Description                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                 |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Renames a file or directory on an SFTP server.

### Fields

| Field             | Description                                                                                                                                                                                                |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections       |                                                                                                                                                                                                            |
| Source Connection | Type of connection to use to connect to the source SFTP server. <ul style="list-style-type: none"> <li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li> </ul> |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <ul style="list-style-type: none"><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p>                                                                                                                                                                                                                    |
| Source Connection Alias | Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Source Connection list. |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source Credential alias | Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a> , <a href="#">connections</a> , and <a href="#">aliases</a> . The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list. |
| Host                    | Name or IP address of the SFTP server that contains the file or directory you wish to rename.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Port                    | Port number to communicate with the server.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| MID Selection           | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"><li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li><li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li><li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                     |

| Field           | Description                                                                                                                                                                                                                           |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.                                                                                                                             |
| MID Application | Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.  |
| Capabilities    | Capability of the MID Server. Select <b>SSH</b> . This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list. |
| MID Server      | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.                |
| MID Cluster     | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.     |
| Command Details |                                                                                                                                                                                                                                       |
| Source Path     | Full path to the file or directory.                                                                                                                                                                                                   |

| Field                             | Description                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Target Path                       | Full path with the renamed file or directory.                                                                                                                                                                                         |
| Retry Policy                      |                                                                                                                                                                                                                                       |
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                           |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                 |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Sets common file attributes, such as timestamps, size, permissions, and UID/GID, for a file or directory on an SFTP server.

A good practice is to use the Get File List command to return a list of files and their attributes first. Then, after you have moved the files from a

source host to a target host, use the Set File Attributes command to set the source file attributes on the target file.

## Fields

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections             | <p>Type of connection to use to connect to the source SFTP server.</p> <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p> |
| Source Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when</p>                     |

| Field                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <b>Use Connection Alias</b> is selected from the Source Connection list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Source Credential alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| Host                    | Name or IP address of the SFTP server that contains the file you wish to remove.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Port                    | Port number to communicate with the server.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| MID Selection           | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p>                                                                                                                                                                                                                                                    |
| MID Application         | <p>Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Field                      | Description                                                                                                                                                                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capabilities               | Capability of the MID Server. Select <b>SSH</b> . This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.            |
| MID Server                 | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.                           |
| MID Cluster                | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.                |
| Command Details            |                                                                                                                                                                                                                                                  |
| Source Path                | Path of the directory that contains the files you wish to remove.                                                                                                                                                                                |
| User ID                    | User ID attribute to apply to the file or directory. The UID and GUID variables must be set together as a pair.                                                                                                                                  |
| Group ID                   | Group ID attribute to apply to the file or directory. The UID and GUID variables must be set together as a pair.                                                                                                                                 |
| Permissions (chmod)        | File or directory permissions to set for the user and group specified. This value must be specified in Octal notation only. For example, 755.<br><b>Note:</b> The permissions number is an internal value returned by the Get File List command. |
| Modified Timestamp (epoch) | Override the timestamp when the file or directory was last modified.                                                                                                                                                                             |

| Field                             | Description                                                                                                                                                                                                                                                      |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>Timestamp must be in epoch format.</li> <li>Access and modification timestamps must be set together as a pair.</li> </ul>                                                                             |
| Accessed Timestamp (epoch)        | <p>Override the timestamp when the file or directory was last accessed.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>Timestamp must be in epoch format.</li> <li>Access and modification timestamps must be set together as a pair.</li> </ul> |
| Retry Policy                      |                                                                                                                                                                                                                                                                  |
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                                                      |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                            |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement.                            |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Copies the specified attachments from ServiceNow instance to an SFTP server.

## Fields

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections      | Type of connection to use to connect to the source SFTP server. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a> . |
| Connection Alias | Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <p>Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Connection list.</p>                                                                                                             |
| Credential Alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p> |
| Host             | <p>Name or IP address of the SFTP server to which the files you should be copied. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Port             | <p>Port number to communicate with the server. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| MID Selection    | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul>                                                                                                                                                                                                                                                                                                                                                              |

| Field               | Description                                                                                                                                                                                                                       |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.                                                                                                                         |
| MID Server          | Specific MID Server to run the SFTP step. This field is available when <b>Specific MID Server</b> is selected from the MID Selection list.                                                                                        |
| MID Cluster         | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list. |
| MID Application     | Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.     |
| Capabilities        | Capability of the MID Server. Select <b>SSH</b> . This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.    |
| MID Server          | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.                   |
| Attachments to Copy |                                                                                                                                                                                                                                   |
| Attachment Records  | Records in your ServiceNow instance that you want to copy to SFTP server.                                                                                                                                                         |
| Copy to SFTP Target |                                                                                                                                                                                                                                   |
| Target Path         | Full path to the file in the target server you want to copy the contents. For example, /root/doc/. In this case, the attachments would be copied to this path on the server.                                                      |
| Retry Policy        |                                                                                                                                                                                                                                   |

| Field                             | Description                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                                           |
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the <b>Connection</b> list.                                                                          |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Attaches the specified files in the SFTP server to the specified record in ServiceNow instance.

### Fields

| Field       | Description                                                                                                                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connections |                                                                                                                                                                                                            |
| Connection  | Type of connection to use to connect to the source SFTP server. <ul style="list-style-type: none"> <li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li> </ul> |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <ul style="list-style-type: none"> <li><b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li> </ul> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p>                                                                                                                                                                                                                       |
| Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Connection list.</p> |
| Credential Alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                         |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Host            | Name or IP address of the SFTP server to which the files you should be copied. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                                                                                                                                                                                         |
| Port            | Port number to communicate with the server. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                                                                                                                                                                                                                                            |
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list.</p> |
| MID Server      | Specific MID Server to run the SFTP step. This field is available when <b>Specific MID Server</b> is selected from the MID Selection list.                                                                                                                                                                                                                                                                                                                |
| MID Cluster     | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Source Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.                                                                                                                                                                                                                         |
| MID Application | Option to use a MID Server to run the SFTP step. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.                                                                                                                                                                                                                             |
| Capabilities    | Capability of the MID Server. Select <b>SSH</b> . This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.                                                                                                                                                                                                                            |

| Field                                     | Description                                                                                                                                                                                                     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MID Server                                | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Specific MID Server</b> is selected from the MID Selection list. |
| <b>SFTP Files To Copy</b>                 |                                                                                                                                                                                                                 |
| Source Path                               | Path of the directory that contains the files you want to copy. For example, /root/doc/.                                                                                                                        |
| Include Files                             | List of target files to copy. This is a comma separated list that accepts wild cards, such as *.txt.<br><br><b>Note:</b> If no value is provided, subfolders in the specified directory are copied.             |
| Exclude Files                             | List of target files that should not be copied. This is a comma separated list that accepts wild cards, such as *.txt.                                                                                          |
| Maximum File Size (KB)                    | Maximum size of the file that can be copied.                                                                                                                                                                    |
| Maximum Number of Files                   | Maximum number of files that can be copied in a request.                                                                                                                                                        |
| <b>Attach Files To This Target Record</b> |                                                                                                                                                                                                                 |
| Target Record                             | Record in ServiceNow instance to which you want to attach the files.                                                                                                                                            |
| Table                                     | ServiceNow table in which the target record is saved.                                                                                                                                                           |
| <b>Retry Policy</b>                       |                                                                                                                                                                                                                 |
| Enable Retry Policy                       | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                                     |

| Field                             | Description                                                                                                                                                                                                                           |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Override Default Policy for Alias | Option to override the default retry policy. This option is not applicable when <b>Define Connection Inline</b> is selected from the Connection list.                                                                                 |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## SSH step

The SSH step executes SSH commands on an external \*nix system through a ServiceNow® MID Server. The step also stores scripts and commands for the \*nix systems.

### Note:

- This step requires an Integration Hub subscription. For more information, see [Legal schedules - IntegrationHub overview](#).
- Integration Hub supports ServiceNow SSH only.

## Roles and availability

The SSH step is available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

## Sanitizing inputs

Escape all user inputs to eliminate the possibility of a malicious user executing arbitrary commands on your target server. Escape and validate data pills before the command field uses them by sanitizing arguments using [Sanitize shell arguments transform functions](#). This transform function category automatically appears when a data pill is dropped into the **Command** input.

## Fields

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection Details | Type of connection to use. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action.</li></ul> To learn more about connections and credentials, see <a href="#">Introduction</a> |
| Connection         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <p><a href="#">to credentials, connections, and aliases.</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Use Connection Alias</b> is selected from the Connection list.</p> |
| Credential Alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>.</p>                                                                                                                                                                                                                                                           |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <p><a href="#">connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                                                                                                                                                                 |
| Host            | <p>Host name or IP address of the target server. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                                                                                                                                                                                                                                                            |
| Port            | <p>Port number to communicate with the server. This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p>                                                                                                                                                                                                                                                                                              |
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p> |
| MID Application | <p>Option to use a MID Server to run the SSH step. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                                |

| Field             | Description                                                                                                                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capabilities      | Capability of the MID Server. Select <b>SSH</b> . This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Auto-Select MID Server</b> is selected from the MID Selection list. |
| MID Server        | Data pill of the required MID Server. This field is available when <b>Define Connection Inline</b> is selected from the Connection list and <b>Specific MID Server</b> is selected from the MID Selection list.                |
| MID Cluster       | Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Connection list, and <b>Specific MID Cluster</b> is selected from the MID Selection list.     |
| SSH Configuration |                                                                                                                                                                                                                                |
| Working Directory | Optional target directory on the target host where the command is run.                                                                                                                                                         |
| Command           | Command that runs on the target directory. The command can also include MID Server scripts. See <a href="#">Advanced SSH script options</a> for more information.                                                              |

| Field        | Description                                                                                                                                                                                                                                                          |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <p><b>Note:</b> Escape and validate data pills before the command field uses them by sanitizing arguments using a preprocessing <a href="#">Script step</a>. For more information, see <a href="#">Sanitizing arguments using the escape class and function</a>.</p> |
| Long Running | Option to disable the SSH connection timeout for commands that might take longer than the default time of 120 seconds to run. When selected, the engine detaches from the execution thread until completion.                                                         |
| Sudo Mode    | Option to elevate privileges to execute the script.                                                                                                                                                                                                                  |

For more information, see [SSH credentials](#).

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

### Advanced SSH script options

To run a MID Server script on the target host, specify the script type and pass the name of the script into the \${syncFile()} parameter. The system uses this parameter to locate the named script in the MID Server Script File [ecc\_agent\_script\_file] table and run it on the target host. For example, a bash script can be expressed as:

```
bash ${syncFile("<MID script name>")} argument1 argument2
argument3
```

A base script (`main_script.bash`) can reference another script (`my_include.bash`) as well as a separate file (`.my_profile`) located on the target host. Both scripts and the file referenced must be synced to the MID Server, using the `syncFile()` parameter, to execute properly.

```
source ${syncFile(".my_profile")}
cp ${syncFile("my_include.bash")} /usr/ssmith/my_include.b
ash
bash ${syncFile("main_script.bash")} one two three four fi
ve six
rm /usr/ssmith/my_include.bash
```

A Python example with inline comments might look like this:

```
set $LIB_DIR=/usr/bin;.
Sync a file that is referenced inside myF5CreateLBPool.p
y
cp ${syncFile("specialFunctions.py")} ~/specialFunctions.p
y
set up environment variables
source ${syncFile(".python_profile")}
call script that sets up dependencies on the box from re
mote package repos
python ${syncFile("setupPythonDependencies.py")} pycontro
l
call a script that requires functions from the package a
s well as a function from myIncludedFile
python ${syncFile("myF5CreateLBPool.py")} snow_pool myActu
alValue
user is responsible for their own cleanup
rm ~/specialFunctions.py
```

To see the list of available MID Server scripts, navigate to **MID Server > Script Files**.

## SOAP step

Enable action designers to send outbound SOAP web service requests to external systems.

**Note:** SOAP step is not available in the base system and requires the ServiceNow® Integration Hub subscription. After the required plugin is activated, the step is visible under Integrations.

### Roles and availability

- Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.
- Action designers need the web\_service\_admin role to perform these web services tasks.
  - Select WSDL
  - Load new WSDL
  - Select a WS-Security policy
- The ServiceNow® MID Server doesn't support WS-Security policies.

### Fields

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection Details | The type of connection to use. <ul style="list-style-type: none"><li>• <b>Define Connection Inline:</b> Define connection information within the action step.</li><li>• <b>Use Connection Alias:</b> Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information</li></ul> |
| Connection         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Field            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <p>changes, you don't need to update your custom action.</p> <p>To learn more about connections and credentials, see <a href="#">Introduction to credentials, connections, and aliases</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Connection Alias | <p>Connection &amp; Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials, connections, and aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel.</p> <p><b>Note:</b> This field is available when <b>Use Connection Alias</b> is selected from the Connection list.</p> |
| Credential Alias | <p>Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Field              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <p>the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see <a href="#">credentials</a>, <a href="#">connections</a>, and <a href="#">aliases</a>. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel.</p> <p><b>Note:</b> This field is available when <b>Define Connection Inline</b> is selected from the Connection list.</p> |
| Use MID            | <p>Option to use a MID Server to run the SOAP step. Select this check box to display the <b>MID Selection</b>, <b>MID Application</b>, and <b>Capabilities</b> fields.</p> <p><b>Note:</b> This field is available when <b>Use Connection Alias</b> is selected from the Connection list.</p>                                                                                                                                                                                                                                                                    |
| Endpoint           | <p>The URL endpoint for the SOAP request. If <b>Use Connection Alias</b> is selected, this field is read-only and displays the endpoint URL associated with alias. If <b>Define Connection Inline</b> is selected, enter an endpoint URL for the connection.</p>                                                                                                                                                                                                                                                                                                 |
| Connection Timeout | <p>Number of milliseconds the system waits for a successful host connection. If the step</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Field           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <p>does not make a successful connection during this time, the connection request times out. If <b>Define Connection Inline</b> is selected, enter a timeout value for the connection. Leave this field empty to use the system default connection timeout value.</p>                                                                                                                                                                                                             |
| MID Selection   | <p>Option to select the specific MID Server or MID Cluster.</p> <ul style="list-style-type: none"> <li>• <b>Auto-Select MID Server:</b> Selects the MID Server automatically.</li> <li>• <b>Specific MID Server:</b> Uses the MID Server you select.</li> <li>• <b>Specific MID Cluster:</b> Uses the MID Cluster you select.</li> </ul> <p>This field is available when <b>Define Connection Inline</b> is selected from the Connection list, and <b>Use MID</b> is checked.</p> |
| MID Cluster     | <p>Data pill for the MID Cluster you want to use. This field is available when <b>Define Connection Inline</b> is selected from the Connection list, <b>Use MID</b> is checked, and <b>Specific MID Cluster</b> is selected from the MID Selection list.</p>                                                                                                                                                                                                                      |
| Request Details |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Build Envelope  | <p>The method to use when building the SOAP envelope.</p> <ul style="list-style-type: none"> <li>• <b>From WSDL:</b> Select this option to display the <b>Select a WSDL</b> and <b>Operation</b> fields.</li> </ul>                                                                                                                                                                                                                                                               |

| Field         | Description                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <ul style="list-style-type: none"> <li>• <b>Manually:</b> Select this option to manually enter or paste WSDL text.</li> </ul>                                                                                                                                                                                                                                                              |
| Select a WSDL | <p>The WSDL to use to build the SOAP envelope. Select an existing WSDL record or click <b>Load New WSDL</b> to download or manually enter a WSDL file. The selected WSDL populates the values of the <b>Operation</b>, <b>SOAP action</b>, and <b>SOAP Envelope</b> fields.</p> <p><b>Note:</b> This field is available when you select <b>From WSDL</b> from the Build Envelope list.</p> |
| Load New WSDL | <p>Option to download or manually enter a WSDL file.</p>                                                                                                                                                                                                                                                                                                                                   |
| Operation     | <p>The operation to run from the selected WSDL. Each WSDL has its own list of available operations.</p>                                                                                                                                                                                                                                                                                    |
| SOAP Action   | <p>The URL to run the SOAP action. If <b>Build Envelope</b> is set to <b>From WSDL</b>, this field is read-only and displays the URL to run SOAP action. If <b>Build Envelope</b> is set to <b>Manually</b>, enter a URL to run the SOAP action.</p>                                                                                                                                       |
| Request Type  | <p>Format of the request. Options include.</p> <ul style="list-style-type: none"> <li>• <b>Text:</b> A request in JSON, XML, or other text format.</li> <li>• <b>Binary:</b> A request in a binary file format.</li> </ul>                                                                                                                                                                 |

| Field          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SOAP Envelope  | <p>The XML text sent to the endpoint. If <b>Build Envelope</b> is set to <b>From WSDL</b>, the system adds the necessary XML for the <b>Operation</b> that you select. If <b>Build Envelope</b> is set to <b>Manually</b>, enter the XML text that you want to use. Enter record values in the appropriate SOAP envelope elements. For example, enter an incident short description in the &lt;short_description&gt; element.</p> <p><b>Note:</b> This field is available when the <b>Request Type</b> is <b>Text</b>.</p> |
| Attachment     | <p>Attachment record that contains the request. You can look up or create this record in a prior step and define it as an input variable. Create it by using the <a href="#">JSONStreamingBuilder</a> and <a href="#">XMLStreamingBuilder</a> APIs in the Script step.</p> <p><b>Note:</b> This field is available when the <b>Request Type</b> is <b>Binary</b>.</p>                                                                                                                                                      |
| Reset Envelope | <p>Option to discard all manual changes that you made to the SOAP envelope. Select this check box to revert the SOAP envelope to its original state.</p> <p><b>Note:</b> This field is available when you select <b>From WSDL</b> from the Build Envelope list.</p>                                                                                                                                                                                                                                                        |
| New WSDL       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Field         | Description                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | The name of the WSDL record you want to create.                                                                                                                                                                                                                                                                                                                                                                              |
| Import Method | <p>The method to enter WSDL.</p> <ul style="list-style-type: none"> <li>• <b>Download from URL:</b> Select to display the <b>WSDL URL</b>, <b>User name</b>, and <b>Password</b> fields to retrieve the WSDL from an external source, typically the web service provider.</li> <li>• <b>Manually Populate WSDL Content:</b> Select to display the <b>WSDL Content</b> field to manually enter or paste WSDL text.</li> </ul> |
| WSDL URL      | <p>The URL to the SOAP web service.</p> <p><b>Note:</b> This field is available when you select <b>Download from URL</b> from the Import Method list.</p>                                                                                                                                                                                                                                                                    |
| User name     | <p>The user name to authenticate with the SOAP web service.</p> <p><b>Note:</b> This field is available when you select <b>Download from URL</b> from the Import Method list.</p>                                                                                                                                                                                                                                            |
| Password      | <p>The password to authenticate with the SOAP web service. The system always masks passwords in the user interface and prevents exporting them as plain text.</p>                                                                                                                                                                                                                                                            |

| Field                             | Description                                                                                                                                                                                     |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | <b>Note:</b> This field is available when you select <b>Download from URL</b> from the Import Method list.                                                                                      |
| WSDL Content                      | The XML document describing the SOAP web service and its operations.<br><b>Note:</b> This field is available when you select <b>Manually Populate WSDL Content</b> from the Import Method list. |
| Import                            | Option to add the SOAP web service WSDL to the instance.                                                                                                                                        |
| WS-Security                       |                                                                                                                                                                                                 |
| Enable WS-Security Policy         | Option to restrict the SOAP web service to a security policy. Select this check box to display the <b>Policy</b> field.                                                                         |
| Policy                            | The policy record that you want to use to restrict web service connections. Select an existing policy record.                                                                                   |
| Retry Policy                      |                                                                                                                                                                                                 |
| Enable Retry Policy               | Option to enable the retry policy. For more information, see <a href="#">Retry policy</a> .                                                                                                     |
| Override Default Policy for Alias | Option to override the default retry policy. This check box is not applicable when <b>Define</b>                                                                                                |

| Field                             | Description                                                                                                                                                                                                                                            |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | <b>Connection Inline</b> is selected from the Connection list.                                                                                                                                                                                         |
| Retry Policy                      | Default retry policy associated with <b>Connection Alias</b> . If <b>Override Default Policy for Alias</b> is selected, you can override the default retry policy and select another existing retry policy based on your requirement.                  |
| Advanced Options                  |                                                                                                                                                                                                                                                        |
| Headers                           | The name-value pairs to include in the SOAP message as HTTP headers. Click the plus icon  to add headers. Add a <b>Name</b> and <b>Value</b> for each HTTP header. |
| <b>Headers &gt; Omit if empty</b> | <p>Option to exclude a header if the value is empty or null.</p> <p><b>Note:</b> This check box is available after clicking the down arrow to display the advanced options.</p>                                                                        |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## SOAP response size limit

The system limits the size of SOAP responses to 5 MB. Direct SOAP responses that exceed this limit generate an error. To support larger response sizes, increase the response size limit with the `glide.pf.soap.response_payload_max_size` system property. This system property supports a maximum value of 10 MB.

## Update Multiple Records step

Look up and update multiple records as a single step. Using this step removes the need to separately look up a list of records and then process the list with a Script step. Set field values with a template or add and configure them using data pills.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

### Fields

| Field        | Description                                                                                                                                                                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table        | Select the table containing the records to look up and update.                                                                                                                                                                                                        |
| Conditions   | Define the filter conditions used to look up records.                                                                                                                                                                                                                 |
| Field Values | <p>Set static or dynamic values of fields in the record. For example, to set the short description to a static value, select <b>Short description</b> and set the desired value.</p> <p>To add dynamic values, see <a href="#">Create a template value input</a>.</p> |

| Field                           | Description                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | <b>Important:</b> The system does not support updating multiple journal fields such as the additional comments or work notes of a task record. |
| Order by                        | Select the field that you want to use to sort the records when more than one record matches the defined conditions.                            |
| Sort Type                       | Determine whether to sort the records alphabetically in ascending or descending order.                                                         |
| Run Business Rules and Workflow | Determine whether to call any business rules and workflows associated with the table.                                                          |
| Update System Fields            | Select if you want to automatically update <b>system fields</b> such as <b>Updated by</b> .                                                    |
| Don't fail on error             | Specify whether to continue running the flow when there is an error.                                                                           |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Example

The screenshot shows the ServiceNow Action Outline interface for a 'Test Update Action'. The main area displays a single step: '1. Update Multiple Records step'. This step is configured to update the 'Incident (incident)' table. The 'Conditions' section specifies that 'All of these conditions must be met': 'Parent . Number is action = Parent Number'. The 'Field Values' section contains three fields: 'State' set to 'Resolved', 'Resolution code' set to 'action = Problem Resolution Code', and 'Resolution notes' set to 'action = Problem Resolution Notes'. The right side of the interface shows 'Input Variables' (Parent Number, Problem Resolution Code, Problem Resolution Notes) and 'Output Variables' (Count, Status, Error Message). Below the configuration, there are checkboxes for 'Run Business Rules and Workflow', 'Update System Fields', and 'Don't fail on error'.

## Outputs

| Field         | Description                                                                                                                                | Data Type |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Count         | Number of records updated. If no records are updated, the count is 0.                                                                      | Integer   |
| Error Message | Message that is displayed if the step produces an error.                                                                                   | String    |
| Status        | The completion status of the step as a numeric value. <ul style="list-style-type: none"> <li>• 0 (success)</li> <li>• 1 (error)</li> </ul> | Choice    |

## Update Record step

Update an existing record in a table. You can dynamically add and configure fields for the record, or use a template to set field values.

### Roles and availability

Available as an Action Designer action step. Users with the action\_designer role can create a custom action with one or more action steps.

### Fields

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record       | The record to be updated. Drag-and-drop a record data pill or use the data pill picker to select a record.                                                                                                                                                                                                                                                                                                                  |
| Table        | The table associated with the record. When you select a record, this field is automatically set to the table associated with the record.                                                                                                                                                                                                                                                                                    |
| Field Values | <p>Set static or dynamic values of fields in the record. For example, to set the short description to a static value, select <b>Short description</b> and set the desired value.</p> <p>To add dynamic values, see <a href="#">Create a template value input</a>.</p> <p><b>Important:</b> The system does not support updating multiple journal fields such as the additional comments or work notes of a task record.</p> |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Wait For Condition step

Pause a flow until record values match a specific set of conditions.

### Roles and availability

Available as an Action Designer action step. Users with the `action_designer` role can create a custom action with one or more action steps.

### Fields

| Field      | Description                                                                                                                                                                                                                                                                                                                                                       |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record     | Drag an input record or a record from a previous step.<br><b>Note:</b> If this record is deleted, the flow stops waiting and continues running.                                                                                                                                                                                                                   |
| Table      | Read-only. Set to the table associated with the record. Confirm that <a href="#">the system supports Wait for Condition</a> for your selected table.                                                                                                                                                                                                              |
| Conditions | Select the record values necessary to resume running the flow. For example, if the condition is <b>[State] [is] [Closed]</b> , the flow pauses until the condition is met. Once met, the flow moves on to the next step or action. Set static or dynamic conditions to filter records. To define a static condition applied each time the action runs, define the |

| Field          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | conditions with the condition builder. To enable flow designers to dynamically apply conditions, define an input of type Conditions and drag-and-drop the input data pill into the <b>Conditions</b> field.                                                                                                                                                                                                                                                                                                                                             |
| Enable timeout | <p>Option to limit the amount of time that the flow waits for the action to be completed before continuing.</p> <p><b>Note:</b> Use the <b>Enable timeout</b> option to prevent this action from continuing to run. If the condition to continue is never met, a timeout value specifies when the system skips the Wait for Condition action and go to the next item in the flow. You must set a Duration value to enable a timeout. You can also select a Schedule if you want to compute the duration end date based on a specific work schedule.</p> |
| Duration       | Amount of time that the flow waits before continuing when the <b>Enable timeout</b> option is selected. Enter the time to wait in hours, minutes, and seconds. If you leave this field empty, the flow does not wait.                                                                                                                                                                                                                                                                                                                                   |
| Schedule       | Schedule used to compute the timeout duration when the <b>Enable timeout</b> option is selected. For example, waiting for 10 hours as part of an 8-5 weekdays schedule causes the flow to wait for one or more business days. If you leave this field empty, the timeout runs without a schedule.                                                                                                                                                                                                                                                       |

### Action error evaluation fields

| Field              | Description                                                         |
|--------------------|---------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. |

| Field | Description                                                                                                               |
|-------|---------------------------------------------------------------------------------------------------------------------------|
|       | To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Unsupported tables

The system does not support Wait for Condition for the following tables.

| Table Category | Table Names                                                                                                                                                                                                                                                                                              |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Audit          | Sys Audit [sys_audit], Audit Deleted Record [sys_audit_delete], Audit Relationship Change [sys_audit_relation], Audit Roles [sys_audit_role], Audit Relationship Change [sys_audit_relation], Audit Deleted Record [sys_audit_delete]                                                                    |
| Email          | Email [sys_email], Email Account [sys_email_account], Email Log [sys_email_log]                                                                                                                                                                                                                          |
| Events         | Event [sysevent], Notification [sysevent_email_action], Stationery [sysevent_email_style], Email Template [sysevent_email_template], Inbound Email Actions [sysevent_in_email_action], Slow Event [sysevent_pattern], Event Registration [sysevent_registration], Script Action [sysevent_script_action] |
| Import Sets    | Import Set [sys_import_set], Import Set Row [sys_import_set_row], Import Set Row Error [sys_import_set_row_error], Transform History                                                                                                                                                                     |

| Table Category        | Table Names                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | [sys_import_set_run], Computer<br>[imp_computer], Notification<br>[imp_notification], Location<br>[imp_location], User [imp_user]                                                                                                                                                                                                                                                                                               |
| JRobin                | JRobin Database<br>[jrobin_database], JRobin<br>Shard [jrobin_shard], Graph<br>Line [jrobin_graph_line],<br>JRobin Shard Fragments<br>[jrobin_shard_location], Member<br>[jrobin_graph_set_member], Round<br>Robin Archive [jrobin_archive],<br>Round Robin Data Source<br>[jrobin_datasource], Round Robin<br>Definition [jrobin_definition], Round<br>Robin Graph [jrobin_graph], Round<br>Robin Graph Set [jrobin_graph_set] |
| Logs                  | Log Entry [syslog], Service Portal<br>Log Entry [sp_log]                                                                                                                                                                                                                                                                                                                                                                        |
| MID Server            | MID Server Property<br>[ecc_agent_property], Mid Server<br>Log [ecc_agent_log], Queue<br>[ecc_queue], Configuration<br>[ecc_queue_config], ECC Queue<br>Statistics (by ECC Agent)<br>[ecc_queue_stats_by_ecc_agent]                                                                                                                                                                                                             |
| Performance Analytics | Job Log [pa_job_logs]                                                                                                                                                                                                                                                                                                                                                                                                           |
| Record Watcher        | Responders [sys_rw_action],<br>Channel Responders<br>[sys_rw_amb_action]                                                                                                                                                                                                                                                                                                                                                        |
| Reporting             | Summary Set<br>[sys_report_summary], Report<br>Summary Line<br>[sys_report_summary_line]                                                                                                                                                                                                                                                                                                                                        |

| Table Category     | Table Names                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scheduled Jobs     | Schedule Item [sys_trigger], Broadcast Message [sys_broadcast_message], Broadcast Message Relationships [sys_broadcast_message_m2m], Progress Worker [sys_progress_worker], Progress Worker Domain [sys_progress_worker_domain] |
| SSO                | SSO Properties [sso_properties], Digest Token Properties [digest_properties], SAML Update 1 Properties [saml2_update1_properties], SSO Federation [sso_federation]                                                              |
| System Cache       | Cache Flush [sys_cache_flush], Cache Entry [sys_db_cache]                                                                                                                                                                       |
| System Clone       | ServiceNow Instance [instance], Clone Security Token [clone_token], Preserved Data [clone_preserved_data]                                                                                                                       |
| System Dictionary  | Dictionary Entry Override [sys_dictionary_override]                                                                                                                                                                             |
| System Events      | Event Processor [sys_event_processor]                                                                                                                                                                                           |
| System Fields      | Field Class [sys.glide_object]                                                                                                                                                                                                  |
| System Performance | Component Status [sys_status], Cluster Message [sys_cluster_message], Node State [sys_cluster_state]                                                                                                                            |
| Text Index         | Ts Attachment [ts_attachment], Text Index Attribute Map [ts_attribute_map], Ts Chain                                                                                                                                            |

| Table Category | Table Names                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <ul style="list-style-type: none"> <li>[ts_chain], Chain Summary</li> <li>[ts_chain_summary], Text Index Column Attribute Map [ts_column_attribute_map], Text Index Configuration</li> <li>[ts_configuration], Text Index Configuration Attribute</li> <li>[ts_configuration_attribute], Ts Delete Doc [ts_deleted_doc], Ts Document [ts_document], Ts Field</li> <li>[ts_field], Text Search Groups</li> <li>[ts_group], Japanese User Token [ts_japanese_token_dictionary], Ts Phrase [ts_phrase], Global Searches [ts_query], Knowledge Searches [ts_query_kb], Text Search Stat [ts_search_stats], Text Search Summaries</li> <li>[ts_search_summary], Stop Word</li> <li>[ts_stop], Synonym Dictionary [ts_synonym_dictionary], Synonym Set [ts_synonym_set], Text Search Table [ts_table], Text Index Table Attribute Map</li> <li>[ts_table_attribute_map], Service Catalog Searches [sc_ts_query], Ts Word [ts_word], Ts Word Roots [ts_word_roots]</li> </ul> |
| Update Sets    | <ul style="list-style-type: none"> <li>Update Set [sys_update_set], Update Version</li> <li>[sys_update_version], Customer Update [sys_update_xml], Update Set Log [sys_update_set_log]</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Upgrades       | <ul style="list-style-type: none"> <li>System Upgrades</li> <li>[sys_upgrade_history], Upgrade Details [sys_upgrade_history_log], System Upgrade Metric</li> <li>[sys_upgrade_metric], Upgrade Blame Log [sys_upgrade_blame], Upgrade Manifest</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Table Category  | Table Names                                                                                                                                                                                                                                                                          |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | [sys_upgrade_manifest], Upgrade State [sys_upgrade_state]                                                                                                                                                                                                                            |
| Usage Analytics | Usage Data for Applications [ua_app_usage], UsageAnalytics Count Configurations [usageanalytics_count_cfg], Application Metadata [ua_app_metadata], UsageAnalytics Count for Tables [usageanalytics_count], Subscription [license_details], Role for Subscription [role_has_license] |
| Users           | User Session [sys_user_session], User Token [sys_user_token], User Preference [sys_user_preference], Navigator History [sys_ui_navigator_history]                                                                                                                                    |
| Workflow        | Workflow Execution [wf_workflow_execution], Workflow History [wf_history], Workflow Executing Activity [wf_executing], Workflow Queued Command [wf_command], Workflow Context [wf_context], Workflow Transition History [wf_transition_history]                                      |

## Example

The screenshot shows the ServiceNow Action Outline interface. On the left, the 'Action Outline' panel displays a sequence of steps: 1. Create Record step (Inputs), followed by 2. Wait For Condition step (Outputs). Step 2 is currently selected. To the right, the '2. Wait For Condition step' configuration screen is shown. It includes fields for 'Record' (set to 'step > Create Record step > Incident Record'), 'Table' (set to 'Incident [incident]'), and 'Conditions' (set to 'State is Resolved'). The 'Data' pane on the right shows details for the 'Create Record step' and 'Wait For Condition step'.

## Output

| Field | Description                                                                                                                               | Data Type |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| State | The completion status of the action as a numeric value. <ul style="list-style-type: none"><li>• 0 (success)</li><li>• 1 (error)</li></ul> | Choice    |

## ZIP step

Manage the attachments in a record by performing archive operations such as zip and unzip. You can also view the details of a zipped file.

### Roles and availability

Users with the action\_designer role can create a custom action with one or more action steps.

### Benefits

Use zip operations to achieve the following benefits:

- Zip the attachments in a record to reduce the file size.
- Unzip specific attachments from a zipped archive in a record.
- View the details of the attachments before unzipping a zipped archive.

### Zip operations

Perform the following operations by using the zip step:

- For information about the zip operation, see [Zip](#).
- For information about the Unzip operation, see [Unzip](#).
- For more information about viewing the contents of a compressed zip archive, see [Get Zip File Details](#).

- [Zip operation](#)

Compress one or more record attachments into a single zip archive. You can also manage the contents of a zip archive by removing specific attachments from the zipped file.

- [Unzip operation](#)

Extract one or more compressed attachments from a zip archive. You can extract all the compressed attachments in an archive or choose specific attachments to unzip.

- [Get Zip file details](#)

View the contents of a compressed zip archive.

Compress one or more record attachments into a single zip archive. You can also manage the contents of a zip archive by removing specific attachments from the zipped file.

### **Zip step**

| Field                     | Description                                                                                                                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Operation                 | <b>Zip</b> operation that archives the attachments in the required record.                                                               |
| Source Attachment Records | Records that contain the attachments that you want to archive.                                                                           |
| Target Zip File Name      | Name of the zipped archive.                                                                                                              |
| Target record             | Record that you want to archive the attachments to.                                                                                      |
| Target Table              | Table related to the target record. The table is automatically populated when you select the record from the <b>Target record</b> field. |
| Advanced Options          |                                                                                                                                          |

| Field               | Description                                                                                              |
|---------------------|----------------------------------------------------------------------------------------------------------|
| Delete Source Files | Field used to remove the original attachments from the source record after the attachments are archived. |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

Extract one or more compressed attachments from a zip archive. You can extract all the compressed attachments in an archive or choose specific attachments to unzip.

### Zip step

| Field                     | Description                                                                                                                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Operation                 | <b>Unzip</b> operation that extracts the attachments from the zipped archive in the record.                                              |
| Source Attachment Records | Record that contains that zipped archive that you want to unzip.                                                                         |
| Target record             | Record that you want to unzip the attachments in the zipped archive to.                                                                  |
| Target Table              | Table related to the target record. The table is automatically populated when you select the record from the <b>Target record</b> field. |

| Field                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advanced Options             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Files to Unzip               | <p>Option to select the files that you want to unzip. Use the following options:</p> <ul style="list-style-type: none"><li>• <b>All Files:</b> Unzips all the attachments from the zipped archive.</li><li>• <b>Selected Files:</b> Unzips only specific attachments that you select by using the <b>File Name Regular Expression</b> field.</li><li>• <b>File Name Regular Expression:</b> Regular expression for selecting the required attachments from the zipped file in the source record. For example, the regular expression *\..png selects all the .png files in the archive.</li></ul> |
| Delete Source Zip Attachment | Field that removes the zipped archive in the source record after the unzip operation is completed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

### Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

View the contents of a compressed zip archive.

## Zip step

| Field          | Description                                                                                           |
|----------------|-------------------------------------------------------------------------------------------------------|
| Operation      | <b>Get Zip File Details</b> operation displays the details of the zip archive in the required record. |
| Zip Attachment | Zipped archive that you want to view the details for.                                                 |

## Action error evaluation fields

| Field              | Description                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If this step fails | Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see <a href="#">Action error evaluation</a> . |

## Flow Designer system properties

Configure how the system processes flows.

These properties are available for Flow Designer.

To set Flow Designer system properties, click **Process Automation > Properties** or navigate to the System Properties [sys\_properties] table.

### Properties for Flow Designer

| Property                                                   | Description                                                                                                                      |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| The maximum number of records to return when fetching data | Specify the maximum number of records a look up action or step can return. Flow Designer ignores records that exceed this limit. |

| Property                                                                                                                                                                 | Description                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| sn_flow_designer.action_picker_limit                                                                                                                                     | <ul style="list-style-type: none"> <li>Type: integer</li> <li>Default value: 1000</li> <li>Location: <b>Process Automation &gt; Properties</b></li> <li>Learn more: <a href="#">Architecture Overview</a></li> </ul>                                                                              |
| <p>Set to True to show duration in the stage column</p> <p>com.glide.hub.flow_engine.stage_display.show_duration</p>                                                     | <p>Specify whether flows with stages display a duration.</p> <ul style="list-style-type: none"> <li>Type: true   false</li> <li>Default value: true</li> <li>Location: <b>Process Automation &gt; Properties</b></li> <li>Learn more: <a href="#">Flow Designer stages</a></li> </ul>             |
| <p>Allow the option for select users to write a script to populate the value of an input on Flow and Action Designers.</p> <p>sn_flow_designer.input_scripts_enabled</p> | <p>Specify whether users can write inline scripts to compute input values.</p> <ul style="list-style-type: none"> <li>Type: true   false</li> <li>Default value: true</li> <li>Location: <b>Process Automation &gt; Properties</b></li> <li>Learn more: <a href="#">Inline scripts</a></li> </ul> |
| Specify the log level of system log entries to replicate to the flow log. The system only replicates log entries of the specified level or higher.                       | Specify the threshold required for Flow Designer to replicate a system log entry to the flow log. Flow Designer only replicates system log                                                                                                                                                        |

| Property                                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| com.glide.hub.flow_engine.listener_trace.threshold                                                                    | <p>entry at the given level or higher.<br/>Options include:</p> <ul style="list-style-type: none"> <li>• DEBUG</li> <li>• INFO</li> <li>• WARN</li> <li>• ERROR</li> <li>• NONE: Disables the replication of system log entries to the flow log.</li> <li>• Type: choice</li> <li>• Default value: ERROR</li> <li>• Location: <b>Process Automation &gt; Properties</b></li> </ul>                                                                                                                                             |
| <p>The maximum amount of iterations that a loop will run in Flow Designer.</p> <p>sn_flow_designer.max_iterations</p> | <p>Specify the maximum number of times that a Do the following Until flow logic loop can run before being stopped. A loop will error out if it iterates beyond this value, preventing infinite loops.</p> <ul style="list-style-type: none"> <li>• Type: integer</li> <li>• Default value: 1000</li> <li>• Location: <b>Process Automation &gt; Properties</b></li> <li>• Learn more: <a href="#">Architecture Overview</a></li> </ul> <p><b>Note:</b> Changing this value does not effect flows that are already running.</p> |

| Property                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Enable flow engine debug messages in the system log<br/>com.glide.hub.flow_engine.debug</p>                                                        | <p>Enable or disable logging Flow Designer debug messages in the system log. All debug messages start with a Flow Designer: string prefix.</p> <ul style="list-style-type: none"><li>• Type: true   false</li><li>• Default value: false</li><li>• Location: <b>Process Automation &gt; Properties</b></li><li>• Learn more: <a href="#">Architecture Overview</a></li></ul>                                                                                                                                                                                                                                                                         |
| <p>Number of times that a flow or subflow can be indirectly triggered during a transaction<br/>com.glide.hub.flow_engine.indirect_recursion_limit</p> | <p>Specify the maximum number of times a flow or subflow permits indirect recursion. Flow Designer ignores all further calls or trigger condition matches from indirect recursion after the limit has been reached. Set the value to any integer equal to or greater than one. The system ignores any property value less than one and instead uses a limit of one. Set the value to one to prevent all indirect recursion.</p> <ul style="list-style-type: none"><li>• Type: integer</li><li>• Default value: 3</li><li>• Location: <b>Process Automation &gt; Properties</b></li><li>• Learn more: <a href="#">Architecture Overview</a></li></ul> |

| Property                                                                                                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The maximum number of actions allowed on a flow.</p> <p><code>sn_flow_designer.max_actions</code></p>       | <p>Specify the maximum number of actions a flow or subflow can contain. Flow Designer prevents you from adding further actions after the maximum number of actions has been reached. Consider the performance impact raising the maximum number of actions may have. For example, running more actions may conflict with the default transaction quota rule that prevents flows from running longer than an hour.</p> <ul style="list-style-type: none"><li>• Type: integer</li><li>• Default value: 50</li><li>• Location: <b>Process Automation &gt; Properties</b></li><li>• Learn more: <a href="#">Architecture Overview</a></li></ul> |
| <p>The maximum amount of allowed steps on an action.</p> <p><code>sn_flow_designer.max_action_steps</code></p> | <p>Specify the maximum number of steps that an action can contain. Flow Designer prevents you from adding further steps after the maximum number of steps has been reached. Consider the performance impact raising the maximum number of steps may have. For example, running more steps may conflict with the default transaction quota rule that prevents flows from running longer than an hour.</p> <ul style="list-style-type: none"><li>• Type: integer</li><li>• Default value: 20</li></ul>                                                                                                                                        |

| Property                                                                                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                          | <ul style="list-style-type: none"><li>• Location: <b>Process Automation &gt; Properties</b></li><li>• Learn more: <a href="#">Architecture Overview</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>Level of reporting data generated by the flow engine.</p> <p>com.snc.process_flow.reporting.level</p> | <p>Specify when Flow Designer generates execution details and what information the details include. Options include:</p> <p><b>Off</b></p> <p>Reporting is deactivated. The system only generates execution details when you run a test.</p> <p><b>Note:</b> Testing an action or flow generates execution details at the Developer Trace level.</p> <p><b>Flows Only</b></p> <p>Reporting is activated for all flows and subflows. Execution details show the status and duration of each flow and subflow run. You can see the configuration and runtime values of flow triggers and subflow inputs.</p> <p><b>Flows and Actions</b></p> <p>Reporting is activated for all flows, subflows, and actions. Execution details show the status and duration of each flow, subflow, and action run. You can see the configuration and runtime values of flow triggers and the inputs</p> |

| Property | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <p>and output values of subflows and actions.</p> <p><b>Flows Actions and Steps</b></p> <p>Reporting is activated for all flows, subflows, actions, and the steps of custom actions. Execution details show the status and duration of each flow, subflow, action, and the steps of custom actions run. You can see the configuration and runtime values of flow triggers and the inputs and output values of subflows, actions, and the steps of custom actions.</p> <p><b>Developer Trace</b></p> <p>Reporting is activated for all flows, subflows, actions, and steps (custom and base system). Execution details show the status and duration of each flow, subflow, action, step run. You can see the configuration and runtime values of flow triggers and the inputs and output values of subflows, actions, and steps.</p> <p><b>Note:</b> Testing an action or flow generates execution details at the Developer Trace level.</p> <p>The reporting level determines what if any flow execution details are generated. If a flow runs while reporting is off, execution details are never available for the flow, even if the reporting level later changes. If a flow runs while</p> |

| Property                                                                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                     | <p>reporting is activated, execution details are always available for that flow execution, even if the reporting level later changes.</p> <ul style="list-style-type: none"> <li>• Type: choice</li> <li>• Default value: Off</li> <li>• Location: <b>Process Automation &gt; Properties</b></li> <li>• Learn more: <a href="#">Flow execution details</a></li> </ul>                                                                                                                                                                                                     |
| <p>Number of recent iterations to report for Do Until and For Each loops.</p> <p>com.snc.process_flow.reporting.iteration.lastn</p> | <p>Specify the number of recent iterations to report upon in the flow execution details. Use this property to sample a recent portion of flow logic iterations. Use a positive value to specify the number of recent iterations to display. Use the value of -1 to display all iterations. The system treats the value 0 as a value of 1.</p> <ul style="list-style-type: none"> <li>• Type: integer</li> <li>• Default value: 50</li> <li>• Location: <b>Process Automation &gt; Properties</b></li> <li>• Learn more: <a href="#">Flow execution details</a></li> </ul> |
| <p>Truncate runtime values in the flow execution details step configuration</p>                                                     | <p>Specify the number of bytes allowed for runtime values in each step in the flow execution details. To prevent truncation of runtime values, set the value to an</p>                                                                                                                                                                                                                                                                                                                                                                                                    |

| Property                                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| com.snc.process_flow.reporting.serialized.val_size_limit          | <p>integer equal to or less than zero. Preventing truncation of runtime values requires additional system resources and may impact system performance.</p> <ul style="list-style-type: none"><li>• Type: integer</li><li>• Default value: 16384</li><li>• Location: System Properties [sys_properties] table</li><li>• Learn more: <a href="#">Flow execution details</a></li></ul>                                                                                                                                                                                                         |
| Maximum inputs per action<br><br>sn_flow_designer.max_action_vars | <p>Specify the maximum number of inputs that can be added to an action. Flow Designer prevents you from adding further inputs after the maximum number of inputs has been reached. Consider the performance impact raising the maximum number of action inputs may have. For example, processing more action inputs may risk the action running for more than an hour and being stopped by the default transaction quota rule.</p> <ul style="list-style-type: none"><li>• Type: integer</li><li>• Default value: 20</li><li>• Location: System Properties [sys_properties] table</li></ul> |

| Property                                                                                                                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum script variables per Script step<br><br><code>sn_flow_designer.max_script_variables</code>                                      | <p>Specify the maximum number of input and output variables that can be added to a Script step. Flow Designer prevents you from adding further script variables after the maximum number of variables has been reached. Consider the performance impact raising the maximum number of script variables may have. For example, processing more script variables may risk the Script step running for more than an hour and being stopped by the default transaction quota rule.</p> <ul style="list-style-type: none"> <li>Type: integer</li> <li>Default value: 20</li> <li>Location: System Properties [sys_properties] table</li> </ul> |
| Maximum number of branches allowed for the <b>Make a decision</b> flow logic<br><br><code>sn_flow_designer.max_decision_branches</code> | <p>Specify the maximum number of branches to use when the <b>Use Branches</b> option is selected for the <b>Make a decision</b> flow logic.</p> <ul style="list-style-type: none"> <li>Type: integer</li> <li>Default value: 100</li> <li>Location: System Properties [sys_properties] table</li> </ul>                                                                                                                                                                                                                                                                                                                                   |
| Option to enable users to create flow variables.                                                                                        | <p>Specify whether users can create custom variables for their flow.</p> <ul style="list-style-type: none"> <li>Type: true   false</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Property                                                                                                                           | Description                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| sn_flow_designer.flow_variables_enabled                                                                                            | <ul style="list-style-type: none"> <li>• Default value: true</li> <li>• Location: System Properties [sys_properties] table</li> </ul>                                                                                                                                                                                                                 |
| Maximum number of popular actions<br><br>sn_flow_designer.action_picker.popular_actions.max_number                                 | Specify the maximum number of popular actions to display in the Action picker.<br><br><ul style="list-style-type: none"> <li>• Type: integer</li> <li>• Default value: 10</li> <li>• Location: System Properties [sys_properties] table</li> </ul>                                                                                                    |
| Number of consecutive days used to generate popular actions<br><br>sn_flow_designer.action_picker.popular_actions.last_num_of_days | Specify the number of consecutive days used to generate popular actions. For example, the default value of 7 generates popular actions based on action usage during the last week.<br><br><ul style="list-style-type: none"> <li>• Type: integer</li> <li>• Default value: 7</li> <li>• Location: System Properties [sys_properties] table</li> </ul> |
| com.glide.hub.flow.restricted_caller_access.track_flows_as_source                                                                  | Allow the system to generate restricted caller access privilege requests for flows and actions. The access privileges for flows and actions supersede any existing access privileges for script includes and business rules that call flows and actions. This property is disabled on instances upgraded from San Diego and earlier                   |

| Property                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       | <p>releases. Customers who want to continue using script-based access privileges for flows and actions should not enable this property. Enabling this property requires you to regenerate and approve access privileges for your flows and actions.</p> <ul style="list-style-type: none"><li>• Type: true   false</li><li>• Default value: true for Tokyo and later releases. False for San Diego and earlier releases.</li><li>• Location: System Properties [sys_properties] table</li><li>• Learn more: <a href="#">Restricted caller access privilege settings</a></li></ul> |
| com.glide.cs.fdih.interactive.timeout | <p>Specify the length of time, in seconds, before the Flow Designer Integration Hub action workflow times out.</p> <ul style="list-style-type: none"><li>• Type: integer</li><li>• Default value: 120</li><li>• Location: System Properties [sys_properties] table</li><li>• Learn more: <a href="#">Specify the action workflow timeout.</a></li></ul>                                                                                                                                                                                                                           |

## Flow Designer trigger types

Each trigger type defines when a flow starts and the starting data available to it. There are triggers for record operations, dates, and application operations.

### Record triggers

Use record triggers to start a flow when a record is created or updated.

| Trigger | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Created | Starts a flow when a record is created in a specific table.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Updated | Starts a flow when a record is updated in a specific table.<br>Requires selecting when to run the flow. <ul style="list-style-type: none"><li>• <b>For each unique change:</b> Triggers the flow for every unique update to a non-system field even if the flow is currently running.</li></ul> <p><b>Note:</b> The system stores a history of every change to a record and determines whether the change is unique. For example, if an incident record's <b>State</b> field changes from In Progress to On Hold, the flow can run. However, if the <b>State</b> field then changes back to In Progress, the flow can't run.</p> |

| Trigger            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <p><b>Note:</b> Flows that have a record trigger that runs <b>For each unique change</b> can produce recursions when run in a non-interactive session. When this type of flow makes a change to the trigger record, the change meets the flow trigger conditions and causes a recursion.</p> <ul style="list-style-type: none"> <li>• <b>Once:</b> Triggers the flow once for the life of the record.</li> <li>• <b>Only if not currently running:</b> Triggers the flow for every unique change if the flow is not currently running. This behavior is the same as the <b>Always</b> option in previous releases.</li> <li>• <b>For every update:</b> Triggers the flow every time that the record is updated, regardless of whether there has already been or currently are any running contexts for the flow.</li> </ul> |
| Created or Updated | <p>Starts a flow when a record is either created or updated in a specific table. Requires selecting when to run the flow.</p> <ul style="list-style-type: none"> <li>• <b>For each unique change:</b> Triggers the flow for every unique update to a <b>non-system field</b> even if the flow is currently running.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Trigger | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | <p><b>Note:</b> The system stores a history of every change to a record and determines whether the change is unique. For example, if an incident record's <b>State</b> field changes from In Progress to On Hold, the flow can run. However, if the <b>State</b> field then changes back to In Progress, the flow can't run.</p> <p><b>Note:</b> Flows that have a record trigger that runs <b>For each unique change</b> can produce recursions when run in a non-interactive session. When this type of flow makes a change to the trigger record, the change meets the flow trigger conditions and causes a recursion.</p> <ul style="list-style-type: none"><li>• <b>Once:</b> Triggers the flow once for the life of the record.</li><li>• <b>Only if not currently running:</b> Triggers the flow for every unique change if the flow is not currently running. This behavior is the same as the <b>Always</b> option in previous releases.</li><li>• <b>For every update:</b> Triggers the flow every time that the record is updated, regardless of whether there has already</li></ul> |

| Trigger | Description                                              |
|---------|----------------------------------------------------------|
|         | been or currently are any running contexts for the flow. |

**Note:** Flows including approval actions should only run the trigger once.

## REST triggers

Use REST triggers to start a flow after a specific REST API request.

**Note:** This feature requires an Integration Hub Enterprise subscription. For more information, see [Request Integration Hub](#).

| Trigger                 | Description                                                                                                                                                                                                                    |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| REST API - Asynchronous | Start a flow from an inbound API call or webhook from an external system. Configure the trigger start conditions without having to write or maintain custom code. For more information, see <a href="#">REST API trigger</a> . |

## Date triggers

Use date triggers to start a flow after a specific date and time or repeatedly at scheduled intervals.

**Note:** Because flows are processed asynchronously, a flow with a date trigger may not run at the exact scheduled time its trigger conditions were met. For example, if a scheduled flow is triggered during core business hours, the system may have to process other events in the queue before it can run the scheduled flow.

| Trigger | Description                                 |
|---------|---------------------------------------------|
| Daily   | Starts a flow at a specific time every day. |

| Trigger  | Description                                                                                                                                             |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weekly   | Starts a flow at a specific time every week.                                                                                                            |
| Monthly  | Starts a flow at a specific time every month.                                                                                                           |
| Run Once | Starts a flow once at a specific time but does not repeat. If you select a past date or time, the system schedules the flow to run as soon as possible. |
| Repeat   | Starts a flow at regular intervals you define.                                                                                                          |

## Application triggers

Use application triggers to start a flow when application-specific conditions are met.

| Trigger         | Description                                                                                                                                                              |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MetricBase      | Starts a flow when a MetricBase trigger is met. Requires the MetricBase application. For more information, see <a href="#">Create a flow with a MetricBase trigger</a> . |
| Service Catalog | Starts a flow from a Service Catalog item request. For more information, see <a href="#">Create a flow with a Service Catalog trigger</a> .                              |

| Trigger  | Description                                                                                                                                                                            |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <p><b>Note:</b> Service Catalog triggers do not support catalog variables as part of the trigger condition. Instead, get or create catalog variables in the main body of the flow.</p> |
| SLA Task | <p>Starts a flow from an SLA Definition record. For more information, see <a href="#">Create a flow with an SLA Task trigger</a>.</p>                                                  |

## Inbound email triggers

Start a flow when your instance receives an email.

Inbound email flows take priority over inbound email actions. If you create flows with inbound email triggers, emails are first processed by the inbound email triggers before they are processed by inbound email actions.

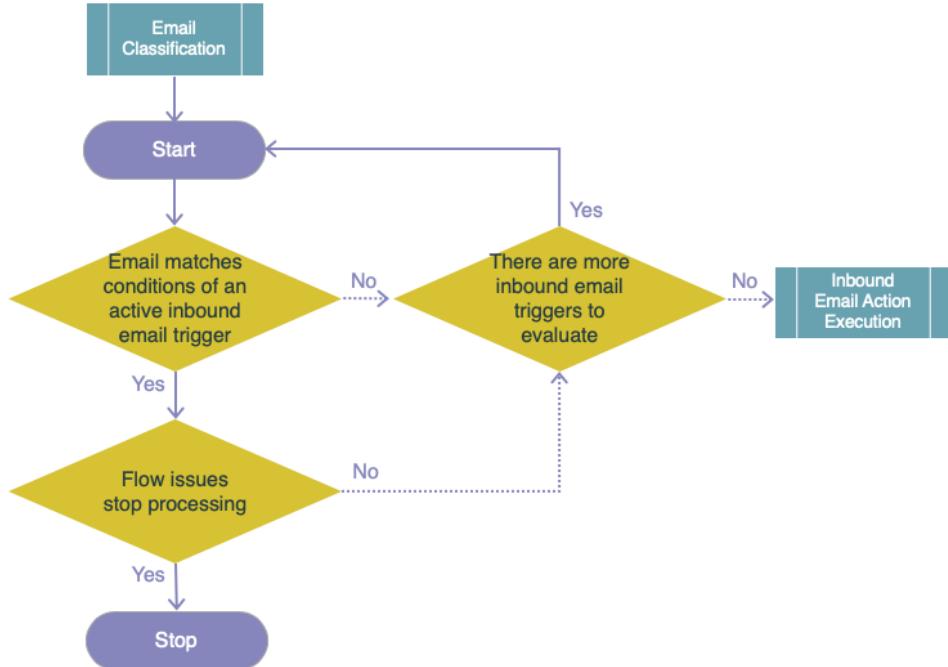
With inbound email actions, you don't have full control over email attachment handling or assigning the target record of an email. When you create a flow with an inbound email trigger, you can perform these actions with the [Move Email Attachments to Record action](#) and the [Associate Record to Email action](#). For greater control over email attachments, you can also use the [Look up email attachments action](#) to access a specific attachment as a data pill.

Although you can process an inbound email with multiple inbound email actions, you can't process an inbound email with multiple flows by default. Additional configuration is required. For information on how to stop processing in inbound email actions, see [Specifying the inbound email processing order](#).

For more information on running multiple flows on an inbound email, see [Allow multiple triggers to process an inbound email](#).

The following diagram shows how inbound emails are processed by inbound email triggers. After the email has been classified as a reply, forward, or new email, the system tries to match the email to an active inbound email trigger. If the email meets the conditions of an inbound email trigger, the flow runs. If the flow issues stop processing, the email is finished being processed. If the flow does not issue stop processing, the system evaluates the conditions of more inbound email triggers. If there are no more inbound email triggers to evaluate, the system tries to match the email with an active inbound email action instead.

#### Processing emails with inbound email triggers



**Note:** With other types of flows, you can choose to run as a system user or the user who initiates the session. However, inbound email flows always run as the sender of the inbound email. If the system does not recognize the sender, inbound email flows will run as the Guest user. The actions of inbound email flows are limited by user ACL restrictions. To test access controls for an inbound email flow, impersonate a typical inbound email user and manually trigger the flow.

## Advanced options

Specify the user session requirements needed to start a flow with **Advanced Options**.

### When to run the flow

Determine the type of session that can trigger the flow, whether to run the flow when triggered by certain users, and which tables can trigger the flow.

#### Interactive session options

| Option                                                | Description                                                                                             |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Only Run for Non-Interactive Session                  | Flow that is only triggered in non-interactive sessions. See <a href="#">Non-interactive sessions</a> . |
| Only Run for User Interactive Session                 | Flow that is only triggered in interactive sessions.                                                    |
| Run for Both Interactive and Non-Interactive Sessions | Flow that is triggered in all sessions.                                                                 |

#### User options

| Option                                         | Description                                                                                                                                                                                        |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Do not run if triggered by the following users | Flow that does not trigger for a selected list of users. Click the Add User icon (  ) to add users to the list. |
| Only run if triggered by the following users   | Flow that triggers only for a selected list of users. Click the Add User icon (  ) to add users to the list.    |
| Run for any user                               | Flow that runs for any user.                                                                                                                                                                       |

## Table options

| Option                             | Description                                                            |
|------------------------------------|------------------------------------------------------------------------|
| Run only on current table          | Flow that is only triggered for the selected table.                    |
| Run on current and extended tables | Flow that is triggered for the selected table and any extended tables. |

## Where to run the flow

Determine whether to run the flow in the background or in the current session.

| Option                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Run flow in background (default) | Flow that runs asynchronously in the background. Use this option for flows that do not require immediate updates and to allow other system processes to run at the same time.                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Run flow in foreground           | Flow that runs synchronously in the current session. Use this option to provide immediate updates to an end user. For example, if a flow opens a task after the previous task closes, use this option to open the next task immediately after a user closes one.<br><br><b>Note:</b> Running a flow in foreground may block the current session thread and prevent user input until the flow finishes. Avoid running flows in the foreground when they contain actions that cannot be interrupted, such as actions that run script. Actions or flow logic that pause a flow will not block a session. |

## Data pills available by trigger type

Flow designers have access to data pills from the trigger.

| Trigger Type | Data pills available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Record       | <p><b>[Table Label] Record</b></p> <p>An object containing the triggering record.</p> <p><b>Changed Fields</b></p> <p>An array of objects containing the field values that changed. This data pill is only available for the <b>Updated or Created or Updated</b> trigger types.</p> <p><b>Note:</b> To process the <b>Changed Fields</b> array data pill, you will need to use <a href="#">For Each flow logic</a>. For more information on working with array data pills, see <a href="#">Complex data</a>.</p> <p><b>[Table Label] Table</b></p> <p>The Sys ID of the table containing the trigger record.</p> <p><b>Run Start Date/Time</b></p> <p>Date/Time object that stores when the flow started in the system's local timezone. Use this data pill to pass a Date/Time value to other actions and steps such as the Create record action or the Update record action.</p> |

| Trigger Type            | Data pills available                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <p><b>Run Start Time UTC</b></p> <p>Date/Time string that stores when the flow started in Coordinated Universal Time (UTC). Use this data pill to pass data to legacy flows that expect UTC date-time strings.</p>                                                                                                                                                                                                                                                                       |
| REST API - Asynchronous | <p><b>Path Parameters</b></p> <p>An object containing path parameters in the inbound request.</p> <p><b>Query Parameters</b></p> <p>An object containing query parameters in the inbound request.</p> <p><b>Request Headers</b></p> <p>An object containing headers in the inbound request.</p> <p><b>Request Body</b></p> <p>Complex data object that defines the body structure of the inbound request. For more information on complex objects, see <a href="#">Complex data</a>.</p> |
| Date                    | <p><b>Run Start Date/Time</b></p> <p>Date/Time object that stores when the flow started in the system's local timezone. Use this data pill to pass a Date/Time value to</p>                                                                                                                                                                                                                                                                                                              |

| Trigger Type  | Data pills available                                                                                                                                                                                                                                                                                            |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <p>other actions and steps such as the Create record action or the Update record action.</p> <p><b>Run Start Time UTC</b></p> <p>Date/Time string that stores when the flow started in Coordinated Universal Time (UTC). Use this data pill to pass data to legacy flows that expect UTC date-time strings.</p> |
| SLA Task      | <p><b>Task SLA Record</b></p> <p>An object containing the triggering Task SLA record.</p> <p><b>sla_flow_inputs</b></p> <p>An Object containing Task SLA Definition values.</p>                                                                                                                                 |
| Inbound Email | <p><b>Email Record</b></p> <p>An object containing the triggering Email record.</p> <p><b>[Table Label] Table</b></p> <p>The Sys ID of the table associated with the target email.</p> <p><b>Body Text</b></p> <p>A String containing the body of the email message.</p>                                        |

| Trigger Type | Data pills available                                                                                                                                                                                                                                                                                                                                                       |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <p><b>Subject</b></p> <p>A String containing the subject of the email message.</p> <p><b>User Record</b></p> <p>An object containing the user who sent the triggering email. If the sender does not have an associated User record, the data pill lists the object for the Guest user.</p> <p><b>From address</b></p> <p>A String containing the sender email address.</p> |
| Metric Base  | <p><b>MetricBase Trigger Definition Record</b></p> <p>An object containing the triggering MetricBase Trigger Definition Record.</p> <p><b>Level</b></p> <p>The Integer value of the MetricBase trigger level.</p> <p><b>Time of Metric Event</b></p> <p>The Date/Time value of when the metric event occurred.</p>                                                         |

| Trigger Type    | Data pills available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <b>Record</b><br><br>An object containing the record for which metric events have been collected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Service Catalog | <b>Requested Item Record</b><br><br>An object containing the triggering Requested Item record.<br><br><b>Run Start Date/Time</b><br><br>Date/Time object that stores when the flow started in the system's local timezone. Use this data pill to pass a Date/Time value to other actions and steps such as the Create record action or the Update record action.<br><br><b>Run Start Time UTC</b><br><br>Date/Time string that stores when the flow started in Coordinated Universal Time (UTC). Use this data pill to pass data to legacy flows that expect UTC date-time strings.<br><br><b>Table Name</b><br><br>The table name containing the requested catalog item. |

## Design considerations

Follow these design considerations when creating record triggers.

### Determine whether your flow needs a trigger or variable input

Flows always run when their trigger conditions are met. Triggers always provide the same data as input for flows. If you need variable input to initiate a flow instead, create a [subflow](#).

### Add conditions to specify what record values start your flow

Starting a flow only when needed consumes fewer system resources than starting a flow, pausing it, and waiting to resume the flow until a specific record condition applies. Instead of creating a flow that starts with a Wait for condition action, redesign the flow to include the wait condition as part of the record trigger.

### Create unique conditions for record triggers on the same table

To prevent flows from overwriting each other, create unique conditions for each flow running on the same table. If multiple flows on the same table use the same filter, there is no way to know the order in which the flows run. Using conditions also helps to optimize flow performance by returning a more precise, smaller set of records.

### Ignore records added or updated by import and update sets

Record triggers ignore records added or updated by applying an update set or importing an XML file. These operations apply to the entire application or table rather than an individual record.

### Replace record triggers on Service Catalog tables with Service Catalog application triggers

Flow Designer no longer displays Service Catalog tables as options for record triggers. Instead, create flows that use the Service Catalog application trigger type.

## Flow preferences

Enable or disable flow preferences to change options available to Flow Designer.

| Flow preference                  | Description                                                                                                                                                                                                              |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Show draft actions               | Option to show or hide actions in the draft state from the action picker. By default, this option is disabled, and the action picker only displays published actions.                                                    |
| Show triggered flows             | Option to show flows with a trigger from the subflow picker. By default, this option is disabled, and the subflow picker hides triggered flows from the subflow picker.                                                  |
| Show store spokes                | Option to show Flow Designer content from the ServiceNow Store from the action picker. By default, this option is enabled, which displays Flow Designer content from ServiceNow Store spokes you have already installed. |
| Show inline script toggle.       | Option to add or edit inline scripts when configuring an action input. By default this options is enabled, and you can add or edit inline scripts.                                                                       |
| Show advanced connection options | Option to show advanced connection properties for actions that use connection aliases or inline connections. By default, this option is disabled.                                                                        |
| Show flows as diagrams           | Option to show all flows in the flow diagramming view. By default this option is disabled, and all flows open in the descriptive text view.                                                                              |
| Auto Refresh Tests               | Option to create an Asynchronous Message Bus (AMB) channel for test runs of flows and actions.                                                                                                                           |

| Flow preference | Description                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | The AMB channel listens for state changes of execution details that are in a waiting state. When the execution details are done, the AMB channel closes and sets the state to complete. By default, this option is disabled, and you must manually update execution details. |

## Supported Service Catalog variable types

Flow Designer supports several Service Catalog variable types for both single-row and multi-row variable sets.

### Supported variable types

| Service Catalog variable type | Flow Designer variable type for single-row variable sets | Flow Designer variable type for multi-row variable sets |
|-------------------------------|----------------------------------------------------------|---------------------------------------------------------|
| Check box                     | True/false                                               | True/false                                              |
| Date                          | Date                                                     | Date/time                                               |
| Date and time                 | Date/time                                                | Date/time                                               |
| Duration                      | Duration                                                 | String                                                  |
| Email                         | Email                                                    | String                                                  |
| HTML                          | HTML                                                     | Not supported                                           |
| IP Address                    | IP Address                                               | String                                                  |
| Label                         | String                                                   | Not supported                                           |
| List collector                | List                                                     | Not supported                                           |

| Service Catalog variable type | Flow Designer variable type for single-row variable sets | Flow Designer variable type for multi-row variable sets |
|-------------------------------|----------------------------------------------------------|---------------------------------------------------------|
| Lookup multiple choice        | Choice                                                   | String                                                  |
| Lookup select box             | Choice                                                   | String                                                  |
| Macro                         | String                                                   | Not supported                                           |
| Macro with label              | String                                                   | Not supported                                           |
| Masked                        | Masked code                                              | String                                                  |
| Multi-line text               | Multiple line small text area                            | String                                                  |
| Multiple choice               | Choice                                                   | Choice                                                  |
| Numeric scale                 | Integer                                                  | Integer                                                 |
| Reference                     | Reference                                                | String                                                  |
| Select box                    | Choice                                                   | Choice                                                  |
| Single-line text              | String                                                   | String                                                  |
| URL                           | URL                                                      | String                                                  |
| Wide single-line text         | String                                                   | String                                                  |
| Yes/No                        | True/false                                               | True/false                                              |

## Transform functions

Transform data pill values without the need to write a script. Use transform functions to reformat text, perform mathematical calculations, sanitize potentially unsafe SQL statements, and serialize complex objects to raw XML.

Available transform function categories include [date and time](#), [string](#), [utilities](#), [simple math](#), [sanitize shell arguments](#), [sanitize SQL](#), and [complex data](#). Some examples of transform function uses include:

- Trimming white space from a string before integrating it into the CMDB.
- Adding days, hours, minutes, and seconds to a date or time to localize for a specific time zone.
- Sanitizing SQL values to prevent injection as part of a [JDBC step](#) for an Integration Hub spoke.
- Retrieving an appropriate value from a map of priorities that have equivalent values in a third-party database.
- Transforming a complex object into raw XML as part of a [REST step Request Body](#) field.

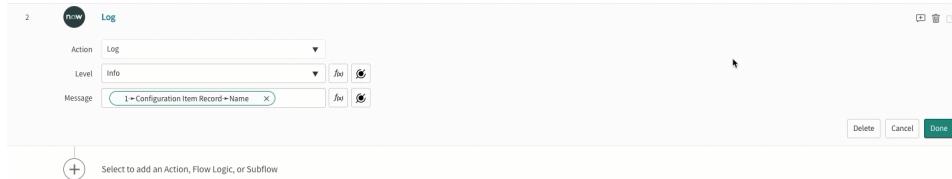
**Note:** Custom transform functions are not currently supported. For information on creating custom functions to transform Flow Designer data, see [Inline scripts](#).

## Applying a transform function

You can apply a transform function to a data pill when you are designing or creating a flow. To apply a transform function, point or tab to a data



pill and select the **f(x)** ( ) icon that appears. Selecting the icon displays the Available Transforms list. Select the transform function that you want to apply to your data pill, enter information into any required fields, and select **Apply**. Your selected transform function appears in the Applied Transforms list.



## Applying multiple transform functions

You can apply multiple transform functions to the same data pill. The system applies transform functions sequentially from top to bottom as listed in the Applied Transforms list. For example, you can apply a String to Date transform function followed by the Add Time transform function.

### Viewing applied transform functions

You can find out which transform functions are applied to a data pill by looking at the Applied Transforms list. When you are designing or creating a flow or action, point to or tab into the data pill and select the **f(x)**



( ) icon. You can also view applied transform functions in the [flow execution details](#).

**Note:** The output values for applied transform functions are field values, not [Display values](#).

When a data pill is dropped into certain types of inputs, the system automatically suggests a transform function category that is related to the input. For example, the system suggests transform functions to escape special characters in SQL statements, prevent script injection in shell scripts, and validate API or operation requests. Currently, the system suggests transform function categories for these inputs:

- For data pills dropped in the JDBC step's **SQL Statement** input, the [sanitize SQL transform function category](#) is displayed automatically.
- For data pills dropped in the SSH step's **Command** input, the [sanitize shell arguments transform function category](#) is displayed automatically.

### Design considerations

#### Apply transform functions to valid types of data pills for the input

Be sure to check the type of data pill for the input before applying a transform function. Applying a transform function to an invalid data pill type results in the system skipping the transform. An error also occurs if transform functions produce results that the system cannot parse. For example, when transforming a string into a date, the system throws an error if the transform does not produce a valid date.

## Confirm applied transform functions for multiple inputs with the same data pill

A transform function creates a new value at runtime for a specific input, and does not change the original data pill. If you use the same data pill across multiple actions or steps, transform functions must therefore be applied to each individual input.

### View final transformed values in the flow execution details

Only the final transformed value appears in the [flow execution details](#), and not the value for each applied transform.

### Test transform functions to verify they produce expected results

Make sure that your transform functions produce the expected runtime values for the data pills. For more information, see [Test a flow](#) and [Test an action](#).

- [Date and time transform functions](#)

Use date and time transform functions to recalculate or reformat data pills for Date/Time values.

- [String transform functions](#)

Use string transform functions to reformat or perform calculations on String data pills.

- [Utilities transform functions](#)

Use utilities transform functions to return a Complex Object from an Array, or a value associated with a specific key.

- [Simple math transform functions](#)

Use simple math transform functions to perform basic mathematical calculations on Number data pills.

- [Sanitize shell arguments transform functions](#)

Use sanitize shell arguments transform functions to remove any potentially unsafe command injections in String data pills to be used for Bash shell scripting.

- **Sanitize SQL transform functions**

Use sanitize SQL transform functions to escape special characters and prevent injection in String data pills to be used for SQL statements.

- **Complex data transform functions**

Use complex data transform functions to serialize Complex Object data pills into an XML format.

## Date and time transform functions

Use date and time transform functions to recalculate or reformat data pills for Date/Time values.

Date and time transform functions require a Date/Time or String input data pill. Some functions also support Duration data pills. Make sure to use the correct input [data pill type](#) when applying date and time transform functions. If a date and time transform function is applied to an improper data pill type, the data is not transformed at runtime and the input value is returned instead. For more information on confirming your flow runtime values, see [Test a flow](#).

**Note:** Runtime Date/Time values are not localized and appear in the UTC (Coordinated Universal Time) time zone. For more information, see [Time zones](#) and [time zone representation](#).

### Add Time

Adds days, hours, minutes, or seconds to an input Date/Time, Date, Due Date, or Duration.

| Input data pill                        | Parameters                                                            | Output data pill                                                            |
|----------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Date/Time, Date, Due Date, or Duration | Duration - Amount of time to add in days, hours, minutes, and seconds | Date/Time - Transformed Date/Time value after adding the specified Duration |

| Input data pill                                                                                                                                    | Parameters | Output data pill |
|----------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------|
| <b>Note:</b> If the input is a Date or Due Date, the transform creates a full Date/Time value using time values of hour 0, minute 0, and second 0. |            |                  |

#### Example

- Input: 2019-09-12 11:00:00
- Duration: 3 hours
- Output: 2019-09-12 14:00:00

### Subtract Time

Subtracts days, hours, minutes, and/or seconds from the input Date/Time, Date, Due Date, or Duration.

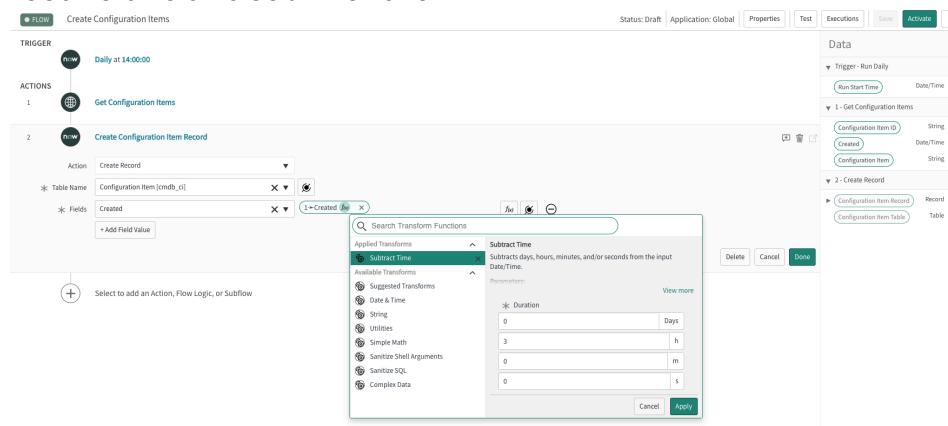
| Input data pill                                                                                                                                                                                  | Parameters                                                                          | Output data pill                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Date/Time, Date, Due Date, or Duration<br><br><b>Note:</b> If the input is a Date or Due Date, the transform creates a full Date/Time value using time values of hour 0, minute 0, and second 0. | Duration - Enter an amount of time to subtract in days, hours, minutes, and seconds | Date/Time - Transformed Date/Time value after subtracting the specified Duration |

## Example

- Input: 2019-09-12 11:00:00
- Duration: 2 days, 1 hours, 5 minutes, 10 seconds
- Output: 2019-09-10 09:54:50

In this example, the flow retrieves a CMDB Configuration Item record from a remote instance. The Subtract Time transform function then localizes the value of the **Created** field by subtracting three hours from the input Date/Time.

## Localize a field value's time zone



## String to Date

Converts the input String to a Date/Time.

| Input data pill                                        | Parameters                                                                                                                                                                 | Output data pill |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| String formatted as specified in the Input Date Format | <ul style="list-style-type: none"> <li>Input Date Format - Date/Time or date format of the input String</li> <li>Custom Format - Valid Date/Time or date format</li> </ul> | Date/Time        |

| Input data pill | Parameters                                                                                    | Output data pill |
|-----------------|-----------------------------------------------------------------------------------------------|------------------|
|                 | represented as a String. Required only if Custom Format is selected as the Input Date Format. |                  |

**Note:**

- If the Date/Time value for the **Custom Format** input is incomplete, the transform creates a full Date/Time value using default dates and times. In such a case, the transform defaults to the current year, the current month, day 1 of a month, hour 0, minute 0, and second 0. For example, an input data pill value of **Oct 2019** and a custom date format of **MMM yyyy** produces an output of **2019-10-01 00:00:00**.
- If you use an incorrect data pill type or invalid **Custom Format**, the flow cancels during runtime.

**Example**

- Input: '1995-11-20'
- Input Date Format: ISO Date (2004-06-28)
- Output: 1995-11-20 00:00:00

### Date to String

Converts the input Date/Time, Date, or Due Date to a String. Select a **Date Format** for the input Date/Time. Alternatively, enter a **Custom Format** for the input Date/Time.

| Input data pill              | Parameters                                                                               | Output data pill                                        |
|------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Date/Time, Date, or Due Date | <ul style="list-style-type: none"> <li>Output Date Format - Date/Time or date</li> </ul> | String formatted as specified in the Output Date Format |

| Input data pill | Parameters                                                                                                                                                                                                                       | Output data pill |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
|                 | <p>format of the output String</p> <ul style="list-style-type: none"><li>• Custom Format - Valid Date/Time or date format represented as a String. Required only if selecting Custom Format as the <b>Date Format</b>.</li></ul> |                  |

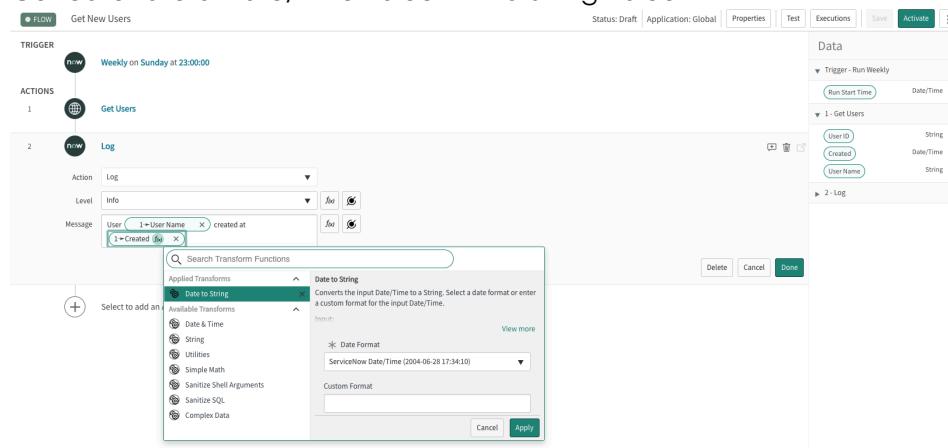
**Note:** If you use an incorrect input data pill type or invalid **Custom Format**, the flow cancels during runtime.

## Example

- Input: 1969-12-31 14:23:57
- Output Date Format: Custom (enter below)
- Custom Format: 'On' MMM dd, yyyy 'at' hh:mm a
- Output: 'On Dec 31, 1969 at 2:23 PM'

In this example, the flow retrieves a User [sys\_user] record from a third-party database. The Date to String transform function converts the format of the **Created** field and then logs the date, time, and name that is associated with the record.

## Concatenate a Date/Time value with a String value



## Custom date formats

You can specify a custom date format with a sequence of specific date and time pattern strings. A pattern string consists of one or more uppercase and lowercase letters from A to Z. Any text within quotation marks is ignored and is instead copied into the date output.

| String | Description    | Output Format | Example |
|--------|----------------|---------------|---------|
| G      | Era designator | Text          | AD      |

| String | Description                               | Output Format | Example           |
|--------|-------------------------------------------|---------------|-------------------|
| y      | Year                                      | Year          | 2019; 19          |
| Y      | Week in year                              | Year          | 2019; 19          |
| M      | Month in year<br>(within date)            | Month         | July; Jul; 07     |
| L      | Month in year<br>(standalone value)       | Month         | July; Jul; 07     |
| w      | Week in year                              | Number        | 52                |
| W      | Week in month                             | Number        | 1                 |
| D      | Day in year                               | Number        | 365               |
| d      | Day in month                              | Number        | 2                 |
| F      | Day of week in month                      | Number        | 3                 |
| E      | Day name in week                          | Text          | Wednesday;<br>Wed |
| u      | Day number of week                        | Number        | 3                 |
| a      | a.m. or p.m.                              | Text          | p.m.              |
| H      | Hour in day from 0 through 23             | Number        | 0                 |
| k      | Hour in day from 1 through 24             | Number        | 24                |
| K      | Hour in a.m.<br>or p.m. from 0 through 11 | Number        | 0                 |

| String | Description                            | Output Format                | Example                    |
|--------|----------------------------------------|------------------------------|----------------------------|
| h      | Hour in a.m. or p.m. from 1 through 12 | Number                       | 12                         |
| m      | Minute in hour                         | Number                       | 59                         |
| s      | Second in minute                       | Number                       | 1                          |
| S      | Millisecond                            | Number                       | 500                        |
| z      | Time zone in default format            | Time zone in default format  | Pacific Standard Time; PST |
| Z      | Time zone in RFC 822 format            | Time zone in RFC 822 format  | -0800                      |
| X      | Time zone in ISO 8601 format           | Time zone in ISO 8601 format | -08; -0800; -08:00         |

## Day

Retrieves the day component from the specified Date/Time.

| Input data pill | Output data pill                       |
|-----------------|----------------------------------------|
| Date/Time       | Integer - Day from the specified date. |

### Example

- Input: 2021-11-20 13:06:12
- Input Date Format: ISO Date (2004-06-28)
- Output: 20

## Hour

Retrieves the hour component from the specified Date/Time.

| Input data pill | Output data pill                        |
|-----------------|-----------------------------------------|
| Date/Time       | Integer - Hour from the specified date. |

**Example**

- Input: 2021-11-20 13:06:12
- Input Date Format: ISO Date (2004-06-28)
- Output: 13

**Minute**

Retrieves the minute component from the specified Date/Time.

| Input data pill | Output data pill                                    |
|-----------------|-----------------------------------------------------|
| Date/Time       | Integer - Minute component from the specified date. |

**Example**

- Input: 2021-11-20 13:06:12
- Input Date Format: ISO Date (2004-06-28)
- Output: 06

**Second**

Retrieves the second component from the specified Date/Time.

| Input data pill | Output data pill                                    |
|-----------------|-----------------------------------------------------|
| Date/Time       | Integer - Second component from the specified date. |

### Example

- Input: 2021-11-20 13:06:12
- Input Date Format: ISO Date (2004-06-28)
- Output: 12

### Month

Retrieves the month component from the specified Date/Time.

| Input data pill | Output data pill                                   |
|-----------------|----------------------------------------------------|
| Date/Time       | Integer - Month component from the specified date. |

### Example

- Input: 2021-11-20 13:06:12
- Input Date Format: ISO Date (2004-06-28)
- Output: 11

### Week

Evaluates the week number for the specified Date/Time.

| Input data pill | Output data pill                              |
|-----------------|-----------------------------------------------|
| Date/Time       | Integer - Week number for the specified date. |

### Example

- Input: 2021-04-07 12:01:12
- Input Date Format: ISO Date (2004-06-28)
- Output: 15

## Year

Retrieves the year component from the specified Date/Time.

| Input data pill | Output data pill                                  |
|-----------------|---------------------------------------------------|
| Date/Time       | Integer - Year component from the specified date. |

### Example

- Input: 2021-04-07 12:01:12
- Input Date Format: ISO Date (2004-06-28)
- Output: 2021

## Date Difference

Evaluates the time duration difference between the specified input date and the parameter date and then adds the difference time duration to the Epoch time (1970-01-01 00:00:00).

| Input data pill              | Parameters                   | Output data pill                                                                   |
|------------------------------|------------------------------|------------------------------------------------------------------------------------|
| Date/Time, Date, or Due Date | Date/Time, Date, or Due Date | Duration - Time duration difference added to the Epoch time (1970-01-01 00:00:00). |

### Example

- Input: 2021-05-02 09:10:12
- Input Date Format: ISO Date (2004-06-28)
- Parameters: 2021-04-07 06:02:23
- Output: 1970-01-26 03:07:49

## End of Month

Evaluates the last day of the month after adding the specified number of the months to the specified date.

| Input data pill | Parameters                                              | Output data pill                                                                               |
|-----------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Date            | Number of Months - Months to add to the specified date. | Integer - Last day of the month after adding the number of months to the specified input date. |

### Example

- Input: 2021-11-20
- Input Date Format: ISO Date (2004-06-28)
- Number of Months: 3
- Output: 2022-02-28

## String transform functions

Use string transform functions to reformat or perform calculations on String data pills.

String transform functions require a String input data pill. Make sure to use the correct input [data pill type](#) when applying string transform functions. If a string transform function is applied to an improper data type, the data is not transformed at runtime and the input value is returned instead. For more information on confirming your flow runtime values, see [Test a flow](#).

### Convert String to Number

Converts a string into a number.

| Input data pill | Output data pill                         |
|-----------------|------------------------------------------|
| String          | Number - Number converted from a string. |

**Example**

- Input: "500"
- Output: 500

**Contains**

Returns **true** when the input string contains a given sequence of characters.

| Input data pill | Parameters                | Output data pill                                                               |
|-----------------|---------------------------|--------------------------------------------------------------------------------|
| String          | Characters to search for. | Boolean indicating whether a sequence of characters exists in the input string |

**Example**

- Input: cheese Pizza
- Parameter: Cheese
- Output: true

**Does not Contain**

Returns **true** when the input string does not contain a given sequence of characters.

| Input data pill | Parameters                | Output data pill                      |
|-----------------|---------------------------|---------------------------------------|
| String          | Characters to search for. | Boolean indicating whether a sequence |

| Input data pill | Parameters | Output data pill                                 |
|-----------------|------------|--------------------------------------------------|
|                 |            | of characters does not exist in the input string |

Example

- Input: Cheese Pizza
- Parameter: Joey
- Output: true

### Ends With

Returns **true** when the input string ends with a given sequence of characters.

| Input data pill | Parameters                | Output data pill                                                                       |
|-----------------|---------------------------|----------------------------------------------------------------------------------------|
| String          | Characters to search for. | Boolean indicating whether the input string ends with the given sequence of characters |

Example

- Input: Cheese Pizza
- Parameter: Pizza
- Output: true

### First Character

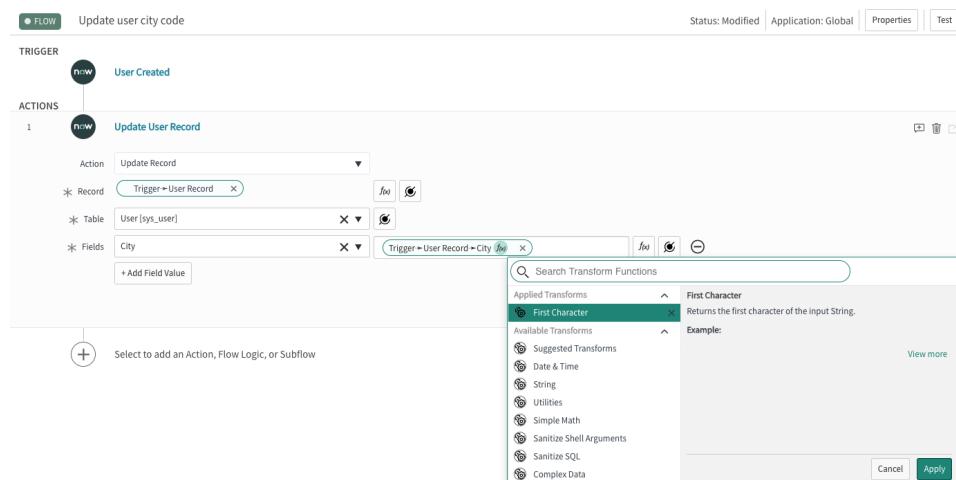
Returns the first character of the input String.

| Input data pill | Output data pill                                                       |
|-----------------|------------------------------------------------------------------------|
| String          | String - Transformed String as the first character of the input String |

## Example

- Input: Madrid
- Output: M

In this example, the flow triggers when a User [sys\_user] record is created. The flow then updates the **City** field for the User [sys\_user] record with a code that is represented as the first character of the city's name.



## Last Character

Returns the last character of the input String.

| Input data pill | Output data pill                                                      |
|-----------------|-----------------------------------------------------------------------|
| String          | String - Transformed String as the last character of the input String |

### Example

- Input: Madrid
- Output: d

## Replace String

Returns a replaced string from the input string based on the provided regex and replacement string.

| Input data pill | Parameters                                                                                                                                               | Output data pill                                         |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| String          | <ul style="list-style-type: none"><li>• Regex - Regular expression to be matched for replacement</li><li>• Replace String - Replacement string</li></ul> | Resulting string after replacement with given parameters |

### Example

- Input: Pepperoni Pizza
- Parameters:
  - Regex: Pepperoni
  - Replacement string: Cheese
- Output: Cheese Pizza

## Size

Returns the total number of characters in the input String.

| Input data pill | Output data pill |
|-----------------|------------------|
| String          | Integer          |

### Example

- Input: Example input string.
- Output: 21

## Split

Returns an Array.String based on a provided **Separator** that splits the input String. If the **Separator** field is left blank, the transformation is ignored and the system returns the input String. If entering any data type other than a String as the **Separator**, the system converts the provided value to a String.

| Input data pill | Parameters                                                                                                                                          | Output data pill                                            |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| String          | Separator - Enter a delimiter that specifies where the input String should be split. If left blank, the input String is not transformed at runtime. | Array.String - An array of substrings from the input String |

### Example

- Input: Example, input, string.
- Separator: ,
- Output: ["Example", "input", "string."]

## Starts With

Returns **true** when the input string starts with a given sequence of characters.

| Input data pill | Parameters                | Output data pill                                                                         |
|-----------------|---------------------------|------------------------------------------------------------------------------------------|
| String          | Characters to search for. | Boolean indicating whether the input string starts with the given sequence of characters |

### Example

- Input: cheese Pizza
- Parameter: Chees
- Output: true

### Substring

Returns a substring from the input String that is based on the provided **Start Index** and **End Index**. Input String index starts at 0.

| Input data pill | Parameters                                                                                                                                                                                                               | Output data pill                                               |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| String          | <ul style="list-style-type: none"><li>• Start Index - Index of the first character to include in the returned substring</li><li>• End Index - Index of the last character to include in the returned substring</li></ul> | String - Transformed String as a substring of the input String |

### Example

- Input: Example input string
- Start Index: 3
- End Index: 6
- Output: mple

### To Lower Case

Converts the input String to all lowercase characters.

| Input data pill | Output data pill                   |
|-----------------|------------------------------------|
| String          | String in all lowercase characters |

Example

- Input: ExamPle input strIng
- Output: example input string

### To Proper Case

Changes the case of words in the input string. Capitalizes the first letter of each word and makes the remaining letters in the word lower case. A word is considered any string separated by a space, hyphen, backslash, or forward slash character. The transform function always evaluates words from left-to-right to determine the first letter.

| Input data pill | Output data pill      |
|-----------------|-----------------------|
| String          | String in proper case |

Example

- Input: exAMPlE-input string/TEXT
- Output: Example-Input String/Text

### To Upper Case

Converts the input String to all uppercase characters.

| Input data pill | Output data pill                   |
|-----------------|------------------------------------|
| String          | String in all uppercase characters |

Example

- Input: ExamPle input strIng
- Output: EXAMPLE INPUT STRING

## Trim

Removes white space from the beginning and end of the input String.  
Does not remove white space within the input String.

| Input data pill | Output data pill                                     |
|-----------------|------------------------------------------------------|
| String          | String - Transformed String with trimmed white space |

### Example

- Input: SQL Server APAC 1
- Output: SQL Server APAC 1

In this example, the action makes a REST call to a third-party system and GETs a response body containing data about a server. Then, the Trim transform function removes any unwanted white space before adding the server's name to a new record in the Server [cmdb\_ci\_server] table.

## Utilities transform functions

Use utilities transform functions to return a Complex Object from an Array, or a value associated with a specific key.

Utilities transform functions require an Array, Name-Value Pair, String, Integer, or Choice input data pill. Make sure to use the correct input [data pill type](#) when applying utilities transform functions. If a utility transform function is applied to an improper data type, the data is not transformed at runtime and the input value is returned instead. For more information on confirming your flow runtime values, see [Test a flow](#).

### Get First Item from Array

Returns the first item from the input array as a complex object.

| Input data pill | Output data pill                                     |
|-----------------|------------------------------------------------------|
| Array           | Complex Object - First item found in the input array |

### Get Item from Array

Returns a Complex Object from the input Array. Enter a value for the Nth Item in the input Array that you want to return. The Nth Item represents the Array index, starting at 0.

| Input data pill | Parameters                                                                                       | Output data pill |
|-----------------|--------------------------------------------------------------------------------------------------|------------------|
| Array           | Nth Item - Enter the index of the target object in the input Array. The Array index starts at 0. | Complex Object   |

### Get Item from Name/Values

Returns a value that is associated with a matching key from a map of Name-Value Pairs.

| Input data pill  | Parameters                                                                                                                                                                                   | Output data pill                        |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Name-Value Pairs | <ul style="list-style-type: none"><li>• Key - Name of the key that is used to look up its corresponding value</li><li>• Default - The value returned when there is no matching key</li></ul> | String associated with the matching key |

**Note:** When applying the Get Item from Name/Values transform function, consider that the runtime value might be the system value, not the display value. For example, if mapping the **Priority** field in the Incident table to a similar field in a remote table, the returned runtime value might be 2, not 2 - High.

## Example

- Input: "username": "abel.tuter"
- Key: username
- Default: example.username
- Output: abel.tuter

In this example, an action makes a REST call to a third-party system and GETs ticket data as a map of Name-Value Pairs. A Ticket ID is provided as an output for this action. The Get Item from Name/Values transform function returns either the value that is associated with the `ticket_id` key or Ticket ID not found.

## Get Last Item from Array

Returns the last item from the input array as a complex object.

| Input data pill | Output data pill                                    |
|-----------------|-----------------------------------------------------|
| Array           | Complex Object - Last item found in the input array |

## Is Blank

Returns **true** when the input is blank. A string input is blank when it is an empty string. An integer input is blank when it is zero. A Boolean input is blank when it is **false**.

| Input data pill | Output                              |
|-----------------|-------------------------------------|
| Any             | Returns <b>true</b> or <b>false</b> |

### Example

- Input: an integer data pill with 0
- Output: **true**

## Is False

Returns **true** when the input is false. A string is false when it is an empty string. An integer is false when it is zero. A Boolean input is false when it is **false**.

| Input data pill | Output data pill                    |
|-----------------|-------------------------------------|
| Any             | Returns <b>true</b> or <b>false</b> |

### Example

- Input: an integer data pill with 13
- Output: **false**

## Is Not Blank

Returns **true** when the input is not blank. A string is not blank when it is not an empty string. An integer is not blank when it is anything but zero. A Boolean input is not blank when it is **true**.

| Input data pill | Output data pill                    |
|-----------------|-------------------------------------|
| Any             | Returns <b>true</b> or <b>false</b> |

Example

- Input: an integer data pill with 13
- Output: **true**

### Is Null

Returns **true** when the input value is null. An input is null if it is not initialized, or if it is a null object or reference.

| Input data pill | Output                              |
|-----------------|-------------------------------------|
| Any             | Returns <b>true</b> or <b>false</b> |

Example

- Input: an integer data pill with 725
- Output: **false**

### Is True

Returns **true** when the input is true. A string is true when it is not an empty string. An integer is true when it is anything but zero. A Boolean input is true when it is **true**.

| Input data pill | Output data pill                    |
|-----------------|-------------------------------------|
| Any             | Returns <b>true</b> or <b>false</b> |

Example

- Input: an integer data pill with 13
- Output: **true**

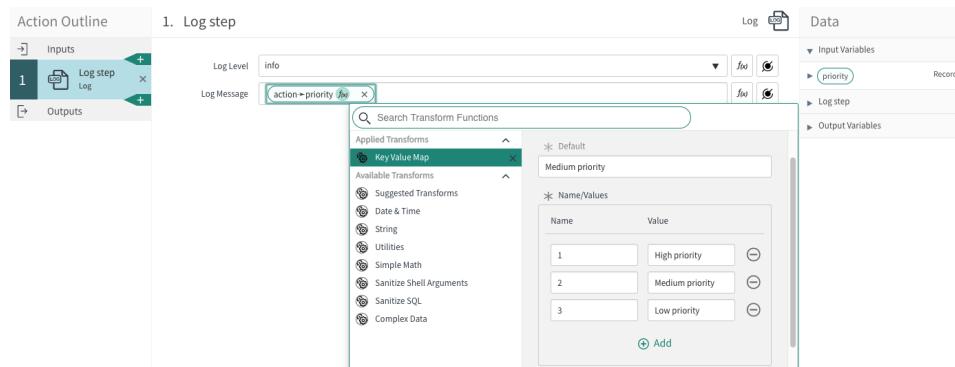
## Key Value Map

Returns a value associated with a matching key, or a default value if there is not a match.

| Input data pill   | Parameters                                                                                                                                                                                                                              | Output data pill                        |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| String or Integer | <ul style="list-style-type: none"> <li>Name - The key that is used to find the corresponding value</li> <li>Value - The value matched to a specific key</li> <li>Default - The value returned when there is no matching name</li> </ul> | String associated with the matching key |

### Example

In this example, a log action stores a record's priority as a message. In the Name-Values section, each priority is mapped to a corresponding string value. When the flow runs, the record's priority number is transformed to a string, and the string is logged to a message.



## Sort

Sorts the specified array in ascending or descending order.

| Input data pill                                                                             | Parameters                              | Output data pill     |
|---------------------------------------------------------------------------------------------|-----------------------------------------|----------------------|
| Array.String,<br>Array.Integer,<br>Array.Boolean, or<br>Array.Datetime. -<br>Unsorted array | Sort Order - Ascending<br>or descending | Array - Sorted array |

**Note:** Sort function is case-sensitive for array.strings.

#### Example

- Input: [7, 2, 3, 1, 7, 9]
- Parameter: Ascending
- Output: [1, 2, 3, 7, 7, 9]

#### Unique

Removes the duplicate elements from the specified array.

| Input data pill                                                   | Output data pill                                 |
|-------------------------------------------------------------------|--------------------------------------------------|
| Array.String, Array.Integer,<br>Array.Boolean, or Array.Datetime. | Array - After duplicated elements<br>are removed |

#### Example

- Input: [7, 2, 3, 2, 7, 9]
- Output: [7, 2, 3, 9]

#### Join

Concatenates the individual elements of the specified array with the specified delimiter and returns the concatenated string.

| Input data pill                 | Parameters                                  | Output data pill                               |
|---------------------------------|---------------------------------------------|------------------------------------------------|
| Array.String,<br>Array.Integer, | Delimiter - Character<br>that separates the | String - String after a<br>delimiter is added. |

| Input data pill                      | Parameters                                  | Output data pill |
|--------------------------------------|---------------------------------------------|------------------|
| Array.Boolean, or<br>Array.Datetime. | individual elements<br>after concatenation. |                  |

Example

- Input: [1, 2, 3]
- Parameters: <
- Output: 1<2<3

## Simple math transform functions

Use simple math transform functions to perform basic mathematical calculations on Number data pills.

Simple math transform functions require an Array.Number, Array.Integer, or Array.Decimal input data pill. Make sure to use the correct input [data pill type](#) when applying simple math transform functions. If a simple math transform function is applied to an improper data type, the data is not transformed at runtime and the input value is returned instead. For more information on confirming your flow runtime values, see [Test a flow](#).

### Absolute Value

A mathematical function that returns the distance from zero for any real number. An absolute value is always a positive or zero value.

| Input data pill             | Output data pill                                 |
|-----------------------------|--------------------------------------------------|
| Number, Integer, or Decimal | Number as the absolute value of the input number |

Example

- Input: -3
- Output: 3

## Add

Adds the given value to the input.

| Input data pill             | Parameters          | Output data pill                                            |
|-----------------------------|---------------------|-------------------------------------------------------------|
| Number, Integer, or Decimal | Number to be added. | Number as the addition of the input value by the parameter. |

Example

- Input: 12
- Parameter: 4
- Output: 16

## Average

Returns the average value of the elements in the input array.

| Input data pill                               | Output data pill                                |
|-----------------------------------------------|-------------------------------------------------|
| Array.Number, Array.Integer, or Array.Decimal | Number as the average value of the input array. |

Example

- Input: [10, 30, 20]
- Output: 20

## Count

Returns the number of elements in the input array.

| Input data pill                                                                          | Output data pill                      |
|------------------------------------------------------------------------------------------|---------------------------------------|
| Array.Number, Array.Integer, Array.Decimal, Array.Object, Array.String, or Array.Boolean | Number of elements in the input array |

**Example**

- Input: [2, 10, 30]
- Output: 3

**Divide**

Divides the input value by a given value.

| Input data pill             | Parameters                           | Output data pill                                            |
|-----------------------------|--------------------------------------|-------------------------------------------------------------|
| Number, Integer, or Decimal | Number to divide the input value by. | Number as the division of the input value by the parameter. |

**Example**

- Input: 12
- Parameter: 4
- Output: 3

**Max**

Returns the highest value found in the input Array.

| Input data pill                               | Output data pill                               |
|-----------------------------------------------|------------------------------------------------|
| Array.Number, Array.Integer, or Array.Decimal | Number as the highest value in the input Array |

### Example

- Input: [1, -5, 20, 6]
- Output: 20

### Median

Returns the median value of elements in the input array.

| Input data pill                                  | Output data pill                                  |
|--------------------------------------------------|---------------------------------------------------|
| Array.Number, Array.Integer, or<br>Array.Decimal | Number as the median value of<br>the input array. |

### Example

- Input: [10, 30, 15]
- Output: 15

### Min

Returns the lowest value found in the input Array.

| Input data pill                                  | Output data pill                                 |
|--------------------------------------------------|--------------------------------------------------|
| Array.Number, Array.Integer, or<br>Array.Decimal | Number as the lowest value in the<br>input Array |

### Example

- Input: [1, -5, 20, 6]
- Output: -5

### Multiply

Multiplies the input value by a given value.

| Input data pill             | Parameters               | Output data pill                                              |
|-----------------------------|--------------------------|---------------------------------------------------------------|
| Number, Integer, or Decimal | Number to be multiplied. | Number as multiplication of the input value by the parameter. |

**Example**

- Input: 12
- Parameter: 4
- Output: 48

**Power**

Returns the value of the input value raised to the power of a given value.

| Input data pill             | Parameters                           | Output data pill                                     |
|-----------------------------|--------------------------------------|------------------------------------------------------|
| Number, Integer, or Decimal | Number as the exponent of the power. | Number as the power of input value to the parameter. |

**Example**

- Input: 2
- Parameter: 3
- Output: 8

**Round**

A mathematical function that approximates a numeric value based on rounding rules and a digit position. The function rounds up by adding one to the digit to be rounded and then replacing all digits to its right with zeroes.

| Input data pill             | Parameters                                                                                                    | Output data pill                                |
|-----------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Number, Integer, or Decimal | Number of Digits - A positive integer specifying the position of the digit to be rounded starting on the left | Number as the rounded value of the input number |

**Example**

- Input: 194
- Parameter: 2
- Output: 190

**Note:** The function uses the digit to the right of the parameter digit to round up or down. If the digit to the right has a value from zero through four, the function rounds down. If the digit to the right has a value from five through nine, then the function rounds up. If there is no digit to the right, then the function rounds down.

## Square Root

A mathematical function that computes a positive number that when multiplied by itself produces the input value. The input value must be a positive real number.

| Input data pill             | Output data pill                              |
|-----------------------------|-----------------------------------------------|
| Number, Integer, or Decimal | Number as the square root of the input number |

**Example**

- Input: 16
- Output: 4

## Subtract

Subtracts the given value from the input.

| Input data pill             | Parameters                               | Output data pill                                               |
|-----------------------------|------------------------------------------|----------------------------------------------------------------|
| Number, Integer, or Decimal | Number to subtract from the input value. | Number as the subtraction of the input value by the parameter. |

Example

- Input: 12
- Parameter: 4
- Output: 8

## Sum

Returns the sum of all values in the input Array.

| Input data pill                               | Output data pill                                 |
|-----------------------------------------------|--------------------------------------------------|
| Array.Number, Array.Integer, or Array.Decimal | Number as a sum of all values in the input Array |

Example

- Input: [1, -5, 20, 6]
- Output: 22

## To Fixed

Truncates a floating number to the specified number of decimal places.

| Input data pill                            | Parameter                                                                          | Output data pill                          |
|--------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------|
| Number - Decimal number before truncation. | Number of Digits - Number that specifies the number of decimal places to truncate. | Number - Decimal number after truncation. |

Example

- Input: 1.93456
- Parameter: 2
- Output: 1.93

## Sanitize shell arguments transform functions

Use sanitize shell arguments transform functions to remove any potentially unsafe command injections in String data pills to be used for Bash shell scripting.

Sanitize shell arguments transform functions require a String input data pill. Make sure to use the correct input [data pill type](#) when applying sanitize shell arguments transform functions. If a sanitize shell arguments transform function is applied to an improper data type, the data is not transformed at runtime and the input value is returned instead. For more information on confirming your flow runtime values, see [Test a flow](#).

**Note:** When a data pill is dropped into the **Command** input for an [SSH step](#), the sanitize shell arguments transform function category automatically appears.

### Sanitize Bash shell arguments

Returns a String free of any unsafe command injections in your Bash shell script. Wraps the input String with single quotes and escapes any existing single quotes so that you can pass the String directly to a shell function as a safe argument.

| Input data pill | Output data pill                                           |
|-----------------|------------------------------------------------------------|
| String          | String - String with Bash shell arguments properly escaped |

## Sanitize SQL transform functions

Use sanitize SQL transform functions to escape special characters and prevent injection in String data pills to be used for SQL statements.

Sanitize SQL transform functions require a String input data pill. Make sure to use the correct input [data pill type](#) when applying sanitize SQL transform functions. If a sanitize SQL transform function is applied to an improper data type, the data is not transformed at runtime and the input value is returned instead. For more information on confirming your flow runtime values, see [Test a flow](#).

**Note:** When a data pill is dropped into the **SQL Statement** input for a [JDBC step](#), the sanitize SQL transform function category automatically appears.

### Sanitize SQL Identifier

Returns a String with escaped special characters/injected values for SQL identifiers (such as table, view, and column names). Wraps the input String in database-specific quotes.

| Input data pill | Parameters                                                                                                                                     | Output data pill                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| String          | Database - The database-specific context in which characters are escaped. Choices include MySQL, Oracle, PostgreSQL, and Microsoft SQL Server. | String - String with SQL identifiers that are properly escaped based on the selected database |

### Example

- Input: simple\_column
- Database: MySQL
- Output: `simple\_column`

### Note:

- If your input String contains a period character, **Sanitize SQL Identifier** returns an error. To join SQL identifiers using a period, use two data pills concatenated with a period and apply **Sanitize SQL Identifier** to both pills.
- Don't enclose the input data pill in quotes. The system automatically wraps the input value with the type of quotes or backticks that apply to your database type.

### Sanitize SQL Value

Returns a String with escaped special characters or injected values for SQL values. Wraps the input String in database-specific quotes.

| Input data pill | Parameters                                                                                                                                     | Output data pill                                                                         |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| String          | Database - The database-specific context in which characters are escaped. Choices include MySQL, Oracle, PostgreSQL, and Microsoft SQL Server. | String - String with SQL values that are properly escaped based on the selected database |

### Example

- Input: '1'='1
- Database: SQLServer
- Output: ''1''=''1'

**Note:** Don't enclose the input data pill in quotes. The system automatically wraps the input value with the type of quotes or backticks that apply to your database type.

## Complex data transform functions

Use complex data transform functions to serialize Complex Object data pills into an XML format.

Complex data functions require a Complex Object input data pill. Make sure to use the correct input [data pill type](#) when applying complex data transform functions. If a complex data transform function is applied to an improper data type, the data is not transformed at runtime and the input value is returned instead. For more information on confirming your flow runtime values, see [Test a flow](#).

### To XML

Serializes the input Complex Object to XML.

| Input data pill | Output data pill                         |
|-----------------|------------------------------------------|
| Complex Object  | XML - XML document formatted as a String |

## Example

- Input: { "article\_id": KB3843202, "article\_description": "How do I reset my Active Directory password?" }
- Output: <article\_id>KB3843202</article\_id>  
<article\_description>How do I reset my Active Directory password?</article\_description>

In this example, an action makes a REST call to a third-party knowledge base and retrieves KB article IDs and descriptions. The To XML transform function changes the response body's JSON text into XML format before it is integrated into the system's knowledge base.

### Data transformed from JSON text to XML format

The screenshot shows the ServiceNow Action Editor interface. On the left, the Action Outline pane lists two steps: 'Get KB Articles' (REST) and 'Construct payload' (Script). The 'Get KB Articles' step has an 'Applied Transform' of 'To XML' applied to its output. A modal window titled 'Search Transform Functions' is open, showing the 'Applied Transforms' section with 'To XML' selected. The 'To XML' transform is described as 'Serializes the input Complex Object to XML.' Below it, the 'Available Transforms' section includes 'Date & Time', 'String', 'Utilities', 'Simple Math', 'Sanitize Shell Arguments', 'Sanitize SQL', and 'Complex Data'. The 'Input:' field is empty. At the bottom of the modal are 'Cancel' and 'Apply' buttons.

## Types of flows and when to use them

A decision matrix and basic definitions help you determine what type of flows to create.

### Types of flows

#### Flow

A flow consists of a trigger and one or more actions.

#### Subflow

A subflow consists of properties, one or more inputs, one or more outputs, a sequence of actions, and the data collected or created.

Contrary to the name, Dynamic Flow is a type of flow logic, not a type of flow.

### When to use different flows

#### When to use different flows

| If...                                                                                             | Then create...    |
|---------------------------------------------------------------------------------------------------|-------------------|
| You need a constant input to initiate a set of actions                                            | A flow            |
| You need a variable input to initiate a set of actions                                            | A subflow         |
| You want to start a flow by calling it from another flow or script                                | A subflow         |
| You want to reuse a set actions in other flows                                                    | A subflow         |
| You want to configure different types of inputs for each call                                     | A subflow         |
| You want to specify the inputs available to a subflow when it starts                              | A subflow         |
| You want to specify the outputs available to a parent flow after a subflow ends                   | A subflow         |
| You have a large flow with 25 or more actions and want to improve its performance and readability | Subflows          |
| There are interrelated outputs or some action must be taken when all are available                | Parallel subflows |

| If...                                                                                  | Then create...                             |
|----------------------------------------------------------------------------------------|--------------------------------------------|
| There are not interrelated outputs or some action must be taken when all are available | Multiple flows triggered by a single event |
| You want to correct certain errors in your record data automatically                   | A subflow                                  |
| You want to avoid the limit of 10 items in the error-handling-process                  | A subflow                                  |
| You want to use subflow outputs to trigger automation in other flows                   | A subflow                                  |