



Executing Workflows

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Workflow Execution

When you execute a workflow, a service request is created. You can execute a workflow directly, schedule a workflow to run later, or create a trigger to run a workflow when certain conditions are met. You can also create a policy to execute workflows on VMs.

Each of these options is briefly outlined here.

- *Execute a Workflow Directly* - You can execute a selected workflow immediately. Navigate to **Policies > Orchestration > Workflows** or open the **Workflow Designer**, then choose **Execute Now**.
- *Schedule a Service Request to be Executed Later* - You can schedule execution of a selected workflow. Navigate to **Policies > Orchestration > Workflows**, then choose **Schedule**.
- *Trigger Conditional Workflow Execution* - You can create a trigger to execute a workflow when a set of conditions is met. Navigate to **Policies > Orchestration > Workflows**, then choose **Triggers**.
- *Create an Action Policy* - You can create a policy to execute workflows on VMs within a virtual data center (vDC). Navigate to **Policies > Orchestration > Workflows**, choose **User VM Action Policy**, then add the policy to a virtual data center (vDC).

Detailed instructions and examples are given in the following sections.

Pre- and Post-Provisioning Workflows

When you publish a standard service request in a catalog, you can associate workflows to run before (pre-provisioning) and after (post-provisioning) the VM provisioning. See "Managing Catalogs" in the [Cisco UCD Director Administration Guide](#). The following features and rules apply to pre- and post-provisioning workflows.

- Pre- and post-provisioning workflows must be saved as compound tasks. See [Creating a Compound Task](#).
- If pre-provisioning fails, the service request stops and the provisioning does not occur.
- Similarly, if the service request fails during provisioning, post-provisioning is not executed.
- No inputs are explicitly passed between the pre-provisioning, provisioning, and post-provisioning workflows.
- The tasks within the pre- and post-provisioning workflows are expanded as they are run, and their individual tasks are visible in the service request. This is in contrast to running a "normal" workflow containing a compound task, where the compound task is not expanded.

Executing a Workflow

You can execute a workflow immediately from either the **Workflows** page or the **Workflow Designer**.

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- Step 1** Choose the workflow you want to execute by navigating to it on the **Workflows** page (it might be in a directory or subdirectory).
Optionally, open the workflow in the **Workflow Designer** by clicking **Workflow Designer**.
- Step 2** Click the **Execute Workflow** action.
- Step 3** On the **Executing Workflow** screen, choose the version of the workflow you want to run.
- Step 4** If the workflow has the **Load Inputs from Previous Service Request** option enabled, you can optionally fill the input fields by duplicating the inputs from a previous service request:
- From the **Select an SR to Load Inputs** pull-down list, choose a service request from which to copy input values. Only the last 10 service requests appear in the list.
- All of the input fields are filled with the corresponding input values from the selected SR, with the following exceptions:
- Password fields are left blank.
 - Form Managed lists remain unpopulated.
- Step 5** Complete the input fields on the page. You can change any input field, including inputs that were populated by checking **Load inputs from previous SR**.
- The input fields show the workflow inputs that you are allowed to change as a user.
- Note** Workflow inputs can be defined with values (*admin inputs*) that cannot be overridden at runtime. See [Defining Workflow Input and Output](#). Admin inputs are not displayed in the **Executing Workflow** dialog.
- If an input is mandatory and has no default input, you must provide a user input.

If workflow input rules are active, values you supply to input fields might cause other inputs to appear or disappear. See [Dynamic Workflow Inputs](#).

Note Workflow input rules affect only the visibility of input fields, not their values. If you loaded inputs from a previous service request, all inputs, including hidden fields, contain the values copied from the selected SR.

Step 6 Click **Submit**.
The **Service Request Submit Status** screen appears.

What to do next

On the **Service Request Submit Status** screen, click **Show Detail Status** to see the progress of the service request.

Example: Executing a Workflow

This example demonstrates executing a workflow directly.

Before you begin

Create the example workflow as described in [Example: Creating a Workflow](#).

- Step 1** Choose **Orchestration**.
- Step 2** On the **Orchestration** page, click **Workflows**.
- Step 3** Locate and select the PowerCycleVM workflow you created in [Example: Creating a Workflow](#).
- Step 4** On the **Executing Workflow** screen, click **Submit**.
- Step 5** On the **Service Request Submit Status** screen, click **Show Detail Status**.
- Step 6** On the **Service Request** screen, click **Workflow Status**.
On the status page is a graphic of the service request's progress.
- Step 7** Click **Log** to view the service request log.
- Note** Click **Refresh** to view the latest updates to the log.
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What to do next

Click **Workflow Status** and record the **Request ID** from the report. You can view the status of a service request by ID at any time. See [Viewing Service Requests](#).

Click **Close** to leave the **Service Request** screen.

Creating a Workflow Trigger

You can define a trigger to execute a workflow when specific conditions are met. These conditions are typically the states of various system components.



Note If you want a workflow to execute at a predetermined time, you can create a schedule for workflow execution. See [Scheduling a Service Request, on page 9](#).

When you enable a trigger, Cisco UCS Director monitors the system state and when the trigger conditions are met executes the workflow you specify.

To create a workflow trigger, follow these steps:

- Step 1** Choose **Orchestration**.
- Step 2** On the **Orchestration** page, click **Triggers**.
- Step 3** Click **Add**.
- Step 4** On the **Add Trigger: Trigger Information** screen, complete the following fields:

Name	Description
Trigger Name	A unique name for the trigger.
Is Enabled	Enables the trigger. (You can create and save a trigger, then enable it later.)
Description	A description of the trigger.
Frequency	<p>The period between checks for the trigger rule. The choices for this period span three minutes to one month.</p> <p>Note Internally, Cisco UCS Director polls for triggers every two minutes. Therefore, the actual period might be up to two minutes longer than specified. This can be significant for small trigger periods.</p> <p>For example, with Frequency set to three minutes, the trigger might activate up to three + two = five minutes after the trigger condition is satisfied.</p>

Name	Description
<p>Trigger Type</p>	<p>Choose the trigger type:</p> <ul style="list-style-type: none"> • Stateful—The last trigger state is recorded and actions are executed when there is a change in the trigger state. (The trigger state is Active when the trigger conditions are met, and Clear otherwise.) You choose workflows for both trigger state transitions: one for when the trigger state changes from Active to Clear, and one for when the trigger state changes from Clear to Active. The trigger state is checked at the frequency specified in the Frequency drop-down list. • Stateless—The trigger is executed anytime the trigger conditions are met, at a frequency specified in the Frequency drop-down list.

During execution of a triggered service request, additional requests by the same trigger are ignored. Only after the triggered service request has completed does the next polling event, as defined by the Frequency parameter, trigger another service request.

For example: Stateful Trigger T has a Frequency parameter of 5 minutes. T polls parameter P at time 13:00 and finds that P meets the trigger criterion, so T executes a service request SR that runs for 8 minutes. At 13:05, T polls again but, because SR is still running, T does not execute another service request, regardless of the state of P. At 13:08, SR ends. When T polls again at 13:10, it executes a new service request if the criterion for P is met.

Step 5

Click **Next**.

Step 6

Specify the trigger conditions.

- a) On the **Add Trigger: Specify Conditions** screen, do the following:
 - Expand the **Conditions** list.
- b) In the **Add Entry to Monitor** dialog box, complete the following fields:

Name	Description
<p>Type of Object to Monitor</p>	<p>Choose which type of object to monitor with this condition.</p>
<p>Object</p>	<p>Choose the particular object to monitor. Entries in this list vary depending on the type of object. You might need to specify additional information (a pod, for example) to filter for the object.</p>
<p>Parameter</p>	<p>Choose an operational parameter to monitor. Entries in this list vary depending on the object.</p>
<p>Operation</p>	<p>Choose the relational operation for the trigger comparison. Entries in this list vary depending on the possible states of the parameter.</p>

Name	Description
Value	Choose the value with which to compare the parameter. When the relation defined by Parameter, Operation, and Value is true, the trigger state is Active; otherwise, the trigger state is Clear.

- c) Click **Submit**.
- d) Repeat the previous two steps to add more trigger conditions.
- e) Choose one of the two options in the **Trigger When** drop-down list:
 - Choose **All Condition(s) Satisfied** to specify that the trigger state is true only when all of the trigger conditions are met.
 - Choose **Any Condition(s) Satisfied** to specify that the trigger state is true if one or more of the trigger conditions are met.

Step 7 Click **Next**.

Step 8 On the **Add Trigger: Specify Workflow** screen, choose the workflow or workflows to execute on the trigger:

- a) In the **Select Workflow** drop-down list under **When Trigger State Becomes Active**, choose a workflow. This workflow is executed:
 - Whenever the trigger state is Active (polled at a frequency specified in the **Frequency** drop-down list), if the trigger is stateless.
 - If and only if the trigger state has changed from Clear to Active since last checked one period ago (as specified in the **Frequency** drop-down list), if the trigger is stateful.
- b) If you chose the stateful trigger type, in the **Select Workflow** drop-down list under **When Trigger State Becomes Clear**, choose a workflow. This workflow is executed if and only if the trigger state has changed from Active to Clear since last checked one period ago (as specified in the **Frequency** drop-down list).

Step 9 Click **Next**.

Step 10 On the **Add Trigger: Specify Workflow Inputs** screen, enter all the required inputs for the workflow, and any needed optional inputs.

Note You must enter all inputs that are needed by the workflow. There is no opportunity for user input in a triggered workflow.

Step 11 Click **Submit**.

What to do next

You can enable or disable a trigger by selecting the trigger on the **Policies > Orchestration > Triggers** screen and checking or unchecking **Is Enabled**.

Example: Creating a Trigger to Execute a Workflow

This example demonstrates creating a trigger to execute a workflow when a set of conditions are met.

Step 1

Create a workflow with a single task as follows:

- a) Create the workflow as described in the following table.

Name	Description
Workflow Name	Type <i>VM Power Event Notify</i> .
Description	Type <i>Sends an email when a VM changes power state</i> .
Workflow Context	Choose <i>Any</i> .
Select Folder	Choose <i>Orchestration Examples</i> .

- b) Create an input as described in the following table:

Name	Description
Input Label	Type <i>Admin Emails</i> .
Input Description	Type <i>Email addresses to send power event notifications</i> .
Optional	Leave unchecked.
Input Type	Choose <i>email_address_list</i> .
Value Restrictions	Do not check Admin Input .

- c) Do not define any user outputs.
- d) In the **Workflow Designer**, add a **Send Email** task to the workflow.
- e) Complete the task information as described in the following table:

Name	Description
Task Information screen	
Task Name	Type <i>VMPowerEventEmail</i> .
User Input Mapping screen	
Email Addresses (Mandatory)	Check Map to User Input .
Task Inputs screen	
Subject	This is the subject line of the notification email. Type <i>VM power event notification</i> .
Body	This is the body of the notification email. Type <i>One of the following VMs has had a power -on or power-off event: (list the VMs in your VMPowerCycle workflow)</i> .
Value Restrictions	Do not check Admin Input .

- f) On the **User Output Mapping** page, do not map any outputs.
- g) Validate the workflow, then exit the **Workflow Designer**.

Step 2 Click **Triggers**.

Step 3 Choose **Add**.

Step 4 On the **Trigger Information** screen, complete the following fields:

Name	Description
Trigger Name	Type <i>VMPowerEvent</i> .
Is Enabled	Leave this checked.
Description	Type <i>Executes VMPowerEventEmail when a power-on or power-off occurs on a monitored VM</i> .
Frequency	To test the trigger, you want a short time between polls. Choose <i>3 minutes</i> .
Trigger Type	Choose <i>Stateful</i> . This causes the trigger to activate when a condition changes between polls.

Step 5 On the Specify Conditions screen, add some conditions.

a) Expand the Conditions list and add a condition using the following values:

Name	Description
Type of Object to Monitor	Choose <i>VM</i> .
Object	Choose a VM to be monitored.
Parameter	Choose <i>Power Status</i> .
Operation	Choose <i>Equals</i> .
Value	Choose <i>ON</i> .

b) Repeat the last step to add more VMs to be monitored. Each VM has its own condition.

c) In the **Trigger When** drop-down list, select **Any Condition(s) Satisfied**.

Step 6 On the Specify Workflow screen, complete the fields using the following values:

Name	Description
Maximum Invocations	For demo purposes, choose <i>20</i> . You might choose <i>Unlimited</i> in an actual production application.
When Trigger State Becomes Active	In the Select Workflow drop-down list, choose <i>VMPowerEventNotify</i> . The trigger executes this workflow when any of your monitored VMs changes from <i>OFF</i> to <i>ON</i> as defined on the Specify Conditions page. Note Items appear by serially assigned ID number in the drop-down list, so your workflow is at the bottom of list.

Name	Description
When Trigger State Becomes Clear	In the Select Workflow drop-down list, choose <i>VMPowerEventNotify</i> . The trigger executes this workflow when any of your monitored VMs changes from <i>ON</i> to <i>OFF</i> as defined on the Specify Conditions screen.

What to do next

Test the trigger by turning on or off one of the monitored VMs. Make sure that the VM's state remains changed for at least three minutes. The trigger polls the state, so any change that is not visible at the time of polling (on and back off during the three minute wait interval, for example) does not activate the trigger.

Scheduling a Service Request

You can schedule execution of a workflow for a specific time.

- Step 1** Choose **Orchestration**.
- Step 2** On the **Orchestration** page, click **Workflows**.
- Step 3** On the **Workflows** screen, choose the workflow that you want to schedule.
- Step 4** Click **Schedule**.
- Step 5** On the **Schedule Workflow** screen, complete the following fields:

Name	Description
Recurrence Type	Whether and at what frequency you want the workflow execution to recur. Choose one of the following: <ul style="list-style-type: none"> • No End—Execute the workflow repeatedly without end at intervals defined by Frequency Type and Frequency Interval, starting at Start Time. • Only once—Execute the workflow only once, at Start Time. • Fixed Number of Times—Execute the workflow a number of times specified by Repeat Count at intervals defined by Frequency Type and Frequency Interval, starting at Start Time. • End by Date—Execute the workflow until the defined end time at intervals defined by Frequency Type and Frequency Interval, starting at Start Time.
Start Time	The time at which to start the workflow execution (or the first of a series of recurring executions).

Name	Description
Frequency Type	The unit of the recurrence frequency interval. Choose hourly, daily, weekly, or monthly.
Frequency Interval	Choose the interval at which the workflow needs to be executed for the frequency that you chose. For example, if the Frequency Interval is four and the Frequency Type is daily, the workflow is executed every four days.
User ID (optional)	The user ID to run the workflow. The service request runs with the permissions of this user ID.

Note You must provide inputs with the workflow. Scheduled workflows do not accept user inputs.

Note The same workflow can be run from any number of workflow schedules.

What to do next

Click **Workflow Schedules** to view scheduled workflows.

On the **Workflow Schedules** screen, you can modify a scheduled workflow by choosing a workflow and clicking the **Edit** button. The **Modify Workflow Schedule** screen appears. Modify the fields described in the previous steps. The **Modify Workflow Schedule** screen is identical to the **Schedule Workflow** screen.

Example: Scheduling Workflow Execution

This example demonstrates how to schedule a workflow for later execution.

Before you begin

Create the example workflow as described in [Example: Creating a Workflow](#).

- Step 1** Choose **Orchestration**.
- Step 2** On the **Orchestration** page, click **Workflows**.
- Step 3** Choose the *VMPowerCycle* workflow.
- Step 4** Click **Schedule**.
- Step 5** On the **Schedule Workflow** dialog, complete the following:

Name	Description
Recurrence Type	Choose <i>Only once</i> . You might choose other values in an actual production application.
Start Time	Choose today's date and set a time a few minutes later than your current time.
Use ID	Type the administrator ID you are signed in as.

Step 6 Click **Submit**.**What to do next**

Click the **Workflow Schedules** tab. The scheduled workflow is listed.

Check the service request queue at the time you specified in the Start Time control. See [Viewing Service Requests](#). A service request is generated for the workflow you specified.

Creating a Context Workflow Mapping

A context workflow mapping consists of an action label mapped to a workflow on a page, such that clicking on the action label triggers the workflow.

The **Context Workflow Mapping** module allows you to dynamically add a context workflow mapping. In this way, you can customize the Cisco UCS Director UI by creating an action label for a page and assigning a workflow to that action label.

The following lists the mappings and the relevant navigation path for the action labels.

- **Initiator**—Navigate to **Physical > Storage**, choose a Netapp 7 mode device, and then navigate to **Filers > Initiator**.
- **Initiator Group**—Navigate to **Physical > Storage**, choose a Netapp 7 mode device, and then navigate to **Filers > Initiator Group**.
- **LUN**—Navigate to **Physical > Storage**, choose a Netapp 7 mode device, and then navigate to **Filers > LUN**.
- **vFilers**—Navigate to **Organization > Physical Resources > vFilers**.
- **vFiler LUN**—Navigate to **Physical > Storage**, choose a Netapp 7 mode device, and then navigate to **Filers > vFiler > LUN**.
- **vFiler Volume**—Navigate to **Physical > Storage**, choose a Netapp 7 mode device, and then navigate to **Filers > vFiler > Volume**.
- **vFiler Initiator**—Navigate to **Physical > Storage**, choose a Netapp 7 mode device, and then navigate to **Filers > vFiler > Initiator**.
- **vFiler Initiator Group**—Navigate to **Physical > Storage**, choose a Netapp 7 mode device, and then navigate to **Filers > vFiler > Initiator Group**.
- **NetApp Volume**—Navigate to **Physical > Storage**, choose a Netapp 7 mode device, and then navigate to **Filers > Volume**.
- **UCS Server**—Navigate to **Organization > Physical Resources > Servers**.
- **UCS Service Profile**—Navigate to **Organization > Physical Resources > Service Profiles**.
- **Cloud**—Navigate to **HyperConverged > Virtual SAN > IaaS**.

Creating a context workflow mapping requires knowing the name of the page to which you are adding the action label. The name, and other metadata, of a page are displayed in an **Information** dialog that is available when you enable the **Developer Menu** in Cisco UCS Director.

- Step 1** Choose **Orchestration**.
- Step 2** On the **Orchestration** page, click **Context Workflow Mapping**.
- Step 3** On the **Context Workflow Mapping** page, double-click the mapping you want to use.
- Step 4** On the **Edit Workflow Mappings** screen, click **Add Workflow**.
- Step 5** On the **Workflow 1** screen, complete the following:

Name	Description
Selection Required	<p>If you check Selection Required, the Workflow drop-down list no longer has any values available. To make the workflow visible in the workflow drop-down list, execute Context Workflow Mapping on the Workflow Designer screen.</p> <p>If you do not check this box, provide information for the remaining fields.</p>
Action Label	Enter the name of the action label to connect to the workflow. It should be a unique name.
Workflow drop-down list	<p>Select the workflow to be executed when the user clicks the action label in the report.</p> <p>If you checked Selection Required, a new workflow is created. If you did not check Selection Required, choose a workflow listed in this drop-down list.</p>
Authorized User Types	<p>On the Select Items screen, click the each of the user types you authorize. Your choices are:</p> <ul style="list-style-type: none"> • Service End-User • Group Admin • System Admin • Operator/Other Administrator

To add an additional **Workflow** step to this **Context Workflow Mapping**, click the **Add Workflow** button and complete the fields.

To delete a **Workflow** step from this **Context Workflow Mapping**, click **Delete Field** below the workflow you want to delete.

- Step 6** Click **Submit**.

Using VM Action Policies

You can create a user VM action policy to apply to virtual data centers (VDCs). The policy contains workflows that can be run on VMs within that VDC.



Note Only one VM action policy can be assigned per VDC.

To create a VM action policy, do the following:

Step 1 Choose **Orchestration**.

Step 2 On the **Orchestration** page, click **User VM Action Policy**.

Step 3 Click **Add**.

Step 4 On the **Add Policy: Create New Policy** screen, complete the following:

Name	Description
Policy Name	The policy name.
Policy Description	A description of the policy.
Select No of Actions	The number of actions defined by the policy. One action specifies a single workflow.

Step 5 Click **Next**.

Step 6 For each **VM Action** on the **Add Policy: Add VM Actions** screen, complete the following:

Name	Description
Action Label	The label for the VM action. The action is available when you select a VM that is part of a virtual data center (VDC) to which the action policy is applied.
Workflow	The workflow represented by this action.
Authorized User Types	The user types authorized to run the policy workflows.

Step 7 Click **Submit**.

What to do next

After you create a User VM Action policy, as an administrator, you can choose this policy when you create a VDC. All VMs that belong to the VDC can then use the workflows specified in the action policy.

