Executing Workflows

This chapter contains the following sections:

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 the **Policies** > **Orchestration** > **Workflows** tab 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 the **Policies** > **Orchestration** > **Workflows** tab, choose **Schedule**.

- *Trigger Conditional Workflow Execution* - You can create a trigger to execute a workflow when a set of conditions is met. Navigate to the **Policies** > **Orchestration** > **Workflows** tab, 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 the **Policies** > **Orchestration** > **Workflows** tab, choose **User VM Action Policy**, then add the policy to a vDC.

Detailed instructions and examples are given in the following sections.

Executing a Workflow

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

Step 1   Navigate to the **Workflows** page. From the menu, choose **Policies** > **Orchestration**, then choose the **Workflows** tab.

Step 2   Select 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 the **Workflow Designer** action.

Step 3   Click the **Execute Workflow** action.

   • If you are in the **Workflow Designer**, the button is near the upper right of the window.

   • If you are on the **Workflows** page, select the action from the task bar or from the drop-down menu at the right of the task bar.

Step 4   In the **Executing Workflow** dialog, choose the version of the workflow you want to run.

Step 5   Also in the **Executing Workflow** dialog, set user inputs for the workflow.
The input controls show the workflow inputs that you are allowed to change as a user.

If an input is mandatory and has no default input, you must provide a user input.

Note   Workflow inputs can be defined with values (admin inputs) that cannot be overridden at runtime. Admin inputs are not displayed in the **Executing Workflow** dialog.

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

What to Do Next

In the view **Service Request Submit Status** window, 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   Navigate to **Policies** > **Orchestration**.

Step 2   Click the **Workflows** tab.

Step 3   Locate and select the PowerCycleVM workflow you created in Example: Creating a Workflow.

Step 4   In the **Executing Workflow** dialog, click **Submit**.

Step 5   In the view **Service Request Submit Status** window, click **Show Detail Status**.

Step 6   In the **Service Request** dialog, click the **Workflow Status** tab.
On the status page is a graphic of the service request's progress.

Step 7   Click the **Log** tab to view the service request log.
Note   Click the **Refresh** button to view the latest updates to the
log.

What to Do Next

Click the **Workflow Status** tab 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** dialog.

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. When you enable a trigger, 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   On the menu bar, choose **Policies** > **Orchestration**.

Step 2   Choose the **Triggers** tab.

Step 3   Click **Add**.

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

Name	Description
Trigger Name field	The name of trigger.
Is Enabled check box	Enables the trigger. (You can create and save a trigger, then enable it later.)
Description field	A description of the trigger.

Name	Description
Frequency drop-down list	The period between checks for the trigger rule. The choices for this period span three minutes to one month.
Trigger Type drop-down list	Choose the trigger type: • **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.

Step 5   Click **Next**.

Step 6   Specify the trigger conditions.

     a) In the **Add Trigger: Specify Conditions** screen, do the following:
       Click (+) to create a condition in the conditions list.

     b) In the **Add Entry to Monitor** dialog box, complete the following fields:

Name	Description
Type of Object to Monitor drop-down list	What type of object to monitor with this condition.
Object drop-down list	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.
Parameter drop-down list	Choose an operational parameter to monitor. Entries in this list vary depending on the object.
Operation drop-down list	Choose the relational operation for the trigger comparison. Entries in this list vary depending on the possible states of the parameter.
Value drop-down list	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   In 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   In 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 in the **Policies** > **Orchestration** > **Triggers** tab and checking or unchecking the **Is Enabled** check box.

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 text field	Type *VM Power Event Notify*.
Description text box	Type *Sends an email when a VM changes power state*.
Workflow Context drop-down list	Choose *Any*.
Select Folder drop-down list	Choose *Orchestration Examples*.

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

Name	Description
Input Label text field	Type *Admin Emails*.
Input Description text box	Type *Email addresses to send power event notifications*.
Optional check box	Leave unchecked.
Input Type drop-down list	Choose *email_address_list*.
Value Restrictions selections	Do not select the **Admin Input** check box.

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 page	
Task Name text field	Type *VMPowerEventEmail*.
User Input Mapping page	
Email Addresses (Mandatory) heading	Click the **Map to User Input** check box.
Task Inputs page	
Subject text field	This is the subject line of the notification email. Type *VM power event notification*.
Body text box.	This is the body of the notification email. Type *One of the following VMs has had a power -on or power-off event: (list the VMs in your VMPowerCycle workflow)*.
Value Restrictions selections	Do not select the **Admin Input** check box.

f) On the **User Output Mapping** page, do not map any outputs.

g) Validate the workflow, then exit the **Workflow Designer**.

Step 2 Click the **Triggers** tab.

Step 3 Click the **Add** action.

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

Name	Description
Trigger Name text field	Type *VMPowerEvent*.
Is Enabled check box	Leave this box checked.
Description text box	Type *Executes VMPowerEventEmail when a power-on or power-off occurs on a monitored VM*.
Frequency drop-down list	To test the trigger, you want a short time between polls. Choose *3 minutes*.
Trigger Type drop-down list	Choose *Stateful*. This causes the trigger to activate when a condition changes between polls.

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

a) Click the + icon to add a condition as specified in the following table:

Name	Description
Type of Object to Monitor drop-down list	Choose *VM*.
Object drop-down list	Select a VM to be monitored.
Parameter drop-down list	Choose *Power Status*.
Operation drop-down list	Choose *Equals*.
Value drop-down list	Choose *ON*.

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 page, complete the fields as specified in the following table:

Name	Description
Maximum Invocations drop-down list	For demo purposes, choose *20*. You might choose *Unlimited* in an actual production application.

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

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   On the menu bar, choose **Policies** > **Orchestration**.

Step 2   Choose the **Workflows** tab.

Step 3   In the **Workflows** pane, choose the workflow that you want to schedule.

Step 4   Click **Schedule**.

Step 5   In the **Schedule Workflow** screen, complete the following fields:

Name	Description
Recurrence Type drop-down list	Whether and at what frequency you want the workflow execution to recur. Choose one of the following: • **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 field	The time at which to start the workflow execution (or the first of a series of recurring executions).
Frequency Type drop-down list	The unit of the recurrence frequency interval. Choose hourly, daily, weekly, or monthly.
Frequency Interval drop-down list	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 field (optional)	The user ID to run the workflow.

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

What to Do Next

Choose the **Workflow Schedules** tab to view scheduled workflows.

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

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   Navigate to **Policies** > **Orchestration**.

Step 2   Click the **Workflows** tab.

Step 3   Choose the *VMPowerCycle* workflow.

Step 4   Click the **Schedule** action.

Step 5   In the Schedule Workflow dialog, complete the fields as described in this table:

Name	Description
Recurrence Typedrop-down list	Choose *Only once*. You might choose other values in an actual production application.
Start Time date and time controls	Choose today's date and set a time a few minutes later than your current time.
Use ID text field	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.

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 On the menu bar, choose **Policies** > **Orchestration**.

Step 2 Choose the **User VM Action Policy** tab.

Step 3 Click **Add**.

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

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

Step 5 Click **Next**.

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

Name	Description
Action Label field	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 drop-down list	The workflow represented by this action.
Authorized User Types drop-down list	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.