Using the VMware vCenter Orchestrator Client

vCenter Orchestrator 5.1

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EN-000808-00

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Using the VMware vCenter Orchestrator Client

Using the VMware vCenter Orchestrator Client provides information and instructions about performing tasks in the VMware[®] vCenter Orchestrator client.

Intended Audience

This information is intended for advanced vSphere administrators and experienced system administrators who are familiar with virtual machine technology and datacenter operations.

The Orchestrator Client

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The Orchestrator client is an easy-to-use desktop application. By using the Orchestrator client you can import packages, run and schedule workflows, and manage user permissions.

In addition, by using the Orchestrator client you can also develop workflows and actions as well as create packages and resource elements. For more information, see *Developing with VMware vCenter Orchestrator*.

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Log in to the Orchestrator Client

To perform general administration tasks or to edit and create workflows, you must log in to the Orchestrator client interface.

The Orchestrator client interface is designed for developers with administrative rights who want to develop workflows, actions, and other custom elements.

IMPORTANT   Ensure that the clocks of the Orchestrator server machine and the Orchestrator client machine are synchronized.

Prerequisites

All components of the Orchestrator server must be configured and the Orchestrator server service must be running.

Procedure

1   Log in as an administrator to the machine on which the Orchestrator client is installed.

2   Click **Start > Programs > VMware > vCenter Orchestrator Client**.

3   In the **Host name** field, type the IP address to which Orchestrator server is bound.

   To check the IP address, log in to the Orchestrator configuration interface and check the IP settings on the **Network** tab.

4   Log in by using the Orchestrator user name and password.

   To check the credentials, log in to the Orchestrator configuration interface and check the credentials on the **Authentication** tab.

5   In the Security Warning window select an option to handle the certificate warning.

The Orchestrator client communicates with the Orchestrator server by using an SSL certificate. A trusted CA does not sign the certificate during installation. Because of this, you receive a certificate warning each time you connect to the Orchestrator server.

Option	Description
Ignore	Click **Ignore** to continue using the current SSL certificate.
	The warning message appears again when you reconnect to the same Orchestrator server, or when you try to synchronize a workflow with a remote Orchestrator server.
Cancel	Click **Cancel** to close the window and stop the login process.
Install this certificate and do not display any security warnings for it anymore.	Select this check box and click **Ignore** to install the certificate and stop receiving security warnings.

You can change the default SSL certificate with a certificate signed by CA. For more information about changing SSL certificates, see *Installing and Configuring VMware vCenter Orchestrator*.

The **My Orchestrator** view appears. This view summarizes the recent activities on the server, shows pending and running workflows, running policies, scheduled tasks, completed workflows, and elements you recently edited.

What to do next

You can import a package, start a workflow, or set root access rights on the system.

Orchestrator Client Perspectives

You can access different views in the Orchestrator client by selecting one of three perspectives. Each perspective offers specific functionality.

You can select a perspective by using the drop-down list on the main menu in the Orchestrator client. The default view is **Run**.

Perspective	Description
Run	You can schedule tasks, manage policies, run workflows, access the inventory, and manage permissions from the **My Orchestrator** view. This perspective also gives you an overview of recent activities.
Design	You can create and modify workflows and actions. You can also manage resources, configuration elements, and policy templates.
Administer	You can access the inventory and manage authorizations, Web views, and packages.

Orchestrator Views in the Run Perspective

From the Run perspective in the Orchestrator client, you can schedule tasks, manage policies, run workflows, access the inventory, and manage permissions.

View	Description
My Orchestrator	Summarizes the most recent activities on the Orchestrator server, such as recently modified elements, pending and running workflows, running policies, completed workflows, and workflows that are waiting for user interaction.
	You can use the **My Orchestrator** view to perform common administrative tasks, such as running a workflow, importing a package, and setting root access rights.
Scheduler	Displays a list of all scheduled workflows in the system. The workflows are sorted by name or date, together with their status.
	You can use the **Scheduler** view to create, edit, suspend, resume, and cancel scheduled workflows.

View	Description
Policies	Displays existing policies.
	You can use the **Policies** view to create and apply policies.
Workflows	Provides access to the Orchestrator workflow library.
	You can use the **Workflows** view to view information about each workflow, create, edit, and run workflows, as well as to interact with the workflows.
Inventory	Displays the objects of the plug-ins that are enabled in Orchestrator.
	You can use the **Inventory** view to run workflows on an inventory object.

Orchestrator Views in the Design Perspective

From the Design perspective in the Orchestrator client, you can create and modify workflows and actions. You can also manage resources, configuration elements, and policy templates.

View	Description
Workflows	Provides access to the Orchestrator workflow library.
	You can use the **Workflows** view to view information about each workflow, create, edit, and run workflows, as well as to interact with the workflows.
Actions	Provides access to the libraries of predefined actions.
	You can use the **Actions** view to duplicate actions, export them to a file, or move them to a different module in the actions hierarchical list.
Resources	Provides access to the list of resource elements.
	You can use the **Resources** view to import external objects such as images, `sysprep` files, HTML templates, XML templates, and custom scripts, and use them as resource elements in workflows and Web views.
Configurations	Provides access to the available configuration elements.
	You can use the **Actions** view to create configuration elements to define common attributes across an Orchestrator server.
Packages	Displays a list of the available packages and where a selected package is used.
	You can use the **Packages** view to add, import, export, and synchronize packages.
Inventory	Displays the objects of the plug-ins that are enabled in Orchestrator.
	You can use the **Inventory** view to run workflows on an inventory object.

Orchestrator Views in the Administer Perspective

From the Administer perspective in the Orchestrator client, you can access the inventory and manage authorizations, Web views, and packages.

View	Description
Inventory	Displays the objects of the plug-ins that are enabled in Orchestrator.
	You can use the **Inventory** view to run workflows on an inventory object.
Policy Templates	Displays a list of the available master policies.
	You can use the **Policy Templates** view to create policy templates.
Authorizations	Displays a list of the available authorization elements.
	You can use the **Authorizations** view to create and edit authorization elements.
Web views	Displays a list of the available Web views.
	You can use the **Web views** view to create, publish, and export Web views to a working folder. You can either modify exported Web views or use them as templates from which to create other Web views. You can also use Web views to access Orchestrator functions from a Web browser.
Packages	Displays a list of the available packages and where a selected package is used.
	You can use the **Packages** view to add, import, export, and synchronize packages.

User Preferences

You can customize the options displayed to users of the Orchestrator client by using the User preferences tool.

Your preferences are saved on the client side in the vmware-vmo.cfg file.

To set preferences, select **Tools > User preferences** in the Orchestrator client toolbar.

From the User preferences tool you can change the following preferences.

General Preferences

Table 1-1. Orchestrator Client Customization Options

Option	Description
Auto-edit new inserted	The new elements that you add open in an editor.
Script compilation delay [ms]	The frequency of the background task that compiles the scripts and reports errors in edit mode in milliseconds.
Show decision scripts	The option enables you to see the decision script of the implemented decision functions.
Delete non empty folder permitted	The option enables you to delete a folder together with its subfolders and contents.
Size of run logs (number of lines)	The maximum number of lines in the system log that Orchestrator displays when you select a workflow run in the Orchestrator client and click **Logs** on the **Schema** tab. The value must be greater than **0**.
Server log fetch limit	The maximum number of lines in the server logs that Orchestrator fetches from the database and displays when you click any of the **Events** tabs in the Orchestrator client. The value must be greater than **0**.
Finder maximum size	The maximum number of results that the searches return when you search for elements such as actions or workflows. The value must be greater than **0**.
Check usage when deleting an element (slow)	Orchestrator checks whether the element you are trying to delete is referenced by other elements. If the element is used by another workflow, policy, or action, a warning message appears.
Check OGNL expression	Orchestrator validates the OGNL expressions in the workflow presentations. NOTE The use of OGNL expressions in workflow presentations is deprecated as of Orchestrator 4.1. Using OGNL expressions in workflow presentations is not supported in Orchestrator 4.1 and later.

Workflows Preferences

Table 1-2. Workflow Editor Customization Options

Option	Description
Check task/decision IN/OUT parameters	Orchestrator checks whether the input and output parameters of an activity are correctly bound to the corresponding input or output attribute of the workflow.
Check error in task's scripts	Orchestrator validates the script in scriptable task elements.
Check workflow termination	Orchestrator checks whether each terminal transition of a workflow with different possible outcomes is connected to an End Workflow schema element.

Table 1-2. Workflow Editor Customization Options (Continued)

Option	Description
Check unreachable items	Orchestrator checks whether all activities are reachable.
Check unused workflow's parameters/attributes	Orchestrator checks whether all parameters and attributes of a workflow are used.
Check for unknown types within plug-ins	Orchestrator checks whether all parameters and attributes of a workflow are of a known type.
Check for legacy actions scripting calls	Orchestrator detects legacy actions calls and displays a warning message.
Use direct lines as workflow diagram links	The connector tool uses direct lines to link the workflow schema elements.
Display workflows in a tree view	The workflow selector displays a hierarchical tree viewer instead of the default list panel.
Edit workflow items in a pop-up window	Orchestrator opens a pop-up window in which you can edit the workflow items.
Display grid in the schema editor	Orchestrator displays a grid in the schema editor.
Validate a workflow before running it	Orchestrator validates each workflow before running it.
Validate a workflow before saving it	Orchestrator validates each workflow before saving it.
Increase the workflow version when clicking save and close	Orchestrator increases the workflow version when clicking save and close.
Pop up a workflow user interaction form	Orchestrator pops up a workflow user interaction form.

Inventory Preferences

You can select the **Use contextual menu in inventory** option to display the workflows that are available for an inventory object. After the option is enabled, when you right-click an object in the Orchestrator inventory, all workflows applicable to the selected object type are displayed.

Script Editor Preferences

You can customize the scripting engine. For example, you can disable automatic completion of lines, highlight selected lines and brackets, and change the options for default color code formatting.

Access the Orchestrator API Explorer

Orchestrator provides an API Explorer that you can use to search the Orchestrator API and see the documentation for JavaScript objects that you can use in scripted elements.

You can consult an online version of the Scripting API for the vCenter Server plug-in on the Orchestrator documentation home page.

Procedure

1   Log in to the Orchestrator client and select **Design** or **Run** from the drop-down menu in the left upper corner.

2   Select **Tools > API Explorer**.

The API Explorer appears. You can use it to search all the objects and functions of the Orchestrator API.

What to do next

Use the API Explorer to write scripts for scriptable elements.

Managing Workflows

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A workflow is a series of actions and decisions that you run sequentially. Orchestrator provides a library of workflows that perform common management tasks according to best practices. Orchestrator also provides libraries of the individual actions that the workflows perform.

Workflows combine actions, decisions, and results that, when performed in a particular order, complete a specific task or a specific process in a virtual environment. Workflows perform tasks such as provisioning virtual machines, backing up, performing regular maintenance, sending emails, performing SSH operations, managing the physical infrastructure, and other general utility operations. Workflows accept inputs according to their function. You can create workflows that run according to defined schedules, or that run if certain anticipated events occur. Information can be provided by you, by other users, by another workflow or action, or by an external process such as a Web service call from an application. Workflows perform some validation and filtering of information before they run.

Workflows can call upon other workflows. For example, you can reuse in several different workflows a workflow that starts a virtual machine.

You create workflows by using the Orchestrator client interface's integrated development environment (IDE), that provides access to the workflow library and the ability to run workflows on the workflow engine. The workflow engine can also take objects from external libraries that you plug in to Orchestrator. This ability allows you to customize processes or implement functions that third-party applications provide.

This chapter includes the following topics:

Key Concepts of Workflows

Workflows consist of a schema, attributes, and parameters. The workflow schema is the main component of a workflow as it defines all the workflow elements and the logical connections between them. The workflow attributes and parameters are the variables that workflows use to transfer data. Orchestrator saves a workflow token every time a workflow runs, recording the details of that specific run of the workflow.

Workflow User Permissions

Orchestrator defines levels of permissions that you can apply to users or groups to allow or deny them access to workflows.

View	The user can view the elements in the workflow, but cannot view the schema or scripting.
Inspect	The user can view the elements in the workflow, including the schema and scripting.
Execute	The user can run the workflow.
Edit	The user can edit the workflow.
Admin	The user can set permissions on the workflow and has all other permissions.

The **Admin** permission includes the **View**, **Inspect**, **Edit**, and **Execute** permissions. All the permissions require the **View** permission.

If you do not set any permissions on a workflow, the workflow inherits the permissions from the folder that contains it. If you do set permissions on a workflow, those permissions override the permissions of the folder that contains it, even if the permissions of the folder are more restrictive.

Workflow Parameters

Workflows receive input parameters and generate output parameters when they run.

Input Parameters

Most workflows require a certain set of input parameters to run. An input parameter is an argument that the workflow processes when it starts. The user, an application, another workflow, or an action passes input parameters to a workflow for the workflow to process when it starts.

For example, if a workflow resets a virtual machine, the workflow requires as an input parameter the name of the virtual machine.

Output Parameters

A workflow's output parameters represent the result from the workflow run. Output parameters can change when a workflow or a workflow element runs. While workflows run, they can receive the output parameters of other workflows as input parameters.

For example, if a workflow creates a snapshot of a virtual machine, the output parameter for the workflow is the resulting snapshot.

Workflow Attributes

Workflow elements process data that they receive as input parameters, and set the resulting data as workflow attributes or output parameters.

Read-only workflow attributes act as global constants for a workflow. Writable attributes act as a workflow's global variables.

You can use attributes to transfer data between the elements of a workflow. You can obtain attributes in the following ways:

- Define attributes when you create a workflow
- Set the output parameter of a workflow element as a workflow attribute
- Inherit attributes from a configuration element

Workflow Schema

A workflow schema is a graphical representation that shows the workflow as a flow diagram of interconnected workflow elements. The workflow schema is the most important element of a workflow as it determines its logic.

Workflow Presentation

When users run a workflow, they provide the values for the input parameters of the workflow in the workflow presentation. When you organize the workflow presentation, consider the type and number of input parameters of the workflow.

Workflow Tokens

A workflow token represents a workflow that is running or has run.

A workflow is an abstract description of a process that defines a generic sequence of steps and a generic set of required input parameters. When you run a workflow with a set of real input parameters, you receive an instance of this abstract workflow that behaves according to the specific input parameters you give it. This specific instance of a completed or a running workflow is called a workflow token.

Workflow Token Attributes

Workflow token attributes are the specific parameters with which a workflow token runs. The workflow token attributes are an aggregation of the workflow's global attributes and the specific input and output parameters with which you run the workflow token.

Workflow Version History

Orchestrator keeps the version history for each workflow, irrespective of whether it is included in the default workflow library or whether the workflow is newly developed. By keeping the version history in the database, you can compare different workflow versions and to revert to a previous workflow version.

Orchestrator creates a new version history item for each workflow when you increase and save the workflow version. Subsequent changes to the workflow do not change the current saved version. The version history is kept in the database along with the workflow itself.

When you delete a workflow or an action, Orchestrator marks the element as deleted in the database without deleting the version history of the element from the database. This way, you can restore deleted workflows and actions.

Standard Workflows in the Workflow Library

Orchestrator provides a standard library of workflows that you can use to automate operations in the virtual infrastructure. The workflows in the standard library are locked in the read-only state. To customize a standard workflow, you must create a duplicate of that workflow. Duplicate workflows or custom workflows that you create are fully editable.

For information about the different access rights that you can have when you work with the Orchestrator server depending on the type of vCenter Server license, see *Installing and Configuring VMware vCenter Orchestrator*.

The contents of the workflow library is accessible through the **Workflows** view in the Orchestrator client. The standard workflow library provides workflows in the following folders.

JDBC	Test the communication between a workflow and a database by using the SQL plug-in shipped with Orchestrator.
Locking	Demonstrates the locking mechanism for automated processes, that allows workflows to lock the resources they use.
Mail	Send and receive emails from workflows.
Orchestrator	Automate certain common Orchestrator operations.
SQL	Manage databases and database tables, as well as run SQL operations.
SSH	Implement the Secure Shell v2 (SSH-2) protocol. These workflows allow you to run remote command and file transfer sessions with password and public key-based authentication. The SSH configuration allows you to specify paths to objects to expose in the Orchestrator inventory through secure connections.
Troubleshooting	Export application settings and log files to a ZIP archive that you can send to VMware support for troubleshooting.
vCenter Server	Access the functions of the vCenter Server API, so that you can incorporate all of the vCenter Server functions into the management processes that you automate by using Orchestrator.
Workflow documentation	Export information about workflows or workflow categories as PDF files.
XML	A Document Object Model (DOM) XML parser that you can use to process XML files in workflows.

Set User Permissions on a Workflow

You set levels of permission on a workflow to limit the access that users or user groups can have to that workflow.

You can select the users and user groups for which to set permissions from the Orchestrator LDAP server.

Prerequisites

- Create a workflow.

- Open the workflow for editing in the workflow editor.

- Add some elements to the workflow schema.

Procedure

1 Click the **Permissions** tab.

2   Click the **Add access rights** link to define permissions for a new user or user group.

3   Search for a user or user group.

The search results contain all the users and user groups from the Orchestrator LDAP server that match the search.

4   Select a user or user group and select the appropriate check boxes to set the level of permissions for this user or user group.

To allow a user to view the workflow, inspect the schema and scripting, run and edit the workflow, and change the permissions, you must select all check boxes.

5   Click **Select**.

The user or user group appears in the permissions list.

6   Click **Save and close** to exit the editor.

Run a Workflow

You can perform automated operations in vCenter Server by running workflows from the standard library or workflows that you create.

For example, you can create a virtual machine by running the Create simple virtual machine workflow.

Prerequisites

Verify that you have configured the vCenter Server plug-in. For details, see *Installing and Configuring VMware vCenter Orchestrator*.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Run**.

2   Click the **Workflows** view.

3   In the workflows hierarchical list, open **Library > vCenter > Virtual machine management > Basic** to navigate to the Create simple virtual machine workflow.

4   Right-click the Create simple virtual machine workflow and select **Start workflow**.

5   Provide the general parameters and click **Next**.

Option	Action
Virtual machine name	Name the virtual machine **orchestrator-test**.
Virtual machine folder	a Click **Not set** for the **Virtual machine folder** value. b Select a virtual machine folder from the inventory. The **Select** button is inactive until you select an object of the correct type, in this case, VC:VmFolder.
Size of the new disk in GB	Type an appropriate numeric value.
Memory size in MB	Type an appropriate numeric value.
Number of virtual CPUs	Select an appropriate number of CPUs from the **Number of virtual CPUs** drop-down menu.
Virtual machine guest OS	Click the **Not set** link and select a guest operating system from the list.
Make the disk thin provisioned	Select whether to make the disc thin or thick provisioned.

6   Provide the infrastructure parameters.

Option	Description
Host on which to create the virtual machine	Click **Not set** for the **Host on which to create the virtual machine** value and navigate through the vCenter Server infrastructure hierarchy to a host machine.
Resource pool	Click **Not set** for the **Resource pool** value and navigate through the vCenter Server infrastructure hierarchy to a resource pool.
The network to connect to	Click **Not set** for the **The network to connect to** value and select a network. Press Enter in the **Filter** text box to see all the available networks.
Datastore in which to store the virtual machine files	Click **Not set** for the **Datastore in which to store the virtual machine** value and navigate through the vCenter Server infrastructure hierarchy to a datastore.

7   Click **Submit** to run the workflow.

A workflow token appears under the Create simple virtual machine workflow, showing the workflow running icon.

8   Click the workflow token to view the status of the workflow as it runs.

9   Click the **Events** tab in the workflow token view to follow the progress of the workflow token until it completes.

10   Click the **Inventory** view.

11   Navigate through the vCenter Server infrastructure hierarchy to the resource pool you defined.

If the virtual machine does not appear in the list, click the refresh button to reload the inventory.

The orchestrator-test virtual machine is present in the resource pool.

12   (Optional) Right-click the orchestrator-test virtual machine in the **Inventory** view to see a contextual list of the workflows that you can run on the orchestrator-test virtual machine.

The Create simple virtual machine workflow ran successfully.

What to do next

You can log in vSphere Client and manage the new virtual machine.

Respond to a Request for a User Interaction

Workflows that require interactions from users during their run suspend their run either until the user provides the required information or until the workflow times out.

Workflows that require user interactions define which users can provide the required information and direct the requests for interaction.

Prerequisites

Verify that at least one workflow is in the Waiting for User Interaction state.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Run**.

2   Click the **My Orchestrator** view in the Orchestrator client.

3   Click the **Waiting for Input** tab.

The **Waiting for Input** tab lists the workflows that are waiting for user inputs from you or from members of your user group that have permission.

4   Double-click a workflow that is waiting for input.

The workflow token that is waiting for input appears in the **Workflows** hierarchical list with the following symbol: .

5   Right-click the workflow token and select **Answer**.

6   Follow the instructions in the input parameters dialog box to provide the information that the workflow requires.

You provided information to a workflow that was waiting for user input during its run.

Scheduling Workflows

You can schedule a workflow to run once, or multiple times using a recurrence pattern.

Schedule a Workflow

You can schedule a workflow from the Orchestrator client **Scheduler** or **Workflows** views. The user credential that starts the workflow is the same as the credential you use to schedule it.

Prerequisites

You must have the **Execute** privilege to schedule a workflow.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Run**.

2   Click the **Scheduler** view.

3   Right-click within the left pane and select **Schedule task**.

4   (Optional) Select **Schedule task as** to use another user's credentials to schedule a workflow.

5   Search for the workflow to schedule by typing the name of the workflow, select it, and click **Select**.

6   Set the start date and time for the workflow.

7   (Optional) Select whether to start the workflow if the scheduled time is in the past.

Option	Description
Yes	The workflow starts immediately.
No	The workflow starts at the next set recurrence.

8   (Optional) Select a workflow recurrence pattern.

a   From the **Recurrence** drop-down menu, select the workflow recurrence pattern.

b   If you set the workflow to recur, specify an end time and date for the workflow.

9   If the workflow requires input parameters, click **Next** and provide the necessary information.

10 Click **Submit** to schedule the workflow.

The scheduled workflow is listed in the **Scheduler** view. An R appears next to the scheduled workflow to denote that recurrence is set.

What to do next

You can monitor the workflow run and delete the scheduled task from the **Scheduler** view.

Edit the Workflow Recurrence Pattern

A recurrence pattern is used to specify the way in which a given workflow is scheduled. You can edit the recurrence pattern of a workflow from the **Scheduler** view.

Prerequisites

A recurrent workflow that is scheduled.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Run**.

2   Click the **Scheduler** view.

3   Right-click the scheduled workflow whose recurrence pattern you want to edit and select **Edit**.

4   Click the **Recurrence** tab.

5   From the drop-down menu, select the recurrence pattern.

    You can add an unlimited number of entries to the pattern. You can edit each entry.

    The display changes according to the selected pattern.

6   Click **Save and close** to exit the editor.

The new recurrence pattern for the scheduled workflow appears on the **Recurrence** tab.

What to do next

You can view details about the different runs of the scheduled workflow on the **Workflow Runs** tab.

Use Workflow Version History

You can use version history to revert a workflow to a previously saved state. You can revert the workflow state to an earlier or a later workflow version. You can also compare the differences between the current state of the workflow and a saved version of the workflow.

Orchestrator creates a new version history item for each workflow when you increase and save the workflow version. Subsequent changes to the workflow do not change the current saved version. For example, when you create a workflow version 1.0.0 and save it, the state of the workflow is stored in the version history. If you make any changes to the workflow, you can save the workflow state in the Orchestrator client, but you cannot apply the changes to workflow version 1.0.0. To store the changes in the version history, you must create a subsequent workflow version and save it. The version history is kept in the database along with the workflow itself.

When you delete a workflow, Orchestrator marks the element as deleted in the database without deleting the version history of the element from the database. This way, you can restore deleted workflows. See "Restore Deleted Workflows," on page 21.

Prerequisites

Open a workflow for editing in the workflow editor.

Procedure

1   Click the **General** tab in the workflow editor and click **Show version history**.

2   Select a workflow version and click **Diff Against Current** to compare the differences.

    A window displays the differences between the current workflow version and the selected workflow version.

3   Select a workflow version and click **Revert** to restore the state of the workflow.

⚠️ **CAUTION**   If you have not saved the current workflow version, it is deleted from the version history and you cannot revert back to the current version.

The workflow state is reverted to the state of the selected version.

Restore Deleted Workflows

You can restore workflows that have been deleted from the workflow library.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Run** or **Design**.

2   Click the **Workflows** view.

3   Navigate to the workflow folder in which you want to restore deleted workflows.

4   Right-click the folder and select **Restore deleted workflows**.

5   Select the workflow or workflows that you want to restore and click **Restore**.

The restored workflows appear in the selected folder.

Export a Workflow

You can export workflows to use them in another Orchestrator server instance.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Run**.

2   Click the **Workflows** view.

3   Browse to the workflow you want to export and right-click that workflow.

4   Select **Export workflow**.

5   Browse to locate the folder in which you want to save the workflow, and click **Save**.

The workflow is saved on your system as a `.workflow` file.

Import a Workflow

If you have exported a workflow from one Orchestrator server system you can import it to another Orchestrator server system.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Run**.

2   Click the **Workflows** view.

3   Browse to the workflow folder in which you want to import the workflow and right-click it.

4   Select **Import workflow**.

5   Browse to locate the workflow you want to import, and click **Open**.

If the workflow already exists in your workflow library, a dialog box with version information appears.

NOTE   You cannot import a workflow with an earlier version number than the version number of the existing workflow.

The imported workflow appears in the workflow folder that you selected.

Managing Policies 3

Policies are event triggers that monitor the activity of the system. Policies respond to predefined events issued by changes in the status or performance of certain defined objects.

Policies are a series of rules, gauges, thresholds and event filters that run certain workflows or scripts when specific predefined events occur in Orchestrator or in the technologies that Orchestrator accesses through plug-ins. Orchestrator constantly evaluates the policy rules as long as the policy is running. For instance, you can implement policy gauges and thresholds that monitor the behavior of vCenter Server objects of the `VC:HostSystem` and `VC:VirtualMachine` types.

Orchestrator defines the following types of policy:

Policy Templates	Master policies. Policy templates are not linked to real objects. They are abstract sets of rules that define the behavior to implement if a certain abstract event occurs. You can see existing policy templates and create templates in the **Policy Templates** view in the Orchestrator client.
Policies	Policies are instances of a template or standalone event triggers that are linked to real objects, and that are triggered by real-life events. You can see existing policies and create policies in the **Policies** view in the Orchestrator client.

You can organize policy templates into folders, for easier navigation.

This chapter includes the following topics:

- "Create a Policy," on page 23
- "Apply a Policy," on page 24

Create a Policy

You can create a policy to monitor the activity of the system for specific events.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Run**.

2   Click the **Policies** view.

3   Right-click within the left pane and select **Create new policy**.

4   Type a name for the policy and click **Ok**.

    The policy appears in the list of policies.

5   Right-click the policy and select **Edit**.

    The policy editor opens.

6 On the **General** tab, edit the startup settings, priority, startup user, and description of the policy.

7 On the **Scripting** tab, add and remove policy elements, periodic tasks, and trigger events, as well as manage attributes.

8 On the **Events** and **Logs** tabs, view information about the policy.

9 On the **Permissions** tab, add and remove access rights for users or user groups.

10 Click **Save and close** to exit the editor.

11 In the **Policies** view, right-click the policy that you created and select **Start policy**.

Apply a Policy

You can apply a policy from an existing policy template.

Prerequisites

Verify that you have created a policy template.

Procedure

1 From the drop-down menu in the Orchestrator client, select **Run**.

2 Click the **Policies** view.

3 Right-click within the left pane and select **Apply Policy**.

4 In the **Filter** text box type the name of the policy template.

5 Select the policy template and click **Select**.

6 Provide the required policy information and click **Submit**.

The policy appears in the list of policies.

7 In the **Policies** view, right-click the policy that you created and select **Start policy**.

Using Packages

<div style="text-align: right; font-size: 3em;">**4**</div>

You can use packages to transport content from one Orchestrator server to another. Packages can contain workflows, actions, policies, Web views, configurations, and resources.

When you add an element to a package, Orchestrator checks for dependencies and adds any dependent elements to the package. For example, if you add a workflow that uses actions or other workflows, Orchestrator adds those actions and workflows to the package.

When you import a package, the server compares the versions of the different elements of its content to matching local elements. The comparison shows the differences in versions between the local and imported elements. The administrator can decide whether to import the whole package, or choose specific elements to import.

Packages feature digital rights management to control how the receiving server can use the content of the package. Orchestrator signs packages and encrypts the packages for data protection. Packages use X509 certificates to monitor which users export and redistribute elements.

This chapter includes the following topics:

Create a Package

You can export workflows, policies, actions, plug-in references, resources, Web views, and configuration elements in packages. All elements that an element in a package implements are added to the package automatically, to ensure compatibility between versions. If you do not want to add the referenced elements, you can delete them in the package editor.

Prerequisites

Verify that the Orchestrator server contains elements such as workflows, actions, and policies that you can add to a package.

Procedure

1 From the drop-down menu in the Orchestrator client, select **Administer**.

2   Click the **Packages** view.

3   Right-click in the left pane and select **Add package**.

4   Type the name of the new package and click **Ok**.

The syntax for package names is *domain.your_company.folder.package_name*.

For example, `com.vmware.myfolder.mypackage`.

5   Right-click the package and select **Edit**.

The package editor opens.

6   On the **General** tab, add a description for the package.

7   On the **Workflows** tab, add workflows to the package.

- Click **Insert Workflows (list search)** to search for and select workflows in a selection dialog box.

- Click **Insert Workflows (tree browsing)** to browse and select folders of workflows from the hierarchical list.

8   On the **Policy Templates**, **Actions**, **Web View**, **Configurations**, **Resources**, and **Used Plug-Ins** tabs, add policy templates, actions, Web views, configuration elements, resource elements, and plug-ins to the package.

9   Click **Save and close** to exit the editor.

You created a package and added elements to it.

What to do next

Set user permissions for this package.

Set User Permissions on a Package

You set different levels of permission on a package to limit the access that different users or user groups can have to the contents of that package.

You can select the different users and user groups for which to set permissions from the users and user groups in the Orchestrator LDAP or vCenter Single Sign On server. Orchestrator defines levels of permissions that you can apply to users or groups.

View	The user can view the elements in the package, but cannot view the schemas or scripting.
Inspect	The user can view the elements in the package, including the schemas and scripting.
Edit	The user can edit the elements in the package.
Admin	The user can set permissions on the elements in the package.

Prerequisites

Create a package, open it for editing in the package editor, and add the necessary elements to the package.

Procedure

1   Click the **Permissions** tab in the package editor.

2   Click **Add access rights** to define permissions for a new user or user group.

3   Search for a user or user group.

 The search results show all of the users and user groups that match the search.

4   Select a user or user group.

5   Check the appropriate check boxes to set the level of permissions for this user and click **Select**.

 To allow a user to view the elements, inspect the schema and scripting, run and edit the elements, and change the permissions, you must check all check boxes.

6   Click **Save and close** to exit the editor.

You created a package and set the appropriate user permissions.

Export a Package

You can export a package and reuse its contents on another Orchestrator server. The system adds the certificates for all of the contents of the exported package. When the package is imported into another server, these certificates are also imported.

Prerequisites

Create a package and add the necessary elements to it.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Administer**.

2   Click the **Packages** view.

3   Right-click the package to export and select **Export package**.

4   Browse to select a location to save the package.

5   (Optional) Sign the package.

 a   Click **Add target Certificate** to sign the package.

 b   In the list of certificates, select the certificate to use for the exported package.

 c   Click **Select**.

6   (Optional) To apply restrictions for the exported package, deselect any of the following options.

Option	Description
View contents	The importer of the package is allowed to view the JavaScript of the elements contained in the package.
Add to package	The importer of the package is allowed to redistribute the elements contained in the package.
Edit contents	The importer of the package is allowed to modify the elements contained in the package.

7   (Optional) Deselect the **Export version history** check box if you do not want to export the version history of the package.

8   Click **Save**.

You exported the package.

What to do next

You can use all of the workflows, actions, policies, and Web views from the exported package on another Orchestrator server.

Import a Package

To reuse workflows, actions, policies, Web views, and configuration elements from one Orchestrator server on another server, you can import them as a package.

IMPORTANT   Packages that Orchestrator 3.2 generates are upwardly compatible with Orchestrator 4.x and 5.1. You can import a package from an Orchestrator 3.2 server to an Orchestrator 4.x or 5.1 server. Packages from Orchestrator 4.x and 5.1 are not backward compatible with Orchestrator 3.2. You cannot import to an Orchestrator 3.2 server a package that an Orchestrator 4.x or 5.1 server generates.

Prerequisites

■   Back up any standard Orchestrator elements that you have modified. If the imported package contains elements whose version number is later than the version number of the elements stored in the Orchestrator database, your changes might be lost.

■   On the remote server, create a package and add the necessary elements to it.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Administer**.

2   Click the **Packages** view.

3   Right-click within the left pane and select **Import package**.

4   Browse to select the package that you want to import and click **Open**.

    Certificate information about the exporter appears.

5   Review the package import details and select **Import** or **Import and trust provider**.

    The **Import package** view appears. If the version of the imported package element is later than the version on the server, the system selects the element for import.

6   (Optional) Deselect the elements that you do not want to import.

    For example, deselect custom elements for which later versions exist.

7   Click **Import selected elements**.

The imported package appears in the list of packages.

What to do next

You can use all the workflows, actions, policies, Web views, and configuration elements from the imported package as new building blocks on your Orchestrator server.

Get a Remote Package

You can retrieve a package from a remote Orchestrator server.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Administer**.

2   Click the **Packages** view.

3   Right-click within the left pane and select **Get remote package**.

4   Log in to the remote server.

The Orchestrator Synchronization dialog box opens. It displays the differences between the package elements. To view only elements that are different on the local and remote server, select **Hide identical** from the drop-down menu.

5   Select the package that you want and click **Import**.

6   View the remote package elements and select an option.

Option	Description
None	Does not import the element.
Update	The element is imported from the remote server to the local server.

NOTE   If the remote server does not recognize your certificate, you cannot commit and overwrite the elements.

7   Click **Synchronize**.

Synchronize a Remote Package

The **Packages** view provides a way to synchronize a package on one Orchestrator server with an existing package on another server.

Synchronizing packages is the only way to obtain all the elements from the remote server. If you synchronize individual elements, Orchestrator only synchronizes elements that already exist on the local server. To obtain any new elements from the remote server, you must synchronize the package that contains those elements.

Procedure

1   From the drop-down menu in the Orchestrator client, select **Administer**.

2   Click the **Packages** view.

3   Right-click the package that you want to synchronize and select **Synchronize**.

4   Log in to the remote server.

The Orchestrator Synchronization dialog box opens. It displays the differences between the package elements. To view only elements that are different on the local and remote server, select **Hide identical** from the drop-down menu.

5   View the comparison between the local and remote package elements and select an option.

Option	Description
None	The local and remote elements have the same version number. No synchronization is required.
Commit	The version of the local element is later. The remote element is overwritten.
Update	The version of the remote element is later. The local element is updated. If an element does not exist locally, it is imported from the remote server to the local server.
Merge	The local and remote packages are overwritten with a merged list of references. The referenced elements remain unchanged.

NOTE   If the remote server does not recognize your certificate, you cannot commit elements.

6   Click **Synchronize**.

The synchronized package is reloaded.

What to do next

You can use the updated package content in workflows, actions, policies, and Web views.

Remove a Package

Workflows and actions, as well as other resources, can be reused in many packages. This is why, before you remove a package, you must decide whether to delete the workflows, actions, policies and other resources contained in the package.

Procedure

1 From the drop-down menu in the Orchestrator client, select **Administer**.

2 Click the **Packages** view.

3 Right-click the package to delete and select one of the deletion options.

Option	Description
Delete	Removes the package only from the **Packages** view.
Delete element with content	Removes all workflows, actions, policies, Web views, configurations, plug-in settings or resources that the package contains. Does not remove read-only elements and the plug-in `.dar` archive.
	CAUTION This action might delete elements that are referenced by other packages too. To avoid deleting an element that another package needs, remove any dependencies that you added to the package. To view a list of all the packages, workflows and policies that reference an element, use the **Find elements that use this element** function.

Using Authorizations

5

With authorizations you can manage the permissions of users and user groups over elements of specific types.

This chapter includes the following topics:

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Create an Authorization Element

You can create an authorization element to provide different permissions to users or user groups over elements or specific type.

Procedure

1 From the drop-down menu in the Orchestrator client, select **Administer**.

2 Click the **Authorizations** view.

3 Right-click within the left pane and select **Create Authorization**.

4 In the **Name** text box, type a name for the element.

5 Click **Not set** and search for an LDAP user group.

6 (Optional) In the **Description** text box, type a description of the element.

7 Click **Submit** to create the element.

The authorization element appears in the list of authorizations.

What to do next

Edit the configuration of the authorization element.

Configure an Authorization Element

You can configure references and permissions for an authorization element.

Prerequisites

Verify that you have created an authorization element.

Procedure

1 From the drop-down menu in the Orchestrator client, select **Administer**.

2 Click the **Authorizations** view.

3 Right-click the authorization element that you want to modify and select **Edit**.

  The authorization element editor opens.

4 (Optional) On the **General** tab, edit the description of the element.

5 On the **References** tab, create references to available element types from the tree.

6 On the **Permissions** tab, set the level of permissions for a user or user group.

7 Click **Save and close** to exit the editor.

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