

Tenant Administration

vRealize Automation 6.2



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Tenant Administration

Tenant Administration explains how to perform administrative tasks for vRealize Automation. It describes procedures for configuring tenants, setting up notifications, managing users, and managing the contents of the catalog.

Note Not all features and capabilities of vRealize Automation are available in all editions. For a comparison of feature sets in each edition, see <https://www.vmware.com/products/vrealize-automation/>.

Intended Audience

This information is intended for system administrators, tenant administrators, service architects, and business group managers who need to configure and maintain the vRealize Automation environment.

VMware Technical Publications Glossary

VMware Technical Publications provides a glossary of terms that might be unfamiliar to you. For definitions of terms as they are used in VMware technical documentation, go to <http://www.vmware.com/support/pubs>.

Updated Information

This *Tenant Administration* guide for vRealize Automation is updated with each release of the product or when necessary.

This table provides the update history of the *Tenant Administration* guide.

Revision	Description
001445-04	Added information about reconfiguration support for SCVMM machines. See Reconfigure a Machine and Action Menu Options for Virtual, Physical, and Cloud Machines .
001445-03	<ul style="list-style-type: none">■ Updated Workflow States of Reconfigure Operations■ Added information for managing user and group entitlements in Manage User and Group Entitlements■ Updated the power actions information in Schedule the Start
001445-02	<ul style="list-style-type: none">■ Added post-provisioning actions information. See Chapter 12 Running Actions for Provisioned Resources and Troubleshooting Missing Actions in the Resource Actions Menu.■ Added information about machines that are not available for reclamation. See Send Reclamation Requests.

Revision	Description
001445-01	■ Included documentation for support for remote consoles for machines provisioned on vSphere. See Chapter 10 Configuring Remote Consoles for vSphere with Untrusted SSL Certificates .
001445-00	Initial release.

Using the Goal Navigator

The goal navigator guides you through high-level goals that you might want to accomplish in vRealize Automation.

The goals you can achieve depend on your role. To complete each goal, you must complete a sequence of steps that are presented on separate pages in the vRealize Automation console.

The goal navigator can answer the following questions:

- Where do I start?
- What are all the steps I need to complete to achieve a goal?
- What are the prerequisites for completing a particular task?
- Why do I need to do this step and how does this step help me achieve my goal?

The goal navigator is hidden by default. You can expand the goal navigator by clicking the icon on the left side of the screen.

After you select a goal, you navigate between the pages needed to accomplish the goal by clicking each step. The goal navigator does not validate that you completed a step, or force you to complete steps in a particular order. The steps are listed in the recommended sequence. You can return to each goal as many times as needed.

For each step, the goal navigator provides a description of the task you need to perform on the corresponding page. The goal navigator does not provide detailed information such as how to complete the forms on a page. You can hide the page information or move it to a more convenient position on the page. If you hide the page information, you can display it again by clicking the information icon on the goal navigator panel.

Configure Branding for the vRealize Automation Console

1

System administrators can change the appearance of the vRealize Automation console to meet site-specific branding guidelines by changing the logo, the background color, and information in the header and footer.

System administrators control the default branding for tenants. Tenant administrators can use the default or reconfigure branding for each tenant.

As you make changes, a preview of each change appears at the bottom of the form. The changes take effect when they are saved.

Prerequisites

Log in to the vRealize Automation console as a **system administrator** or **tenant administrator**.

Procedure

- 1 Select **Administration > Branding**.
- 2 Clear the **Use default** check box.
- 3 Create a banner.
 - a Click **Choose File** to upload a logo image.
 - b Follow the prompts to finish creating the banner.
- 4 Click **Next**.
- 5 Type the copyright information in the **Copyright notice** text box and press Enter to preview your selection.
- 6 (Optional) Type the URL to your privacy policy in the **Privacy policy link** text box and press Enter to preview your selection.
- 7 (Optional) Type the URL to your contact page in the **Contact link** text box and press Enter to preview your selection.
- 8 Click **Update**.

The console is updated with your changes.

Configuring Notifications

Tenant administrators can configure settings for sending notifications to users who subscribe to receive communications from vRealize Automation.

This chapter includes the following topics:

- [Configuring Notifications Overview](#)
- [Add a Tenant-Specific Outbound Email Server](#)
- [Add a Tenant-Specific Inbound Email Server](#)
- [Override a System Default Outbound Email Server](#)
- [Override a System Default Inbound Email Server](#)
- [Configure Notifications](#)
- [Subscribe to Notifications](#)
- [Revert to System Default Email Servers](#)

Configuring Notifications Overview

Depending on your role, you can choose how to support notifications and whether you want to receive them.

The following high-level overview describes the process for configuring notifications:

- 1 Configure an outbound email server to send notifications. See [Add a Tenant-Specific Outbound Email Server](#). If your system administrator configured a default outbound server and you need to configure your own, see [Override a System Default Outbound Email Server](#).
- 2 (Optional) Configure an inbound server so that users can complete tasks by responding to notifications. See [Add a Tenant-Specific Inbound Email Server](#). If your system administrator configured a default inbound server and you need to configure your own, see [Override a System Default Inbound Email Server](#).
- 3 Select the vRealize Automation events to trigger user notifications. See [Configure Notifications](#).
- 4 (Optional) Each user must subscribe to notifications before they can receive the notifications that you configured. See [Subscribe to Notifications](#).

Add a Tenant-Specific Outbound Email Server

Tenant administrators can add an outbound email server to send notifications for completing work items, such as approvals.

Each tenant can have only one outbound email server. If your system administrator has already configured a global outbound email server, see [Override a System Default Outbound Email Server](#).

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**.
- If the email server requires authentication, the specified user must be in an identity store and the business group.

Procedure

- 1 Select **Administration > Notifications > Email Servers**.
- 2 Click the **Add** icon ().
- 3 Select **Email – Outbound**.
- 4 Click **OK**.
- 5 Enter a name in the **Name** text box.
- 6 (Optional) Enter a description in the **Description** text box.
- 7 Type the name of the server in the **Server Name** text box.
- 8 Choose an encryption method.
 - Click **Use SSL**.
 - Click **Use TLS**.
 - Click **None** to send unencrypted communications.
- 9 Type the server port number in the **Server Port** text box.
- 10 (Optional) Select the **Required** check box if the server requires authentication.
 - a Type a user name in the **User Name** text box.
 - b Type a password in the **Password** text box.
- 11 Type the email address that vRealize Automation emails should appear to originate from in the **Sender Address** text box.

This email address corresponds to the user name and password you supplied.

12 Choose whether vRealize Automation can accept self-signed certificates from the email server.

This option is available only if you enabled encryption.

- Click **Yes** to accept self-signed certificates.
- Click **No** to reject self-signed certificates.

13 Click **Test Connection**.

14 Click **Add**.

Add a Tenant-Specific Inbound Email Server

Tenant administrators can add an inbound email server so that users can respond to notifications for completing work items, such as approvals.

Each tenant can have only one inbound email server. If your system administrator already configured a global inbound email server, see [Override a System Default Inbound Email Server](#).

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**.
- Verify that the specified user is in an identity store and in the business group.

Procedure

- 1 Select **Administration > Notifications > Email Servers**.
- 2 Click the **Add** icon (+).
- 3 Select **Email - Inbound** and click **OK**.
- 4 Configure the following inbound email server options.

Option	Action
Name	Enter a name for the inbound email server.
Description	Enter a description of the inbound email server.
Security	Select the Use SSL check box.
Protocol	Choose a server protocol.
Server Name	Enter the server name.
Server Port	Enter the server port number.

- 5 Type the folder name for emails in the **Folder Name** text box.
This option is required only if you choose IMAP server protocol.
- 6 Enter a user name in the **User Name** text box.
- 7 Enter a password in the **Password** text box.
- 8 Type the email address that vRealize Automation users can reply to in the **Email Address** text box.

- 9 (Optional) Select **Delete From Server** to delete from the server all processed emails that are retrieved by the notification service.
- 10 Choose whether vRealize Automation can accept self-signed certificates from the email server.
This option is available only if you enabled encryption.
 - Click **Yes** to accept self-signed certificates.
 - Click **No** to reject self-signed certificates.
- 11 Click **Test Connection**.
- 12 Click **Add**.

Override a System Default Outbound Email Server

If the system administrator configured a system default outbound email server, the tenant administrator can override this global setting.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

- 1 Select **Administration > Notifications > Email Servers**.
- 2 Select the Outbound email server.
- 3 Click **Override Global**.
- 4 Enter a name in the **Name** text box.
- 5 (Optional) Enter a description in the **Description** text box.
- 6 Type the name of the server in the **Server Name** text box.
- 7 Choose an encryption method.
 - Click **Use SSL**.
 - Click **Use TLS**.
 - Click **None** to send unencrypted communications.
- 8 Type the server port number in the **Server Port** text box.
- 9 (Optional) Select the **Required** check box if the server requires authentication.
 - a Type a user name in the **User Name** text box.
 - b Type a password in the **Password** text box.
- 10 Type the email address that vRealize Automation emails should appear to originate from in the **Sender Address** text box.

This email address corresponds to the user name and password you supplied.

- 11 Choose whether vRealize Automation can accept self-signed certificates from the email server.

This option is available only if you enabled encryption.

- Click **Yes** to accept self-signed certificates.
- Click **No** to reject self-signed certificates.

- 12 Click **Test Connection**.

- 13 Click **Add**.

Override a System Default Inbound Email Server

If the system administrator has configured a system default inbound email server, tenant administrators can override this global setting.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

- 1 Select **Administration > Notifications > Email Servers**.
- 2 Select the Inbound email server in the Email Servers table.
- 3 Click **Override Global**.
- 4 Enter the following inbound email server options.

Option	Action
Name	Enter the name of the inbound email server.
Description	Enter a description of the inbound email server.
Security	Select the SSL check box to use SSL for security.
Protocol	Choose a server protocol.
Server Name	Enter the server name.
Server Port	Enter the server port number.

- 5 Type the folder name for emails in the **Folder Name** text box.
This option is required only if you choose IMAP server protocol.
- 6 Enter a user name in the **User Name** text box.
- 7 Enter a password in the **Password** text box.
- 8 Type the email address that vRealize Automation users can reply to in the **Email Address** text box.
- 9 (Optional) Select **Delete From Server** to delete from the server all processed emails that are retrieved by the notification service.

10 Choose whether vRealize Automation can accept self-signed certificates from the email server.

This option is available only if you enabled encryption.

- Click **Yes** to accept self-signed certificates.
- Click **No** to reject self-signed certificates.

11 Click **Test Connection**.

12 Click **Add**.

Configure Notifications

Each user determines whether to receive notifications, but tenant administrators determine which events trigger notifications.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**.
- Verify that a tenant administrator or system administrator configured an outbound email server. See [Add a Tenant-Specific Outbound Email Server](#).

Procedure

- 1 Select **Administration > Notifications > Scenarios**.
- 2 Select one or more notifications.
- 3 Click **Activate**.

Users who subscribe to notifications in their preference settings now receive the notifications.

Subscribe to Notifications

If your administrators have configured notifications, you can subscribe to receive notifications from vRealize Automation. Notification events can include the successful completion of a catalog request or a required approval.

Prerequisites

Log in to the vRealize Automation console.

Procedure

- 1 Click **Preferences**.
- 2 Select the **Enabled** check box for the Email protocol in the Notifications table.
- 3 Click **Apply**.
- 4 Click **Close**.

Revert to System Default Email Servers

Tenant administrators who override system default servers can revert the settings back to the global settings.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

- 1 Select **Administration > Notifications > Email Servers**.
- 2 Select the email server to revert.
- 3 Click **Revert to Global**.
- 4 Click **Yes**.

Managing Users

Tenant administrators create and manage custom groups and grant and manage user access rights to the vRealize Automation console.

This chapter includes the following topics:

- [Add Identity Store](#)
- [Assign Roles to Identity Store Users or Groups](#)
- [Create a Custom Group](#)
- [Manage User and Group Entitlements](#)

Add Identity Store

vRealize Automation uses identity stores to authenticate users. Each tenant is associated with at least one identity store when it is created, but you can add new ones if necessary.

When you delete an identity store, this removes the roles assigned to users from this store, the roles assigned to users from custom groups, and the information about which services are available to this user. Entries for entitlements and business groups are not affected.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

- 1 Select **Administration > Identity Stores**.
- 2 Click the **Add** icon (.
- 3 Enter a name in the **Name** text box.
- 4 Select the type of the identity store from the **Type** drop-down menu.
- 5 Enter the following Identity Store configuration options.

Option	Action
URL	Enter the URL for the identity store. For example, <code>ldap://10.141.64.166:875</code> .
Domain	Enter the domain for the identity store.

Option	Action
(Optional) Domain Alias	Enter the domain alias.
Login User DN	Enter the login user Distinguished Name. For example, cn=demoadmin,ou=demo,dc=dev,dc=mycompany,dc=com.
Password	Enter the password for the identity store login user.
Group Search Base DN	Enter the group search base Distinguished Name. For example, ou=demo,dc=dev,dc=mycompany,dc=com.
User Search Base DN	Enter the user search base Distinguished Name.

6 Click **Test Connection**.

7 Click **Add**.

What to do next

[Assign Roles to Identity Store Users or Groups.](#)

Assign Roles to Identity Store Users or Groups

Tenant administrators grant users access rights by assigning roles to users or groups.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

1 Select **Administration > Users & Groups > Identity Store Users & Groups**.

2 Enter a user or group name in the **Search** box and press Enter.

Do not use an at sign (@), backslash (\), or slash (/) in a name. You can optimize your search by typing the entire user or group name in the form user@domain.

3 Click the name of the user or group to which you want to assign roles.

4 Select one or more roles from the Add Roles to this User list.

The Authorities Granted by Selected Roles list indicates the specific authorities you are granting.

5 (Optional) Click **Next** to view more information about the user or group.

6 Click **Update**.

Users who are currently logged in to the vRealize Automation console must log out and log back in to the vRealize Automation console before they can navigate to the pages to which they have been granted access.

What to do next

Optionally, you can create your own custom groups from users and groups in your identity stores. See [Create a Custom Group](#).

Create a Custom Group

Tenant administrators can create custom groups by combining other custom groups, identity store groups, and individual identity store users.

You can assign roles to your custom group, but it is not necessary in all cases. For example, you can create a custom group called Machine Specification Approvers, to use for all machine pre-approvals. You can also create custom groups to map to your business groups so that you can manage all groups in one place. In those cases, you do not need to assign roles.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

- 1 Select **Administration > Users & Groups > Custom Groups**.
- 2 Click the **Add** icon ().
- 3 Enter a group name in the **New Group Name** text box.
Custom group names cannot contain the combination of a semicolon (;) followed by an equal sign (=).
- 4 (Optional) Enter a description in the **New Group Description** text box.
- 5 Select one or more roles from the Add Roles to this Group list.
The Authorities Granted by Selected Roles list indicates the specific authorities you are granting.
- 6 Click **Next**.
- 7 Add users and groups to create your custom group.
 - a Enter a user or group name in the **Search** box and press Enter.
Do not use an at sign (@), backslash (\), or slash (/) in a name. You can optimize your search by typing the entire user or group name in the form user@domain.
 - b Select the user or group to add to your custom group.
- 8 Click **Add**.

Users who are currently logged in to the vRealize Automation console must log out and log back in to the vRealize Automation console before they can navigate to the pages to which they have been granted access.

Manage User and Group Entitlements

You can use user and group directory name search parameters to control user and group entitlements.

If users or groups from other domains do not possess the expected system privileges, and do not appear on the **Administration > Users** page or the **Administration > Groups** page, check the user and group search base distinguished name parameters on the Identity Store Configuration page. Ensure that the distinguished name search parameters are not so restrictive that the users and groups are excluded the desired domains.

Prerequisites

Log in to vRealize Automation as a tenant administrator.

Procedure

- 1 Select **Administration > Identity Stores** .
- 2 Select the appropriate identity store and then click the **Edit** button.
- 3 Edit the group base distinguished name search parameters in the **Group search base DN** field.
If users or groups do not possess adequate privileges, edit the search parameters to be less restrictive.
- 4 Edit the user base distinguished name search parameters in the **User search base DN** field.
If users or groups do not possess adequate privileges, edit the search parameters to be less restrictive.
- 5 Click **Test Connection**.
- 6 Click **Update**.

4

Managing the Service Catalog

A tenant administrator's tasks include creating services, configuring catalog items, adding entitlements, and assigning approvals.

This chapter includes the following topics:

- [Create a Service](#)
- [Add and Remove Catalog Items in a Service](#)
- [Configure a Catalog Item](#)
- [Approvals Overview](#)
- [Creating an Entitlement](#)
- [Prioritize Entitlements](#)

Create a Service

You can create a service to organize catalog items into related offerings.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

Procedure

- 1 Select **Administration > Catalog Management > Services**.
- 2 Click **Add** (+).
- 3 Enter a name and, optionally, a description.
- 4 (Optional) Click **Browse** to select an icon for the service and click **Open**.
- 5 (Optional) Select a status for the service from the **Status** drop-down menu.

Option	Description
Inactive	Service is saved in a draft state and cannot be published to the catalog.
Active	Service can be published in the catalog.

- 6 (Optional) Configure information to display to users of the service when they browse the catalog.
 - a Select the availability of internal support services teams from the **Hours** drop-down menus.
 - b Enter the name of the service owner in the **Owner** text box and press Enter.
 - a Enter the name of the person or group of persons in charge of the service in the **Support Team** text box and press Enter.
 - b Select a time for scheduled maintenance from the **Change Window** drop-down menus.
- 7 Click **Add**.

What to do next

Associate your catalog item with a service.

Add and Remove Catalog Items in a Service

A tenant administrator, service architect, or business group manager can add and remove catalog items to and from a service.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator, business group manager, or service architect**.
- Verify that a service exists. If necessary, request one from a tenant administrator or service architect. See [Create a Service](#).
- Verify that one or more catalog items are published. See [Configure a Catalog Item](#).

Procedure

- 1 Select **Administration > Catalog Management > Services**.
- 2 Select the service to use when adding or removing catalog items.
- 3 Click **Manage Catalog Items**.
- 4 (Optional) Add a catalog item.
 - a Click the **Catalog Items**  icon.
 - b Select the check box for the catalog item to add to the service.

Repeat this step for any additional catalog items to add. Only catalog items not associated with a service are available.
 - c Click **Add**.
- 5 (Optional) Remove a catalog item.
 - a Locate the catalog item to remove.
 - b In the Actions column, click the down arrow and click **Remove**.

- c Click **OK**.
- d Repeat [Step 5a](#) through [Step 5c](#) to remove additional catalog items.

6 Click **Close**.

What to do next

Users cannot request your catalog item until you entitle them to the service or the item. See [Creating an Entitlement](#).

Configure a Catalog Item

Before users can request an item, you must configure the catalog item and associate it with a service.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**, **business group manager**, or **service architect**.
- Verify that you have at least one blueprint published as a catalog item. Depending on the type of blueprints you are working with, see the appropriate guide for more information about publishing a blueprint. For example, for a services blueprint see *Advanced Service Design*. For a virtual machine blueprint, see *IaaS Configuration for Virtual Platforms*.

Procedure

- 1 Select **Administration > Catalog Management > Catalog Items**.
- 2 Select the catalog item to configure.
- 3 Click **Configure**.
- 4 (Optional) Enter a description in the **Description** text box.
- 5 (Optional) Click **Browse** to choose an icon for the catalog item.
- 6 Select the status of the catalog item from the **Status** drop-down menu.

Option	Description
Active	The catalog item appears in the service catalog and entitled users can request it.
Inactive	The catalog item does not appear in the service catalog and users cannot request it.

- 7 Select a service from the **Service** drop-down menu.
This action determines in which service catalog your item appears.
- 8 (Optional) Select the **New and noteworthy** check box.
The catalog item appears in the New & Noteworthy area on the **Home** page.
- 9 (Optional) Click the **Entitlements** tab to view the entitlements associated with this item and service.
- 10 Click **Update**.

What to do next

Users cannot request your catalog item until you entitle them to the service or the item. See [Creating an Entitlement](#).

Approvals Overview

Any catalog request, whether it is for a new catalog item or to perform an action on a provisioned item, can be subject to approval.

A tenant administrator or business group manager can associate an approval policy with any service, catalog item, or action as part of entitling the items or actions to users.

A tenant administrator or an approval administrator can create approval policies. Each approval policy has an approval policy type that determines to what requests that policy can apply. For example, you can apply some policies only to new catalog item requests, or requests for a specific type of item. You can apply other policies only to post-provisioning actions or to a specific action on provisioned items.

Each approval policy has at least one phase and each phase can have one or more levels.

An approval level represents a single step in a business process. For example, an approval policy can have one level for manager approval, followed by a level for finance approval. An approval level can be designated as always required or required based on certain conditions. The available conditions can vary depending on the approval policy type. For example, an approval policy for virtual machine requests can be conditional based on the number of CPUs in the machine request.

Each level specifies one or more approvers. If a level has multiple approvers, the policy can specify whether all the approvers must approve the request to complete the level, or any one of the approvers can complete the level. If any approver rejects the request, then the entire request is rejected.

For each approval level, you can specify attributes that an approver can edit when completing the approval. For example, in an approval level for IT to review a machine request, they might be able to update the requested CPU, memory, or storage specifications. The approvers must determine that the requested specifications are not appropriate for the proposed use of the machine.

An approval phase is a sequence of approval levels associated with a particular stage in the request. The approval policy type defines how many phases a policy has and which stage in a request triggers a particular approval phase. For example, an approval policy can define the following phases:

- A preprovisioning approval phase must be complete before provisioning a requested item
- A postprovisioning phase occurs after the item is already provisioned but before it is released to the owner

An approval policy in the Draft status can be edited but after it is activated, it becomes read-only. A policy with an Inactive status is also read-only.

Create an Approval Policy

Tenant administrators and approval administrators can define approval policies and use them in entitlements. You can set up the approval policies with multiple levels for pre- and post-approval events.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **approval administrator**.

Procedure

1 Specify Approval Policy Information

When you create an approval policy, first define the approval policy type, name, description, and status.

2 Create an Approval Level

When you create an approval policy, you can add pre- and post-approval levels.

3 Configure an Approval Form

You can configure an approval form to allow the approvers to change the values of system properties for machine resource settings such as CPU, Lease, or Memory and custom properties before they complete an approval request.

Specify Approval Policy Information

When you create an approval policy, first define the approval policy type, name, description, and status.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **approval administrator**.

Procedure

- 1 Select **Administration > Approval Policies**.
- 2 Click the **Add** icon (.
- 3 Select an approval policy type from the **Policy Type** drop-down menu.
- 4 Click **OK**.
- 5 Enter a name and, optionally, a description.
- 6 Select the state of the policy from the **Status** drop-down menu.

Option	Description
Draft	Saves the approval policy in an editable state.
Active	Saves the approval policy in a read-only state that you can use in an entitlement.
Inactive	Saves the approval policy in a read-only state that you cannot use in an entitlement until you activate the policy.

What to do next

Create the pre- and post-approval levels.

Create an Approval Level

When you create an approval policy, you can add pre- and post-approval levels.

You can create multiple approval levels for an approval phase. See [Approvals Overview](#).

Prerequisites

[Specify Approval Policy Information](#).

Procedure

- 1 On the **Pre Approval** or **Post Approval** tab, click the **Add** icon (+).
- 2 Enter a name and, optionally, a description.
- 3 Select a manual approval requirement.

Option	Description
Always Required	A manual approval is always required.
Required based on conditions	A manual approval is required based on the conditions you select from the Clause drop-down menu. You can create a clause to determine whether to include all, include any, or exclude some of the manual approvers.

- 4 Select the approvers.

Option	Action
Specific Users and Groups	Enter a user or group name in the Search text box and press Enter.
Determine approvers from the request	Select the approvers from the Value drop-down menu.

- 5 Indicate who must approve the request or action.

Option	Description
Anyone can approve	Any one of the approvers can approve the request.
All must approve	Each of the approvers must approve the request.

- 6 Click **Add**.
- 7 Click **Add** again.

You can apply your approval policy to services, catalog items, and actions when you create an entitlement.

Configure an Approval Form

You can configure an approval form to allow the approvers to change the values of system properties for machine resource settings such as CPU, Lease, or Memory and custom properties before they complete an approval request.

Only system properties and custom properties that consumers can edit display their original values to approvers on the approval form.

Custom properties you add to the approval form overwrite any other instances of that custom property for example, in blueprints, build profiles or endpoints. If your approver decides not to enter a value for the custom property, the value is not inherited from an existing implementation of the custom property.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **approval administrator**.

Procedure

- 1 On the **Pre Approval** or **Post Approval** tab, select an existing approval policy in the draft state.
- 2 Click the **Approval Form** tab.
- 3 Select system properties you want the approver to configure during approval.
- 4 Add a custom property you want approvers to configure during a pre-provisioning approval phase. Multiple custom properties can be selected and removed concurrently.
 - a Click the **Add** icon ().
 - b Type the custom property value and click **Add**.
- 5 Click **Add** again.

Update an Approval Policy

To update an existing approval policy, the policy must be in the draft state. Active and inactive approval policies are read-only. To update an active approval policy that is in use or an inactive approval policy, you must create a copy of the original policy.

When you make the copy of the approval policy, the status of the new policy is in the draft state. You can edit all of the attributes except the policy type.

You can create pre- and post-approval levels. For instructions about creating an approval level, see [Create an Approval Level](#).

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

- 1 Select **Administration > Approval Policies**.
- 2 Select the row of the approval policy to copy.
- 3 Click the **Copy** icon ().

A copy of the approval policy is created.
- 4 Select the new approval policy to edit.
- 5 Enter a name in the **Name** text box.
- 6 (Optional) Enter a description in the **Description** text box.

- 7 Select the state of the policy from the **Status** drop-down menu.

Option	Description
Draft	Saves the approval policy in an editable state.
Active	Saves the approval policy in a read-only state that you can use in an entitlement.
Inactive	Saves the approval policy in a read-only state that you cannot use in an entitlement until you activate the policy.

- 8 Edit the pre- and post-approval levels.
- 9 Click **Update**.
- 10 Click **View Linked Entitlements** to view the entitlements linked to the old policy and update them to use the new approval policy.

You cannot deactivate a policy if it is linked to an entitlement.

What to do next

Deactivate the old policy. See [Deactivate an Approval Policy](#).

Deactivate an Approval Policy

When an approval policy is out-of-date, you can deactivate the policy so that it is not available during provisioning.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**.
- Verify that there are no entitlements linked to the approval policy. See [Update an Approval Policy](#).

Procedure

- 1 Select **Administration > Approval Policies**.
- 2 Select the row of the approval policy to deactivate.
- 3 Click the **Edit** icon ().
- 4 Select **Inactive** from the Status drop-menu.
- 5 Click **Update**.

The approval policy is deactivated.

Creating an Entitlement

As a tenant administrator or business group manager, you can create entitlements to manage user and group access to services, catalog items, and resource actions in business groups, and to assign approval policies to entitlements.

You specify the entitlement information first. This information includes the name and status of the entitlement and the business group whose selected users and groups are entitled to request the services and catalog items and perform the actions listed in the entitlement.

You then identify one or more services, catalog items, and resource actions that entitled users can request. You can also assign approvals to the services, catalog items, and resource actions.

Specify Entitlement Information

When you create an entitlement, start by identifying the name of the entitlement, the business group, and the users and groups in the business group who are entitled to use the specified items.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

Procedure

1 Select **Administration > Catalog Management > Entitlements**.

2 Click the **Add** icon (+).

3 Enter a name in the **Name** text box.

4 (Optional) Enter a description in the **Description** text box.

5 (Optional) Select an expiration date and time.

a Click the calendar icon.

b Select an expiration year, month, and day, as required.

The actual time of expiration is calculated from your local time.

You can use the double arrows to select an adjacent month, or use the drop-down boxes to select a different month or year.

c Click the up and down arrows to select a different time.

Clicking the circled x clears the date and time fields.

6 Select the status of the entitlement from the **Status** drop-down box.

The status can be Draft or Active. Users have access to items listed in the entitlement only when it is active.

7 Select the business group for the entitlement from the **Business Group** drop-down menu.

8 Type a user or group name in the **Users & Groups** search box.

vRealize Automation displays a list of matching names, if any.

9 Select a name.

The name appears in the **Users and Groups** list.

10 Click **Next**.

What to do next

For information about entitling users to services, catalog items, and resource actions, see [Creating an Entitlement](#).

Add an Item to an Entitlement

You can identify the items in an entitlement in any sequence and combination. For example, you can combine services and resource actions in the same entitlement, separate them into different entitlements, specify only catalog items, and so on. You can assign approvals to the services, catalog items, and resource actions as you add them to the entitlement.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

- [Entitle Users to Services](#)

When you add a service to an entitlement, you allow the users and groups identified in the entitlement to request catalog items associated with that service. You can also apply an approval to the service.

- [Entitle Users to Catalog Items](#)

When you add a catalog item to an entitlement, you allow the business group members identified in the entitlement to request that catalog item. You can also apply an approval to that catalog item.

- [Entitle Users to Resource Actions](#)

When you add a resource action to an entitlement, you allow the business group members who are identified in the entitlement to use the resource action with any item that supports that action. You can also apply an approval to that resource action.

Entitle Users to Services

When you add a service to an entitlement, you allow the users and groups identified in the entitlement to request catalog items associated with that service. You can also apply an approval to the service.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

Procedure

- 1 Select **Administration > Catalog Management > Entitlements**.
- 2 Create or edit an entitlement.

Option	Description
Create an entitlement	Click Add (+), enter a name, and click Next .
Edit an entitlement	Click an entitlement name, and click Next .

- 3 Click the Add icon () for **Entitled Services**.
The **Add Services to Entitlement** dialog box appears.
- 4 (Optional) Enter all or part of a service name in the **Name** search box.
vRealize Automation displays a list of matching names, if any.
- 5 Select the check boxes of the services to add to the entitlement.
- 6 (Optional) Select an approval policy from the **Apply this Policy to selected Items** drop-down menu.
- 7 Click **OK**.
- 8 (Optional) Change the policy.
 - a Point to the down arrow for the service.
 - b Click **Modify Policy**.
The Modify Policy dialog box appears.
 - c Select a policy from the **Apply this Policy** drop-down menu.
- 9 Click **OK**.
- 10 (Optional) Click an Add icon () to entitle users to more services, catalog items, or resource actions with this entitlement.
- 11 Click **Add** or **Update** to save your changes and close the entitlement.
Add appears when you create an entitlement. **Update** appears when you edit an entitlement.

What to do next

For information about how to specify entitlement information, or how to entitle users to catalog items and resource actions, see [Creating an Entitlement](#).

Entitle Users to Catalog Items

When you add a catalog item to an entitlement, you allow the business group members identified in the entitlement to request that catalog item. You can also apply an approval to that catalog item.

When you add a catalog item and its service to the same entitlement, the approval for the catalog item applies.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

Procedure

- 1 Select **Administration > Catalog Management > Entitlements**.

2 Create or edit an entitlement.

Option	Description
Create an entitlement	Click Add (+), enter a name, and click Next .
Edit an entitlement	Click an entitlement name, and click Next .

3 Click the Add icon (+) for Entitled Catalog Items.

The Add Catalog Items to Entitlement dialog box appears.

4 (Optional) Select the service in which to search in the **Service** drop-down menu.

5 (Optional) Select the type of catalog item to search for in the **Type** drop-down menu.

6 (Optional) Type all or part of a catalog item name in the **Name** search box.

vRealize Automation displays a list of matching names, if any.

7 Select the check boxes of the catalog items to add to the entitlement.

8 (Optional) Select an approval policy from the **Apply this Policy to Selected Items** drop-down menu.

9 Click **OK**.

10 (Optional) Change the policy.

a Click the down arrow for the catalog item.

b Click **Modify Policy**.

The Modify Policy dialog box appears.

c Select a policy from the **Apply this Policy** drop-down menu.

11 Click **OK**.

12 (Optional) Click an Add icon (+) to entitle users to more services, catalog items, or resource actions with this entitlement.

13 Click **Add** or **Update**.

Add appears when you create an entitlement. **Update** appears when you edit an entitlement.

What to do next

For information about how to specify entitlement information, or how to entitle users to services and resource actions, see [Creating an Entitlement](#).

Entitle Users to Resource Actions

When you add a resource action to an entitlement, you allow the business group members who are identified in the entitlement to use the resource action with any item that supports that action. You can also apply an approval to that resource action.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

Procedure

1 Select **Administration > Catalog Management > Entitlements**.

2 Create or edit an entitlement.

Option	Description
Create an entitlement	Click Add () , enter a name, and click Next .
Edit an entitlement	Click an entitlement name, and click Next .

3 Click the Add icon () for **Entitled Actions**.

The Add Resource Actions to Entitlement dialog box appears.

4 (Optional) Select the type of resource action in the **Type** drop-down menu.

5 (Optional) Type all or part of a resource action name in the **Name** search box.

vRealize Automation displays a list of matching names, if any.

6 Select the check boxes of the resource actions to add to the entitlement.

7 (Optional) Select an approval policy from the **Apply this Policy to selected Items** drop-down menu.

8 Click **OK**.

9 (Optional) Change the policy.

a Click the down arrow for the resource action.

b Click **Modify Policy**.

The Modify Policy dialog box appears.

c Select a policy from the **Apply this Policy** drop-down menu.

10 Click **OK**.

11 (Optional) Click an Add icon () to entitle users to more services, catalog items, or resource actions with this entitlement.

12 Click **Add** or **Update**.

Add appears when you create an entitlement. **Update** appears when you edit an entitlement.

What to do next

For information about how to specify entitlement information, or how to entitle users to services and catalog items, see [Creating an Entitlement](#).

Prioritize Entitlements

By prioritizing entitlements in a business group, you can determine the activation order of the approval policies associated with the entitlements.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

Procedure

- 1 Select **Administration > Catalog Management > Entitlements**.
- 2 Click the **Prioritize** icon ().
- 3 Select a business group from the **Business Group** drop-down list.
- 4 Drag an entitlement to a new location in the list to change its priority.
- 5 Select an update method.

Option	Description
Update	Saves your changes.
Update & Close	Saves your changes and closes the Prioritize Elements window.

Monitoring Resource Usage

You can monitor virtual and physical resource use with the vRealize Automation console.

This chapter includes the following topics:

- [Managing Resource Reports](#)
- [Resource Reports](#)
- [Chargeback Reports](#)
- [Chargeback Cost Calculation](#)
- [Managing Machine Leases](#)
- [Reclamation Overview](#)

Managing Resource Reports

You can add real-time resource reports to your Home page to monitor virtual, physical, and cloud resource usage, change their layout, and export their data to other applications.

Add Reports to the Home Page

You can add one or more IaaS reports to your Home page. These real-time reports list your most recent open tasks, catalog requests, provisioned items, and provisioned machines broken down by user, blueprint, compute resource, and business group. Two reports also display updated summaries of reclamation savings.

Prerequisites

Log in to the vRealize Automation console.

Procedure

- 1 Navigate to the **Home** page.
- 2 Click the Edit  icon in the upper-right corner of the page and click **Add Portlets** in the drop-down menu.
- 3 Click **Add** for each report to add to your Home page.

A disabled **Add** button indicates an already added report.

- 4 Click **Close**.

What to do next

[Configure the Report Layout.](#)

Configure the Report Layout

You can configure your Home page to display reports in one, two, three, or four columns. You can move a report from one column to another.

Prerequisites

Log in to the vRealize Automation console.

Procedure

- 1 Navigate to the **Home** page.
- 2 Click the Edit icon () in the upper-right corner of the page and click **Change Layout** in the drop-down menu.
- 3 Select a report layout.

Option	Description
1 Column	Lay out reports in one column.
2 Columns	Lay out reports in two columns of equal or unequal widths.
3 Columns	Lay out reports in three columns of equal or unequal widths.
4 Columns	Lay out reports in four equal columns.

- 4 Click **Submit**.
- 5 Point to the title bar of a report.
The cursor changes to a four-headed cursor.
- 6 Drag the report to its new location.
The width of the report changes to fit the new location.

Export Report Data

You can save IaaS reports located on your Home page to CSV files where you can customize the data.

Prerequisites

- Log in to the vRealize Automation console.
- [Add Reports to the Home Page.](#)

Procedure

- 1 Navigate to the **Home** page.

- 2 Click **Export as CSV** in the report to save.

Some browsers save the file immediately. With Firefox, a dialog box appears with selections for opening or saving the report with Microsoft Excel or another application.

- 3 (Optional) Select whether to open or save the report data, and which application to use.

Resource Reports

Resource reports display data about machines and resources used and reclaimed according to owner, compute resource, and group.

Name	Description
My Inbox	Displays a list of the most recent open tasks in your inbox. Click a row to view the detail page of a task. Click More to open the complete list of inbox tasks.
My Open Requests	Displays a list of your most recent catalog requests. Click a row to view the detail page of a request. Click More to open the complete list of requests.
My Recent Requests	Displays a list of your most recent catalog requests regardless of status. Click a row to view the detail page of a request. Click More to open the complete list of requests.
My Items	Displays a list of your most recently provisioned items. Click a row to view the detail page of an item. Click More to open the complete list of items.
My Group Requests	Displays a list of the most recent catalog requests for users in groups that you manage. Click a row to view the detail page of a request. Click More to open the complete list of requests.
My Groups Items	Displays a list of the most recently provisioned items for users in groups that you manage. Click a row to view the detail page of an item. Click More to open the complete list of items.
New & Noteworthy	Highlights catalog items that were recently made available in the catalog.
Calendar of Events	Displays a calendar view of important events for catalog items that you own, such as lease expiration and machine destruction.
IaaS Capacity Usage by Blueprint	Displays the number of machines provisioned from each blueprint and the total resources that those machines used.
IaaS Capacity Usage by Group	Displays the number of machines that users own in each business group and the total resources that those machines use.
IaaS Capacity Usage by Owner	Displays the number of machines that each user owns and the total resources that those machines use.
IaaS Capacity Usage by Compute Resource	Displays the number of machines provisioned on each compute resource and the total resources that those machines use.
IaaS Reclamation Savings by Owner	Displays a summary of cost savings because of reclaiming machines that each user owns.
IaaS Reclamation Savings by Group	Displays a summary of cost savings because of reclaiming machines that users in each business group own.
IaaS Chargeback by Group by Allocated Resources	Displays the cumulative cost over time of provisioned machines that each business group owns. See Chargeback Reports .
My Trips	Displays a sample consumer report.

Chargeback Reports

Chargeback reports allow IaaS administrators, tenant administrators, and business group managers to track the cumulative cost of provisioned machines over time.

Chargeback cost is calculated differently for each machine type. See [Chargeback Cost Calculation](#).

Table 5-1. Chargeback Reports

Situation	Report	Role Restrictions
Monitor machine costs at the business group level. By default, the report shows the first 100 most expensive machines. You can filter these reports by business group and by machine type, and run the report with different time parameters. For example, you can see the cost of all machines owned by all business groups last year, or you can view the cost of physical machines owned by business group B last week.	Chargeback by Allocated Resources by Group	Business group managers see reports only for the business groups that they manage. IaaS administrators and tenant administrators see reports for all business groups within the tenant.

Chargeback Cost Calculation

Machine costs are calculated differently depending on the machine type, but are typically based on a combination of cost profiles and blueprint cost settings.

For more information about creating and applying cost profiles, see the *IaaS Configuration* documentation for the relevant machine type.

Cost Calculation for Virtual Machines

Several factors can contribute to the calculation of cost for virtual machines.

The daily cost of a machine is based on the cost of the memory, CPU, and storage resources that it consumes, and the blueprint cost.

Table 5-2. Daily Cost Drivers

Cost Driver	Calculated Cost
Memory	Allocated memory (GB) multiplied by the daily memory cost per gigabyte specified in the cost profile associated with the compute resource on which the machine is provisioned
CPUs	Number of allocated CPUs multiplied by the daily CPU cost specified in the cost profile associated with the compute resource on which the machine is provisioned

Table 5-2. Daily Cost Drivers (Continued)

Cost Driver	Calculated Cost
Storage	<p>Allocated storage (GB) multiplied by the storage cost per gigabyte specified in one of the following places:</p> <ul style="list-style-type: none"> ■ The cost profile associated with the compute resource on which the machine is provisioned ■ The storage cost profile on the datastore on which the machine is provisioned <p>The cost specified in a storage cost profile for a specific datastore overrides the storage cost specified in a cost profile on the compute resource.</p>
Blueprint cost	<p>The value for daily cost specified in the machine blueprint is added to the total cost of the machine.</p> <p>This value can represent a markup for using the machine in addition to the resources consumed by the machine.</p>

Lease cost is calculated as daily cost multiplied by the total number of days in the lease period, if applicable.

Cost-to-date is calculated as daily cost multiplied by the number of days a machine is provisioned.

Cost Information for Cloud Machines

Cost profiles do not apply to cloud machines. The only factor in calculating cost for cloud machines is the blueprint cost.

Lease cost is calculated as daily cost multiplied by the total number of days in the lease period, if applicable.

Cost-to-date is calculated as daily cost multiplied by the number of days a machine is provisioned.

Cost Calculation for Physical Machines

Several factors can contribute to the calculation of cost for physical machines.

The daily cost of a machine is based on the cost of the memory and CPU resources that it consumes, and the blueprint cost.

Table 5-3. Daily Cost Drivers

Cost Driver	Calculated Cost
Memory	Memory (GB) on the physical machine multiplied by the daily memory cost per gigabyte specified in the cost profile associated with the machine
CPUs	Number of CPUs on the physical machine multiplied by the daily CPU cost specified in the cost profile associated with the machine
Blueprint cost	<p>The value for daily cost specified in the machine blueprint is added to the total cost of the machine.</p> <p>This value can represent a markup for using the machine in addition to the resources consumed by the machine.</p>

Storage cost specified in a cost profile is not taken into account for physical machines. If you assign a cost profile that includes a value for storage cost to a physical machine, it is ignored. You can account for the cost of using storage in the daily cost specified in the blueprint for the physical machine.

Lease cost is calculated as daily cost multiplied by the total number of days in the lease period, if applicable.

Cost-to-date is calculated as daily cost multiplied by the number of days a machine is provisioned.

Cost Calculation for vCloud Director

Several factors can contribute to the chargeback calculation of cost for vApps.

The cost of a vApp is based on the cost of memory and CPU that component machines consume, and the costs specified in the vApp blueprint and vApp component blueprints. Storage cost is not taken into account for component machines. If you assign a cost profile that includes a value for storage cost to a component machine, it is ignored. You can account for the cost of using storage in the daily cost specified in the blueprint for the component machine.

Table 5-4. Daily Cost Drivers

Cost Driver	Calculated Cost
Memory	Allocated memory (GB) multiplied by the daily memory cost per gigabyte specified in the cost profile associated with the virtual datacenter on which a component machine is provisioned
CPUs	Number of allocated CPUs multiplied by the daily CPU cost specified in the cost profile associated with the virtual datacenter on which a component machine is provisioned
Blueprint cost (vApp component)	The value for daily cost specified in the vApp component blueprint is added to the total cost of each component machine. This value can represent a markup for using the machine in addition to the resources consumed by the machine.
Blueprint cost (vApp)	The value for daily cost specified in the vApp blueprint is added to the total cost of the vApp. This value can represent a markup for using the vApp in addition to the costs of the component machines.

Lease cost is calculated as daily cost multiplied by the total number of days in the lease period, if applicable.

Cost-to-date is calculated as daily cost multiplied by the number of days a vApp is provisioned.

Cost Calculation for Multi-Machine Services

Chargeback reports calculate and report the cost of a multi-machine and its component machines. Chargeback cost for component machines is calculated differently depending on the type of machine.

Parent Machine

The cost of the parent multi-machine is determined by the cost specified in the multi-machine parent blueprint.

Virtual Component Machines

The daily cost of a machine is based on the cost of the memory, CPU, and storage resources that it consumes, and the blueprint cost.

Table 5-5. Daily Cost Drivers

Cost Driver	Calculated Cost
Memory	Allocated memory (GB) multiplied by the daily memory cost per gigabyte specified in the cost profile associated with the compute resource on which the machine is provisioned
CPUs	Number of allocated CPUs multiplied by the daily CPU cost specified in the cost profile associated with the compute resource on which the machine is provisioned
Storage	<p>Allocated storage (GB) multiplied by the storage cost per gigabyte specified in one of the following places:</p> <ul style="list-style-type: none"> ■ The cost profile associated with the compute resource on which the machine is provisioned ■ The storage cost profile on the datastore on which the machine is provisioned <p>The cost specified in a storage cost profile for a specific datastore overrides the storage cost specified in a cost profile on the compute resource.</p>
Blueprint cost	<p>The value for daily cost specified in the machine blueprint is added to the total cost of the machine.</p> <p>This value can represent a markup for using the machine in addition to the resources consumed by the machine.</p>

Lease cost is calculated as daily cost multiplied by the total number of days in the lease period, if applicable.

Cost-to-date is calculated as daily cost multiplied by the number of days a machine is provisioned.

Cloud Component Machines

The cost of a cloud machine is determined by the cost specified in the blueprint.

Lease cost is calculated as daily cost multiplied by the total number of days in the lease period, if applicable.

Cost-to-date is calculated as daily cost multiplied by the number of days a machine is provisioned.

Physical Component Machines

The daily cost of a machine is based on the cost of the memory and CPU resources that it consumes, and the blueprint cost.

Table 5-6. Daily Cost Drivers

Cost Driver	Calculated Cost
Memory	Memory (GB) on the physical machine multiplied by the daily memory cost per gigabyte specified in the cost profile associated with the machine
CPUs	Number of CPUs on the physical machine multiplied by the daily CPU cost specified in the cost profile associated with the machine
Blueprint cost	The value for daily cost specified in the machine blueprint is added to the total cost of the machine. This value can represent a markup for using the machine in addition to the resources consumed by the machine.

Storage cost specified in a cost profile is not taken into account for physical machines. If you assign a cost profile that includes a value for storage cost to a physical machine, it is ignored. You can account for the cost of using storage in the daily cost specified in the blueprint for the physical machine.

Lease cost is calculated as daily cost multiplied by the total number of days in the lease period, if applicable.

Managing Machine Leases

Tenant administrators or business group managers can use leases to place time limits on resource consumption.

Tenant administrators or business group managers can optionally define a lease duration when creating a blueprint.

- If a blueprint does not specify a lease period, machines are provisioned from that blueprint with no expiration date.
- If a blueprint specifies a single value for lease duration, machines are provisioned from that blueprint with the lease duration specified in the blueprint.
- If a blueprint specifies a range of possible lease durations, a user can select the desired lease duration when submitting the machine request. Machine requests can be subject to approval based on the requested lease duration.

The lease duration can be changed after a machine is provisioned. A typical use case is for a machine owner to extend the lease past its original expiration date. The following considerations apply to modifying the lease on a provisioned machine:

- Users must be entitled to the Change Lease action to modify a lease.
- The new expiration date is not subject to the constraints on lease duration specified in the blueprint.
- Tenant administrators or approval administrators can create approval policies of the type Service Catalog - Resource Action Request (Change Lease). The policy can be configured so that approval is always required for lease modifications, or approval can be conditional based on criteria such as the new lease duration or the cost of the machine.

Tenant administrators can also request that a machine owner release a provisioned machine for reclamation, which might result in a shortened lease period.

Managing Leases for Multi-Machine Services

Leases are controlled at the multi-machine service level. Lease operations such as change, extend, and expire are not available for individual component machines.

- The lease period for a multi-machine service always overrides the lease on its component machines. A component machine always has the same lease period as the multi-machine service.
- When the expiration date for a multi-machine service changes, that change is applied to all its component machines.
- Component machines cannot expire earlier than the multi-machine service to which they belong.
- When a multi-machine service expires, all its component machines expire at the same time. The multi-machine service and its component machines are destroyed immediately when the lease expires.

Reclamation Overview

Tenant administrators can use metrics such as low CPU use, low memory use, or low hard disk use to reclaim virtual machines in their tenant and help control resources.

You can use the basic metrics provided by vRealize Automation to sort and filter metrics information for all of your machines, or you can configure a vRealize Operations Manager endpoint to provide metrics and health badges for your vSphere virtual machines.

You can use the metrics to identify underused machines that might be candidates for reclamation. Select the candidate machines and send a reclamation request to the owners of the machines. The machine owner has a fixed period of time to respond to the request. If the machine is still in use, the owner can stop the reclamation process and continue using the machine. If the machine is no longer needed, the owner can release the machine for reclamation, in which case the machine lease is ended. If the owner does not respond in a timely manner, a lease determined by the administrator is imposed. If the owner continues to take no action, the machine is powered off on the new expiration date, the machine is reclaimed, and the resources are freed.

Configure a Metrics Provider

You can configure vRealize Automation to use vRealize Operations Manager health and resource metrics for vSphere virtual machines.

For more information about vRealize Operations Manager health badges and metrics, see the vRealize Operations Manager documentation.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**.
- Create a vRealize Operations Manager user account with view and resource metrics query privileges for all vSphere servers that you integrate with vRealize Automation.

- Create vRealize Operations Manager adapter instances for all vSphere servers you add as endpoints in vRealize Automation. For information about creating adapter instances, see the vRealize Operations Manager documentation.

Procedure

- 1 Select **Administration > Tenant Machines > Metrics Provider Configuration**.
- 2 Select a metrics provider.

Option	Description
(Default) vRealize Automation metrics provider	If you do not have a vRealize Operations Manager instance, vRealize Automation provides basic machine metrics.
vRealize Operations Manager endpoint	Provide connection information for the vRealize Operations Manager instance you want to use as your metrics provider for vSphere virtual machines.

- 3 Click **Test Connection**.
- 4 Click **Save**.

Tenant administrators can view health badges and health alerts on the item details pages for vSphere virtual machines, and can view vRealize Operations Manager metrics and health badges when they filter by the platform type vSphere on the reclamations page.

What to do next

[Send Reclamation Requests](#).

Send Reclamation Requests

A tenant administrator can send reclamation requests to virtual machine owners. A reclamation request specifies a new lease length in days, the amount of time given for a machine owner’s response, and which machines to target for reclamation.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**.
- (Optional) To see health badges or view metrics provided by vRealize Operations Manager, [Configure a Metrics Provider](#).

Procedure

- 1 Select **Administration > Tenant Machines > Reclamation**.

2 Find virtual machines that match your search criteria.

You must select platform type vSphere to view metrics provided by vRealize Operations Manager.

- a Click the **Advanced Search** down arrow to open the search box.
- b Enter or select one or more search values.

Option	Action
Virtual Machine name contains	Enter one or more characters in the text box to find virtual machine names that match.
Owner name contains	Enter a name in the text box to find owner names that match.
Business group names contains	Enter a name in the text box to find business group names that match.
Platform Type (required for vRealize Operations Manager)	Select a platform type from the drop-down menu. Select vSphere to view metrics provided by vRealize Operations Manager.
Power State	Select a power state value from the drop-down menu to find virtual machines with a matching power state.
Expiration date between	Click the calendar icons and select start and end dates to find expiration dates inside the range.
CPU usage	Select a value from the drop-down menu to find virtual machines with High CPU use, above 80%, Low CPU use below 5%, or None, no value. If you are querying vRealize Operations Manager metrics, you cannot use this filter to query, and you cannot sort results by CPU usage.
Mem usage	Select a value from the drop-down menu to find virtual machines with High Memory use, above 80%, Low Memory use, below 10%, or None, no value. If you are querying vRealize Operations Manager metrics, you cannot use this filter to query, and you cannot sort results by memory usage.
Disk usage	Select a value from the drop-down menu to find virtual machines with Low Hard Disk use, less than 2 KBs per second or None, no value. If you are querying vRealize Operations Manager metrics, you cannot use this filter to query, and you cannot sort results by disk usage.
Network usage	Select a value from the drop-down menu to find virtual machines with Low Network use, less than 1 KB per second, or None, no value. If you are querying vRealize Operations Manager metrics, you cannot use this filter to query, and you cannot sort results by network usage.
Complex metric	Select a value from the drop-down menu to find virtual machines based on complex metrics. For example, select idle to find machines that have CPU, network, memory, and disk usage values all under 20%. You cannot use this filter if you are querying vRealize Operations Manager metrics.

- c Click the search icon ().

3 From the current results page, select one or more virtual machines to reclaim.

For manageability, only machines selected on the current results page are reclaimed.

4 Click **Reclaim Virtual Machine**.

Virtual machines selected on the current results page are included in the request.

Note The Reclamation page can list machines that are not available for reclamation, such as machines for which the lease has expired. If you specify a machine that is not available for reclamation, you receive the following error:

```
Selection Error: Virtual machine name is not in valid state for reclamation.
```

5 Enter the duration of the new lease in the **New lease length (days)** text box.

The minimum is 1 day, the maximum is 365 days, and the default is 7 days.

6 Enter how many days the machine owner has to respond to the reclamation request in the **Wait before forcing lease (days)** text box.

At the end of that time, the machine gets a new lease with the new lease length. The minimum waiting period is 1 day, the maximum is 365 days, and the default is 3 days.

7 Enter a reason for the request in the **Reason for request** text box.

8 Click **Submit**.

9 Click **OK**.

When you send a reclamation request, it appears in the Inbox of the owner of the virtual machine. If the owner does not respond to the request in the required number of days, the virtual machine gets a new lease of the specified length, unless its current lease is shorter. If the owner clicks **Item in Use** on the reclamation request, the virtual machine's lease remains unchanged. If the owner clicks **Release for Reclamation**, the virtual machine lease expires immediately.

What to do next

[Track Reclamation Requests.](#)

Track Reclamation Requests

A tenant administrator can track the current state of reclamation requests and other details.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

1 Select **Administration > Tenant Machines > Reclamation Requests**.

- 2 Find the virtual machines that match your search criteria.
 - a Click the **Advanced Search** down arrow to open the search box.
 - b Type or select one or more search values.

Option	Action
Virtual Machine name contains:	Type one or more characters in the text box to find virtual machine names that match.
Owner name contains:	Type one or more characters in the text box to find owner names that match.
Request Reason contains:	Type one or more characters in the text box to find a request reason that matches.
Request State:	Select a request state value from the drop-down menu to find virtual machines with a matching request state.

- c Click the **Search** icon () or press Enter to start the search.
 - d Click the **Advanced Search** up arrow to close the search box.
- 3 (Optional) Click **Refresh Data** to update the display of reclamation requests.

Managing Virtual Machines

Managing virtual machines requires different roles to perform some tasks. For example, only a fabric administrator can change the reservation of a virtual machine, but a machine owner can create a snapshot of a virtual machine.

This chapter includes the following topics:

- [Reconfigure a Machine](#)
- [Change the Reservation of a Virtual Machine](#)
- [Create a Snapshot of Your Machine](#)

Reconfigure a Machine

vSphere, vCloud Director, and SCVMM platforms support reconfiguration of existing machines to accommodate changes in workload demand.

A business group manager, support user, or machine owner can perform the following tasks:

- Reconfigure CPU or memory
- (vSphere and vApp only) Reconfigure network and Storage
- Change description
- Add, edit, and delete properties
- Reconfigure shutdown

Reconfiguration requests are subject to approval based on entitlements, policies, and specifications on the machine blueprint. You cannot reconfigure any machines if you are not entitled to the Reconfigure (Machine) actions, and you might not be able reconfigure a specific machine if the machine blueprint does not allow reconfigure. If your machine is provisioned on SCVMM, you cannot reconfigure networks or storage.

If you are entitled to the Cancel Reconfigure (Machine) and Execute Reconfigure (Machine) actions, you can cancel a reconfiguration or retry a failed reconfiguration.

Prerequisites

- Log in to the vRealize Automation console as a **machine owner, support user, tenant administrator, or business group manager**.

- The machine you want to reconfigure has the status On or Off with no active reconfigure status.

Procedure

1 Start the Operation

You start the reconfigure operation by selecting a provisioned machine with an On or Off status.

2 Reconfigure CPUs and Memory

You can optionally change the number of CPUs or the amount of memory used by the provisioned machine, within the limits set by the provisioning blueprint.

3 Reconfigure Storage

You can add, delete, or change the size of a storage volume on a provisioned virtual machine.

4 Add Custom Properties

Optionally, you can add custom properties to a volume.

5 Reconfigure Networks

You can add, remove, or edit a network adapter when you reconfigure a virtual machine.

6 Schedule the Start

You can start the reconfiguration immediately, or schedule it to start at a particular day and time. You can also specify the power option for the machine before reconfiguring it.

Start the Operation

You start the reconfigure operation by selecting a provisioned machine with an On or Off status.

Prerequisites

- Log in to the vRealize Automation console as a **machine owner**, **support user**, **tenant administrator**, or **business group manager**.
- The machine you want to reconfigure must have the status On or Off with no active reconfigure status.

Procedure

- 1 Select **Items > Machines**.
- 2 Select the row of the machine to reconfigure.
- 3 Select **Reconfigure** from the **Actions** drop-down menu.

What to do next

[Reconfigure CPUs and Memory.](#)

Reconfigure CPUs and Memory

You can optionally change the number of CPUs or the amount of memory used by the provisioned machine, within the limits set by the provisioning blueprint.

Prerequisites

[Start the Operation.](#)

Procedure

- 1 (Optional) Type the number of CPUs in the **# CPUs** text box.
The allowable range appears next to the text box.
- 2 (Optional) Type the amount of memory in the **Memory (MB)** text box.
The allowable range appears next to the text box.

What to do next

[Reconfigure Storage.](#)

Reconfigure Storage

You can add, delete, or change the size of a storage volume on a provisioned virtual machine.

You cannot reconfigure storage for the IDE disk type.

Prerequisites

[Reconfigure CPUs and Memory.](#)

Procedure

- 1 Click the **Storage** tab.
The allowable range for storage appears below the Storage volumes table.
- 2 (Optional) Add a volume.
 - a Click **New Volume**.
 - b Type the capacity in the **Capacity (GB)** text box.
 - c (Optional) Select a storage reservation policy from the **Storage reservation policy** drop-down menu.
 - d Click the **Save** icon (.
- 3 (Optional) Delete a volume.
 - a Locate the volume.
 - b Click the **Delete** icon (.

An unselectable icon indicates an undeletable volume such as one from a linked clone.

4 (Optional) Increase the size of a volume.

You cannot reduce the size of existing volumes. Volume size is limited by the total amount of storage specified in the blueprint, less the amount allocated to other volumes.

- a Locate the volume.
- b Click the **Edit** icon ().
- c Type the new size in the **Capacity (GB)** text box.
- d Click the **Save** icon (.

What to do next

[Add Custom Properties.](#)

Add Custom Properties

Optionally, you can add custom properties to a volume.

You cannot use custom properties to enter values for volume disk number, capacity, label, or storage reservation policy. You must enter these values in their required locations by adding or editing a volume in the Storage volumes table.

Prerequisites

[Reconfigure Storage.](#)

Procedure

- 1 In the **Custom Properties** column of the **Storage volumes** table, click **Edit** for the volume receiving the custom property.
- 2 Click **New Property**.
- 3 Enter the name of the custom property in the **Name** text box.
- 4 Enter the value for the custom property in the **Value** text box.
- 5 Select the **Encrypted** check box to encrypt the value.
- 6 Select the **Prompt user** check box to prompt users for the value when they request the machine.

What to do next

[Reconfigure Networks.](#)

Reconfigure Networks

You can add, remove, or edit a network adapter when you reconfigure a virtual machine.

Prerequisites

[Add Custom Properties.](#)

Procedure

- 1 Click the **Network** tab.
- 2 (Optional) Add a network adapter.
 - a Click **New Network Adapter**.
 - b Select a network from the **Network Path** drop-down menu.
All networks selected on the machine's reservation are available.
 - c Type a static IP address for the network in the **Address** text box.
The IP address must be unallocated in the network profile assigned in the reservation.
 - d Click the **Save** icon ()
- 3 (Optional) Remove a network adapter.
 - a Locate the network adapter.
 - b Click the **Delete** icon ()

You cannot remove network adapter 0.
- 4 (Optional) Edit a network adapter.
 - a Locate the network adapter.
 - b Click the **Edit** icon ()
 - c Select a network from the **Network Path** drop-down menu.
 - d Click the **Save** icon ()

What to do next

[Schedule the Start.](#)

Schedule the Start

You can start the reconfiguration immediately, or schedule it to start at a particular day and time. You can also specify the power option for the machine before reconfiguring it.

Prerequisites

[Reconfigure Networks.](#)

Procedure

- 1 Click the **Execution** tab.

- (Optional) Select an option from the **Execute request** drop-down menu.

Option	Description
Immediate	Start reconfiguration as soon as possible after approval.
Scheduled	Start reconfiguration at the specified date and time. Type or select the date and time in the text boxes that appear.

The scheduled time is the local time where the vRealize Automation Web server is located. If **Execute request** is not available, reconfiguration starts immediately.

- (Optional) Select a power action from the **Power action** drop-down menu.

Option	Description
Reboot if required	(Default) If required, reboot the machine before reconfiguring it.
Reboot	Reboot the machine before reconfiguring it, regardless of whether reboot is required.
Do not reboot	Do not reboot the machine before reconfiguring it, even if reboot is required.

The following conditions require that the machine be rebooted before reconfiguration:

- CPU change where hot CPU is not supported or is disabled
- Memory change where hot CPU is not supported or is disabled
- Storage change where hot CPU is not supported or is disabled
- Hardware reconfiguration

If the machine is in the shutdown state, it is not rebooted.

- Click **OK**.

What to do next

You can monitor the progress of the reconfiguration by observing the workflow states displayed in the user interface. See [Workflow States of Reconfigure Operations](#).

Workflow States of Reconfigure Operations

When reconfiguration starts and as it progresses through the workflow, you can monitor the progress from the Edit page.

Table 6-1. Workflow States of Reconfigure Operations

State	Description
Reconfigure pending	The State Operation was created.
Scheduled	A scheduled workflow has been created for the Distributed Execution Manager (DEM).
Reconfiguring	The interface-specific workflow is being executed.
Reconfigure failed, waiting to retry	The reconfigure failed, waiting for the owner to request a retry. If the machine owner is entitled to the actions execute reconfigure or cancel reconfigure, the owner can retry or cancel a reconfiguration.

Table 6-1. Workflow States of Reconfigure Operations (Continued)

State	Description
ReconfigureFailed	The reconfigure failed, waiting for the RVG workflow to perform the next action.
ReconfigureSuccessful	The reconfigure was successful, waiting for the RVG workflow to perform the next action.
Canceled	The user has canceled the reconfiguration. Machine owners who are entitled to the cancel reconfigure action can cancel a reconfiguration.
Complete	The completion workflow sets this state after completing the cleanup, so that the RVG workflow can proceed to clean up the state operations and approvals. A status of complete indicates that the request from vRealize Automation is finished, but it does not indicate that the machine reconfiguration completed successfully.

Change the Reservation of a Virtual Machine

A fabric administrator can change the reservation of a virtual machine. This ability is useful when a virtual machine moves to a new storage path that is not available in its current reservation.

You can change the machine's current compute resource. You can also move it to any reservation on that compute resource, including one belonging to a different business group. You must be a business group manager of the original and the target business groups to use this function.

Prerequisites

Log in to the vRealize Automation console as a **fabric administrator**.

Procedure

- 1 Select **Infrastructure > Machines > Managed Machines**.
- 2 Locate the virtual machine with the reservation to change.
- 3 Click **Change Reservation** in the drop-down menu.
- 4 Select values from the drop-down menus as required.
- 5 Click **OK**.

Create a Snapshot of Your Machine

Depending on how your administrators have configured your environment, you might be able to create a snapshot of your virtual machine. A snapshot is an image of a virtual machine at a specific time. It is a space-efficient copy of the original VM image. Snapshots are an easy way to recover a system from damage, data loss, or security threats. After you create a snapshot of your virtual machine, you can apply it and reset your system back to the point where the snapshot was taken.

When you create a memory snapshot, the snapshot captures the state of the virtual machine power settings and, optionally, the virtual machine's memory. When you capture the virtual machine's memory state, the snapshot operation takes longer to complete. You might also see a momentary lapse in response over the network.

Prerequisites

- An existing virtual machine that is powered on, off, or suspended.
- If your virtual machine is configured for one or more independent disks, power off the machine before creating a snapshot. You cannot create a snapshot when it is powered on. For disk configuration information, see *Custom Properties V Table*.
- Snapshot Manager is enabled on your machine by a tenant administrator or business group manager. For more information, see *IaaS Configuration for Virtual Platforms*.

Procedure

- 1 Select **Items > Machines**.
- 2 Locate the machine to snapshot.
- 3 In the Actions column, click the down arrow and click **View Details**.
- 4 Click the **Snapshots** tab.
- 5 Click the **Add** icon (.
- 6 Enter a name and, optionally, a description.
- 7 Select **Snapshot the machine's memory** to capture the memory of the virtual machine.
- 8 Click **OK**.

Managing Physical Machines

You can import or provision a physical machine, connect a managed physical machine to the management interface of its endpoint, and join a hypervisor-provisioned physical machine to a vCenter Server cluster.

This chapter includes the following topics:

- [Physical Machine Provisioning and Management](#)
- [Physical Endpoints](#)
- [Physical Reservations](#)
- [Configure Hardware Details](#)
- [Assign a Cost Profile to a Physical Machine](#)
- [Provision a Reserved Physical Machine](#)
- [Import a Physical Machine](#)
- [Connect a Physical Machine to an Endpoint](#)
- [Join a Hypervisor to a Cluster](#)

Physical Machine Provisioning and Management

To provision and manage physical machines, vRealize Automation communicates directly with each system's management interface to run actions such as OS installation, rebooting, and reprovisioning.

By directly provisioning an operating system on a physical system using the hardware's management interface, machine requesters and administrators can standardize, customize, use, track, manage and decommission physical machines in the same manner as virtual and cloud machines.

You can provision a virtual machine on a single virtualization compute resource and you can provision cloud machines within a single cloud service account. One physical machine represents one hardware system. But you provision, use, and manage virtual, cloud, and physical machines in much the same way.

Physical Endpoints

A physical endpoint represents one physical machine or a pool of multiple physical machines. To make a physical machine available for provisioning, you must create an endpoint to represent it.

Information about each known physical machine, such as its installed memory and CPU count, is collected regularly through its management interface. Physical machines do not belong to fabric groups. A fabric administrator can manage any known physical machine and reserve it for any business group.

Until a physical machine is provisioned, it is considered to be unprovisioned, even if it already has an operating system. After it is provisioned with an operating system, or imported with its existing operating system intact, a physical machine is under the same management and control as a virtual or cloud machine.

vRealize Automation communicates with physical machines through the following types of physical endpoints, which represent the management interfaces through which it communicates.

- Cisco UCS Manager
- Dell iDRAC
- HP iLO

iDRAC and iLO endpoints represent single standalone machines. Cisco UCS Manager endpoints represent pools of multiple machines.

Physical Reservations

A physical reservation is a set of physical machines reserved for and available to a particular business group for provisioning.

Any physical machine or blade represented by a physical endpoint is available to any fabric administrator to include in a physical reservation, but each machine or blade can belong to only one reservation. Unprovisioned physical machines or blades must be added to a physical reservation before they can be provisioned or imported, and cannot be removed from a reservation until they are decommissioned and become unprovisioned. Each physical reservation is for one business group only but a business group can have any number of physical reservations containing any number of physical machines or blades.

A reservation can also define policies, priorities, and quotas that determine machine placement.

Configure Hardware Details

A fabric administrator can modify the data center, row, and rack details of a managed or reserved physical machine.

Prerequisites

Log in to the vRealize Automation console as a **fabric administrator**.

Procedure

- 1 Navigate to a managed or reserved physical machine.

Machine Type	Location
Managed	Select Infrastructure > Machines > Managed Machines
Reserved	Select Infrastructure > Machines > Reserved Machines

- 2 Locate the physical machine to be configured.
- 3 Select **Edit** from the drop-down menu.
- 4 Click the **Hardware** tab.
- 5 Type values in the **Data center**, **Row**, and **Rack** text boxes, as required.
- 6 Click **OK**.

Assign a Cost Profile to a Physical Machine

A fabric administrator can assign a cost profile to a managed or reserved physical machine.

Prerequisites

- Log in to the vRealize Automation console as a **fabric administrator**.
- Verify that you have a reserved or managed physical machine in vRealize Automation. The managed physical machine must be powered off.

Procedure

- 1 Navigate to a managed or reserved physical machine.

Machine Type	Navigation
Managed	Infrastructure > Machines > Managed Machines
Reserved	Infrastructure > Machines > Reserved Machines

- 2 Locate the physical machine to be assigned the cost profile.
- 3 Click **Edit** in the drop-down menu.
A managed physical machine must have an Off status for **Edit** to appear in the drop-down menu.
- 4 Click the **Hardware** tab.
- 5 (Optional) Click **New cost profile** to create a cost profile.
The link opens the Cost Profiles page.
- 6 Select a cost profile from the **Cost profile** drop-down menu.
The memory and CPU costs of the machine appear.
- 7 Click **OK**.

What to do next

You must navigate back to the Managed Machines or Reserved Machines page to finish assigning the cost profile.

Provision a Reserved Physical Machine

You provision a reserved physical machine by using a physical blueprint. The reservation for the machine determines the business group, so only blueprints from that group appear.

When you use the Provision option, provisioning proceeds even if the CPU count or memory of the selected machine does not match the specifications in the selected blueprint.

The Provision option does not appear for an unprovisioned Cisco USC physical machine with an associated service profile, which indicates it has an existing operating system. To provision such a machine in vRealize Automation, import then reprovision the machine with the same blueprint used for the import.

Caution When you use the Provision option to provision a physical machine with an existing operating system, the operating system and all associated data are deleted.

None of these changes affects the machine itself, but change only the record of the machine, and in some cases, the virtualization platform's record of a virtual machine, in vRealize Automation. The correct property value is restored and the record corrected with the next data collection.

Prerequisites

- Log in to the vRealize Automation console as a **business group manager**.
- Verify that a fabric group exists that does not have compute resources or a physical endpoint for the physical machine.
- Verify that a business group exists.
- Verify that a physical reservation exists and that it contains a physical machine.
- Create a physical blueprint. The **Properties** tab in the blueprint must include the Image.ISO.Location and Image.ISO.Name custom properties to identify the image to be deployed on the physical machine during provisioning.

For more information about how to prepare for provisioning a physical machine, see *IaaS Configuration for Physical Machines*.

Procedure

- 1 Select **Infrastructure > Machines > Reserved Machines**.
- 2 Locate the machine to provision.
- 3 Select **Provision** from the drop-down menu.
- 4 Select the blueprint to use when provisioning the machine.
Only blueprints in the associated business group appear.
- 5 Click the **Request Information** tab.
- 6 Type values in the **Description**, **Owner**, and **Reason for request** text boxes, as required.
Your user name appears in the **Owner** text box.

7 (Optional) Add custom properties.

If the physical blueprint does not include the Image.ISO.Location and Image.ISO.Name custom properties to identify the image being deployed on the physical machine, you can enter them here.

- a Click the **Properties** tab.
- b Click **New Property**.
- c Type a custom property name in the **Name** text box.
- d Type the value of the custom property in the **Value** text box.
- e Click the **Save** icon (✔).
- f Repeat [Step 7a](#) through [Step 7e](#) to add more custom properties.

8 Click **OK**.

Import a Physical Machine

A fabric administrator with business group manager privileges can import a reserved physical machine while retaining its current operating system. The fabric administrator then becomes the machine's owner.

The Import option brings a reserved machine under vRealize Automation management while retaining its current operating system. The Import option is not available for an unprovisioned Cisco UCS physical machine with no associated service profile.

If a mismatch exists between the imported machine and the blueprint you select, for example a different amount of memory or number of CPUs, the vRealize Automation record of the machine differs from its actual specifications until the machine is decommissioned.

Prerequisites

- Log in to the vRealize Automation console as a **fabric administrator** and as a **business group manager**.
- Create a machine prefix.
- An IaaS administrator created a fabric group with no compute resources selected, and an endpoint for the physical machine to be imported.
- A tenant administrator created a business group.
- Create a physical reservation and add a physical machine to it.
- Create a physical blueprint.

For more information about how to prepare for importing a physical machine, see *IaaS Configuration for Physical Machines*.

Procedure

- 1 Select **Infrastructure > Machines > Reserved Machines**.
- 2 Locate the reserved machine to import and select **Import** from its drop-down menu.

- 3 Select the blueprint to use when importing the machine.
Only blueprints in the associated business group are displayed.
- 4 Type the name for the imported machine in the **Machine name** text box.
- 5 (Optional) Type a comment in the **Reason for request** text box.
- 6 Click **OK**.

The machine is imported with you as owner and a status of Off.

Connect a Physical Machine to an Endpoint

A fabric administrator can connect to the management interface of a reserved or managed physical machine.

When you connect a physical machine to an endpoint and log into the management interface, you can perform remote operations on the machine.

Prerequisites

- Log in to the vRealize Automation console as a **fabric administrator**.
- Verify that you have a reserved or managed physical machine in vRealize Automation.

Procedure

- 1 Select **Infrastructure > Machines > Managed Machines**.
- 2 Locate the physical machine to connect to the endpoint.
- 3 Click **Connect to Endpoint** in the drop-down menu.
The login page for the endpoint's management interface opens in a new browser window.
- 4 Log in to the management interface with the credentials for the endpoint.

Join a Hypervisor to a Cluster

A fabric administrator and business group manager can join a physical machine provisioned as a hypervisor to an existing compute resource cluster in vCenter Server.

Prerequisites

- Log in to the vRealize Automation console as a **fabric administrator** and as a **business group manager**.
- A system administrator installed a vSphere agent as described in *Installation and Configuration*. The agent must manage the vCenter Server instance where you plan to join the hypervisor to an existing cluster.
- An administrator created an ESXi or ESX reference machine for deployment on the physical machine being provisioned. See *IaaS Configuration for Physical Machines*.

- An IaaS administrator created a fabric group, a vSphere endpoint for the targeted vCenter Server instance, and a physical endpoint for the physical machine.
- A tenant administrator created a business group.
- Create a physical reservation and add the physical machine to it.
- A tenant administrator or business group manager created a physical blueprint for a hypervisor physical machine. The **Properties** tab in the blueprint must include the Image.ISO.Location and Image.ISO.Name custom properties to identify the image to be deployed on the physical machine during provisioning.
- Provision the physical machine as a hypervisor with the blueprint.
- Connect the hypervisor provisioned physical machine to its endpoint. See [Connect a Physical Machine to an Endpoint](#).
- After logging on to the management interface of the machine, locate and record the IP address of the machine for use in this procedure.

For more information about setting up and provisioning a physical machine, see *IaaS Configuration for Physical Machines*.

Procedure

- 1 Select **Infrastructure > Machines > Managed Machines**.
- 2 Locate the hypervisor provisioned physical machine.
- 3 Select **Join to Cluster** in the drop-down menu.
- 4 Select an endpoint in the **Endpoint** drop-down menu.
This is the vSphere endpoint for the vCenter Server instance where the cluster exists.
- 5 Select the cluster from the **Cluster** drop-down menu.
This menu contains all clusters discovered in the vCenter Server instance by the most recent data collection from the selected endpoint.
- 6 Type the user name for the ESXi or ESX instance deployed on the hypervisor provisioned machine in the **Host username** text box.
The user account must allow vRealize Automation to add the machine to the vCenter Server instance.
- 7 Type the password for the ESXi or ESX instance deployed on the hypervisor provisioned machine in the **Host password** text box.
- 8 Type the IP address of the hypervisor provisioned physical machine in the **Host IP address** text box.
This is the IP address you found with the management interface when you connected the hypervisor provisioned physical machine to its endpoint.
- 9 If your site uses host profiles in ESX, select the **Apply cluster host profile** check box.

- 10 (Optional) Select the **Leave compute resource in maintenance mode** check box to add the host to the cluster in maintenance mode without activating it.
- 11 Click **OK**.

The hypervisor appears as a host attached to the targeted cluster in the vCenter Server instance.

Managing Multi-Machine Services

8

The machine owner or fabric administrator can view and manage multi-machine services and their component machines.

After the multi-machine service is provisioned, the machine owner, or fabric administrator, can perform the following machine actions:

- Add components
- Edit provisioned machines
- Change lease information
- Power off, reset, restart, and shut down
- View details such as status, cost, type, expiration date, and business group name

Reprovisioning is not available at the multi-machine service level. You can reprovision individual component machines.

This chapter includes the following topics:

- [Add Component Machines to a Multi-Machine Service](#)
- [Edit Custom Properties](#)
- [Determining Multi-Machine Service Status](#)
- [Power Options for Multi-Machine Services](#)

Add Component Machines to a Multi-Machine Service

You can add component machines to the multi-machine service in the maximum number of allowed machines.

Prerequisites

Log in to the vRealize Automation console as a **fabric administrator**.

You can also log in as an entitled user who owns a multi-machine service.

Procedure

1 Select **Items > Machines**.

A list of provisioned machines appears, including machine information such as status and platform type.

2 Select **Add Component** from the **Actions** drop-down menu of a multi-machine item.

- Selection options differ from those that are available when you request a new machine.
- Components that are at their maximum capacity are disabled in the selection menu.
- Components that are not at their maximum capacity are selectable but you can only add machines up to the maximum specified capacity.
- The property tab is not available to group managers.

3 Review the information in the summary table and click **OK**.

Edit Custom Properties

A machine owner or fabric administrator can add, change, or delete custom properties for a provisioned machine.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

You can also log in as a machine owner.

Procedure

1 Select **Items > Machines**.

A list of provisioned machines appears, including machine information such as status and platform type.

2 In the machine name row, click the down arrow in the Actions column.

- For a multi-machine service, click **View Details** to view the details of the multi-machine service.
- For a multi-machine service, click **View Components** to display the service's component machines.

Alternatively, click the machine name to display its Item Details page.

The **Actions** menu is also available from the machine's Item Details page. The **Actions** menu for component machines is only available from the component machine's Item Details page.

3 Select **Edit** from the **Actions** drop-down menu.

4 Click the **Properties** tab.

- 5 (Optional) Add a new property.
 - a Click the **New Property** icon ()
 - b Type a name for the property.
 - c (Optional) Type a value for the property.
 - d (Optional) Indicate whether the property is to be encrypted.
 - e (Optional) Indicate whether a user should be prompted for additional information.
 - f Click the **Save** icon ()
- 6 (Optional) Edit an existing property.
 - a Click the **Edit** icon () next to the property to edit.
 - b Make any necessary changes.
 - c Click the **Save** icon ()
- 7 (Optional) Delete a property.
 - a Click the **Delete** icon () next to the property to delete.
A confirmation prompt appears.
 - b Click **OK** to remove the property.
- 8 When you are finished, click **OK**.

Determining Multi-Machine Service Status

A multi-machine service has a status of on or off, and is considered healthy if at least the minimum number of machines for each component type are powered on.

The status of the multi-machine service is based on the power state of its component machines.

When the number of machines that are powered on for a component type is lower than the minimum, the multi-machine service is considered unhealthy and its state is set to off.

Multi-machine service requests are reported as successful even if one or more of the component machine requests fail. You can find details about the full or partial success of a multi-machine service request on the **Requests** and **Infrastructure** tabs.

View Machine Status

A machine owner or fabric administrator can determine if a machine is powered on or off.

Procedure

- 1 Log in to the vRealize Automation console as a **machine owner** or **fabric administrator**.

2 Select **Items** > **Machines**.

A list of provisioned machines appears, including machine information such as status and platform type.

Power Options for Multi-Machine Services

The multi-machine service menu provides several options for managing the power status of a multi-machine service and all of its component machines.

Table 8-1. Power Options for Multi-Machine Services

Menu Option	Description
Power On	Power on all component machines in the startup order specified on the multi-machine blueprint.
Power Off	Power off all component machines without shutting down the guest operating systems in the shutdown order specified on the multi-machine blueprint.
Power Cycle	Power off all component machines in shutdown order, then power on all machines in the startup order.
Reboot	Shut down all component machines, including guest operating systems, in shutdown order, then power on all machines in the startup order.
Shut Down	Shut down the guest operating system and power off all component machines in the shutdown order specified in the multi-machine blueprint.

If a multi-machine service has multiple machines of the same component type, all machines of that type are powered on before machines of the next component type in the startup order and shutdown order.

Managing vApp and vApp Component Machines

9

A machine owner can perform tasks on a provisioned vApp machine.

A fabric administrator or business group owner can change the owner of a component machine. This updates the owner for all component machines in the vApp.

Leases are controlled at the parent level, which affects the component machines. Lease operations such as change, extend, and expire are not available for individual component machines.

For more information about managing machines, see *Tenant Administration*.

This chapter includes the following topics:

- [Determining vApp Status](#)
- [Connect Remotely to a Virtual Machine](#)

Determining vApp Status

A machine owner or fabric administrator can determine if a machine is powered on or off.

A vApp has a status of on or off, and is considered healthy if its components are powered on. When one or more component machines are powered off, the vApp is considered unhealthy and its status is set to off. The vApp status is updated based on the power state of its component machines.

The vApp machine list displays the name, status, platform type, and description of each vApp. It also displays their expiration and destruction dates. Additional columns can be displayed.

Connect Remotely to a Virtual Machine

A machine owner, tenant administrator, or business group manager can connect remotely to a virtual machine from the vRealize Automation console.

Prerequisites

- Log in to the vRealize Automation console as a **machine owner**, **tenant administrator**, or **business group manager**.
- Verify that the provisioned vApp machine and its vApp component machines are powered on.

Procedure

- 1 Select **Items > Application Deployment**.

- 2 Click **Actions** in the machine name row or select the machine and click **Actions** on its machine page.
- 3 Select the remote connection method.
 - Select **Connect Using RDP** to connect by using RDP.
 - Select **Connect to remote console** to connect by using VMware Remote Console.Respond to any prompts.
- 4 Click **Connect** and log in to the machine as directed.
- 5 When finished, log out and close the browser window.

Configuring Remote Consoles for vSphere with Untrusted SSL Certificates

10

If your vRealize Automation deployment uses untrusted certificates, before you can use remote consoles with VMRC, you must configure your client browser to trust the certificate. The steps to do this vary by browser.

If vRealize Automation is configured with a trusted SSL certificate for your environment, then VMRC does not require additional configuration on client browsers. When a vRealize Appliance certificate is replaced and is a trusted certificate, there is no need to update certificate information for the Web browser client.

If you want to replace the certificate, see the topic on replacing a vRealize Appliance certificate in the *System Administration* guide for vRealize Automation.

Remote connections using VMRC for machines provisioned on vSphere are secured by vRealize Appliance certificates through a proxy console. VMRC requires WebSockets support in the browser and browsers must trust the vRealize Appliance certificate. The certificate can be obtained by going to the root-level virtual appliance at an address of the form `https://vra-va.eng.mycompany.com/`.

For information about support requirements for browsers and vSphere, see the VMware vRealize Support Matrix.

This chapter includes the following topics:

- [Configure Firefox to Trust a Certificate for vRealize Automation](#)
- [Configure Internet Explorer to Trust a Certificate for vRealize Automation](#)
- [Configure Chrome to Trust a Certificate for vRealize Appliance](#)

Configure Firefox to Trust a Certificate for vRealize Automation

Untrusted vRealize Appliance certificates must be manually imported to client browsers to support VMware Remote Console on clients provisioned on vSphere.

For information about supported versions of Firefox, see the *VMware vRealize Support Matrix* on the VMware Web site.

Note If vRealize Automation is configured with a trusted SSL certificate for your environment, then VMRC does not require additional configuration on client browsers.

Procedure

- 1 In a Firefox browser, log in to the vRealize Appliance.
A message appears saying that the certificate is not trusted.
- 2 Choose the option to display the current connection information, Click **View Certificate** to display the current SSL certificate and click **Detail** in the Certificate Viewer. . .
- 3 Click **More Information** and click the **Security** tab on the Page Info page..
- 4 Select a certificate from the Certificate Hierarchy pane.

Option	Action
Certificate Authority issued certificates	Select the top-level vRealize Automation certificate.
Self-signed certificates	Select the vRealize Automation certificate.

- 5 Click **Export**.
- 6 Configure the certificate information in the Save Certificate To File dialog box.
 - a Enter a certificate name in the **Save As** text box. The certificate name must end in .crt, .cert, or .cer.
 - b Select a location in which to save the file.
 - c Select **X.509 Certificate (PEM)** as the format.
- 7 Click **Save**.
- 8 Click the **Authorities** tab in the Certificate Management dialog box.

Option	Action
Windows	Select Preference > Advanced > Certificates from the Firefox menu.
iOS	Select Preference > Advanced > Certificates from the Firefox menu and click View Certificates .

- 9 Click the **Authorities** tab and click **Import**.
- 10 Select the certificate file you saved earlier and click **Open** in the dialog box.
- 11 Edit the trust settings.

Option	Action
self-signed certificates	Select This certificate can identify websites .
Certificates issued by a Certificate Authority	Select Trust this CA to identify websites .

- 12 Click **OK** and restart the browser.

You can connect to the remote console without certificate errors.

Configure Internet Explorer to Trust a Certificate for vRealize Automation

Untrusted vRealize Appliance certificates must be manually imported to client browsers to support VMware Remote Console on clients provisioned on vSphere.

Note If vRealize Automation is configured with a trusted SSL certificate for your environment, then VMRC does not require additional configuration on client browsers.

The steps in this procedure apply for self-signed certificates and certificates issued by a Certificate Authority.

For information about supported versions of Internet Explorer, see the *VMware vRealize Support Matrix* on the VMware Web site.

Procedure

- 1 In an Internet Explorer browser, log in to the vRealize Appliance.
- 2 Click **View Certificate** on the certificate error message that appears in the browser address bar.
- 3 Click the **General** tab of the Certificate Information window..
- 4 Verify that the information about the certificate is correct and click **Install Certificate**.
- 5 Select **Place all certificates in the following store** in the Certificate Store dialog box.
- 6 Click **Browse** to locate the certificate store.
- 7 Select **Trusted Root Certification Authority** and click **OK**.
- 8 Click **Next** on the Certificate Store dialog box.
- 9 Click **Yes** in the Security Warning dialog box to install the certificate.
- 10 Restart the browser.

You can connect to the remote console without certificate errors.

Configure Chrome to Trust a Certificate for vRealize Appliance

Untrusted vRealize Appliance certificates must be manually imported to client browsers to support VMware Remote Console on clients provisioned on vSphere.

For information about supported versions of Chrome, see the *VMware vRealize Support Matrix* on the VMware Web site.

Note If vRealize Automation is configured with a trusted SSL certificate for your environment, then VMRC does not require additional configuration on client browsers.

On Windows, Chrome and Internet Explorer use the same certificate store. This means that certificates that are trusted by Internet Explorer are also trusted by Chrome. To establish trusted certificates for Chrome, import them through Internet Explorer. For information about this procedure, see [Configure Internet Explorer to Trust a Certificate for vRealize Automation](#).

When you complete the procedure, restart Chrome.

To permanently trust a certificate on the Macintosh operating system, download the certificate file and install the certificate as trusted in your certificate management tool.

Procedure

- 1 In a Chrome browser, log in to the vRealize Appliance.
- 2 Click the icon in the address bar.
- 3 Click the certificate information link.
- 4 Save the certificate by dragging the certificate icon to the desktop.
- 5 Start the Keychain Access application.
- 6 Select **File > Import Items**.
- 7 On the Keychain Access screen, select the certificate file you saved earlier.
Set the value of **Destination Key** to **System**.
- 8 Click **Open** to import the certificate.
- 9 Restart the browser.

Install the VMRC Plug-in for vApps on vCloud Director

11

You can enable remote console capabilities through VMware Remote Console (VMRC) when you provision machines with vApps for vCloud Director.

The first time you use this feature, you must install the VMRC plug-in on client browsers.

Procedure

- 1 Select **Connect to Remote Console** from the Actions menu on the **Items** tab of the vRealize Automation console.

If the VMRC plug-in is not present or is disabled, you are prompted to download it.

- 2 Enable pop-ups if prompted.
- 3 When you see the following message, click the link for your operating system to download the installation program.

```
VMRC Plug-in is not installed or is disabled by your browser.  
To install, download and run the installation program for your  
operating system: Windows, Linux 32-bit, or Linux 64-bit.
```

- 4 Close all browsers.
- 5 Select the installation program and right-click.
- 6 On Windows, select **Run as Administrator** and install the plug-in.
- 7 Reopen a browser.
- 8 Log in to vRealize Automation.
- 9 Select **Allow user to activate remote console** at the prompt.

VMRC functionality is available when you select **Connect to Remote Console** from the Actions Menu.

Running Actions for Provisioned Resources

12

Items that you provisioned using vRealize Automation might have actions that you can run on those items. The configured actions that are available for a provisioned items appear in the **Actions** menu for the selected resource on the **Items** tab.

The actions that are available for a provisioned resource depend on the type of resource, how the action was configured and made available for provisioned items, and the operational state of the item.

If the item was provisioned using an IaaS machine blueprint, the list of available actions is determined by what was selected on the **Actions** tab when the blueprint was created, and then by what is applicable based on machine type or state.

If the item was provisioned using an Advanced Services blueprint, the resource actions must be created, published, and entitled in the same service that is used to provision the item. The list of available actions is determined by the item type and the current state of the item.

The available actions for an item that was provisioned as an IaaS machine might also include Advanced Services resource actions if the actions are mapped to the item.

This chapter includes the following topics:

- [Action Menu Options for Virtual, Physical, and Cloud Machines](#)
- [Action Menu Options for Container and Component Machines](#)
- [Troubleshooting Missing Actions in the Resource Actions Menu](#)

Action Menu Options for Virtual, Physical, and Cloud Machines

You can perform actions on a provisioned machine relative to its status as a Virtual, Physical, or Cloud machine.

The options you see on the Action menu for your provisioned machine include actions that were specified on the machine's blueprint, and might include custom menu operations created by your service architects. You only see options that your tenant administrator or business group manager entitled you to use.

For information about actions, see *Foundations and Concepts*. For information about creating resource actions to provide users with custom menu operations, see *Advanced Service Design*.

Table 12-1. Action Menu Options Available on the Machine Page from the Items Tab

Connect using RDP	Connect to the selected machine using Microsoft Remote Desktop Protocol.
Connect using SSH	Connect to the selected machine using SSH. This option requires that the <code>Machine.SSH</code> custom property is included, and set to true, in the machine blueprint's build profile or Properties page.
Connect to remote console	Connect to the selected machine using VMware Remote Console.
Destroy	Destroy a machine. Machines are destroyed when their lease expires. This action is not available for physical machines.
Decommission	Decommission a physical machine. Physical machines are decommissioned when their lease expires. This action is only available for physical machines.
Change Lease	Change the machine's lease duration period.
Expire	Terminate the machine's lease.
Reconfigure (vSphere machines, SCVMM machines, and vApp component machines only)	A business group manager, support user, or machine owner can perform the following tasks: <ul style="list-style-type: none"> ■ Reconfigure CPU or memory ■ (vSphere and vApp only) Reconfigure network and storage ■ Change description ■ Add, edit, and delete properties ■ Reconfigure shutdown Business group managers and support users can change ownership of a machine.
Power On	Power on the machine. if the machine was suspended, normal operation resumes from the point at which the machine was suspended.
Power Off	Power off the machine without shutting down the guest operating system.
Power Cycle	Power off the machine, then power it back on.
Reboot	Shut down the machine, then power it back on.
Shut Down	Shut down the guest operating system and power off the machine.
Suspend	Pause the machine so that it cannot be used and does not consume any system resources other than the storage it is currently using.

Action Menu Options for Container and Component Machines

You can perform actions on a provisioned machine relative to its status as a container or a component machine.

The options you see on the Action menu for your provisioned machine include actions that were specified on the machine's blueprint, and might include custom menu operations created by your service architects. You only see options that your tenant administrator or business group manager entitled you to use.

For information about actions, see *Foundations and Concepts*. For information about creating resource actions to provide users with custom menu operations, see *Advanced Service Design*.

Performing an operation such as destroy, expire, or a power operation affects the vApp or Multi-Machine service and its component machines.

Table 12-2. Action Menu Options Available by Displaying the Machine Page on the Items Tab

Menu Option	vApp or Multi-Machine Container Machine	vApp or Multi-Machine Component Machine
Connect using RDP	Connect to the selected machine using Microsoft Remote Desktop Protocol.	Connect to the selected machine using Microsoft Remote Desktop Protocol.
Connect using SSH	Connect to the selected machine using SSH. This option requires that the Machine.SSH custom property is included, and set to true, in the machine blueprint's build profile or Properties page.	Connect to the selected machine using SSH. This option requires that the Machine.SSH custom property is included, and set to true, in the machine blueprint's build profile or Properties page.
Connect to remote console	Connect to the selected machine by using VMware Remote Console or WebMKS.	Connect to the selected machine by using VMware Remote Console. or WebMKS.
Destroy	Destroy a vApp and component machines. Machines are destroyed when their lease expires.	Not available.
Change Lease	Change lease, in vRealize Automation only. The vApp in vCloud Director always has an unlimited lease and is unaffected.	Not available.
Expire	The vApp machine and its component machines are destroyed.	Not available.

Table 12-2. Action Menu Options Available by Displaying the Machine Page on the Items Tab (Continued)

Menu Option	vApp or Multi-Machine Container Machine	vApp or Multi-Machine Component Machine
Reconfigure (vSphere machines and vApp component machines only)	A business group manager, support user, or machine owner can perform the following tasks on a vSphere machine or vApp container machine: <ul style="list-style-type: none"> ■ Change description ■ Add, edit, and delete properties Business group managers and support users can also change the owner of a machine.	A business group manager, support user, or machine owner can perform the following tasks on a vSphere machine or vApp component machine: <ul style="list-style-type: none"> ■ Change description ■ Reconfigure CPU, memory, network, and disk settings ■ Add, edit, and delete properties ■ Reconfigure shutdown Business group managers and support users can also change the owner of a machine.
Power On	Power on the vApp and all its vApp component machines in the startup order specified in the vApp template. if the machine was suspended, normal operation resumes from the point at which the machine was suspended.	Power on the machine. if the machine was suspended, normal operation resumes from the point at which the machine was suspended.
Power Off	Power off the vApp and all its vApp component machines, without shutting down the guest operating system, in the shutdown order specified in the vApp template.	Power off the machine without shutting down the guest operating system.
Power Cycle	Power off the vApp and all its vApp component machines in shutdown order, then power on the vApp and all its vApp component machines in the startup order.	Power off the machine, then power it back on.
Reboot	Shut down the vApp and all its vApp component machines in shutdown order, then power on the vApp and all its vApp component machines in the startup order.	Shut down the machine, then power it back on.
Shut Down	Shut down the guest operating system and power off the vApp and all its vApp component machines in the shutdown order specified in the vApp template.	Shut down the guest operating system and power off the machine.
Suspend	Pause the machine so that it cannot be used and does not consume any system resources other than the storage it is currently using.	Pause the machine so that it cannot be used and does not consume any system resources other than the storage it is currently using.

Troubleshooting Missing Actions in the Resource Actions Menu

As a machine or resource owner, you do not see all entitled actions for a provisioned item.

Problem

In an environment where you know that an action was entitled for your user or business group, you expect to see all actions when you select an item in your **Items** list.

Cause

The availability of actions depends on the type of provisioned resource, operational state of the resource, and how it was configured and made available. The following list provides some reasons why you do not see all configured actions.

- The action is not applicable based on the current state of the provisioned resource. For example, Power Off is available only when the machine is powered on.
- The action is not applicable to the selected item type. If the item does not support the action, it does not appear in the list. For example, the Take Snapshot action is not available for a physical machine, and the Connect by Using RDP action is not available if the selected item is a Linux machine.
- The action is applicable for the provisioned resource type, but the action is disabled in the Infrastructure blueprint. If the action is disabled, it never appears as an available action for any of the items that were provisioned using the blueprint.
- The action is not entitled for the service. Only entitled actions, either as part of an Infrastructure blueprint or as an Advanced Services resource action, can appear in the Actions menu.
- The action is created as an Advanced Services resource action but was not entitled for the service. Only entitled actions appear in the Actions menu.
- The action might be limited based on the configured target criteria for Advanced Services resource actions or resource mappings to provisioned IaaS machines.

Solution

- Verify that the action is applicable to the provisioned resource or the state of the resource.
- Verify that the action is configured and entitled for the service that provisioned the resource.