IaaS Configuration for vCloud Air and vCloud Director

vRealize Automation 6.2

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Contents

IaaS Configuration for vCloud Air and vCloud Director

IaaS Configuration for vCloud Air and vCloud Director describes how to integrate vCloud Director or vCloud Air in an existing VMware vRealize ™ Automation deployment.

This document guides you through the following processes:

- Bringing resources under vRealize Automation management

- Configuring IaaS features and policies

- Preparing for provisioning

- Creating vApp (vCloud) blueprints

- Creating vApp Component (vCloud) blueprints

- Creating vCloud endpoints

All of the IaaS configuration steps that you must complete before machine provisioning are included in this document. For information about how to manage provisioned machines, see *Tenant Administration*.

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 IaaS Service administrators, tenant administrators and business group managers, and fabric administrators who want to integrate vCloud Director or vCloud Air vApps into their vRealize Automation deployment. This content is written for experienced Windows or Linux system administrators who are familiar with virtualization technology and the basic concepts described in *Foundations and Concepts*.

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 *IaaS Configuration for vCloud Air and vCloud Director* is updated with each release of the product or when necessary.

This table provides the update history of the *IaaS Configuration for vCloud Air and vCloud Director* .

Revision	Description
001641-04	■ Updated Create a vCloud Endpoint for vCloud Air OnDemand or Subscription Gen 2 step 4.
001641-03	■ Updated topic title Create a vCloud Endpoint for vCloud Air OnDemand or Subscription Gen 2 and included link to relevant KB article.
	■ Updated topic title Create a vCloud Endpoint for a vCloud Air Subscription Gen 1 and included link to relevant KB article.
001641-02	■ Updated Preparing for vApp Provisioning.
	■ Split Create a vCloud Endpoint for vCloud Director into additional topics Create a vCloud Endpoint for a vCloud Air Subscription Gen 1 and Create a vCloud Endpoint for vCloud Air OnDemand or Subscription Gen 2 to better delineate vCloud Director, vCloud Air, and vCloud Air On Demand options.
001641-01	■ Added Custom Properties for Networking.
	■ Updated Custom Properties for vApp Blueprints.
	■ Updated Specify vApp Component Build Information to state that step 5 and 6 are optional.
	■ Revised the *As you create vApp blueprints...* paragraph in Creating a vApp Component (vCloud) Blueprint and Creating a vApp (vCloud) Blueprint.
	■ Removed an entity comparison table from Creating vApp and vApp Component Blueprints.
	■ Added the `VirtualMachine.Disk`*N*`.IsFixed` property to Custom Properties for vApp Blueprints.
001641-00	Initial 6.2 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.

Provisioning with vCloud Air or vCloud Director vApps

Users can provision vApps and their component machines in a virtual datacenter, based on an existing vApp template, using vCloud blueprints.

Before you can integrate vCloud Air or vCloud Director with vRealize Automation, install and configure your vCloud Air or vCloud Director instance, including setting up organizations, cloud resources, and vApp templates.

If you intend to use a vCloud Air endpoint, set up an account with the vCloud Air support organization and gather account information such as address and organizational unit for use when defining the vCloud endpoint.

The vApp request owner should be a member of the domain associated with the Organization vDC on which the vApp is provisioned. If the request owner is not a member of the domain, an owner value is not assigned. The owner must exist in the organization.

For vCloud Director, the organization administrator or system administrator role is required for endpoint credentials. For running data collection on the endpoint, these access rights are also required. For consumers in a business group, if the user account does not exist, vCloud Director will perform a lookup in the associated LDAP or Active Directory and create the account if the user exists in the identity store.

For vCloud Air, the infrastructure administrator or account administrator role is required for endpoint credentials. For consumers in a business group, if the user account does not exist, vCloud Air will create it. For related information about vCloud Air user management, see vCloud Air documentation.

vCloud Director user roles in an organization do not need to correspond with roles in the vRealize Automation business group. For example, unless the vRealize Automation business group manager or tenant administrator needs to create templates in vCloud Director, they do not need vApp author permissions to create or edit vApp (vCloud) blueprints in vRealize Automation.

You must complete the following administrative tasks before vApp provisioning:

- Configure cloud resources, including virtual datacenters and networks, to provision vApps.

- Create vApp templates for vApps to provision.

For information about configuring vCloud Air or vCloud Director, see vCloud Air or vCloud Director documentation.

About vApps

A vApp is a container object composed of one or more component machines that can be provisioned and managed as a single entity.

vApps combine software-defined services when used with vRealize Automation to provide a single self-service portal for multiple provisioning platforms.

When you request a vApp from vRealize Automation, it provisions the vApp and its component machines in your organization's virtual data center. vRealize Automation manages the vApp as a parent and its virtual machines as children components in a similar manner to how it manages multi-machine services.

This relationship allows you to manage the vCloud Air or vCloud Director vApp by managing the vRealize Automation vApp. You can also perform operations directly on the individual component machines. For example, you can power off the vApp in vCloud Director by using machine actions in vRealize Automation. If you destroy a vApp machine and its component machines in vRealize Automation, you destroy the corresponding vApp and its component machines in vCloud Air or vCloud Director.

Tenant administrator or business group managers create vApp and vApp component blueprints. These blueprints specify the source vApp template from the vCloud Director endpoint or vCloud Air endpoint and define additional provisioning parameters to apply to the template. For example, additional storage volumes and capacity can be applied to a component blueprint which will be configured when the vApp virtual machine is provisioned in vCloud Director or vCloud Air.

In vRealize Automation, a vApp is a container for its component machines and is not a machine itself. The vApp is not counted as a machine in reports or licensing. For reporting and license purposes, vApp component machines are treated like any machine that vRealize Automation manages.

For more information about vApps, see *Foundations and Concepts*.

vApp and vApp Component vCloud Concepts

vCloud Air and vCloud Director integration features are available when you use vRealize Automation for vApps and vApp components.

vApp

A compound object composed of one or more machines that vRealize Automation can provision and manage as a single entity. A vCloud Director or vCloud Air vApp is provisioned by a vApp (vCloud) blueprint, which is composed of vApp Component (vCloud) blueprints.

vApp (vCloud) Blueprint

A blueprint that defines a vCloud Director or vCloud Air vApp.

vApp Component (vCloud) Blueprint

A machine blueprint that is part of a vCloud Director or vCloud Air vApp. A vApp Component (vCloud) blueprint is referenced by a vApp (vCloud) blueprint.

vApp Component Machine

A machine that is managed in vRealize Automation as part of a vCloud Director or vCloud Air vApp. A vApp can include multiple component machines provisioned using the same vApp component blueprint or different vApp component blueprints.

Mapping Between vCloud Air or vCloud Director and vRealize Automation

Administrators can provision several machines with a single request using either vApps or multiple-machine services.

Table 1. Mapping Between Entities in vCloud Air or vCloud Director and vRealize Automation

vCloud Air or vCloud Director Entity	vRealize Automation Entity	Notes
vCloud Air or vCloud Director server	endpoint	A vRealize Automation vCloud endpoint can be mapped to a vCloud Air or vCloud Director instance or the combination of a vCloud Director server and an organization, which provides access only to the relevant organization's virtual datacenters.
organization	business group	User roles and membership in vCloud Director organizations and vRealize Automation business groups are maintained independently in each tool.
organization virtual datacenter (organization vDC)	compute resource	vRealize Automation enforces a one-to-one mapping between a compute resource and a virtual datacenter with one or many reservations.
vApp template	vApp blueprint	A vApp blueprint must specify a vApp template from which to clone a vApp and one or more virtual machines in vCloud Director. A blueprint in vRealize Automation that is specific to a business group is analogous to a template that is part of an organization's catalog. Global blueprints are analogous to templates in a public catalog.
vApp	vApp machine	vApps are containers for component machines. vRealize Automation extends the vApp to add additional life cycle management features.
virtual machine	vApp component machine	A component machine is managed through its vApp and as an individual machine in vRealize Automation.

For more information, see *Foundations and Concepts*.

Comparing Multi-Machine Services and vApps

You can use vRealize Automation multi-machine services or vApps to group component machines.

Table 2. Comparison of Multi-Machine Service and vApp (vCloud) Features

vRealize Automation Multi-Machine Service	vApp (vCloud)
Create a multi-machine blueprint that references individual machine blueprints in vRealize Automation.	Use existing vApp templates created in vCloud Director or vCloud Air.
Provision machines of any type (virtual, physical, or cloud) as part of a service.	Provision virtual machines from vCloud Director or vCloud Air.
Use vRealize Automation to manage component machines of a multi-machine service.	Use vCloud Director or vCloud Air to manage vApp machines.
Application-specific networks can be defined in a multi-machine blueprint for vCloud Networking and Security and NSX.	Application-specific networks are defined in a vApp.
Component machines can be added or removed after initial provisioning.	Component machines cannot be added or removed after initial provisioning.
vRealize Automation defines startup and shutdown order.	The vApp template defines startup and shutdown order.

For both, access to the component portal for Microsoft Remote Desktop Protocol, Virtual Network Computing, and SSH depends on the guest and console and the endpoint.

Integration Considerations for vCloud Air and vCloud Director

Several considerations exist for vCloud Air and vCloud Director vApps in vRealize Automation.

As you prepare to provision vApps in vRealize Automation, be mindful of the following considerations.

- If you import a vApp with multiple component virtual machines into vRealize Automation but the import process fails for one or more component machines, you cannot import any of the virtual machines that failed the import process.

- When you configure vRealize Automation for vCloud Director, if you have users who are configured in the vCloud Director identity store as LDAP users, configure these users for LDAP in the vRealize Automation identity store so that the same set of users are available in both products.

- The following actions are not supported in vRealize Automation:

  - Creating vApp templates

  - Defining vApp (vCloud) and vApp Component (vCloud) blueprints without specifying a vApp template

  - Moving vApps between virtual datacenters

  - Moving virtual machines between reservations

  - Adding or removing components from a vApp

  - Creating or using vApp snapshots

  - Using a static IP address

Configuring IaaS for vApps

Administrators and managers bring resources under vRealize Automation management, allocate resources for users, and prepare for machine provisioning.

Configuring IaaS for vCloud Air or vCloud Director Checklist

IaaS administrators, fabric administrators, tenant administrators, and business group managers perform required and optional configurations to fully implement and customize vRealize Automation.

The Configuring IaaS Checklist provides a high-level overview of the sequence of steps required to have a fully functioning IaaS instance.

Table 3. Configuring IaaS checklist

Task	Required Role
❑ Store credentials and create endpoints to bring resources under vRealize Automation management. See Bringing Resources Under vRealize Automation Management.	IaaS administrator
❑ Configure the machine prefixes used to create names for machines provisioned through vRealize Automation. See Configure Machine Prefixes.	Fabric administrator
❑ Create at least one business group of users who need to request machines. See Create a Business Group for vCloud Provisioning.	Tenant administrator
❑ Create at least one reservation to allocate resources to a business group. See Create a vCloud Reservation.	Fabric administrator
❑ Configure optional policies and settings. See Optional Configurations.	Fabric administrator
❑ Prepare the vCloud Director resources required to create and provision vRealize Automation blueprints. For example, create the vCloud Director vApp template and customization objects. See Preparing for vApp Provisioning.	Outside of vRealize Automation
❑ Create and publish machine blueprints. See Preparing for vApp Provisioning.	▪ Tenant administrator ▪ Business group manager

For related information about creating and configuring approvals, see *Tenant Administration* in vRealize Automation documentation.

Before users can request machines, a tenant administrator must configure the service catalog. See *Tenant Administration*.

Using Custom Properties in vApp Machine Provisioning, Blueprints, and Build Profiles

Custom properties are name-value pairs used to specify attributes of a machine or to override default specifications.

Different custom properties are used for different provisioning methods, types of machines, and machine options. For example, you can use custom properties to perform the following tasks:

- Configure a machine's system specifications, such as adding multiple hard disk drives

- Configure a machine's guest operating system, for example by including specified users in selected local groups

Specify the characteristics of the machines to be provisioned by adding custom properties or build profiles to blueprints. You can make custom properties available to blueprints and business groups by placing them in build profiles.

Any property specified in a blueprint overrides the same property specified in the incorporated build profile. This enables a blueprint to use most of the properties in a profile while differing from the profile in some limited way. For example, a blueprint that incorporates a standard developer workstation profile might override the US English settings in the profile with UK English settings. On the other hand, if no appropriate profile is available, you can specify the needed properties in the blueprint itself. This arrangement ensures that the number and complexity of blueprints remain manageable.

When a new machine is requested, vRealize Automation has not yet allocated a reservation and the compute resource and endpoint are unknown. Only custom properties from a build profile, blueprint, or business group are reconciled and presented when the machine is initially requested.

Order of Precedence for Custom Properties That Use vApps

When the same property exists in more than one source, a specific order is followed when applying properties to the machine.

Custom properties in a vApp blueprint override runtime properties at the vApp level. This action allows the vApp blueprint to apply a consistent behavior across all its component machines, while allowing a user to override the vApp properties for each component.

You can add custom properties to the following elements and apply them to provisioned machines.

- A reservation, to apply them to all machines provisioned from that reservation

- A business group, to apply them to all machines provisioned by business group members

- A global or local blueprint, to apply them to all machines provisioned from the blueprint

- Build profiles, which can be incorporated into any global or local blueprint, to apply them to all machines provisioned from the blueprint

- A machine request, if you are a fabric administrator or business group, to apply them to that machine

- The applicable approval policy, if any exist and if advanced approval support is enabled, to require approvers to provide the values to be applied to the machine being approved

The full order of precedence for custom properties is that any property value specified in a source later in the list overrides values for the same property specified in sources earlier in the list.

1 Build profile, specified on a vApp component blueprint

2 vApp component blueprint

3   Build profile, specified on a vApp blueprint

4   vApp blueprint

5   Business group

6   Compute resources

7   Reservations

8   Endpoint

9   Runtime specified on a vApp

10   Runtime specified on a component machine

Any runtime property takes higher precedence and overrides a property from any source. A custom property is marked as runtime if any of the following conditions exist.

■   The property is marked as Prompt User, which specifies that the user must supply a value for it when requesting a machine. This condition requires that the machine requestor customize individual characteristics of each machine, or gives them the option of doing so when a default value is provided for the required property.

■   A business group manager is requesting a machine and the property appears in the custom properties list on the **Properties** tab of the Confirm Machine Request page.

You generally specify the characteristics of the machine to be provisioned by adding properties to blueprints and build profiles. Use custom properties in reservations and business groups carefully because they can be applied to many machines. Their use is typically limited to purposes related to their sources, such as resource management, line of business accounting, and so on.

Each blueprint can optionally incorporate one build profile and thereby inherit the custom properties in that profile. Build profiles are especially useful for applying common sets of properties for specific purposes to a wide range of blueprints. For example, your site might want to add a second disk to, customize Microsoft Remote Desktop Protocol behavior for, and enable Active Directory cleanup for a wide variety of machines. If a build profile with the necessary properties is created, it can be incorporated into all of your blueprints, local or global.

When creating and managing build profiles, a fabric administrator can load a number of predefined property sets to add several related properties all at once, instead of one by one.

Bringing Resources Under vRealize Automation Management

To allow vRealize Automation to manage your infrastructure, IaaS administrators create endpoints, store administrator-level user credentials for those endpoints, and add compute resources to a fabric group. The procedure for creating endpoints differs depending on your environment.

Store User Credentials for vCloud Endpoints

An IaaS administrator stores administrator-level credentials so that vRealize Automation can communicate with your vCloud endpoints. Because the same credentials can be used for multiple endpoints, credentials are managed separately from endpoints and are associated when endpoints are created or edited.

Credentials that are used to manage endpoints require administrator privileges. The credentials must also have rights to connect by using VMware Remote Console. These rights enable users to connect to vApps by using VMRC.

You typically provide organization administrator credentials for vCloud Air or vCloud Director. You can also use vCloud Air or vCloud Director system administrator credentials. If you work regularly with multiple organizations, consider using vCloud Air or vCloud Director system administrator credentials. Do not attempt to manage both types in the same instance of vRealize Automation.

Prerequisites

Log in to the vRealize Automation console as an **IaaS administrator**.

Procedure

1   Select **Infrastructure > Endpoints > Credentials**.

2   Click **New Credentials**.

3   Enter a name and, optionally, a description.

4   Enter a user name in the **User Name** text box.

5   Type the password in the **Password** text boxes.

6   Click the **Save** icon ( ).

What to do next

Now that your credentials are stored, you can create an endpoint. See Create a vCloud Endpoint for vCloud Director.

Creating a vCloud Endpoint

An IaaS administrator is responsible for creating the endpoints that allow vRealize Automation to communicate with your infrastructure. A vCloud endpoint is required to connect to a vCloud Director or vCloud Air server.

A vCloud Director or vCloud Air instance is supported by vSphere resources that provide the CPU, memory, and storage for its virtual machines. When vRealize Automation performs data collection on the endpoint, it collects information about the underlying vSphere resources. To avoid conflicts in resource accounting, if you create an endpoint to the vCloud Director instance, do not create an endpoint for its underlying vSphere resources.

For the same vCloud Director instance, you should not set up both organization-specific endpoints and single endpoints that access all organizations.

vRealize Automation uses a proxy agent to manage vSphere resources.

Create a vCloud Endpoint for vCloud Air OnDemand or Subscription Gen 2

An IaaS administrator can create a vCloud endpoint for vCloud Air OnDemand or Subscription Gen 2.

For information about vCloud Air Management Console, see vCloud Air documentation.

To determine which vCloud Air endpoint procedure is right for you, either Gen 1 or Gen 2, see *Identifying the generation of VMware vCloud Air Virtual Private Cloud being used (2120464)* at http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2120464.

Prerequisites

- Log in to the vRealize Automation console as an **IaaS administrator**.

- Verify that you have account administrator access to vCloud Air OnDemand.

- Store User Credentials for vCloud Endpoints.

Procedure

1   Select **Infrastructure > Endpoints > Endpoints**.

2   Select **New Endpoint > Cloud > vApp (vCloud)**.

3   Enter a name and, optionally, a description.

4   Type the URL for the endpoint in the **Address** text box.

The URL specifies the actual OnDemand API URL for your environment.

For vCloud Air OnDemand, the address must be specified in the following format:

```
https://region-name.vchs.mycompany.com/api/compute
```

a   Log in to vCloud Air OnDemand using administrator credentials.

b   Select the Organization vDC.

c   Click the vCloud Director API URL link to display a link such as `https://region-name.vchs.mycompany.com:443/api/compute`.

d   Enter the first part of the resultant link text, for this example `https://us-california-1-3.vchs.mycompany.com:443/api/compute`, in the **Address** text box.

5   Select the **Credentials** for the endpoint.

The credentials must be that of thevCloud Air OnDemand account administrator.

6   Enter the organization name for your vCD region in the **Organization** text box.

The organization name is a unique ID, used to identify your specific environment in your OnDemand region. It is a randomly generated key, similar to a license key format. The organization value is displayed as the end portion of the URL when you log in to vCloud Air OnDemand.

a   Log in to vCloud Air OnDemand using administrator credentials.

b   Select the Organization vDC.

c   Click the vCloud Director API URL link to display a link such as `https://region-name.vchs.mycompany.com:443/api/compute/ui?orgname=organization-name_for_vCD_in_region&serviceInstanceId=instance-id…..` .

d   Enter the last part of the resultant link text, for this example **organization-name_for_vCD_in_region**, in the **Organization** text box.

If you set up multiple organizations, either as separate endpoints or as a single endpoint, create reservation policies for each organization. This configuration ensures that vApps are provisioned to the appropriate virtual datacenters. Do this if vApps must be put on a specific resource. For example, if the resources must be controlled this strictly or if the templates to be used are only for a specific organization. However, if the template is public and the requester knows that they want a Pay As You Go or Allocated resource, you can use one reservation policy to group both of those goals.

7   (Optional) Click the **Use proxy server** check mark box to configure additional security and force connections to vCloud Air to pass through a proxy server.

a   Enter the host name of your proxy server in the **Hostname** text box.

b   Enter the port number to use for connecting to the proxy server in the **Port** text box.

c   (Optional) Click the **Browse** icon next to the **Credentials** text box.

Select or create credentials that represent the user name and password for the proxy server, if required by the proxy configuration.

8   (Optional) Add any custom properties.

9   Click **OK**.

10   Right-click the new endpoint name on the Endpoints page.

11   Select **Data Collection > Start**.

12   Allow data collection to finish.

What to do next

Create a Fabric Group.

Create a vCloud Endpoint for a vCloud Air Subscription Gen 1

An IaaS administrator can create a vCloud endpoint for a vCloud Air subscription Gen 1.

You can specify a vRealize Automation endpoint connection to a vCloud Air subscription and enable additional security by using the **Use proxy server** checkbox.

For information about vCloud Air Management Console, see vCloud Air documentation.

To determine which vCloud Air endpoint procedure is right for you, either Gen 1 or Gen 2, see *Identifying the generation of VMware vCloud Air Virtual Private Cloud being used (2120464)* at http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2120464.

Prerequisites

- Log in to the vRealize Automation console as an **IaaS administrator**.

- Verify that you have account administrator access to vCloud Air subscription services.

- Store User Credentials for vCloud Endpoints.

Procedure

1 Select **Infrastructure > Endpoints > Endpoints**.

2 Select **New Endpoint > Cloud > vApp (vCloud)**.

3 Enter a name and, optionally, a description.

4 Type the URL for the endpoint in the **Address** text box.

   The URL specifies the fully qualified host name or IP address of the vCloud Director server. The address URL must be specified using either a FQDN format or an IP address, including the p# and v# of the subscription, based on your vCloud Air account, in the following format:

   ```
   https://p#v#-vcd-vchs.mycompany.com
   ```

   For example:

   The vCloud Air Management URL is not the URL of the vCloud Air Management Console. Rather, it is the URL of the vCloud Director server that is used to manage a specific virtual data center (vDC).

   Open the vCloud Air Management Console to get the Management URL for the Organization vDC.

   a   Log in to the vCloud Air Management Console using administrator credentials.

   b   Select the Organization vDC.

   c   Click the vCloud Director API URL link to display a link such as `https://vcd-vchs.mycompany.com:443/cloud/org/vCloudAutomation/`.

   d   Enter the first part of the resultant link text, for this example **`https://p2v5-vcd-vchs.mycompany.com:443`**, in the **Address** text box.

5   Select the **Credentials** for the endpoint.

   ■   To connect to the vCloud Director server and specify the organization for which the user has the administrator role, use organization administrator credentials. With these credentials, the endpoint can only access the associated organization virtual datacenters. You can add endpoints for each additional organization in the vCloud Director instance to integrate with vRealize Automation.

   ■   To allow access to all Organization vDCs in the vCloud Director instance, use system administrator credentials for a vCloud Director and leave the **Organization** text box empty.

6   If you are configured as an organization administrator, you can enter a vCloud Director organization name in the **Organization** text box.

   The **Organization** name matches your vCloud Director Organization name, which may also be displayed as your Virtual Data Center (vDC) name. If you are using a Virtual Private Cloud, then this is a unique identifier in the M123456789-12345 format. In a Dedicated Cloud, this is the given name of the target Virtual Data Center.

   You cannot leave the **Organization** text box empty. For vCloud Air, you must create a separate management endpoint for each Organization vDC.

   To find your organization name, log in to vCloud Air, open your Virtual Data Center details, and click the vCloud Director API URL link to display the needed information.

   a   Log in to vCloud Air using administrator credentials.

   b   Open your the Organization vDC details.

   c   Click the vCloud Director API URL link to display a link, such as `https://p#v#vcd-vchs.mycompany.com:443/cloud/org/vCloudAutomation/`.

   d   Enter the last part of the resultant link text, for this example `vCloudAutomation`, in the **Organization** text box.

   If you set up multiple organizations, either as separate endpoints or as a single endpoint, create reservation policies for each organization. This configuration ensures that vApps are provisioned to the appropriate virtual datacenters. Do this if vApps must be put on a specific resource. For example, if the resources must be controlled this strictly or if the templates to be used are only for a specific organization. However, if the template is public and the requester knows that they want a Pay As You Go or Allocated resource, you can use one reservation policy to group both of those goals.

7   (Optional) Click the **Use proxy server** check mark box to configure additional security and force connections to vCloud Air to pass through a proxy server.

   a   Enter the host name of your proxy server in the **Hostname** text box.

   b   Enter the port number to use for connecting to the proxy server in the **Port** text box.

   c   (Optional) Click the **Browse** icon next to the **Credentials** text box.

      Select or create credentials that represent the user name and password for the proxy server, if required by the proxy configuration.

8 (Optional) Add any custom properties.

9 Click **OK**.

10 Right-click the new endpoint name on the Endpoints page.

11 Select **Data Collection > Start**.

12 Allow data collection to finish.

What to do next

Create a Fabric Group.

Create a vCloud Endpoint for vCloud Director

An IaaS administrator can create a vCloud endpoint to connect to a vCloud Director server.

For information about Organization vDCs, see VMware vCloud Director® documentation.

See also Creating a vCloud Endpoint.

Prerequisites

- Log in to the vRealize Automation console as an **IaaS administrator**.

- Store User Credentials for vCloud Endpoints.

Procedure

1 Select **Infrastructure > Endpoints > Endpoints**.

2 Select **New Endpoint > Cloud > vApp (vCloud)**.

3 Enter a name and, optionally, a description.

4 Type the URL for the endpoint in the **Address** text box.

The URL specifies the fully qualified host name or IP address of the vCloud Director server. The URL must be specified using either a FQDN format or an IP address.

For example: `https://mycompany.com`

5 Select the **Credentials** for the endpoint.

- To connect to the vCloud Director server and specify the organization for which the user has the administrator role, use organization administrator credentials. With these credentials, the endpoint can only access the associated organization virtual datacenters. You can add endpoints for each additional organization in the vCloud Director instance to integrate with vRealize Automation.

- To allow access to all Organization vDCs in the vCloud Director instance, use system administrator credentials for a vCloud Director and leave the **Organization** text box empty.

6   If you are configured as an organization administrator, you can enter a vCloud Director organization name in the **Organization** text box.

You can specify a vCloud Director endpoint using the **Organization** text box or, if you have implemented vCloud Director in a private cloud, you can leave the **Organization** text block empty to allow the application to discover all the available Organization vDCs.

If you set up multiple organizations, either as separate endpoints or as a single endpoint, create reservation policies for each organization. This configuration ensures that vApps are provisioned to the appropriate virtual datacenters. Do this if vApps must be put on a specific resource. For example, if the resources must be controlled this strictly or if the templates to be used are only for a specific organization. However, if the template is public and the requester knows that they want a Pay As You Go or Allocated resource, you can use one reservation policy to group both of those goals.

7   (Optional) Click the **Use proxy server** check mark box to configure additional security and force connections to pass through a proxy server.

a   Enter the host name of your proxy server in the **Hostname** text box.

b   Enter the port number to use for connecting to the proxy server in the **Port** text box.

c   (Optional) Click the **Browse** icon next to the **Credentials** text box.

Select or create credentials that represent the user name and password for the proxy server, if required by the proxy configuration.

8   (Optional) Add any custom properties.

9   Click **OK**.

What to do next

Create a Fabric Group.

Preparing an Endpoint CSV File for Import

Instead of adding endpoints one at a time by using the vRealize Automation console, you can import a list of endpoints of various types by uploading a CSV file.

The CSV file must contain a header row with the expected fields. Fields are case sensitive and must be in a specific order. You can upload multiple endpoints of varying types with the same CSV file. For vCloud Director, system administrator accounts are imported, rather than organization administrator endpoints.

Table 4. CSV File Fields and Their Order for Importing Endpoints

Field	Description
InterfaceType	(Required) You can upload multiple types of endpoints in a single file. ■ AmazonEC2 ■ Openstack ■ vCloud ■ vCO ■ CiscoUCS ■ DellIdrac ■ HPIlo ■ NetAppOnTap ■ SCVMM ■ KVM ■ vSphere
Address	(Required for all interface types except Amazon AWS) URL for the endpoint. For information about the required format for your platform type, see the appropriate procedure to create an endpoint for your platform.
Credentials	(Required) Name you gave the user credentials when you stored them in vRealize Automation.
Name	(Required) Provide a name for the endpoint. For RedHat Openstack, the address is used as the default name.
Description	(Optional) Provide a description for the endpoint.
DataCenter	(Optional) For physical machines, you can provide the datacenter where the machine is located.
Row	(Optional) For physical machines, you can provide the row where the machine is located.
Rack	(Optional) For physical machines, you can provide the rack where the machine is located.
OpenstackProject	(Required for RedHat Openstack only) Provide the tenant name for the endpoint.

Import a List of Endpoints

Importing a CSV file of endpoints can be more efficient than adding endpoints one at a time by using the vRealize Automation console.

Prerequisites

■ Log in to the vRealize Automation console as an **IaaS administrator**.

■ Store the credentials for your endpoints.

■ Prepare an Endpoint CSV file for import.

Procedure

1   Select **Infrastructure > Endpoints > Endpoints**.

2   Click **Import Endpoints**.

3   Click **Browse**.

4   Locate the CSV file that contains your endpoints.

5 Click **Open**.

A CSV file opens that contains a list of endpoints in the following format:

```
InterfaceType,Address,Credentials,Name,Description
vCloud,https://abxpoint2vco,svc-admin,abxpoint2vco,abxpoint
```

6 Click **Import**.

You can edit and manage your endpoints through the vRealize Automation console.

Create a Fabric Group

An IaaS administrator can organize virtualization compute resources and cloud endpoints into fabric groups by type and intent. An IaaS administrator also assigns one or more fabric administrators to manage the resources in the fabric group.

You can grant the Fabric Administrator role to multiple users by either adding multiple users one at a time or by choosing an identity store group or custom group as your fabric administrator.

Prerequisites

- Log in to the vRealize Automation console as an **IaaS administrator**.

- Create at least one endpoint.

Procedure

1 Select **Infrastructure > Groups > Fabric Groups**.

2 Click **New Fabric Group**.

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

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

5 Type a user name or group name in the **Fabric administrators** text box and press Enter.

Repeat this step to add multiple users or groups to the role.

6 Click one or more **Compute resources** to include in your fabric group.

Only templates that exist on the clusters you select for your fabric group are discovered during data collection and available for cloning on reservations you create for business groups.

7 Click **OK**.

Fabric administrators can now configure machine prefixes.

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.

Configure Machine Prefixes

Fabric administrators create machine prefixes that are used to create names for machines provisioned through vRealize Automation. Tenant administrators and business group managers select these machine prefixes and assign them to provisioned machines through blueprints and business group defaults.

A prefix is a base name to be followed by a counter of a specified number of digits. When the digits are all used, vRealize Automation rolls back to the first number.

Machine prefixes must conform to the following limitations:

- Contain only the case-insensitive ASCII letters a through z, the digits 0 through 9, and the hyphen (-).

- Not begin with a hyphen.

- No other symbols, punctuation characters, or blank spaces can be used.

- No longer than 15 characters, including the digits, to conform to the Windows limit of 15 characters in host names.

    Longer host names are truncated when a machine is provisioned, and updated the next time data collection is run. However, for WIM provisioning names are not truncated and provisioning fails when the specified name is longer than 15 characters.

- vRealize Automation does not support multiple virtual machines of the same name in a single instance. If you choose a naming convention that causes an overlap in machine names, vRealize Automation does not provision a machine with the redundant name. If possible, vRealize Automation skips the name that is already in use and generates a new machine name using the specified machine prefix. If a unique name cannot be generated, provisioning fails.

Prerequisites

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

Procedure

1   Select **Infrastructure > Blueprints > Machine Prefixes**.

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

3   Enter the machine prefix in the **Machine Prefix** text box.

4   Enter the number of counter digits in the **Number of Digits** text box.

5   Enter the counter start number in the **Next Number** text box.

6   Click the **Save** icon ( ).

Tenant administrators can create business groups so that users can access vRealize Automation to request machines.

Create a Business Group for vCloud Provisioning

Tenant administrators create business groups to associate a set of services and resources to a set of users, often corresponding to an organizational business unit.

Users must belong to a business group to request machines.

Prerequisites

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

- Request a machine prefix from a fabric administrator. See Configure Machine Prefixes.

Procedure

1 Select **Infrastructure > Groups > Business Groups**.

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

3 (Optional) Select an existing business group from the **Copy from existing group** drop-down box.

 Data from the group you chose appears.

4 Enter a name and, optionally, a description.

5 Select a **Default machine prefix**.

6 (Optional) Type a default **Active directory container** for machines provisioned in this group and press Enter.

 The Active Directory container is used only for WIM provisioning. Other provisioning methods require additional configuration to join provisioned machines to an AD container.

7 Type a user name or group name in the **Group manager role** search box and press Enter.

 Repeat this step to add more than one user or group to the role. You do not have to specify users at this time. You can create empty business groups to populate later.

8 Type one or more user names or group names in the **Send manager emails to** text box and press Enter.

 Multiple entries must be separated with commas. For example,
 `JoeAdmin@mycompany.com,WeiMgr@mycompany.com`.

9   Add users to your business group.

To support vCloud Director integration, the same business group members in the vRealize Automation business group must also be members of the vCloud Director organization.

You do not have to specify users at this time. You can create empty business groups to populate later.

a   Type a user name or group name in the **Support role** search box and press Enter.

Repeat this step to add more than one user or group to the role.

b   Type a user name or group name in the **User role** search box and press Enter.

Repeat this step to add more than one user or group to the role.

10 (Optional) Add any custom properties.

11 Click **OK**.

Fabric administrators can now allocate resources to the business group by creating a reservation. This ability allows business group users to request machines.

What to do next

A fabric administrator must create a reservation. See Create a vCloud Reservation.

vCloud Reservations

A vApp (vCloud) reservation is a share of the memory, networking, and storage resources of a virtual datacenter that is allocated to a business group.

To provision vApps, a business group needs at least one vCloud reservation. Each reservation is for one business group only but a group can have multiple reservations on one compute resource or reservations on multiple compute resources.

The allocation model for a reservation depends on the allocation model in the associated virtual datacenter. Available allocation models are Allocation Pool, Pay As You Go, and Reservation Pool. For information about these allocation models, see thevCloud Director or vCloud Air documentation.

In addition to defining the share of fabric resources allocated to the business group, a reservation can define policies, priorities, and quotas that determine machine placement.

vCloud Reservation Selection

When a member of a business group requests a vApp, a vCloud reservation is selected from the group's reservations to provision the vApp.

The reservation on which a vApp is provisioned must satisfy the following criteria.

■   The reservation must be a vCloud reservation.

If the request specifies an allocation model, the virtual datacenter associated with the reservation must have the same allocation model.

■   The reservation must be enabled.

- The vCloud Director or vCloud Air organization must be enabled.

- The reservation must have capacity remaining in its machine quota or have an unlimited quota.

  The allocated machine quota includes only machines that are powered on. For example, if a reservation has a quota of 50, and 40 machines have been provisioned but only 20 of them are powered on, the reservation's quota is 40 percent allocated, not 80 percent.

- The reservation must have sufficient unallocated memory and storage resources to provision the machine.

  In a Pay As You Go reservation, resources can be unlimited.

- If the blueprint has specific network settings, the reservation must have the same networks.

  If the blueprint or reservation specifies a network profile for static IP address assignment, an IP address must be available to assign to the new machine.

- Any blueprint templates must be available on the reservation. If the reservation policy maps to more than one resources, the templates should be public.

- If the request specifies an allocation model, the allocation model in the reservation must match the allocation model in the request.

- If the blueprint specifies a reservation policy, the reservation must belong to that reservation policy.

  Reservation policies are a way to guarantee that the selected reservation satisfies any additional requirements for provisioning machines from a specific blueprint. For example, you can use reservation policies to limit provisioning to compute resources with a specific vApp template.

If no reservation is available that meets all of the selection criteria, provisioning fails.

If multiple reservations meet all of the criteria, the reservation from which to provision a requested machine is determined by the following logic.

- Reservations with higher priority are selected over reservations with lower priority.

- If multiple reservations have the same priority, the reservation with the lowest percentage of its machine quota allocated is selected.

- If multiple reservations have the same priority and quota use, machines are distributed among reservations in round-robin fashion.

If multiple storage paths are available on a reservation with sufficient capacity to provision the machine volumes, storage paths are selected according to the following logic.

- If the blueprint or request specifies a storage reservation policy, the storage path must belong to that storage reservation policy.

  If the custom property `VirtualMachine.DiskN.StorageReservationPolicyMode` is set to Not Exact, and no storage path with sufficient capacity is available in the storage reservation policy, then provisioning proceeds with a storage path outside the specified storage reservation policy. The default value of `VirtualMachine.DiskN.StorageReservationPolicyMode` is Exact.

- Storage paths with higher priority are selected over reservations with lower priority.

- If multiple storage paths have the same priority, machines are distributed among storage paths by using round-robin scheduling.

Create a vCloud Reservation

Before members of a business group can request vApp machines, fabric administrators must allocate resources to them by creating a vCloud reservation.

Each business group must have at least one reservation for its members to provision machines of that type. A vCloud reservation is required for provisioning vApps.

Prerequisites

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

- Verify that a tenant administrator created at least one business group. See Create a Business Group for vCloud Provisioning.

Procedure

1 Specify vCloud Reservation Information

A fabric administrator can create a vCloud reservation for each vCloud Director or vCloud Air organization virtual datacenter. Each reservation is configured for a specific business group to grant them access to request machines on a specified compute resource.

2 Specify vCloud Resources and Network Paths

A fabric administrator uses a vCloud reservation to configure the resources and network paths available to vApp machines that are provisioned from this reservation.

3 Configure vCloud Reservation Alerts

A fabric administrator can configure alerts to send email notifications when vCloud reservation resources are low.

What to do next

Create a vApp Component Blueprint.

Specify vCloud Reservation Information

A fabric administrator can create a vCloud reservation for each vCloud Director or vCloud Air organization virtual datacenter. Each reservation is configured for a specific business group to grant them access to request machines on a specified compute resource.

After you create a reservation, you cannot change the business group or the compute resource.

Prerequisites

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

- Verify that a tenant administrator created at least one business group. See Create a Business Group for vCloud Provisioning.

Procedure

1   Select **Infrastructure > Reservations > Reservations**.

2   Select **New Reservation > Cloud** and select the type of reservation you are creating.

    Select **Cloud > vApp (vCloud)**.

3   (Optional) Select an existing reservation from the **Copy from existing reservation** drop-down menu.

    Data from the reservation you chose appears, and you can make changes as required for your new reservation.

4   Select a compute resource on which to provision machines from the **Compute resource** drop-down menu.

    The reservation name appears in the **Name** text box.

5   Type a new name in the **Name** text box or accept the default name.

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

7   Select a tenant from the **Tenant** drop-down menu.

8   Select a business group from the **Business group** drop-down menu.

    Only users in this business group can provision machines by using this reservation.

9   (Optional) Select a reservation policy from the **Reservation policy** drop-down menu.

    This option requires additional configuration. You must create a reservation policy.

10 (Optional) Type a number in the **Machine quota** text box to set the maximum number of machines that can be provisioned on this reservation.

    Only machines that are powered on are counted towards the quota. Leave blank to make the reservation unlimited.

11 Type a number in the **Priority** text box to set the priority for the reservation.

    The priority is used when a business group has more than one reservation. A reservation with priority 1 is used for provisioning over a reservation with priority 2.

12 (Optional) Deselect the **Enable this reservation** check box if you do not want this reservation active.

13 (Optional) Add any custom properties.

Do not navigate away from this page. Your reservation is not complete.

Specify vCloud Resources and Network Paths

A fabric administrator uses a vCloud reservation to configure the resources and network paths available to vApp machines that are provisioned from this reservation.

The available resource allocation models for machines provisioned from a vCloud reservation are Allocation Pool, Pay As You Go, and Reservation Pool. For Pay As You Go, you do not need to specify storage or memory amounts but do need to specify a priority for the storage path. For details about these allocation models, see vCloud Air and vCloud Director documentation.

Prerequisites

Specify vCloud Reservation Information.

Procedure

1   Click the **Resources** tab.

2   Specify the amount of memory, in GB, to be allocated to this reservation from the Memory table.

3   Configure a storage profile in the **Storage** table.

    a   Select a storage path.

    b   Type a value in the **This Reservation Reserved** text box to specify how much storage to allocate to this reservation.

    c   Specify the priority for the storage path.

4   Click the **Network** tab.

5   Configure a network path for machines provisioned by using this reservation.

    a   Select a network path for machines provisioned on this reservation from the Network table.

    b   (Optional) Select a network profile from the **Network Profile** drop-down menu.

       This option requires additional configuration to configure network profiles.

You can select more than one network path on a reservation, but only one network is selected when provisioning a machine.

Do not navigate away from this page. Your reservation is not complete.

Configure vCloud Reservation Alerts

A fabric administrator can configure alerts to send email notifications when vCloud reservation resources are low.

Alerts are an optional step in the reservation configuration. If you do not want to set alerts, click **OK** to save your reservation.

If configured, alerts are generated daily, rather than when the specified thresholds are reached.

Alerts are not available for Pay As You Go reservations that were created with no specified limits.

Important   Notifications are only sent if emails are configured and notifications are enabled. See *Tenant Administration*.

Prerequisites

Specify vCloud Resources and Network Paths.

Procedure

1   Click the **Alerts** tab.

2   Set capacity alerts to On.

3 Use the sliders to set thresholds for resource allocation.

4 Type one or more user email addresses or group names to receive alert notifications in the **Recipients** text box.

Press Enter to separate multiple entries.

5 Select **Send alerts to group manager** to include group managers in the email alerts.

6 Choose a reminder frequency (days).

7 Click **OK**.

Tenant administrators and business group managers can now create vApp (vCloud) and vApp Component (vCloud) blueprints. Fabric administrators can now configure optional policies such as storage reservation policies.

What to do next

Create a vApp Component Blueprint.

Optional Configurations

You can configure optional policies and settings to give you more control over the resource usage of provisioned machines.

For related information about creating and configuring approval policies, see *Tenant Administration* in vRealize Automation documentation.

Build Profiles and Property Sets

vRealize Automation contains property sets that fabric administrators can use when they create build profiles.

Property sets are groups of related properties that are commonly used together in build profiles and machine blueprints. Instead of adding custom properties to a build profile or a machine blueprint individually, you can add an entire set to a build profile and provide the values.

Many commonly used property sets are included in vRealize Automation.

For example, the `WimImagingProperties` property set contains custom properties commonly used for WIM-based provisioning:

- `Image.ISO.Location`

- `Image.ISO.Name`

- `Image.Network.Password`

- `Image.Network.User`

- `Image.WIM.Index`

- `Image.WIM.Name`

■ `Image.WIM.Path`

As another example, the vApp property set contains the following custom properties that can be used for vApp provisioning:

■ `VirtualMachine.NetworkN.Name`

■ `VCloud.Template.MakeIdenticalCopy`

■ `VMware.SCSI.Type`

■ `Sysprep.Identification.DomainAdmin`

■ `Sysprep.Identification.DomainAdminPassword`

■ `Sysprep.Identification.JoinDomain`

Fabric administrators can create their own property sets and add them to vRealize Automation.

Create a Property Set

Fabric administrators can create their own groupings of related custom properties and add them to vRealize Automation for use in build profiles.

Property sets are available to fabric administrators of all tenants.

Procedure

1 Create a Property Set XML File

   A fabric administrator defines property sets in an XML file and uploads them to vRealize Automation.

2 Add a Property Set to vRealize Automation

   After you create a property set XML file, a fabric administrator can upload the property set to vRealize Automation.

Create a Property Set XML File

A fabric administrator defines property sets in an XML file and uploads them to vRealize Automation.

If you edit a property set that is already in use in a build profile, vRealize Automation does not automatically update the build profile. A fabric administrator must reload the property set to the build profile.

Procedure

1 Create an XML file.

2 Insert the following version and encoding values into the schema declaration.
   version="1.0" encoding="UTF-16".

3 Insert a <Doc> element.

   ```
   <Doc>
   </Doc>
   ```

4 Insert a <CustomProperties> element in the <Doc> element.

```
<Doc>
  <CustomProperties>
  </CustomProperties>
</Doc>
```

5 Define the attributes of the custom property to include in the property set.

```
<Doc>
  <CustomProperties>
    <Property Name="property_name" DefaultValue="property_value" Encrypted="true_or_false"
PromptUser="true_or_false"/>
  </CustomProperties>
</Doc>
```

If you do not include the DefaultValue attribute, no default value is stored. If you do not include the Encrypted or PromptUser attributes, they default to false.

6 Repeat Step 5 step for each property to include in the property set.

7 Save and close the file.

A fabric administrator can now upload your property set XML file to vRealize Automation.

Add a Property Set to vRealize Automation

After you create a property set XML file, a fabric administrator can upload the property set to vRealize Automation.

Prerequisites

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

- Create a property set XML file.

Procedure

1 Select **Infrastructure > Blueprints > Build Profiles**.

2 Click **Manage Property Sets**.

3 Click **Browse** to select the **Property set XML file name**.

4 Enter a name and, optionally, a description.

5 Click **OK**.

You can now include your property set in build profiles.

Create a Build Profile

Fabric administrators can organize commonly used custom properties into build profiles so that tenant administrators and business group managers can include these custom property sets in blueprints.

Build profiles are available to tenant administrators and business group managers of all tenants. You can create your build profile by adding custom properties individually, by loading property sets that contain multiple custom properties, or by using a combination of the two methods.

Prerequisites

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

Procedure

1 Select **Infrastructure > Blueprints > Build Profiles**.

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

3 Enter a name and, optionally, a description.

4 (Optional) Add custom properties individually to your build profile.

    a   Click **New Property**.

    b   Enter the custom property in the **Name** text box.

    c   Enter the value of the custom property in the **Value** text box.

    d   (Optional) Select the **Encrypted** check box to encrypt the custom property in the database.

    e   (Optional) Select the **Prompt user** check box to require the user to provide a value when they request a machine.

         If you choose to prompt users for a value, any value you provide for the custom property is presented to them as the default. If you do not provide a default, users cannot continue with the machine request until they provide a value for the custom property.

    f   Click the **Save** icon ( ).

5 (Optional) Select a property set to load into your build profile.

    a   Select a property set from the **Add from property set** drop-down menu.

    b   Click **Load**.

6 (Optional) Click the **Edit** icon ( ) to configure a custom property loaded from a property set.

    a   Enter the value of the custom property in the **Value** text box.

    b   Select the **Encrypted** check box to encrypt the custom property in the database.

    c   Select the **Prompt user** check box to require the user to provide a value when they request a machine.

         If you choose to prompt users for a value, any value you provide for the custom property is presented to them as the default. If you do not provide a default, users cannot continue with the machine request until they provide a value for the custom property.

    d   Click the **Save** icon ( ).

7 Click **OK**.

Tenant administrators and business group managers can now select your build profile and include it in their blueprints.

Configuring Reservation Policies

When a user requests a machine, it can be provisioned on any reservation of the appropriate type that has sufficient capacity for the machine. You can apply a reservation policy to a blueprint to restrict the machines provisioned from that blueprint to a subset of available reservations.

Reservation policies provide an optional and helpful means of controlling how reservation requests are processed. A reservation policy is often used to collect resources into groups for different service levels, or to make a specific type of resource easily available for a particular purpose. The following scenarios provide a few examples of possible uses for reservation policies:

- To ensure that machines provisioned from a virtual blueprint are placed on reservations with storage devices that support NetApp FlexClone

- To restrict provisioning of cloud machines to a specific region containing a machine image that is required for a specific blueprint

- To restrict provisioning of Cisco UCS physical machines to reservations on endpoints on which the selected service profile template and boot policy are available

- As an additional means of using a Pay As You Go allocation model for vApps

You can add multiple reservations to a reservation policy, but a reservation can belong to only one policy. You can assign a single reservation policy to more than one blueprint. A blueprint can have only one reservation policy.

A reservation policy can include reservations of different types, but only reservations that match the blueprint type are considered when selecting a reservation for a particular request. For more information about how reservations are selected for provisioning a machine, see *IaaS Configuration for Cloud Platforms*, *IaaS Configuration for Physical Machines*, or *IaaS Configuration for Virtual Platforms*.

Configure a Reservation Policy

Fabric administrators create reservation policies to collect resources into groups for different service levels, or to make a specific type of resource easily available for a particular purpose. After you create the reservation policy, you then must populate it with reservations before tenant administrators and business group managers can use the policy effectively in a blueprint.

Prerequisites

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

- Create at least one reservation.

Procedure

1 Create a Reservation Policy

Fabric administrators use reservation policies to group similar reservations together. Create the reservation policy tag first, then add the policy to reservations to allow a tenant administrator or business group manager to use the reservation policy in a blueprint.

2 Assign a Reservation Policy to a Reservation

When fabric administrators create a reservation, the option to assign that reservation to a reservation policy appears. To assign an existing reservation to a reservation policy, you edit the reservation.

Create a Reservation Policy

Fabric administrators use reservation policies to group similar reservations together. Create the reservation policy tag first, then add the policy to reservations to allow a tenant administrator or business group manager to use the reservation policy in a blueprint.

Prerequisites

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

- Create at least one reservation.

Procedure

1 Select **Infrastructure > Reservations > Reservation Policies**.

2 Click **New Reservation Policy**.

3 Enter a name and, optionally, a description.

4 Click the **Save** icon ( ).

Assign a Reservation Policy to a Reservation

When fabric administrators create a reservation, the option to assign that reservation to a reservation policy appears. To assign an existing reservation to a reservation policy, you edit the reservation.

Prerequisites

Create a Reservation Policy.

Procedure

1 Select **Infrastructure > Reservations > Reservations**.

2 Point to a reservation and click **Edit**.

3 Select your reservation policy from the **Reservation Policy** drop-down menu.

4 Click **OK**.

Tenant administrators and business group managers can now use your reservation policy in blueprints. See Add a Reservation Policy to a Blueprint.

.

Storage Reservation Policies for vApps

Fabric administrators create storage reservation policies to allow tenant administrators and business group managers to assign the volumes of a virtual machine to different storage profiles.

When you assign the volumes of a virtual machine to a different storage profile, tenant administrators and business group managers can control and use storage space more effectively. For example, they might deploy the operating system volume to a slower, less expensive storage profile and the database volume to a faster storage profile.

Tenant administrators and business group managers can assign a single storage profile or a storage reservation policy that represents multiple storage profiles to a volume. When they assign a single storage profile to a volume, vRealize Automation uses that storage profile at provisioning time. When they assign a storage reservation policy to a volume, vRealize Automation uses one of its storage profiles at provisioning time.

A storage reservation policy is a tag applied to one or more storage profiles by a fabric administrator to group storage profiles that have similar characteristics, such as speed or price. A storage profile can be assigned to only one storage reservation policy at a time, but a storage reservation policy can have many different storage profiles. A fabric administrator creates a storage reservation policy and assigns it to one or more storage profiles. A tenant administrator or business group manager assigns the storage reservation policy to a volume in a virtual blueprint. When a user requests a virtual machine that uses the blueprint, vRealize Automation uses the storage reservation policy specified in the blueprint to select a storage profile for the machine's volume.

Configure a Storage Reservation Policy

Fabric administrators create vRealize Automation storage reservation policies to group datastores that have similar characteristics, such as speed or price. After you create the storage reservation policy, you then need to populate it with datastores before tenant administrators and business group managers can use the policy in a blueprint.

vCloud Director 5.5 does not allow a virtual machine to have disks in different storage tiers. For example, if you change the storage reservation policy for one volume in a vApp, vRealize Automation changes the storage reservation policy for all the volumes in that vApp. You cannot provision a virtual machine with volumes on different types of storage.

Prerequisites

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

Procedure

1 Create a Storage Reservation Policy

When you create a storage reservation policy, you are creating an empty container that you use to group datastores that have similar characteristics, such as speed or price.

2 Assign a Storage Reservation Policy to a Datastore

After the storage reservation policy is created, populate it with datastores. A datastore can belong to only one storage reservation policy. Add multiple datastores to create a group of datastores for use with a blueprint.

Create a Storage Reservation Policy

When you create a storage reservation policy, you are creating an empty container that you use to group datastores that have similar characteristics, such as speed or price.

Prerequisites

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

Procedure

1 Select **Infrastructure > Reservations > Reservation Policies**.

2 Click **New Storage Reservation Policy**.

3 Enter a name and, optionally, a description.

4 Click the **Save** icon (✓).

Assign a Storage Reservation Policy to a Datastore

After the storage reservation policy is created, populate it with datastores. A datastore can belong to only one storage reservation policy. Add multiple datastores to create a group of datastores for use with a blueprint.

Prerequisites

Create a storage reservation policy.

Procedure

1 Select **Infrastructure > Compute Resources > Compute Resources**.

2 Point to a compute resource and click **Edit**.

3 Click the **Configuration** tab.

4 Locate the datastore to add to your storage reservation policy in the Storage table.

5 Click the **Edit** icon (✎).

6 Select your storage reservation policy from the **Storage Reservation Policy** column drop-down menu.

7 Click the **Save** icon (✓).

8 Click **OK**.

9 (Optional) Assign additional datastores to your storage reservation policy.

Tenant administrators and business group managers can now use your storage reservation policy in blueprints.

Cost Profiles

Fabric administrators can associate compute resources and physical machines with cost profiles to enable calculation of a machine's cost. The cost is displayed to machine owners, requesters, approvers, and administrators at various points in the request and provisioning life cycle.

A cost profile includes the following values for daily cost:

- Cost per GB of memory capacity specified in the virtual blueprint or installed in the physical machine

- Cost per CPU specified in the virtual blueprint or installed in the physical machine

- Cost per GB of storage capacity as specified in the virtual blueprint (not used for physical machines, because storage attached to physical machines is not discovered or tracked)

For finer definition of storage cost for virtual machines, you can also associate each known datastore on a compute resource with a storage cost profile. A storage cost profile contains only a daily cost per GB of storage. If you assign a storage cost profile to a datastore, this storage cost overrides the storage cost in the cost profile assigned to the compute resource.

For virtual machines, the machine cost is calculated from the cost profile and storage cost profile on the compute resource, the resources it consumes, and the daily blueprint cost. You can use the blueprint cost to represent a markup for using the machine in addition to the resources that the machine consumes, for example to account for the cost of specific software deployed with that blueprint.

For physical machines, the machine cost is calculated from the cost profile on the machine, the CPU and memory on the machine, and the daily blueprint cost. You can use the blueprint cost to represent such factors as storage cost or additional costs for using the machine.

You cannot apply cost profiles to machines provisioned on Amazon Web Services or Red Hat OpenStack. For machines provisioned on these cloud platforms, the only cost factor is the daily cost in the blueprint from which it was provisioned. The cost for vCloud Director vApps includes any cost profile and storage cost profile on the virtual datacenter and the blueprint cost.

Cost Calculation for vCloud Director

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

The daily cost of a vApp is based on the cost of the memory, CPU, and storage resources that its component machines consume, and the cost specified in the vApp blueprint and vApp component blueprints.

Table 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 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
Storage	Allocated storage (GB) multiplied by the storage cost per gigabyte specified in one of the following places: ■ the cost profile associated with the virtual datacenter on which a component machine is provisioned ■ The storage cost profile on the datastore on which a component machine is provisioned 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.
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.

How Cost Is Displayed

The vApp cost appears at various stages of the request and provisioning life cycle and is updated according to the current information in the request or on the provisioned item.

Daily cost and lease cost appear at all stages of the lifecycle. After the vApp is provisioned, the cost-to-date also appears.

Table 6. Cost Displayed During the Request and Provisioning Life Cycle

Life Cycle Stage	Value Displayed for Cost
Viewing the catalog item details before a request	Projected costs based on the cost profile, the values for machine resources specified in the component blueprints, lease duration specified in the vApp blueprint, and the daily costs specified in the component blueprints and vApp blueprint. The values of some of the cost drivers can be unknown before a machine is requested: ■ The component blueprints can specify a range for machine resources. The requester can specify any value in the blueprint range. ■ More than one reservation can be available for provisioning the vApp. If these reservations have different virtual datacenters, different cost profiles can apply. ■ More than one datastore can be available for provisioning the vApp, either on the same reservation or on different reservations, that have different storage cost profiles. ■ If more than one reservation or datastore is available, the daily cost apperas as a range with the lower bound being the minimum resource use multiplied by the lowest resource cost for memory, CPU, and storage, and the upper bound being the maximum resource use multiplied by the highest cost. If the vApp blueprint specifies a range for the lease duration or the daily cost is a range, the lease cost appears as a range with the lower bound being the minimum lease duration multiplied by the minimum cost, and the upper bound being the maximum lease duration multiplied by the maximum cost.
Completing the request form	Projected costs based on the cost profile, the values for machine resources and lease duration specified in the request form and the blueprint cost. The daily cost can be a range if more than one reservation is available for provisioning the component machines and these reservations have different virtual datacenters that vary in cost. Alternatively, more than one datastore can be available for provisioning the component machines, either on the same reservation or on different reservations, that vary in cost. By default the request form shows the request for the vApp, but the requester can select a specific vApp component to edit the properties of the component. The values for daily and lease cost are updated as the user edits the relevant values in the request form.
Viewing details of a submitted request or approving a request	Projected costs based on the requested machine resources, lease duration, and blueprint cost. The daily cost can be a range if more than one reservation is available for provisioning the component machines and these reservations have different virtual datacenters that vary in cost. Alternatively, more than one datastore can be available for provisioning the component machines, either on the same reservation or on different reservations, that vary in cost. Depending on the approval policy, an approver can edit values for machine resources or lease duration that affect the cost, but the cost information is not updated in the request.
Viewing the details of a provisioned machine	Actual daily cost, lease cost, and cost-to-date based on the resource use of the provisioned component machines, lease duration, blueprint costs, and number of days since the vApp was provisioned. You can view the cost details for both the vApp as a whole and its component machines.

Configure a Cost Profile

Fabric administrators can create cost profiles and associate them with compute resources to enable calculation of a machine's cost.

Prerequisites

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

Procedure

1   Create a Cost Profile

   Fabric administrators create cost profiles to define daily costs for memory, storage, and CPU for compute resources.

2   Assign a Cost Profile to a Compute Resource

   Fabric administrators can assign a cost profile to a compute resource to apply those costs to all machines provisioned on that compute resource.

Create a Cost Profile

Fabric administrators create cost profiles to define daily costs for memory, storage, and CPU for compute resources.

The values for daily cost specified in a cost profile can be up to four decimal places, although the values are rounded to two decimal places when displayed to end users in the catalog.

Prerequisites

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

Procedure

1   Select **Infrastructure > Compute Resources > Cost Profiles**.

2   Click **New Cost Profile**.

3   Enter a name and, optionally, a description.

4   Specify the costs for the machine resources on a compute resource.

   a   Type a value for the daily cost per gigabyte of memory in the **Memory Cost (per GB)** text box.

   b   Type a value for the daily cost per gigabyte of storage in the **Storage Cost (per GB)** text box.

   c   Type a value for the daily cost per CPU in the **CPU Cost** text box.

   It is not necessary to specify a cost value for all the resources, only the resources that you want to include in cost calculations.

5   Click the **Save** icon (✅).

Assign a Cost Profile to a Compute Resource

Fabric administrators can assign a cost profile to a compute resource to apply those costs to all machines provisioned on that compute resource.

Prerequisites

Create a Cost Profile.

Procedure

1   Select **Infrastructure > Compute Resources > Compute Resources**.

2   Point to a compute resource and click **Edit**.

3   Click the **Configuration** tab.

4   Select a cost profile from the **Cost Profile** drop-down menu.

The costs for memory, storage, and CPU appear, and the cost for each datastore is populated with the storage cost from the cost profile, unless a storage cost profile is applied to that datastore.

5   Click **OK**.

If reservations for this compute resource exist, the costs for each datastore are also populated based on the cost profile.

Configure a Storage Cost Profile

Fabric administrators can create storage cost profiles and associate them with storage paths to provide more detailed storage cost information. Storage cost profiles override the storage cost in any cost profile assigned to the compute resource.

Prerequisites

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

Procedure

1   Create a Storage Cost Profile

Fabric administrators create storage cost profiles to define daily costs for specific datastores.

2   Assign a Storage Cost Profile to a Datastore

Fabric administrators can assign a storage cost profile to a datastore to apply those costs to all machines provisioned on that datastore.

Create a Storage Cost Profile

Fabric administrators create storage cost profiles to define daily costs for specific datastores.

The values for daily cost specified in a storage cost profile can be up to four decimal places. The values are rounded to two decimal places when displayed to end users in the catalog.

Prerequisites

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

Procedure

1   Select **Infrastructure > Compute Resources > Cost Profiles**.

2   Click **New Storage Cost Profile**.

3   Enter a name and, optionally, a description.

4   Type a value for the daily cost per gigabyte of storage in the **Storage Cost (per GB)** text box.

5   Click the **Save** icon (✓).

Assign a Storage Cost Profile to a Datastore

Fabric administrators can assign a storage cost profile to a datastore to apply those costs to all machines provisioned on that datastore.

Prerequisites

Create a Storage Cost Profile.

Procedure

1   Select **Infrastructure > Compute Resources > Compute Resources**.

2   Point to a compute resource and click **Edit**.

3   Click the **Configuration** tab.

4   Locate the datastore to which to assign the storage cost profile in the Storage table.

5   Click the **Edit** icon (✎).

6   Select a storage cost profile from the **Storage Cost Profile** drop-down menu.

     The cost for the datastore is populated with the value from the storage cost profile.

7   Click the **Save** icon (✓).

8   Click **OK**.

If there are any reservations that include this datastore, its cost is also updated based on the cost in the storage cost profile.

Preparing for vApp Provisioning

You must perform some configuration outside of vRealize Automation to prepare for machine provisioning. To provision and manage machines in vCloud Director by using vRealize Automation, you prepare the organization virtual data center with templates and customization objects.

To provision vCloud Director vApps using vRealize Automation cloning, the organization requires a vApp template consisting of one or more virtual machine resources. vRealize Automation vApp blueprints and vApp component blueprints reference these resources. They also provide the ability to further configure machines during the provisioning and management process.

Templates that are to be shared across organizations must be public.

Note   When you create a vApp blueprint by cloning from a vCloud Director template, that template's unique identifier (UID) becomes associated with the blueprint. When the blueprint is published to the vRealize Automation catalog and used in the provisioning and data collection processes, the associated vCloud Director template is recognized. If you delete the vApp template in vCloud Director, subsequent vRealize Automation provisioning and data collection fails because the associated template no longer exists. Instead of deleting and recreating a template, for example to upload an updated version, you can replace the template using the vCloud Director template replacement process. Using vCloud Director to replace the template, rather than deleting and recreating the template, keeps the template's unique ID intact and allows provisioning and data collection to continue functioning.

The following high-level overview is of the preparation required to provision vCloud Director vApps using vRealize Automation. For more information about vCloud Director administrator tasks, see vCloud Director product documentation.

1   In vCloud Director, create a vApp template for cloning and add it to the organization catalog.

    Depending on access, the template can be added to the global catalog.

2   In vCloud Director, use the vApp template to specify custom settings such as passwords, domain, and scripts for the guest operating system on each machine.

    You can use vRealize Automation to override some of these settings.

    Customization can vary depending on the guest operating system of the resource.

3   In vCloud Director, configure the catalog to be shared with everyone in the organization.

    The vCloud Director organization administrator allows all users and groups in the organization to have access to the catalog. Without this sharing designation, the catalog templates are not be visible to tenant administrators or business group managers in vRealize Automation.

4   Run endpoint data collection in vRealize Automation to collect your templates.

5   Gather the following information so that tenant administrators and business group managers can include it in their blueprints:

    ■   Name of the vApp template.

    ■   Amount of total storage specified for the template.

        Note   Only reserved templates are available as a cloning source.

Creating vApp and vApp Component Blueprints

You can createvCloud Director or vCloud Air Vapp and vApp components blueprints. Machine blueprints determine a machine's attributes, the manner in which it is provisioned, and its policy and management settings. A tenant administrator or business group manager can configure blueprints for provisioning and managing associated machines.

A vApp (vCloud) blueprint and its vApp component (vCloud) blueprints provision by using cloning. The vApp template that you select as the vApp blueprint is the primary source of information for provisioning vApps from the vRealize Automation console.

The vApp template determines how many machines to provision per vApp. It also determines which properties to apply to the machines being provisioned. vSphere specifies properties for each machine to be provisioned.

You can specify the following information by using vApp component blueprints.

- Additional storage volumes

- Additional machine resources

- Maximum number of volumes

- Maximum number of network adapters

For example, the vApp template defines *volume 0* for the machine VM1, but if the assigned vApp component blueprint defines two additional storage volumes, and the reservation and other settings allow, then VM1 is provisioned with three storage volumes.

After you assign a vApp component blueprint to a vApp blueprint, the machine properties specified by the vApp template are displayed as machine resources in the vApp component blueprint and become the minimum values allowed for provisioning. You can increase machine resources to the maximum values allowed by the reservation and other settings for a vApp component blueprint.

vRealize Automation uses the vApp template identified in the vApp blueprint to provision the vApp and its component machines. The machine properties specified in the vApp template are used during provisioning.

When users request a vApp, they can configure the following items.

- How many vApps to provision, based on the limits specified in the vApp blueprint

- Specifications for the component machines, such as CPU, memory, and storage, based on the individual vApp component blueprints

- General settings, such as lease duration and custom properties, to be applied to component machines in the vApp

To allow users to provision vApps from vRealize Automation, provide the following prerequisites.

- A vApp template with one or more machines in vCloud Director or vCloud Air

- A vApp blueprint in vRealize Automation associated to the vApp template

- vApp component blueprints that refer to the machines specified in the vApp template

For more information, see *Foundations and Concepts*.

Creating a vApp Component (vCloud) Blueprint

Machine blueprints determine a machine's attributes, the manner in which it is provisioned, and its policy and management settings. A tenant administrator or business group manager creates a vApp Component (vCloud) blueprint for each component machine to be included in the vApp (vCloud) blueprint. The vApp component blueprint must exist before the vApp blueprint can be configured.

The vApp component blueprint provides information for provisioning a vApp virtual machine in vCloud Air or vCloud Director. Provisioning settings include the following items:

- Machine prefix
- Provisioning workflow
- Machine resource specifications
- Build profiles and custom properties
- Available machine operations

As you create a vApp blueprint, you specify the vApp component blueprints to include in that vApp blueprint. While you must specify a vApp template to clone from when you create a vApp blueprint, template specification is optional when you create a vApp component blueprint. You might choose to specify a template when you create a vApp component blueprint if there are one or more settings in the template that you want to use in your component blueprint, for example a specific endpoint, compute resource, and storage setting combination. You can either use the settings from the template or change those settings for your blueprint. Blueprint settings are used during provisioning. If you have more than one component in a vApp template, you can use one vApp component blueprint for all the components.

For related information, see Create a vApp Component Blueprint and Create a vApp Blueprint.

For more information about blueprints, see *Foundations and Concepts*.

Create a vApp Component Blueprint

Machine blueprints determine a machine's attributes, the manner in which it is provisioned, and its policy and management settings. A tenant administrator or business group manager creates a vApp component blueprint for each component machine that will be included in the vApp.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.
- Contact your fabric administrator for information about the templates to use.

Procedure

1 Specify vApp Component Blueprint Information

   Blueprint information settings include a name and description, machine prefix information, and the daily cost.

2 Specify vApp Component Build Information

The build information settings determine how a machine is provisioned. Machine resource settings control the resources that a machine that is provisioned by the blueprint consumes.

3 Add vApp Component Blueprint Custom Properties

Adding custom properties to a blueprint gives you detailed control over provisioned machines.

4 Configure vApp Component Blueprint Actions

Use blueprint actions and entitlements together to maintain detailed control over provisioned machines.

What to do next

After you create each vApp component blueprint, create the vApp blueprint. See Create a vApp Blueprint.

Specify vApp Component Blueprint Information

Blueprint information settings include a name and description, machine prefix information, and the daily cost.

Prerequisites

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

Procedure

1 Select **Infrastructure > Blueprints > Blueprints**.

2 Select **New Blueprint > Cloud > vApp Component (vCloud)**.

3 Enter a name and, optionally, a description.

4 (Optional) Select the **Master** check box to allow users to copy your blueprint.

5 Select who can provision machines with this blueprint.

Roles	Who Can Provision
If you are both a business group manager and a tenant administrator	▪ Select the **Shared blueprint** check box to allow the blueprint to be entitled to users in any business group. ▪ Deselect the **Shared blueprint** check box to create a local blueprint, and select a business group from the **Business group** drop-down menu.
Business group manager	Select a business group from the **Business group** drop-down menu.
Tenant administrator	Your blueprints are always shared. You cannot choose who can use them to provision machines.

6 Select a machine prefix from the **Machine prefix** drop-down menu.

You can select **Use group default** to accept the default machine prefix of the user's business group.

The prefix is used for all vApp component machines provisioned from this blueprint.

7 (Optional) Set the daily cost of the machine by typing the amount in the **Cost (daily)** text box.

This cost is added to any cost profiles that your fabric administrator sets up.

Your blueprint is not finished. Do not navigate away from this page.

Specify vApp Component Build Information

The build information settings determine how a machine is provisioned. Machine resource settings control the resources that a machine that is provisioned by the blueprint consumes.

Prerequisites

Specify vApp Component Blueprint Information.

Procedure

1   Click the **Build Information** tab.

2   Select whether machines provisioned from this blueprint are classified as Desktop or Server from the **Blueprint type** drop-down menu.

     This information determines which license type vRealize Automation uses when it provisions the machines.

3   Select **Clone** from the **Action** drop-down menu.

4   Select **vAppCloneWorkflow** from the **Provisioning workflow** drop-down menu.

5   (Optional) Click the **Browse** icon next to the **Clone from** text box.

     Template specification is optional when you create a vApp component blueprint. By default, the template specified in the **Clone from** text box on the vApp blueprint is used. You can specify a template to clone from on a vApp component blueprint if there are one or more settings in the template that you want to use in your component blueprint, for example a specific endpoint, compute resource, and storage setting combination.

6   (Optional) Select a template to clone.

Blueprint Type	Available Templates
Shared	The list includes all templates for all reservations. No validation is available to ensure that the template you select exists in the reservation used to provision a machine from this blueprint.
Local (you selected a business group for the blueprint)	You only see templates that exist on reservations for the business group you selected.

7   Specify CPU settings for provisioned machines.

     a   Enter the minimum number of CPUs in the **Minimum** text box.

          If you only provide a minimum, this number becomes the value for all machines provisioned from this blueprint.

     b   (Optional) Enter the maximum number of CPUs in the **Maximum** text box to allow users to select their own settings within the range that you provide.

8   Specify memory settings for provisioned machines.

    a   Enter the minimum amount of memory in the **Minimum** text box.

       If you only provide a minimum, this number becomes the value for all machines provisioned from this blueprint.

    b   (Optional) Enter the maximum amount of memory in the **Maximum** text box to allow users to select their own settings within the range that you provide.

9   Specify storage settings for provisioned machines.

    a   Enter the minimum amount of storage in the **Minimum** text box.

       If you only provide a minimum, this number becomes the value for all machines provisioned from this blueprint.

    b   (Optional) Enter the maximum amount of storage in the **Maximum** text box to allow users to select their own settings within the range that you provide.

10   Add **Storage volumes**.

    a   Click **New Volume**.

    b   Enter the capacity in the **Capacity (GB)** text box.

    c   (Optional) Enter a drive letter and mount path in the **Drive Letter/Mount Path** text box.

    d   (Optional) Enter a name in the **Label** text box.

    e   (Optional) Select a **Storage Reservation Policy** from the drop-down menu.

       This option requires additional configuration by a fabric administrator to create storage reservation policies.

    f   Click the **Save** icon ( ).

11   (Optional) Select **Allow user to see and change storage reservation policies**.

    If selected, users who are provisioning machines can see and change the storage reservation policies that you apply to blueprints.

12   Enter the maximum number of volumes a user can select for provisioned machines in the **Max # of volumes** text box.

    Leave blank to accept the default of **15**, or enter **0** to disable adding volumes.

13   Enter the maximum number of network adapters a user can select for provisioned machines in the **Max # of network adapters** text box.

    For example, if your integration platform has a limit of 10 network adapters, set your maximum at or below this threshold so that users cannot cause provisioning to fail by selecting more network adapters than your platform supports.

Your blueprint is not finished. Do not navigate away from this page.

Add vApp Component Blueprint Custom Properties

Adding custom properties to a blueprint gives you detailed control over provisioned machines.

Prerequisites

Specify vApp Component Build Information.

Procedure

1 Click the **Properties** tab.

2 (Optional) Select one or more build profiles from the **Build profiles** menu.

   Build profiles contain groups of custom properties. Fabric administrators can create build profiles.

3 (Optional) Add any custom properties to your blueprint.

   a Click **New Property**.

   b Enter the custom property in the **Name** text box.

   c Enter the value of the custom property in the **Value** text box.

   d (Optional) Select the **Encrypted** check box to encrypt the custom property in the database.

   e (Optional) Select the **Prompt user** check box to require the user to provide a value when they request a machine.

      If you choose to prompt users for a value, any value you provide for the custom property is presented to them as the default. If you do not provide a default, users cannot continue with the machine request until they provide a value for the custom property.

   f Click the **Save** icon (✓).

Your blueprint is not finished. Do not navigate away from this page.

Custom Properties for vApp Blueprints

You can add certain vRealize Automation custom properties to a vApp or vApp component blueprint or property group to allow a vApp machine to join an Active Directory domain.

The Active Directory domain is supported for Windows machines. If the vApp machine contains Linux and Windows component machines, use a property group to assign custom properties to the vApp component blueprint associated with the Windows machines.

Table 7. Custom Properties for vApp Blueprints

Custom Property	Description
Sysprep.Identification.DomainAdmin	Specifies a user name with administrator-level access to the target domain in Active Directory. Do not include the user domain in the credentials that you send to vCloud Director.
Sysprep.Identification.DomainAdminPassword	Specifies the password to associate with the Sysprep.Identification.DomainAdmin property.
Sysprep.Identification.JoinDomain	Specifies the name of the domain to join in Active Directory.

Table 7. Custom Properties for vApp Blueprints (Continued)

Custom Property	Description
`VirtualMachine.DiskN.IsFixed`	Disables the editing of a specific disk when reconfiguring a machine. Set to True to disable display of the edit capacity option for a specific volume. The True value is case-sensitive. The *N* value is the 0-based index of the disk. Alternatively, you can set the `VirtualMachine.DiskN.IsFixed` custom property to True in the VirtualMachineProperties table in the database or use the Repository API to specify a URI value such as `.../Repository/Data/ManagementModelEntities.svc/VirtualMachines(guid'60D93A8A-F541-4CE0-A6C6-78973AC0F1D2')/VirtualMachineProperties`.
`VirtualMachine.DiskN.StorageReservationPolicy`	Specifies the storage reservation policy to use to find storage for disk *N*. Also assigns the named storage reservation policy to a volume. To use this property, substitute the volume number for *N* in the property name and specify a storage reservation policy name as the value. This property is equivalent to the storage reservation policy name specified on the blueprint. Disk numbering must be sequential. This property is valid for all Virtual and vCloud reservations. This property is not valid for Physical or Cloud reservations, other than vCloud reservations.
`VirtualMachine.NetworkN.Name`	Specifies the name of the network to connect to, for example the network device *N* to which a machine is attached. By default, a network is assigned from the network paths available on the reservation on which the machine is provisioned. You can ensure that a network device is connected to a specific network by setting the value of this property to the name of a network on an available reservation. `VirtualMachine.NetworkN` custom properties are designed to be specific to individual blueprints and machines. When a machine is requested, network and IP address allocation is performed before the machine is assigned to a reservation. Because blueprints are not guaranteed to be allocated to a specific reservation, do not use this property on a reservation. You can add this property to a vApp (vCloud) blueprint or a vApp (vCloud) Component blueprint. For related information, see Custom Properties for Networking.

Table 7. Custom Properties for vApp Blueprints (Continued)

Custom Property	Description
VCloud.Lease.Sync.TimeBufferMins	Specifies a threshold integer value for a compute resource such that lease synchronization between vCloud Director and vRealize Automation will only occur for vCloud Director or VMware vCloud® Air™-provisioned machines that are set to expire in vCloud Director or VMware vCloud® Air™ in that time period. If a conflict is found, the lease value is synchronized to match the lease length defined invRealize Automation. The default VCloud.Lease.Sync.TimeBufferMins value is 720 minutes, which is 12 hours. If VCloud.Lease.Sync.TimeBufferMins is not present, the default value is used. For example, if the default values are used, vRealize Automation will run the lease synchronization check workflow every 45 minutes, which is the workflow default, and only the leases of machines that are set to expire within 12 hours are changed to match the lease length defined in vRealize Automation.
VCloud.Template.MakeIdenticalCopy	Set to True to clone an identical copy of the vApp template in vCloud Director and provision the results in vRealize Automation. This ignores all settings specified in the blueprints except the name of the vApp and its virtual machines. The storage path specified in the vApp template during cloning is used, even if a different storage path is specified in a vApp component blueprint or when requesting a vApp machine. Set to False to clone a copy of the vApp template with settings specified by the vApp and vApp component blueprints.
VMware.SCSI.Type	For vApps and vSphere, specifies the SCSI machine type using one of the following case-sensitive values: - buslogic Use BusLogic emulation for the virtual disk. - lsilogic Use LSILogic emulation for the virtual disk (default). - lsilogicsas Use LSILogic SAS 1068 emulation for the virtual disk. - pvscsi Use para-virtualization emulation for the virtual disk. - none Use if a SCSI controller does not exist for this machine.

Configure vApp Component Blueprint Actions

Use blueprint actions and entitlements together to maintain detailed control over provisioned machines.

Entitlements control which operations specific users can access. Blueprint actions control which machine operations can be performed on machines provisioned from a blueprint.

Note The options that appear on the Actions tab depend on your platform and any customizations made in your vRealize Automation instance.

Prerequisites

Add vApp Component Blueprint Custom Properties.

Procedure

1 Click the **Actions** tab.

2 (Optional) Select the check boxes for each machine option to enable for machines provisioned from this blueprint.

3 Click **OK**.

Your blueprint is saved in draft state.

What to do next

Publish the blueprint to create a catalog item. See Publish a vApp Blueprint.

Creating a vApp (vCloud) Blueprint

Machine blueprints determine a machine's attributes, the manner in which it is provisioned, and its policy and management settings. You can use the vApp (vCloud) blueprint to associate a vApp Component (vCloud) blueprint with each virtual machine in the vApp template. A vApp blueprint contains references to vApp component blueprints.

Before you can create a vApp blueprint, vApp component blueprints must exist for the component machines that are to be included in the vApp.

A member of the business group associated with a vApp blueprint can use the blueprint to provision a vApp and its virtual machines in a vCloud Air or vCloud Director organization. The provisioning process also produces a vApp machine and its component machines in vRealize Automation.

The vApp component blueprints must be available to the same business group as the vApp blueprint.

The vApp blueprint can specify a vApp template to be used to create the vApp and provision its component machines.

The vApp and its component machines use a machine prefix and the next available sequence of numbers, for example CA04, CA05, and CA06.

Administrators can specify a vApp lease duration. The lease specified in vRealize Automation overrides the lease specified in vCloud Director. Every 45 minutes, by default, a workflow checks if it needs to synchronize your vCloud Director or vCloud Air lease length.

If no lease length is specified in vRealize Automation, the lease length is interpreted as having been set to never expire. This lease length value is also evaluated by the synchronization workflow checker.

If a lease length conflict is found, the lease value is synchronized to match the lease length defined invRealize Automation. This prevents provisioned machines from expiring before the lease period that is defined in vRealize Automation is reached. The scheduled workflow checks the lease length values for provisioned machines every 45 minutes. To overwrite the 45 minute setting, reinstall the schedule by using `repoutil`.

You can also use the `VCloud.Lease.Sync.TimeBufferMins` custom property to specify a threshold integer for a compute resource such that lease synchronization only occurs for machines that are set to expire in that time period. The default value is 720 minutes, which is 12 hours. If `VCloud.Lease.Sync.TimeBufferMins` is not present, the default value is used. For example, if the default values are used, vRealize Automation runs the lease synchronization checker workflow every 45 minutes, and only the leases of machines that are set to expire in vCloud Director or vCloud Air within 12 hours are changed to match the lease length defined in vRealize Automation.

When a vApp expires, its component machines also expire. The vApp and its component machines are destroyed immediately when their lease expires.

As you create a vApp blueprint, you specify the vApp component blueprints to include in that vApp blueprint. While you must specify a vApp template to clone from when you create a vApp blueprint, template specification is optional when you create a vApp component blueprint. You might choose to specify a template when you create a vApp component blueprint if there are one or more settings in the template that you want to use in your component blueprint, for example a specific endpoint, compute resource, and storage setting combination. You can either use the settings from the template or change those settings for your blueprint. Blueprint settings are used during provisioning. If you have more than one component in a vApp template, you can use one vApp component blueprint for all the components.

Create a vApp Blueprint

Machine blueprints determine a machine's attributes, the manner in which it is provisioned, and its policy and management settings. A tenant administrator or business group manager creates a vApp blueprint for provisioning the vApp and its component machines as a whole. A vApp component blueprint must already exist for each component machine that will be included in the vApp.

Prerequisites

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

- Create a vApp Component Blueprint.

Procedure

1 Specify vApp Blueprint Information

   Blueprint information settings include a name and description, machine prefix information, number of days after expiration to archive the machine, and a daily cost assignment.

2 Specify vApp Build Information

   Build information settings determine how a machine is provisioned.

3 Add vApp Blueprint Custom Properties

   Adding custom properties to a blueprint gives you detailed control over provisioned machines.

4 Configure vApp Blueprint Actions

Use blueprint actions and entitlements together to maintain detailed control over provisioned machines.

What to do next

Publish the blueprint to create a catalog item. See Publish a vApp Blueprint.

Specify vApp Blueprint Information

Blueprint information settings include a name and description, machine prefix information, number of days after expiration to archive the machine, and a daily cost assignment.

Prerequisites

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

Procedure

1 Select **Infrastructure > Blueprints > Blueprints**.

2 Select **New Blueprint > Cloud > vApp (vCloud)**.

3 (Optional) Select a master blueprint from the **Copy from existing blueprint** text box to populate form fields.

4 Enter a name and, optionally, a description.

5 (Optional) Select the **Master** check box to allow users to copy your blueprint.

6 Select who can provision machines with this blueprint.

Roles	Who Can Provision
If you are both a business group manager and a tenant administrator	- Select the **Shared blueprint** check box to allow the blueprint to be entitled to users in any business group. - Deselect the **Shared blueprint** check box to create a local blueprint, and select a business group from the **Business group** drop-down menu.
Business group manager	Select a business group from the **Business group** drop-down menu.
Tenant administrator	Your blueprints are always shared. You cannot choose who can use them to provision machines.

7 (Optional) Select a reservation policy from the **Reservation policy** drop-down menu.

This option requires additional configuration by a fabric administrator to create a reservation policy.

8 Select a machine prefix from the **Machine prefix** drop-down menu.

You can select **Use group default** to accept the default machine prefix of the user's business group.

The prefix is used for all vApp component machines provisioned from this blueprint.

9 (Optional) Enter a number in the **Maximum per user** text box to limit the number of machines that a single user can provision with this blueprint.

10 Specify the number of days to archive machines provisioned from this blueprint in the **Archive (days)** text box.

Enter **0** if you do not want to archive machines.

11 (Optional) Set the daily cost of the machine by typing the amount in the **Cost (daily)** text box.

This value should include any extra cost for the vApp as a whole in addition to the cost for the individual vApp component machines.

Your blueprint is not finished. Do not navigate away from this page.

Specify vApp Build Information

Build information settings determine how a machine is provisioned.

Prerequisites

Specify vApp Blueprint Information.

Procedure

1 Click the **Build Information** tab.

2 Select **Clone** from the **Action** drop-down menu.

3 Select **vAppCloneWorkflow** from the **Provisioning workflow** drop-down menu.

4 Click the **Browse** icon next to the **Clone from** text box.

5 Select a template to clone.

Blueprint Type	Available Templates
Shared	The list includes all templates for all reservations. No validation is available to ensure that the template you select exists in the reservation used to provision a machine from this blueprint.
Local (you selected a business group for the blueprint)	You only see templates that exist on reservations for the business group you selected.

6 (Optional) Click the **Edit** icon ( ) next to the component blueprint to clone.

7 Click the drop-down arrow in the **Components** text box and select a blueprint.

8 Click the **Save** icon ( ).

9 Select **Allow user to specify reservation type**.

Use this option if multiple allocation types are available in the business group.

10 (Optional) Specify the lease settings for provisioned machines, or leave blank for no expiration date.

   a   Enter the minimum number of lease days in the **Minimum** text box.

       If you only provide a minimum, this number becomes the value for all machines provisioned from this blueprint.

   b   (Optional) Enter the maximum number of lease days in the **Maximum** text box to allow users to select their own settings within the range that you provide.

Your blueprint is not finished. Do not navigate away from this page.

Add vApp Blueprint Custom Properties

Adding custom properties to a blueprint gives you detailed control over provisioned machines.

Prerequisites

Specify vApp Build Information.

Procedure

1 Click the **Properties** tab.

2 (Optional) Select one or more build profiles from the **Build profiles** menu.

   Build profiles contain groups of custom properties. Fabric administrators can create build profiles.

3 (Optional) Add any custom properties to your blueprint.

   a   Click **New Property**.

   b   Enter the custom property in the **Name** text box.

   c   Enter the value of the custom property in the **Value** text box.

   d   (Optional) Select the **Encrypted** check box to encrypt the custom property in the database.

   e   (Optional) Select the **Prompt user** check box to require the user to provide a value when they request a machine.

       If you choose to prompt users for a value, any value you provide for the custom property is presented to them as the default. If you do not provide a default, users cannot continue with the machine request until they provide a value for the custom property.

   f   Click the **Save** icon ( ).

Your blueprint is not finished. Do not navigate away from this page.

Custom Properties for vApp Blueprints

You can add certain vRealize Automation custom properties to a vApp or vApp component blueprint or property group to allow a vApp machine to join an Active Directory domain.

The Active Directory domain is supported for Windows machines. If the vApp machine contains Linux and Windows component machines, use a property group to assign custom properties to the vApp component blueprint associated with the Windows machines.

Table 8. Custom Properties for vApp Blueprints

Custom Property	Description
Sysprep.Identification.DomainAdmin	Specifies a user name with administrator-level access to the target domain in Active Directory. Do not include the user domain in the credentials that you send to vCloud Director.
Sysprep.Identification.DomainAdminPassword	Specifies the password to associate with the Sysprep.Identification.DomainAdmin property.
Sysprep.Identification.JoinDomain	Specifies the name of the domain to join in Active Directory.
VirtualMachine.Disk$N$.IsFixed	Disables the editing of a specific disk when reconfiguring a machine. Set to True to disable display of the edit capacity option for a specific volume. The True value is case-sensitive. The N value is the 0-based index of the disk. Alternatively, you can set the VirtualMachine.Disk$N$.IsFixed custom property to True in the VirtualMachineProperties table in the database or use the Repository API to specify a URI value such as .../Repository/Data/ManagementModelEntities.svc/VirtualMachines(guid'60D93A8A-F541-4CE0-A6C6-78973AC0F1D2')/VirtualMachineProperties.
VirtualMachine.Disk$N$.StorageReservationPolicy	Specifies the storage reservation policy to use to find storage for disk N. Also assigns the named storage reservation policy to a volume. To use this property, substitute the volume number for N in the property name and specify a storage reservation policy name as the value. This property is equivalent to the storage reservation policy name specified on the blueprint. Disk numbering must be sequential. This property is valid for all Virtual and vCloud reservations. This property is not valid for Physical or Cloud reservations, other than vCloud reservations.
VirtualMachine.Network$N$.Name	Specifies the name of the network to connect to, for example the network device N to which a machine is attached. By default, a network is assigned from the network paths available on the reservation on which the machine is provisioned. You can ensure that a network device is connected to a specific network by setting the value of this property to the name of a network on an available reservation. VirtualMachine.Network$N$ custom properties are designed to be specific to individual blueprints and machines. When a machine is requested, network and IP address allocation is performed before the machine is assigned to a reservation. Because blueprints are not guaranteed to be allocated to a specific reservation, do not use this property on a reservation. You can add this property to a vApp (vCloud) blueprint or a vApp (vCloud) Component blueprint. For related information, see Custom Properties for Networking.

Table 8. Custom Properties for vApp Blueprints (Continued)

Custom Property	Description
VCloud.Lease.Sync.TimeBufferMins	Specifies a threshold integer value for a compute resource such that lease synchronization between vCloud Director and vRealize Automation will only occur for vCloud Director or VMware vCloud® Air™-provisioned machines that are set to expire in vCloud Director or VMware vCloud® Air™ in that time period. If a conflict is found, the lease value is synchronized to match the lease length defined invRealize Automation. The default VCloud.Lease.Sync.TimeBufferMins value is 720 minutes, which is 12 hours. If VCloud.Lease.Sync.TimeBufferMins is not present, the default value is used. For example, if the default values are used, vRealize Automation will run the lease synchronization check workflow every 45 minutes, which is the workflow default, and only the leases of machines that are set to expire within 12 hours are changed to match the lease length defined in vRealize Automation.
VCloud.Template.MakeIdenticalCopy	Set to True to clone an identical copy of the vApp template in vCloud Director and provision the results in vRealize Automation. This ignores all settings specified in the blueprints except the name of the vApp and its virtual machines. The storage path specified in the vApp template during cloning is used, even if a different storage path is specified in a vApp component blueprint or when requesting a vApp machine. Set to False to clone a copy of the vApp template with settings specified by the vApp and vApp component blueprints.
VMware.SCSI.Type	For vApps and vSphere, specifies the SCSI machine type using one of the following case-sensitive values: ■ buslogic Use BusLogic emulation for the virtual disk. ■ lsilogic Use LSILogic emulation for the virtual disk (default). ■ lsilogicsas Use LSILogic SAS 1068 emulation for the virtual disk. ■ pvscsi Use para-virtualization emulation for the virtual disk. ■ none Use if a SCSI controller does not exist for this machine.

Configure vApp Blueprint Actions

Use blueprint actions and entitlements together to maintain detailed control over provisioned machines.

Entitlements control which operations specific users can access. Blueprint actions control which machine operations can be performed on machines provisioned from a blueprint.

Note The options that appear on the Actions tab depend on your platform and any customizations made in your vRealize Automation instance.

Prerequisites

Add vApp Blueprint Custom Properties.

Procedure

1 Click the **Actions** tab.

2 (Optional) Select the check boxes for each machine option to enable for machines provisioned from this blueprint.

3 Click **OK**.

Your blueprint is saved in draft state.

What to do next

Publish the blueprint to create a catalog item. See Publish a vApp Blueprint.

Publish a vApp Blueprint

Blueprints are saved in draft state and must be manually published before they appear as catalog items.

You need to publish a blueprint only once. Any changes you make to a published blueprint are automatically reflected in the catalog.

Note You can also publish component blueprints to have them come under the control of approvals. However, component blueprints can not be used to request individual component machines. For related information about creating and configuring approvals, see *Tenant Administration* in vRealize Automation documentation.

Prerequisites

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

▪ Create a vApp Blueprint.

Procedure

1 Select **Infrastructure > Blueprints > Blueprints**.

2 Locate the blueprint to publish.

3 In the Actions column, click the down arrow and click **Publish**.

4 Click **OK**.

Your blueprint is now a catalog item.

What to do next

Tenant administrators, business group managers, and service architects configure your catalog item and associate it with a service so that entitled users can request it from the catalog. For information about configuring and managing the catalog, see *Tenant Administration*.

Configuring Advanced Blueprint Settings

Tenant administrators and business group managers can use custom properties and optional policies to configure advanced blueprint settings such as reservation policies, Visual Basic scripts, and Active Directory cleanup.

Configuring Network Settings

You can also specify aspects of network configuration such as static IP address assignment, the networks to which machines should be attached, and other networking details.

By default, vCloud Automation Center uses DHCP to assign IP addresses to provisioned machines. For cloud and virtual machines provisioned by using cloning or Linux kickstart/autoYaST provisioning, it is possible to assign static IP addresses from a predefined range. Static IP address assignment can be configured either at the reservation level or at the blueprint level.

Note This information does not apply to Amazon Web Services.

Custom Properties for Networking

The vRealize Automation custom properties for networking specify configuration for a specific network device on a machine.

Note This information does not apply to Amazon Web Services.

Network assignments are performed during machine allocation. vRealize Automation retrieves network information from the blueprint. If you want to assign more than one network, use the `VirtualMachine.Network`*N*`.Name` custom property on your machine blueprint. If you do not provide custom properties, allocation only assigns one network, which is picked using a round robin method in conjunction with the selected reservation.

By default, a machine has one network device configured with the `VirtualMachine.Network0.Name` property. You can configure additional network devices by using the `VirtualMachine.Network`*N*`.Name` custom property.

The numbering of network properties must be sequential, starting with 0. For example, if you specify custom properties for only `VirtualMachine.Network0` and `VirtualMachine.Network2`, the properties for `VirtualMachine.Network2` are ignored, because the preceding network, `VirtualMachine.Network1`, was not specified.

Table 9. Custom Properties for Networking Configuration

Custom Property	Description
`VirtualMachine.NetworkN.Address`	Specifies the IP address of network device *N* in a machine provisioned with a static IP address.
`VirtualMachine.NetworkN.MacAddressType`	Indicates whether the MAC address of network device *N* is generated or user-defined (static). This property is available for cloning.
	The default value is generated. If the value is static, you must also use `VirtualMachine.NetworkN.MacAddress` to specify the MAC address.
	`VirtualMachine.NetworkN` custom properties are designed to be specific to individual blueprints and machines. When a machine is requested, network and IP address allocation is performed before the machine is assigned to a reservation. Because blueprints are not guaranteed to be allocated to a specific reservation, do not use this property on a reservation.
`VirtualMachine.NetworkN.MacAddress`	Specifies the MAC address of a network device *N*. This property is available for cloning.
	If the value of `VirtualMachine.NetworkN.MacAddressType` is generated, this property contains the generated address.
	If the value of `VirtualMachine.Network.N.MacAddressType` is static, this property specifies the MAC address. For virtual machines provisioned on ESX server hosts, the address must be in the range specified by VMware. For details, see vSphere documentation.
	`VirtualMachine.NetworkN` custom properties are designed to be specific to individual blueprints and machines. When a machine is requested, network and IP address allocation is performed before the machine is assigned to a reservation. Because blueprints are not guaranteed to be allocated to a specific reservation, do not use this property on a reservation.
`VirtualMachine.NetworkN.Name`	Specifies the name of the network to connect to, for example the network device *N* to which a machine is attached.
	By default, a network is assigned from the network paths available on the reservation on which the machine is provisioned.
	You can ensure that a network device is connected to a specific network by setting the value of this property to the name of a network on an available reservation.
	`VirtualMachine.NetworkN` custom properties are designed to be specific to individual blueprints and machines. When a machine is requested, network and IP address allocation is performed before the machine is assigned to a reservation. Because blueprints are not guaranteed to be allocated to a specific reservation, do not use this property on a reservation.
	You can add this property to a vApp (vCloud) blueprint or a vApp (vCloud) Component blueprint.

Table 9. Custom Properties for Networking Configuration (Continued)

Custom Property	Description
`VirtualMachine.NetworkN.PortID`	Specifies the port ID to use for network device N when using a dvPort group with a vSphere distributed switch. `VirtualMachine.NetworkN` custom properties are designed to be specific to individual blueprints and machines. When a machine is requested, network and IP address allocation is performed before the machine is assigned to a reservation. Because blueprints are not guaranteed to be allocated to a specific reservation, do not use this property on a reservation.
`VirtualMachine.NetworkN.ProfileName`	Specifies the name of a network profile from which to assign a static IP address to network device N or from which to obtain the range of static IP addresses that can be assigned to network device N of a cloned machine, where N=0 for the first device, 1 for the second, and so on. If a network profile is specified in the network path in the reservation on which the machine is provisioned, a static IP address is assigned from that network profile. You can ensure that a static IP address is assigned from a specific profile by setting the value of this property to the name of a network profile.
■ `VirtualMachine.NetworkN.SubnetMask` ■ `VirtualMachine.NetworkN.Gateway` ■ `VirtualMachine.NetworkN.PrimaryDns` ■ `VirtualMachine.NetworkN.SecondaryDns` ■ `VirtualMachine.NetworkN.PrimaryWins` ■ `VirtualMachine.NetworkN.SecondaryWins` ■ `VirtualMachine.NetworkN.DnsSuffix` ■ `VirtualMachine.NetworkN.DnsSearchSuffixes`	Appending a name allows you to create multiple versions of a custom property. For example, the following properties might list load balancing pools set up for general use and machines with high, moderate, and low performance requirements: ■ `VCNS.LoadBalancerEdgePool.Names` ■ `VCNS.LoadBalancerEdgePool.Names.moderate` ■ `VCNS.LoadBalancerEdgePool.Names.high` ■ `VCNS.LoadBalancerEdgePool.Names.low` **Note** In a multi-machine service, this custom property is supported only for VM components with Routed Virtual Wire. It is also not supported for pre-defined static IP addresses for VM components in the context of a multi-machine blueprint. Configures attributes of the network profile specified in `VirtualMachine.NetworkN.ProfileName`.

Table 9. Custom Properties for Networking Configuration (Continued)

Custom Property	Description
VCNS.LoadBalancerEdgePool.Names.*name*	Specifies the vCloud Networking and Security load balancing pools to which the virtual machine is assigned during provisioning. The virtual machine is assigned to all service ports of all specified pools. The value is an *edge/pool* name or a list of *edge/pool* names separated by commas. Names are case-sensitive. Appending a name allows you to create multiple versions of a custom property. For example, the following properties might list load balancing pools set up for general use and machines with high, moderate, and low performance requirements: ■ VCNS.LoadBalancerEdgePool.Names ■ VCNS.LoadBalancerEdgePool.Names.moderate ■ VCNS.LoadBalancerEdgePool.Names.high ■ VCNS.LoadBalancerEdgePool.Names.low **Note** In a multi-machine service, this custom property is supported only for VM components with Routed Virtual Wire. It is also not supported for pre-defined static IP addresses for VM components in the context of a multi-machine blueprint.
VCNS.SecurityGroup.Names.*name*	Specifies the vCloud Networking and Security security group or groups to which the virtual machine is assigned during provisioning. The value is a security group name or a list of names separated by commas. Names are case-sensitive. Appending a name allows you to create multiple versions of the property, which can be used separately or in combination. For example, the following properties can list security groups intended for general use, for the sales force, and for support: ■ VCNS.SecurityGroup.Names ■ VCNS.SecurityGroup.Names.sales ■ VCNS.SecurityGroup.Names.support
VCNS.SecurityTag.Names.*name*	Specifies the vCloud Networking and Security security tag or tags to which the virtual machine is associated during provisioning. The value is a security tag name or a list of names separated by commas. Names are case-sensitive. Appending a name allows you to create multiple versions of the property, which can be used separately or in combination. For example, the following properties can list security tags intended for general use, for the sales force, and for support: ■ VCNS.SecurityTag.Names ■ VCNS.SecurityTag.Names.sales ■ VCNS.SecurityTag.Names.support

Applying Reservation Policies

When a user requests a machine, it can be provisioned on any reservation of the appropriate type that has sufficient capacity for the machine. You can apply a reservation policy to a blueprint to restrict the machines provisioned from that blueprint to a subset of available reservations.

Reservation policies provide an optional and helpful means of controlling how reservation requests are processed. A reservation policy is often used to collect resources into groups for different service levels, or to make a specific type of resource easily available for a particular purpose. The following scenarios provide a few examples of possible uses for reservation policies:

- To ensure that machines provisioned from a virtual blueprint are placed on reservations with storage devices that support NetApp FlexClone

- To restrict provisioning of cloud machines to a specific region containing a machine image that is required for a specific blueprint

- To restrict provisioning of Cisco UCS physical machines to reservations on endpoints on which the selected service profile template and boot policy are available

- As an additional means of using a Pay As You Go allocation model for vApps

You can add multiple reservations to a reservation policy, but a reservation can belong to only one policy. You can assign a single reservation policy to more than one blueprint. A blueprint can have only one reservation policy.

A reservation policy can include reservations of different types, but only reservations that match the blueprint type are considered when selecting a reservation for a particular request. For more information about how reservations are selected for provisioning a machine, see *IaaS Configuration for Cloud Platforms*, *IaaS Configuration for Physical Machines*, or *IaaS Configuration for Virtual Platforms*.

Add a Reservation Policy to a Blueprint

When tenant administrators and business group managers create a new blueprint, the option to add a reservation policy appears. To add a reservation policy to an existing blueprint, you edit the blueprint.

Prerequisites

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

- Verify that a fabric administrator configured a reservation policy. See Configure a Reservation Policy.

Procedure

1   Select **Infrastructure > Blueprints > Blueprints**.

2   Point to the blueprint to edit.

3   Click the **Edit** icon ( ).

4   Select a **Reservation policy** from the **Reservation policy** drop-down menu.

5   Click **OK**.

The machines provisioned from your blueprint are now restricted to the resources specified in your reservation policy.

Assigning Datastores to Machine Volumes

Storage assignment is determined by reservations. Tenant administrators and business group managers can further restrict storage volume assignment by specifying a single datastore or a storage reservation policy that represents multiple datastores to a volume. With the multi-storage feature you can assign the volumes of a virtual machine to different datastores for the vSphere, KVM (RHEV), and SCVMM platforms.

When you assign the volumes of a virtual machine to different datastores, you can control and use storage space more effectively. For example, you might deploy the operating system volume to a slower, less expensive datastore and the database volume to a faster datastore.

You can assign a single datastore or a storage reservation policy that represents multiple datastores to a volume. When you assign a single datastore to a volume, that datastore is used at provisioning time, if possible. When you assign a storage reservation policy to a volume, one of its datastores is used at provisioning time.

A storage reservation policy is a tag applied to one or more datastores by a fabric administrator and is used to group datastores that have similar characteristics, such as speed or price. A datastore can be assigned to only one storage reservation policy at a time, but a storage reservation policy can have many different datastores. A fabric administrator creates a storage reservation policy and assigns it to one or more datastores. A tenant administrator or business group manager then assigns the storage reservation policy to a volume in a virtual blueprint. When a user requests a virtual machine that uses the blueprint, the storage reservation policy specified in the blueprint is used to select a datastore for the machine's volume.

When you add or edit a volume in a virtual blueprint, you can make the following assignments:

- Assign a single datastore to the volume. This one-to-one relationship assigns only the specified datastore at provisioning time. If the datastore is not available or lacks sufficient space, provisioning fails.

- Assign a storage reservation policy to the volume. This assignment allows the selection of one of the datastores associated with the storage reservation policy at provisioning time. If the policy's datastores are unavailable or lack sufficient space, provisioning fails.

- Assign a storage reservation policy to the volume and include the custom property `VirtualMachine.DiskN.StorageReservationPolicyMode` with the value of **NonExact**. This configuration allows you to assign a datastore that is not included in the storage reservation policy.

- Do not assign a datastore or a storage reservation policy to a volume. Not making an assignment allows selection from all available datastores at provisioning time. Provisioning fails if a datastore with sufficient space is not available.

Datastore priority, as assigned by a datastore reservation, is also used to select a datastore at provisioning time.

Avoid specifying a storage path and a storage reservation policy for the same volume. If you must specify a storage path and a storage reservation policy for the same volume, the storage path takes precedence over the storage reservation policy.

Add a Storage Reservation Policy to a Component Blueprint

Tenant administrators and business group managers can assign storage reservation policies to blueprints to control and use storage space more efficiently.

For related information about storage volumes, see Add a Storage Volume to a Component Blueprint.

Prerequisites

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

- Verify that a fabric administrator created the reservation policy. See Configure a Reservation Policy.

- Verify that the vApp component blueprint is available. See Create a vApp Component Blueprint.

- Verify that all disks for the component machine point to the same storage policy. Multiple disks of a component machine must use the same storage profile.

Procedure

1   Select **Infrastructure > Blueprints > Blueprints**.

2   Point to the blueprint to edit.

3   Click the **Build Information** tab.

4   Add **Storage volumes**.

    a   Click **New Volume**.

    b   Enter the capacity in the **Capacity (GB)** text box.

    c   (Optional) Enter a drive letter and mount path in the **Drive Letter/Mount Path** text box.

    d   (Optional) Enter a name in the **Label** text box.

    e   (Optional) Select a **Storage Reservation Policy** from the drop-down menu.

        This option requires additional configuration by a fabric administrator to create storage reservation policies.

    f   Click the **Save** icon ( ).

5   (Optional) Select **Allow user to see and change storage reservation policies**.

    If selected, users who are provisioning machines can see and change the storage reservation policies that you apply to blueprints.

6   Click the **Save** icon ( ).

7   Click **OK**.

Add a Storage Volume to a Component Blueprint

Tenant administrators and business group managers can add one or more storage volumes to a component machine.

Prerequisites

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

- Verify that the vApp component blueprint is available. See Create a vApp Component Blueprint.

- Verify that all disks for the component machine point to the same storage policy. Multiple disks of a component machine must use the same storage profile.

Procedure

1   Select **Infrastructure > Blueprints > Blueprints**.

2   Point to the blueprint to edit.

3   Click the **Edit** icon ( ).

4   Click the **Build Information** tab.

5   Click the plus sign next to **New Volume**.

6   Enter the capacity in the **Capacity (GB)** text box.

7   Enter a drive letter and mount path in the **Drive Letter/Mount Path** text box.

8   Enter a name in the **Label** text box.

9   Click the **Save** icon ( ).

10 Enter the maximum number of volumes a user can select for provisioned machines in the **Max # of volumes** text box.

Leave blank to accept the default of **15**, or enter **0** to disable adding volumes.

11 Click **OK**.

What to do next

You can add a storage reservation policy, allow users to see change storage reservation policies, or add and edit custom properties. See Add a Storage Reservation Policy to a Component Blueprint.

Enabling Remote Desktop Connections

A system administrator can create a custom remote desktop protocol file that tenant administrators and business group managers use in blueprints to configure RDP settings.

The following high-level overview is the sequence of tasks required to enable machine users to connect using RDP.

1   A system administrator creates a custom RDP file and places it in the `Website\Rdp` subdirectory of the vRealize Automation installation directory. Provide fabric administrators, tenant administrators, and business group managers with the full pathname for the custom RDP file so that it can be included in blueprints.

2   (Optional) A fabric administrator creates a build profile using the property set `RemoteDesktopProtocolProperties` to compile RDP custom properties and values for tenant administrators and business group managers to include in their blueprints.

3   A tenant administrator or business group manager adds the RDP custom properties to a blueprint to configure the RDP settings of machines provisioned from the blueprint.

4   A tenant administrator or business group manager enables the **Connect using RDP or SSH** option in a blueprint.

5   A tenant administrator or business group manager entitles users or groups to use the **Connect using RDP or SSH** option. See *Tenant Administration*.

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.

Configure Connections Using RDP

Tenant administrators and business group managers can use custom properties to configure RDP settings.

Note If your fabric administrator creates a build profile that contains the required custom properties and you include it in your blueprint, you do not need to individually add the required custom properties to the blueprint.

Prerequisites

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

- Create at least one blueprint.

Procedure

1 Select **Infrastructure > Blueprints > Blueprints**.

2 Point to the blueprint to change and click **Edit**.

3 Click the **Properties** tab.

4 (Optional) Select one or more build profiles from the **Build profiles** menu.

   Build profiles contain groups of custom properties. Fabric administrators can create build profiles.

5 Configure RDP settings.

   a Click **New Property**.

   b Enter the RDP custom property names in the **Name** text box and the corresponding values in the **Value** text box.

Option	Description and Value
(Required for RDP customization) `RDP.File.Name`	Specifies an RDP file from which to obtain settings, for example `My_RDP_Settings.rdp`. The file must reside in the `Website\Rdp` subdirectory of the vRealize Automation installation directory.
(Required for RDP customization) `VirtualMachine.Rdp.SettingN`	Configures specific RDP settings. *N* is a unique number used to distinguish one RDP setting from another. For example, to specify the Authentication Level so that no authentication requirement is specified, define the custom property `VirtualMachine.Rdp.Setting1` and set the value to authentication level:i:3. Use to open an RDP link to specify settings. For a list of available settings and correct syntax, see the Microsoft Windows RDP documentation.
`VirtualMachine.Admin.NameCompletion`	Specifies the domain name to include in the fully qualified domain name of the machine that the RDP or SSH files generate for the user interface options **Connect Using RDP** or **Connect Using SSH** option. For example, set the value to myCompany.com to generate the fully qualified domain name *my-machine-name*.myCompany.com in the RDP or SSH file.

   c (Optional) Select the **Encrypted** check box to encrypt the custom property in the database.

d   (Optional) Select the **Prompt user** check box to require the user to provide a value when they request a machine.

If you choose to prompt users for a value, any value you provide for the custom property is presented to them as the default. If you do not provide a default, users cannot continue with the machine request until they provide a value for the custom property.

e   Click the **Save** icon ( ).

6   Click **OK**.

What to do next

Enable Connections Using RDP.

Enable Connections Using RDP

Tenant administrators and business group managers can enable RDP connections on a blueprint so that entitled users can remotely access machines provisioned from that blueprint.

Prerequisites

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

- Create at least one blueprint.

- (Optional) Configure Connections Using RDP.

Important   If you are using Amazon Web Services, RDP, or SSH must be enabled on the Amazon machine instance and the machines must be in a security group in which the correct ports are open.

Procedure

1   Select **Infrastructure > Blueprints > Blueprints**.

2   Point to the blueprint to change and click **Edit**.

3   Click the **Actions** tab.

4   Select the **Connect using RDP or SSH** check box to allow users to connect to their machine by using an RDP or SSH connection.

5   Click **OK**.

All users who are entitled to connect using RDP now see the **Connect Using RDP** option for all machines they request from your blueprint. For information about entitlements, see *Tenant Administration*.

Enable Connections Using SSH

Tenant administrators and business group managers can use a custom property to enable users to connect remotely to their Linux machines using SSH.

Note If your fabric administrator creates a build profile that contains the required custom properties and you include it in your blueprint, you do not need to individually add the required custom properties to the blueprint.

Prerequisites

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

- Create at least one blueprint.

Important If you are using Amazon Web Services, RDP, or SSH must be enabled on the Amazon machine instance and the machines must be in a security group in which the correct ports are open.

The SSH daemon must also be running on the target machine.

Procedure

1   Select **Infrastructure > Blueprints > Blueprints**.

2   Point to the blueprint to change and click **Edit**.

3   Click the **Properties** tab.

4   (Optional) Select one or more build profiles from the **Build profiles** menu.

     Build profiles contain groups of custom properties. Fabric administrators can create build profiles.

5   Click **New Property**.

6   Type `Machine.SSH` in the **Name** text box.

     You may also need to add the `VirtualMachine.Admin.NameCompletion` custom property.

7   Type `true` in the **Value** text box.

8   (Optional) Select the **Encrypted** check box to encrypt the custom property in the database.

9   (Optional) Select the **Prompt user** check box to require the user to provide a value when they request a machine.

     If you choose to prompt users for a value, any value you provide for the custom property is presented to them as the default. If you do not provide a default, users cannot continue with the machine request until they provide a value for the custom property.

10 (Optional) Add the `VirtualMachine.Admin.NameCompletion` custom property.

Specifies the domain name to include in the fully qualified domain name of the machine that the RDP or SSH files generate for the user interface options **Connect Using RDP** or **Connect Using SSH** option. For example, set the value to myCompany.com to generate the fully qualified domain name `my-machine-name.myCompany.com` in the RDP or SSH file.

11 Click the **Save** icon ( ).

12 Click the **Actions** tab.

13 Select the **Connect using RDP or SSH** check box to allow users to connect to their machine by using an RDP or SSH connection.

14 Click **OK**.

All users who are entitled to connect using SSH see the **Connect Using SSH** option for all machines they request from your blueprint. For information about entitlements, see *Tenant Administration*.

Cloning an Identical Copy from a vApp Template

You can clone an identical copy of a vApp template with the `vCloud.Template.MakeIdenticalCopy` custom property.

When set to True, the `VCloud.Template.MakeIdenticalCopy` custom property instructs vRealize Automation to ignore the customization specified in the vApp blueprint selected for provisioning and its vApp component blueprints. In this example, only the vApp template, and not the vApp and vApp component blueprints, are used to provision the vApp and its virtual machines. The default setting for the property is False.

A vApp and its component machines are provisioned as an identical copy of the vApp template. The only changes from the vApp template are the names of the cloned vApp and its virtual machines, which are generated from the machine prefix. See Custom Properties for vApp Blueprints.

To use the `VCloud.Template.MakeIdenticalCopy` property, a tenant administrator or business group manager enters the custom property on the Properties page of the vApp blueprint or as part of a build profile. The property can also reside in a business group that includes the selected vApp blueprint, although using this approach affects all vApp blueprints in the business group.

vApps provisioned as identical copies can use networks and storage profiles that are not available in the vRealize Automation reservation. If you clone a vApp template and use the identical copy option, the machine is successfully provisioned. The network and storage settings are used without their allocation being accounted for in a reservation. To avoid having unaccounted reservation allocations, verify that the storage profile or network specified in the template is available in the reservation.

Table 10. Property and Template Settings for Making an Identical Copy

Make Identical Copy Using a Blueprint Property	Make Identical Copy Using a vApp Template	Result
True	Ignored	Clone from the vApp template only. ■ Do not configure networks. ■ Do not customize hardware. ■ Do not change the computer name. ■ Do not join vApp virtual machines to the AD domain. Only the names of the vApp machine and its component machines are changed from the template names. The `SysPrep.` custom properties are ignored.
False	Selected	Clone from the vApp template. Also use the vApp and vApp component blueprints, but do not configure networks. Use the storage path specified in the vApp component blueprint, or one specified for a component during a request for a vApp machine. The `SysPrep.` custom properties are recognized.
False	Not Selected	Clone from the vApp template. Also use the vApp and vApp component blueprints.

If the custom property is set to True for the vApp blueprint, and an assigned vApp component blueprint specifies a minimum and maximum range for machine resources, changes made to the machine resources when using those blueprints are ignored. You can change the machine resources after provisioning the machine and while it is powered on.

If the custom property is set to True for the vApp blueprint, and an assigned vApp component blueprint specifies a different storage path than the one specified in the vApp template, the storage path specified in the vApp template prevails.

Monitoring Workflows and Viewing Logs

Depending on your role, you can monitor workflows and view activity logs.

Table 11. Monitoring and Log Display Options

Objective	Role	Menu Sequence and Description
Display information about actions that have occurred, such as the action type, date and time of the action, and so on.	IaaS administrator	Display default log information or control display content using column and filter options. Select **Infrastructure > Monitoring > Audit Logs**. The audit log provides details about the status of managed virtual machines and activities performed on these machines during reconfiguration. It also displays information about Amazon machine provisioning. The log includes Amazon machine provisioning, multi-machine, vCloud Networking and Security, reclamation, and reconfigure actions.
View the status of scheduled and available Distributed Execution Manager and other workflows.	IaaS administrator	Display workflow status and optionally open a specific workflow to display its details. Select **Infrastructure > Monitoring > Distributed Execution Status**.
View and optionally export log data.	IaaS administrator	Display default log information or control display content using column and filter options. Select **Infrastructure > Monitoring > Log**.
View the status and history of executed Distributed Execution Manager and other workflows.	IaaS administrator	Display workflow history and optionally open a specific workflow to display its execution details. Select **Infrastructure > Monitoring > Workflow History**.
Display a list of events, including event type, time, user ID, and so on, and optionally display an event details page.	System administrator	View a list of events and their associated attributes, such as run time, event description, tenant name, target type and ID, and other characteristics. Select **Administration > Event Logs**.
View information about recent events.	IaaS administrator or Tenant administrator	Display recent events for the currently logged in user. Select **Infrastructure > Recent Events**

Machine Life Cycle and Workflow States for vCloud Air or vCloud Director vApps

Several machine workflows and workflow states are available in vRealize Automation.

The tenant administrator or business group manager selects a provisioning workflow when they create a blueprint. A workflow is a predefined process that defines a sequence of steps and required parameters.

Table 12. MasterWorkflow States

Workflow State	Work Item	Description
Requested		A new machine is requested. The machine is created or registered.
AwaitingApproval		The approval process starts. The machine build is on hold until it is approved.

Table 12. MasterWorkflow States (Continued)

Workflow State	Work Item	Description
RegisterMachine	RegisterVM	The existing machine is registered. Attributes are set in the hypervisor. For information about registering machines, see vSphere product documentation.
BuildingMachine		The machine build is about to start. The provisioning workflow that is specified in the blueprint is being created.
MachineProvisioned	SetMachineOperations	The machine build completed successfully. Operations are being performed on the machine before it is made available for use. The allowed machine operations that are defined in the blueprint are configured on the machine.
MachineActivated		The requested machine is activated.
InstallTools	InstallTools	Hypervisor guest operating system tools are installed on the machine by the hypervisor.
Expired		The machine has expired and is turned off. After the archive period elapses, it is disposed of. The machine cannot be used. The machine can only be reactivated or disposed of in this state.
DeactivateMachine		The machine disposal process has started.
UnprovisionMachine		The machine unprovisioning process has started.
Disposing	DisposeVM	The hypervisor is disposing of the machine.
Finalized		The machine was disposed of and is about to be removed from management. The master workflow is about to stop.

vAppCloneWorkflow states differ from MasterWorkFlow states.

Table 13. vAppCloneWorkflow States

Workflow State	Work Item	Description
CloneMachine	CloneVM	The hypervisor is cloning the machine.
CustomizeMachine	CustomizeVM	The hypervisor is configuring the machine.
InitialPowerOn	PowerOn	The machine is being powered on for the first time after the clone process is finished.
BuildComplete		The machine build process is finished.