System Administration

vRealize Automation 6.2

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Contents

System Administration

System Administration tells you how to customize, configure, and manage vRealize Automation. It includes information about customizing the vRealize Appliance and VMware Infrastructure as a Service servers as well as information about managing tenants, using the bulk import feature, and performing backup and restore procedures.

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 anyone who wants to configure and manage vRealize Automation. The information is written for experienced Windows or Linux system administrators who are familiar with virtual machine technology and datacenter operations.

vCloud Suite Licensing and Integration

You can license vRealize Automation individually or as part of vCloud Suite. You should consider the licensing and integration options that are available to you.

Some vCloud Suite components are available as standalone products that are licensed on a per-virtual machine basis. When the products are part of vCloud Suite, they are licensed on a per-CPU basis. You can run an unlimited number of virtual machines on CPUs that are licensed with vCloud Suite. For more information, see *vCloud Suite Architecture Overview and Use Cases*.

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

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

Revision	Description
EN-001648-08	■ Updated "Modify an Existing Automatic Email Template," on page 17. ■ Updated "Customize the Date for Email Notification for Machine Expiration," on page 18. ■ Added "Install a Hotfix," on page 47. ■ Added "Resolve Certificate Revocation Errors," on page 63.
EN-001648-07	Updated documentation for "Start Up vRealize Automation," on page 67.
EN-001648-06	■ New documentation for "Brand Tenant Login Pages," on page 47 ■ New documentation for importing virtual machines with static IP addresses. See "Edit Virtual Machine CSV Data File," on page 35.
EN-001648-05	■ Updated documentation for Chapter 2, "Configure the vRealize Automation Appliance Database," on page 23
EN-001648-04	■ New documentation for Chapter 2, "Configure the vRealize Automation Appliance Database," on page 23 ■ Updated documentation for Chapter 7, "Backup and Recovery for vRealize Automation Installations," on page 73.
EN-001648-03	Clarification of steps in the following topics: ■ "Update the vRealize Appliance with the Identity Appliance Certificate," on page 52 ■ "Update the vRealize Appliance with the IaaS Certificate," on page 57
EN-001648-02	■ New documentation for "Starting Up and Shutting Down vRealize Automation," on page 67. ■ Revised and updated documentation for Management Agents. See "Manually Update Management Agents to Recognize a vRealize Appliance Management Site Certificate," on page 61
EN-001648-01	■ Revised and updated documentation for Chapter 7, "Backup and Recovery for vRealize Automation Installations," on page 73.
EN-001648-00	Initial release.

1 Configuring vRealize Automation

System administrators can change the appearance of the vRealize Automation console, configure notifications for the vRealize Automation appliance, and configure Infrastructure as a Service features.

This chapter includes the following topics:

Configuring System Settings

System administrators can configure system settings to change the appearance of the vRealize Automation console and configure inbound and outbound email servers to handle system notifications.

Configure Branding for the vRealize Automation Console

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

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

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

Prerequisites

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

Procedure

1 Select **Administration > Branding**.

2 Clear the **Use default** check box.

3 Create a banner.

   a Click **Choose File** to upload a logo image.

   b Follow the prompts to finish creating the banner.

4 Click **Next**.

5 Type the copyright information in the **Copyright notice** text box and press Enter to preview your selection.

6 (Optional) Type the URL to your privacy policy in the **Privacy policy link** text box and press Enter to preview your selection.

7 (Optional) Type the URL to your contact page in the **Contact link** text box and press Enter to preview your selection.

8 Click **Update**.

The console is updated with your changes.

Configuring Global Email Servers for Notifications

Tenant administrators can add email servers as part of configuring notifications for their own tenants. As a system administrator, you can set up global inbound and outbound email servers that appear to all tenants as the system defaults. If tenant administrators do not override these settings before enabling notifications, vRealize Automation uses the globally configured email servers.

Create a Global Inbound Email Server

System administrators create a global inbound email server to handle inbound email notifications, such as approval responses. You can create only one inbound server, which appears as the default for all tenants. If tenant administrators do not override these settings before enabling notifications, vRealize Automation uses the globally configured email server.

Prerequisites

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

Procedure

1 Select **Administration > Email Servers**.

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

3 Select **Email – Inbound**.

4 Click **OK**.

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

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

7 (Optional) Select the **SSL** check box to use SSL for security.

8 Choose a server protocol.

9 Type the name of the server in the **Server Name** text box.

10 Type the server port number in the **Server Port** text box.

11 Type the folder name for emails in the **Folder Name** text box.

This option is required only if you choose IMAP server protocol.

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

13 Enter a password in the **Password** text box.

14 Type the email address that vRealize Automation users can reply to in the **Email Address** text box.

15 (Optional) Select **Delete From Server** to delete from the server all processed emails that are retrieved by the notification service.

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

17 Click **Test Connection**.

18 Click **Add**.

Create a Global Outbound Email Server

System administrators create a global outbound email server to handle outbound email notifications. You can create only one outbound server, which appears as the default for all tenants. If tenant administrators do not override these settings before enabling notifications, vRealize Automation uses the globally configured email server.

Prerequisites

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

Procedure

1 Select **Administration > Email Servers**.

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

3 Select **Email – Outbound**.

4 Click **OK**.

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

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

7 Type the name of the server in the **Server Name** text box.

8 Choose an encryption method.

- Click **Use SSL**.
- Click **Use TLS**.
- Click **None** to send unencrypted communications.

9 Type the server port number in the **Server Port** text box.

10 (Optional) Select the **Required** check box if the server requires authentication.

a Type a user name in the **User Name** text box.

b Type a password in the **Password** text box.

11 Type the email address that vRealize Automation emails should appear to originate from in the **Sender Address** text box.

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

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

13 Click **Test Connection**.

14 Click **Add**.

Configuring IaaS

A system administrator can adjust concurrency limits for an IaaS Windows server to best use resources, customize email sent from the server, and enable connections to other machines.

Setting Resource-Intensive Concurrency Limits

To conserve resources, vRealize Automation limits the number of concurrently running instances of machine provisioning and data collection. You can change the limits.

Configuring Concurrent Machine Provisioning

Multiple concurrent requests for machine provisioning can impact the performance of vRealize Automation. You can make some changes to limits placed on proxy agents and workflow activities to alter performance.

Depending on the needs of machine owners at your site, the vRealize Automation server may receive multiple concurrent requests for machine provisioning. This can happen under the following circumstances:

- A single user submits a request for multiple machines
- Many users request machines at the same time
- One or more group managers approve multiple pending machine requests in close succession

The time required for vRealize Automation to provision a machine generally increases with larger numbers of concurrent requests. The increase in provisioning time depends on three important factors:

- The effect on performance of concurrent resource-intensive vRealize Automation workflow activities, including the SetupOS activity (for machines created within the virtualization platform, as in WIM-based provisioning) and the Clone activity (for machines cloned within the virtualization platform).
- The configured vRealize Automation limit on the number of resource-intensive (typically lengthy) provisioning activities that can be executed concurrently. By default this is two. Concurrent activities beyond the configured limit are queued.
- Any limit within the virtualization platform or cloud service account on the number of vRealize Automation work items (resource-intensive or not) that can be executed concurrently. For example, the default limit in vCenter Server is four, with work items beyond this limit being queued.

By default, vRealize Automation limits concurrent virtual provisioning activities for hypervisors that use proxy agents to two per proxy agent. This ensures that the virtualization platform managed by a particular agent never receives enough resource-intensive work items to prevent execution of other items. Plan to carefully test the effects of changing the limit before making any changes. Determining the best limit for your site may require that you investigate work item execution within the virtualization platform as well as workflow activity execution within vRealize Automation.

If you do increase the configured vRealize Automation per-agent limit, you may have to make additional configuration adjustments in vRealize Automation, as follows:

- The default execution timeout intervals for the SetupOS and Clone workflow activities are two hours for each. If the time required to execute one of these activities exceeds this limit, the activity is cancelled and provisioning fails. To prevent this failure, increase one or both of these execution timeout intervals.
- The default delivery timeout intervals for the SetupOS and Clone workflow activities are 20 hours for each. Once one of these activities is initiated, if the machine resulting from the activity has not been provisioned within 20 hours, the activity is cancelled and provisioning fails. Therefore, if you have increased the limit to the point at which this sometimes occurs, you will want to increase one or both of these delivery timeout intervals.

Configuring Concurrent Data Collections

By default, vRealize Automation limits concurrent data collection activities. If you change this limit, you can avoid unnecessary timeouts by changing the default execution timeout intervals for the different types of data collection.

vRealize Automation regularly collects data from known virtualization compute resources through its proxy agents and from cloud service accounts and physical machines through the endpoints that represent them. Depending on the number of virtualization compute resources, agents, and endpoints in your site, concurrent data collection operations may occur frequently.

Data collection running time depends on the number of objects on endpoints including virtual machines, datastores, templates, and compute resources. Depending on many conditions, a single data collection can require a significant amount of time. As with machine provisioning, concurrency increases the time required to complete data collection.

By default, concurrent data collection activities are limited to two per agent, with those over the limit being queued. This ensures that each data collection completes relatively quickly and that concurrent data collection activities are unlikely to affect IaaS performance.

Depending on the resources and circumstances at your site, however, it may be possible to raise the configured limit while maintaining fast enough performance to take advantage of concurrency in proxy data collection. Although raising the limit can increase the time required for a single data collection, this might be outweighed by the ability to collect more information from more compute resources and machines at one time.

If you do increase the configured per-agent limit, you might have to adjust the default execution timeout intervals for the different types of data collection that use a proxy agent—inventory, performance, state, and WMI. If the time required to execute one of these activities exceeds the configured timeout intervals, the activity is canceled and restarted. To prevent cancellation of the activity, increase one or more of these execution timeout intervals.

Adjust Concurrency Limits and Timeout Intervals

You can change the per-agent limits on concurrent provisioning, data collection activities, and the default timeout intervals.

When typing a time value for these variables, use the format hh:mm:ss (hh=hours, mm=minutes, and ss=seconds).

Prerequisites

Log in as an administrator to the server hosting the IaaS Manager Service. For distributed installations, this is the server on which the Manager Service was installed.

Procedure

1 Open the `ManagerService.exe.config` file in an editor. The file is located in the vRealize Automation server install directory, typically `%SystemDrive%\Program Files x86\VMware\vCAC\Server`.

2 Locate the section called `workflowTimeoutConfigurationSection`.

3 Update the following variables, as required.

Parameter	Description
MaxOutstandingResourceIntensiveWorkItems	Concurrent provisioning limit (default is two)
CloneExecutionTimeout	Virtual provisioning execution timeout interval
SetupOSExecutionTimeout	Virtual provisioning execution timeout interval
CloneTimeout	Virtual provisioning clone delivery timeout interval

Parameter	Description
SetupOSTimeout	Virtual provisioning setup OS delivery timeout interval
CloudInitializeProvisioning	Cloud provisioning initialization timeout interval
MaxOutstandingDataCollectionWorkItems	Concurrent data collection limit
InventoryTimeout	Inventory data collection execution timeout interval
PerformanceTimeout	Performance data collection execution timeout interval
StateTimeout	State data collection execution timeout interval

4 Save and close the file.

5 Select **Start > Administrative Tools > Services**.

6 Stop and then restart the vRealize Automation service.

7 (Optional) If vRealize Automation is running in High Availability mode, any changes made to the `ManagerService.exe.config` file after installation must be made on both the primary and failover servers.

Adjust Execution Frequency of Machine Callbacks

You can change the frequency of several callback procedures, including the frequency that the vRealize Automation callback procedure is run for changed machine leases.

vRealize Automation uses a configured time interval to run different callback procedures on the Model Manager service, such as *ProcessLeaseWorkflowTimerCallbackIntervalMiliSeconds* which searches for machines whose leases have changed. You can change these time intervals to check more or less frequently.

When entering a time value for these variables, enter a value in milliseconds. For example, 10000 milliseconds = 10 seconds and 3600000 milliseconds = 60 minutes = 1 hour.

Prerequisites

Log in as an administrator to the server hosting the IaaS Manager Service. For distributed installations, this is the server on which the Manager Service was installed.

Procedure

1 Open the `ManagerService.exe.config` file in an editor. The file is located in the vRealize Automation server install directory, typically `%SystemDrive%\Program Files x86\VMware\vCAC\Server`.

2 Update the following variables, as desired.

Parameter	Description
RepositoryWorkflowTimerCallbackMiliSeconds	Checks the repository service, or Model Manager Web Service, for activity. Default value is 10000.
ProcessLeaseWorkflowTimerCallbackIntervalMiliSeconds	Checks for expired machine leases. Default value is 3600000.
BulkRequestWorkflowTimerCallbackMiliSeconds	Checks for bulk requests. Default value is 10000.
MachineRequestTimerCallbackMiliSeconds	Checks for machine requests. Default value is 10000.
MachineWorkflowCreationTimerCallbackMiliSeconds	Checks for new machines. Default value is 10000.

3 Save and close the file.

4 Select **Start > Administrative Tools > Services**.

5 Stop and then restart the vCloud Automation Center service.

6 (Optional) If vRealize Automation is running in High Availability mode, any changes made to the `ManagerService.exe.config` file after installation must be made on both the primary and failover servers.

Configuring Templates for Automatic IaaS Emails

You can configure the templates for automatic notification emails sent to machine owners by the IaaS service about events involving their machines.

The events that trigger these notifications include, for example, the expiration or approaching expiration of archive periods and virtual machine leases.

Tenant administrators can enable or disable IaaS email notifications for machine owners, and machine owners can choose to receive or not receive email notifications. Anyone with access to the directory `\Templates` under the vRealize Automation server install directory (typically `%SystemDrive %\Program Files x86\VMware\vCAC\Server`) can configure the templates for these email notifications.

Email Template Object Reference

You can add email template objects to automatic email templates to return information about URIs, machines, blueprints, costs, and requests.

You can use the following email template objects to return information to automatic email templates.

- WebsiteURIItems
- WebsiteURIInbox
- VirtualMachineEx
- VirtualMachineTemplateEx
- ReservationHelper
- Request
- RequestWithAudit

The WebsiteURIItems object returns the URL of the Items tab on the vRealize Automation console, for example `https://vcac.mycompany.com/shell-ui-app/org/mytenant/#csp.catalog.item.list`. To use this object to provide a link to the My Items page in the console, consider the following sample lines.

```
Click
   <a>
     <xsl:attribute name="href">
       <xsl:value-of select="//WebsiteURIItems"/>
     </xsl:attribute><xsl:value-of select="//WebsiteURIItems"/>here</a>
   for your provisioned items.
```

The WebsiteURIInbox object returns the URL of the Inbox tab on the vRealize Automation console, for example `https://vcac.mycompany.com/shell-ui-app/org/mytenant/#cafe.work.items.list`. To use this object to provide a link to the My Inbox page in the console, consider the following sample lines.

```
Click
   <a>
     <xsl:attribute name="href">
       <xsl:value-of select="//WebsiteURIInbox"/></xsl:attribute><xsl:value-of
select="//WebsiteURIInbox"/>here</a>
      for your assigned tasks.
```

The VirtualMachineEx object returns a specific item of information about the machine associated with the event triggering the email. The information is determined by the attribute provided with the object; see the table Selected Attributes of the VirtualMachineEx Object for more information. For example, you could use the following line to include the expiration date of the machine in an email.

```
<xsl:value-of select="//VirtualMachineEx/Expires"/>
```

Table 1-1. Selected Attributes of the VirtualMachineEx Object

Attribute	Returns
Name	Name of machine as generated by vRealize Automation
Description	Machine's description
DnsName	Machine's DNS name
TemplateName	Name of blueprint from which machine was provisioned
StoragePath	If a virtual machine, name of storage path on which machine was provisioned
State/Name	Status of machine
Owner	Owner of machine
Expires	Date on which machine expires
ExpireDays	Number of days until machine expires
CreationTime	Date and time at which machine was provisioned
HostName	If a virtual machine, name of host where machine was provisioned
GroupName	Name of business group in which machine was provisioned
ReservationName	Name of reservation on which machine was provisioned
Group/AdministratorEmail	Names of users or groups who receive group manager emails for business group for which machine was provisioned

In addition, the special attribute Properties lets you search the custom properties associated with the machine for a specific property and return the value if found. For example, to include the value of Image.WIM.Name, which specifies the name of the WIM image from which a machine was provisioned, you could use the following lines.

```
<xsl:for-each select="//VirtualMachineEx/Properties/NameValue">
    <xsl:if test="starts-with(Name, 'Image.WIM.Name')">
        <xsl:value-of select="Value"/>
```

If the machine does not have the Image.WIM.Name property, nothing is returned.

The VirtualMachineTemplateEx object returns a specific item of information about the source blueprint of the machine associated with the even triggering the email. The information is determined by the attribute provided with the object; see the table Selected Attributes of the VirtualMachineTemplateEx Email Object for more information. For example, to include the daily cost specified in the source blueprint you could use the following line:

```
<xsl:value-of select="//VirtualMachineTemplateEx/Cost"/>
```

Table 1-2. Selected Attributes of the VirtualMachineTemplateEx Email Object

Attribute	Returns
Name	Name of blueprint
Description	Blueprint's description
MachinePrefix	Machine prefix specified in blueprint
LeaseDays	Number of lease days specified in blueprint
ExpireDays	If a virtual blueprint, number of archive days specified
Cost	Daily cost specified in blueprint

VirtualMachineTemplateEx also takes the special attribute Properties to let you search the custom properties included in the blueprint for a specific property and return the value if found, as described for the VirtualMachineEx object.

The ReservationHelper object returns information about the daily cost of the machine, as specified by the attributes in the table Selected Attributes of the ReservationHelper Email Object, when a cost profile applies to the virtual or physical machine associated with the event triggering the email.

Table 1-3. Selected Attributes of the ReservationHelper Email Object

Attribute	Returns
DailyCostFormatted	Daily cost of machine
LeaseCostFormatted	Daily cost times the number of days in the machine's lease.

Modify an Existing Automatic Email Template

You can edit the automatic email templates used by the IaaS service when notifying machine owners and managers.

You can customize the text and format of the automatic email for an IaaS event by editing the XSLT template for the event. You can find the following IaaS templates in the directory `\Templates` under the vRealize Automation server install directory (typically `%SystemDrive%\Program Files x86\VMware\vCAC\Server`).

For related information about configuring vRealize Automation email notifications, see the following Knowledge Base articles:

- Customizing email templates in vRealize Automation (2088805)
- Examples for customizing email templates in vRealize Automation (2102019)

To modify the email notification setting for machine expirations, use the vRealize Automation Global Properties page. See "Customize the Date for Email Notification for Machine Expiration," on page 18.

- ArchivePeriodExpired
- EpiRegister
- EpiUnregister
- LeaseAboutToExpire
- LeaseExpired
- LeaseExpiredPowerOff
- ManagerLeaseAboutToExpire
- ManagerLeaseExpired
- ManagerReclamationExpiredLeaseModified
- ManagerReclamationForcedLeaseModified
- ReclamationExpiredLeaseModified
- ReclamationForcedLeaseModified
- VdiRegister
- VdiUnregister

Prerequisites

Log in to the IaaS Manager Service host using administrator credentials.

Procedure

1 Change to the directory `\Templates`.

2 Edit an XSLT template as required.

Customize the Date for Email Notification for Machine Expiration

You can choose when to send email to notify users of a machine expiration date.

Procedure

1 Log in to vRealize Automation as a vRealize administrator.

2 Navigate **Infrastructure > Administration > Global Properties > Group: EmailByState**.

3 On the Global Properties page, locate the WorkflowEmailByState section.

4 Change the value of **DaysNotificationBeforeExpire** to the number of days prior to machine expiration that you want the email sent. The default is 7.

This setting requires that the LeaseExpired option is set to true. You can set separate values for owners and managers.

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*.

Create a Custom RDP file

A system administrator creates a custom RDP file and provides fabric administrators, tenant administrators, and business group managers with the full pathname for the file so it can be included in blueprints.

Note If you are using Internet Explorer with Enhanced Security Configuration enabled, `.rdp` files cannot be downloaded.

Prerequisites

Log in to the IaaS Manager Service as an administrator.

Procedure

1 Set your current directory to *<vCAC_installation_dir>*\Rdp.

2 Copy the file `Default.rdp` and rename it to `Console.rdp` in the same directory.

3 Open the `Console.rdp` file in an editor.

4 Add RDP settings to the file.

For example, **`connect to console:i:1`**.

5 If you are working in a distributed environment, log in as a user with administrative privileges to the IaaS Host Machine where the Model Manager Website component is installed.

6 Copy the `Console.rdp` file to the directory *<vCAC_installation_dir>*\Website\Rdp.

What to do next

See "Enabling Remote Desktop Connections," on page 18 for an overview of steps and options for making RDP connections available. Consult your IaaS configuration guide for next steps for your site configuration.

Enabling Users to Select Datacenter Locations

The **Display location on request** check box on the Blueprint Information tab allows users to select a particular datacenter location at which to provision a requested virtual or cloud machine.

For example, if you have an office in London and an office in Boston, you might have compute resources and business groups in both locations. By enabling the **Display location on request** check box, your business group users can choose to provision their machines with the resources that are local, for example.

The following is a high-level overview of the sequence of steps required to enable users to select datacenter locations:

1 A system administrator adds datacenter location information to a locations file.

2 A fabric administrator edits a compute resource to associate it with a location.

3 A tenant administrator or business group manager creates a blueprint that prompts users to choose a datacenter location when submitting a machine request.

Add Datacenter Locations

The first step in making location choices available to users is for a system administrator to add location information to a locations file.

Prerequisites

Log in to the IaaS web site host using administrator credentials.

Procedure

1 Edit the file `WebSite\XmlData\DataCenterLocations.xml` in the Windows server install directory (typically *%SystemDrive%*`\Program Files x86\VMware\vCAC\Server`).

2 For each location, create a Data Name entry in the CustomDataType section of the file. For example:

```
– <CustomDataType>
     <Data Name="London" Description="London datacenter" />
        <Data Name="Boston" Description="Boston datacenter" />
</CustomDataType
```

3 Save and close the file.

4 Restart the manager service.

A fabric administrator can edit a compute resource to associate it with a location. See *IaaS Configuration for Cloud Platforms* or *IaaS Configuration for Virtual Platforms*.

Removing Datacenter Locations

To remove a datacenter location from a user menu, a system administrator must remove the location information from the locations file and a fabric administrator must remove location information from the compute resource.

For example, if you add London to the locations file, associate ten compute resources with that location, and then remove London from the file, the compute resources are still associated with the location London and London is still included in the location drop-down list on the Confirm Machine Request page. To remove the location from the drop-down list, a fabric administrator must edit the compute resource and reset the Location to blank for all compute resources that are associated with the location.

The following is a high-level overview of the sequence of steps required to remove a datacenter location:

1 A system administrator removes the datacenter location information from the locations file.

2 A fabric administrator removes all the compute resource associations to the location by editing the locations of each associated compute resource.

Enabling Visual Basic Scripts in Provisioning

Visual Basic scripts are run outside of vRealize Automation as additional steps in the machine life cycle and can be used to update the custom property values of machines. Visual Basic scripts can be used with any provisioning method.

For example, you could use a script to generate certificates or security tokens before provisioning and then use those certificates and tokens in provisioning a machine.

Note This information does not apply to Amazon Web Services.

When executing a Visual Basic script, the EPI agent passes all machine custom properties as arguments to the script. To return updated property values to vRealize Automation, you must place these properties in a dictionary and call a function provided by vRealize Automation.

The sample Visual Basic script `PrePostProvisioningExample.vbs` is included in the `Scripts` subdirectory of the EPI agent installation directory. This script contains a header to load all arguments into a dictionary, a body in which you can include your functions, and a footer to return updated custom properties to vRealize Automation.

The following is a high-level overview of the steps required to use Visual Basic scripts in provisioning:

1 A system administrator installs and configures an EPI agent for Visual Basic scripts. See *Installation and Configuration*.

2 A system administrator creates Visual Basic scripts and places them on the system where the EPI agent is installed.

3 Gather the following information for tenant administrators and business group managers for each Visual Basic script:

- The complete path to the Visual Basic script, including the filename and extension. For example, `%System Drive%Program Files (x86)\VMware\vCAC Agents\EPI_Agents\Scripts\SendEmail.vbs`.

Note A fabric administrator can create a build profile by using the property sets ExternalPreProvisioningVbScript and ExternalPostProvisioningVbScript to provide this required information. Doing so makes it easier for tenant administrators and business group managers to include this information correctly in their blueprints.

4 Tenant administrators and business group managers use custom properties in their blueprints to call the Visual Basic scripts.

The Customer Experience Improvement Program

This product participates in VMware's Customer Experience Improvement Program (CEIP). The CEIP provides VMware with information that enables VMware to improve its products and services, to fix problems, and to advise you on how best to deploy and use our products. You can choose to join or leave the CEIP for vRealize Automation at any time.

Details regarding the data collected through CEIP and the purposes for which it is used by VMware are set forth at the Trust & Assurance Center at http://www.vmware.com/trustvmware/ceip.html.

Join or Leave the Customer Experience Improvement Program for vRealize Automation

You can join or leave the Customer Experience Improvement Program (CEIP) for vRealize Automation at any time.

vRealize Automation gives you the opportunity to join the Customer Experience Improvement Program (CEIP) when you initially install and configure the product. After installation, you can join or leave the CEIP by following these steps.

Procedure

1 Log in as root to the vRealize Appliance management interface.

https://*vrealize-automation-appliance-FQDN*:5480

2 Click the **Telemetry** tab.

3 Check or uncheck the **Join the VMware Customer Experience Improvement Program** option.

When checked, the option activates the Program and sends data to https://vmware.com.

4 Click **Save Settings**.

Configure Data Collection Time

You can set the day and time when the Customer Experience Improvement Program (CEIP) sends data to VMware.

Procedure

1 Log in to a console session on the vRealize Appliance as root.

2 Open the following file in a text editor.

`/etc/telemetry/telemetry-collector-vami.properties`

3 Edit the properties for day of week (dow) and hour of day (hod).

Property	Description
`frequency.dow=<day-of-week>`	Day when data collection occurs.
`frequency.hod=<hour-of-day>`	Local time of day when data collection occurs. Possible values are 0–23.

4 Save and close `telemetry-collector-vami.properties`.

5 Apply the settings by entering the following command.

```
vcac-config telemetry-config-update --update-info
```

Changes are applied to all nodes in your deployment.

Configure the vRealize Automation Appliance Database

2

The vRealize Automation system has been updated to use an internal database that now offers clustering and streaming replication. Users must update new and existing vRealize Automation 6.x systems to use this new Appliance Database.

Designate one vRealize Appliance as the primary Appliance Database machine and the second as the secondary Appliance Database machine. When configured correctly, each appliance can support the Appliance Database as needed.

Note The Appliance Database replication channel is not encrypted.

Prerequisites

- Create DNS entry, for example: dbCluster.domain.local
- IP address allocated for load balancer.
- Two installed vRealize Appliances freshly deployed and resolvable through DNS.
- The user configuring the Appliance Database must have Administrator access to vSphere in order to add new disks to the vRealize Appliances.
- Download the 2108923_dbCluster.zip file from the VMware Knowledge Base.

  The link is http://kb.vmware.com/selfservice/microsites/search.do?cmd=displayKC&docType=kc&externalId=2108923 if you need to paste it into a browser.

Procedure

1 Configure Database Virtual IP on page 24

  Configure the database virtual IP (VIP) as appropriate for your system configuration in accordance with VMware guidelines.

2 Configure Internal Appliance Database on page 24

  Configure an Appliance Database on both the designated primary and secondary vRealize Appliances.

3 Configure Appliance Database Replication on the Secondary Appliance on page 25

  Configure the secondary or failover virtual appliance to support appliance database replication.

4 Test Appliance Database Failover on page 26

  Test failover functionality from the primary appliance database machine to the secondary machine.

5 Test Appliance Database Failback on page 28

  Test that failback from the secondary appliance database machine to the primary machine functions.

Configure Database Virtual IP

Configure the database virtual IP (VIP) as appropriate for your system configuration in accordance with VMware guidelines.

The appropriate virtual IP for your system depends upon numerous factors, including whether or not it uses a load balancer. Most distributed production systems use a load balancer.

The active node in the network load balancer should be the master node with the writeable database.

Procedure

1 Review your system configuration and choose an appropriate virtual IP (VIP configuration.

Consult the VMware Knowledge Base for information about choosing a VIP configuration.

2 Configure the database virtual IP (VIP) as appropriate for your system configuration.

When configuring the VIP, observe the following.

- Port 5432 must be balanced.
- Only the current master node can be active in the load balancer.

Configure Internal Appliance Database

Configure an Appliance Database on both the designated primary and secondary vRealize Appliances.

For related information, see the following content:

- *Add a New Hard Disk to a Virtual Machine in vSphere Web Client* in vSphere product documentation
- *Gracefully Shutting Down a Windows Guest When the Virtual Machine Powers Off (1744)* in the VMware Knowledge Base.

Procedure

1 Perform a graceful shutdown of the target appliance using shut down guest in the VMware vCenter Server™.

2 Add a 20 GB disk to the virtual appliance by using the VMware vCenter Server™.

3 Power on the appliance.

4 Verify that SSH is enabled on the virtual appliance.

a Log in to the Virtual Appliance Management Interface at https://appliance_IP:5480.

b Click the **Admin** tab.

c Ensure that the **SSH service enabled** and **Administrator SSH login enabled** check boxes are selected.

d Click **Save Settings**.

5 Unzip the 2108923_dbCluster.zip file that you downloaded from the VMware Knowledge Base and copy the 2108923_dbCluster.tar file to the appliance.

6 Extract the configureDisk.sh and pgClusterSetup.sh files using the `tar xvf 2108923_dbCluster.tar` command.

```
# tar xvf 2108923_dbCluster.tar
configureDisk.sh
pgClusterSetup.sh
```

7 Locate the disk you added using the `parted -l` command.

Note For a fresh vRealize Automation deployment, the disk name should be `/dev/sdd`. The name differs depending on the original version of vRealize Automation deployed.

```
# parted -l
...
Error: /dev/sdd: unrecognized disk label
Sector size (logical/physical): 512B/512B
```

8 Configure the disk using the `./configureDisk.sh` *`disk name`* command.

For a vRealize Automation deployment, the exact command is `./configureDisk.sh /dev/sdd`.

```
# ./configureDisk.sh /dev/sdd
...
Ownership changed successfully
WAL Archive disk configured successfully
```

9 Run the `pgClusterSetup.sh` script using the following command.

```
/pgClusterSetup.sh [-d] <db_fqdn> [-D] <db_vip> [-w] <db_pass> [-r] <replication_password> [-p] <postgres_password>
```

Replace the parameters with the following values as appropriate for your system.

Option	Value
[-d]	Database load balancer FQDN
[-D]	Database virtual IP address. Optional, will create /etc/hosts entry.
[-w]	Sets the database password to the specified entry.
[-r]	Replication password. Optional, will use the database password if not set.
[-p]	Postgres password. Optional, will use database password if not set.

For example, `./pgClusterSetup.sh -d pgCluster.domain.local -w changeMe1! -r changeMe1! -p changeMe1!`

Note If you are using a load balancer virtual IP, specify the -D parameter using the IP address of the virtual IP.

```
# ./pgClusterSetup.sh -d dbCluster.domain.local -w changeMe1! -r changeMe1! -p changeMe1!
...
11.) Updating vRealize Automation to utilize database cluster fully qualified domain name
Finished
```

10 Update the password from *ChangeMe!* to one that is appropriate for your system.

What to do next

"Configure Appliance Database Replication on the Secondary Appliance," on page 25.

Configure Appliance Database Replication on the Secondary Appliance

Configure the secondary or failover virtual appliance to support appliance database replication.

Set up database replication on the designated secondary appliance so that the appliance database on the primary appliance is replicated on the secondary appliance in the case of failover.

Prerequisites

The appliance database is installed and configured as described in *vRealize Automation Installation and Configuration*.

Procedure

1 Log in to the virtual appliance as root using SSH with the `su - postgres` command.

2 Configure replication as the postgres user using the following command.

```
./run_as_replica –h <Primary Appliance> –b –W –U replicate
```

Replace the parameters with the following values.

Option	Value
[-h]	Hostname of the master database server. Port 5432 is assumed.
[-b]	Take a base backup from the master. This option destroys the current contents of the data directory.
[-W]	Prompt for the password of the user performing the replication.
[-U]	The user performing the replication. Generally this user is replicate.

For example:

```
# su - postgres
  /opt/vmware/vpostgres/current/share/run_as_replica –h app1.domain.local –b –W –U replicate
```

3 Enter the replicate user password when prompted.

4 Type "yes" after verifying the thumb print of the primary machine when prompted.

5 Enter the postgres user password when prompted.

6 Type "yes" in response to the following message.

"Type yes to enable WAL archiving on primary."

7 Type "yes" in response to the following message.

"WARNING: the base backup operation will replace the current contents of the data directory. Please confirm by typing yes."

What to do next

Validate that the replication was successful. See Chapter 4, “Validate Appliance Database Replication,” on page 31.

Test Appliance Database Failover

Test failover functionality from the primary appliance database machine to the secondary machine.

For this test, the appliance database is failed over, and the replica database on the secondary appliance becomes the master database.

Prerequisites

The appliance database is installed and configured on primary and secondary vRealize Appliances as described in *vRealize Automation Installation and Configuration*.

Procedure

1 Log in to your primary, or master, appliance as root using SSH.

2 Stop the vpostgres service using the `service vpostgres stop` command.

A message similar to the following appears.

```
# service vpostgres stop
Stopping VMware vPostgres: Last login: Mon Apr 27 19:49:26 UTC 2015 on pts/0
ok
```

3 Log in to the secondary appliance as root using SSH.

4 Run the `/opt/vmware/vpostgres/current/share/promote_replica_to_primary` command as the postgres user to promote the replica database to master.

```
su – postgres
/opt/vmware/vpostgres/current/share/promote_replica_to_primary
server promoting
```

Note After running this command, the replica database on the secondary appliance becomes the master. The appliance database on the original primary appliance does not become an actual replica until you run the `run_as_replica` command.

5 Log in to the targeted replica appliance machine as root using SSH.

6 Configure replication using the following command.

```
./run_as_replica –h master database appliance –b –W –U replicate
```

Replace the parameters with the following values.

Option	Value
[-h]	Host name of the master database server. Port 5432 is assumed.
[-b]	Take a base backup from the master. This option destroys the current contents of the data directory.
[-W]	Prompt for the password of the user performing the replication.
[-U]	The user performing the replication. Generally this user is replicate.

For example:

```
# su – postgres
/opt/vmware/vpostgres/current/share/run_as_replica –h app2.domain.local –b –W –U replicate
```

7 Enter the replicate user password when prompted.

8 Type "yes" after verifying the thumb print of the primary machine when prompted.

9 Enter the postgres user password when prompted.

10 Type "yes" in response to the following message.

"WARNING: the base backup operation will replace the current contents of the data directory. Please confirm by typing yes."

What to do next

Validate that the replication was successful. See Chapter 4, “Validate Appliance Database Replication,” on page 31.

Test Appliance Database Failback

Test that failback from the secondary appliance database machine to the primary machine functions.

For this test, the appliance database is failed back from the secondary appliance to the original primary appliance.

Prerequisites

The appliance database is installed and configured as described in *vRealize Automation Installation and Configuration*.

Procedure

1 Log in to the replica appliance machine, which currently contains the master appliance database, as root using SSH.

2 Stop the vpostgres service using the `service postgres stop` command.

```
# service postgres stop
Stopping VMware vPostgres: Last login: Mon Apr 27 19:49:26 UTC 2015 on pts/0
ok
```

3 Log in to the primary appliance machine as root using SSH.

4 Promote the replicate database to master as the postgres user with the `/opt/vmware/vpostgre/current/share/promote_replica_to_primary` command.

```
# su – postgres
/opt/vmware/vpostgres/current/share/promote_replica_to_primary
server promoting
```

5 Log in to the replica appliance machine as root using SSH.

6 Configure database replication as the postgres user with a command of the form `./run_as_replica–h` *`Primary Appliance`* `–b –W –U replicate`

```
# su – postgres
/opt/vmware/vpostgres/current/share/run_as_replica –h appl.domain.local
–b –W –U replicate
```

7 Enter the replicate user password when prompted.

8 Type "yes" in response to the following message.

"Warning: the base backup operation will replace the current contents of the data directory. Please confirm by typing yes."

What to do next

Validate that the replication was successful. See Chapter 4, “Validate Appliance Database Replication,” on page 31.

Perform an Appliance Database Failover

3

If your designated primary Appliance Database fails, implement a failover to the designated replica database on the secondary appliance to maintain system operation.

Prerequisites

Configure the Appliance Database as applicable for your system configuration. See Chapter 2, "Configure the vRealize Automation Appliance Database," on page 23.

Procedure

1 If possible, log in to the appliance hosting the primary Appliance Database as root using SSH.

If the appliance or its host machine is not running, skip to step 3.

2 Stop the vpostgres service using the `service postgres stop command`.

```
# service postgres stop
Stopping Vmware vPostgres: Last login: Mon Apr 27 19:49:26 UTC 2015 on pts/0
ok
```

3 Promote the replica database on the secondary appliance to be the primary database.

a Log in the secondary appliance as root using SSH.

b Promote the replica database to master as the postrgres user using the `/opt/vmware/vpostgres/current/share/promote_replica_to_primary` command.

```
# su – postgres
/opt/vmware/vpostgres/current/share/promote_replica_to_primary
server promoting
```

4 Configure the database virtual IP for the new Appliance Database configuration.

VIP Configuration Option	Procedure
If you are using a DNS entry for the Appliance Database, change the DNS entry point as appropriate for your system.	1 Modify the IP of the DNS entry to point at the new primary appliance. 2 Log in to each vRealize Appliance as root and execute a service network restart.
If you configured a virtual IP for the Appliance Database, edit the pool that you created containing the two vRealize Automation appliances as nodes.	1 Disable the old primary node. 2 Enable the new primary node.

5 Rebuild the replica database on the original primary Appliance Database host machine.

a Log in to the appliance as root using SSH.

b Configure database replication as the postrgres user using the `./run_as_replica–h primary appliance –b–W–U replicate` command.

```
# su –postgres
/opt/vmware/vpostgres/current/share/run_as_replica –h appl.domain.local –b –W –U
replicate
```

c Enter the replicate user password when prompted.

d Type yes in response to the following message.

"WARNING: the base backup operation will replace the current contents of the data directory. Please confirm by typing yes."

What to do next

Validate that the replication was successful. See Chapter 4, “Validate Appliance Database Replication,” on page 31.

Validate Appliance Database Replication

4

When testing failover or failback of the Appliance Database, validate that the database was replicated correctly.

After configuring the Appliance Database on designated master and replica appliance host machines, test that the database on either machine can function with your system.

Prerequisites

Procedure

1 Log in to the appliance that contains the primary or master database.

2 Run the `ps –ef |grep wal` command to validate that the WAL process is running.

```
# ps –ef |grep wal
postgres  4784  4779  0 21:42 ?        00:00:00 postgres: wal writer
process
postgres 20901  4779  0 22:49 ?        00:00:00 postgres: wal sender process replicate
10.26.36.64(55887) streaming 0/70000B8
```

3 Run the `pg_is_in_recovery` command to validate that the master appliance database is ready for read-write connections.

```
su – postgres
=
SELECT pg_is_in_recovery() ;
```

The command returns f for false.

```
vcac=# SELECT pg_is_in_recovery () ;
pg_is_in_recovery
___________________
f
(1 row)
```

4 Quit psql using the `\q` command.

5 Log in to the secondary appliance with the replica database using SSH.

6 Run the `pg_is_in_recovery` command to validate that the replica database is read only.

```
su – postgres
/opt/vmware/vpostgres/current/bin/psql vcac
SELECT pg_is_in_recovery () ;
```

The command returns t for true.

```
vcac=# SELECT pg_is_in_recovery () ;
pg_is_in_recovery
_____________________
t
(1 row)
```

7 Quit psql using the `\q` command.

Bulk Import, Update, or Migrate Virtual Machines

5

You can use the Bulk Import feature to import one or more virtual machines to a vRealize Automation deployment. You can also use ths feature to update one or more virtual machines without the need to re-import them or to migrate machines from one environment to another.

The Bulk Import feature imports virtual machines intact with defining data such as reservation, storage path, blueprint, owner, and any custom properties. Bulk Import supports the following administrative tasks:

- Import one or more unmanaged virtual machines so that they can be managed in a vRealize Automation deployment
- Import one or more managed virtual machines from a vRealize Automation deployment into an upgraded deployment
- Make a global change to a virtual machine property, such as a storage path
- Migrate a virtual machine from one environment to another

You can execute the Bulk Import feature commands using either the vRealize Automation console or the CloudUtil command-line interface. For more information about using the CloudUtil command-line interface, see the *Machine Extensibility* documentation.

Prerequisites

Log in to the vRealize Automation console as a **fabric administrator** and as a **business group manager**.

Procedure

1 Generate Virtual Machine CSV Data File on page 34

You generate a virtual machine CSV data file to import, update, or migrate virtual machines to a vRealize Automation deployment.

2 Edit Virtual Machine CSV Data File on page 35

Before you import or update one or more virtual machines, you must edit the virtual machine CSV data file so that each machine value matches a value that exists in the target deployment. If you are migrating a virtual machine from one environment to another, editing is optional.

3 Import, Update, or Migrate One or More Virtual Machines on page 36

After you edit the virtual machine CSV data file, you can import, update, or migrate one or more virtual machines into a vRealize Automation deployment.

Generate Virtual Machine CSV Data File

You generate a virtual machine CSV data file to import, update, or migrate virtual machines to a vRealize Automation deployment.

Prerequisites

Log in to the vRealize Automation console as a **fabric administrator** and as a **business group manager**.

Procedure

1 Select **Infrastructure > Infrastructure Organizer > Bulk Imports**.

2 Click **Generate CSV File**.

3 Select the machine type from the **Machines** drop-down menu.

Option	Description
Managed	Virtual machine is managed in a vRealize Automation deployment and can be viewed in the console. Select this option if you are updating a machine or migrating from one environment to another.
Unmanaged	Virtual machine exists in a hypervisor but is not managed in a vRealize Automation deployment and cannot be viewed in the console. Select this option if you are importing a virtual machine.

4 Select the **Business group** default value.

5 Select the **Owner** default value.

6 Select the **Blueprint** default value.

If you select **Unmanaged** for the machine type and select a value for **Business group** and **Blueprint**, you might see the following results in the CSV data file:

- `Host Reservation (Name or ID) = INVALID_RESERVATION`
- `Host To Storage (Name or ID) = INVALID_HOST_RESERVATION_TO_STORAGE`

This happens when you do not have a reservation in the selected business group for the host machine that also hosts the unmanaged machine. If you have a reservation in that business group for the unmanaged machine's host, the Host Reservation and Host To Storage values fill in properly.

7 Select the resource type from the **Resource** drop-down menu.

Option	Description
Endpoint	Information required to access a virtualization host.
Compute Resource	Information required to access a group of virtual machines performing a similar function.

8 Select the name of the virtual machine resource from the **Name** drop-down menu.

9 Click **OK**.

Edit Virtual Machine CSV Data File

Before you import or update one or more virtual machines, you must edit the virtual machine CSV data file so that each machine value matches a value that exists in the target deployment. If you are migrating a virtual machine from one environment to another, editing is optional.

To import, update or migrate virtual machines contained in a CSV data file, each machine must be associated with a reservation, storage location, blueprint, and owner that already exists in the target vRealize Automation deployment. All of the values for each machine must be present in the target vRealize Automation deployment for the operation to succeed. You can change the values for reservation, storage location, blueprint, and owner for any operation on each machine by editing the CSV file.

If you are importing a virtual machine that uses a static IP address, you must append the appropriate command to the CSV file.

Prerequisites

"Generate Virtual Machine CSV Data File," on page 34

Procedure

1 Open the CSV file and edit the data categories so that they match existing categories in the target vRealize Automation deployment.

Heading	Comment
# Import--Yes or No	Can change to No to prevent a particular machine from being imported.
Virtual Machine Name	Do not change.
Virtual Machine ID	Do not change because it is ignored during the import process.
Host Reservation (Name or ID)	Must match the name of a reservation in the target vRealize Automation instance.
Host To Storage (Name or ID)	Must match the name of a storage location in the target vRealize Automation instance.
Blueprint (Name or ID)	Must match a blueprint in the target vRealize Automation instance.
Owner Name	Must match a domain user in the target vRealize Automation instance.

Custom properties are exported only for managed machines and appear in the CSV file following the data categories. This table presents the custom property format.

Heading	Comment
Property Name	Custom property name, for example, __Legacy.Workflow.User.
Property Value	Custom property value, for example, user%40org.sqa-horizon.local.
(H|N)(E|O)(R|P)	Custom property flags: (H|N) = Hidden|Not Hidden - (E|O) Encrypted|NotEncrypted - (R|P) Runtime|NotRuntime, for example, NOP = Not Hidden, Not Encrypted, Not Runtime.

Custom properties ensure that each managed machine is imported with all of the machine properties from the previous environment. The custom properties vary from machine to machine, and there is no standard set of custom properties that appear for each machine by default.

2 If you are importing a virtual machine with a static IP address, append a command in the following form to the CSV file.

```
,VirtualMachine.Network#.Address, w.x.y.z, HOP
```

Configure the command with the appropriate information for your virtual machine.

- Change the `#` to the number of the network interface being configured with this static IP address. For example, `VirtualMachineNetwork0.Address`
- Change `w.x.y.z` to be the static IP address for the virtual machine.
- The `HOP` string sets the visibility of the property. This default property is removed from the virtual machine after a successful import.

Note For a successful import, the IP address must be available in a properly configured address pool. If the address cannot be found or is already in use, the import will succeed without the static IP address definition, and an error will be logged.

3 Save the CSV file and close it.

Import, Update, or Migrate One or More Virtual Machines

After you edit the virtual machine CSV data file, you can import, update, or migrate one or more virtual machines into a vRealize Automation deployment.

You can import a managed machine or an unmanaged machine. You can migrate or update only managed machines. A managed machine is a virtual machine that is managed in a vRealize Automation deployment and that you can view in the console. An unmanaged machine is a virtual machine that exists in a hypervisor but is not managed in a vRealize Automation deployment and cannot be viewed in the console.

Prerequisites

"Edit Virtual Machine CSV Data File," on page 35

Procedure

1 Select **Infrastructure > Infrastructure Organizer > Bulk Imports**.

2 Click **New Bulk Import**.

3 Enter a name for this task in the **Name** text box.

4 Enter the CSV file name in the **CSV file** text box by browsing to the CSV file name.

5 Import the file using these options.

- Select **Now** to begin the import, update, or migrate process immediately.
- Select a start date and time in the **Start time** drop-down menu.

  Note The specified start time is the server's local time and not the local time of the user's workstation.

- Select the number of seconds to delay each virtual machine registration in the **Delay (seconds)** drop-down menu.

  Note To specify no delay, leave the option blank. Selecting this option slows the import process. Select this option when you import a large number of virtual machines.

- Select the total number of machines being registered at a given time in the **Batch size** menu.

  Note To specify no limit, leave the option blank. Selecting this option slows the import process. Select this option when you import a large number of virtual machines.

- If you are importing virtual machines, select **Ignore managed machines** to omit managed machines during the import process.

  Note By selecting this option, you can rerun the import without editing the CSV file to exclude machines that are already successfully imported.

- If you are updating virtual machines, do not select **Ignore managed machines**.
- If you are migrating machines, select **Ignore managed machines** in the target environment so that you can reprocess the CSV file.
- Select **Skip user validation** to omit validating users during the import process.

  Note Selecting this option sets a machine's owner to the value listed in the Owner column of the CSV data file without verifying that the user exists. Selecting this option can decrease the import time.

- Select **Test import** to run the import process without importing machines.

  Note Testing the import process allows you to test the CSV file for errors before you actually import the machines.

6 Click **OK**.

The progress of the operation appears on the Bulk Import Details page.

Managing vRealize Automation 6

The system administrator configures a default tenant for the vRealize Automation. They can update SSL certificates and licenses, and monitor logs, services, and license usage.

This chapter includes the following topics:

Managing Tenants

The system administrator performs the initial configuration of single sign-on and basic tenant setup, including designating at least one identity store and a tenant administrator for each tenant. Thereafter, a tenant administrator can configure additional identity stores and assign roles to users or groups from the identity stores.

Note You cannot delete a tenant that contains a business group. You must remove all business groups and then delete the tenant.

Tenancy Overview

A tenant is an organizational unit in a vRealize Automation deployment. A tenant can represent a business unit in an enterprise or a company that subscribes to cloud services from a service provider.

Each tenant has its own dedicated configuration. Some system-level configuration is shared across tenants.

Table 6-1. Tenant Configuration

Configuration Area	Description
Login URL	Each tenant has a unique URL to the vRealize Automation console. ■ The default tenant URL is in the following format: https://*hostname*/vcac ■ The URL for additional tenants is in the following format: https://*hostname*/vcac/org/*tenantURL*
Identity stores	Each tenant requires access to one or more directory services, such as OpenLDAP or Microsoft Active Directory servers, that are configured to authenticate users. You can use the same directory service for more than one tenant, but you must configure it separately for each tenant.
Branding	A tenant administrator can configure the branding of the vRealize Automation console including the logo, background color, and information in the header and footer. System administrators control the default branding for all tenants.
Notification providers	System administrators can configure global email servers that process email notifications. Tenant administrators can override the system default servers, or add their own servers if no global servers are specified.
Business policies	Administrators in each tenant can configure business policies such as approval workflows and entitlements. Business policies are always specific to a tenant.
Service catalog offerings	Service architects can create and publish catalog items to the service catalog and assign them to service categories. Services and catalog items are always specific to a tenant.
Infrastructure resources	The underlying infrastructure fabric resources, for example, vCenter servers, Amazon AWS accounts, or Cisco UCS pools, are shared among all tenants. For each infrastructure source that vRealize Automation manages, a portion of its compute resources can be reserved for users in a specific tenant to use.

About the Default Tenant

When the system administrator configures single sign-on during the installation of vRealize Automation, a default tenant is created with the built-in system administrator account to log in to the vRealize Automation console. The system administrator can then configure the default tenant and create additional tenants.

The default tenant supports all of the functions described in Tenant Configuration. In the default tenant, the system administrator can also manage system-wide configuration, including global system defaults for branding and notifications, and monitor system logs.

The default tenant is the only tenant that supports native Active Directory authentication. All other tenants must use Active Directory over OpenLDAP.

User and Group Management

All user authentication is handled through single sign-on. Each tenant has one or more identity stores, such as Active Directory servers, that provide authentication.

The system administrator performs the initial configuration of single sign-on and basic tenant setup, including designating at least one identity store and a tenant administrator for each tenant. Thereafter, a tenant administrator can configure additional identity stores and assign roles to users or groups from the identity stores.

Tenant administrators can also create custom groups within their own tenant and add users and groups defined in the identity store to custom groups. Custom groups, like identity store groups and users, can be assigned roles or designated as the approvers in an approval policy.

Tenant administrators can also create business groups within their tenant. A business group is a set of users, often corresponding to a line of business, department or other organizational unit, that can be associated with a set of catalog services and infrastructure resources. Users, identity store groups, and custom groups can be added to business groups.

Comparison of Single-Tenant and Multitenant Deployments

vRealize Automation supports deployments with either a single tenant or multiple tenants. The configuration can vary depending on how many tenants are in your deployment.

System-wide configuration is always performed in the default tenant and can apply to one or more tenants. For example, system-wide configuration might specify defaults for branding and notification providers.

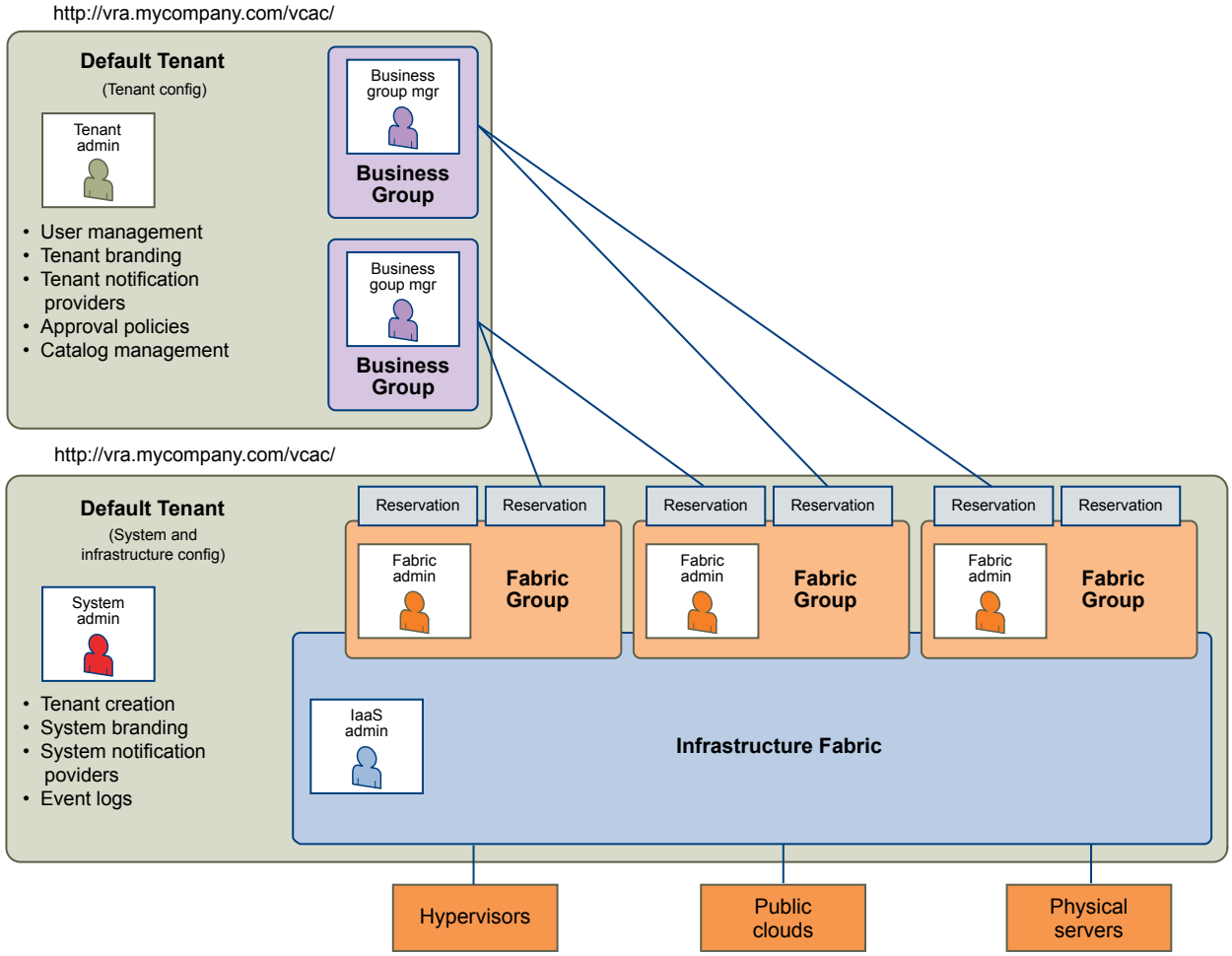
Infrastructure configuration, including the infrastructure sources that are available for provisioning, can be configured in any tenant and is shared among all tenants. The infrastructure resources, such as cloud or virtual compute resources or physical machines, can be divided into fabric groups managed by fabric administrators. The resources in each fabric group can be allocated to business groups in each tenant by using reservations.

Single-Tenant Deployment

In a single-tenant deployment, all configuration can occur in the default tenant. Tenant administrators can manage users and groups, configure tenant-specific branding, notifications, business policies, and catalog offerings.

All users log in to the vRealize Automation console at the same URL, but the features available to them are determined by their roles.

Figure 6-1. Single-Tenant Example



Note In a single-tenant scenario, it is common for the system administrator and tenant administrator roles to be assigned to the same person, but two distinct accounts exist. The system administrator account is always administrator@vsphere.local. The tenant administrator must be a user in one of the tenant identity stores, such as *username*@mycompany.com.

Multitenant Deployment

In a multitenant environment, the system administrator creates tenants for each organization that uses the same vRealize Automation instance. Tenant users log in to the vRealize Automation console at a URL specific to their tenant. Tenant-level configuration is segregated from other tenants and from the default tenant. Users with system-wide roles can view and manage configuration across multiple tenants.

There are two main scenarios for configuring a multi-tenant deployment.

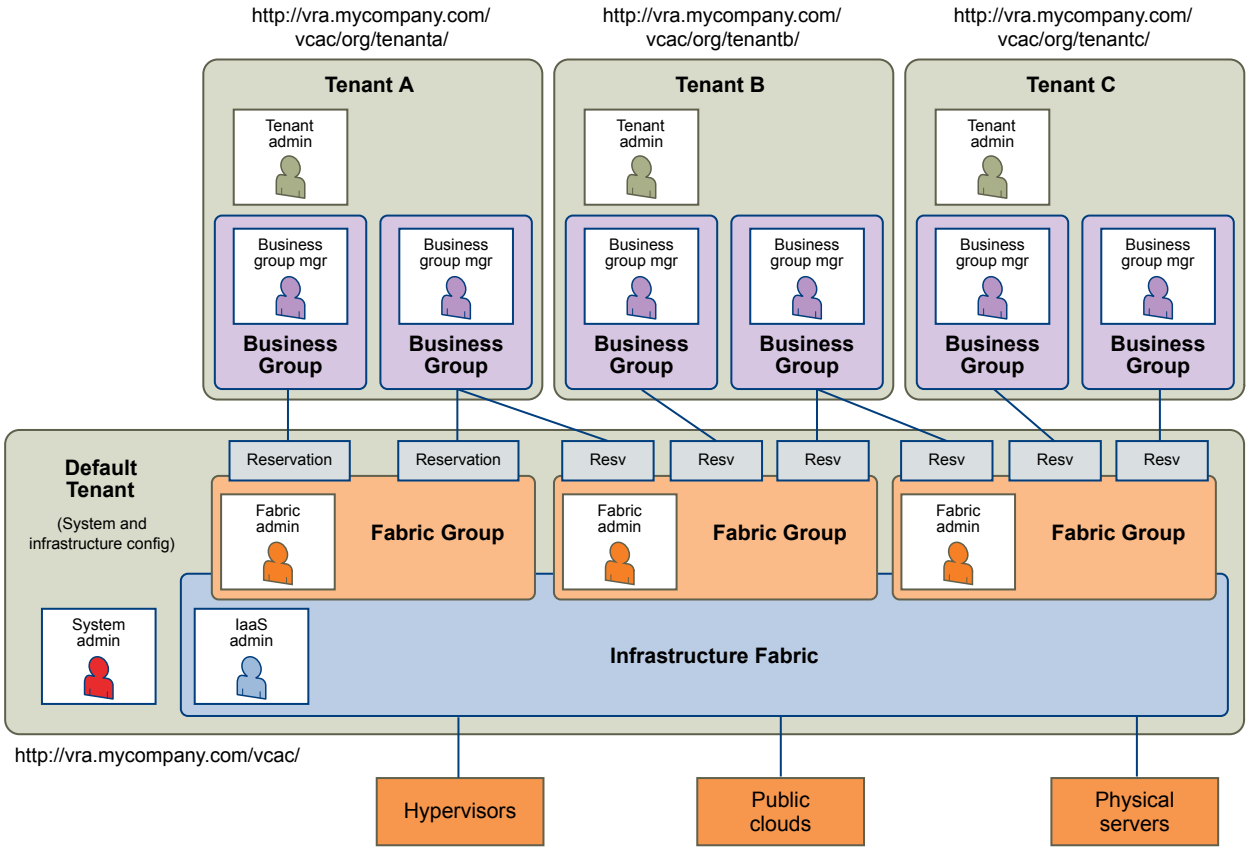
Table 6-2. Multitenant Deployment Examples

Example	Description
Manage infrastructure configuration only in the default tenant	In this example, all infrastructure is centrally managed by IaaS administrators and fabric administrators in the default tenant. The shared infrastructure resources are assigned to the users in each tenant by using reservations.
Manage infrastructure configuration in each tenant	In this scenario, each tenant manages its own infrastructure and has its own IaaS administrators and fabric administrators. Each tenant can provide its own infrastructure sources or can share a common infrastructure. Fabric administrators manage reservations only for the users in their own tenant.

The following diagram shows a multitenant deployment with centrally managed infrastructure. The IaaS administrator in the default tenant configures all infrastructure sources that are available for all tenants. The IaaS administrator can organize the infrastructure into fabric groups according to type and intended purpose. For example, a fabric group might contain all virtual resources, or all Tier One resources. The fabric administrator for each group can allocate resources from their fabric groups. Although the fabric administrators exist only in the default tenant, they can assign resources to business groups in any tenant.

Note Some infrastructure tasks, such as importing virtual machines, can only be performed by a user with both the fabric administrator and business group manager roles. These tasks might not be available in a multitenant deployment with centrally managed infrastructure.

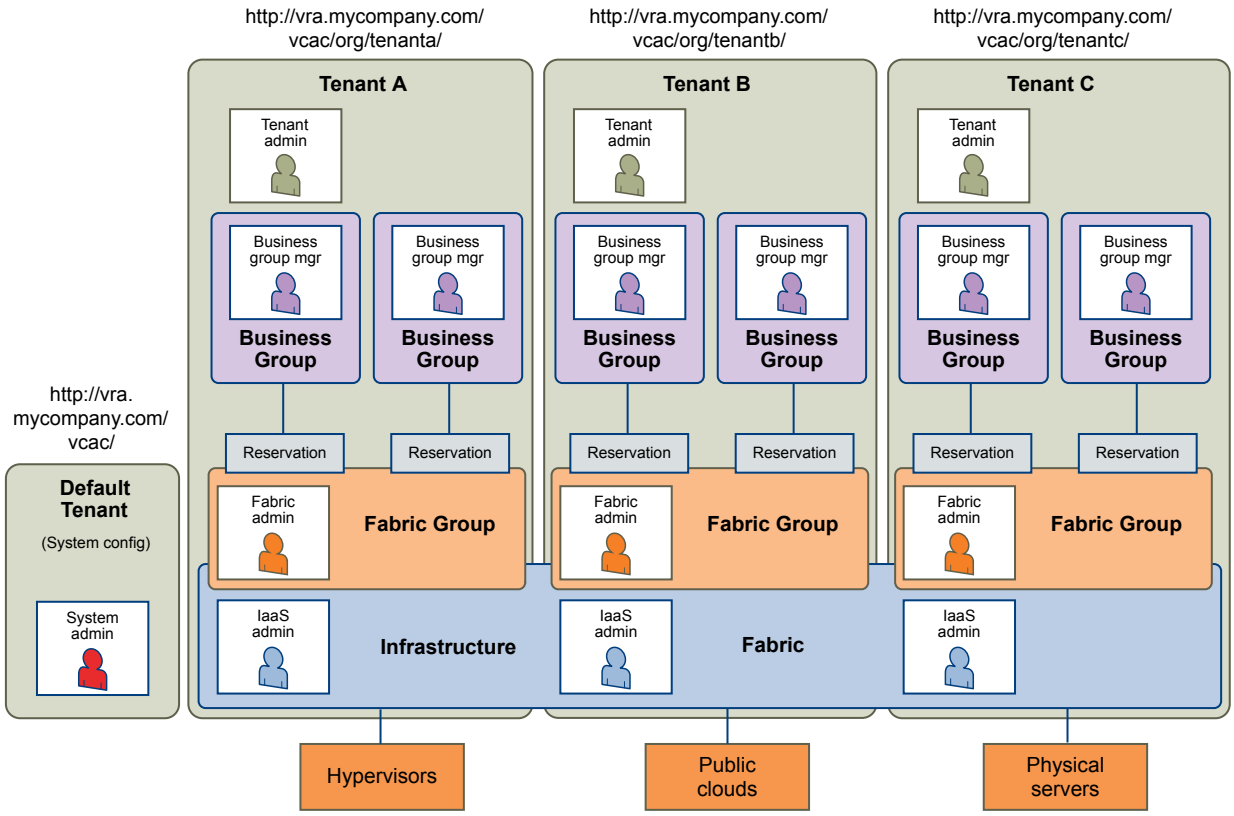
Figure 6-2. Multitenant Example with Infrastructure Configuration Only in Default Tenant



The following diagram shows a multitenant deployment where each tenant manages their own infrastructure. The system administrator is the only user who logs in to the default tenant to manage system-wide configuration and create tenants.

Each tenant has an IaaS administrator, who can create fabric groups and appoint fabric administrators with their respective tenants. Although fabric administrators can create reservations for business groups in any tenant, in this example they typically create and manage reservations in their own tenants. If the same identity store is configured in multiple tenants, the same users can be designated as IaaS administrators or fabric administrators in each tenant.

Figure 6-3. Multitenant Example with Infrastructure Configuration in Each Tenant



Create and Configure a Tenant

System administrators create tenants and specify basic configuration such as name, login URL, identity stores, and administrators.

Prerequisites

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

Procedure

1 Specify Tenant Information on page 45

The first step to configuring a tenant is to add the new tenant to vRealize Automation and create the tenant-specific access URL.

2 Configure Identity Stores on page 45

Each tenant must be associated with at least one identity store. Identity stores can be OpenLDAP or Active Directory. Use of Native Active Directory is also supported for the default tenant.

3 Appoint Administrators on page 46

You can appoint one or more tenant administrators and IaaS administrators from the identity stores you configured for a tenant.

Specify Tenant Information

The first step to configuring a tenant is to add the new tenant to vRealize Automation and create the tenant-specific access URL.

Prerequisites

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

Procedure

1 Select **Administration > Tenants**.

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

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

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

5 Enter a unique identifier for the tenant in the **URL Name** text box.

This URL token is used to append a tenant-specific identifier to the vRealize Automation console URL.

For example, enter **`mytenant`** to create the URL https://*vrealize-appliance-hostname.domain.name*/vcac/org/*mytenant*.

6 (Optional) Enter an email address in the **Contact Email** text box.

7 Click **Submit and Next**.

Your new tenant is saved and you are automatically directed to the **Identity Stores** tab for the next step in the process.

Configure Identity Stores

Each tenant must be associated with at least one identity store. Identity stores can be OpenLDAP or Active Directory. Use of Native Active Directory is also supported for the default tenant.

Prerequisites

"Specify Tenant Information," on page 45.

Procedure

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

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

3 Select the type of identity store from the **Type** drop-down menu.

4 Enter the URL for the identity store in the **URL** text box.

For example, **`ldap://ldap.mycompany.com:389`** .

5 Enter the domain for the identity store in the **Domain** text box.

6 (Optional) Enter the domain alias in the **Domain Alias** text box.

The alias allows users to log in by using *userid@domain-alias* rather than *userid@identity-store-domain* as a user name.

7 Enter the Distinguished Name for the login user in the **Login User DN** text box.

Use the display format of the user name, which can include spaces and is not required to be identical to the user ID.

For example, `cn=Demo Admin,ou=demo,dc=dev,dc=mycompany,dc=com`.

8 Enter the password for the identity store login user in the **Password** text box.

9 Enter the group search base Distinguished Name in the **Group Search Base DN** text box.

For example, `ou=demo,dc=dev,dc=mycompany,dc=com`.

10 (Optional) Enter the user search base Distinguished Name in the **User Search Base DN** text box.

For example, `ou=demo,dc=dev,dc=mycompany,dc=com`.

11 Click **Test Connection**.

Check that the connection is working.

12 Click **Add**.

13 (Optional) Repeat Step 1 to Step 12 to configure additional identity stores.

14 Click **Next**.

Your new identity store is saved and associated with the tenant. You are directed to the **Administrators** tab for the next step in the process.

Appoint Administrators

You can appoint one or more tenant administrators and IaaS administrators from the identity stores you configured for a tenant.

Tenant administrators are responsible for configuring tenant-specific branding, as well as managing identity stores, users, groups, entitlements, and shared blueprints within the context of their tenant. IaaS Administrators are responsible for configuring infrastructure source endpoints in IaaS, appointing fabric administrators, and monitoring IaaS logs.

Prerequisites

- "Configure Identity Stores," on page 45.
- Before you appoint IaaS administrators, you must install IaaS. For more information about installation, see *Installation and Configuration*.

Procedure

1 Enter the name of a user or group in the **Tenant Administrators** search box and press Enter.

For faster results, enter the entire user or group name, for example myAdmins@mycompany.domain. Repeat this step to appoint additional tenant administrators.

2 If you have installed IaaS, enter the name of a user or group in the **Infrastructure Administrators** search box and press Enter.

For faster results, enter the entire user or group name, for example IaaSAdmins@mycompany.domain. Repeat this step to appoint additional infrastructure administrators.

3 Click **Add**.

Brand Tenant Login Pages

You can apply custom branding on a customer level to vRealize Automation tenant login pages.

Custom branding configured using this procedure applies to all tenants for a particular customer.

Prerequisites

Complete the tenant configuration process as described in "Create and Configure a Tenant," on page 44.

Procedure

1 Create a file named `mybranding.txt` that contains your branding content, and save it to the `/etc/` folder under your vRealize Appliance installation.

The content must be what you want for the value of the "vmwSTSBrandName" LDAP string.

2 Run the following command to ensure that the vcac user has read permissions for the branding file.

```
Chmod 744/etc/mybranding.txt
```

3 Add the following instruction to the `/etc/vcac/setenv-user` file.

```
VCAC_OPTS="$VCAC_OPTS -Dcom.vmware.vcac.tenant.branding.file=/etc/mybranding.txt
```

4 Run the following command to restart the vRealize Automation Tomcat server.

```
/etc/init.d/vcac-server restart
```

5 Log in to the system as a tenant manager and update existing tenants to implement the branding.

The specified branding applies to all new tenants automatically.

What to do next

Verify that the tenant login page is appropriately branded by logging in and accessing the updated tenant.

Install a Hotfix

Technical support for your vRealize Automation installation might involve a software patch, or hotfix, that you can install using the vRealize Appliance management interface.

The hotfix installer cannot patch the following vRealize Automation components.

- The Management Agent
- Non vSphere agents such as XenServer, VDI, or Hyper-V

Prerequisites

- Obtain the hotfix file, and copy it to the file system available to the machine where you run your Web browser.
- Verify that all nodes in your vRealize Automation installation are up and running.

  If you attempt to install a hotfix without all nodes running, the vRealize Appliance management interface might become unresponsive. If that happens, contact technical support. Do not attempt to install patches through other means or otherwise use vRealize Automation until resolving the issue.

Procedure

1 Log in to the vRealize Appliance management interface as root.

https://*vrealize-automation-appliance-FQDN*:5480

2 Click **vRA Settings > Hotfix**.

3 Click **New**.

4 Click **Browse**, and navigate to the hotfix file.

You can click **Back** to select a different hotfix, or to return to the Hotfix page.

5 Click **Upload**.

6 Select the uploaded patch, and click **Install**.

It might take several moments to install the patch. When installed, the status changes to COMPLETED.

If you need to uninstall a hotfix, Technical Support can provide a rollback hotfix that you install using the same procedure.

If you need to enable or disable the hotfix interface, use the following commands from a root login vRealize Appliance console session.

```
/opt/vmware/share/htdocs/service/hotfix/hotfix.sh enable
/opt/vmware/share/htdocs/service/hotfix/hotfix.sh disable
```

Updating vRealize Automation Certificates

A system administrator can replace certificates for vRealize Automation components. Typically, you replace a certificate to switch from self-signed certificates to certificates provided by a certificate authority or when a certificate expires.

When you replace a certificate for a vRealize Automation component, components that have a dependency on this certificate are affected. You must register the new certificate with these components to ensure certificate trust.

You must update all components of the same type in a distributed system. For example, if you update a certificate for one vRealize Appliance in a distributed environment, you must update all instances of vRealize Appliance for that installation.

Certificates for the Identity Appliance management site and vRealize Appliance management site do not have registration requirements.

Note vRealize Automation supports both SHA1 and SHA2 certificates. The self-signed certificates generated by the system use SHA-256 With RSA Encryption. You may need to update vRealize Automation components to use SHA2 certificates due to browser requirements.

Update components in the following order:

1 Identity Appliance

2 vRealize Appliance

3 IaaS components

With one exception, changes to later components in this list do not affect earlier ones. For example, if you import a new certificate to a vRealize Appliance, you must register this change with the IaaS server, but not with the Identity Appliance. The exception is that an updated certificate for IaaS components must be registered with vRealize Appliance.

The following table shows registration requirements when you update a certificate.

Table 6-3. Registration Requirements

Updated Certificate	Register new certificate with Identity Appliance	Register new certificate with vRealize Appliance	Register new certificate with IaaS
Identity Appliance	Not applicable	Done automatically when you replace the vRealize Appliance certificate	Done automatically when you replace the vRealize Appliance certificate
vRealize Appliance	No	Not applicable	Yes
IaaS	No	Yes	Not applicable

Note If your certificate uses a passphrase for encryption and you do not enter it when you replace your certificate on the virtual appliance, the certificate replacement fails and the message `Unable to load private key` appears.

In addition to certificates for the Identity Appliance, the vRealize Appliance, IaaS Website components, and Manager Service components, your deployment can have certificates for the Identity Appliance management site and the vRealize Appliance management site. Management Agents also have certificates. Each IaaS machine runs a Management Agent.

For important information about troubleshooting, supportability, and trust requirements for certificates, see the VMware knowledge base article at http://kb.vmware.com/kb/2106583.

Extracting Certificates and Private Keys

Certificates that you use with the virtual appliances must be in the PEM file format.

The examples in the following table use Gnu `openssl` commands to extract the certificate information you need to configure the virtual appliances.

Table 6-4. Sample Certificate Values and Commands (openssl)

Certificate Authority Provides	Command	Virtual Appliance Entries
RSA Private Key	openssl pkcs12 -in *path _to_.pfx certificate_file* -nocerts -out key.pem	**RSA Private Key**
PEM File	openssl pkcs12 -in *path _to_.pfx certificate_file* -clcerts -nokeys -out cert.pem	**Certificate Chain**
(Optional) Pass Phrase	n/a	**Pass Phrase**

Update vRealize Automation Certificates when all are Expired

As a system administrator, you need to update all of your vRealize Automation certificates because they have expired or are no longer appropriate for your deployment.

You must update certificates and appropriate trust relationships for all vRealize Automation system components in the specified order.

After updating certificates, if you encounter problems with trust relationships between vRealize Automation components, see the following Knowledge Base article:
https://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2110207

Prerequisites

- Obtain the appropriate valid, fresh certificates for your vRealize Automation deployment, if applicable.

- If you are using signed certificates, the certificate root CA, Intermediate CA, and CRL servers are all reachable by all vRealize Automation components.

Procedure

1 Back up all vRealize Automation appliances and related databases.

See "Replace a Certificate in the vRealize Appliance," on page 53.

2 Replace the Identity Appliance certificate.

See "Update the vRealize Appliance with the Identity Appliance Certificate," on page 52.

3 Update the Identity Appliance trust relationship.

See . "Update the vRealize Appliance with the Identity Appliance Certificate," on page 52

4 Replace the vRealize Appliance certificate on all appliances.

See "Replace a Certificate in the vRealize Appliance," on page 53.

5 Update SSO registration for all instances of the vRealize Appliance.

See "Update SSO Registration for the vRealize Appliance," on page 54.

6 Replace the certificates on all IIS components running on Infrastructure Web Servers.

See "Replace the Internet Information Services Certificate," on page 56.

7 Update the trust relationship with Model Manager Data artifacts on Infrastructure Web Servers.

See "Update the IaaS Servers with the vRealize Appliance Certificate," on page 55.

8 Update the certificates of Infrastructure components on he Infrastructure Web Server with Model Manager Data artifacts in order to establish trust between the appliances and the infrastructure.

See "Update the vRealize Appliance with the IaaS Certificate," on page 57

9 If the Manager Service resides on a separate tier from the Web Server, ensure that the Web Server tier certificate is trusted on all Infrastructure nodes.

10 Update the Manager Service certificate.

See "Replace the Internet Information Services Certificate," on page 56.

11 Verify that all Infrastructure nodes trust the certificate on the Manager Service.

12 Update the vRealize Orchestrator plugins to trust the Infrastructure Web Appliance and SSO certificates.

13 Update all templates to trust the Manager Service certificates.

In the case of a combined deployment, this would be the Web/Manager Service.

Updating the Identity Appliance Certificate

The system administrator can replace a self-signed certificate with another self-signed certificate or a domain certificate after the installation is complete.

1 Replace a Certificate in the Identity Appliance on page 51

The system administrator can replace a self-signed certificate with one from a certificate authority. The same certificate can be used on multiple machines.

2 Update the vRealize Appliance with the Identity Appliance Certificate on page 52

After the Identity Appliance certificate is updated, the system administrator updates the vRealize Appliance with the new certificate information. This process reestablishes trusted communications between the virtual appliances.

Replace a Certificate in the Identity Appliance

The system administrator can replace a self-signed certificate with one from a certificate authority. The same certificate can be used on multiple machines.

The labels for the private key and certificate chain headers and footers depend on the certificate authority in use. Information here is based on headers and footers for a certificate generated by `openssl`.

Procedure

1 Navigate to the Identity Appliance management console by using its fully qualified domain name, https://*identity-hostname.domain.name*:5480/.

2 Log in with user name **`root`** and the password you specified when you deployed the Identity Appliance.

3 Click the **SSO** tab.

The red text is a prompt, not an error message.

4 Select the certificate type from the **Choose Action** menu.

If you are using a PEM-encoded certificate, for example for a distributed environment, select **Import PEM Encoded Certificate**.

Certificates that you import must be trusted and must also be applicable to all instances of vRealize Appliance and any load balancer by using Subject Alternative Name (SAN) certificates.

Note If you use certificate chains, specify the certificates in the following order:

- The client/server certificate signed by the intermediate CA certificate
- One or more intermediate certificates
- A root CA certificate

Option	Action
Import PEM Encoded Certificate	a Copy the certificate values from BEGIN PRIVATE KEY to END PRIVATE KEY, including the header and footer, and paste them in the **RSA Private Key** text box. b Copy the certificate values from BEGIN CERTIFICATE to END CERTIFICATE, including the header and footer, and paste them in the **Certificate Chain** text box. c (Optional) If your certificate uses a pass phrase to encrypt the certificate key, copy the pass phrase and paste it in the **Pass Phrase** text box.
Generate Self-Signed Certificate	a Type a common name for the self-signed certificate in the **Common Name** text box. You can use the fully qualified domain name of the virtual appliance (*hostname.domain.name*) or a wild card, such as *.*mycompany*.com. b Type your organization name, such as your company name, in the **Organization** text box. c Type your organizational unit, such as your department name or location, in the **Organizational Unit** text box. d Type a two-letter ISO 3166 country code, such as **US**, in the **Country** text box.
Keep Existing	Leave the current SSL configuration. Select this option to cancel your changes.

5 Click **Apply Settings.**

The certificate is updated.

Update the vRealize Appliance with the Identity Appliance Certificate

After the Identity Appliance certificate is updated, the system administrator updates the vRealize Appliance with the new certificate information. This process reestablishes trusted communications between the virtual appliances.

Use the `import-certificate` command to import the SSL certificate from the Identity Appliance into the SSL keystore used by the vRealize Appliance. The `alias` value specifies the alias under which the imported certificate is stored in the keystore, and `url` is the address of the SSL endpoint.

Prerequisites

"Replace a Certificate in the Identity Appliance," on page 51.

Procedure

1 Start Putty or another Unix SSL remote login tool.

2 Log in to the vRealize Appliance with user name **root** and the password you specified when deploying the appliance.

3 Execute the `import-certificate` command:

```
/usr/sbin/vcac-config import-certificate --alias websso --url https://identity-hostname.domain.name:7444
```

For example:

```
/usr/sbin/vcac-config import-certificate --alias websso --url https://identity-vm76-115.eng.mycompany.com:7444
```

4 Restart the vRealize Appliance.

5 Navigate to the vRealize Appliance management console by using its fully qualified domain name, https://*vra-va-hostname.domain.name*:5480/.

6 Select **System > Reboot**.

7 Click **Services** and wait for all services to be registered.

The certificate is updated on the vRealize Appliance.

Updating the vRealize Appliance Certificate

The system administrator can replace a self-signed certificate with another self-signed certificate or a domain certificate. You can use Subject Alternative Name (SAN) certificates, wildcard certificates, or any other method of multi-use certification appropriate for your environment as long as you satisfy the trust requirements.

1 Replace a Certificate in the vRealize Appliance on page 53

The system administrator can replace a self-signed certificate with a trusted one from a certificate authority. You can use Subject Alternative Name (SAN) certificates, wildcard certificates, or any other method of multi-use certification appropriate for your environment as long as you satisfy the trust requirements.

2 Update SSO Registration for the vRealize Appliance on page 54

When the host name for a vRealize Appliance is changed, the system administrator must update Identity Appliance SSO registration.

3 Update the IaaS Servers with the vRealize Appliance Certificate on page 55

After the virtual appliance certificates are updated, the system administrator updates the IaaS server running the Model Manager Data component registry to reestablish trusted communications between the virtual appliances and IaaS components.

Replace a Certificate in the vRealize Appliance

The system administrator can replace a self-signed certificate with a trusted one from a certificate authority. You can use Subject Alternative Name (SAN) certificates, wildcard certificates, or any other method of multi-use certification appropriate for your environment as long as you satisfy the trust requirements.

Procedure

1 Navigate to the vRealize Appliance management console by using its fully qualified domain name, https://*vra-va-hostname.domain.name*:5480/.

2 Log in with user name **root** and the password you specified when deploying the Identity Appliance.

3 Navigate to **vRA Settings > Host Settings**.

4 Go to the **SSL Configuration** pane.

5 Select the certificate type from the **Certificate Action** menu.

If you are using a PEM-encoded certificate, for example for a distributed environment, select **Import**.

Certificates that you import must be trusted and must also be applicable to all instances of vRealize Appliance and any load balancer through the use of Subject Alternative Name (SAN) certificates.

Note If you use certificate chains, specify the certificates in the following order:

- Client/server certificate signed by the intermediate CA certificate
- One or more intermediate certificates
- A root CA certificate

Option	Action
Import	a Copy the certificate values from BEGIN PRIVATE KEY to END PRIVATE KEY, including the header and footer, and paste them in the **RSA Private Key** text box. b Copy the certificate values from BEGIN CERTIFICATE to END CERTIFICATE, including the header and footer, and paste them in the **Certificate Chain** text box. For multiple certificate values, include a BEGIN CERTIFICATE header and END CERTIFICATE footer for each certificate. c (Optional) If your certificate uses a pass phrase to encrypt the certificate key, copy the pass phrase and paste it in the **Passphrase** text box.
Generate Certificate	a Type a common name for the self-signed certificate in the **Common Name** text box. You can use the fully qualified domain name of the virtual appliance (*hostname.domain.name*) or a wild card, such as *.*mycompany*.com. If you use a load balancer, you need to specify the FQDN of the load balancer or a wildcard that matches the name of the load balancer. If the name is the same as the host name for the virtual appliance, you can leave the text box empty. Do not accept a default value if one is shown, unless it matches the host name of the virtual appliance. b Type your organization name, such as your company name, in the **Organization** text box. c Type your organizational unit, such as your department name or location, in the **Organizational Unit** text box. d Type a two-letter ISO 3166 country code, such as **US**, in the **Country** text box.
Keep Existing	Leave the current SSL configuration. Select this option to cancel your changes.

6 Click **Save Settings**.

After a few minutes, the certificate details appear on the page.

The certificate is updated.

Update SSO Registration for the vRealize Appliance

When the host name for a vRealize Appliance is changed, the system administrator must update Identity Appliance SSO registration.

Prerequisites

"Replace a Certificate in the vRealize Appliance," on page 53.

Procedure

1 Navigate to the vRealize Appliance management console by using its fully qualified domain name, https://*vra-va-hostname.domain.name*:5480/.

2 Log in with user name **root** and the password you specified when deploying the Identity Appliance.

3 Go to **vRA Settings > SSO.**

4 Verify that the fully qualified name for the Identity Appliance, *identity-va-hostname.domain.name*, appears in the **SSO Host** text box.

For example, **vra-sso.mycompany.com**.

The https:// prefix is not used.

5 Verify that **:7444** is the entry in the **SSO Port** text box.

6 Verify that the SSO default tenant is **vsphere.local**.

Do not change this name.

7 Type the default administrator name **administrator@vsphere.local** in the **SSO Admin User** text box.

8 Type the SSO administrator password in the **SSO Admin Password** text box.

The password must match the password you specified in the SSO settings for the Identity Appliance.

9 Click **Save Settings**.

The Identity Appliance is updated with certificate information for the new vRealize Appliance host name.

Update the IaaS Servers with the vRealize Appliance Certificate

After the virtual appliance certificates are updated, the system administrator updates the IaaS server running the Model Manager Data component registry to reestablish trusted communications between the virtual appliances and IaaS components.

Execute the `vcac-Config.exe` command with the `UpdateServerCertificates` argument to update the IaaS database to recognize the new vRealize Appliance certificate.

For help on the `vcac-Config` command, type the following at a command prompt:

```
vcac-Config.exe help
```

Prerequisites

"Update SSO Registration for the vRealize Appliance," on page 54.

Procedure

1 Open a command prompt as an administrator and navigate to the `Cafe` directory on the Model Manager Data installation machine.

```
C:\Program Files (x86)\VMware\vCAC\Server\Model Manager Data\Cafe
```

2 Type the following command to update the IaaS database with the certificate information in one step. Supply the IaaS database name (vcac, by default) and the fully qualified domain name of the database server.

```
vcac-Config.exe UpdateServerCertificates -d vcac_database -s sql_database_server -v
```

For example:

```
vcac-Config.exe UpdateServerCertificates -d vCAC -s tr-w2008-13.eng.mycompany -v
```

Note The version of the command shown here, without the thumbprint argument, downloads the certificate in one step.

3 (Optional) If you use self-signed certificates or certificates signed by a custom certificate authority (CA), verify that the Windows servers that host the Manager Service, DEMs, and IaaS Website trust the new certificate and its certificate chain.

4 (Optional) Add the virtual appliance certificate to the trusted store if it is not trusted and recheck that Windows servers now trust the certificate and its certificate chain.

5 Type **iisreset** to reset IIS.

For high-availability installations, reset IIS for all servers that are part of your installation.

Updating the IaaS Certificate

The system administrator can replace a self-signed certificate with another self-signed certificate or a certificate from a certificate authority after the installation is complete. Certificate updates are required when the certificate type changes or the certificate expires.

1 Replace the Internet Information Services Certificate on page 56

The system administrator can replace an expired certificate or a self-signed certificate with one from a certificate authority to ensure security in a distributed deployment environment.

2 Update the vRealize Appliance with the IaaS Certificate on page 57

After certificates are updated on the IaaS servers, the system administrator updates the component registry to reestablish trusted communications between the virtual appliances and IaaS components.

3 Update Guest Agent Trust Relationship on page 58

You may need to update the trust relationship between vRealize Automation and Guest Agents if you updated or replaced an IaaS certificate. Guest Agents run on the virtual machine template that is used for provisioning through vRealize Automation.

Replace the Internet Information Services Certificate

The system administrator can replace an expired certificate or a self-signed certificate with one from a certificate authority to ensure security in a distributed deployment environment.

You can use a Subject Alternative Name (SAN) certificate on multiple machines. Import the certificate to the trusted root certificate store of all machines on which you installed the Website Component and Manager Service (the IIS machines) during the IaaS installation.

Procedure

1 Obtain a certificate from a trusted certificate authority.

2 Open the Internet Information Services (IIS) Manager.

3 Double-click **Server Certificates** from Features View.

4 Click **Import** in the Actions pane.

a Enter a file name in the **Certificate file** text box, or click the browse button **(…)**, to navigate to the name of a file where the exported certificate is stored.

b Enter a password in the **Password** text box if the certificate was exported with a password.

c Select **Mark this key as exportable**.

5 Click **OK**.

6 Click on the imported certificate and select **View**.

7 Verify that the certificate and its chain is trusted.

If the certificate is untrusted, you see the message, `This CA root certificate is not trusted`.

Note You must resolve the trust issue before proceeding with the installation. If you continue, your deployment fails.

8 Update IIS bindings.

a Select the site that hosts the component Web site and model manager.

b Click **Bindings** in the Action pane.

c Click **Edit** on the https (443) in the Site Bindings dialog box.

d Change the SSL certificate to the newly imported one.

9 Restart IIS or open an elevated command prompt window and type `iisreset`.

Update the vRealize Appliance with the IaaS Certificate

After certificates are updated on the IaaS servers, the system administrator updates the component registry to reestablish trusted communications between the virtual appliances and IaaS components.

As part of updating an IaaS certificate, you must register the new certificate with the vRealize Appliance. You can use the hostname or IP address of the IaaS machines in the following commands. If you are using a load balancer, supply the host name of the load balancer instead. Note that URL paths are case-sensitive.

If you encounter errors, see the troubleshooting section in the installation documentation.

Prerequisites

"Replace the Internet Information Services Certificate," on page 56.

Procedure

1 On the IaaS machine that has an updated certificate, open a command prompt as Administrator, and navigate to the following directory.

```
C:\Program Files (x86)\VMware\vCAC\Server\Model Manager Data\Cafe
```

2 Register the address for applicable IaaS components by entering the following command:

```
Vcac-Config.exe RegisterEndpoint --EndpointAddress
https://<iaas-web-server-or-load-balancer-hostname> -v
```

For example:

```
Vcac-Config.exe RegisterEndpoint --EndpointAddress https://vcac.tech.mycompany.com -v
```

3 Restart the vRealize Appliance service by entering the following command:

```
service vcac-server restart
```

Wait approximately 15 minutes for the service to restart.

Update Guest Agent Trust Relationship

You may need to update the trust relationship between vRealize Automation and Guest Agents if you updated or replaced an IaaS certificate. Guest Agents run on the virtual machine template that is used for provisioning through vRealize Automation.

You do not need to entirely reinstall Guest Agents in order to reestablish the trust relationship with vRealize Automation. The `cert.pem` file that resides on the machine on which the Guest Agent is installed contains the certificate trust data. In order to reestablish trust, this file must be updated.

The location of this file depends on whether the Guest Agent runs under Windows or Linux.

Table 6-5. Guest Agent Certificate File Locations

Operating System	Folder
Windows	`c:\vrmguestagent\cert.pem`
Linux	`/usr/share/gugent/cert.pem`

Update the `cert.pem` file by running the appropriate commands.

Prerequisites

- Obtain the server name and IP address of the server that runs the IaaS Manager Service.
- If necessary, convert the template on which the Guest Agent is installed to a virtual machine.

Procedure

1 Run the operating system appropriate commands in an elevated command prompt.

Option	Description
Windows	Run the following commands: a `cd c:\vrmguestagent` b `echo | openssl s_client –connect` *`manager_service_load_balancer.mycompany.com`*`:443 | sed –ne '/–BEGIN CERTIFICATE–/,/–END CERTIFICATE–/p' > cert.pem`
Linux	Run the following commands: a `cd /usr/share/gugent` b `echo | openssl s_client –connect` *`manager_service_load_balancer.mycompany.com`*`:443 | sed –ne '/–BEGIN CERTIFICATE–/,/–END CERTIFICATE–/p' > cert.pem`

2 If applicable, convert the Guest Agent virtual machine back to a template.

Replace the Identity Appliance Management Site Certificate

The Identity Appliance uses lighttpd to run its own management site. You can replace the SSL certificate of the management site service, for example, if your certificate expires or if you are using a self-signed certificate and your company security policy requires you to use its SSL certificates. You secure the management site service on port 5480.

Prerequisites

To install a new certificate, the certificate must be in PEM format and the private key cannot be encrypted. By default the Identity Appliance management site SSL certificate and private key are stored in a PEM file located at `/opt/vmware/etc/lighttpd/server.pem`.

See "Extracting Certificates and Private Keys," on page 49 if you require information about exporting a certificate and private key from a Java keystore to a PEM file.

Procedure

1 Login through the appliance console or through SSH.

2 Back up your current certificate file.

```
cp /opt/vmware/etc/lighttpd/server.pem /opt/vmware/etc/lighttpd/server.pem-bak
```

3 Copy the new certificate to your appliance by replacing the content of the file `/opt/vmware/etc/lighttpd/server.pem` with the new certificate information.

4 Run the following command to restart the lighttpd server.

```
service vami-lighttp restart
```

5 Login to the management console and validate that the certificate is replaced. You might need to restart your browser.

The new Identity Appliance management site certificate is installed.

Updating the vRealize Appliance Management Site Certificate

The system administrator can replace the SSL certificate of the management site service when it expires or to replace a self-signed certificate with one issued by a certificate authority. You secure the management site service on port 5480.

The vRealize Appliance uses lighttpd to run its own management site. When you replace a management site certificate, you must also configure all Management Agents to recognize the new certificate.

If you are running a distributed deployment, you can update Management Agents automatically or manually. If you are running a minimal deployment, you must update the management agent manually.

See "Manually Update Management Agents to Recognize a vRealize Appliance Management Site Certificate," on page 61 for more information.

1 Replace the vRealize Automation Appliance Management Site Certificate on page 60

   The vRealize Appliance uses lighttpd to run its own management site. You can replace the SSL certificate of the management site service if your certificate expires or if you are using a self-signed certificate and your company security policy requires you to use its SSL certificates. You secure the management site service on port 5480.

2 Manually Update Management Agents to Recognize a vRealize Appliance Management Site Certificate on page 61

   After replacing a vRealize Appliance management site certificate, a system administrator updates all Management Agents to recognize the new certificate to reestablish trusted communications between the virtual appliance management site and Management Agents on IaaS hosts. Each IaaS hosts runs a Management Agent and each Management Agent must be updated.

3 Automatically Update Management Agents in a Distributed Environment to Recognize a vRealize Appliance Management Site Certificate on page 62

   After the Management Site certificate is updated in a high-availability deployment, the Management Agent configuration must be modified so that it recognizes the new certificate. This is necessary to reestablish trusted communications between the virtual appliance management site and Management Agents on IaaS host. Each IaaS host runs a Management Agent and each Management Agent must be updated.

Replace the vRealize Automation Appliance Management Site Certificate

The vRealize Appliance uses lighttpd to run its own management site. You can replace the SSL certificate of the management site service if your certificate expires or if you are using a self-signed certificate and your company security policy requires you to use its SSL certificates. You secure the management site service on port 5480.

You can choose to install a new certificate or reuse the certificate used byvCloud Automation Center service on port 443.

When you request a new certificate to update another CA-issued certificate, it is a best practice to reuse the Common Name from the existing certificate.

Prerequisites

- New certificates must be in PEM format and the private key cannot be encrypted. By default, the vRealize Appliance management site SSL certificate and private key are stored in a PEM file located at `/opt/vmware/etc/lighttpd/server.pem`.

  See "Extracting Certificates and Private Keys," on page 49 if you require information about exporting a certificate and private key from a Java keystore to a PEM file.

Procedure

1 Login through the appliance console or through SSH.

2 Back up your current certificate file.

```
cp /opt/vmware/etc/lighttpd/server.pem /opt/vmware/etc/lighttpd/server.pem-bak
```

3 Copy the new certificate to your appliance by replacing the content of the file `/opt/vmware/etc/lighttpd/server.pem` with the new certificate information.

4 Run the following command to restart the lighttpd server.

```
service vami-lighttp restart
```

5 Login to the management console and validate that the certificate is replaced. You might need to restart your browser.

The new vRealize Appliance management site certificate is installed.

What to do next

Update all Manangement Agents to recognize the new certificate.

For distributed deployments, you can update Management Agents manually or automatically. For minimal installations, you must update agents manually.

For information about automatic update, see "Automatically Update Management Agents in a Distributed Environment to Recognize a vRealize Appliance Management Site Certificate," on page 62. For information about manual update, see "Manually Update Management Agents to Recognize a vRealize Appliance Management Site Certificate," on page 61

Manually Update Management Agents to Recognize a vRealize Appliance Management Site Certificate

After replacing a vRealize Appliance management site certificate, a system administrator updates all Management Agents to recognize the new certificate to reestablish trusted communications between the virtual appliance management site and Management Agents on IaaS hosts. Each IaaS hosts runs a Management Agent and each Management Agent must be updated.

Perform these steps for each Management Agent in your deployment after you replace a certificate for the vRealize Appliance management site.

For distributed deployments, you can update Management Agents manually or automatically. For information about automatic update, see "Automatically Update Management Agents in a Distributed Environment to Recognize a vRealize Appliance Management Site Certificate," on page 62

For minimal deployments, you must update Management Agents manually as described in this procedure.

Prerequisites

Obtain the SHA1 thumbprints of the new vRealize Appliance management site certificate.

Procedure

1 Stop the VMware vCloud Automation Center Management Agent service.

2 Navigate to the Management Agent configuration file located at `[vcac_installation_folder]\Management Agent\VMware.IaaS.Management.Agent.exe.Config`, typically `C:\Program Files (x86)\VMware\vCAC\Management Agent\VMware.IaaS.Management.Agent.exe.Config`.

3 Open the file for editing and locate the endpoint configuration setting for the old management site certificate. which you can identify by the endpoint address.

For example:

```
<agentConfiguration id="C816CFBC-4830-4FD2-8951-C17429CEA291" pollingInterval="00:03:00">
  <managementEndpoints>
    <endpoint address="https://vra-va.local:5480"
thumbprint="D1542471C30A9CE694A512C5F0F19E45E6FA32E6" />
  </managementEndpoints>
</agentConfiguration>
```

4 Change the thumbprint to the SHA1 thumbprint of the new certificate.

For example:

```
<agentConfiguration id="C816CFBC-4830-4FD2-8951-C17429CEA291" pollingInterval="00:03:00">
  <managementEndpoints>
    <endpoint address="https://vra-va.local:5480"
thumbprint="8598B073359BAE7597F04D988AD2F083259F1201" />
  </managementEndpoints>
</agentConfiguration>
```

5 If there are other `managementEndpoint` entries, delete them.

6 Start the VMware vCloud Automation Center Management Agent service.

7 Login to the virtual appliance management site and go to**vRA Settings > Cluster**.

8 Check the Distributed Deployment Information table to verify that the IaaS server has contacted the virtual appliance recently, which confirms that the update is successful.

Automatically Update Management Agents in a Distributed Environment to Recognize a vRealize Appliance Management Site Certificate

After the Management Site certificate is updated in a high-availability deployment, the Management Agent configuration must be modified so that it recognizes the new certificate. This is necessary to reestablish trusted communications between the virtual appliance management site and Management Agents on IaaS host. Each IaaS host runs a Management Agent and each Management Agent must be updated.

You can update vRealize Appliance management site certificate information for distributed systems manually or automatically. For information about manually updating Management Agents, see "Manually Update Management Agents to Recognize a vRealize Appliance Management Site Certificate," on page 61.

Use this procedure to update the certificate information automatically.

Procedure

1 When Management Agents are running, replace the certificate on a single vRealize Appliance management site in your deployment.

2 Wait fifteen minutes for the Management Agent to synchronize with the new vRealize Appliance management site certificate.

3 Replace certificates on other vRealize Appliance management sites in your deployment.

  Management Agents are automatically updated with the new certificate information.

Replace a Management Agent Certificate

The system administrator can replace the Management Agent certificate when it expires or replace a self-signed certificate with one issued by a certificate authority.

Each IaaS host runs its own Management Agent. Repeat this procedure on each IaaS node whose Management Agent you want to update.

Prerequisites

- Before you replace a Management Agent certificate, remove its entry from the Distributed Deployment Information table. Note the Management Agent identifier in the Node ID column before you remove the record. You use this identifier when you create the new Management Agent certificate and when you register it. For more information, see the procedure about removing a node from the Distributed Deployment Information table in *System Administration* for vRealize Automation.
- When you request a new certificate, ensure that the Common Name (CN) attribute in the certificate subject field for the new certificate is typed in in the following format:

  ```
  VMware Management Agent 00000000-0000-0000-0000-000000000000
  ```

  Use the string VMware Management Agent, followed by a single space and the GUID for the Management Agent in the numerical format shown.
- Record the SHA1 thumbprint of the new Management Agent certificate.

Procedure

1 Stop the Management Agent service from your Windows Services snap-in.

  a From your Windows machine, click **Start**.

  b In the Windows Start Search box, type **`services.msc`** and press Enter.

  c Right-click **VMware vCloud Automation Center Management Agent** service and click **Stop** to stop the service.

2 Remove the current certificate from the machine. For information about managing certificates on Windows Server 2008 R2, see the Microsoft Knowledge Base article at http://technet.microsoft.com/en-us/library/cc772354.aspx or the Microsoft wiki article at http://social.technet.microsoft.com/wiki/contents/articles/2167.how-to-use-the-certificates-console.aspx.

3 Register the Management Agent certificate with the vRealize Appliance management site.

a Open a command prompt as an administrator and navigate to the Cafe directory on the machine on which the Management Agent is installed at `<vra-installation-dir>\Management Agent\Tools\Cafe`, typically `C:\Program Files (x86)\VMware\vCAC\Management Agent\Tools\Cafe`

b Type the `Vcac-Config.exe RegisterNode` command with options to register the Management Agent identifier and certificate in one step. Include the Management Agent identifier you recorded earlier as the value for the `-nd` option and the thumbprint of the new certificate as the value of the `-tp`.

Table 6-6. Required Options and Arguments for Vcac-Config.exe RegisterNode

Option	Argument	Notes
`-url`	"*vra-va-hostname.domain.name*:5480"	The URL of the management site host, including a port specification
`-cu`	"root"	The user name, which must be the root user
`-cp`	"*password*"	Password for the root user as a quoted string
`-hn`	"*machine-hostname.domain.name*"	The machine name of the Management Agent host, including domain information
`-nd`	"*00000000-0000-0000-0000-000000000000*"	Management Agent identifier
`-tp`	"*0000000000000000000000000000000000000000*"	Thumbprint for the new certificate

The following example shows the command format:

```
Vcac-Config.exe RegisterNode -v -url "vra-va-hostname.domain.name:5480"
-cu "root" -cp "password" -hn "machine-hostname.domain.name"
-nd "00000000-0000-0000-0000-000000000000"
-tp "0000000000000000000000000000000000000000"
```

Example: Command to Register a Management Agent Certificate

```
Vcac-Config.exe RegisterNode -v -url "vra-va.eng.mycompany:5480" -cu "root" -cp "secret" -hn
"iaas.eng.mycompany" -nd "C816CFBX-4830-4FD2-8951-C17429CEA291" -tp
"70928851D5B72B206E4B1CF9F6ED953EE1103DED"
```

Resolve Certificate Revocation Errors

If you have a certificates generated by a Certificate Authority that is not located on the addressable network, HTTP requests will fail with an invalid certificate error. You can resolve this issue by editing the `web.config` file so that web applications on vRealize Automation components ignore certificate revocation errors.

Certificate revocation errors will result in certificates not being trusted which prevents your remote server from authenticating. You can determine if certificate revocation errors are causing problems by running the Windows vcac-config command `CheckServerCertificates` and then examining the log files.

If you make this change to configure your deployment to accept revoked certificates, these certificates are accepted until their expiration date.

Procedure

1 Open the Internet Information Services (IIS) Manager.

The exact procedure for opening IIS varies according to the version of Windows you are using.

2 Right-click the applicable site for your deployment.

3 Select **Explore**.

4 In the Windows Explorer window that opens containing the `web.config` file, locate the Configuration section and add the following commands.

```
<system.net>
<settings>
<servicePointManager checkCertificateRevocationList="false"/>
</settings>
</system.net>
```

5 Save the file and close it.

6 Repeat these steps for all applicable sites and IIS servers.

View License Usage

A system administrator can view the average number of servers and desktop licenses per endpoint. The average is calculated to the current day and the last time data collection ran. License usage information for the past twelve months is available to view.

Prerequisites

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

Procedure

1 Navigate to **Infrastructure > Administration > Licensing**.

2 In **License Report**, click **Select Month** and select the month you want to display.

The average number of servers and desktop licenses per endpoint appears.

Monitoring Logs and Services

A system administrator can monitor events and the state of services from the administration console.

View the Event Log

The Event Log displays alert and audit events for tenants. Advanced search capabilities are available.

Prerequisites

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

Procedure

1 Select **Administration > Event Logs**.

2 (Optional) Click **Advanced Search**, specify information for the event you are looking for and click the **Search** icon.

3 Select an event and click **View Details**.

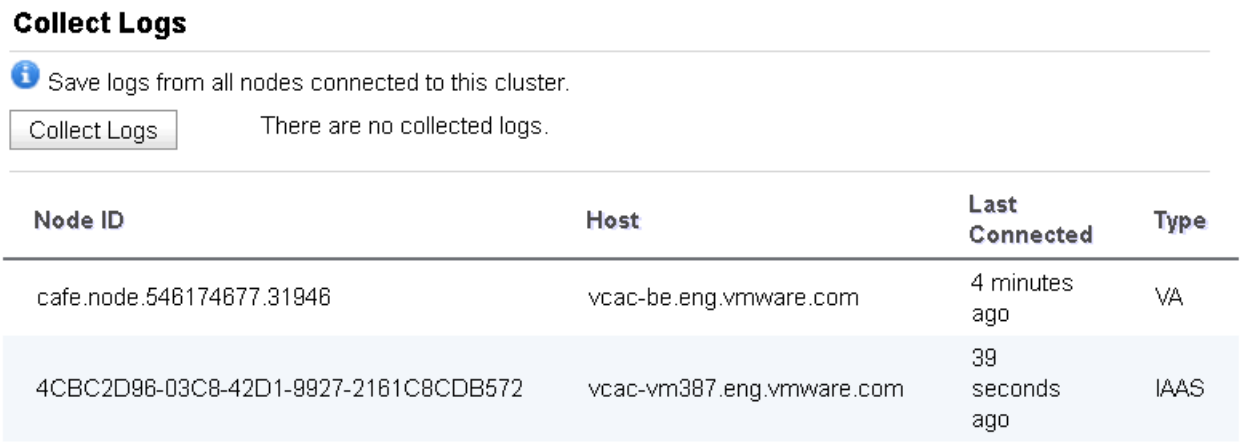
Viewing Host Information for Clusters in Distributed Deployments

You can collect logs for all nodes that are clustered in a distributed deployment from the vRealize Appliance management console.

You can also view information for each host in your deployment. The **Cluster** tab on the vRealize Automation management console includes a Distributed Deployment Information table that displays the following information:

- A list of all nodes in your deployment
- The host name for the node. The host name is given as a fully qualified domain name.
- The time since the host last replied to the management console. Nodes for IaaS components report availability every three minutes and nodes for virtual appliances report every nine minutes.
- The vRealize Automation component type. Identifies whether the node is a virtual appliance or an IaaS server.

Figure 6-4. Distributed Deployment Information table



You can use this table to monitor activity in your deployment. For example, if the Last Connected column indicates a host has not connected recently, that can be an indication of a problem with the host server.

Log Collection

You can create a zip file that contains log files for all hosts in your deployment. For more information, see "Collect Logs for Clusters and Distributed Deployments," on page 65.

Removing Nodes from the Table

When you remove a host from your deployment, remove the corresponding node from the Distributed Deployment Information table to optimize log collection times. For more information, see "Remove a Node from the Distributed Deployment Information Table," on page 66.

Collect Logs for Clusters and Distributed Deployments

You can create a zip file that includes all log files for servers in your deployment.

The Distributed Deployment Information table lists the nodes from which log files are collected.

Procedure

1 Log in to the vRealize Appliance with user name **root** and the password you specified when deploying the appliance.

2 Click **vRA Settings**.

3 Click the **Cluster** tab.

The Distributed Deployment Information table displays a list of nodes for the distributed deployment.

4 Click **Collect Logs**.

Log files for each node are collected and copied to a zip file.

Remove a Node from the Distributed Deployment Information Table

You delete the entry for a node from the Distributed Deployment Information table when the node is removed from your deployment cluster or when you are replacing a Management Agent certificate.

Procedure

1 Log in to the vRealize Appliance by using the user name **root** and the password you specified when you deployed the appliance.

2 Click **vRA Settings**.

3 Click the **Cluster** tab.

The Distributed Deployment Information table displays a list of nodes for the distributed deployment.

4 Locate the node ID for the node to be deleted and copy the ID to use in the next step.

5 Open a command prompt and type a command of the following form, using the node ID you previously copied.

```
/usr/sbin/vcac-config cluster-config-node
--action delete --id node-UID
```

6 Click **Refresh**.

The node no longer appears in the display.

vRealize Automation Services

A system administrator can view the status of vRealize Automation services from the Event Log on the system administrator console.

Subsets of services are required to run individual product components. For example, identity services and UI core services must be running before you can configure a tenant.

The following tables tell you which services are associated with areas of vRealize Automation functionality.

Table 6-7. Identity Service Group

Service	Description
management-service	Identity Service Group
sts-service	Single Sign-on Appliance
authorization	Authorization Service
authentication	Authentication
eventlog-service	Event log service
licensing-service	Licensing service

Table 6-8. UI Core services

Service	Description
shel-ui-app	Shell Service
branding-service	Branding Service
plugin-service	Extensibility (Plug-in) Service
portal-service	Portal Service

All the following services are required to run the IaaS component.

Table 6-9. Service Catalog Group (Governance Services)

Service	Description
notification-service	Notification service
workitem-service	Work Item service
approval-service	Approval Service
catalog-service	Service Catalog

Table 6-10. IaaS Services Group

Service	Description
iaas-proxy-provider	IaaS Proxy
iaas-server	IaaS Windows machine

Table 6-11. Advanced Services Designer

Service	Description
vco	vRealize Orchestrator
advanced-designer-service	Advanced Services

Starting Up and Shutting Down vRealize Automation

A system administrator performs a controlled shutdown or startup of vRealize Automation to preserve system and data integrity.

You can also use a controlled shutdown and startup to resolve performance or product behavior issues that can result from an incorrect initial startup. Use the restart procedure when only some components of your deployment fail.

Start Up vRealize Automation

When you start vRealize Automation from the beginning, such as after a power outage or a controlled shutdown, you must start its components in a specified order.

Prerequisites

Verify that the load balancers that your deployment uses are running.

Procedure

1 Start the MSSQL database machine. If you are using a legacy PostgreSQL standalone database, start that machine as well.

2 Start your Identity Appliance or vSphere SSO appliance and wait for the startup to finish.

3 Start the primary vRealize Appliance instance and wait for the startup to finish.

   The primary vRealize Appliance instance contains the writeable Appliance Database, if applicable, and is the last appliance that you shut down in an ordered shutdown procedure.

4 (Optional) If you are running a distributed deployment, start the secondary virtual appliances and wait for the startup to finish.

   You must wait for one appliance to boot before you start up another appliance. Make sure that all services, besides IaaS and vRealize Orchestrator, are running on the appliance before you start another appliance.

5 Start the primary Web node and wait for the startup to finish.

6 (Optional) If you are running a distributed deployment, start all secondary Web nodes and wait 5 minutes.

7 Start the primary Manager Service node and wait for 2 to 5 minutes, depending on your site configuration.

8 Start the Distributed Execution Manager Orchestrator and Workers and all vRealize Automation agents.

   You can start these components in any order and you do not need to wait for one startup to finish before you start another.

9 Verify that the startup succeeded.

   a Navigate to the vRealize Appliance management console by using its fully qualified domain name, https://*vra-va-hostname.domain.name*:5480/.

   b Click the **Services** tab.

   c Click the **Refresh** tab to monitor the progress of service start up.

When all services are listed as registered, the system is ready to use.

Restart vRealize Automation

When you restart more than one vRealize Automation component, you must restart the components in a specified order.

You might need to restart some components in your deployment to resolve anomalous product behavior. If you are using vCenter Server to manage your virtual machines, use the guest `restart` command to restart vRealize Automation.

If you cannot restart a component or service, follow the instructions in "Shut Down vRealize Automation," on page 69 and "Start Up vRealize Automation," on page 67.

Prerequisites

Verify that load balancers that your deployment uses are running.

Procedure

1 Restart your Identity Appliance or vSphere SSO appliance and wait for the startup to finish.

2 Restart the primary vRealize Appliance and wait for the start up to finish.

   The primary vRealize Appliance is the one containing the writeable Appliance Database, if applicable, and the last appliance that you shut down in an ordered shut down procedure.

3 For distributed deployments, restart secondary virtual appliances, and wait for all appliances to restart.

   You do not need to wait for one appliance to finish booting up before you restart another appliance.

4 Restart the primary Web node and wait for the startup to finish.

5 If you are running a distributed deployment, start all secondary Web nodes and wait for the startup to finish.

6 Restart all Manager Service nodes and wait for the startup to finish.

7 Restart the Distributed Execution Manager Orchestrator and Workers and all vRealize Automation agents, and wait for the startup to finish for all components.

   You can restart these components in any order.

8 Verify that the service you restarted is registered.

   a Navigate to the vRealize Appliance management console by using its fully qualified domain name, https://*vra-va-hostname.domain.name*:5480/.

   b Click the **Services** tab.

   c Click the **Refresh** tab to monitor the progress of service start up.

When all services are listed as registered, the system is ready to use.

Shut Down vRealize Automation

To preserve data integrity, you must shut down vRealize Automation in a specified order.

If you are using vCenter Server to manage your virtual machines, use the guest `shutdown` command to shut down vRealize Automation.

Procedure

1 Shut down the Distributed Execution Manager Orchestrator and Workers and all vRealize Automation agents in any order and wait for all components to finish shutting down.

2 Shut down virtual machines that are running the Manager Service and wait for the shutdown to finish.

3 (Optional) For distributed deployments, shut down all secondary Web nodes and wait for the shutdown to finish.

4 Shut down the primary Web node, and wait for the shutdown to finish.

5 (Optional) For distributed deployments, shut down all secondary vRealize Appliance instances and wait for the shutdown to finish.

6 Shut down the primary vRealize Appliance and wait for the shutdown to finish.

   If applicable, the primary vRealize Appliance is the one that contains the master, or writeable, Appliance Database. Make a note of the name of the primary vRealize Appliance. You use this information when you restart vRealize Automation.

7 Shut down the MSSQL virtual machines in any order and wait for the shutdown to finish.

8 If you are using a legacy standalone PostgreSQL database, also shut down that machine.

9 Shut down your SSO appliance, which could be an Identity Appliance or a vSphere SSO appliance.

You shut down your vRealize Automation deployment.

Customize Data Rollover Settings

You can enable and configure vRealize Automation data rollover settings to control how your system retains, archives or deletes legacy data.

Use the data rollover feature to configure the maximum number of days for the vRealize Automation system to retain data in the IaaS SQL Server database before archiving or deleting it. By default, this feature is disabled. To enable data rollover or configure settings, modify the data rollover settings on the vRealize Automation Global Properties page. When enabled, this feature queries and purges data only from the following SQL Server database tables.

- UserLog
- Audit
- CategoryLog
- VirtualMachineHistory
- VirtualMachineHistoryProp
- AuditLogItems
- AuditLogItemsProperties
- TrackingLogItems
- WorkflowHistoryInstances
- WorkflowHistoryResults

If the data rollover DataRolloverIsArchiveEnabled feature is set to **True**, archive versions of the tables are created in the dbo schema. For instance, the archive version of UserLog would be UserLogArchive, and the archive version of VirtualMachineHistory would be VirtualMachineHistoryArchive.

When enabled, the data rollover workflow runs once a day at a predetermined time of 3 a.m. according to the vRealize Appliance time zone configuration. Using the DataRollover MaximumAgeInDays setting, you can set the maximum number of days that you want to retain the data. If archive is set to **True**, data older than that specified in the DataRollover MaximumAgeInDays is moved to the archive tables. If archive is set to **False**, data is permanently deleted and no data archiving occurs. Deleted data is not recoverable.

Note Consider existing system data and the potential impact on system performance before enabling data rollover. For example, if you enable this feature one year after vRealize Automation began running in your environment, verify that you have set the value of DataRollover MaximumAgeInDays property to 300 or greater to ensure that enabling data rollover feature does not impact system performance.

Procedure

1 Log in to vRealize Automation as a vRealize administrator.

2 Navigate **Infrastructure > Administration > Global Properties**.

3 On the Global Properties page, locate the Data Rollover section of the table and review and set properties as appropriate.

Property	Description
DataRollover IsArchiveEnabled	By default this property is set to **True** and it moves the data to the archive tables. Note: If you set this property to **False**, all data older than that specified in the DataRollover MaximumAgeInDays field is permanently deleted.
DataRollover MaximumAgeInDays	Specifies the maximum number of days that the system retains data in the database before moving to archive or purging. By default this property is set to 90 days.
DataRollover Status	By default this property is set to **Disabled**. To enable this feature, set the DataRollover Status property to **Enabled**. If you disable this feature while it is running, the current workflow is not impacted, but the next workflow is disabled.

4 Click the **Edit** icon () in the first table column to edit a property.

The Value field for the applicable property becomes editable and you can place your cursor within it to change the value.

5 Click the **Save** icon () in the first table column to save your changes.

Remove an Identity Appliance from a Domain

You can remove an Identity Appliance host machine from your domain.

In some cases, you might need to remove an Identity Appliance from your domain. For instance, if the Identity Appliance domain account becomes corrupted or is deleted, you might need to remove the existing appliance and then add another instance of it with updated account information.

Procedure

- Run the following command on the target Identity Appliance host server machine.

```
cd opt/likewise/bin./domainjoin-cli leave
```

The targeted Identity Appliance is removed from the domain.

Backup and Recovery for vRealize Automation Installations

7

To minimize system downtime and data loss in the event of failures, administrators back up the entire vRealize Automation installation on a regular basis. If your system fails, you can recover by restoring the last known working backup and reinstalling some components.

This chapter includes the following topics:

Backing Up vRealize Automation

A system administrator backs up the full vRealize Automation installation on a regular basis.

Users can employ several strategies, singly or in combination, to back up vRealize Automation system components. For virtual machines, you can use the Snapshot function to create snapshot images of critical components. If a system failure occurs, you can use these images to restore components to their state when the images were created. Alternatively, and for non-virtual machine components, you can create copies of critical configuration files for system components, which can be used to restore these components to a customer configured state following reinstallation.

A complete backup includes the following components:

- IaaS MS SQL database.
- PostgreSQL database. (Applicable only for legacy installations that do not use an Appliance Database.)
- Identity Appliance or other SSO appliance.
- vRealize Appliance.
- IaaS components.
- (Optional) Application Services load balancers.
- (Optional) Load balancers that support your distributed deployment. Consult the vendor documentation for your load balancer for information about backup considerations.

Guidelines for Planning Backups

Use these guidelines to plan backups:

- When you back up a complete system, back up the Identity Appliance, all instances of the vRealize Appliance, and databases at the same time.
- Minimize the number of active transactions before you begin a backup.

- Back up all databases at the same time.
- Back up the virtual appliance load balancer at the same time you back up the Identity Appliance.
- Create a backup of instances of the vRealize Appliance when you update certificates.
- Create a backup of IaaS components when you update certificates.

In addition, back up the Identity Appliance in the following cases:

- You change the configuration.
- You add or delete a tenant.
- You create, delete, or modify an identity store.

Backing Up vRealize Automation Databases

The database administrator backs up the IaaS MSSQL Server and Appliance Database or legacy PostgreSQL database.

As a best practice, back up MSSQL and Appliance Database or legacy PostgreSQL databases as nearly simultaneously as possible to prevent or minimize data loss. Also, if possible, back up the databases with Point-in-Time enabled. By using Point-in-Time recovery, you ensure that the two databases are consistent with each other. If only one database fails, you must restore the running database to the most recent backup so that the databases are consistent.

IaaS MSSQL Database

Follow your in-house procedures to back up the IaaS MSSQL database outside of the vRealize Automation framework.

Use the following guidelines when creating a backup:

- If possible, check that all IaaS workflows are complete and that all IaaS services are stopped or that activity is minimized.
- Back up with Point-in-Time enabled.
- Back up the MSSQL database at the same time that you back up the other components.
- Back up the passphrase for your database.

Note Your database is protected by a passphrase. Have the passphrase available when you restore the database. Typically, you record the passphrase in a safe and accessible location at install time.

Appliance Database or Legacy PostgreSQL Database

If you are using an Appliance Database or a legacy PostgreSQL database embedded in a vRealize Appliance, you can back up the database by backing up the entire appliance with one of the methods described in "Backing Up the vRealize Appliance," on page 75. If you are using a legacy PostgreSQL database, you can also backup the database separately. See the VMware Knowledge Base article *Migrating from external vPostgres appliance to vPostgres instance located in the vCAC appliance (2083562)* at http://kb.vmware.com/kb/2083562 for more information.

A standalone legacy PostgreSQL appliance must be backed up separately. See the VMware Knowledge Base article *Migrating from external vPostgres appliance to vPostgres instance located in the vCAC appliance (2083562)* at http://kb.vmware.com/kb/2083562 for more information.

Backing Up the Identity Appliance

The system administrator schedules backups of the Identity Appliance single sign-on server on a regular basis.

As a best practice, back up your Identity Appliance, vRealize Appliance, and databases at the same time.

In addition, back up the Identity Appliance in the following cases:

You can use one or more of the following methods to create backups.

- The vSphere Export function.
- Cloning.
- VMware vSphere Data Protection, to create backups of the entire appliance.
- vSphere Replication, to replicate the virtual appliance to another site.
- VMware Recovery Manager, to enable high availability by backing up the appliance to a different data center.

You can use snapshots for backups only if you store or replicate them to a location other than the appliance location. If the snapshot image is accessible after a failure, using it is the most direct way to recover the appliance.

Backing Up the vRealize Appliance

The system administrator backs up the vRealize Appliance by exporting or cloning the appliance. You can also copy configuration files to use to recreate the configuration that was in place at the time of the backup.

Back up appliances by exporting or cloning them.

As a best practice, back up your Identity Appliance, vRealize Appliance, and databases on the same schedule.

You can use the following methods to create backups.

- The vSphere Export function.
- Cloning.
- VMware vSphere Data Protection, to create backups of the entire appliance.
- vSphere Replication, to replicate the virtual appliance to another site.
- VMware Recovery Manager, to enable high availability by backing up the appliance to a different data center.

You can use snapshots to backup virtual appliances only if you store or replicate them to a location other than the appliance location. If the snapshot image is accessible after a failure, using it is the most direct way to recover the appliance.

To preserve only the configuration information for the appliance, back up the following files, preserving the owner, group, and permissions for each file. These files are also backed up as part of exporting or cloning an appliance.

- `/etc/vcac/encryption.key`
- `/etc/vcac/vcac.keystore`
- `/etc/vcac/vcac.properties`
- `/etc/vcac/security.properties`
- `/etc/vcac/server.xml`

- /etc/vcac/solution-users.properties
- /etc/apache2/server.pem
- /etc/vco/app-server/sso.properties
- /etc/vco/app-server/plugins/*
- /etc/vco/app-server/vmo.properties
- /etc/vco/app-server/js-io-rights.conf
- /etc/vco/app-server/security/*
- /etc/vco/app-server/vco-registration-id
- /etc/vco/app-server/vcac-registration.status
- /etc/vco/configuration/passwd.properties
- /var/lib/rabbitmq/.erlang.cookie
- /var/lib/rabbitmq/mnesia/**

Backing Up Load Balancers

Load balancers distribute work among servers in high-availability deployments. The system administrator backs up the load balancers on a regular basis at the same time as other components.

Follow your site policy for backing up load balancers, keeping in mind the preservation of network topology and vRealize Automation backup planning.

As a best practice, always back up your load balancer when you back up the Identity Appliance.

Backing Up IaaS Components

The system administrator backs up IaaS components. Use these guidelines to plan backups.

You can back up IaaS components by taking a snapshot or by copying configuration files to a second location. If you choose to copy files, copy back up components in the following order:

- Agents and DEMs
- Manager Service
- Websites

For agents, back up the following information:

1 The agent name.

2 The endpoint name. Note that this is different from the endpoint address.

3 The following files located in the Agent's installation folder (<vCAC Folder>\Agents\<Agent Name>\):

- VRMAgent.exe.config file

- RepoUtil.exe.config file

For agents, back up the following information:

1 The agent name.

2 The endpoint name. Note that this is different from the endpoint address.

3 The following files located in the Agent's installation folder (<vCAC Folder>\Agents\<Agent Name>\):

- VRMAgent.exe.config file

- RepoUtil.exe.config file

For DEMs, back up the following information:

1 The agent name.

2 The following files located in the DEM's installation folder (<vCAC Folder>\Distributed Execution Manager\<DEM Name>\):

- ManagerService.exe.config file

- policy.config file

For Web components, back up the following files:

1 For the primary Web node only, in the Model Manager Data folder (<vCAC Folder>\Server)

- ConfigTool folder (applicable only for the primary Web node)

- policy.config file

2 The following files located in the installation folder (<vCAC Folder>\Server\Website\):

- Web.config file

3 The following files located in the installation folder (<vCAC Folder>\Web API\):

- Web.config file

- policy.config file

4 The name of the IIS instance.

Backing Up vRealize Automation Certificates

A system administrator backs up certificates and certificate chains at installation time or when a certificate is replaced.

Back up the following certificates:

- The SSO certificate and its entire chain.
- vRealize Appliance certificates and the entire corresponding certificate chain.
- IaaS certificates and the entire corresponding certificate chain.

Activate the Failover IaaS Server

If a system failure occurs on the Manager Service host and your system is configured appropriately, you can activate a secondary failover server.

Prerequisites

Procedure

1 Change the startup type of the vCloud Automation Center Manager Service on the primary Manager Service host to manual start up.

a Select **Start > Administrative Tools > Services** on the primary server.

b Select **Manual** as the startup type of the vCloud Automation Center service.

2 Make the secondary Manager Service host the active host by changing the startup type of the vCloud Automation Center service to automatic start up.

a Select **Start > Administrative Tools > Services** on the primary server.

b Select **Automatic** as the startup type of the vCloud Automation Center service.

3 Verify that the secondary node is enabled on the load balancer.

4 Restart vCloud Automation Center services.

   a Select **Start > Administrative Tools > Services**.

   b Start the vCloud Automation Center service, the Distributed Execution Manager services, and vCloud Automation Center agent services, in that order.

   c Wait five minutes and check that the services you started are running.

vRealize Automation System Recovery

A system administrator uses backups to restore vRealize Automation to a functional state after a system failure. If IaaS components such as Manager Service machines fail, you must reinstall them.

If you restore from a backup, machines that were provisioned after the backup still exist, but are not managed by vRealize Automation. For example, they do not appear in the items list for the owner. Use the Infrastructure Organizer to import virtual machines and bring them back under management.

Perform these steps in order, beginning with the first component that needs to be restored. If a component is functioning normally, you do not have to restore it.

1 Restoring vRealize Automation Databases on page 78

   A system administrator restores the IaaS MSSQL database and the PostgreSQL database.

2 Restoring the Identity Appliance on page 80

   If a failure occurs, a system administrator restores the Identity Appliance.

3 Restore the vRealize Appliance and Load Balancer on page 80

   If a failure occurs, a system administrator restores the vRealize Appliance. If a load balancer is used, the administrator restores the load balancer and the virtual appliances that it manages. If a host name changes during restoration, you must update configuration files appropriately.

4 Restoring the IaaS Website, Manager Services, and Their Load Balancers on page 81

   A system administrator restores the IaaS Website and Manager Service and their associated load balancers. If you change a host name or IP address for a load balancer, you must update this information in associated configuration files.

5 Reinstall the DEM Orchestrator and the DEM Workers on page 84

   If a failure occurs, a system administrator reinstalls all DEMs.

6 Reinstall the IaaS Agents on page 84

   The system administrator reinstalls all IaaS agents that need to be restored.

Restoring vRealize Automation Databases

A system administrator restores the IaaS MSSQL database and the PostgreSQL database.

Recover a database in the following situations:

- If both databases fail, restore them from the last known time when both databases were backed up.
- If one database fails, restore it and revert the functional database to the version that was in use when the backup used to restore the failed database was created.

The backup time for each database can differ. The greater the gap between the last working time of the databases, the greater the potential for data loss.

For information about how to restore a PostgreSQL database, see the VMware Knowledge Base article *Migrating from external vPostgres appliance to a vPostgres instance located in the vCAC appliance (2083562)..*

Database Passphrases

IaaS MSSQL database security requires a security passphrase to generate an encryption key that protects the data. You specify this passphrase when you install vRealize Automation.

If you lose the passphrase, or want to change the passphrase, consult VMware technical support for more information.

Configure vRealize Automation MSSQL Databases with New Host Names

You can restore an MSSQL database from a backup with no additional steps required. If the hostname of the MSSQL database machine changes, you must revise configuration information for the MSSQL database.

Procedure

1 Update the database entries.

   a Open SQL Server Management Studio and locate the `DynamicOps.RepositoryModel.Models` table.

   b Locate the string `Data Source` in the table and change the original SQL Server host name to the new host name for each instance of the connection string.

   For example:

   ```
   Data Source=MACHINE-NAME.domain.name;...
   ```

2 For each machine not being reinstalled that contains a Web site component, update the host name in the configuration file.

   a Open the `C:\Program Files (x86)\VMware\vCAC\Server\Model Manager Web\Web.config` file in an editor.

   b Locate the `repository` element and make the following changes:

   - Modify the value of the `server` attribute for the database hostname. For example:

     ```
     server=DB-repository-hostname.domain.name
     ```

   - If you changed the database name, modify the value of the `database` attribute to use the new name.

   c Save and close the `Web.config` file.

3 Run the `iisreset` command from an account with administrator privileges.

4 For each machine not being reinstalled that contains a Manager Service component, update the host name in the configuration file.

   a Open the `C:\Program Files (x86)\VMware\vCAC\Server\ManagerService.exe.config` file in an editor.

   b Locate the string `Data Source` and change the original SQL Server host name to the new host name for each instance of the connection string. For example:

   ```
   server=DB-hostname.domain.name
   ```

   c If you changed the database name, modify the value of the `Initial Catalog` attribute to use the new name. For example:

   ```
   Initial Catalog=DBName;
   ```

   d Save and close the `ManagerService.exe.config` file.

5 Restart the Manager Service.

What to do next

Restore the Identity Appliance. See "Restoring the Identity Appliance," on page 80.

Restoring the Identity Appliance

If a failure occurs, a system administrator restores the Identity Appliance.

You can restore the Identity Appliance either by redeploying it or by importing a snapshot of the appliance.

- To restore the Identity Appliance by redeploying, see *Installation and Configuration* documentation for vRealize Automation.
  - If you have tenants other than the default tenant, reconfigure them.
  - If you change the hostname of the Identity Appliance, reconfigure the SSO settings on each vCloud Automation Center Appliance management console to point to the new name.
- To restore the Identity Appliance from a snapshot, import it from an appropriate image.
- To restore the Identity Appliance using VMware vSphere Data Protection or Replication, follow the steps to deploy the Identity Appliance in *Installation and Configuration*.

After you restore the Identity Appliance, restore the vCloud Automation Center Appliance and, if required, your load balancers. See "Restore the vRealize Appliance and Load Balancer," on page 80.

Restore the vRealize Appliance and Load Balancer

If a failure occurs, a system administrator restores the vRealize Appliance. If a load balancer is used, the administrator restores the load balancer and the virtual appliances that it manages. If a host name changes during restoration, you must update configuration files appropriately.

You might need to restore a failed virtual appliance in the following circumstances:

- You are running a minimal deployment and your only vRealize Appliance fails or becomes corrupted.
- You are running a distributed deployment and some, but not all, virtual appliances fail.
- You are running a distributed deployment and all virtual appliances fail.

How you restore a vRealize Appliance or virtual appliance load balancer depends on your deployment type and on which appliances failed.

- If you are using a single virtual appliance whose name is unchanged, restore the virtual appliance, or redeploy it and restore a set of backed up files. No further steps are required.
- If you are running a distributed deployment that uses a load balancer, and you change the name of the virtual appliance or the IP address of the load balancer, you must redeploy the appliance and restore its backup files. Also, you must regenerate and copy certificates for your deployment.

If you are redeploying, reconfiguring, or adding virtual appliances to a cluster, see the *Installation and Configuration* documentation for vRealize Appliance for more information.

Procedure

1 Redeploy the virtual appliance.

  You must also configure the Appliance Database after redeploying the vRealize Appliance if it is applicable to your system configuration.

2 Restore all backed up files.

3 Check the file permissions and owners for the restored files.

   a Verify that the vcac user owns the files in the `vcac` directory and that only the vcac user has read and write permissions. Update any settings that have changed.

   b Verify that the root user owns the files in the `apache2` directory and that only the owner has read and write permissions. Update any settings that have changed.

   c Verify that the vco user owns the files in the `vco` directory and that only the owner has read and write permissions. Update any settings that have changed.

   If the hostname or virtual IP address is unchanged, the restore procedure is finished.

4 If the hostname of a stand-alone virtual appliance has changed, or if you are using a load balancer and its virtual IP address has changed, regenerate and copy certificates for each of the virtual appliances.

   a Obtain a certificate by using a command of the following form:

   ```
   C:\Program Files (x86)\VMware\vCAC\Server\Model Manager Data\Cafe
   \Vcac-Config.exe GetServerCertificates -url https://VA FQDN
   --FileName .\Vcac-Config-time-stamp.data -v
   ```

   b Register your solution user certificate by using a command of the following form:

   ```
   C:\Program Files (x86)\VMware\vCAC\Server\Model Manager Data\Cafe
   \Vcac-Config.exe RegisterSolutionUser -url https://VA FQDN --Tenant vsphere.local
   -cu administrator@vsphere.local -cp vmware --FileName .\Vcac-Config-time-stamp.data -v
   ```

   c Move your solution user certificate information to the database by using a command of the following form:

   ```
   C:\Program Files (x86)\VMware\vCAC\Server\Model Manager Data\Cafe
   \Vcac-Config.exe MoveRegistrationDataToDB -d vcac -s localhost
   -f .\Vcac-Config-time-stamp.data -v
   ```

5 Navigate to the vRealize Appliance management console and verify that the host, SSL, database, and SSO settings are correct.

6 Update settings that changed.

7 Start the vRealize Automation server service or save the SSO settings page.

8 Configure the load balancer to distribute traffic to the virtual appliances.

What to do next

"Restore the IaaS Website Service or Web Load Balancer," on page 82

Restoring the IaaS Website, Manager Services, and Their Load Balancers

A system administrator restores the IaaS Website and Manager Service and their associated load balancers. If you change a host name or IP address for a load balancer, you must update this information in associated configuration files.

1 Restore the IaaS Website Service or Web Load Balancer on page 82

   If the server for your IaaS Website service or Web load balancer fails, a system administrator restores the IaaS Web site components, and reconfigures the load balancer if host names change.

2 Restore the Manager Service or Manager Service Load Balancer on page 83

   If the server for your Manager Service or load balancer fails, a system administrator restores the Manager Service and reconfigures the load balancer if host names change.

Restore the IaaS Website Service or Web Load Balancer

If the server for your IaaS Website service or Web load balancer fails, a system administrator restores the IaaS Web site components, and reconfigures the load balancer if host names change.

You can restore the server or load balancer by reinstalling. You can also rename the server or load balancer. If you rename the server, you must edit the configuration files to use the new host name for components that are not being restored.

For more information see the *Installation and Configuration* documentation for vRealize Automation.

Procedure

1 Install the Website component by using the custom IaaS installer.

Do not install the ModelManagerData component now.

To avoid losing encrypted data, use the same passphrase as used for the original installation.

2 If you have backups of configuration files, copy the files to the server on which you are installing, verifying that these settings are correct for your current deployment.

3 If you changed the hostname when you reinstalled the Website machine or load balancer, update the host name in the associated configuration files.

If your deployment does not use a load balancer, the address is the hostname of the machine where the Model Manager Data component is installed. For an environment with a Web load balancer, use the Website load balancer address.

File Path	Machine Type
<*vCAC Folder*>\Server\Website\Web.config	Machines where the Website component is installed.
<*vCAC Folder*>\Server\ManagerService.exe.config	Machines that have a Manager Service Component installed.
<*vCAC Folder*>\Distributed Execution Manager\<*DEM Name*>\DynamicOps.DEM.exe.config	Machines that have DEM Worker or DEM Orchestrator installed.
<*vCAC Folder*>\Agents\<*Agent Name*>\<*Agent Config File*>	All machines and agents that are installed.

4 For each file, locate the `key="repositoryAddress"` line, and change the value of the `value` attribute to point to your Web site address.

For example:

`value="https://myWebsite.myhostname.name:`*`Port`*`/repository/`

5 If you are reinstalling the primary IaaS Website component and you have a backup of Meta Model data, copy the data to the new Web site.

Do not perform this step if you are reinstalling a secondary Website component.

Copy the following folders from the installation folder at (<*vCAC Folder*>\Server\):

- Model Manager Data folder
- ConfigTool folder

Restore the Manager Service or Manager Service Load Balancer

If the server for your Manager Service or load balancer fails, a system administrator restores the Manager Service and reconfigures the load balancer if host names change.

If the server for your Manager Service or load balancer fails, you can restore it by reinstalling. If you rename the server or load balancer, you must edit the configuration files for components not being restored so that they use the new hostname.

Prerequisites

"Restore the IaaS Website Service or Web Load Balancer," on page 82.

Procedure

1 Reinstall all applicable Manager Service machines.

   a Verify that the fully qualified domain names (FQDNs) for databases are correct for the restore location.

   b Verify that the FQDN for the Manager Server, not the load balancer, matches the FQDN for the local host.

   c Verify that the passphrase is the same as the one used in the original installation.

2 If the Manager Service hostname or load balancer hostname has changed, update all DEM configuration files.

   a On the server that hosts the agent or DEM, open the `DynamicOps.DEM.exe.config` file in an editor.

   The file location is as follows, where *DEO* is the name of the Distributed Execution Manager Orchestrator for the Distributed Execution Manager Worker.

   `C:\Program Files (x86)\VMware\vCAC\Distributed Execution Manager\`*`DEO Name`*`\DynamicOps.`*`DEO`*`.exe.config`

   b Locate the `endpoint` element and change the value of the `address` attribute to the new Manager Service or Manager Service Load Balancer hostname.

   For example, `address="https://MSHostName.domain.name/VMPS`.

   c Repeat this step for each agent or DEM in your deployment.

3 If the Manager Service hostname or load balancer hostname has changed, update all agent configuration files.

   a On the server that hosts the agent, open the `DynamicOps.DEM.exe.config` file in an editor.

   The file location is as follows, where *DEO* is the name of the Distributed Execution Manager Orchestrator for the Distributed Execution Manager Worker.

   `C:\Program Files (x86)\VMware\vCAC\Agents\`*`Agent Name`*`\DynamicOps.`*`Agent Name`*`.exe.config`

   b Locate the `endpoint` element and change the value of the `address` attribute to the new Manager Service or Manager Service Load Balancer hostname.

   For example: `address="https://MSHostName.domain.name/VMPS`

   c Repeat this step for each agent in your deployment.

4 For every `ManagerService.exe.config` file, restart the service.

What to do next

"Reinstall the DEM Orchestrator and the DEM Workers," on page 84

Reinstall the DEM Orchestrator and the DEM Workers

If a failure occurs, a system administrator reinstalls all DEMs.

Follow the instructions in *Installation and Configuration* for installing a DEM orchestrator and DEM workers.

When you reinstall a DEM worker or orchestrator you might want to use the same names as used previously. If you specify names that were used previously, you receive a message similar to the following message.

```
DEM name already exists. Click yes to enter a different name for
this DEM. Click No if you are restoring or reinstalling a DEM with
the same name.
```

Click **No** to reuse the name and continue with the installation.

What to do next

"Reinstall the IaaS Agents," on page 84.

Reinstall the IaaS Agents

The system administrator reinstalls all IaaS agents that need to be restored.

After you reinstall the DEM Orchestrator and the DEM Workers, reinstall IaaS agents. For instructions on installing IaaS agents, see *Installation and Configuration*.

When you reinstall vSphere agents, keep the same endpoint name used at installation time.

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