You can find the most up-to-date technical documentation on the VMware Web site at:
http://www.vmware.com/support/
The VMware Web site also provides the latest product updates.
If you have comments about this documentation, submit your feedback to:
docfeedback@vmware.com
Index  95
# Updated Information

This *vRealize Operations Manager Installation and Configuration Guide for Linux and Windows* is updated with each release of the product or when necessary.

This table provides the update history of the *vRealize Operations Manager Installation and Configuration Guide for Linux and Windows*.

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
</tr>
</thead>
</table>
| EN-001599-03 | - Added support for vRealize Operations Manager 6.0.1.  
               - Moved custom certificate instructions to the customization and administration guide. |
| EN-001599-02 | - Added instructions for configuring the monitoring of vRealize Automation objects. See “Setting up vRealize Automation,” on page 70. |
| EN-001599-01 | - Added statement to not make cluster node changes while the cluster is starting, in “Run the Setup Wizard to Create the Master Node,” on page 23 and similar topics.  
               - Added link to video in “About vRealize Operations Manager High Availability,” on page 29.  
               - Added instructions for installing a custom certificate.  
               - Added additional supported URL formats for the adapter configuration in “Add a vCenter Adapter Instance in vRealize Operations Manager,” on page 41. |
| EN-001599-00 | Initial release. |
About Installation and Configuration for Linux and Windows

The vRealize Operations Manager Installation and Configuration Guide for Linux and Windows provides information about installing VMware® vRealize Operations Manager on the Linux or Windows operating system, including how to create and configure the vRealize Operations Manager cluster.

The vRealize Operations Manager installation process consists of running the vRealize Operations Manager Enterprise installer on each cluster node, and accessing the product to finish setting up the application.

Intended Audience

This information is intended for anyone who wants to install and configure vRealize Operations Manager on Linux or Windows machines. The information is written for experienced Linux or Windows system administrators who are familiar with enterprise management applications and datacenter operations.

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.
Preparing for vRealize Operations Manager Installation

You prepare for vRealize Operations Manager installation by evaluating your environment and deploying enough vRealize Operations Manager cluster nodes to support how you want to use the product.

This chapter includes the following topics:

- “About vRealize Operations Manager Linux and Windows Installation,” on page 10
- “Complexity of Your Environment,” on page 11
- “About vRealize Operations Manager Nodes,” on page 13
- “How vRealize Operations Manager Uses Network Ports,” on page 15
- “vRealize Operations Manager Platform Requirements for Linux,” on page 16
- “Create a Node by Running the vRealize Operations Manager Linux Installer,” on page 18
- “vRealize Operations Manager Platform Requirements for Windows,” on page 19
- “Create a Node by Running the vRealize Operations Manager Windows Installer,” on page 20
About vRealize Operations Manager Linux and Windows Installation

The vRealize Operations Manager installation process consists of running the vRealize Operations Manager Enterprise installer on each cluster node, accessing the product to set up cluster nodes according to their role, and logging in to configure the installation.

Figure 1-1. vRealize Operations Manager Installation

1. Start
2. Run installer to create master node.
3. (optional) Run installer for master replica, data, or remote collector nodes
4. Run master node setup
5. (optional) Enable master replica
6. (optional) Run data nodes setup
7. (optional) Run remote collector nodes setup
8. First-time login to the product
9. Configure an upgrade
10. Configure new installation
11. Licensing
12. Select source
13. Import from source
14. Add monitoring policies
15. Add solutions
16. Configure added solutions
17. Select, license, and upload
18. Monitor your environment
Complexity of Your Environment

When you deploy vRealize Operations Manager, the number and nature of the resources that you want to monitor might be complex enough to recommend a Professional Services engagement.

Complexity Levels

Every enterprise is different in terms of the systems that are present and the level of experience of deployment personnel. The following table presents a color-coded guide to help you determine where you are on the complexity scale.

- **Green**
  
  Your installation only includes conditions that most users can understand and work with, without assistance. Continue your deployment.

- **Yellow**
  
  Your installation includes conditions that might justify help with your deployment, depending on your level of experience. Consult your account representative before proceeding, and discuss using Professional Services.

- **Red**
  
  Your installation includes conditions that strongly recommend a Professional Services engagement. Consult your account representative before proceeding, and discuss using Professional Services.

Note that these color-coded levels are not firm rules. Your product experience, which increases as you work with vRealize Operations Manager and in partnership with Professional Services, must be taken into account when deploying vRealize Operations Manager.

**Table 1-1. Effect of Deployment Conditions on Complexity**

<table>
<thead>
<tr>
<th>Complexity Level</th>
<th>Current or New Deployment Condition</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>You run only one vCenter Operations Manager deployment.</td>
<td>Lone instances are usually easy to re-create in vRealize Operations Manager.</td>
</tr>
<tr>
<td>Green</td>
<td>Your deployment includes a management pack that is listed as Green according to the compatibility guide on the VMware Solutions Exchange Web site.</td>
<td>The compatibility guide indicates whether the supported management pack for vRealize Operations Manager is a compatible 5.x one or a new one designed for this release. In some cases, both might work but produce different results. Regardless, users might need help in adjusting their configuration so that associated data, dashboards, alerts, and so on appear as expected. Note that the terms solution, management pack, and adapter are used somewhat interchangeably.</td>
</tr>
<tr>
<td>Yellow</td>
<td>You run multiple instances of vCenter Operations Manager.</td>
<td>Multiple instances are typically used to address scaling or operator use patterns.</td>
</tr>
<tr>
<td>Yellow</td>
<td>You configured vCenter Operations Manager to retain more data by increasing the default six months of history or by increasing the polling frequency.</td>
<td>A very large data set dramatically increases the time needed for migration and makes it harder to properly size and configure the deployment.</td>
</tr>
<tr>
<td>Complexity Level</td>
<td>Current or New Deployment Condition</td>
<td>Additional Notes</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Yellow</td>
<td>Your deployment includes a management pack that is listed as Yellow according to the compatibility guide on the VMware Solutions Exchange Web site.</td>
<td>The compatibility guide indicates whether the supported management pack for vRealize Operations Manager is a compatible 5.x one or a new one designed for this release. In some cases, both might work but produce different results. Regardless, users might need help in adjusting their configuration so that associated data, dashboards, alerts, and so on appear as expected.</td>
</tr>
<tr>
<td>Yellow</td>
<td>You are deploying vRealize Operations Manager remote collector nodes.</td>
<td>Remote collector nodes gather data but leave the storage and processing of the data to the analytics cluster.</td>
</tr>
<tr>
<td>Yellow</td>
<td>You are deploying a multiple-node vRealize Operations Manager cluster.</td>
<td>Multiple nodes are typically used for scaling out the monitoring capability of vRealize Operations Manager.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Your current vCenter Operations Manager 5.x instance includes a Linux or Windows based deployment.</td>
<td>Linux and Windows deployments are not as common as vApp deployments and often need special consideration.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Your new vRealize Operations Manager instance will include a Linux or Windows based deployment.</td>
<td>Linux and Windows deployments are not as common as vApp deployments and often need special consideration.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Your vRealize Operations Manager instance will use high availability (HA).</td>
<td>High availability and its node failover capability is a unique multiple-node feature that you might want additional help in understanding.</td>
</tr>
<tr>
<td>Yellow</td>
<td>You want help in understanding the new or changed features in vRealize Operations Manager and how to use them in your environment.</td>
<td>vRealize Operations Manager is different than vCenter Operations Manager in areas such as policies, alerts, compliance, custom reporting, or badges. In addition, vRealize Operations Manager uses one consolidated interface.</td>
</tr>
<tr>
<td>Red</td>
<td>You run multiple instances of vCenter Operations Manager, where at least one includes virtual desktop infrastructure (VDI).</td>
<td>Multiple instances are typically used to address scaling, operator use patterns, or because separate VDI (V4V monitoring) and non-VDI instances are needed.</td>
</tr>
<tr>
<td>Red</td>
<td>Your deployment includes a management pack that is listed as Red according to the compatibility guide on the VMware Solutions Exchange Web site.</td>
<td>The compatibility guide indicates whether the supported management pack for vRealize Operations Manager is a compatible 5.x one or a new one designed for this release. In some cases, both might work but produce different results. Regardless, users might need help in adjusting their configuration so that associated data, dashboards, alerts, and so on appear as expected.</td>
</tr>
<tr>
<td>Red</td>
<td>You are deploying multiple vRealize Operations Manager clusters.</td>
<td>Multiple clusters are typically used to isolate business operations or functions.</td>
</tr>
</tbody>
</table>
### Table 1-1. Effect of Deployment Conditions on Complexity (Continued)

<table>
<thead>
<tr>
<th>Complexity Level</th>
<th>Current or New Deployment Condition</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Your current vCenter Operations Manager 5.x deployment required a Professional Services engagement to install it.</td>
<td>If your environment was complex enough to justify a Professional Services engagement in version 5.x, it is possible that the same conditions still apply and might warrant a similar engagement for this version.</td>
</tr>
<tr>
<td>Red</td>
<td>Professional Services customized your vCenter Operations Manager 5.x deployment. Examples of customization include special integrations, scripting, nonstandard configurations, multiple level alerting, or custom reporting.</td>
<td>If your environment was complex enough to justify a Professional Services engagement in version 5.x, it is possible that the same conditions still apply and might warrant a similar engagement for this version.</td>
</tr>
</tbody>
</table>

### About vRealize Operations Manager Nodes

All vRealize Operations Manager clusters consist of a master node, an optional replica node for high availability, optional data nodes, and optional remote collector nodes.

When you install vRealize Operations Manager, you use a vRealize Operations Manager vApp deployment, Linux installer, or Windows installer to create role-less nodes. After the nodes are created and have their names and IP addresses, you use an administration interface to configure them according to their role.

You can create role-less nodes all at once or as needed. A common as-needed practice might be to add nodes to scale out vRealize Operations Manager to monitor an environment as the environment grows larger.

**Master Node**

The initial, required node in the cluster. All other nodes are managed by the master node.

In a single-node installation, the master node must also perform data collection and analysis because it is the sole node, and the only place where vRealize Operations Manager adapters are installed.

**Data Node**

In larger deployments, additional data nodes have adapters installed to perform collection and analysis.

Larger deployments usually include adapters only on data nodes, not on the master node or replica node.

**Replica Node**

To enable high availability (HA), the cluster requires that you convert a data node into a replica of the master node.

**Remote Collector Node**

Distributed deployments might require a remote collector node that can navigate firewalls, interface with a remote data source, reduce bandwidth across data centers, or reduce the load on the vRealize Operations Manager analytics cluster. Remote collectors only gather objects for the inventory, without storing data or performing analysis. In addition, remote collector nodes may be installed on a different operating system than the rest of the cluster nodes.

**NOTE** The main part of the cluster that does not include remote collector nodes is informally referred to as the analytics cluster.
There are some additional things to keep in mind about vRealize Operations Manager node behavior.

- Cluster nodes often need to communicate with one another. When performing cluster-level actions, required node communication might cause unexpected behaviors.

  For example, any manual or system action that restarts the cluster brings all vRealize Operations Manager nodes online, including any nodes that you had taken offline.

- When the nodes in a vRealize Operations Manager cluster are virtual machines, you only update their virtual machine software by directly updating the vRealize Operations Manager software.

  For example, going outside of vRealize Operations Manager to access vSphere to update VMware Tools is not supported.

vRealize Operations Manager Node Requirements

When you create the nodes of the vRealize Operations Manager cluster, you address certain requirements at deployment or installation time, before you log in to configure the role for any nodes, including the master node.

General Requirements

- Deployment Type. Except for the remote collector, all cluster nodes must be the same kind of deployment: vApp, Linux, or Windows. Do not mix vApp, Linux, and Windows nodes in the same analytics cluster.

  When you add a remote collector of a different deployment type, only the following combinations are supported:

  - vApp analytics cluster and Windows remote collector
  - Linux analytics cluster and Windows remote collector

- Uniform Sizing. When you create nodes; CPU, memory, and disk sizing must be identical among nodes in the analytics cluster. Data nodes, master node, and replica node must be the same size. Remote collector nodes may be of different sizes.

Networking Requirements

- You must be able to successfully reverse-DNS all nodes to their fully qualified domain name (FQDN), currently the node hostname. Nodes deployed by OVF have their hostnames set to this retrieved FQDN.

- The master node and replica node must be addressed by static IP address or FQDN with a static IP address. Other nodes can use dynamic host control protocol (DHCP).

- All nodes must be bidirectionally routable by IP address or FQDN.

- Nodes in the analytics cluster must not be separated by network address translation (NAT), load balancer, firewall, or a proxy that inhibits bidirectional communication by IP address or FQDN.

- Multiple nodes in the analytics cluster may not have the same hostname.

Sizing the vRealize Operations Manager Cluster

The resources needed for vRealize Operations Manager depend on how large of an environment you expect to monitor and analyze, how many metrics you plan to collect, and how long you need to store the data.

It is difficult to broadly predict the CPU, memory, and disk requirements that will meet the needs of a particular environment. There are many variables, such as the number and type of resources collected, which includes the number and type of adapters installed, the presence of HA, the duration of data retention, and the quantity of specific data points of interest, such as symptoms, changes, and so on.
VMware expects vRealize Operations Manager sizing information to evolve, and maintains the following Knowledge Base article so that sizing calculations can be adjusted to adapt to usage data.

Knowledge Base article 2093783

The Knowledge Base article includes overall maximums, plus spreadsheet calculators in which you enter the number of objects and metrics that you expect to monitor. To obtain the numbers, some users take the following high-level approach, which uses vRealize Operations Manager itself.

1. Review this guide to understand how to deploy and configure a vRealize Operations Manager node.
2. Deploy a temporary vRealize Operations Manager node.
3. Configure one or more adapters, and allow the temporary node to collect overnight.
4. Access the Cluster Management page on the temporary node.
5. Using the Adapter Instances list in the lower portion of the display as a reference, enter object and metric totals of the different adapter types into the sizing spreadsheet from Knowledge Base article 2093783.
6. Deploy the vRealize Operations Manager cluster based on the spreadsheet sizing recommendation. You can build the cluster by adding resources and data nodes to the temporary node or by starting over.

If you have a large number of adapters, you might need to reset and repeat the process on the temporary node until you have all the totals you need. The temporary node will not have enough capacity to simultaneously run every connection from a large enterprise.

Another approach to sizing is through self monitoring. Deploy the cluster based on your best estimate, but create an alert for when capacity falls below a threshold, one that allows enough time to add nodes or disk to the cluster. You also have the option to create an email notification when thresholds are passed.

Add Disk Space to a vRealize Operations Manager Linux or Windows Node

You add disk to vRealize Operations Manager Linux or Windows nodes when space for storing the collected data runs low.

The following example is for a Linux system. The Windows process is similar, but with Windows characteristics such as backward slashes instead of forward slashes.

Procedure

1. Add a new disk to the system, and partition and format the disk as needed.
2. Use the vRealize Operations Manager administration interface to take the cluster offline.
3. Stop the `vmware-casa` service.
4. Move the contents of `/storage/db` into a directory on the new disk.
5. Create a symbolic link from the new directory back to `/storage/db`, so that `/storage/db` now references the new disk.
6. Start the `vmware-casa` service.
7. Bring the cluster online.

How vRealize Operations Manager Uses Network Ports

vRealize Operations Manager uses network ports to communicate with vCenter Server and vRealize Operations Manager components.

In Linux and Windows deployments, configure the firewalls so that these ports are open.

IMPORTANT: vRealize Operations Manager does not support the customization of server ports.
## Network Ports

**Table 1-2. Default Port Access Requirements for vRealize Operations Manager**

<table>
<thead>
<tr>
<th>Port Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 (TCP)</td>
<td>Used for SSH access to the vRealize Operations Manager cluster.</td>
</tr>
<tr>
<td>80 (TCP)</td>
<td>Redirects to port 443.</td>
</tr>
<tr>
<td>123 (UDP)</td>
<td>Used by vRealize Operations Manager for Network Time Protocol (NTP) synchronization to the master node.</td>
</tr>
<tr>
<td>443 (TCP)</td>
<td>Used to access the vRealize Operations Manager product user interface and the vRealize Operations Manager administrator interface.</td>
</tr>
<tr>
<td>1235 (TCP)</td>
<td>Used by all nodes in the cluster to transmit resource data and key-value data for the Global xDB database instance.</td>
</tr>
<tr>
<td>3091–3094 (TCP)</td>
<td>When Horizon View (V4V) is installed, used to access data for vRealize Operations Manager from V4V.</td>
</tr>
<tr>
<td>6061 (TCP)</td>
<td>Used by clients to connect to the GemFire Locator to get connection information to servers in the distributed system. Also monitors server load to send clients to the least-loaded servers.</td>
</tr>
<tr>
<td>10000–10010 (TCP and UDP)</td>
<td>GemFire Server ephemeral port range used for unicast UDP messaging and for TCP failure detection in the peer-to-peer distributed system.</td>
</tr>
<tr>
<td>20000–20010 (TCP and UDP)</td>
<td>GemFire Locator ephemeral port range used for unicast UDP messaging and for TCP failure detection in the peer-to-peer distributed system.</td>
</tr>
</tbody>
</table>

## vRealize Operations Manager Platform Requirements for Linux

vRealize Operations Manager requires the following hardware and software when you install on Linux.

### CPU and Memory Requirements

vRealize Operations Manager is supported for installation with the following CPU and memory.

**Table 1-3. vRealize Operations Manager Linux Virtual CPU and Memory Requirements**

<table>
<thead>
<tr>
<th>Node Form Factor</th>
<th>Virtual CPU and Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra Small</td>
<td>2 vCPU</td>
</tr>
<tr>
<td></td>
<td>8 GB vRAM</td>
</tr>
<tr>
<td>Small</td>
<td>4 vCPU</td>
</tr>
<tr>
<td></td>
<td>16 GB vRAM</td>
</tr>
<tr>
<td>Medium</td>
<td>8 vCPU</td>
</tr>
<tr>
<td></td>
<td>32 GB vRAM</td>
</tr>
<tr>
<td>Large</td>
<td>16 vCPU</td>
</tr>
<tr>
<td></td>
<td>48 GB vRAM</td>
</tr>
<tr>
<td>Standard Remote Collector</td>
<td>2 vCPU</td>
</tr>
<tr>
<td></td>
<td>4 GB vRAM</td>
</tr>
</tbody>
</table>
Table 1-3. vRealize Operations Manager Linux Virtual CPU and Memory Requirements (Continued)

<table>
<thead>
<tr>
<th>Node Form Factor</th>
<th>Virtual CPU and Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Remote Collector</td>
<td>4 vCPU</td>
</tr>
<tr>
<td></td>
<td>16 GB vRAM</td>
</tr>
</tbody>
</table>

Disk Requirements

Disk space for vRealize Operations Manager is not driven solely by how much space the application needs in order to successfully install. In addition, you must consider data collection and retention requirements, which might vary from site to site.

See “Sizing the vRealize Operations Manager Cluster,” on page 14.

The default disk requirement for a new, single-node cluster is 250 GB. Thereafter, one approach to prevent disk capacity shortages is by using vRealize Operations Manager for self monitoring and by adding disk or data nodes as needed.

When you import an earlier vCenter Operations Manager deployment into this version, the product reports the disk space that you need before you can successfully import the earlier deployment.

Software Version Requirements

vRealize Operations Manager is supported for installation on the following Linux versions.

- Red Hat Enterprise Linux (RHEL) 6, starting with version 6.5

Required Linux Packages for vRealize Operations Manager

vRealize Operations Manager requires that certain Linux packages be installed before running the product installer. Also, vRealize Operations Manager installs additional packages.

Prerequisite Linux Packages

The following packages must be present before running the vRealize Operations Manager installer. Furthermore, if a package is a Linux default, it must not be removed after installation.

- bash
- chkconfig
- coreutils
- db4
- expat
- glibc
- initscripts
- libselinux
- libstdc++
- libuuid
- mailcap
- openssl
- python
vRealize Operations Manager Installation and Configuration Guide for Linux and Windows

- redhat-logos
- rpm-libs
- shadow-utils
- zlib

Packages that vRealize Operations Manager Installs

vRealize Operations Manager installs its own copies of the following packages.

- apr
- apr-util
- apr-util-ldap
- httpd
- httpd-tools
- mod_ssl
- openssl
- python
- VMware-Postgres-libs
- VMware-Postgres-osslibs
- VMware-Postgres-osslibs-server
- VMware-Postgres-server

Create a Node by Running the vRealize Operations Manager Linux Installer

vRealize Operations Manager consists of one or more nodes, in a cluster. To create nodes, you download and run the vRealize Operations Manager Enterprise installer for Linux.

Prerequisites

- Verify that vRealize Operations Manager ports are open at the firewall. See “How vRealize Operations Manager Uses Network Ports,” on page 15.
- Verify that prerequisite packages are installed. See “Required Linux Packages for vRealize Operations Manager,” on page 17.
- Verify that the Linux machine does not contain an underscore character (_) in its host name or anywhere in the fully qualified domain name (FQDN).
- Configure the Linux machine IP address.
  The master node and replica node require a static IP address or FQDN. A data node or remote collector node may use DHCP, static IP, or FQDN.
- When you use virtual machines and this node will be a high availability (HA) replica node, deploy the node on different hardware from the master node.
- Be aware that vRealize Operations Manager uninstalls httpd if it is installed, because vRealize Operations Manager installs its version of Apache.
  If vRealize Operations Manager uninstalls httpd, it backs up the /etc/httpd configuration directory.
Verify that all machines in the file `ntp.conf` are resolvable. If you are unsure about the contents of `ntp.conf`, make a backup copy of the file, and overwrite the original with the default version from a new machine installation.

Locate your copy of the vRealize Operations Manager Enterprise bin installer for Linux.

**Procedure**

1. Log in with an account that has root privileges.
2. Turn off the firewall.
   ```bash
   # su -
   # service iptables save
   iptables: Saving firewall rules to /etc/sysconfig/iptables:[  OK  ]
   # service iptables stop
   iptables: Flushing firewall rules:                         [  OK  ]
   iptables: Setting chains to policy ACCEPT: filter  [  OK  ]
   iptables: Unloading modules:                               [  OK  ]
   # chkconfig iptables off
   # service iptables status
   iptables: Firewall is not running.
   ```
3. Ensure that the open file limit is appropriate by configuring the required minimum.
   ```bash
   echo "* - nofile 64000" >> /etc/security/limits.conf
   ```
4. Set SELinux to Permissive.
   ```bash
   setenforce 0
   sed -i "s/SELINUX=[^ ]*/SELINUX=permissive/g" /etc/selinux/config
   ```
5. Ensure that node hostname is resolvable.
6. Run the vRealize Operations Manager Enterprise bin installer.
   ```bash
   cd /tmp
   sh ./vRealize_Operations_Manager_Enterprise.bin -i gui
   ```
7. If you are creating a multiple node vRealize Operations Manager cluster, repeat Step 1 through Step 6 on each Linux machine that will serve as a node in your vRealize Operations Manager cluster.

**What to do next**

Use a Web browser client to configure a newly added node as the vRealize Operations Manager master node, a data node, a high-availability master replica node, or a remote collector node. The master node is required first.

---

**CAUTION** For security, do not access vRealize Operations Manager from untrusted or unpatched clients, or from clients using browser extensions.

---

**vRealize Operations Manager Platform Requirements for Windows**

vRealize Operations Manager requires the following hardware and software when you install on Windows.

**CPU and Memory Requirements**

vRealize Operations Manager is supported for installation with the following CPU and memory.
### Disk Requirements

Disk space for vRealize Operations Manager is not driven solely by how much space the application needs in order to successfully install. In addition, you must consider data collection and retention requirements, which might vary from site to site.

See “Sizing the vRealize Operations Manager Cluster,” on page 14.

The default disk requirement for a new, single-node cluster is 250 GB. Thereafter, one approach to prevent disk capacity shortages is by using vRealize Operations Manager for self monitoring and by adding disk or data nodes as needed.

When you import an earlier vCenter Operations Manager deployment into this version, the product reports the disk space that you need before you can successfully import the earlier deployment.

### Software Version Requirements

vRealize Operations Manager is supported for installation on the following Windows versions.

- Windows Server 2008 R2 Service Pack 1 (SP1)

Windows Server also requires the updates found in the following Microsoft Knowledge Base articles:

- [http://support.microsoft.com/kb/2577795](http://support.microsoft.com/kb/2577795)
- [http://support.microsoft.com/kb/2538243](http://support.microsoft.com/kb/2538243)

### Create a Node by Running the vRealize Operations Manager Windows Installer

vRealize Operations Manager consists of one or more nodes, in a cluster. To create nodes, you download and run the vRealize Operations Manager Enterprise installer for Windows.

**Prerequisites**

- Verify that vRealize Operations Manager ports are open at the firewall. See “How vRealize Operations Manager Uses Network Ports,” on page 15.
- Verify that the partition on which you install vRealize Operations Manager is formatted as NTFS.
- Verify that the Windows machine does not contain an underscore character (_) in its host name or anywhere in the fully qualified domain name (FQDN).
- Configure the Windows machine IP address.
  - The master node and replica node require a static IP or FQDN. A data node or remote collector node may use DHCP, static IP, or FQDN.
- When you use virtual machines and this node will be a high availability (HA) replica node, deploy the node on different hardware from the master node.
- Uninstall any existing copies of Apache Tomcat.
- Locate your copy of the vRealize Operations Manager Enterprise EXE installer for Windows.

**Procedure**

1. Start the installer by running the EXE file.
2. Select your language and click **OK**.
3. Read the introduction and click **Next**.
4. Read the patent notice and click **Next**.
5. Read and scroll to the bottom of the license notice, select the option to accept it, and click **Next**.
6. Accept or change the installation folder, and click **Next**.
7. Accept or change the data folder, and click **Next**.
8. Review your settings, and click **Install**.
   - A progress bar appears. After a few moments, the installation finishes.
9. Click **Done**.
10. If you are creating a multiple node vRealize Operations Manager cluster, repeat Step 1 through Step 9 on each Windows machine that will serve as a node in your vRealize Operations Manager cluster.

**What to do next**

Use a Web browser client to configure a newly added node as the vRealize Operations Manager master node, a data node, a high-availability master replica node, or a remote collector node. The master node is required first.

**CAUTION** For security, do not access vRealize Operations Manager from untrusted or unpatched clients, or from clients using browser extensions.
Creating the vRealize Operations Manager Master Node

All vRealize Operations Manager installations require a master node.

This chapter includes the following topics:

- “About the vRealize Operations Manager Master Node,” on page 23
- “Run the Setup Wizard to Create the Master Node,” on page 23

About the vRealize Operations Manager Master Node

The master node is the required, initial node in your vRealize Operations Manager cluster.

In single-node clusters, administration and data are on the same master node. A multiple-node cluster includes one master node and one or more data nodes. In addition, there might be remote collector nodes, and there might be one replica node used for high availability.

The master node performs administration for the cluster and must be online before you configure any new nodes. In addition, the master node must be online before other nodes are brought online. For example, if the entire cluster were offline for any reason, you would bring the master node online first.

Run the Setup Wizard to Create the Master Node

All vRealize Operations Manager installations require a master node. With a single node cluster, administration and data functions are on the same master node. A multiple-node vRealize Operations Manager cluster contains one master node and one or more nodes for handling additional data.

Prerequisites

- Create a node by running the vRealize Operations Manager Enterprise installer for Linux or Windows.
- After it is deployed, note the fully qualified domain name (FQDN) or IP address of the node.

Procedure

1. Navigate to the name or IP address of the node that will be the master node of vRealize Operations Manager.
   The setup wizard appears, and you do not need to log in to vRealize Operations Manager.
2. Click New Cluster.
3. Click Next.
4 Enter and confirm a password for the admin user account, and click **Next**.

Passwords require a minimum of 8 characters, one uppercase letter, one lowercase letter, one digit, and one special character.

The user account name is admin by default and cannot be changed.

5 Select whether to use the certificate included with vRealize Operations Manager or to install one of your own.

a To use your own certificate, click **Browse**, locate the certificate file, and click **Open** to load the file in the Certificate text box.

   The certificate `.pem` file must contain a valid private key and a valid certificate chain.

b Enter the certificate password and alias name.

c Click **Upload**.

d Review the information detected about your certificate to verify that it conforms to the requirements for certificates.

6 Click **Next**.

7 Enter a name for the master node.

   For example: **Ops-Master**

8 Enter the URL or IP address for the Network Time Protocol (NTP) server with which the cluster will synchronize.

   For example: **time.nist.gov**

9 Click **Add**.

   Leave the NTP blank to have vRealize Operations Manager manage its own synchronization by having all nodes synchronize with the master node and replica node.

10 Click **Next**, and click **Finish**.

   The administration interface appears, and it takes a moment for vRealize Operations Manager to finish adding the master node.

**What to do next**

- (Optional) Create data nodes.
- (Optional) Create remote collector nodes.
- Click **Start vRealize Operations Manager** to start the cluster, and log in to finish configuring the product.

   The cluster might take from 10 to 30 minutes to start, depending on the size of your cluster and nodes. Do not make changes or perform any actions on cluster nodes while the cluster is starting.

**Requirements for Custom vRealize Operations Manager TLS/SSL Certificates**

By default, vRealize Operations Manager installs its own TLS/SSL certificate. The included certificate generates security warnings when you connect to the vRealize Operations Manager monitoring page. If you do not want to use the included certificate, you can use your own TLS/SSL certificate.

**Custom Certificate Requirements**

A custom TLS/SSL certificate must conform to the following requirements. Using a custom certificate is optional and does not affect vRealize Operations Manager features.

- The certificate file contains both a valid private key and a valid certificate chain.
- The private key is generated by the RSA or the DSA algorithm.
- The private key is not encrypted by a pass phrase.
- If the certificate is signed by a chain of other certificates, all other certificates must be included in the certificate file that you plan to import.
- All the certificates and the private key that are included in the certificate file must be PEM-encoded. vRealize Operations Manager does not support DER-encoded certificates and private keys.
- All the certificates and the private key that are included in the certificate file must be in the PEM format. vRealize Operations Manager does not support certificates in the PFX, PKCS12, PKCS7, or other formats.
Scaling vRealize Operations Manager Out by Adding a Data Node

You can deploy and configure additional nodes so that vRealize Operations Manager can support larger environments.

This chapter includes the following topics:
- “About vRealize Operations Manager Data Nodes,” on page 27
- “Run the Setup Wizard to Add a Data Node,” on page 27

About vRealize Operations Manager Data Nodes

Data nodes are the additional cluster nodes that allow you to scale out vRealize Operations Manager to monitor larger environments.

A data node always shares the load of performing vRealize Operations Manager analysis and might also have a solution adapter installed to perform collection and data storage from the environment. You must have a master node before you add data nodes.

You can dynamically scale out vRealize Operations Manager by adding data nodes without stopping the vRealize Operations Manager cluster. When you scale out the cluster by 25% or more, you should restart the cluster to allow vRealize Operations Manager to update its storage size, and you might notice a decrease in performance until you restart. A maintenance interval provides a good opportunity to restart the vRealize Operations Manager cluster.

In addition, the product administration options include an option to rebalance the cluster, which can be done without restarting. Rebalancing adjusts the vRealize Operations Manager workload across the cluster nodes.

Run the Setup Wizard to Add a Data Node

Larger environments with multiple-node vRealize Operations Manager clusters contain one master node and one or more data nodes for additional data collection, storage, processing, and analysis.

Prerequisites
- Create nodes by running the vRealize Operations Manager Enterprise installer for Linux or Windows.
- Create and configure the master node.
- Note the fully qualified domain name (FQDN) or IP address of the master node.

Procedure
1. In a Web browser, navigate to the name or IP address of the node that will become the data node.

   The setup wizard appears, and you do not need to log in to vRealize Operations Manager.
2 Click **Expand Existing Cluster**.

3 Click **Next**.

4 Enter a name for the node (for example, **Data-1**).

5 From the Node Type drop-down, select **Data**.

6 Enter the FQDN or IP address of the master node and click **Validate**.

7 Click **Accept this certificate** and click **Next**.
   If necessary, locate the certificate on the master node and verify the thumbprint.

8 Verify the vRealize Operations Manager administrator username of **admin**.

9 Enter the vRealize Operations Manager administrator password.
   Alternatively, instead of a password, type a pass-phrase that you were given by your vRealize Operations Manager administrator.

10 Click **Next**, and click **Finish**.
   The administration interface appears, and it takes a moment for vRealize Operations Manager to finish adding the data node.

**What to do next**

- (Optional) Create more data nodes.
- (Optional) Create a high availability master replica node.
- (Optional) Create remote collector nodes.
- Click **Start vRealize Operations Manager** to start the cluster, and log in to finish configuring the product.
   The cluster might take from 10 to 30 minutes to start, depending on the size of your cluster and nodes. Do not make changes or perform any actions on cluster nodes while the cluster is starting.
Adding High Availability to vRealize Operations Manager

You can dedicate one vRealize Operations Manager cluster node to serve as a replica node for the vRealize Operations Manager master node.

This chapter includes the following topics:

- “About vRealize Operations Manager High Availability,” on page 29
- “Run the Setup Wizard to Add a Master Replica Node,” on page 29

About vRealize Operations Manager High Availability

vRealize Operations Manager supports high availability (HA) by enabling a replica node for the vRealize Operations Manager master node.

When present, an HA replica node can take over the functions that a master node provides. When a problem occurs with the master node, failover to the replica node is automatic and requires only two to three minutes of vRealize Operations Manager downtime. Data stored on the master node is always 100% backed up on the replica node. In addition, with HA enabled, the cluster can survive the loss of a data node without losing any data.

To enable HA, you must have another node deployed in addition to the master node. When you deploy nodes as virtual machines, deploy the replica node on different hardware than the master node so that backup is physically redundant.

Install vRealize Operations Manager with High Availability (http://link.brightcove.com/services/player/bcpid2296383276001?bctid=ref:video_install_vrom_with_ha)

Run the Setup Wizard to Add a Master Replica Node

You can convert a vRealize Operations Manager data node to a replica of the master node, which adds high availability (HA) for vRealize Operations Manager.

**NOTE** If the cluster is running, enabling HA restarts the cluster.

If you convert a data node that is already in use for data collection and analysis, adapters and data connections that were provided through that data node fail over to other data nodes.

You may add HA to the vRealize Operations Manager cluster at installation time or after vRealize Operations Manager is up and running. Adding HA at installation is less intrusive because the cluster has not yet started.

**Prerequisites**

- Create nodes by running the vRealize Operations Manager Enterprise installer for Linux or Windows.
Create and configure the master node.
Create and configure a data node with a static IP address.
Note the fully qualified domain name (FQDN) or IP address of the master node.

Procedure
1. In a Web browser, navigate to the master node administration interface.
   
   https://master-node-name-or-ip-address/admin

2. Enter the vRealize Operations Manager administrator username of admin.
3. Enter the vRealize Operations Manager administrator password and click Log In.
4. Under High Availability, click Enable.
5. Select a data node to serve as the replica for the master node.
6. Select the Enable High Availability for this cluster option, and click OK.

   If the cluster was online, the administration interface displays progress as vRealize Operations Manager configures, synchronizes, and rebalances the cluster for HA.

What to do next
- (Optional) Create data nodes.
- (Optional) Create remote collector nodes.
- Click Start vRealize Operations Manager to start the cluster, and log in to finish configuring the product.

The cluster might take from 10 to 30 minutes to start, depending on the size of your cluster and nodes. Do not make changes or perform any actions on cluster nodes while the cluster is starting.
Continuing With a New vRealize Operations Manager Installation

After you deploy the vRealize Operations Manager nodes and complete the initial setup, you continue with installation by logging in for the first time and configuring a few settings.

This chapter includes the following topics:

- “About New vRealize Operations Manager Installations,” on page 31
- “Log In and Continue with a New Installation,” on page 31

About New vRealize Operations Manager Installations

A new vRealize Operations Manager installation requires that you deploy and configure nodes. Then, you add solutions for the kinds of resources to monitor and manage.

After you add solutions, you configure them in the product and add monitoring policies that gather the kind of data that you want. At any future point, a new installation can also have part or all of an environment that is monitored by a previous vCenter Operations Manager instance migrated to it.

Log In and Continue with a New Installation

To finish a new vRealize Operations Manager installation, you log in and complete a one-time process to license the product and add solutions for the kinds of resources to monitor and manage.

Prerequisites

- Create and configure the new cluster of vRealize Operations Manager nodes.
- Click the Start vRealize Operations Manager button to start the cluster.

Procedure

1. In a Web browser, navigate to the name or IP address of the master node.
   If you configured nodes and started the cluster, the product takes you to the login page.
2. Enter the username admin and the password that you defined when you configured the master node, and click Login.
   Because this is the first time logging in, a one-time wizard appears.
3. Click New Environment and click Next.
4. Read and accept the End User License Agreement, and click Next.
5 Enter your product key, or select the option to run vRealize Operations Manager in evaluation mode.

Your level of product license determines what solutions you may install to monitor and manage resources.

- Standard. vCenter only
- Advanced. vCenter plus other infrastructure solutions
- Enterprise. All solutions

vRealize Operations Manager does not license managed objects in the same way that vSphere does, so there is no object count when you license the product.

6 If you entered a product key, click **Validate License Key**.

7 Click **Next**, and click **Finish**.

The one-time wizard finishes, and the vRealize Operations Manager interface appears.

**What to do next**

- Use the vRealize Operations Manager interface to configure the solutions that are included with the product.
- Use the vRealize Operations Manager interface to add more solutions.
- Use the vRealize Operations Manager interface to add monitoring policies.
After you deploy the vRealize Operations Manager nodes and complete the initial setup, you can import from an earlier vCenter Operations Manager deployment by logging in for the first time and configuring a few settings.

You can also migrate the data later, after the new installation of vRealize Operations Manager is established or in production. Migrating and importing are synonymous.

This chapter includes the following topics:

- “About the vRealize Operations Manager Migration Import Process,” on page 33
- “Log In and Migrate a Previous Installation,” on page 33

**About the vRealize Operations Manager Migration Import Process**

By importing configuration and, optionally, data, this version of vRealize Operations Manager can assume the monitoring of an earlier vCenter Operations Manager deployment.

Migration occurs side by side and does not turn off the source. After migration, both target and source can monitor the same objects. When you turn off the earlier deployment, monitoring of the inventory and data is done solely by the new version of vRealize Operations Manager. Performing the entire process is known as a migration-based upgrade.

A vRealize Operations Manager migration requires that you deploy and configure a target cluster of new nodes in the same way as you would for a new vRealize Operations Manager installation. Then, you perform a one-time connection to your previous vCenter Operations Manager source deployment to import the configuration and, optionally, data from that environment.

**Log In and Migrate a Previous Installation**

To migrate a previous vCenter Operations Manager installation, you log in to the target and complete a one-time wizard to license the product and import the source to your new deployment.

**Prerequisites**

**Source Prerequisites**


- Update the source vCenter Operations Manager installation to version 5.8.1 or later.

- Temporarily disable dynamic thresholding (DT). You may restore DT after migration.
  
  The DT setting is in the Custom UI under Environment > Configuration > Resource Kind Defaults.
Verify that the source is not collecting from a vCenter Server that is already being monitored by the target. If you need to temporarily disconnect a vCenter Server to meet this requirement, you may restore it after migration.

Verify that the disk that contains the vCenter Operations Manager log directory has free space. Migration requires approximately 2 GB free log space for every 20,000 resources, 1 TB of FSDB data, and run time history of 1 year.

Temporarily disable alerts so that migrated notifications do not fire immediately. You may restore alerts after migration.

When two vCenter Operations Manager sources will be migrated, and both collect from the same vCenter Server, verify that one source connects to the vCenter Server using the vCenter Server IP address, and the other source connects using FQDN.

Know the names and IP addresses of the source machines.

Know the administrator username and password of the source machines.

For sources that use Oracle or SQL Server for the database, verify that a minimum of 10 idle connections are available.

For vApp sources, verify that the vSphere UI is up and running.

For Linux and Windows sources, verify that the Custom UI is up and running.

For Linux and Windows sources, verify that the source has a minimum of 1 GB of free memory.

For Linux and Windows sources, verify that the outbound port on the source is open so that data can be transferred to the target. The default port is 6061.

For Windows sources, verify that HTTPS is enabled.

For Windows sources, verify that vCenter Operations Manager is installed under a folder path that does not contain spaces.

Target Prerequisites

Verify that network connection speed between the target and source is 100 mbps minimum.

If the target has high availability (HA) enabled, temporarily disable HA.

Take a target snapshot in case the migration does not produce the result that you want, and you need to revert the target.

Increase the data retention time to match the setting from the source.

To avoid a large number of immediate notifications, temporarily disable notifications.

Synchronize the system time setting on the target and all sources. The time zone does not need to be synchronized.

If, after starting the Import Data wizard, the wizard reports a shortage, add CPU, memory, and disk before proceeding.

If, after starting the Import Data wizard, the wizard reports any missing adapters, install the adapters before proceeding.

Procedure

1. In a Web browser, navigate to the FQDN or IP address of the master node of the vRealize Operations Manager target.

   If you configured nodes and started the cluster, the product takes you to the login page.
2 Enter the username admin and the password that you defined when configuring the master node, and click Login. Because this is the first time logging in, a one-time wizard appears.

3 Click Import Environment and click Next.

4 Read and accept the End User License Agreement, and click Next.

5 Enter your product key, or select the option to run vRealize Operations Manager in evaluation mode. vRealize Operations Manager does not license managed objects like vSphere does, so there is no object count when licensing the product.

6 If you entered a product key, click Validate License Key.

7 Click Next.

8 Enter the fully qualified domain name (FQDN) or IP address of the source from which you want to import. For a vApp deployment, the source must be a vCenter Operations Manager UI server, not an analytics server.

9 Enter the admin password for the source.

10 Click Add Source.

vRealize Operations Manager finds and loads the security certificate for the source.

11 Select Accept this certificate and click OK. vRealize Operations Manager adds the source to the list of sources from which it will import, and calculates the amount of resources that the target must have for the import to succeed. If the target does not have enough resources, you must install more disk or data nodes before proceeding.

12 For each source in the list, use the drop menu to select the Migration Mode. Migration mode allows you to exclude historical data when migrating, because migrating the data significantly increases migration time as well as the free space needed on the target.

13 Add more sources or click Next. A list of solutions appears, which reveals any that are present on sources but missing from the target deployment.

14 If the source has an adapter installed that is missing from the target, click Add Solution to add the adapter to the target. The steps to add a solution adapter are the same during migration as when you add a new solution.

15 After adding solutions, click Next.

16 To start the migration import, click Finish. The wizard closes, and you can monitor the progress of the migration.

What to do next

While an import is in progress, do not make changes to the source inventory or resources. The import process might take many hours to complete, especially if you chose to migrate historical data. The number of resources, number of metrics, length of history, and size of the FSDB all contribute to the time needed for migration. During internal testing, an inventory of 13,000 resources with 2.5 years of history took about 44 hours to migrate. A guideline of 1 hour per 10 GB of FSDB data is a good starting point but might be influenced by network performance or other factors.
Multiple sources are migrated in sequence. If one source migration fails, the migration continues with the next source. In addition, you can stop a migration at any time.

After the import finishes, use vRealize Operations Manager to monitor the newly imported resources. Eventually, you might also want to turn off your earlier source vCenter Operations Manager deployment.
After you install or migrate vRealize Operations Manager, consider post-installation tasks that might need your attention.

This chapter includes the following topics:

- “About Logging In to vRealize Operations Manager,” on page 37
- “Configuring Solutions and Adapters in vRealize Operations Manager,” on page 38
- “Migrating a vCenter Operations Manager Deployment into this Version,” on page 79
- “Uninstall vRealize Operations Manager from Linux,” on page 93
- “Uninstall vRealize Operations Manager from Windows Server,” on page 94

About Logging In to vRealize Operations Manager

Logging in to vRealize Operations Manager requires that you point a Web browser to the fully qualified domain name (FQDN) or IP address of a node in the vRealize Operations Manager cluster.

When you log in to vRealize Operations Manager, there are a few things to keep in mind.

- After initial configuration, the product interface URL is:  
  https://node-FQDN-or-IP-address
- Before initial configuration, the product URL opens the administration interface instead.
- After initial configuration, the administration interface URL is:  
  https://node-FQDN-or-IP-address/admin
- The administrator account name is admin. The account name cannot be changed.
- When logged in to the administration interface, avoid taking the node that you are logged into offline and shutting it down. Otherwise, the interface closes.
- vRealize Operations Manager supports up to four total simultaneous login sessions per cluster node: product, administration, or a mixture.
- You cannot log in to a vRealize Operations Manager interface with user accounts that are internal to vRealize Operations Manager.
  For example: maintenanceAdmin or migrationAdmin
- You cannot point to a remote collector node to open the product interface.
- You can point to a remote collector node to open the administration interface.
- For supported Web browsers, see the vRealize Operations Manager Release Notes for your version.
Configuring Solutions and Adapters in vRealize Operations Manager

Solutions target a particular kind of monitoring or analysis of your environment by adding dashboards, alerts, reports, and other vRealize Operations Manager components.

Some solutions are delivered with vRealize Operations Manager, others can be added as management packs that extend vRealize Operations Manager capabilities by integrating with external management tools.

Solutions that are delivered as management packs include dashboards, reports, alerts and other content, and adapters. Adapters are how vRealize Operations Manager manages communication and integration with other products, applications, and functions. When a solution management pack is installed and the solution adapters are configured, you can use the vRealize Operations Manager analytics and alerting tools to manage the objects in your environment.

The most common solution is the VMware vSphere solution. This solution manages the connection between vRealize Operations Manager and your vCenter Server instances, and provides the ability to run actions on those instances. This solution is installed with vRealize Operations Manager and does not require you to install a management pack.

Installing a Solution to Monitor and Manage Objects in Your Environment

If a solution is not delivered with vRealize Operations Manager, you install the solution by installing its management pack. A solution is a licensable entity and can contain multiple management packs.

You download management packs from the VMware Solutions Exchange Web site.

Install a Solution (http://link.brightcove.com/services/player/bcpid2296383276001?bctid=ref:video_install_solution_vrom)

Add a Management Pack

A management pack is the part of the solution that you install. It contains the dashboards, alerts definitions, policies, reports, and other content. A management pack may include multiple adapters.

You use the user interface to install the management pack.

If you upgrade from an earlier version of vRealize Operations Manager, the previous management pack files are copied to the /usr/lib/vmware-vcops/user/plugins/.backup file in a folder with a with a date and time as the folder name. Before migrating your data to your new vRealize Operations Manager instance, install the new adapters. After migration, none of your adapter customizations are included in the migration, and you must reconfigure them.

Prerequisites

The solution that you downloaded includes a PAK file. Save that PAK file to a temporary folder on your local system.

Procedure

1. Log in to the vRealize Operations Manager user interface with administrator privileges.
2. In the left pane of vRealize Operations Manager, click the Administration icon and click Solutions.
3. On the Solutions tab, click the plus sign.
   a. Browse to locate the temporary folder and select the PAK file.
      For example, vmware-vcops-6.0-MPforVCM-6.0-3900464.pak.
   b. Because existing dashboards are not overwritten by default, if you are performing a management pack upgrade and you want to replace existing dashboards, select Reset out-of-the box content, overwriting to a newer version provided by this update.
c Click **Upload**. After the file uploads, click **Next**.

d Read and accept the EULA and click **Next**.

Installation details appear in the window during the process. The installation might take several minutes.

e When the installation is finished, click **Finish**.

The management pack is listed as a solution.

**What to do next**

Configure an adapter instance for the solution.

**VMware vSphere Solution in vRealize Operations Manager**

The VMware vSphere solution connects vRealize Operations Manager to one or more vCenter Server instances so that you can collect data from those instances, monitor them, and run actions in them.

This solution, which is installed with vRealize Operations Manager, includes dashboards, alerts, actions, analysis badges, capacity planning, reports, views, and other tools that monitor the target systems based on the collected data.

The data collected from vCenter Server for managed objects includes metrics and some properties. vRealize Operations Manager evaluates the data, identifying trends in object behavior, calculating possible problems and future capacity for objects in your system based on those trends, and alerting you when an object exhibits defined symptoms. The solution also provides actions that you can run on vCenter Server from vRealize Operations Manager to manage those objects as you respond to problems and alerts.

The actions provided with the action adapter are focused on managing your virtual machines. The actions include managing virtual machine power states, the number of CPUs, and the amount of memory. You can also clean up datastores by deleting unused snapshots.

**How the vCenter Adapter Credentials Work**

The vCenter Server credentials that you use to connect vRealize Operations Manager to a vCenter Server instance determine what objects vRealize Operations Manager monitors. As a vRealize Operations Manager administrator, you must understand how the vCenter Adapter credentials and the user privileges interact to ensure that you configure adapters and users correctly.

Because vRealize Operations Manager supports local user accounts and vCenter Server authentication, you must take care with user permissions in vCenter Server and vRealize Operations Manager.

**vCenter Adapter Credentials**

When you configure a vCenterAdapter, you must provide vCenter Server credentials that have sufficient privileges to connect to the vCenter Server and have access to the objects you are monitoring with vRealize Operations Manager.

The privileges of the provided credentials determines what objects all users can see in vRealize Operations Manager. For example, you can configure the adapter to connect to a vCenter Server instance with credentials that have permission to access only one of your three hosts. Every user who logs in to vRealize Operations Manager sees only the one host, even when an individual user has privileges on all three of the hosts in vCenter Server.

**User Privileges**

You can control user access for the local users based on how you configure user privileges in Access Control in vRealize Operations Manager. If users log in using their vCenter Server accounts, then how their vCenter Server account is configured determines their privileges.
To avoid this type of unexpected result, configure local vRealize Operations Manager users and vCenter Server users with the privileges you want them to have in your environment.

**How vCenter Python Actions Adapter Credentials Work**

When you configure a vCenter Python Actions Adapter in vRealize Operations Manager, you configure credentials that are used to run the actions in vCenter Server. As a vRealize Operations Manager administrator, you must understand how the adapter credentials and user privileges interact to ensure that you configure adapters and users correctly.

Because vRealize Operations Manager supports local user accounts and vCenter Server authentication, you must take care with user permissions in vCenter Server and vRealize Operations Manager.

**vCenter Python Action Adapter Credentials**

When you configure a vCenter Python Actions Adapter, you must provide vCenter Server credentials that have sufficient privileges to connect and make changes to objects on the vCenter Server. If the provided credentials have limited access to objects in vCenter Server, even vRealize Operations Manager administrative users can run actions only on the objects for which the vCenter Server credentials have permission. If the provided credentials have access to all the objects in vCenter Server, any vRealize Operations Manager user who runs actions is using this account.

**User Privileges and Actions**

You can control user access to actions for the local users based on how you configure user privileges in Access Control in vRealize Operations Manager. If users log in using their vCenter Server accounts, then how you have the account configured in vCenter Server determines their privileges.

For example, you might have a vCenter Server user with a read-only role in vCenter Server. If you give this user the vRealize Operations Power User role in vCenter Server rather than a more restrictive role, the user can run actions on objects because the adapter is configured with credentials that have privileges to change objects.

To avoid this type of unexpected result, configure local vRealize Operations Manager users and vCenter Server users with the privileges you want them to have in your environment.

**Configure a VMware vSphere Solution in vRealize Operations Manager**

To monitor your VMware virtual infrastructure, you configure the vCenter Server and vCenter Python action adapters for each of your vCenter Server instances.

The VMware vSphere solution is provided with vRealize Operations Manager. You do not need to download or install a management pack.

The solution includes a vCenter Adapter and a vCenter Python Actions Adapter.

**Procedure**

1. **Add a vCenter Adapter Instance in vRealize Operations Manager** on page 41

   To manage your vCenter Server instances in vRealize Operations Manager, you must configure an adapter instance for each vCenter Server instance. The adapter requires the credentials that are used for communication with the target vCenter Server.

2. **Add a vCenter Python Actions Adapter Instance in vRealize Operations Manager** on page 43

   The vCenter Python Actions Adapter allows you to modify objects on your managed vCenter Server instances from vRealize Operations Manager. The adapter is included with vRealize Operations Manager solution and works in combination with the vCenter Server Adapter.
3 Define Monitoring Goals for Your VMware vSphere Solutions in vRealize Operations Manager on page 44
   To begin creating a monitoring policy specific to your environment, you provide answers to questions that configure your default policy for this solution. Monitoring policies determine how vRealize Operations Manager evaluates the collected data and calculates trends.

4 Configure User Access for vCenter Server Actions in vRealize Operations Manager on page 45
   To ensure that users can run actions in vRealize Operations Manager, you must configure user access to the actions. You create action roles to control which actions a user can run and create user groups to control which action adapter objects are available to the groups to which each user belongs.

5 Modify a vCenter Python Action Adapter Collection Interval on page 48
   The vCenter Python Action Adapter is installed with a five-minute collection interval. To minimize traffic between vCenter Server and vRealize Operations Manager, you can change the collection interval to a longer cycle.

Add a vCenter Adapter Instance in vRealize Operations Manager

To manage your vCenter Server instances in vRealize Operations Manager, you must configure an adapter instance for each vCenter Server instance. The adapter requires the credentials that are used for communication with the target vCenter Server.

The vCenter Adapter that you use to connect to one or more instances of vCenter Server is provided in the vRealize Operations Manager VMware vSphere solution. You do not need to install a management pack before configuring this solution adapter.

When you configure the adapter, you must use one of the following URL formats:

- IP address
- FQDN
- https://IP address/sdk
- https://FQDN/sdk

**Caution** Any adapter credentials you add are shared with other adapter administrators and vRealize Operations Manager collector hosts. Other administrators might use these credentials to configure a new adapter instance or to move an adapter instance to a new host.

**Prerequisites**

Verify that you know the vCenter Server credentials that have sufficient privileges to connect and collect data. If the provided credentials have limited access to objects in vCenter Server, all users, regardless of their vCenter Server privileges, will see only the objects that the provided credentials can access. At a minimum, the user account must have Read privileges and the Read privileges must be assigned at the data center or vCenter Server level. See “How the vCenter Adapter Credentials Work,” on page 39

**Procedure**

1 In the left pane of vRealize Operations Manager, click the Administration icon and click Solutions.
2 On the Solutions tab, select VMware vSphere and click the Configure button on the toolbar.
3 Select vCenter Adapter in the Adapter Type list to add a new vCenter Server adapter instance.
   If you are adding an additional adapter instance, click the plus sign on the lower pane toolbar.
4 Enter a Display name and Description for the adapter configuration.
   For example, vCenter Server 192.0.2.0.
5 In the **vCenter Server** text box, enter the FQDN or IP address of the vCenter Server instance to which you are connecting.

The vCenter Server FQDN or IP address must be reachable from all nodes in the vRealize Operations Manager cluster.

6 To add credentials, click the plus sign.
   
   a In the **Credential name** text box, enter the name by which you are identifying the configured credentials.
   
   b Type the **User name** and **Password** for the vCenter Server instance.
   
   c Click **OK**.

7 Click **Test Connection** to validate the connection with your vCenter Server instance.

8 In the Review and Accept Certificate dialog box, review the certificate information.
   
   ◆ If the certificate presented in the dialog box matches the certificate for your target vCenter Server, click **OK**.
   
   ◆ If you do not recognize the certificate as valid, click **Cancel**. The test fails and the connection to vCenter Server is not completed. You must provide a valid vCenter Server URL or verify the certificate on the vCenter Server is valid before completing the adapter configuration.

9 To modify the advanced options regarding object discovery, change events, or registration user, expand the **Advanced Settings**.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collector</strong></td>
<td>Determines which vRealize Operations Manager collector is used to manage the adapter processes. If you have only one adapter instance, select <strong>Automatically select collector</strong>. If you have multiple collectors in your environment, and you want to distribute the workload to optimize performance, select the collector to manage the adapter processes for this instance.</td>
</tr>
<tr>
<td><strong>Auto Discovery</strong></td>
<td>Determines whether new objects added to the monitored system are discovered and added to vRealize Operations Manager after the initial configuration of the adapter.</td>
</tr>
<tr>
<td></td>
<td>■ If the value is true, vRealize Operations Manager collects information about any new objects that are added to the monitored system after the initial configuration. For example, if you add more hosts and virtual machines, these objects are added during the next collections cycle. This is the default value.</td>
</tr>
<tr>
<td></td>
<td>■ If the value is false, vRealize Operations Manager monitors only the objects that are present on the target system when you configure the adapter instance.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Process Change Events</strong></td>
<td>Determines whether the adapter uses an event collector to collect and process the events generated in the vCenter Server instance.</td>
</tr>
<tr>
<td></td>
<td>- If the value is true, the event collector collects and publishes events from vCenter Server. This is the default value.</td>
</tr>
<tr>
<td></td>
<td>- If the value is false, the event collector does not collect and publish events.</td>
</tr>
<tr>
<td><strong>Registration User and Password</strong></td>
<td>Provides the option to use a different set of credentials than you provided as the standard credentials.</td>
</tr>
<tr>
<td></td>
<td>- The standard credentials must be provided. The standard credentials should have at least read permissions so that vRealize Operations Manager can collect data.</td>
</tr>
<tr>
<td></td>
<td>- These advanced credentials allow you to register a vCenter Server with a different set of credentials. The registration user commonly has more access rights. For example, this user account can register a vCenter Server extension or asset. You use the advanced credentials in conjunction with the standard credentials when you need to manage security by minimizing access.</td>
</tr>
</tbody>
</table>

10 Click **Save Settings**.

The adapter instance is added to the list.

vRealize Operations Manager begins collecting data from the vCenter Server instance. Depending on the number of managed objects, the initial collection can take more than one collection cycle. A standard collection cycle begins every five minutes.

**What to do next**

- Add a vCenter Python Actions Adapter for the same vCenter Server that you configured. See “Add a vCenter Python Actions Adapter Instance in vRealize Operations Manager,” on page 43.

**Add a vCenter Python Actions Adapter Instance in vRealize Operations Manager**

The vCenter Python Actions Adapter allows you to modify objects on your managed vCenter Server instances from vRealize Operations Manager. The adapter is included with vRealize Operations Manager solution and works in combination with the vCenter Server Adapter.

**CAUTION** Any adapter credentials you add are shared with other adapter administrators and vRealize Operations Manager collector hosts. Other administrators might use these credentials to configure a new adapter instance or to move an adapter instance to a new host.

**Prerequisites**

- Verify that the vCenter Adapter is configured for the vCenter Server instances on which you are running the actions. See “Add a vCenter Adapter Instance in vRealize Operations Manager,” on page 41.

- Ensure that you know the vCenter Server credentials that have sufficient privileges to connect and make changes to objects on this instance. If the credentials limited access to objects in vCenter Server, you have the ability to run actions only on the objects for which the credentials have permission. See “How vCenter Python Actions Adapter Credentials Work,” on page 40.

**Procedure**

1 In the left pane of vRealize Operations Manager, click the Administration icon and click Solutions.

2 On the Solutions tab, select VMware vSphere and click the Configure button on the toolbar.

3 Select vCenter Python Actions Adapter in the Adapter Type list to add a new adapter instance.

If you are adding an additional adapter instance, click the plus sign on the lower pane toolbar.
4 Type a Display Name and Description for the adapter configuration.

For example, vCenter Server Actions 192.0.2.0.

5 In the vCenter Server text box, enter the FQDN or IP address of the vCenter Server instance to which you are connecting.

The vCenter Server FQDN or IP address must be reachable from all nodes in the vRealize Operations Manager cluster.

6 To add credentials, click the plus sign.

   a In the Credential name text box, enter the name by which you are identifying the configured credentials.

   b Type the User name and Password for the vCenter Server instance.

   c Click OK.

7 Click Test Connection to validate the connection with your vCenter Server instance.

8 In the Review and Accept Certificate dialog box, review the certificate information.

   ♦ If the certificate presented in the dialog box matches the certificate for your target vCenter Server, click OK.

   ♦ If you do not recognize the certificate as valid, click Cancel. The test fails and the connection to vCenter Server is not completed. You must provide a valid vCenter Server URL or verify the certificate on the vCenter Server is valid before completing the adapter configuration.

9 To modify the advanced option regarding collectors, which determines which vRealize Operations Manager collector manages the adapter processes, expand the Advanced Settings and select one of the options.

   If you have only one adapter instance, select Automatically select collector. If you have multiple collectors in your environment and you want to distribute the workload to optimize performance, select a collector.

10 Click Save Settings.

The adapter instance is added to the list.

What to do next

- Configure the default monitoring policy. See “Define Monitoring Goals for Your VMware vSphere Solutions in vRealize Operations Manager,” on page 44

- If the monitoring policies page is not available because you are configuring an additional adapter instance, configure the user roles for the actions. See “Configure User Access for vCenter Server Actions in vRealize Operations Manager,” on page 45.

- If this is not the first time you configured an adapter instance, you can test that the vCenter Server Python action adapter is working, select a virtual machine and then check that the actions are available in the Actions menu. See the vRealize Operations Manager User Guide.

Define Monitoring Goals for Your VMware vSphere Solutions in vRealize Operations Manager

To begin creating a monitoring policy specific to your environment, you provide answers to questions that configure your default policy for this solution. Monitoring policies determine how vRealize Operations Manager evaluates the collected data and calculates trends.

This page of the Manage Solution - VMware vSphere wizard is available the first time you configure a vSphere solution. It is not available when you configure additional solutions.
Prerequisites

- Configure the adapter for your vCenter Server instance. See “Add a vCenter Adapter Instance in vRealize Operations Manager,” on page 41.

- To run actions on the vCenter Server instance for which you configured the adapter, configure the vCenter Python Actions Adapter. See “Add a vCenter Python Actions Adapter Instance in vRealize Operations Manager,” on page 43.

Procedure

1. On the Define Monitoring Goals page of the Manage Solution - VMware vSphere wizard, create a base monitoring policy or use the current policy.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skip policy customization and use the default base policy settings.</td>
<td>To use the current default policy, select the check box. If you do not select this option, you must complete all the questions in this page.</td>
</tr>
<tr>
<td>Which objects do you want to be alerted on in your environment?</td>
<td>Determines which objects you manage with vRealize Operations Manager.</td>
</tr>
<tr>
<td>Which type of alerts do you want to enable?</td>
<td>Determines which alert badge notifications you want to see in your environment. Alert definitions are configured to affect Health, Risk, or Efficiency when an alert is generated. Select one or more of the alert types for which you want to receive alerts.</td>
</tr>
<tr>
<td>How much do you want to overcommit CPU and Memory in your environment?</td>
<td>Determines how objects are monitored based on how you prefer to oversubscribe resources and whether you want to allow overcommitment for CPU and Memory. CPU overcommitment is running more vCPUs on a host than the total number of physical processor cores in the host. Memory overcommitment is allowing a virtual machine to use more memory space than the physical host has available.</td>
</tr>
<tr>
<td>Do you want to include Network &amp; Storage I/O when analyzing capacity and workload?</td>
<td>Determines whether you want network and storage input and output values included in your capacity calculations.</td>
</tr>
</tbody>
</table>

2. Click Finish.

The vCenter Server adapter is configured and collecting data using the specified monitoring policy. The action adapter can run actions on target objects.

What to do next

- To verify that the adapter is configured and collecting data, view the inventory data for the configured vCenter Server instances.

- Configure the user roles for the actions. See “Configure User Access for vCenter Server Actions in vRealize Operations Manager,” on page 45.

Configure User Access for vCenter Server Actions in vRealize Operations Manager

To ensure that users can run actions in vRealize Operations Manager, you must configure user access to the actions. You create action roles to control which actions a user can run and create user groups to control which action adapter objects are available to the groups to which each user belongs.

Prerequisites

- Verify that the vCenter Python Actions Adapter is configured. See “Add a vCenter Python Actions Adapter Instance in vRealize Operations Manager,” on page 43.

- Verify that you have sufficient privileges to configure the user access settings.
Procedure

1. **Create User Roles for vCenter Server Actions in vRealize Operations Manager** on page 46

   To run actions in vRealize Operations Manager, you must give users permission to run the individual actions as part of the user role. You use the role permissions to control who can run actions. If you create multiple roles, you can assign some users permission to run a subset of the actions and assign other users permission to run a different subset of actions.

2. **Create User Groups for vCenter Server Actions in vRealize Operations Manager** on page 47

   To run actions in vRealize Operations Manager, you create a user group to which you add one or more roles. Creating user groups with assigned roles allows you to add users to the group rather than configuring individual user privileges.

**Create User Roles for vCenter Server Actions in vRealize Operations Manager**

To run actions in vRealize Operations Manager, you must give users permission to run the individual actions as part of the user role. You use the role permissions to control who can run actions. If you create multiple roles, you can assign some users permission to run a subset of the actions and assign other users permission to run a different subset of actions.

You configure the user role permissions so that you can assign the role to any user group or user who does not have the Administrator role or who is not using the default super user account. The vRealize Operations Manager Administrator role has the action permissions enabled by default. Users with the Administrator role assigned to their user account can run all of the actions. The default super user, admin, does not require permission checking and this user can run all actions.

**Prerequisites**

- Verify that actions are configured to run in vRealize Operations Manager. See “Add a vCenter Python Actions Adapter Instance in vRealize Operations Manager,” on page 43.
- Verify that you have sufficient privileges to configure the user access settings.

**Procedure**

1. In the left pane of vRealize Operations Manager, click the **Administration** icon.
2. Click **Access Control**.
3. Click the **Roles** tab.
4. Click the plus sign and enter a name and description for the user role.
   For example, **ActionsRole**.
5. In the Permissions pane, expand **Environment** and expand **Action**.
6. Select the check box for one or more of the actions.
   Users with this role can run the selected actions. To allow one user to run only the Delete Unused Snapshots action and another user to run all actions, you must configure two different roles and assign them appropriately.
7. To apply the changes, click **Update** at the bottom of the permissions list.

**What to do next**

Use the actions to resolve performance problems or reclaim wasted space. See *vRealize Operations Manager User Guide*. 
Create User Groups for vCenter Server Actions in vRealize Operations Manager

To run actions in vRealize Operations Manager, you create a user group to which you add one or more roles. Creating user groups with assigned roles allows you to add users to the group rather than configuring individual user privileges.

You configure the user group for actions so that you can assign the group to any user who must be able to run the actions for which you grant them privileges. Users must have privileges to access the action adapter objects for each associated vCenter Server object.

Prerequisites

- Verify that you have at least one role created to run one or more actions. See “Create User Roles for vCenter Server Actions in vRealize Operations Manager,” on page 46.
- Verify that you have sufficient privileges to configure the user access settings.

Procedure

1. In the left pane of vRealize Operations Manager, click the **Administration** icon.
2. Click **Access Control**.
3. Click the **User Groups** tab.
4. In the toolbar of the top user group list, click the plus sign.
5. Enter a Group Name and Description, and click **Next**.
   For example, **Actions on vc005**.
6. Configure the object privileges.
   a. Click **Objects**.
   b. From the **Object View** drop-down menu, select **Adapter Instance**.
   c. Select the check box for each action adapter instance to which the user needs access to run actions.
7. Assign roles to the group.
   a. Click **Roles**.
   b. Select check box for the action role that you created.
   c. Select any other roles that the user needs.
      For example, select a basic user role in addition to an action role.
8. Assign users to the group.
   a. Click **Members**.
   b. Select the check box for each user that you want to run the actions configured in the roles.
9. Click **Finish**.

The user group is added to the list. The configured Roles, User Accounts, and Associated Objects appear in the details for the group area.

What to do next

- Test the users that you assigned to the group. Log out and log back in as one of them and verify that this user can run the expected actions on the expected objects.
- Configure the collection interval for your vCenter Server Python actions adapter instances. See “Modify a vCenter Python Action Adapter Collection Interval,” on page 48.
Modify a vCenter Python Action Adapter Collection Interval

The vCenter Python Action Adapter is installed with a five-minute collection interval. To minimize traffic between vCenter Server and vRealize Operations Manager, you can change the collection interval to a longer cycle.

The vCenter Server Python Action Adapter is installed with a collection interval of five minutes. The action adapter collects the universally unique identifier (UUID) from the target vCenter Server instance along with general information about the instance in order to associate actions defined in the vCenter Server Python Action Adapter to object data that the vCenter Server adapter collects. When you run actions, they use the collected data from both adapters to populate the action dialog boxes. Because the vCenter Server UUIDs do not often change, you can reduce the collection interval to daily.

Prerequisites

Configure a vCenter Python Action Adapter so that you can run actions on your vCenter Server instance. See “Add a vCenter Python Actions Adapter Instance in vRealize Operations Manager,” on page 43.

Procedure

1. In the left pane of vRealize Operations Manager, click the Administration icon.
2. Click Environment Overview and expand Adapter Instances in the center pane.
3. Expand vCenter Python Actions Adapter Instance and select the adapter name.
4. In the right pane, on the List tab, select the adapter name and click Edit Object.
5. Enter a new value for the Collection Interval (Minutes).
   For example, enter 1440 to collect data once a day.
6. Click OK.

The collection now occurs once a day at the time you made the configuration changes.

Storage Devices Solution in vRealize Operations Manager

The Storage Devices solution provides you with a complete view of your entire storage topology from your host, through your storage network, and out to the storage array. With this solution, you can use vRealize Operations Manager to monitor and troubleshoot capacity and performance problems on different components of your storage area network.

This solution has the following features:

- Provides an end-to-end view of topology, statistics, and events at every affected level of the storage area network.
- Enables a vSphere administrator working with a virtual environment to isolate problems caused by elements in the physical storage stack, such as the Host Bus Adapter (HBA), storage switches, and array. The vSphere admin uses this information to handoff the problem to the domain admin for further analysis.
- Captures and analyzes information for throughput and latency on the HBA and mount objects. Captures throughput on the switch ports.
- Captures IOPS and queue depth at the HBA and switch ports for read and write components.
- Discovers the storage switches and applies the credentials required to collect data from the objects in the storage network. It uses the Common Information Model (CIM) to exchange information with objects managed by the following management systems:
  - Cisco Data Center Network Manager (DCNM)
  - Brocade Network Advisor (BNA)
Install and Configure a Storage Devices Solution

The Storage Devices adapter discovers the objects in your storage topology and maps the path of the data between virtual machines on the ESX host, through the storage network switches, and out to the storage array.

You configure one adapter instance for each vCenter Server system in your environment. If your environment includes multiple vCenter Server systems on the same storage network, you must add fabric CIM servers for each adapter instance. The adapter instance provides you with a holistic view of the storage network connected to the vCenter Server system. The adapter discovers the storage devices only for the ESXi 5.1 update 2 and later.

**CAUTION** Any adapter credentials you add are shared with other adapter administrators and vRealize Operations Manager collector hosts. Other administrators might use these credentials to configure a new adapter instance or to move an adapter instance to a new host.

**Prerequisites**

Verify that the following conditions are met:

- You can provide credentials with sufficient privileges to connect and collect data from the vCenter Server host. If the user account has limited access to objects in the vCenter, you can only collect data from objects for which you have permission. Credentials must include at least read permissions.

- The CIM agent is enabled on all storage network switches from which you are collecting data, and that you can provide credentials with sufficient privileges to connect and collect data. If the user account has limited access to objects in the storage environment, you can only collect data from objects for which you have permission. Credentials must include at least read permissions.

- All storage network switches with the CIM agent enabled are added to DCNM or BNA solutions.

- The fabric CIM service supports switch profile and fabric profile. The supported versions for the Fabric Profile are 1.1 to 1.6.

- A vSphere API for Storage Awareness (VASA) provider is registered as a storage provider with the vCenter Server host for your adapter instance. VASA providers gather information from arrays that support the environment and provide the data to vCenter Server system. If the VASA provider is not registered with vCenter Server host, the Storage Devices Adapter cannot discover objects in the array. The minimum support version is VASA 1.0. See information regarding storage providers in the ESXi and vCenter Server 5.5 Documentation.

- Download and install the management pack for Storage Devices. See “Add a Management Pack,” on page 38.

**Procedure**

1. In the left pane of vRealize Operations Manager, click the Administration icon and click Solutions.


3. Enter a name and description for the adapter configuration.

   For example, vCenter 192.0.4.0 Storage Devices.

4. From the Collector drop-down menu, select the collector to manage the adapter processes.

   If you have only one adapter instance, select Automatically select collector. If you have multiple collectors in your environment, and you want to distribute the workload to optimize performance, select the collector to manage the adapter processes for this instance.
5 In the **vCenter Server** text box, enter the FQDN or IP address of the vCenter Server instance to which you are connecting.

The vCenter Server FQDN or IP address must be reachable from all nodes in the vRealize Operations Manager cluster.

**What to do next**

Add credentials and add the fabric servers. See “Add Credentials and Fabric Servers for a Storage Devices Adapter Instance,” on page 50

**Add Credentials and Fabric Servers for a Storage Devices Adapter Instance**

When configuring an adapter instance for the Management Pack for Storage Devices, you add credentials for a vCenter Server host and at least one CIM fabric switch.

**Procedure**

1 To add credentials on the Manage Solution page, click the plus sign.
   a In the **Credential name** text box, enter the name by which you are identifying the configured credentials.
   b Type the **User name** and **Password** for the vCenter Server instance.
   c Click **OK**.

You configured credentials to connect to a vCenter Server instance.

2 Click **Test Connection** to validate the connection with your vCenter Server instance.

3 To add fabric servers, click **Add Fabric Server**.
   a Click the plus sign.
   b Enter a name and description for the fabric server.
   c Enter the fabric CIM server IP or URL of the host on which the CIM server is installed.

   **Note** The Management Pack for Storage Devices supports CIM servers that manage Fibre Channel switches only. It does not support CIM servers that manage arrays.

<table>
<thead>
<tr>
<th>Option</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brocade fabric</td>
<td>Enter the IP address.</td>
</tr>
<tr>
<td>Cisco fabric</td>
<td>Enter the service URL in the following format:</td>
</tr>
<tr>
<td></td>
<td>https://&lt;IP/Hostname&gt;:&lt;Port&gt;/&lt;Implementation Namespace&gt;, for example,</td>
</tr>
<tr>
<td></td>
<td><a href="https://1.2.3.4:5989/cimv2">https://1.2.3.4:5989/cimv2</a>.</td>
</tr>
</tbody>
</table>

   d To add credentials, click the plus sign.
   e In the **Credential name** text box, enter the name by which you are identifying the configured credentials.
   f Enter the user name and password for the Brocade or Cisco Fabric CIM server.

   For the Cisco Fabric CIM server, the user name and password are for the Cisco Data Center Network Manager (DCNM) and not the Cisco switch.
   g Click **OK**.

4 Click **Save Settings**.

The adapter is added to the Adapter Instance list and is active.
What to do next

To verify that the adapter is configured and collecting data from the objects in the storage topology, wait a few collection cycles, then view application-related data.

- Environment Overview Inventory. Verify that all the objects related to the Storage Devices Instance are listed. Objects should be in the collecting state and receiving data. See “Verify That Your Storage Devices Adapter Is Connected and Collecting Data,” on page 51.

- Dashboards. Verify that the Storage Components Heatmap, the Storage Components Usage, and the Storage Troubleshooting are added to the default dashboards. See vRealize Operations Manager User Guide.

Verify That Your Storage Devices Adapter Is Connected and Collecting Data

You configured an adapter instance of the Management Pack for Storage Devices solution with credentials for a vCenter Server host and at least one CIM fabric switch. Now you want to verify that your adapter instance can retrieve information from objects in the host, switch, and array domains of your environment.

Table 7-1. Object Types that the Storage Devices Adapter Discovers

<table>
<thead>
<tr>
<th>Object Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Zone Set</td>
<td>A collection of all active zones in the storage network.</td>
</tr>
<tr>
<td>Fabric</td>
<td>In the Brocade storage network, fabric is a collection of interconnected switches. There is typically a one-to-one relationship between the fabric and the SAN. In the Cisco storage network, fabric is a virtual SAN which is collection of one or more logical switches. There is typically a one-to-many relationship between the SAN and the fabric.</td>
</tr>
<tr>
<td>Fabric CIM Server</td>
<td>CIM server that manages the switches. It provides the username, password and URL information that the Storage Devices adapter uses to discover storage network objects such as fabric, switches, and switch ports.</td>
</tr>
<tr>
<td>Host Adapter</td>
<td>The Fibre Channel (FC) or Fibre channel over Ethernet (FcoE) host adapters in the host system.</td>
</tr>
<tr>
<td>Logical Switch</td>
<td>A logical switch abstraction for the Cisco storage network. It is a collection of one or more switch ports that are accessible to one other.</td>
</tr>
<tr>
<td>Mount</td>
<td>A storage LUN abstraction that is available on the host system.</td>
</tr>
<tr>
<td>No Existing Object Container</td>
<td>A container that includes all the objects that are no longer discovered in the storage devices topology.</td>
</tr>
<tr>
<td>SAN (Storage Area Network)</td>
<td>In the Brocade storage network, the SAN is a collection of fabrics. There is typically a one-to-one relationship between the SAN and the fabrics. In the Cisco storage network, the SAN is a collection of one or more Virtual Storage Area Networks (VSAN).</td>
</tr>
<tr>
<td>Storage Array</td>
<td>The storage array registered to the VASA provider in the vCenter for the adapter instance.</td>
</tr>
<tr>
<td>Storage Devices Instance</td>
<td>The Storage Devices adapter instance.</td>
</tr>
<tr>
<td>Storage LUN</td>
<td>The storage LUN of a storage array.</td>
</tr>
<tr>
<td>Storage Processor</td>
<td>The storage controller on the storage array.</td>
</tr>
<tr>
<td>Switch</td>
<td>The switch on the storage network that connects the host to the storage array.</td>
</tr>
<tr>
<td>Switch Port</td>
<td>The port on a switch.</td>
</tr>
<tr>
<td>Target Port</td>
<td>The target port of a storage array.</td>
</tr>
<tr>
<td>Zone</td>
<td>A collection of target ports or host adapters in the storage network.</td>
</tr>
</tbody>
</table>

Procedure

1. In the left pane of vRealize Operations Manager, click the Administration tab and click Environment Overview.
2 In the list of tags, expand Adapter Instances and expand Storage Devices Instance.
3 Select the adapter instance name to display the list of objects discovered by your adapter instance.
4 Slide the display bar to the right to view the object status.

<table>
<thead>
<tr>
<th>Object Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection State</td>
<td>If green, the object is connected.</td>
</tr>
<tr>
<td>Collection Status</td>
<td>If green, the adapter is retrieving data from the object.</td>
</tr>
</tbody>
</table>

5 Deselect the adapter instance name and expand the Object Types tag.
Each Object Type name appears with the number of objects of that type in your environment.
6 Verify that you have at least one object in each of the network areas that the Storage Devices adapter discovers.

What to do next
If objects are missing or not transmitting data, you might need to investigate further.
- If an object is not connected or not transmitting data, search for the object and check for related alerts.
- If the adapter does not discover at least one object on the host system, in the storage network, and in the storage array, verify that your environment is configured properly. Common configuration problems such as invalid credentials, Fabric CIM servers not reachable, or VASA providers not registered in the vCenter Server instance are raised as alerts for the Storage Devices adapter instance.

vRealize Configuration Manager Solution for vRealize Operations Manager
The vRealize Configuration Manager solution provides compliance and change data from vRealize Configuration Manager in vRealize Operations Manager. The compliance and change data helps you analyze and resolve problems in your environment.
You must manage the same vCenter Server instances with vRealize Operations Manager and vRealize Configuration Manager.
The vRealize Configuration Manager compliance data is based on compliance templates that are run against the data collected from the same vCenter Server objects that are monitored in vRealize Operations Manager. The templates are the configuration settings that must be present on a target object for it to be considered compliant with the template standards. The standards might be the *VMware vSphere Hardening Guide*, the Payment Card Industry standards, Health Insurance Portability and Accountability Act, or other VMware or industry standards. The compliance results appear in vRealize Operations Manager on the **Compliance** tab, which is a tab on the **Analysis** tab for an object.

The vRealize Configuration Manager change events are based on data collected from virtual machine guest operating systems that are managed by the same vCenter Server instances that are monitored by both vRealize Operations Manager and vRealize Configuration Manager. The changes to the virtual machines, for example, software installation, appear in vRealize Operations Manager as change events on the **Troubleshooting > Events** tab.

The compliance and change data appears after you install the vRealize Configuration Manager management pack in vRealize Operations Manager and configure an adapter instance for each vRealize Configuration Manager instance.
Configure a vRealize Configuration Manager Solution in vRealize Operations Manager

The vRealize Configuration Manager adapter enables the integration and manages communication between vRealize Operations Manager and vRealize Configuration Manager. You configure one vRealize Configuration Manager adapter for each vRealize Configuration Manager instance. When the adapter is added, you can view the compliance and change information from vRealize Configuration Manager, which helps you better understand the state of objects in your environment.

The compliance information is for the vCenter Server objects that vRealize Operations Manager manages. The change information is for any virtual machines on which you installed the vRealize Configuration Manager agent so that you can collect information about the guest operating system.

**CAUTION** Any adapter credentials you add are shared with other adapter administrators and vRealize Operations Manager collector hosts. Other administrators might use these credentials to configure a new adapter instance or to move an adapter instance to a new host.

**Prerequisites**

- Verify that vRealize Configuration Manager and vRealize Operations Manager are collecting data from the same vCenter Server instances.
- In vRealize Configuration Manager, verify that you created a user account that is used only for the adapter. You must not use the account as an interactive user login. The adapter account frequently logs in and out of vRealize Configuration Manager. If you use it as an interactive account, you must regularly refresh the connection, which affects your vRealize Configuration Manager experience. See [https://www.vmware.com/support/pubs/vcm_pubs.html](https://www.vmware.com/support/pubs/vcm_pubs.html).
- In vRealize Configuration Manager, verify that the user account has permission in vRealize Configuration Manager to access the virtual object groups and machine groups that correspond to the objects that this instance of vRealize Operations Manager manages.
- Download and install the vRealize Configuration Manager management pack. See “Add a Management Pack,” on page 38.

**Procedure**

1. In the left pane of vRealize Operations Manager, click the **Administration** icon and click **Solutions**.
2. On the **Solutions** tab, select **Management pack for VCM for vSphere** and click **Configure**.
3. Enter a name and description for the adapter configuration. For example, **vRealize Configuration Manager Adapter 192.0.3.0**.
4. From the **Collector** drop-down menu, select the collector to manage the adapter processes.
   - If you have only one adapter instance, select **Automatically select collector**. If you have multiple collectors in your environment, and you want to distribute the workload to optimize performance, select the collector to manage the adapter processes for this instance.
5. Configure the database connection options.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Database name</strong></td>
<td>Enter the name of the vCenter Server database as it appears in SQL Server. The default name is VCM.</td>
</tr>
<tr>
<td><strong>Database host</strong></td>
<td>Enter the name or URL of the vRealize Configuration Manager instance.</td>
</tr>
</tbody>
</table>
Table of Contents

Chapter 7 vRealize Operations Manager Post-Installation Considerations

Option | Description
--- | ---
**Database instance (optional)** | Enter the name of the Microsoft SQL Server instance on which the database is running. If you do not provide the instance name, vCenter Server uses the instance configured for the vRealize Configuration Manager Collector.

**Database Port** | Enter the database port number on the vRealize Configuration Manager collector that vRealize Operations Manager must use when communicating with vRealize Configuration Manager. The default port is 1433.

6 To add credentials, click the plus sign.

Option | Description
--- | ---
**Credential name** | Enter the name by which you are identifying the configured credentials.

**Database Username and Password** | Enter the database user name and password for the vRealize Configuration Manager instance.

**Database Authentication** | From the drop-down menu, select the method by which the user credentials are verified. If vRealize Configuration Manager is configured for Windows Authentication, select Windows Authentication.

**Windows Domain** | Enter the Windows Domain for the credentials.

7 Click Test Connection to validate the connection with your vRealize Configuration Manager instance.

8 Click Save Settings.

The adapter is added to the Adapter Instance list and is active.

What to do next

- Verify that vRealize Operations Manager can pull the compliance information from vRealize Configuration Manager to the Compliance tab. After configuring the adapter, wait a few collection cycles, browse to an object that you know is managed in vRealize Configuration Manager, and go to the Analysis tab. The Compliance tab should now appear with compliance information for the object. See vRealize Operations Manager User Guide.

- Verify that the change events appear on the Troubleshooting > Events tab. See vRealize Operations Manager User Guide.

Install and Configure a vRealize Infrastructure Navigator Solution

The management pack for vRealize Infrastructure Navigator provides a vRealize Operations Manager solution that you use to monitor applications running on monitored objects in your environment. When the adapter is configured, it discovers and retrieves application-related information from vRealize Infrastructure Navigator.

After vRealize Infrastructure Navigator management pack integration with vRealize Operations Manager, the relevant information is displayed in the vRealize Infrastructure Navigator Environment Overview inventory and the Custom Groups view.

- VIN Application Topology
- VM Dependencies

The adapter discovers the application-related information only for ESXi 5.1 update 2 and later.

**Note** The adapter credentials you add are shared with other adapter administrators and vRealize Operations Manager collector hosts. Other administrators might use these credentials to configure a new vRealize Infrastructure Navigator adapter instance or move a vRealize Infrastructure Navigator adapter instance to another host.
Prerequisites

- Verify that the vCenter Adapter is configured for the vCenter Server instances for which you are configuring the vRealize Infrastructure Navigator adapter. See “Add a vCenter Adapter Instance in vRealize Operations Manager,” on page 41.
- Verify that vRealize Infrastructure Navigator is installed and running properly on vSphere.
- Verify that routing exists from the vRealize Operations Manager collector to the VMs running vCenter Server and vCenter Inventory Service.
- Ensure that you can provide the vCenter Server credentials that have sufficient privileges to connect and collect data. If the user has limited access to objects in vCenter Server, you see only the data for which they have permission. The credentials must have at least read permissions.
- Download and install the vRealize Infrastructure Navigator management pack. See “Add a Management Pack,” on page 38.

Procedure

1. In the left pane of vRealize Operations Manager, click the Administration icon and click Solutions.
2. Click VMware vCenter Operations VIN Adapter and click Configure.
3. Enter a name and description for the adapter configuration. For example, vCenter 192.0.4.0 VIN Adapter.
4. To modify the advanced option regarding collectors, which determines which vRealize Operations Manager collector manages the adapter process, expand the Advanced Settings and select one of the options.
   - If you only one adapter instance, select Automatically select collector. If you have multiple collectors in your environment and you want to distribute the workload to optimize performance, select a collector.
5. In the VC Host text box enter the IP or host name of the vCenter Server instance.
6. To add credentials, click the plus sign.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credential Name</td>
<td>Enter the name by which you are identifying the configured credentials.</td>
</tr>
<tr>
<td>vRealize Infrastructure Navigator Username</td>
<td>Enter the user name of the vRealize Infrastructure Navigator instance.</td>
</tr>
<tr>
<td>vRealize Infrastructure Navigator Username</td>
<td>Enter the password of the vRealize Infrastructure Navigator instance.</td>
</tr>
</tbody>
</table>

7. Click Test Connection to validate the connection with your vRealize Infrastructure Navigator instance.
8. In the Review and Accept Certificate dialog box, review the certificate information.
   - If the certificate presented in the dialog box matches and certificate for your target vCenter Server, click OK.
   - If you do not recognize the certificate as valid, click Cancel. The test fails and the connection to vCenter Server is not completed. You must provide a valid vCenter Server URL or verify the certificate on the vCenter Server is valid before completing the adapter configuration.
9. Click Save Settings.
   The adapter instance is added to the list.
vRealize Operations Manager begins collecting application-related information from vRealize Infrastructure Navigator. Depending on the number of managed objects, the initial collection can take more than one collection cycle. A standard collection cycle for vRealize Operations Manager begins every five minutes. The standard collection cycle for vRealize Infrastructure Navigator begins once every hour. The collection cycle for vRealize Infrastructure Navigator is configurable.

What to do next

To verify that the adapter is configured and collecting data, view application-related data. See “Viewing vRealize Infrastructure Navigator Application-Related Data,” on page 57.

- Environment Overview Inventory. The objects related to applications are added to the inventory under Groups and Applications.
- The vRealize Infrastructure Navigator Dashboard.
- Search Applications. Search for an application by name.

Viewing vRealize Infrastructure Navigator Application-Related Data

You can view application-related data to verify that the vRealize Infrastructure Navigator adapter is configured and collecting data.

You can verify that the vRealize Infrastructure Navigator adapter is correctly installed and collecting data using the following options.

Table 7-2. Successful Installation Indicators

<table>
<thead>
<tr>
<th>Where to View the Information</th>
<th>Information to View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection State and Collection Status columns in the Management Pack for Infrastructure Navigator Solution Details section on the Administration &gt; Solutions tab.</td>
<td>The strings collecting or data receiving appear approximately five minutes after the installation.</td>
</tr>
<tr>
<td>Environment Overview Inventory</td>
<td>The objects related to applications are added to the inventory.</td>
</tr>
<tr>
<td>Dashboards</td>
<td>vRealize Infrastructure Navigator dashboards are added to the default vRealize Infrastructure Navigator dashboards.</td>
</tr>
</tbody>
</table>

vRealize Operations Manager Dashboards for vRealize Infrastructure Navigator

The vRealize Operations Manager dashboards for vRealize Infrastructure Navigator provide the user interface you need to view the status and performance of applications. The vRealize Infrastructure Navigator dashboards are specific to vRealize Infrastructure Navigator.

Tips for Using the VIN Application Topology Dashboard

Table 7-3. vRealize Operations Manager Dashboards for vRealize Infrastructure Navigator

<table>
<thead>
<tr>
<th>Dashboard Name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Topology Dashboard</td>
<td>Use for a quick visual summary of the overall topology of the applications discovered by vRealize Infrastructure Navigator. Applications discovered by vRealize Infrastructure Navigator are labeled and can be viewed in the Topology widget in this dashboard.</td>
</tr>
<tr>
<td>VIN VM Dependencies Dashboard</td>
<td>Use to monitor the all of the known VMs, their properties, and their relationships in vCenter Server.</td>
</tr>
</tbody>
</table>
Viewing vRealize Infrastructure Navigator System Log Files

You can view vRealize Infrastructure Navigator adapter errors in the adapter and collector log files. You can view log files in the user interface or in an external log viewer.

vRealize Infrastructure Navigator adapter log files are found in the `/storage/vcops/log/adapters/VinAdapter/VinAdapter_<id>.log` folder and collector log files are in the `/storage/vcops/log/collector.log` folder on the vApp.

Log files are also available from the vRealize Operations Manager user interface. In the left pane, select `Administration > Support > Logs`.

Setting Log Levels

The logging level is set to `ERROR` by default. To troubleshoot issues, set the logging level to `INFO`. To view detailed messages, including micro steps, queries, and returned results, set the logging level to `DEBUG`.

Troubleshooting vRealize Infrastructure Navigator

Known troubleshooting information can help you diagnose and correct common problems with the vRealize Infrastructure Navigator management pack.

This section provides information for troubleshooting vRealize Infrastructure Navigator error messages and connection problems with vCenter Server.

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Troubleshooting</th>
</tr>
</thead>
</table>
| Unable to Connect to vCenter Server        |  ■ Check the vCenter Server URL.  
  ■ Check the routing from the collector running the vRealize Infrastructure Navigator management pack to the vCenter Server VM.  
  ■ Verify that vCenter Server is the supported version. |
| Unable to log in to vCenter Server         |  Check the vCenter Server credentials.                                          |
| Unable to connect to Inventory Service     |  ■ Check the routing from the collector running the vRealize Infrastructure Navigator management pack in the Inventory Service VM. The URL appears in the error message.  
  ■ Make sure the Inventory Service is running. |
### Table 7-4. Troubleshooting vRealize Infrastructure Navigator (Continued)

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to check vRealize Infrastructure Navigator status</td>
<td>Make sure that the vRealize Infrastructure Navigator is deployed and that discovery is turned ON.</td>
</tr>
</tbody>
</table>
| In the Applications dashboard, Applications appear without any VMs. | Possible causes:  
  - The vSphere management pack instance was not defined for the vCenter instance that the vRealize Infrastructure Navigator management pack is connecting to.  
  - The vRealize Infrastructure Navigator management pack instance was defined before the vSphere management pack instance.  
Suggested troubleshooting:  
  - Make sure the vSphere management pack instance is defined and collecting for the correct vCenter Server instance.  
  - Restart the collector from the vRealize Operations Manager terminal.  
    /usr/lib/vmware-vcops/collector/bin/CollectorService.sh restart  
  - Remove the vRealize Infrastructure Navigator management pack instance and create a vRealize Infrastructure Navigator management pack instance. |

---

**vRealize Operations Management Pack for vRealize Hyperic Solution**

The Management Pack for vRealize Hyperic includes an embedded adapter and preconfigured dashboards. The adapter uses the Hyperic REST API to import resources and metrics from vRealize Hyperic. You can use the dashboards to monitor both the vRealize Hyperic resources imported by the management pack, and also your vRealize Automation environment.

Management Pack for vRealize Hyperic provides visibility of key health and performance data, enabling you to tie applications to underlying infrastructure for comprehensive triage.

If you are working with vRealize Automation, the Management Pack for vRealize Hyperic enables you to monitor your vRealize Automation environment, and view related metrics, alerts and symptoms.

The Management Pack for vRealize Hyperic can be installed on any advanced or enterprise edition VMware vRealize Operations Manager installation. Use on advanced editions is restricted to storage, network and Hyper-V data. All OS and application-specific resources and data can only be consumed in an enterprise edition.

**Installing and Configuring the vRealize Hyperic Solution**

After you have verified that all the prerequisites have been met, you download and install the Management Pack for vRealize Hyperic and then configure it.

**Installation Prerequisites**

Before you configure Management Pack for vRealize Hyperic you must prepare the vRealize Operations Manager and vRealize Hyperic systems.

**Compatible vRealize Operations Manager and vRealize Hyperic Versions**

Use the VMware product compatibility matrix to verify that the Management Pack for vRealize Hyperic is compatible with your versions of vRealize Operations Manager and vRealize Hyperic.
vRealize Hyperic Server Installation and Configuration Requirements

- Verify that the vRealize Hyperic 5.8.4 server and the agents are installed and running correctly.
- Verify that the vRealize Hyperic and vRealize Operations Manager servers are time synchronized.
- Download and install the vRealize Hyperic management pack. See “Add a Management Pack,” on page 38.
  For the Management Pack for vRealize Hyperic.
- Verify that the vRealize Hyperic server is configured to collect vCenter UUID and MOID values for vRealize Hyperic platforms so that vRealize Hyperic platforms can be mapped to the corresponding virtual machines. See “Specify vCenter Details on the vRealize Hyperic Server,” on page 63.

Remote Collector Machine

If you have a multiple node system, verify that you have a remote collector machine available on which to install the vRealize Hyperic adapter. A remote collector is not required for a single node installation.

Connection Requirements

Verify that communication between vRealize Hyperic and the vRealize Operations Manager node on which the vRealize Hyperic adapter is running is bidirectional.

Credential Requirements

- Verify that you can provide the vCenter Server credentials that have sufficient privileges to connect and collect data. If a user has limited access to objects in vCenter Server, they see only the data for which they have permission.
  The credentials must have at least read permissions.
- Verify that you have a vRealize Hyperic user name and password and the vRealize Operations Manager adapter user name and password when you create a credential for a Management Pack for vRealize Hyperic instance.

Certificate Requirements

Verify that you uploaded the vRealize Hyperic certificate to the vRealize Operations Manager server.

This process is required by default and you must perform it manually. If you do not require the security provided by the certificate, you can disable the certificate check during installation. See “Import a Certificate,” on page 62.

Configure a vRealize Hyperic Solution

The Management Pack for vRealize Hyperic provides visibility of key health and performance data, so that you can tie applications to underlying infrastructure for comprehensive triage.

CAUTION Any adapter credentials you add are shared with other adapter administrators and vRealize Operations Manager collector hosts. Other administrators might use these credentials to configure a new adapter instance or to move an adapter instance to a new host.

Prerequisites

Verify that all the prerequisites detailed in “Installation Prerequisites,” on page 59 are met.

Procedure

1. In the left pane of vRealize Operations Manager, on the Administration tab, click Solutions.
2. On the Solutions tab, select vRealize Hyperic and click the Configure icon.
3. Enter a name and description for the adapter configuration.

   For example, vCenter 192.0.4.0 Hyperic Adapter.
4 Enter the name or URL of the Hyperic instance to which you are connecting in the **Hyperic Server URL** text box.

5 Specify the vRealize Operations Manager node on which the adapter is running.

For a multiple node system, the adapter must be installed on a remote collector node. Installing the adapter on a multiple node system comprises selecting the collector node from the **Collector** menu and specifying its URL.

a For a multiple node system, under **Advanced Settings**, select the appropriate remote collector node for the installation from the **Collector** menu.

b Enter the host name or URL of the vRealize Operations Manager node.

- If you have a multiple node installation, in the **vRealize Operations Manager Remote Collector URL** text box, enter the host name or URL of the vRealize Operations Manager collector machine.

- If you have a single node installation, in the **vRealize Operations Manager Remote Collector URL** text box, enter the URL of the node.

6 Select an option from the **Certificate Verification** drop-down menu to enable or disable certificate verification.

Enabling certificate verification prevents a third party from reading traffic between the vRealize Operations Manager server and the vRealize Hyperic server.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>The adapter instance checks the server certificate when it connects to the vRealize Hyperic server. Either a server certificate or a CA-signed certificate must be in the vRealize Operations Manager truststore file.</td>
</tr>
<tr>
<td>false</td>
<td>The adapter instance does not check the server certificate when it connects to the vRealize Hyperic server.</td>
</tr>
</tbody>
</table>

7 Click the plus sign, provide credential information, and click **OK**.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credential Name</strong></td>
<td>Enter the name by which you are identifying the configured credentials.</td>
</tr>
<tr>
<td><strong>Hyperic Username</strong></td>
<td>Enter the user name of the vRealize Hyperic instance.</td>
</tr>
<tr>
<td><strong>Hyperic Password</strong></td>
<td>Enter the password of the vRealize Hyperic instance.</td>
</tr>
<tr>
<td><strong>vRealize Operations Manager Username</strong></td>
<td>Enter the user name of the vRealize Operations Manager instance.</td>
</tr>
<tr>
<td><strong>vRealize Operations Manager Password</strong></td>
<td>Enter the password of the vRealize Operations Manager instance.</td>
</tr>
</tbody>
</table>

8 Verify that **true** is selected in the **Support Autodiscovery** menu to enable autodiscovery.

When you enable autodiscovery, the adapter discovers new vRealize Hyperic objects and creates resources for them in vRealize Operations Manager. If you disable autodiscovery, you must use manual discovery to selectively import objects and create resources.
9 Under **Advanced Settings**, configure an option from the **Host Name Verification** menu to enable or disable host name verification.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>The adapter instance checks the host name in the server certificate. The host name in the URL that the adapter uses to connect to the vRealize Hyperic server must be the common name or one of the subject alternative names in the server certificate. For example, if the URL is <a href="http://www.mysite.com">www.mysite.com</a>, the common name or one of the subject alternative names must be <a href="http://www.mysite.com">www.mysite.com</a>.</td>
</tr>
<tr>
<td>false</td>
<td>The adapter instance does not check the host name in the server certificate.</td>
</tr>
</tbody>
</table>

**CAUTION** Set this option to false if you are using the default vRealize Hyperic server certificates.

10 Click **Test Connection** to validate the connection with your vCenter Server instance.

11 Click **Save Settings**.

The adapter instance is added to the list.

vRealize Operations Manager begins collecting infrastructure-related metrics from the vRealize Hyperic agents. Depending on the number of managed objects, the initial collection can take more than one collection cycle. A standard collection cycle for vRealize Operations Manager begins every five minutes. The standard collection cycle for vRealize Hyperic agents begins once every hour. The collection cycle is configurable.

**What to do next**

View application-related data to verify that the adapter is configured and collecting data. See “**Viewing Application-Related Data,”** on page 62.

**Viewing Application-Related Data**

You can view application-related data to verify that the adapter is configured and collecting data.

You can verify that the adapter is correctly installed and collecting data using the following options.

**Table 7-5. Successful Installation Indicators**

<table>
<thead>
<tr>
<th>Where to View the Information</th>
<th>Information to View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection Status and Collection State columns in the vRealize Hyperic Solution Details section on the <strong>Solution</strong> tab.</td>
<td>The strings <em>collecting</em> or <em>data receiving</em> appear approximately five minutes after the installation.</td>
</tr>
<tr>
<td>Environment Overview Inventory</td>
<td>The objects related to applications are added to the inventory.</td>
</tr>
<tr>
<td>Dashboards</td>
<td>vRealize Hyperic dashboards are added to the default vRealize Operations Manager dashboards.</td>
</tr>
</tbody>
</table>

**Import a Certificate**

You import a certificate to the vRealize Operations Manager server truststore file so that the Management Pack for vRealize Hyperic instance can communicate securely with vRealize Hyperic server.

**Prerequisites**

- Export a certificate from the vRealize Hyperic server, or obtain a signed certificate from a Certificate Authority (CA).
Verify that the keytool utility is added to the system path on the vRealize Operations Manager server. The keytool utility is provided with Java.

**Procedure**

1. Open a command prompt on the vRealize Operations Manager server.
2. Use the `keytool` utility to import the certificate to the server truststore file.
   
   For example:
   
   ```bash
   keytool -import -alias HYPERICCERT -file mycert.cer -keystore "vcenter-ops/user/conf/truststore" -storepass oxygen
   ```
   
   In this example, `mycert.cer` is the name of the certificate to import, HYPERICCERT is an alias name to assign to the certificate in the server truststore file, and oxygen is the default password for the server truststore file.
3. Restart the vRealize Operations Manager Web service.

**What to do next**

Verify that the **Certificate Verification** option in the Management Pack for vRealize Hyperic configuration is set to **true** for the adapter instance. See “Configure a vRealize Hyperic Solution,” on page 60.

**Specify vCenter Details on the vRealize Hyperic Server**

You must configure the vRealize Hyperic server to collect UUID and MOID values for vRealize Hyperic platforms so that vRealize Hyperic platforms can be mapped to the corresponding virtual machines.

**Prerequisites**

Verify that you can perform administration tasks in the vRealize Hyperic user interface. See **vRealize Hyperic Administration**.

**Procedure**

1. In the vRealize Hyperic user interface, click the **Administration** tab.
2. Select the **HQ Server Settings** link.
3. Configure the vCenter Server settings.
   
   a. Type the URL of the vCenter SDK in the **vCenter SDK** text box.
      
      The URL format is `https://ipaddress/sdk`, where ipaddress is the IP address of the vCenter Server host.
   b. Type the user name and password of a user who has vCenter Server administrator privileges in the **vCenter User** and **vCenter Password** text boxes.
   c. Click **OK** to save your changes.
4. (Optional) Verify that the vCenter Server settings are applied.
   
   a. On the **Resources** tab, click a platform link.
   b. Verify that **vCenter UUID** and **MOID** values appear in the summary information at the top of the page.
Customizing Your Configuration

You can customize your Management Pack for vRealize Hyperic configuration by modifying configuration properties and workload calculation definitions.

Modifying Configuration Properties

The `hyperic.properties` file contains configuration properties that control how Management Pack for vRealize Hyperic models vRealize Hyperic services, synchronizes resource relationships, and reports resource down alerts.

The `hyperic.properties` file is in the `conf` folder in the management pack installation folder.

You can edit the `hyperic.properties` file on the `conf` folder on the vRealize Operations Manager virtual machine.

Changes to the `hyperic.properties` file take effect when you restart vRealize Operations Manager services.

**Table 7-6. Management Pack for vRealize Hyperic Configuration Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>allServicesAsIndependentResources</td>
<td>Set this property to true to model all vRealize Hyperic services as independent vRealize Operations Manager resources. If you set this property to false, Management Pack for vRealize Hyperic models a vRealize Hyperic service as an independent vRealize Operations Manager resource unless it meets the criteria specified in the serviceTypesForIndependentServices, serverTypesForIndependentServices, or platformTypesForIndependentServices property.</td>
<td>false</td>
</tr>
<tr>
<td>serviceTypesForIndependentServices</td>
<td>Comma-separated list of service resource kinds. If you set allServicesAsIndependentResources to false, Management Pack for vRealize Hyperic models the services whose resource kinds appear in this list as independent vRealize Operations Manager resources.</td>
<td></td>
</tr>
<tr>
<td>serverTypesForIndependentServices</td>
<td>Comma-separated list of server resource kinds. If you set allServicesAsIndependentResources to false, the Management Pack for vRealize Hyperic models a service as an independent vRealize Operations Manager resource if it belongs to a server whose resource kind appears in this list.</td>
<td></td>
</tr>
<tr>
<td>platformTypesForIndependentServices</td>
<td>Comma-separated list of platform resource kinds. If you set allServicesAsIndependentResources to false, Management Pack for vRealize Hyperic models a service as an independent vRealize Operations Manager resource if it belongs to a platform whose resource kind appears in this list.</td>
<td></td>
</tr>
</tbody>
</table>
Table 7-6. Management Pack for vRealize Hyperic Configuration Properties (Continued)

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>relationshipSyncInterval</td>
<td>Specifies the number of intervals after which Management Pack for vRealize Hyperic runs relationship synchronization logic. This logic populates the virtual machine-to-platform mapping.</td>
<td>10</td>
</tr>
<tr>
<td>errorReportingInterval</td>
<td>Specifies the number of collection cycles to wait after the vRealize Hyperic server reports an error before reporting the error as a resource down alert.</td>
<td>10</td>
</tr>
</tbody>
</table>

Customizing Workload Calculations

You can customize how the Management Pack for vRealize Hyperic calculates workload for specific resource kinds by configuring workload definitions.

Workload Definitions File

You configure workload definitions in the workloaddefinitions.xml file. The workloaddefinitions.xml file is in the conf folder in Management Pack for vRealize Hyperic installation folder.

You can edit the workloaddefinitions.xml file on the conf folder on the vRealize Operations Manager virtual machine.

The workloaddefinitions.xml file has the following format.

```xml
<WorkloadDefinition consumer="resourcekind" resultMetric="resultmetric">
   <Capacity metric="capacitymetric" />
   <Demand metric="demandmetric" />
</Workload Definition>
```

After you modify the workloaddefinitions.xml file, you must redescribe Management Pack for vRealize Hyperic instance to apply your changes.

<WorkloadDefinition> Element

The <WorkloadDefinition> element contains the consumer and resultMetric attributes. The consumer attribute identifies the resource kind for which to calculate workload and the resultMetric attribute specifies the name of the metric in which to store the workload calculation value.

You can optionally specify a metric group in the resultMetric attribute by using the format metric_group | metric, for example:

```xml
<WorkloadDefinition consumer="Exchange" resultMetric="Workload | Connection Workload" />
```

In this example, Management Pack for vRealize Hyperic creates a metric group named Workload and a metric named Connection Workload when it posts the workload calculation value.

<Capacity> and <Demand> Elements

Management Pack for vRealize Hyperic uses the following formula to calculate workload for the specified resource kind:

\[(\text{demand/capacity} \times 100)\]

You identify the capacity metric in the <Capacity> element and the demand metric in the <Demand> element, for example:

```xml
<Capacity metric="Maximum Connections" />
<Demand metric="Active Connection Count" />
```
In this example, the capacity metric is Maximum Connections and the demand metric is Active Connection Count.

If the vRealize Hyperic server is configured to collect the capacity and demand metrics that you specify, Management Pack for vRealize Hyperic calculates workload based on the values of the specified metrics when it receives data from the Management Pack for vRealize Hyperic server.

**vRealize Hyperic Adapter Folders and Files**

The installer places the vRealize Hyperic adapter files in the `hyperic_adapter3` folder.

The `hyperic_adapter3` folder contains several subfolders and files.

**Table 7-7. vRealize Hyperic Adapter Folders and Files**

<table>
<thead>
<tr>
<th>Folder</th>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>conf</td>
<td>db.properties</td>
<td>Contains database connection properties.</td>
</tr>
<tr>
<td></td>
<td>hyperic.properties</td>
<td>Contains adapter configuration properties.</td>
</tr>
<tr>
<td></td>
<td>describe.xml</td>
<td>Describes the adapter.</td>
</tr>
<tr>
<td></td>
<td>version.txt</td>
<td>Contains the adapter version.</td>
</tr>
<tr>
<td></td>
<td>history.txt</td>
<td>Contains the history of the adapter changes.</td>
</tr>
<tr>
<td></td>
<td>open_source_license.txt</td>
<td>Open source license file.</td>
</tr>
</tbody>
</table>

**Resources Created by the Management Pack for vRealize Hyperic**

The Management Pack for vRealize Hyperic can use either autodiscovery or manual discovery to create resources in vRealize Operations Manager.

When you enable autodiscovery, the management pack discovers Hyperic platforms, servers, and services.

The management pack creates vRealize Operations Manager resources for vRealize Operations Manager platforms and servers. The Management Pack for vRealize Hyperic also creates vRealize Operations Manager resources for certain third party products, such as Microsoft SQL. vRealize Hyperic services appear as metric groups under a vRealize Operations Manager platform or server, depending on the object to which the service belongs.

You can modify properties in the `hyperic.properties` file to model some or all vRealize Hyperic services as vRealize Operations Manager resources instead of metric groups.

If you disable autodiscovery, you must use manual discovery to selectively create vRealize Operations Manager resources for Hyperic objects.

You enable autodiscovery or manual discovery when you add an adapter instance for the Management Pack for vRealize Hyperic. Autodiscovery is enabled by default.

**How the Management Pack for vRealize Hyperic Creates Resources**

The Management Pack for vRealize Hyperic uses the vRealize Hyperic REST API to import vRealize Hyperic platforms, servers, and services to vRealize Operations Manager.

The vRealize Hyperic REST API returns the entire vRealize Hyperic inventory, including all parent-child relationships. During the discovery process, the Management Pack for vRealize Hyperic uses the API to determine child objects for the resources that it imports to vRealize Operations Manager.
When autodiscovery is enabled, the Management Pack for vRealize Hyperic imports all vRealize Hyperic platforms, servers, and services to vRealize Operations Manager. You can optionally configure a white or black list to selectively import objects from vRealize Hyperic during autodiscovery. The Management Pack for vRealize Hyperic imports only those objects that pass the filtering criteria that you specify in the white and black lists.

The Management Pack for vRealize Hyperic models vRealize Hyperic platforms and servers as independent resources in vRealize Operations Manager. For vRealize Hyperic services, properties in the `hyperic.properties` file determine whether the Management Pack for vRealize Hyperic models a service as a metric group or as an independent resource. By default, the Management Pack for vRealize Hyperic models all vRealize Hyperic services as full resources.

**How vRealize Operations Manager Creates Resource Relationships**

The Management Pack for vRealize Hyperic creates resource relationships between vRealize Hyperic parent and child objects, which it imports into vRealize Operations Manager.

The Management Pack for vRealize Hyperic also creates resource relationships between vRealize Hyperic platform resources and VMware virtual machine resources in vRealize Operations Manager.

During resource discovery, the vRealize Hyperic REST API retrieves resource details for vRealize Hyperic platforms. If a vRealize Hyperic platform is a virtual machine, and the virtual machine is managed by a vSphere or Hyper-V server that vRealize Hyperic recognizes, these resource details include the UUID and MOID of the vRealize Hyperic platform.

The Management Pack for vRealize Hyperic uses the UUID and MOID of a vRealize Hyperic platform to look up virtual machine resources that the management pack imports to vRealize Operations Manager. If the Management Pack for vRealize Hyperic finds a matching virtual machine resource, it creates a parent-child relationship between the virtual machine resource and the vRealize Hyperic platform resource. The virtual machine resource is the parent object and the vRealize Hyperic platform resource is the child object.

**Data that the Management Pack for vRealize Hyperic Collects**

The Management Pack for vRealize Hyperic uses the vRealize Hyperic REST API to register for metric notification with the vRealize Hyperic server. When autodiscovery is enabled, the management pack registers all vRealize Hyperic resources. When autodiscovery is disabled, the management pack registers only specific vRealize Hyperic resources.

After the Management Pack for vRealize Hyperic registers a resource with the vRealize Hyperic server, the server posts metric data for that resource to the vRealize Operations Manager adapter. The vRealize Operations Manager adapter forwards the metric data to the Management Pack for vRealize Hyperic.

**vRealize Operations Manager Dashboards for vRealize Hyperic**

The vRealize Operations Manager dashboards for vRealize Hyperic provide the user interface you use to monitor and troubleshoot problems with Microsoft SQL, Microsoft Exchange, and vRealize Hyperic Hyper-V components in vRealize Operations Manager.

| Table 7-8. vRealize Operations Manager Dashboards for vRealize Hyperic |
|---|---|
| **Dashboard Name** | **Purpose** |
| MS SQL | Use for a quick visual summary of the overall health of your MS SQL servers and clusters. Select an item in the heatmap to view its usage statistics, alerts, and relationships in the associated widgets. |
| Exchange | Use for a quick visual summary of the overall health of your MS Exchange Servers. Select an item in the heatmap to view its key performance indicators, alerts, and relationships in the associated widgets. |
Table 7-8. vRealize Operations Manager Dashboards for vRealize Hyperic (Continued)

<table>
<thead>
<tr>
<th>Dashboard Name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperic Hyper-V Alerts</td>
<td>Use to review and troubleshoot current issues with your Hyper-V implementation. Select an alert to view its status in the health tree and interesting metrics related to the alert.</td>
</tr>
<tr>
<td>Hyperic Hyper-V VM Utilization</td>
<td>Use to monitor the CPU usage, memory usage, and throughput in KBPS for the virtual machines in your Hyper-V implementation. You can use this information to optimize your current configuration and predict future adjustments needed to handle changing demand.</td>
</tr>
<tr>
<td>Hyperic Hyper-V Host Utilization</td>
<td>Use to monitor the CPU usage, memory usage, disk read and write latency, and throughput in KBPS for the virtual hosts in your Hyper-V implementation. You can use this information to optimize your current configuration and predict future adjustments needed to handle changing demand.</td>
</tr>
</tbody>
</table>

Troubleshooting vRealize Operations Manager Management Pack for vRealize Hyperic

Known troubleshooting information can help you diagnose and correct common problems with vRealize Operations Manager Management Pack for vRealize Hyperic.

Troubleshooting a Management Pack for vRealize Hyperic Adapter Instance

Perform these general troubleshooting steps to diagnose and correct issues with a Management Pack for vRealize Hyperic adapter instance.

1. Check the collection status and collection state for the adapter instance resource.
2. Look for vRealize Hyperic resources.
3. Check the management pack and collector logs for errors. See “Viewing System Log Files,” on page 69.

For information about vRealize Hyperic Server configuration, see http://support.hyperic.com/display/DOC/Configure+and+Run+the+HQ+Server.

Troubleshooting Inability to View Metrics for vRealize Hyperic Objects

You might not be able to view metrics for vRealize Hyperic in vRealize Operations Manager.

Problem

You cannot view metrics for vRealize Hyperic objects in the vRealize Operations Manager dashboards.

Cause

One of the following items might cause this problem:

- The adapter is configured with an incorrect node.
- If you have the high availability feature configured, vRealize Operations Manager might have experienced an event that caused the adapter to be moved to another node.
- The adapter was moved from one node to another.

Solution

1. In vRealize Operations Manager, select Administration > Solutions > Edit the hyperic adapter instance and edit the URL to point to the node on which the adapter is running.
2  Save the configuration.

**Troubleshooting a Certificate Check Failure**
The certificate check might fail in Management Pack for vRealize Hyperic.

**Problem**
When you click **Test**, an error message indicates a failure in the certificate check.

**Cause**
By default, the vRealize Hyperic adapter requires a positive certificate check in order to work. The error message will appear if a valid certificate cannot be found.

**Solution**
  
  If you do not require the security that a certificate provides, you can disable the certificate on the adapter configuration page.

**Troubleshooting Delays in Metrics That Appear in vRealize Operations Manager**
A delay might occur before vRealize Hyperic metrics appear in vRealize Operations Manager.

**Problem**
The display of metrics from vRealize Hyperic in vRealize Operations Manager is delayed.

**Cause**
The system time on vRealize Hyperic and vRealize Operations Manager are not synchronized.

**Solution**
- Configure vRealize Hyperic and vRealize Operations Manager to the same NTP.

**Viewing System Log Files**
You can view Management Pack for vRealize Hyperic errors in the vRealize Operations Manager adapter and collector log files.

Management Pack for vRealize Hyperic log files are in the `vcenter-ops/user/log/adapters/HypericApiAdapter` folder. The collector log file is in the `vcenter-ops/user/log` folder.

The logging level is set to ERROR by default. To troubleshoot issues, set the logging level to INFO. To view detailed messages, including micro steps, queries, and returned results, set the logging level to DEBUG.

You can set the log level for each class in the `log4j.properties` file in the `vcenter-ops/log/conf/collector` folder, for example:


**Note** If you set the logging level to DEBUG, log files can become large very quickly. Set the logging level to DEBUG only for short periods of time.

**Monitoring vRealize Automation**
Integration with vRealize Hyperic enables wider monitoring of vRealize Automation objects through vRealize Operations Manager.
Setting up vRealize Automation

Integration with vRealize Hyperic enables wider monitoring of vRealize Automation objects through the vRealize-Automation and vSphere-SSO plug-ins.

Plug-ins are installed and configured through vRealize Hyperic.

Prerequisites

- Verify that vRealize Automation is installed and configured with a fully qualified domain name.
- If vRealize Orchestrator is installed behind a load balancer, verify that the certificates have been issued from the load balancer.
- If you are running vRealize Hyperic version 5.8.4, delete the following plug-ins from your environment.
  - vRealize Business Standard
  - vSphere SSO
  - vCenter Orchestrator
  - vRealize Automation AppServices
  - vRealize Automation IaaS
- Verify that the Hyperic agent is installed and configured on all virtual machines running vRealize Automation.
- Download the latest versions of the vRealize-Automation and vSphere-SSO plug-ins from the VMware Solution Exchange.

Procedure

1. Install and configure the plug-ins through the vRealize Hyperic Plugin Manager.
2. Configure the following vRealize server components on each server profile.
   - Spring source tc Runtime server
   - PostgreSQL
   - RabbitMQ
3. Configure the IaaS Credentials to create a relationship between the flow of the vRealize components. See “Configuring the IaaS Credentials,” on page 70.
4. Optional. If you have a high availability configuration, and have load balancers as part of your vRealize Automation environment, manually configure the load balancers in vRealize Hyperic. See “Configuring Load Balancer Servers,” on page 71.

What to do next

Access the vRealize Automation Overview dashboard to begin monitoring your vRealize Automation environment.

View the relationship between vRealize components, by accessing the Environment pane in vRealize Operations Manager and clicking vRealize Automation under Inventory Trees.

Configuring the IaaS Credentials

Configure the IaaS credentials to create a relationship between the flow of the vRealize components. This flow is displayed in the vRealize Automation Inventory Tree in the vRealize Operations Manager Environment.

Procedure

1. In vRealize Hyperic, click the Resources tab, and select Servers.
2 In the search area, filter for vRealize Automation IaaS Web. The list of IaaS servers in your environment is displayed.
3 Select a server, and select the Inventory tab.
4 Click the Configuration link.
5 In the Configuration Properties page enter the configuration options.

<table>
<thead>
<tr>
<th>Option</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>process</td>
<td>Retain the default setting.</td>
</tr>
<tr>
<td>query</td>
<td>Retain the default setting.</td>
</tr>
<tr>
<td>install.path</td>
<td>Retain the default setting.</td>
</tr>
<tr>
<td>port</td>
<td>Retain the default setting.</td>
</tr>
<tr>
<td>IaaS user</td>
<td>Enter the IaaS user name.</td>
</tr>
<tr>
<td>IaaS domain</td>
<td>Enter the IaaS domain name.</td>
</tr>
<tr>
<td>IaaS password</td>
<td>Enter the IaaS password.</td>
</tr>
</tbody>
</table>

6 Click OK.
7 Repeat steps 3 to 6 for each server that appears in the server list.

**Configuring Load Balancer Servers**

When you configure a load balancer server, choose the platform upon which the vRealize Automation server is running.

**Procedure**

1 In vRealize Hyperic, select the Resources tab, and select a single platform.
2 Click Tools Menu, and select New Server.
3 Configure the server options.

<table>
<thead>
<tr>
<th>Option</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter the fully qualified domain name of the load balancer, followed by the type of load balancer. For example, vRa-Server-lb-01.eng.vmware.com vRealize Automation Manager Server Load Balancer.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter a description of the load balancer.</td>
</tr>
<tr>
<td>Server Type</td>
<td>Select the type of load balancer.</td>
</tr>
<tr>
<td>Install Path</td>
<td>An entry such as /tmp is sufficient.</td>
</tr>
</tbody>
</table>

The load balancer appears in the list of servers.
vRealize Automation Overview Dashboard

The vRealize Automation Overview dashboard provides the user interface you use to monitor and troubleshoot problems with vRealize Automation components in vRealize Operations Manager.

Table 7-9. vRealize Automation Overview Dashboard Widgets

<table>
<thead>
<tr>
<th>Widget</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>vRealize Automation Instance</td>
<td>Displays the vRealize Automation instances in your environment. When you select an environment, the information displayed in the other widgets is updated accordingly.</td>
</tr>
<tr>
<td>Object Relationship</td>
<td>Displays the application hierarchy. Double-click on a container to display its children.</td>
</tr>
<tr>
<td>Container Details</td>
<td>Displays information about the selected instance. For example, the number of containers, objects, metrics and alerts in the environment.</td>
</tr>
<tr>
<td>Metric Picker</td>
<td>Displays the metrics available for the component selected in the Object Relationship widget. Double-click a metric to view its timeline in the Metric Chart widget.</td>
</tr>
<tr>
<td>Metric Chart</td>
<td>Displays the timeline of a selected metric.</td>
</tr>
</tbody>
</table>

vRealize Automation Alert Definitions

The Management Pack for Hyperic provides vRealize Automation alert definitions which are a combination of symptoms and recommendations that identify problem areas in your environment, and generate alerts on which you can act for those areas.

Table 7-10. vRealize Automation Alert Definitions

<table>
<thead>
<tr>
<th>Alert Name</th>
<th>Object Type</th>
<th>Symptom</th>
<th>Impact</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>vRealize Automation Server Availability</td>
<td>vRealize Automation Server (Group)</td>
<td>Child Metric:vRealize Automation Server</td>
<td>Health</td>
<td>Warning</td>
</tr>
<tr>
<td>Degraded</td>
<td></td>
<td>AVAILABILITY</td>
<td>Availability &lt; 1</td>
<td></td>
</tr>
<tr>
<td>vRealize Automation IaaS Web Availability</td>
<td>vRealize Automation IaaS Web (Group)</td>
<td>Child Metric:vRealize Automation IaaS Web</td>
<td>Health</td>
<td>Warning</td>
</tr>
<tr>
<td>Degraded</td>
<td></td>
<td>AVAILABILITY</td>
<td>Availability &lt; 1</td>
<td></td>
</tr>
<tr>
<td>vRealize Orchestrator Availability</td>
<td>vRealize Orchestrator (Group)</td>
<td>Descendant Metric:vRealize Orchestrator AppServer</td>
<td>Health</td>
<td>Warning</td>
</tr>
<tr>
<td>Degraded</td>
<td></td>
<td>AVAILABILITY</td>
<td>Availability &lt; 1</td>
<td></td>
</tr>
<tr>
<td>More than 1 active vRealize Automation</td>
<td>Realize Automation Manager Serve</td>
<td>Child Metric:vRealize Automation Manager Server</td>
<td>Health</td>
<td>Critical</td>
</tr>
<tr>
<td>Manager Server</td>
<td></td>
<td>AVAILABILITY</td>
<td>Availability = 1</td>
<td></td>
</tr>
</tbody>
</table>
### Table 7-10. vRealize Automation Alert Definitions (Continued)

<table>
<thead>
<tr>
<th>Alert Name</th>
<th>Object Type</th>
<th>Symptom</th>
<th>Impact</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>vSphere SSO Availability Degraded</td>
<td>vSphere SSO (Group)</td>
<td>Descendant Metric: vSphere SSO Availability &lt; 1</td>
<td>Health</td>
<td>Warning</td>
</tr>
<tr>
<td>Critical vSphere SSO services are not available</td>
<td>vSphere SSO</td>
<td>Self Metric: vSphere SSO Directory Service</td>
<td>Health</td>
<td>Symptom Base</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Metric: vSphere SSO Secure Token Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Metric: vSphere SSO WebSSO Availability &lt; 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Metric: vSphere SSO Identity Management Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Metric: vSphere SSO AFD Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Metric: vSphere SSO Certificate Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Metric: vSphere SSO KDC Service</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### vRealize Automation Plug-In Metrics

The vRealize Automation plug-ins collect metrics for objects in your vRealize Automation environment.

#### vSphere-SSO Plug-In Metrics

View the metrics that the vSphere-SSO plug-in collects through the vRealize Automation Overview dashboard.

### Table 7-11. vSphere SSO Plug-In Metrics

<table>
<thead>
<tr>
<th>Application</th>
<th>Service</th>
<th>Metrics Collected</th>
<th>Metrics Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>vSphere SSO</td>
<td>VMware Secure Token Service</td>
<td>Availability</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td>STS Service URL Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td>STS Service URL Response Time</td>
<td>Performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>websso URL Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td>Application</td>
<td>Service</td>
<td>Metrics Collected</td>
<td>Metrics Category</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------</td>
<td>----------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>websso URL Response Time</td>
<td>Performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>VMware Directory Service</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>VMware Certificate Service</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>VMware KDC Service</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>VMware Identity Management Service</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>VMware AFD Service</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>Likewise Service Manager</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>Likewise Registry Service</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>Likewise DCE/RPC End-Point Mapper</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>Likewise Eventlog</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>Likewise Input-Output Service</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>Likewise NetLogon Service</td>
<td>Availability</td>
<td></td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
</tbody>
</table>
### Table 7-11. vSphere SSO Plug-In Metrics (Continued)

<table>
<thead>
<tr>
<th>Application</th>
<th>Service</th>
<th>Metrics Collected</th>
<th>Metrics Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likewise Security and Authentication Subsystem</td>
<td></td>
<td>Availability</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
</tbody>
</table>

### vRealize-Automation Plug-In Metrics

View the metrics that the vRealize-Automation plug-in collects through the vRealize Automation Overview dashboard.

### Table 7-12. vRealize-Automation Plug-In Metrics

<table>
<thead>
<tr>
<th>Application</th>
<th>Service</th>
<th>Metrics Collected</th>
<th>Metrics Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIS Web</td>
<td>IaaS Web</td>
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<td>Availability</td>
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<tr>
<td></td>
<td></td>
<td>WAPI API Availability</td>
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<td>WAPI API Response Time</td>
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<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>IaaS Repository</td>
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<td>Utilization</td>
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<td>vRealize Automation IaaS Web Load Balancer</td>
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<td></td>
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<td>Response Code</td>
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<td>Manager Server</td>
<td>VMware vCloud Automation Center Service</td>
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<td>Availability</td>
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<td></td>
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<td>vRealize Automation Manager Server Load Balancer</td>
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<td>Metrics Category</td>
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<td>identity</td>
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<td>Performance</td>
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<td>management-service</td>
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<td>notification-service</td>
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<td>Application</td>
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<td>vCO Server UI Availability</td>
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<td>vCO Server API Availability</td>
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<td></td>
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<td>AppD</td>
<td>vmware-darwin-tcserver</td>
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<td>Application Services Process Availability</td>
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</tr>
<tr>
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<td>Application Services UI Availability</td>
<td>Availability</td>
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</table>
### Table 7-12. vRealize-Automation Plug-In Metrics (Continued)

<table>
<thead>
<tr>
<th>Application</th>
<th>Service</th>
<th>Metrics Collected</th>
<th>Metrics Category</th>
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<tbody>
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<td>Performance</td>
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<tr>
<td></td>
<td></td>
<td>Resident Memory Size</td>
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</tr>
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<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
<tr>
<td>vRealize Business Server</td>
<td>itbm-server</td>
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<td>Availability</td>
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<td>vRealize Business Server Process Availability</td>
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<td>vRealize Business Server UI Availability</td>
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<td></td>
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<td></td>
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<td>CPU Usage</td>
<td>Utilization</td>
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<td>itbm-data-collector</td>
<td>Availability</td>
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<td>Utilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU Usage</td>
<td>Utilization</td>
</tr>
</tbody>
</table>

### Troubleshooting vRealize Automation

Known troubleshooting information can help you diagnose and correct common problems you may experience while monitoring your vRealize Automation environment through the Management Pack for vRealize Hyperic.

#### Troubleshooting Inability to View vRealize Automation Components

vRealize Automation application components do not display correctly in vRealize Operations Manager.

**Problem**

Some of the vRealize Automation application components are not displayed in the Inventory Tree or in the vRealize Automation Overview dashboard.

**Cause**

- One or more of the vRealize Automation platforms are not defined with the fully qualified domain name.
- The vRealize Automation configuration includes references to virtual machines which are not based on fully qualified domain names.

**Solution**

1. Change the host name of the vRealize Automation platforms to use a fully qualified domain name.
2. Change the vRealize Automation configuration to use fully qualified domain names.

#### Troubleshooting Problems in a High Availability Environment

The vRealize Orchestrator group of components is not displayed in vRealize Operations Manager.

**Problem**

In a high availability environment, the **vRealize Orchestrator Group** is not displayed in the Inventory Tree.
Cause
The certificate on the vRealize Orchestrator server does not contain the load balancer fully qualified domain name.

Solution
◆ Create a new certificate containing the load balancer fully qualified domain name.

Migrating a vCenter Operations Manager Deployment into this Version
By importing data, an established or production version of vRealize Operations Manager can assume the monitoring of an earlier deployment.

After you turn off the earlier deployment, monitoring is done solely by the new version of vRealize Operations Manager. Performing the entire process is known as a migration-based upgrade.

You can also migrate at the same time that you install the new version of vRealize Operations Manager.

About vRealize Operations Manager Migrations
The vRealize Operations Manager migration-based upgrade differs from other software upgrades in a variety of ways.

For migrations, the source is the earlier version of vCenter Operations Manager, and the target is the new, current vRealize Operations Manager version. Migration occurs side by side and does not turn off the source. After migration, the target and source can both monitor the same objects until you decide to use just one or the other.

IMPORTANT A migration-based upgrade does not install new software on a source deployment to refresh the version that is running there.

The migration-based upgrade process uses a separate, target deployment as a receiver of imported inventory and data from the source, leaving the source to continue running its earlier software version.

Deciding to Migrate or Newly Configure vRealize Operations Manager
The role that vCenter Operations Manager plays in your enterprise affects whether you should migrate, or import, your older deployment to vRealize Operations Manager or configure the clean, newly installed deployment from the beginning.

For some users, it is simpler to deploy vRealize Operations Manager, configure the product from the beginning, and monitor the environment. Other users might have integrated vCenter Operations Manager tightly into their business operations and want to migrate as much of their older setup as possible.

If any of the following conditions are true, you are probably a good candidate for configuration and data migration rather than newly configuring vRealize Operations Manager.

■ vCenter Operations Manager is an essential tool for monitoring your environment performance and health, and you act on the alerts that it generates.

■ You actively use vCenter Operations Manager for capacity planning in the following ways:
  ■ You reallocate resources.
  ■ You add resources when objects are stressed.
  ■ You reclaim waste that vCenter Operations Manager identifies in the object pool.
  ■ You run what if scenarios for determining future capacity.
  ■ You use or share capacity planning reports with others.
You have a company requirement to retain monitoring data, and vCenter Operations Manager is the application that you use for that purpose.

You transmit vCenter Operations Manager data such as raw metrics, alerts, reports, or notifications to other production systems.

Migration provides an option to only import the vCenter Operations Manager configuration, without historical data. If any of the following conditions are true, you might be a good candidate for configuration-only migration rather than newly configuring vRealize Operations Manager.

- You invested in the configuration and customization of your vCenter Operations Manager deployment and want to save those configurations in vRealize Operations Manager. Examples include the following configurations:
  - Policy settings
  - Dashboards
  - Hard thresholds and key performance indicators (KPIs)
  - Custom groups
- Features have changed from vCenter Operations Manager to vRealize Operations Manager, but you have reviewed which features are migrated and are satisfied that a migration will import what you need.

Remember that migration to a vRealize Operations Manager target deployment is side-by-side. If a migration does not produce the result you want, you can delete the target deployment and try again. vCenter Operations Manager 5.x remains available to monitor your environment until you decide otherwise. A migration does not shut down version 5.x.

**Ways That the Source and Target vRealize Operations Manager Interact**

The source and target deployments of a vRealize Operations Manager migration interact before and during the importing of data.

You can import multiple vCenter Operations Manager deployments to a single target, resulting in a combined deployment that monitors all of the previous resources.

You can import from the same or different deployment operating system. vRealize Operations Manager supports the following variations:

- Source virtual appliance to target virtual appliance
- Source Windows deployment to target virtual appliance
- Source Linux deployment to target virtual appliance
- Source Linux deployment to target Linux deployment
- Source Windows deployment into target Windows deployment

You can continue to run the earlier, source version and new, target version of vRealize Operations Manager in parallel, even after you perform a migration. You cannot perform a second migration between the same source and target, however.

At import, vRealize Operations Manager measures the available target resources and might warn you that more nodes or disk are needed before enough space is available to import the source.

At import, vRealize Operations Manager notifies you if any adapters are installed on the source that are not installed on the target.
The process might take hours or even days to complete. The number of resources, number of metrics, length of history, and size of the FSDB all contribute to the time needed for migration. During internal testing, an inventory of 13,000 resources with 2.5 years of history took about 44 hours to migrate. A guideline of 1 hour per 10 GB of FSDB data is a good starting point but might be influenced by network performance or other factors.

**Data and Features That vRealize Operations Manager Migrates**

During migration, the vRealize Operations Manager target imports certain data and features from the source.

- Inventory and history; including resources, relationships, properties, and metrics keys
- Metrics data
- Alert definitions, symptom definitions, and notifications
- Custom groups
- Version 5.x policies and attribute packages
- Super metrics
- Applications (tiers)
- Dynamic metadata
- User settings, including dashboards

**Data and Features That vRealize Operations Manager Does Not Migrate**

A vRealize Operations Manager migration cannot import certain data and features from the source. In many cases, you can separately re-add or configure the associated feature on the target, however.

- Reports
- Report templates
- Active or cancelled alerts, alarms, symptoms, and notification history
- Global settings
- Grid column sizes and sequences
- Custom group to policy association
- Resource to attribute package association
- Resource to super metric package association
- User password policies
- Metric and KPI status for World resource kind
- Standard email plugin notification rule:
  - Alert type conditions
- Filter email plugin rule:
  - Alert type conditions
  - Alert subtype conditions
  - Collector conditions
- Adapter-managed groups
In Policies:
- Groups badge thresholds
- Oversized virtual machines settings
- Configure Alerts section
- Forecast and trends
- Custom group associations
- Under use settings

Full profile or balanced profile collection

In vRealize Operations Manager, there is no full mode versus balanced mode, but the default policy is similar to the 5.x balanced mode. To collect the full set of metrics, you must create and apply a new policy or expand the collection scope of the default policy.

Sparkline Chart widget interactions to:
- Resource Relationship
- Resource Relationship (advanced)

Network Port Statistics metric data:
- VmwareDistributedVirtualSwitch
- DistributedVirtualPortgroup

AWS management pack super metric formulas for the following aggregates.
- Aggregate Disk I/O Average (Bytes)
- Aggregate Disk I/O Average (Count)
- Aggregate Network I/O Average (Bytes)

Units for some object type rules in custom groups

The following units change to an incorrect or missing unit:
- Cluster total CPU capacity, GHz to MHz
- Host disk space, GB to unknown
- Virtual machine CPU capacity, MHz to Hz

Latitude and longitude values

After migration, when you manage resource tags that are associated with geographic location, the latitude and longitude values from the 5.x source are not migrated, and the resource location cannot be shown on the map.

Duplicate resources, regardless of how they originate

A resource cannot be migrated when the target is already monitoring it, either originally or because the resource was part of a previous migration. This condition might occur in a number of surprising ways and is key to understanding migrations as described in “Best Practices when Migrating to vRealize Operations Manager,” on page 88.
For example, two vCenter Operations Manager custom groups might be essentially the same because all of their resource identifiers are the same, or, for custom groups that use the name as the sole resource identifier, the names are the same. When that happens, only one of the custom groups can be imported. This restriction applies even if two completely different source deployments are involved, and the custom groups are the same only by coincidence or convention.

**NOTE** If you prefer a source version of a custom group, you can import it if you first remove the duplicate that is already on the target.

### Data and Features That Might Change After a vRealize Operations Manager Migration

After a vRealize Operations Manager migration, you might notice certain changes to vCenter Operations Manager data and features.

- **Metrics status**
  
  Metrics that were disabled in version 5.x attribute packages will be enabled in the corresponding policy on the target if there are enabled symptoms defined that are based on those metrics.

- **Health, risk, and efficiency badges**
  
  After migration, health, risk, and efficiency might vary when compared to version 5.x. Version 5.x percentages were computed based on values and formulas that have different counterparts in this version.

  For example, in version 5.x, efficiency was computed based on waste and density. In this version, it is based on highest criticality of all efficiency alerts on an object.

- **Capacity related badges**
  
  The workload, capacity, time remaining, stress, reclaimable capacity, and density badges might vary when compared to version 5.x because of changes in computations and the data set being considered.

  For example, badges in version 5.x might be computed based on few months of data, but this version bases them on the last 30 days.

- **Authorization data; including user accounts, user groups, LDAP, and mapped privileges**
  
  Imported user privileges and configurations might be slightly different because of interface changes between vCenter Operations Manager 5.x and this version.

- **Super metric names**
  
  Migrated super metrics having the same name on the source become unique by having numbers appended to the names on the target.

  Before:
  
  ```
  superMetric
  superMetric
  superMetric
  ```

  After:
  
  ```
  superMetric
  superMetric_1
  superMetric_2
  ```
Instead of associating super metric packages with resource kinds, super metrics are directly associated to resource kinds as shown in the following example for super metrics s1 and s2, and super metric attribute packages pk1 and pk2:

Before:
In pk1, s1 checked, s2 unchecked
pk1 associated with virtual machine resource kind
In pk2, s1 checked, s2 checked
pk2 associated with host resource kind

After:
s1 migrated and associated with virtual machine resource kind, host resource kind
s2 migrated and associated with host resource kind

- Migrated super metrics can be enabled or disabled according to policy but are set by default at migration to disabled.

- Policy names
Migrated policies having the same name on the source become unique by having numbers appended to the names on the target. The number corresponds to an internal policy ID on the source and can be used for troubleshooting between the target and source.

Migrated policies are also prefixed with the source IP address.

- Dashboard contents
If a source dashboard widget displays data for a resource, and the resource is not migrated for any reason, the migrated widget will not display data.

For example, this happens when dashboard widgets display data from multiple adapters, and some source adapters did not have their target counterparts installed. Other causes might include unmigrated or unsupported metrics that the widget was configured to display.

- Adapter-managed custom groups
Adapter-managed custom groups, such as Folder, are migrated as normal resources instead of custom groups.

### How a vRealize Operations Manager Migration Creates Policies

When migrating vCenter Operations Manager 5.x to this version, you familiarize yourself with the transformations that occur when vRealize Operations Manager creates the migrated set of policies.

The relationship between policies and attribute packages is very different in vCenter Operations Manager 5.x and this version.

When vRealize Operations Manager creates migrated policies per 5.x attribute packages, the following transformations are necessary:

- Merge all Attributes for all resource kinds into one policy.
- Merge all Default Attributes for all resource kinds into one policy.
- Create one policy per custom, user-created attribute package.

vRealize Operations Manager transforms metric states depending on whether the metric is monitored:

- Any collected metric in an attribute package is enabled in the corresponding policy.
- Any metric that is not collected is disabled in the corresponding policy.
vRealize Operations Manager migrates key performance indicators (KPIs), symptom definitions, and alert definitions. For any such metric in an attribute package, the following transformations are necessary:

- If there is any hard threshold specified for the metric:
  - If a matching hard threshold based symptom definition with the same metric, criticality, and operator exists in the new version, enable the symptom definition and override the threshold in the corresponding policy.
  - Otherwise, create a new symptom definition, and enable the symptom definition in the corresponding policy.

- If **Violation Of Hard Threshold Is A Key Indicator** or **Select Criticality Level At Which A Hard Threshold Becomes Key Indicator** is enabled:
  - Mark the metric as a KPI in the corresponding policy.
  - Create alert definitions for any hard threshold symptom definitions created or found in the previous steps, and enable the alert definitions in the corresponding policy.

- If **Violation Of The Upper Dynamic Threshold Is A Key Indicator** is enabled:
  - Mark the metric as a KPI in the corresponding policy.
  - If a matching dynamic threshold based symptom definition exists, enable the symptom definition in the corresponding policy.
  - Otherwise, create a dynamic threshold based symptom definition and enable the symptom definition in the corresponding policy:
    
    \[
    \begin{align*}
    \text{operator} &= \text{DT_VIOLATION} \quad \text{(if both flags are on)} \\
    \text{operator} &= \text{DT_ABOVE} \quad \text{(if only the first flag is on)} \\
    \text{operator} &= \text{DT_BELOW} \quad \text{(if only the second flag is on)}
    \end{align*}
    \]
  - Create alert definitions from the dynamic threshold based symptom definition created or found in the previous steps, and enable the alert definitions in the corresponding policy.

**Migration of vRealize Operations Manager Solutions**

Solutions can have their associated resource configuration or data imported as part of a vRealize Operations Manager migration.

The migration wizard detects adapters on the source and reports if the corresponding adapter is missing on the target. You must install any missing adapters on the target before importing resource configuration or data from a source.

The product does not migrate adapters from source to target for you because of possible differences in adapter version support. If you do not install a missing adapter though, the import process skips that adapter and any resources collected by that adapter. In addition, any dashboards, alerts, custom groups, or super metrics tied to the resources are skipped.

**IMPORTANT** You cannot migrate a source once, install a missing adapter on the target, and migrate the same source again.

For the most current information about adapters, see the compatibility guide, available on the VMware Solution Exchange Web site.
**Supported Adapters in vRealize Operations Manager Migrations**

Many adapters can have their associated resource configuration or data imported as part of a vRealize Operations Manager migration. You install the adapter on the target before importing.

**Supported vCenter Operations Manager 5.x Adapters**

For the vRealize Operations Manager 6.0 release, the following adapters were expected to work on vCenter Operations Manager 5.x and install and be migration-capable on the vRealize Operations Manager target.

This list is subject to change. For the most up-to-date information, see the compatibility guide, available on the [VMware Solution Exchange](https://www.vmware.com) Web site.

Advanced Management Packs

- Amazon Web Services 1.0
- Brocade SAN Analytics
- Dell Compellent
- Dell EqualLogic
- EMC Smarts 3.0
- EMC ViPR
- HP OneView
- HP StoreFront
- Hitachi Storage
- Hitachi Unified Compute Platform
- IBM XIV
- KEMP
- NetApp Storage
- Netflow Logic
- Trend Micro
- VMware vCloud Air 1
- VMware vCloud Networking and Security 1
- VMware NSX for vSphere 2
- X-IO ISE

Enterprise Management Packs

- Care System Analytics for EPIC
- Compuware Gomez 2.9
- HP Business Availability Center 2.7
- HP SiteScope 2.4
- IBM Tivoli
- KEMP Virtual LoadMaster
- Keynote 2.1
- Microsoft SCOM 3.1
- Oracle OEM
- SAP CCMS
- SAP HANA
- TeamQuest Manager 2

Extensibility Tools
- Port 1.1
- Relationship 2.5
- SNMP 2.1
- SQL Loader 2.18
- Textfile 2.0

**Updated or New Adapters**

For the vRealize Operations Manager 6.0 release, the following updated or new adapters were expected to be needed on vRealize Operations Manager in order for the associated resources to be migrated. You would not install the adapter version that was installed on vCenter Operations Manager 5.x.

This list is subject to change. For the most up-to-date information, see the compatibility guide, available on the VMware Solution Exchange Web site.

- VMware Hyperic API 6
- VMware NSX for Multi-Hypervisor 1
- VMware vCM 6

**Unsupported Adapters for vRealize Operations Manager Migrations**

Some adapters cannot have their configuration or data imported as part of a vRealize Operations Manager migration.

**Unsupported Adapters**

For the vRealize Operations Manager 6.0 release, the following adapters were not expected to be supported for migration. To use the adapters, you would install an updated adapter version, and begin new collections in vRealize Operations Manager. Some adapters would not have an update for use with vRealize Operations Manager.

This list is subject to change. For the most up-to-date information, see the compatibility guide, available on the VMware Solution Exchange Web site.

- CIQ
  - CIQ is not applicable on vRealize Operations Manager.
- EMC Storage Analytics
- Hyperic Database Adapter
- Hyperic Push Adapter
- Log Insight
- Self Monitoring
  - The 5.x version self monitoring adapter does not apply. vRealize Operations Manager includes its own self monitoring adapter.
- Storage Devices
Best Practices when Migrating to vRealize Operations Manager

When you migrate to vRealize Operations Manager, certain best practices help to ensure that the data import process succeeds. Without them, the migration might appear to succeed, but the new deployment might not be fully monitoring the inventory or providing all of the data that you expect.

Avoid Duplicate Resources

Do not migrate a source when the target is already monitoring the same inventory. For example, if your earlier deployment is monitoring your vCenter instance, but the new deployment is already monitoring the same vCenter instance, the combining of the earlier data with the new data is not supported.

Similarly, even a single virtual machine, if discovered by different adapters (for example by vCenter on the source and by VIM on the target) cannot have its earlier data imported, because that virtual machine was already being monitored by the target.

Synchronize the System Time

Before you start the migration, make sure that the source and target are configured to the same system time. Be aware that changing the setting might make the system time different than the real time, and time dependent features such as maintenance schedules might run at unexpected times.

Synchronize Adapters

Before you start the migration, make sure that adapters that were installed for the source are installed at the target. The migration does not import data for which there is no adapter.

Verify Licensing

Before you start the import, make sure that the target deployment is not licensed at a lower level than the source. For example, a target that runs a standard license may not monitor the same source inventory that is possible with a source that includes an enterprise license. To ensure no loss in coverage, the target license must be equal to or greater than the source license.

Verify Data Retention Time

Before you start the import, on the target, verify the data retention settings under the Administration option, in Global Settings. The data retention settings are not migrated, and the defaults might be shorter than what was configured on the source.

When a target data retention setting is shorter than the source, the next cleanup cycle on the target removes migrated historical data that falls outside the target retention time setting.

Reduce CPU Load

Before you start the import, on the source, disable dynamic thresholding (DT). DT is CPU intensive and will slow and possibly even stop the import process.

While an import is in progress, do not make changes to the source inventory or resources.

Increase the Source Size and Restart

Migration is resource intensive at the source. For improved performance, consider doubling the memory of the source deployment before beginning the migration. In addition, restart the source before beginning the migration.

After migration, you may return the source to its earlier size.
Back Up the Cluster

**IMPORTANT** No rollback option is available after you perform a migration.

Before you start the import, back up the target vRealize Operations Manager cluster.

- It is assumed that your site uses a commercial backup product such as NetBackup in conjunction with vStorage APIs for Data Protection (VADP). Configuration details for third-party backup applications go beyond the scope of this document, but many resources are available.

- When online, a vCenter Operations Manager cluster is very dynamic. Data is always being updated and modified, and it might be impossible to get a real-time snapshot.

- If you restore a vRealize Operations Manager cluster, it takes a few collection cycles for connections to re-establish themselves and to get to a true picture of the current state of the environment.

  A restore operation must be full, not partial, and must restore the entire cluster, not individual nodes. Partial or individual restores are not supported.

Back up, and being able to restore, is always a recommended practice in case a migration fails to produce the result that you want.

Run the vRealize Operations Manager Import Wizard to Migrate a Source to this Version

Migration-based upgrades, whether at installation time or later, require the same interface and steps to import from an earlier version of vCenter Operations Manager to the current vRealize Operations Manager version.

**Prerequisites**

Source Prerequisites


- Update the source vCenter Operations Manager installation to version 5.8.1 or later.

- Temporarily disable dynamic thresholding (DT). You may restore DT after migration.

  The DT setting is in the Custom UI under Environment > Configuration > Resource Kind Defaults.

- Verify that the source is not collecting from a vCenter Server that is already being monitored by the target. If you need to temporarily disconnect a vCenter Server to meet this requirement, you may restore it after migration.

- Verify that the disk that contains the vCenter Operations Manager log directory has free space.

  Migration requires approximately 2 GB free log space for every 20,000 resources, 1 TB of FSDB data, and run time history of 1 year.

- Temporarily disable alerts so that migrated notifications do not fire immediately. You may restore alerts after migration.

- When two vCenter Operations Manager sources will be migrated, and both collect from the same vCenter Server, verify that one source connects to the vCenter Server using the vCenter Server IP address, and the other source connects using FQDN.

- Know the names and IP addresses of the source machines.

- Know the administrator username and password of the source machines.

- For sources that use Oracle or SQL Server for the database, verify that a minimum of 10 idle connections are available.
- For vApp sources, verify that the vSphere UI is up and running.
- For Linux and Windows sources, verify that the Custom UI is up and running.
- For Linux and Windows sources, verify that the source has a minimum of 1 GB of free memory.
- For Linux and Windows sources, verify that the outbound port on the source is open so that data can be transferred to the target. The default port is 6061.
- For Windows sources, verify that HTTPS is enabled.
- For Windows sources, verify that vCenter Operations Manager is installed under a folder path that does not contain spaces.

**Target Prerequisites**

- Verify that network connection speed between the target and source is 100 mbps minimum.
- If the target has high availability (HA) enabled, temporarily disable HA.
- Take a target snapshot in case the migration does not produce the result that you want, and you need to revert the target.
- Increase the data retention time to match the setting from the source.
- To avoid a large number of immediate notifications, temporarily disable notifications.
- Synchronize the system time setting on the target and all sources. The time zone does not need to be synchronized.
- If, after starting the Import Data wizard, the wizard reports a shortage, add CPU, memory, and disk before proceeding.
- If, after starting the Import Data wizard, the wizard reports any missing adapters, install the adapters before proceeding.

**Procedure**

1. On the left, select **Administration**.
2. Click **Solutions**.
3. Click the **Import Data** tab.
4. Click **Import Data**.
   
   A wizard appears, in which you can select sources.
5. Enter the fully qualified domain name (FQDN) or IP address of the source from which you want to import.
   
   For a vApp deployment, the source must be a vCenter Operations Manager UI server, not an analytics server.
6. Enter the admin password for the source.
7. Click **Add Source**.
   
   vRealize Operations Manager finds and loads the security certificate for the source.
8. Select **Accept this certificate** and click **OK**.
   
   vRealize Operations Manager adds the source to the list of sources from which it will import, and calculates the amount of resources that the target must have for the import to succeed. If the target does not have enough resources, you must install more disk or data nodes before proceeding.
For each source in the list, use the drop menu to select the **Migration Mode**.

Migration mode allows you to exclude historical data when migrating, because migrating the data significantly increases migration time as well as the free space needed on the target.

Add more sources or click **Next**.

A list of solutions appears, which reveals any that are present on sources but missing from the target deployment.

If the source has an adapter installed that is missing from the target, click **Add Solution** to add the adapter to the target.

The steps to add a solution adapter are the same during migration as when you add a new solution.

After you add solutions, click **Next**.

To start the migration import, click **Finish**.

The wizard closes, and you can monitor the progress of the migration.

**What to do next**

While an import is in progress, do not make changes to the source inventory or resources.

The import process might take many hours to complete, especially if you chose to migrate historical data. The number of resources, number of metrics, length of history, and size of the FSDB all contribute to the time needed for migration. During internal testing, an inventory of 13,000 resources with 2.5 years of history took about 44 hours to migrate. A guideline of 1 hour per 10 GB of FSDB data is a good starting point but might be influenced by network performance or other factors.

Multiple sources are migrated in sequence. If one source migration fails, the migration continues with the next source. In addition, you can stop a migration at any time.

After the import finishes, use vRealize Operations Manager to monitor the newly imported resources. Eventually, you might also want to turn off your earlier source vCenter Operations Manager deployment.

**Post-migration Considerations**

After migration finishes, there are steps to take before vRealize Operations Manager begins to fully monitor imported resources or to integrate with the systems to which it can connect.

- After migration, vRealize Operations Manager begins monitoring imported resources to which it can connect. However, configuration settings from a source adapter might not be migrated. You must verify adapter configuration settings at the target and make adjustments if you want to monitor resources the same way as before.

- After migration, the target vRealize Operations Manager deployment cannot collect if the data source connection requires authentication. You must confirm certificates for collections to start. The one exception is when you migrate vCenter Server adapters from vApp vCenter Operations Manager sources.

- If the target deployment has remote collector nodes, you must reconfigure migrated vCenter Server adapters by selecting the vRealize Operations Manager remote collector node from the Collector drop-down menu.

- Less data might appear after migration. Metric data from 5.x should appear in vRealize Operations Manager as expected. Data might be missing, however, because the 5.x metrics were collected using full profile mode, but vRealize Operations Manager is now collecting using a default policy that does not include the full settings from 5.x full profile mode. To collect the full set of metrics going forward, you must create and apply a new policy or expand the collection scope of the default policy.
The migrated vCenter Operations Manager email plug-in requires server authentication, so you must verify the email server certificate at the vRealize Operations Manager target before the migrated plug-in will work.

The new vRealize Operations Manager plug-in for vSphere overrides the previous plug-in. If you need to go back to the version 5.x plug-in, access the admin UI of vCenter Operations Manager 5.x, and update the vCenter Server registration.

After migration, vCenter Server adapters start collecting. However, you must re-register vCenter Server adapters so that vCenter Server users can log in to vRealize Operations Manager, and vCenter Server clients can link to vRealize Operations Manager.

See “Add a vCenter Adapter Instance in vRealize Operations Manager,” on page 41.

When a migration source includes unregistered vCenter adapter instances, after a migration, those adapter instances appear in the list of solutions on the target. You are free to delete the extra vCenter adapter instances from the Solutions page.

Confirm an Authentication Certificate in vRealize Operations Manager

After migration, a migrated adapter instance usually cannot start collecting when the data source connection requires TLS/SSL authentication. Authentication certificates are not migrated, so you must confirm certificates at the vRealize Operations Manager target for collections to start.

Certificate confirmation is needed in the following cases:

- Migration of a vApp source, any adapter that uses TLS/SSL, except the vCenter Server adapter.
- Migration of a Linux or Windows source, any adapter that uses TLS/SSL, including the vCenter Server adapter

Prerequisites

Perform a migration of a version 5.x source to this version of vRealize Operations Manager.

Procedure

1. On the target, navigate to Administration > Solutions.
2. Select the adapter, and click the Configure button in the upper toolbar.
3. Select adapter instances where collections fail, and click Test Connection.
4. Confirm the certificate.
5. Click Save Settings.
6. Back on the Solutions page, for adapter instances where collection failed, click the toolbar buttons to stop and then restart collections.

Verify the Server Certificate for the vRealize Operations Manager Email Plug-in

The migrated vRealize Operations Manager email plug-in requires server authentication, and you must verify the email server certificate before the migrated plug-in will work.

A migration imports the version 5.x filter email plug-in on the source to the standard email plug-in on the target. For security, the target version of vRealize Operations Manager requires server authentication for the standard email plug-in. Part of enabling server authentication requires that you verify the email server certificate after performing a migration.

Prerequisites

Perform a migration of a version 5.x source to this version of vRealize Operations Manager.
**Procedure**

1. Log in to the migration target using the admin account.
2. On the left, click **Administration**.
3. On the left, click **Outbound Alert Settings**.
4. On the right, select the **Standard Email Plug-in**.
5. From the toolbar, click the edit button.
   - A window appears, showing the details for your SMTP server.
6. If a username and password are configured for the SMTP server, re-enter the password.
7. Click **Test**.
   - A window appears, showing the details for the email server certificate.
8. Click **Yes**.
   - vRealize Operations Manager imports the certificate to its trust store, which enables authenticated connections to the email server.

**Uninstall vRealize Operations Manager from Linux**

This release of vRealize Operations Manager for Linux does not include a clean uninstall option. To remove the product, you run the uninstall command and manually remove the remaining artifacts that vRealize Operations Manager installs.

**Prerequisites**

Log in to the console as root, in vCenter Server or by direct access. In vCenter Server, use Alt+F1 to access the login prompt.

For security, vRealize Operations Manager remote terminal sessions are disabled by default.

**Procedure**

1. Uninstall the product by running the following command:
   ```bash
   /usr/bin/sh /usr/lib/vmware-vcopssuite-installsupport/_vRealize\ Operations\ Manager\ Enterprise_installation/Uninstall\ vRealize\ Operations\ Manager\ Enterprise -i silent
   ```
   Alternatively, if you are removing the Beta version, run the following command:
   ```bash
   /usr/bin/sh /usr/lib/vmware-vcopssuite-installsupport/_vCenter\ Operations\ Manager\ Enterprise_installation/Uninstall\ vCenter\ Operations\ Manager\ Enterprise -i silent
   ```
2. Stop the HTTPD service by running the following command:
   ```bash
   /sbin/service httpd stop
   ```
3. Remove the RPMs by running the following commands:
   ```bash
   /bin/rpm -e --nodeps httpd
   /bin/rpm -e --nodeps httpd-tools
   /bin/rpm -e --nodeps VMware-Postgres
   /bin/rpm -e --nodeps VMware-Postgres-libs
   /bin/rpm -e --nodeps VMware-Postgres-osslibs
   /bin/rpm -e --nodeps VMware-Postgres-osslibs-server
   ```
4 Remove the extra users and groups by running the following commands:

    /usr/sbin/userdel -fr admin
    /usr/sbin/userdel -fr postgres
    /usr/sbin/groupdel admin

5 Remove the extra files and directories by running the following commands:

    /bin/rm -rf /usr/lib/openssl/lib/libcrypto.so.10
    /bin/rm -rf /usr/lib/openssl/lib/libssl.so.10
    /bin/rm -rf /usr/lib/openssl/lib/
    /bin/rm -rf /usr/lib/openssl/
    /bin/rm -rf /usr/lib/vmware-vcopssuite-installsupport/.buildInfo.<build_number>
    /bin/rm -rf /usr/lib/vmware-vcopssuite-installsupport/
    /bin/rm -rf /etc/rc.d/*vmware-vcops-watchdog
    /bin/rm -rf /etc/rc.d/*vmware-casa
    /bin/rm -rf /etc/rc.d/*vmware-vcops
    /bin/rm -rf /etc/rc.d/*vmware-vcops-web
    /bin/rm -rf /etc/rc.d/*vmware-vcops-reboot-config
    /bin/rm -rf /var/log/firstboot
    /bin/rm -rf /var/log/preb2b
    /bin/rm -rf /var/log/postb2b
    /bin/rm -rf /var/log/firstboot
    /bin/rm -rf /var/log/casa_logs
    /bin/rm -rf /var/log/tomcat_logs
    /bin/rm -rf /var/log/vcops_logs
    /bin/rm -rf /var/.com.zerog.registry.xml
    /bin/rm -rf /var/log/log

6 Remove the sudoers entries by running the following commands. If you ran the installer multiple times, you might need to run the following commands multiple times.

    /bin/sed -i '/^# ------ vCenter Operations Manager Settings for VCOPS_USER/,/^# ------ End of
    vCenter Operations Manager Settings for VCOPS_USER/d' /etc/sudoers
    /bin/sed -i '/^# ------ vCenter Operations Manager Settings for CoSA/,/^# ------ End of
    vCenter Operations Manager Settings for CoSA/d' /etc/sudoers
    /bin/sed -i '/^# ------ vCenter Operations Manager Settings for vsutilities/,/^# ------ End of
    vCenter Operations Manager Settings for vsutilities/d' /etc/sudoers

7 Review the sudoers file /etc/sudoers to ensure that there are no vRealize Operations Manager entries.

Uninstall vRealize Operations Manager from Windows Server

To uninstall vRealize Operations Manager for Windows, you run an uninstaller to remove the product, and run commands to remove Java.

Procedure

1 Uninstall vRealize Operations Manager using the Windows Control Panel Uninstall a program option.

2 Open the command line.

3 Uninstall Java by running the following commands:

    SET PATH=%PATH%;C:\vmware\vcenter-operations\vmware-jre\bin
    "C:\vmware\vcenter-operations\vmware-vcopssuite-installsupport\java-tools_installation\Uninstall java-tools.exe"
Index

A
action adapter 43
python adapter 43
action adapter, credentials 40
actions
user group 47
user role 46
user access 45–47
user role permissions 46
adapter
action 43
actions 40
collection interval 48
compliance 54
migration 85
migration support 86, 87
vCenter Server 40, 41
vCenter Server actions 40
vCenter Server action 43
vRealize Configuration Manager 52, 54
add credentials, storage devices 50
adding, disk 15
alert definitions, vRealize Automation 72

B
badge, compliance 54
best practices, migration 79, 88

C
certificate, requirements 24
certificate, email plug-in 92
certificates 91, 92
change events, vRealize Configuration Manager 52
cluster, size 14
collection interval, action 48
compliance
adapter 54
vRealize Configuration Manager 52, 54
compliance badge 54
configure IaaS credentials 70
configure solution
applications 55, 59, 60
storage devices 49
configuring load balancer servers 71
credentials
vCenter adapter 39
vCenter Server actions 40
customizing your configuration 64

dashboards, vRealize Automation overview 72
data node, creating 27
data collection 67
data, migration 81, 83
disk, adding 15

e-mail plug-in, certificate 92

F
fabric servers, storage devices 50

G
glossary 7

H
HA 29
hardware requirements
Linux 16
Windows 19
high availability 29
Hyperic management pack, prerequisites 59
Hyperic Management Pack
configure 60, 62
install 60
view data 62
Hyperic platform IDs 63
hyperic_adapter 3 folder 66
hyperic.properties file 64

I
import data 89
importing certificates 62
initial setup 31, 33
install solution, management pack 38
installation
Linux 10
migrating during 33
new 31
new deployment 31
U
uninstall
  Linux 93
  Windows 94
updated information 5
upgrade
  at install time 33
  import data 89
  key concepts 80
  migration-based 79
user group, actions 47
user role, actions 46
user access
  actions 45–47
  vCenter Server actions 45
user privileges, vCenter adapter 39

V
vCenter adapter, credentials 39
vCenter registration 91
vCenter Server
  adapter 41
  solution 39–41, 44
vCenter Server action
  collection interval 48
  credentials 40
vCenter Server actions, user access 45
verify connection, storage devices 51
verify data collection, storage devices 51
VIN Application Topology dashboard 57
VIN Management Pack
  configure 57
  view data 57
Virtual Infrastructure Navigator 58
vRealize Configuration Manager
  adapter 52, 54
    compliance 52, 54
    solution 52, 54
vRealize Infrastructure Navigator solution 55
vSphere, solution 39–41, 44

W
Windows
  hardware 19
  software 19
  uninstall 94
Windows installation 10
workload calculation 65