



Red Hat Enterprise Virtualization 3.6

Administration Guide

Administration Tasks in Red Hat Enterprise Virtualization

Red Hat Enterprise Virtualization 3.6 Administration Guide

Administration Tasks in Red Hat Enterprise Virtualization

Red Hat Enterprise Virtualization Documentation Team
Red Hat Customer Content Services
rhev-docs@redhat.com

Legal Notice

Copyright © 2016 Red Hat.

This document is licensed by Red Hat under the [Creative Commons Attribution-ShareAlike 3.0 Unported License](#). If you distribute this document, or a modified version of it, you must provide attribution to Red Hat, Inc. and provide a link to the original. If the document is modified, all Red Hat trademarks must be removed.

Red Hat, as the licensor of this document, waives the right to enforce, and agrees not to assert, Section 4d of CC-BY-SA to the fullest extent permitted by applicable law.

Red Hat, Red Hat Enterprise Linux, the Shadowman logo, JBoss, OpenShift, Fedora, the Infinity logo, and RHCE are trademarks of Red Hat, Inc., registered in the United States and other countries.

Linux ® is the registered trademark of Linus Torvalds in the United States and other countries.

Java ® is a registered trademark of Oracle and/or its affiliates.

XFS ® is a trademark of Silicon Graphics International Corp. or its subsidiaries in the United States and/or other countries.

MySQL ® is a registered trademark of MySQL AB in the United States, the European Union and other countries.

Node.js ® is an official trademark of Joyent. Red Hat Software Collections is not formally related to or endorsed by the official Joyent Node.js open source or commercial project.

The OpenStack ® Word Mark and OpenStack logo are either registered trademarks/service marks or trademarks/service marks of the OpenStack Foundation, in the United States and other countries and are used with the OpenStack Foundation's permission. We are not affiliated with, endorsed or sponsored by the OpenStack Foundation, or the OpenStack community.

All other trademarks are the property of their respective owners.

Abstract

This book contains information and procedures relevant to Red Hat Enterprise Virtualization administrators.

Table of Contents

CHAPTER 1. ADMINISTERING AND MAINTAINING THE RED HAT ENTERPRISE VIRTUALIZATION ENVIRONMENT	6
1.1. GLOBAL CONFIGURATION	6
PART I. ADMINISTERING THE RESOURCES	29
CHAPTER 2. QUALITY OF SERVICE	30
2.1. STORAGE QUALITY OF SERVICE	30
2.2. VIRTUAL MACHINE NETWORK QUALITY OF SERVICE	31
2.3. HOST NETWORK QUALITY OF SERVICE	33
2.4. CPU QUALITY OF SERVICE	35
CHAPTER 3. DATA CENTERS	37
3.1. INTRODUCTION TO DATA CENTERS	37
3.2. THE STORAGE POOL MANAGER	38
3.3. SPM PRIORITY	38
3.4. USING THE EVENTS TAB TO IDENTIFY PROBLEM OBJECTS IN DATA CENTERS	39
3.5. DATA CENTER TASKS	39
3.6. DATA CENTERS AND STORAGE DOMAINS	43
3.7. DATA CENTERS AND PERMISSIONS	45
CHAPTER 4. CLUSTERS	48
4.1. INTRODUCTION TO CLUSTERS	48
4.2. CLUSTER TASKS	48
4.3. CLUSTERS AND PERMISSIONS	72
CHAPTER 5. LOGICAL NETWORKS	75
5.1. LOGICAL NETWORK TASKS	75
5.2. VIRTUAL NETWORK INTERFACE CARDS	83
5.3. EXTERNAL PROVIDER NETWORKS	89
5.4. LOGICAL NETWORKS AND PERMISSIONS	93
5.5. HOSTS AND NETWORKING	95
CHAPTER 6. HOSTS	107
6.1. INTRODUCTION TO RED HAT ENTERPRISE VIRTUALIZATION HOSTS	107
6.2. RED HAT ENTERPRISE VIRTUALIZATION HYPERVISOR HOSTS	107
6.3. SATELLITE HOST PROVIDER HOSTS	108
6.4. RED HAT ENTERPRISE LINUX HOSTS	108
6.5. HOST TASKS	109
6.6. HOST RESILIENCE	125
6.7. HOSTS AND PERMISSIONS	136
CHAPTER 7. STORAGE	139
7.1. UNDERSTANDING STORAGE DOMAINS	140
7.2. PREPARING AND ADDING NFS STORAGE	140
7.3. PREPARING AND ADDING LOCAL STORAGE	143
7.4. ADDING POSIX COMPLIANT FILE SYSTEM STORAGE	145
7.5. ADDING BLOCK STORAGE	147
7.6. IMPORTING EXISTING STORAGE DOMAINS	155
7.7. STORAGE TASKS	162
7.8. STORAGE AND PERMISSIONS	167
CHAPTER 8. WORKING WITH RED HAT GLUSTER STORAGE	170
8.1. RED HAT GLUSTER STORAGE NODES	170

8.2. USING RED HAT GLUSTER STORAGE AS A STORAGE DOMAIN	171
8.3. CLUSTERS AND GLUSTER HOOKS	181
CHAPTER 9. POOLS	186
9.1. INTRODUCTION TO VIRTUAL MACHINE POOLS	186
9.2. VIRTUAL MACHINE POOL TASKS	186
9.3. POOLS AND PERMISSIONS	192
9.4. TRUSTED COMPUTE POOLS	193
CHAPTER 10. VIRTUAL MACHINE DISKS	196
10.1. UNDERSTANDING VIRTUAL MACHINE STORAGE	196
10.2. UNDERSTANDING VIRTUAL DISKS	196
10.3. SETTINGS TO WIPE VIRTUAL DISKS AFTER DELETION	198
10.4. SHAREABLE DISKS IN RED HAT ENTERPRISE VIRTUALIZATION	199
10.5. READ ONLY DISKS IN RED HAT ENTERPRISE VIRTUALIZATION	199
10.6. VIRTUAL DISK TASKS	200
10.7. VIRTUAL DISKS AND PERMISSIONS	209
CHAPTER 11. EXTERNAL PROVIDERS	212
11.1. INTRODUCTION TO EXTERNAL PROVIDERS IN RED HAT ENTERPRISE VIRTUALIZATION	212
11.2. ADDING EXTERNAL PROVIDERS	213
11.3. EDITING EXTERNAL PROVIDERS	226
11.4. REMOVING EXTERNAL PROVIDERS	226
PART II. ADMINISTERING THE ENVIRONMENT	227
CHAPTER 12. BACKUPS AND MIGRATION	228
12.1. BACKING UP AND RESTORING THE RED HAT ENTERPRISE VIRTUALIZATION MANAGER	228
12.2. BACKING UP AND RESTORING VIRTUAL MACHINES USING THE BACKUP AND RESTORE API	238
CHAPTER 13. ERRATA MANAGEMENT WITH RED HAT SATELLITE	242
CHAPTER 14. USERS AND ROLES	244
14.1. INTRODUCTION TO USERS	244
14.2. INTRODUCTION TO DIRECTORY SERVERS	244
14.3. CONFIGURING AN EXTERNAL LDAP PROVIDER	245
14.4. CONFIGURING LDAP AND KERBEROS FOR SINGLE SIGN-ON	256
14.5. MIGRATING FROM THE LEGACY PROVIDER TO THE NEW EXTENSION-BASED PROVIDER	262
14.6. USER AUTHORIZATION	263
14.7. ADMINISTERING USER TASKS FROM THE ADMINISTRATION PORTAL	263
14.8. ADMINISTERING USER TASKS FROM THE COMMAND LINE	265
14.9. CONFIGURING ADDITIONAL LOCAL DOMAINS	271
CHAPTER 15. QUOTAS AND SERVICE LEVEL AGREEMENT POLICY	272
15.1. INTRODUCTION TO QUOTA	272
15.2. SHARED QUOTA AND INDIVIDUALLY DEFINED QUOTA	273
15.3. QUOTA ACCOUNTING	273
15.4. ENABLING AND CHANGING A QUOTA MODE IN A DATA CENTER	274
15.5. CREATING A NEW QUOTA POLICY	274
15.6. EXPLANATION OF QUOTA THRESHOLD SETTINGS	275
15.7. ASSIGNING A QUOTA TO AN OBJECT	276
15.8. USING QUOTA TO LIMIT RESOURCES BY USER	277
15.9. EDITING QUOTAS	277
15.10. REMOVING QUOTAS	278
15.11. SERVICE LEVEL AGREEMENT POLICY ENFORCEMENT	278

CHAPTER 16. EVENT NOTIFICATIONS	280
16.1. CONFIGURING EVENT NOTIFICATIONS IN THE ADMINISTRATION PORTAL	280
16.2. CANCELING EVENT NOTIFICATIONS IN THE ADMINISTRATION PORTAL	282
16.3. PARAMETERS FOR EVENT NOTIFICATIONS IN OVIRT-ENGINE-NOTIFIER.CONF	282
16.4. CONFIGURING THE RED HAT ENTERPRISE VIRTUALIZATION MANAGER TO SEND SNMP TRAPS	286
CHAPTER 17. UTILITIES	289
17.1. THE OVIRT ENGINE RENAME TOOL	289
17.2. THE DOMAIN MANAGEMENT TOOL	291
17.3. THE ENGINE CONFIGURATION TOOL	295
17.4. THE IMAGE UPLOADER TOOL	297
17.5. THE USB FILTER EDITOR	300
17.6. THE LOG COLLECTOR TOOL	307
17.7. THE ISO UPLOADER TOOL	312
PART III. GATHERING INFORMATION ABOUT THE ENVIRONMENT	316
CHAPTER 18. LOG FILES	317
18.1. RED HAT ENTERPRISE VIRTUALIZATION MANAGER INSTALLATION LOG FILES	317
18.2. RED HAT ENTERPRISE VIRTUALIZATION MANAGER LOG FILES	317
18.3. SPICE LOG FILES	318
18.4. RED HAT ENTERPRISE VIRTUALIZATION HOST LOG FILES	320
18.5. SETTING UP A VIRTUALIZATION HOST LOGGING SERVER	321
CHAPTER 19. PROXIES	322
19.1. SPICE PROXY	322
19.2. SQUID PROXY	324
19.3. WEBSOCKET PROXY	327
APPENDIX A. VDSM AND HOOKS	329
A.1. VDSM	329
A.2. VDSM HOOKS	329
A.3. EXTENDING VDSM WITH HOOKS	329
A.4. SUPPORTED VDSM EVENTS	329
A.5. THE VDSM HOOK ENVIRONMENT	332
A.6. THE VDSM HOOK DOMAIN XML OBJECT	332
A.7. DEFINING CUSTOM PROPERTIES	333
A.8. SETTING VIRTUAL MACHINE CUSTOM PROPERTIES	335
A.9. EVALUATING VIRTUAL MACHINE CUSTOM PROPERTIES IN A VDSM HOOK	335
A.10. USING THE VDSM HOOKING MODULE	335
A.11. VDSM HOOK EXECUTION	336
A.12. VDSM HOOK RETURN CODES	337
A.13. VDSM HOOK EXAMPLES	337
APPENDIX B. CUSTOM NETWORK PROPERTIES	340
B.1. EXPLANATION OF BRIDGE_OPTS PARAMETERS	340
B.2. HOW TO SET UP RED HAT ENTERPRISE VIRTUALIZATION MANAGER TO USE ETHTOOL	342
B.3. HOW TO SET UP RED HAT ENTERPRISE VIRTUALIZATION MANAGER TO USE FCOE	343
APPENDIX C. RED HAT ENTERPRISE VIRTUALIZATION USER INTERFACE PLUGINS	345
C.1. RED HAT ENTERPRISE VIRTUALIZATION USER INTERFACE PLUG-INS	345
C.2. RED HAT ENTERPRISE VIRTUALIZATION USER INTERFACE PLUGIN LIFECYCLE	345
C.3. USER INTERFACE PLUGIN-RELATED FILES AND THEIR LOCATIONS	347
C.4. EXAMPLE USER INTERFACE PLUG-IN DEPLOYMENT	347

C.5. INSTALLING THE RED HAT SUPPORT PLUG-IN	348
C.6. USING RED HAT SUPPORT PLUG-IN	349
APPENDIX D. RED HAT ENTERPRISE VIRTUALIZATION AND SSL	353
D.1. REPLACING THE RED HAT ENTERPRISE VIRTUALIZATION MANAGER SSL CERTIFICATE	353
D.2. SETTING UP SSL OR TLS CONNECTIONS BETWEEN THE MANAGER AND AN LDAP SERVER	354
APPENDIX E. USING SEARCH, BOOKMARKS, AND TAGS	356
E.1. SEARCHES	356
E.2. BOOKMARKS	376
E.3. TAGS	378
APPENDIX F. BRANDING	380
F.1. BRANDING	380
APPENDIX G. SYSTEM ACCOUNTS	383
G.1. SYSTEM ACCOUNTS	383
APPENDIX H. REVISION HISTORY	385

CHAPTER 1. ADMINISTERING AND MAINTAINING THE RED HAT ENTERPRISE VIRTUALIZATION ENVIRONMENT

The Red Hat Enterprise Virtualization environment requires an administrator to keep it running. As an administrator, your tasks include:

- Managing physical and virtual resources such as hosts and virtual machines. This includes upgrading and adding hosts, importing domains, converting virtual machines created on foreign hypervisors, and managing virtual machine pools.
- Monitoring the overall system resources for potential problems such as extreme load on one of the hosts, insufficient memory or disk space, and taking any necessary actions (such as migrating virtual machines to other hosts to lessen the load or freeing resources by shutting down machines).
- Responding to the new requirements of virtual machines (for example, upgrading the operating system or allocating more memory).
- Managing customized object properties using tags.
- Managing searches saved as public bookmarks.
- Managing user setup and setting permission levels.
- Troubleshooting for specific users or virtual machines for overall system functionality.
- Generating general and specific reports.

1.1. GLOBAL CONFIGURATION

Accessed from the header bar in the Administration Portal, the **Configure** window allows you to configure a number of global resources for your Red Hat Enterprise Virtualization environment, such as users, roles, system permissions, scheduling policies, instance types, and MAC address pools. This window allows you to customize the way in which users interact with resources in the environment, and provides a central location for configuring options that can be applied to multiple clusters.

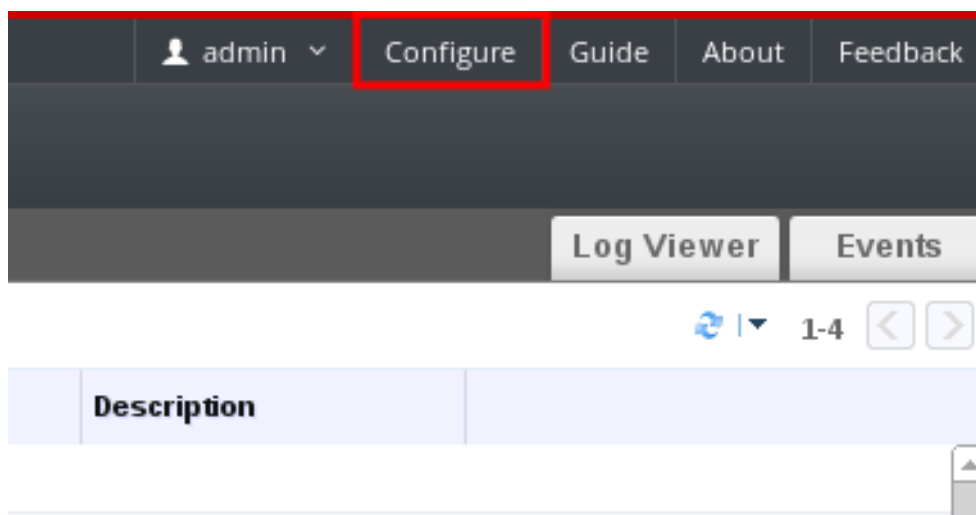


Figure 1.1. Accessing the Configure window

1.1.1. Roles

Roles are predefined sets of privileges that can be configured from Red Hat Enterprise Virtualization Manager. Roles provide access and management permissions to different levels of resources in the data center, and to specific physical and virtual resources.

With multilevel administration, any permissions which apply to a container object also apply to all individual objects within that container. For example, when a host administrator role is assigned to a user on a specific host, the user gains permissions to perform any of the available host operations, but only on the assigned host. However, if the host administrator role is assigned to a user on a data center, the user gains permissions to perform host operations on all hosts within the cluster of the data center.

1.1.1.1. Creating a New Role

If the role you require is not on Red Hat Enterprise Virtualization's default list of roles, you can create a new role and customize it to suit your purposes.

Procedure 1.1. Creating a New Role

1. On the header bar, click the **Configure** button to open the **Configure** window. The window shows a list of default User and Administrator roles, and any custom roles.
2. Click **New**. The **New Role** dialog box displays.

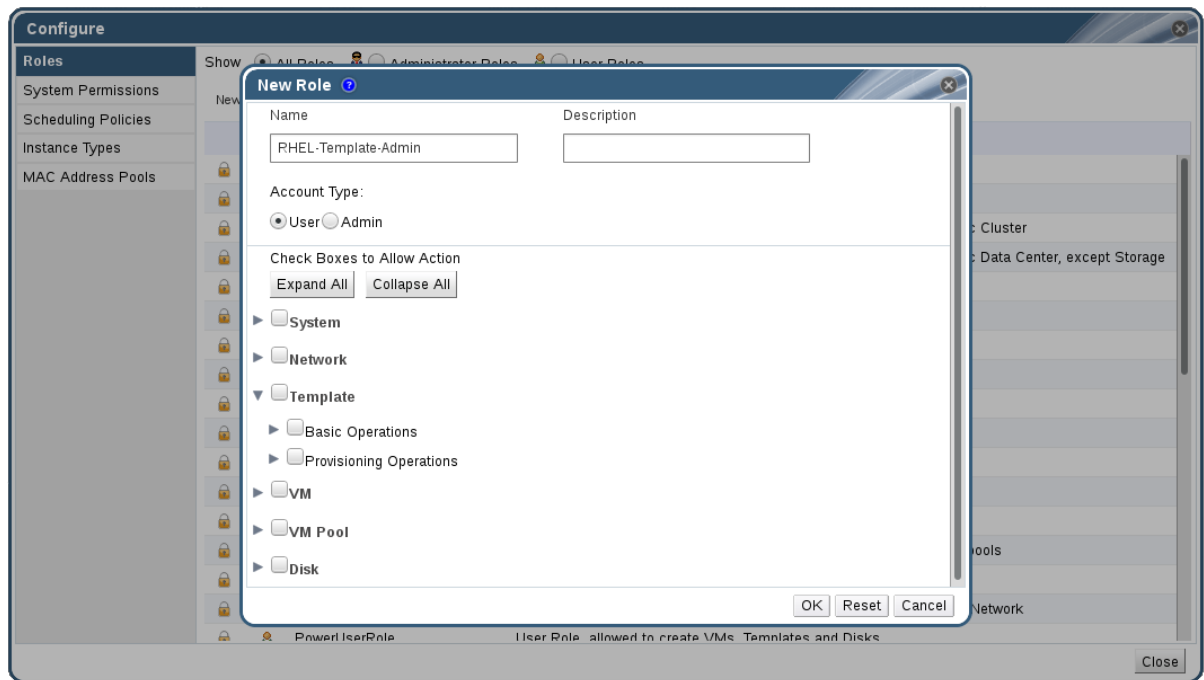


Figure 1.2. The New Role Dialog

3. Enter the **Name** and **Description** of the new role.
4. Select either **Admin** or **User** as the **Account Type**.
5. Use the **Expand All** or **Collapse All** buttons to view more or fewer of the permissions for the listed objects in the **Check Boxes to Allow Action** list. You can also expand or collapse the options for each object.
6. For each of the objects, select or clear the actions you wish to permit or deny for the role you are setting up.
7. Click **OK** to apply the changes you have made. The new role displays on the list of roles.

1.1.1.2. Editing or Copying a Role

You can change the settings for roles you have created, but you cannot change default roles. To change default roles, clone and modify them to suit your requirements.

Procedure 1.2. Editing or Copying a Role

1. On the header bar, click the **Configure** button to open the **Configure** window. The window shows a list of default User and Administrator roles, and any custom roles.
2. Select the role you wish to change. Click **Edit** to open the **Edit Role** window, or click **Copy** to open the **Copy Role** window.
3. If necessary, edit the **Name** and **Description** of the role.
4. Use the **Expand All** or **Collapse All** buttons to view more or fewer of the permissions for the listed objects. You can also expand or collapse the options for each object.

5. For each of the objects, select or clear the actions you wish to permit or deny for the role you are editing.
6. Click **OK** to apply the changes you have made.

1.1.1.3. User Role and Authorization Examples

The following examples illustrate how to apply authorization controls for various scenarios, using the different features of the authorization system described in this chapter.

Example 1.1. Cluster Permissions

Sarah is the system administrator for the accounts department of a company. All the virtual resources for her department are organized under a Red Hat Enterprise Virtualization **cluster** called **Accounts**. She is assigned the **ClusterAdmin** role on the accounts cluster. This enables her to manage all virtual machines in the cluster, since the virtual machines are child objects of the cluster. Managing the virtual machines includes editing, adding, or removing virtual resources such as disks, and taking snapshots. It does not allow her to manage any resources outside this cluster. Because **ClusterAdmin** is an administrator role, it allows her to use the Administration Portal to manage these resources, but does not give her any access via the User Portal.

Example 1.2. VM PowerUser Permissions

John is a software developer in the accounts department. He uses virtual machines to build and test his software. Sarah has created a virtual desktop called **johndesktop** for him. John is assigned the **UserVmManager** role on the **johndesktop** virtual machine. This allows him to access this single virtual machine using the User Portal. Because he has **UserVmManager** permissions, he can modify the virtual machine and add resources to it, such as new virtual disks. Because **UserVmManager** is a user role, it does not allow him to use the Administration Portal.

Example 1.3. Data Center Power User Role Permissions

Penelope is an office manager. In addition to her own responsibilities, she occasionally helps the HR manager with recruitment tasks, such as scheduling interviews and following up on reference checks. As per corporate policy, Penelope needs to use a particular application for recruitment tasks.

While Penelope has her own machine for office management tasks, she wants to create a separate virtual machine to run the recruitment application. She is assigned **PowerUserRole** permissions for the data center in which her new virtual machine will reside. This is because to create a new virtual machine, she needs to make changes to several components within the data center, including creating the virtual machine disk image in the storage domain.

Note that this is not the same as assigning **DataCenterAdmin** privileges to Penelope. As a PowerUser for a data center, Penelope can log in to the User Portal and perform virtual machine-specific actions on virtual machines within the data center. She cannot perform data center-level operations such as attaching hosts or storage to a data center.

Example 1.4. Network Administrator Permissions

Chris works as the network administrator in the IT department. Her day-to-day responsibilities include creating, manipulating, and removing networks in the department's Red Hat Enterprise Virtualization environment. For her role, she requires administrative privileges on the resources and on the networks of each resource. For example, if Chris has **NetworkAdmin** privileges on the IT department's data center, she can add and remove networks in the data center, and attach and detach networks for all virtual machines belonging to the data center.

In addition to managing the networks of the company's virtualized infrastructure, Chris also has a junior network administrator reporting to her. The junior network administrator, Pat, is managing a smaller virtualized environment for the company's internal training department. Chris has assigned Pat **VnicProfileUser** permissions and **UserVmManager** permissions for the virtual machines used by the internal training department. With these permissions, Pat can perform simple administrative tasks such as adding network interfaces onto virtual machines in the **Extended** tab of the User Portal. However, he does not have permissions to alter the networks for the hosts on which the virtual machines run, or the networks on the data center to which the virtual machines belong.

Example 1.5. Custom Role Permissions

Rachel works in the IT department, and is responsible for managing user accounts in Red Hat Enterprise Virtualization. She needs permission to add user accounts and assign them the appropriate roles and permissions. She does not use any virtual machines herself, and should not have access to administration of hosts, virtual machines, clusters or data centers. There is no built-in role which provides her with this specific set of permissions. A custom role must be created to define the set of permissions appropriate to Rachel's position.

New Role ?

Name: Description:

Account Type: ☐ User ☒ Admin

Check Boxes to Allow Action

- ▼ ☐ **System**
 - ▼ ☐ **Configure System**
 - ☒ Manipulate Users
 - ☒ Manipulate Permissions
 - ☐ Add users and groups from directory while adding permissions
 - ☒ Manipulate Roles
 - ☐ Login Permissions
 - ☐ Tag management Permissions
 - ☐ Bookmark management Permissions
 - ☐ Event notification management Permissions
 - ☐ Audit Log management Permissions
 - ☐ Generic Configuration
- ▶ ☐ **Data Center**
- ▶ ☐ **Network**

Figure 1.3. UserManager Custom Role

The **UserManager** custom role shown above allows manipulation of users, permissions and roles. These actions are organized under **System** - the top level object of the hierarchy shown in [Figure 1.3, "UserManager Custom Role"](#). This means they apply to all other objects in the system. The role is set to have an **Account Type** of **Admin**. This means that when she is assigned this role, Rachel can only use the Administration Portal, not the User Portal.

1.1.2. System Permissions

Permissions enable users to perform actions on objects, where objects are either individual objects or container objects.

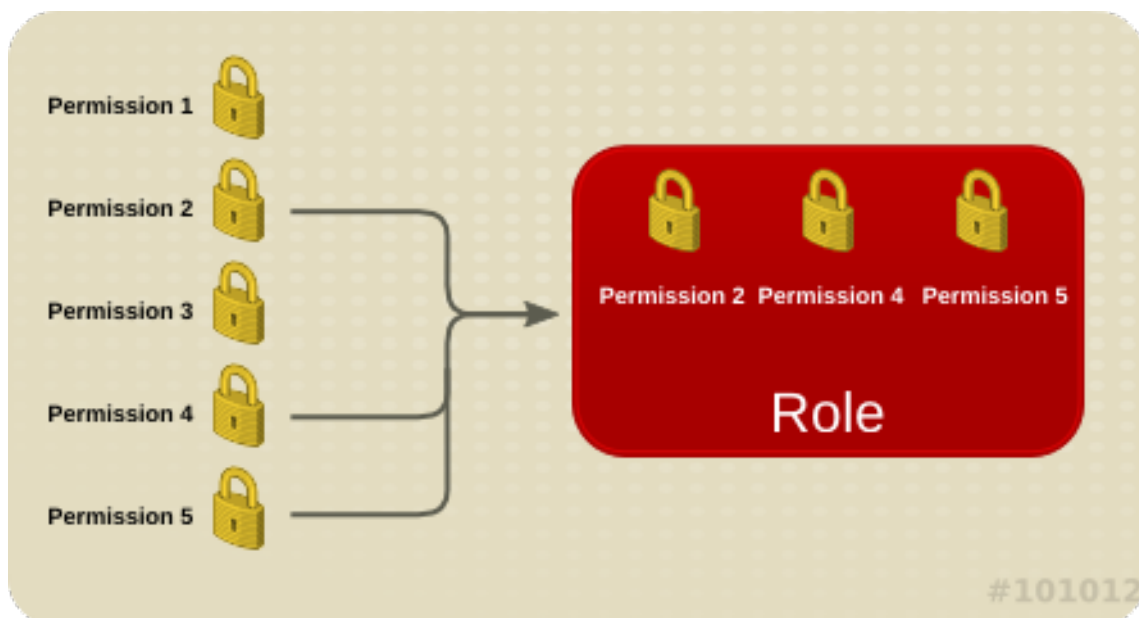


Figure 1.4. Permissions & Roles

Any permissions that apply to a container object also apply to all members of that container. The following diagram depicts the hierarchy of objects in the system.

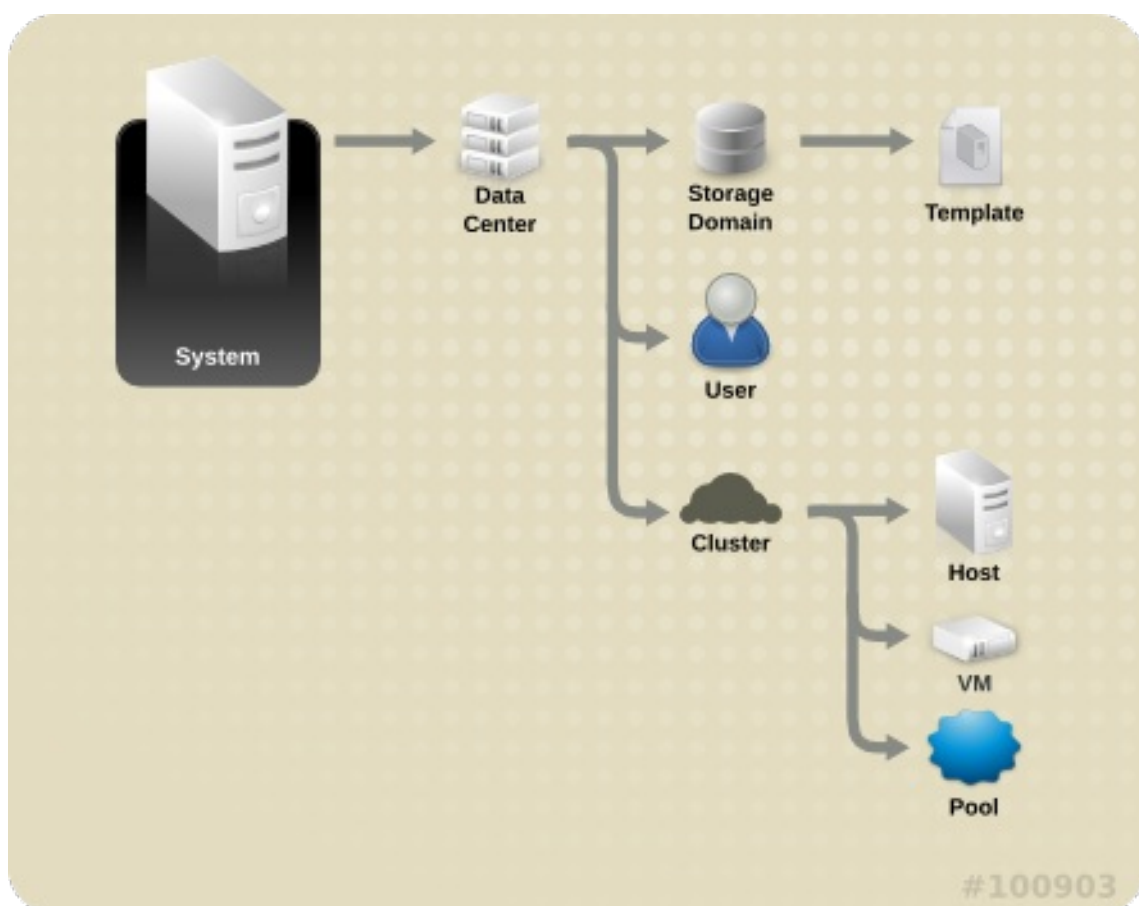


Figure 1.5. Red Hat Enterprise Virtualization Object Hierarchy

1.1.2.1. User Properties

Roles and permissions are the properties of the user. Roles are predefined sets of privileges that permit access to different levels of physical and virtual resources. Multilevel

administration provides a finely grained hierarchy of permissions. For example, a data center administrator has permissions to manage all objects in the data center, while a host administrator has system administrator permissions to a single physical host. A user can have permissions to use a single virtual machine but not make any changes to the virtual machine configurations, while another user can be assigned system permissions to a virtual machine.

1.1.2.2. User and Administrator Roles

Red Hat Enterprise Virtualization provides a range of pre-configured roles, from an administrator with system-wide permissions to an end user with access to a single virtual machine. While you cannot change or remove the default roles, you can clone and customize them, or create new roles according to your requirements. There are two types of roles:

- **Administrator Role:** Allows access to the *Administration Portal* for managing physical and virtual resources. An administrator role confers permissions for actions to be performed in the User Portal; however, it has no bearing on what a user can see in the User Portal.
- **User Role:** Allows access to the *User Portal* for managing and accessing virtual machines and templates. A user role determines what a user can see in the User Portal. Permissions granted to a user with an administrator role are reflected in the actions available to that user in the User Portal.

For example, if you have an **administrator** role on a cluster, you can manage all virtual machines in the cluster using the *Administration Portal*. However, you cannot access any of these virtual machines in the *User Portal*; this requires a **user** role.

1.1.2.3. User Roles Explained

The table below describes basic user roles which confer permissions to access and configure virtual machines in the User Portal.

Table 1.1. Red Hat Enterprise Virtualization User Roles - Basic

Role	Privileges	Notes
UserRole	Can access and use virtual machines and pools.	Can log in to the User Portal, use assigned virtual machines and pools, view virtual machine state and details.
PowerUserRole	Can create and manage virtual machines and templates.	Apply this role to a user for the whole environment with the Configure window, or for specific data centers or clusters. For example, if a PowerUserRole is applied on a data center level, the PowerUser can create virtual machines and templates in the data center.

Role	Privileges	Notes
UserVmManager	System administrator of a virtual machine.	Can manage virtual machines and create and use snapshots. A user who creates a virtual machine in the User Portal is automatically assigned the UserVmManager role on the machine.

The table below describes advanced user roles which allow you to do more fine tuning of permissions for resources in the User Portal.

Table 1.2. Red Hat Enterprise Virtualization User Roles - Advanced

Role	Privileges	Notes
UserTemplateBasedVm	Limited privileges to only use Templates.	Can use templates to create virtual machines.
DiskOperator	Virtual disk user.	Can use, view and edit virtual disks. Inherits permissions to use the virtual machine to which the virtual disk is attached.
VmCreator	Can create virtual machines in the User Portal.	This role is not applied to a specific virtual machine; apply this role to a user for the whole environment with the Configure window. Alternatively apply this role for specific data centers or clusters. When applying this role to a cluster, you must also apply the DiskCreator role on an entire data center, or on specific storage domains.
TemplateCreator	Can create, edit, manage and remove virtual machine templates within assigned resources.	This role is not applied to a specific template; apply this role to a user for the whole environment with the Configure window. Alternatively apply this role for specific data centers, clusters, or storage domains.

Role	Privileges	Notes
DiskCreator	Can create, edit, manage and remove virtual machine disks within assigned clusters or data centers.	This role is not applied to a specific virtual disk; apply this role to a user for the whole environment with the Configure window. Alternatively apply this role for specific data centers or storage domains.
TemplateOwner	Can edit and delete the template, assign and manage user permissions for the template.	This role is automatically assigned to the user who creates a template. Other users who do not have TemplateOwner permissions on a template cannot view or use the template.
VnicProfileUser	Logical network and network interface user for virtual machine and template.	Can attach or detach network interfaces from specific logical networks.

1.1.2.4. Administrator Roles Explained

The table below describes basic administrator roles which confer permissions to access and configure resources in the Administration Portal.

Table 1.3. Red Hat Enterprise Virtualization System Administrator Roles - Basic

Role	Privileges	Notes
SuperUser	System Administrator of the Red Hat Enterprise Virtualization environment.	Has full permissions across all objects and levels, can manage all objects across all data centers.
ClusterAdmin	Cluster Administrator.	Possesses administrative permissions for all objects underneath a specific cluster.
DataCenterAdmin	Data Center Administrator.	Possesses administrative permissions for all objects underneath a specific data center except for storage.



IMPORTANT

Do not use the administrative user for the directory server as the Red Hat Enterprise Virtualization administrative user. Create a user in the directory server specifically for use as the Red Hat Enterprise Virtualization administrative user.

The table below describes advanced administrator roles which allow you to do more fine tuning of permissions for resources in the Administration Portal.

Table 1.4. Red Hat Enterprise Virtualization System Administrator Roles - Advanced

Role	Privileges	Notes
TemplateAdmin	Administrator of a virtual machine template.	Can create, delete, and configure the storage domains and network details of templates, and move templates between domains.
StorageAdmin	Storage Administrator.	Can create, delete, configure, and manage an assigned storage domain.
HostAdmin	Host Administrator.	Can attach, remove, configure, and manage a specific host.
NetworkAdmin	Network Administrator.	Can configure and manage the network of a particular data center or cluster. A network administrator of a data center or cluster inherits network permissions for virtual pools within the cluster.
VmPoolAdmin	System Administrator of a virtual pool.	Can create, delete, and configure a virtual pool; assign and remove virtual pool users; and perform basic operations on a virtual machine in the pool.
GlusterAdmin	Gluster Storage Administrator.	Can create, delete, configure, and manage Gluster storage volumes.

Role	Privileges	Notes
VmImporterExporter	Import and export Administrator of a virtual machine.	Can import and export virtual machines. Able to view all virtual machines and templates exported by other users.

1.1.3. Scheduling Policies

A scheduling policy is a set of rules that defines the logic by which virtual machines are distributed amongst hosts in the cluster that scheduling policy is applied to. Scheduling policies determine this logic via a combination of filters, weightings, and a load balancing policy. The Red Hat Enterprise Virtualization Manager provides five default scheduling policies: **Evenly_Distributed**, **InClusterUpgrade**, **None**, **Power_Saving**, and **VM_Evenly_Distributed**. You can also define new scheduling policies that provide fine-grained control over the distribution of virtual machines.

1.1.3.1. Creating a Scheduling Policy

You can create new scheduling policies to control the logic by which virtual machines are distributed amongst a given cluster in your Red Hat Enterprise Virtualization environment.

Procedure 1.3. Creating a Scheduling Policy

1. Click the **Configure** button in the header bar of the Administration Portal to open the **Configure** window.
2. Click **Scheduling Policies** to view the scheduling policies tab.
3. Click **New** to open the **New Scheduling Policy** window.

New Scheduling Policy ?

Name Description

Filter Modules Drag or use context menu to make changes ?

Enabled Filters

- HA
- Network

Disabled Filters

- Migration
- PinToHost
- VmAffinityGroups
- CPU level

Weights Modules Drag or use context menu to make changes ?

Enabled Weights & Factors

- 4 HA
- 2 VmAffinityGroups

Disabled Weights

- OptimalForEvenGuestDistribution
- OptimalForEvenDistribution
- None
- OptimalForUpReservation

Load Balancer ?

OptimalForEvenGuestDistribution

Properties ?

MigrationThreshold -

Please select a key... - +

OK Reset Cancel

Figure 1.6. The New Scheduling Policy Window

4. Enter a **Name** and **Description** for the scheduling policy.
5. Configure filter modules:
 - a. In the **Filter Modules** section, drag and drop the preferred filter modules to apply to the scheduling policy from the **Disabled Filters** section into the **Enabled Filters** section.
 - b. Specific filter modules can also be set as the **First**, to be given highest priority, or **Last**, to be given lowest priority, for basic optimization.

To set the priority, right-click any filter module, hover the cursor over **Position** and select **First** or **Last**.

6. Configure weight modules:
 - a. In the **Weights Modules** section, drag and drop the preferred weights modules to apply to the scheduling policy from the **Disabled Weights** section into the **Enabled Weights & Factors** section.
 - b. Use the + and - buttons to the left of the enabled weight modules to increase or decrease the weight of those modules.
7. Specify a load balancing policy:

- a. From the drop-down menu in the **Load Balancer** section, select the load balancing policy to apply to the scheduling policy.
 - b. From the drop-down menu in the **Properties** section, select a load balancing property to apply to the scheduling policy and use the text field to the right of that property to specify a value.
 - c. Use the **+** and **-** buttons to add or remove additional properties.
8. Click **OK**.

1.1.3.2. Explanation of Settings in the New Scheduling Policy and Edit Scheduling Policy Window

The following table details the options available in the **New Scheduling Policy** and **Edit Scheduling Policy** windows.

Table 1.5. New Scheduling Policy and Edit Scheduling Policy Settings

Field Name	Description
Name	The name of the scheduling policy. This is the name used to refer to the scheduling policy in the Red Hat Enterprise Virtualization Manager.
Description	A description of the scheduling policy. This field is recommended but not mandatory.

Field Name	Description
Filter Modules	<p>A set of filters for controlling the hosts on which a virtual machine in a cluster can run. Enabling a filter will filter out hosts that do not meet the conditions specified by that filter, as outlined below:</p> <ul style="list-style-type: none"> • CpuPinning: Hosts which do not satisfy the CPU pinning definition. • Migration: Prevent migration to the same host. • PinToHost: Hosts other than the host to which the virtual machine is pinned. • CPU-Level: Hosts that do not meet the CPU topology of the virtual machine. • CPU: Hosts with fewer CPUs than the number assigned to the virtual machine. • Memory: Hosts that do not have sufficient memory to run the virtual machine. • VmAffinityGroups: Hosts that do not meet the conditions specified for a virtual machine that is a member of an affinity group. For example, that virtual machines in an affinity group must run on the same host or on separate hosts. • InClusterUpgrade: Hosts which run an older operating system than the virtual machine currently runs on. • HostDevice: Hosts that do not support host devices required by the virtual machine. • HA: Forces the hosted engine virtual machine to only run on hosts with a positive high availability score. • Emulated-Machine: Hosts which do not have proper emulated machine support. • Network: Hosts on which networks required by the network interface controller of a virtual machine are not installed, or on which the cluster's display network is not installed.

Field Name	Description
Weights Modules	<p>A set of weightings for controlling the relative priority of factors considered when determining the hosts in a cluster on which a virtual machine can run.</p> <ul style="list-style-type: none"> • InClusterUpgrade: Weight hosts in accordance with their operating system version. The weight penalizes hosts with older operating systems more than hosts with the same operating system, giving priority to hosts with newer operating systems. • OptimalForHaReservation: Weights hosts in accordance with their high availability score. • None: Weights hosts in accordance with the even distribution module. • OptimalForEvenGuestDistribution: Weights hosts in accordance with the number of virtual machines running on those hosts. • VmAffinityGroups: Weights hosts in accordance with the affinity groups defined for virtual machines. This weight module determines how likely virtual machines in an affinity group are to run on the same host or on separate hosts in accordance with the parameters of that affinity group. • OptimalForPowerSaving: Weights hosts in accordance with their CPU usage, giving priority to hosts with higher CPU usage. • OptimalForEvenDistribution: Weights hosts in accordance with their CPU usage, giving priority to hosts with lower CPU usage. • HA: Weights hosts in accordance with their high availability score.
Load Balancer	<p>This drop-down menu allows you to select a load balancing module to apply. Load balancing modules determine the logic used to migrate virtual machines from hosts experiencing high usage to hosts experiencing lower usage.</p>

Field Name	Description
Properties	This drop-down menu allows you to add or remove properties for load balancing modules, and is only available when you have selected a load balancing module for the scheduling policy. No properties are defined by default, and the properties that are available are specific to the load balancing module that is selected. Use the + and - buttons to add or remove additional properties to or from the load balancing module.

1.1.4. Instance Types

Instance types can be used to define the hardware configuration of a virtual machine. Selecting an instance type when creating or editing a virtual machine will automatically fill in the hardware configuration fields. This allows users to create multiple virtual machines with the same hardware configuration without having to manually fill in every field.

A set of predefined instance types are available by default, as outlined in the following table:

Table 1.6. Predefined Instance Types

Name	Memory	vCPUs
Tiny	512 MB	1
Small	2 GB	1
Medium	4 GB	2
Large	8 GB	2
XLarge	16 GB	4

Administrators can also create, edit, and remove instance types from the **Instance Types** tab of the **Configure** window.

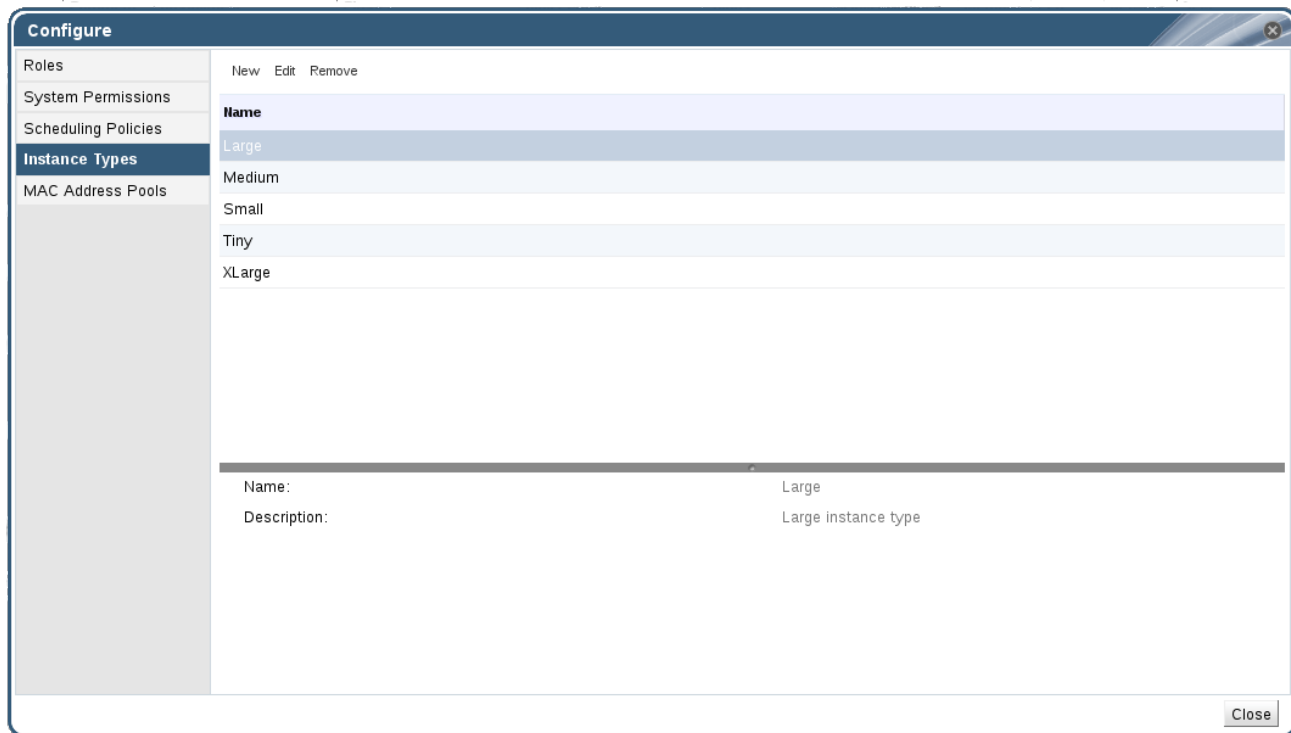




Figure 1.7. The Instance Types Tab

Fields in the **New Virtual Machine** and **Edit Virtual Machine** windows that are bound to an instance type will have a chain link image next to them (). If the value of one of these fields is changed, the virtual machine will be detached from the instance type, changing to **Custom**, and the chain will appear broken (). However, if the value is changed back, the chain will relink and the instance type will move back to the selected one.

1.1.4.1. Creating Instance Types

Administrators can create new instance types, which can then be selected by users when creating or editing virtual machines.

Procedure 1.4. Creating an Instance Type

1. On the header bar, click **Configure**.
2. Click the **Instance Types** tab.
3. Click **New** to open the **New Instance Type** window.

Figure 1.8. The New Instance Type Window

4. Enter a **Name** and **Description** for the instance type.
5. Click **Show Advanced Options** and configure the instance type's settings as required. The settings that appear in the **New Instance Type** window are identical to those in the **New Virtual Machine** window, but with the relevant fields only. See [Explanation of Settings in the New Virtual Machine and Edit Virtual Machine Windows](#) in the *Virtual Machine Management Guide*
6. Click **OK**.

The new instance type will appear in the **Instance Types** tab in the **Configure** window, and can be selected from the **Instance Type** drop-down list when creating or editing a virtual machine.

1.1.4.2. Editing Instance Types

Administrators can edit existing instance types from the **Configure** window.

Procedure 1.5. Editing Instance Type Properties

1. On the header bar, click **Configure**.
2. Click the **Instance Types** tab.
3. Select the instance type to be edited.

4. Click **Edit** to open the **Edit Instance Type** window.
5. Change the settings as required.
6. Click **OK**.

The configuration of the instance type is updated. New virtual machines and restarted existing virtual machines based on the instance type will use the new configuration.

1.1.4.3. Removing Instance Types

Procedure 1.6. Removing an Instance Type

1. On the header bar, click **Configure**.
2. Click the **Instance Types** tab.
3. Select the instance type to be removed.
4. Click **Remove** to open the **Remove Instance Type** window.
5. If any virtual machines are based on the instance type to be removed, a warning window listing the attached virtual machines will appear. To continue removing the instance type, select the **Approve Operation** checkbox. Otherwise click **Cancel**.
6. Click **OK**.

The instance type is removed from the **Instance Types** list and can no longer be used when creating a new virtual machine. Any virtual machines that were attached to the removed instance type will now be attached to **Custom** (no instance type).

1.1.5. MAC Address Pools

MAC address pools define the range of MAC addresses from which MAC addresses are allocated for each data center. A MAC address pool is specified for each data center. By using MAC address pools Red Hat Enterprise Virtualization can automatically generate and assign MAC addresses to new virtual network devices, which helps to prevent MAC address duplication. MAC address pools are more memory efficient when all MAC addresses related to a data center are within the range for the assigned MAC address pool.

The same MAC address pool can be shared by multiple data centers, but each data center has a single MAC address pool assigned. A default MAC address pool is created by Red Hat Enterprise Virtualization and is used if another MAC address pool is not assigned. For more information about assigning MAC address pools to data centers see [Section 3.5.1, “Creating a New Data Center”](#).

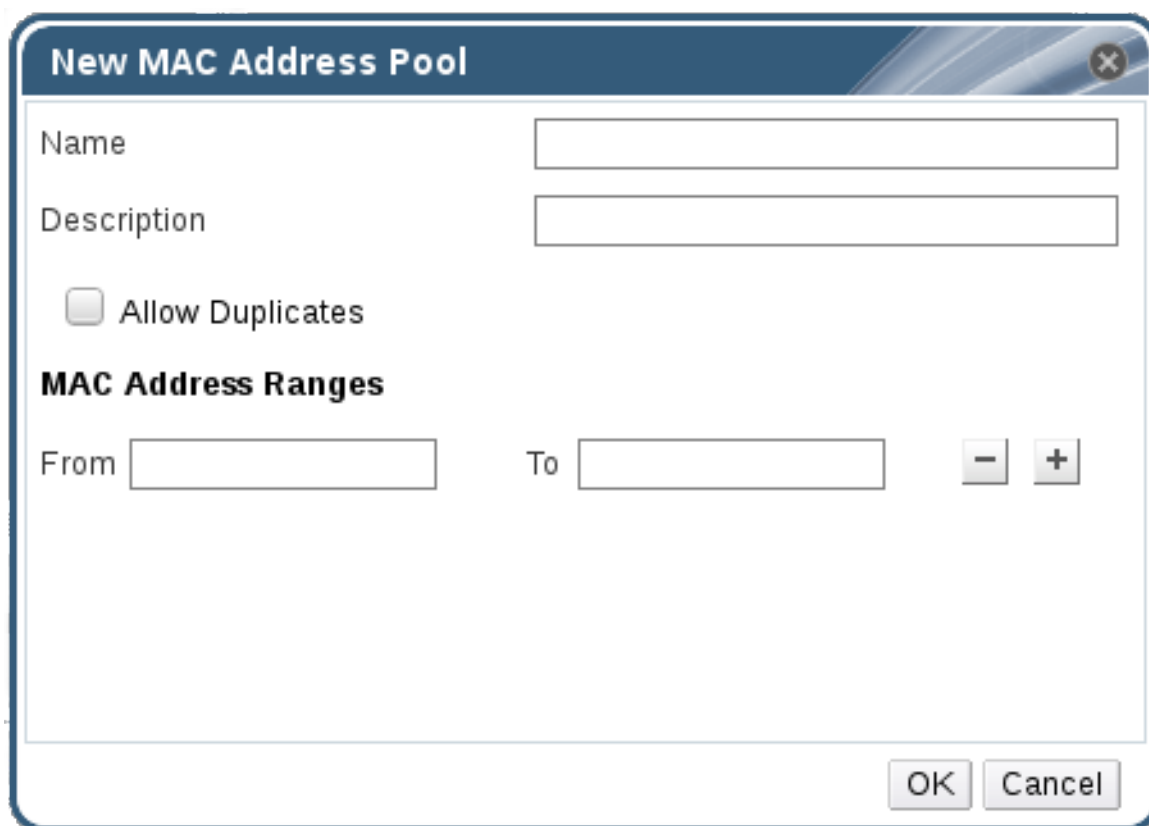
The MAC address pool assigns the next available MAC address following the last address that was returned to the pool. If there are no further addresses left in the range, the search starts again from the beginning of the range. If there are multiple MAC address ranges with available MAC addresses defined in a single MAC address pool, the ranges take turns in serving incoming requests in the same way available MAC addresses are selected.

1.1.5.1. Creating MAC Address Pools

You can create new MAC address pools.

Procedure 1.7. Creating a MAC Address Pool

1. On the header bar, click the **Configure** button to open the **Configure** window.
2. Click the **MAC Address Pools** tab.
3. Click the **Add** button to open the **New MAC Address Pool** window.

**Figure 1.9. The New MAC Address Pool Window**

4. Enter the **Name** and **Description** of the new MAC address pool.
5. Select the **Allow Duplicates** check box to allow a MAC address to be used multiple times in a pool. The MAC address pool will not automatically use a duplicate MAC address, but enabling the duplicates option means a user can manually use a duplicate MAC address.

**NOTE**

If one MAC address pool has duplicates disabled, and another has duplicates enabled, each MAC address can be used once in the pool with duplicates disabled but can be used multiple times in the pool with duplicates enabled.

6. Enter the required **MAC Address Ranges**. To enter multiple ranges click the plus button next to the **From** and **To** fields.
7. Click **OK**.

1.1.5.2. Editing MAC Address Pools

You can edit MAC address pools to change the details, including the range of MAC addresses available in the pool and whether duplicates are allowed.

Procedure 1.8. Editing MAC Address Pool Properties

1. On the header bar, click the **Configure** button to open the **Configure** window.
2. Click the **MAC Address Pools** tab.
3. Select the MAC address pool to be edited.
4. Click the **Edit** button to open the **Edit MAC Address Pool** window.
5. Change the **Name**, **Description**, **Allow Duplicates**, and **MAC Address Ranges** fields as required.



NOTE

When a MAC address range is updated, the MAC addresses of existing NICs are not reassigned. MAC addresses that were already assigned, but are outside of the new MAC address range, are added as user-specified MAC addresses and are still tracked by that MAC address pool.

6. Click **OK**.

1.1.5.3. Editing MAC Address Pool Permissions

After a MAC address pool has been created, you can edit its user permissions. The user permissions control which data centers can use the MAC address pool. See [Section 1.1.1, “Roles”](#) for more information on adding new user permissions.

Procedure 1.9. Editing MAC Address Pool Permissions

1. On the header bar, click the **Configure** button to open the **Configure** window.
2. Click the **MAC Address Pools** tab.
3. Select the required MAC address pool.
4. Edit the user permissions for the MAC address pool:
 - To add user permissions to a MAC address pool:
 - a. Click **Add** in the user permissions pane at the bottom of the **Configure** window.
 - b. Search for and select the required users.
 - c. Select the required role from the **Role to Assign** drop-down list.
 - d. Click **OK** to add the user permissions.
 - To remove user permissions from a MAC address pool:
 - a. Select the user permission to be removed in the user permissions pane at

the bottom of the **Configure** window.

- b. Click **Remove** to remove the user permissions.

1.1.5.4. Removing MAC Address Pools

You can remove created MAC address pools, but the default MAC address pool cannot be removed.

Procedure 1.10. Removing a MAC Address Pool

1. On the header bar, click the **Configure** button to open the **Configure** window.
2. Click the **MAC Address Pools** tab.
3. Select the MAC address pool to be removed.
4. Click the **Remove** button to open the **Remove MAC Address Pool** window.
5. Click **OK**.

PART I. ADMINISTERING THE RESOURCES

CHAPTER 2. QUALITY OF SERVICE

Red Hat Enterprise Virtualization allows you to define quality of service entries that provide fine-grained control over the level of input and output, processing, and networking capabilities that resources in your environment can access. Quality of service entries are defined at the data center level and are assigned to profiles created under clusters and storage domains. These profiles are then assigned to individual resources in the clusters and storage domains where the profiles were created.

2.1. STORAGE QUALITY OF SERVICE

Storage quality of service defines the maximum level of throughput and the maximum level of input and output operations for a virtual disk in a storage domain. Assigning storage quality of service to a virtual disk allows you to fine tune the performance of storage domains and prevent the storage operations associated with one virtual disk from affecting the storage capabilities available to other virtual disks hosted in the same storage domain.

2.1.1. Creating a Storage Quality of Service Entry

Create a storage quality of service entry.

Procedure 2.1. Creating a Storage Quality of Service Entry

1. Click the **Data Centers** resource tab and select a data center.
2. Click **QoS** in the details pane.
3. Click **Storage**.
4. Click **New**.
5. Enter a name for the quality of service entry in the **QoS Name** field.
6. Enter a description for the quality of service entry in the **Description** field.
7. Specify the throughput quality of service:
 - a. Select the **Throughput** check box.
 - b. Enter the maximum permitted total throughput in the **Total** field.
 - c. Enter the maximum permitted throughput for read operations in the **Read** field.
 - d. Enter the maximum permitted throughput for write operations in the **Write** field.
8. Specify the input and output quality of service:
 - a. Select the **Iops** check box.
 - b. Enter the maximum permitted number of input and output operations per second in the **Total** field.
 - c. Enter the maximum permitted number of input operations per second in the **Read** field.

- d. Enter the maximum permitted number of output operations per second in the **Write** field.

9. Click **OK**.

You have created a storage quality of service entry, and can create disk profiles based on that entry in data storage domains that belong to the data center.

2.1.2. Removing a Storage Quality of Service Entry

Remove an existing storage quality of service entry.

Procedure 2.2. Removing a Storage Quality of Service Entry

1. Click the **Data Centers** resource tab and select a data center.
2. Click **QoS** in the details pane.
3. Click **Storage**.
4. Select the storage quality of service entry to remove.
5. Click **Remove**.
6. Click **OK** when prompted.

You have removed the storage quality of service entry, and that entry is no longer available. If any disk profiles were based on that entry, the storage quality of service entry for those profiles is automatically set to **[unlimited]**.

2.2. VIRTUAL MACHINE NETWORK QUALITY OF SERVICE

Virtual machine network quality of service is a feature that allows you to create profiles for limiting both the inbound and outbound traffic of individual virtual network interface controllers. With this feature, you can limit bandwidth in a number of layers, controlling the consumption of network resources.



IMPORTANT

Virtual machine network quality of service is only supported on cluster compatibility version 3.3 and higher.

2.2.1. Creating a Virtual Machine Network Quality of Service Entry

Create a virtual machine network quality of service entry to regulate network traffic when applied to a virtual network interface controller (vNIC) profile, also known as a virtual machine network interface profile.

Procedure 2.3. Creating a Virtual Machine Network Quality of Service Entry

1. Click the **Data Centers** resource tab and select a data center.
2. Click the **QoS** tab in the details pane.
3. Click **VM Network**.

4. Click **New**.
5. Enter a name for the virtual machine network quality of service entry in the **Name** field.
6. Enter the limits for the **Inbound** and **Outbound** network traffic.
7. Click **OK**.

You have created a virtual machine network quality of service entry that can be used in a virtual network interface controller.

2.2.2. Settings in the New Virtual Machine Network QoS and Edit Virtual Machine Network QoS Windows Explained

Virtual machine network quality of service settings allow you to configure bandwidth limits for both inbound and outbound traffic on three distinct levels.

Table 2.1. Virtual Machine Network QoS Settings

Field Name	Description
Data Center	The data center to which the virtual machine network QoS policy is to be added. This field is configured automatically according to the selected data center.
Name	A name to represent the virtual machine network QoS policy within the Manager.
Inbound	<p>The settings to be applied to inbound traffic. Select or clear the Inbound check box to enable or disable these settings.</p> <ul style="list-style-type: none">• Average: The average speed of inbound traffic.• Peak: The speed of inbound traffic during peak times.• Burst: The speed of inbound traffic during bursts.
Outbound	<p>The settings to be applied to outbound traffic. Select or clear the Outbound check box to enable or disable these settings.</p> <ul style="list-style-type: none">• Average: The average speed of outbound traffic.• Peak: The speed of outbound traffic during peak times.• Burst: The speed of outbound traffic during bursts.

2.2.3. Removing a Virtual Machine Network Quality of Service Entry

Remove an existing virtual machine network quality of service entry.

Procedure 2.4. Removing a Virtual Machine Network Quality of Service Entry

1. Click the **Data Centers** resource tab and select a data center.
2. Click the **QoS** tab in the details pane.
3. Click **VM Network**.
4. Select the virtual machine network quality of service entry to remove.
5. Click **Remove**.
6. Click **OK** when prompted.

You have removed the virtual machine network quality of service entry, and that entry is no longer available.

2.3. HOST NETWORK QUALITY OF SERVICE

Host network quality of service configures the networks on a host to enable the control of network traffic through the physical interfaces. Host network quality of service allows for the fine tuning of network performance by controlling the consumption of network resources on the same physical network interface controller. This helps to prevent situations where one network causes other networks attached to the same physical network interface controller to no longer function due to heavy traffic. By configuring host network quality of service, these networks can now function on the same physical network interface controller without congestion issues.

2.3.1. Creating a Host Network Quality of Service Entry

Create a host network quality of service entry.

Procedure 2.5. Creating a Host Network Quality of Service Entry

1. Click the **Data Centers** resource tab and select a data center.
2. Click **QoS** in the details pane.
3. Click **Host Network**.
4. Click **New**.
5. Enter a name for the quality of service entry in the **QoS Name** field.
6. Enter a description for the quality of service entry in the **Description** field.
7. Enter the desired values for **Weighted Share**, **Rate Limit [Mbps]**, and **Committed Rate [Mbps]**.
8. Click **OK**.

2.3.2. Settings in the New Host Network Quality of Service and Edit Host Network Quality of Service Windows Explained

Host network quality of service settings allow you to configure bandwidth limits for outbound traffic.

Table 2.2. Host Network QoS Settings

Field Name	Description
Data Center	The data center to which the host network QoS policy is to be added. This field is configured automatically according to the selected data center.
QoS Name	A name to represent the host network QoS policy within the Manager.
Description	A description of the host network QoS policy.
Outbound	<p>The settings to be applied to outbound traffic.</p> <ul style="list-style-type: none"> • Weighted Share: Signifies how much of the logical link's capacity a specific network should be allocated, relative to the other networks attached to the same logical link. The exact share depends on the sum of shares of all networks on that link. By default this is a number in the range 1-100. • Rate Limit [Mbps]: The maximum bandwidth to be used by a network. • Committed Rate [Mbps]: The minimum bandwidth required by a network. The Committed Rate requested is not guaranteed and will vary depending on the network infrastructure and the Committed Rate requested by other networks on the same logical link.

2.3.3. Removing a Host Network Quality of Service Entry

Remove an existing network quality of service entry.

Procedure 2.6. Removing a Host Network Quality of Service Entry

1. Click the **Data Centers** resource tab and select a data center.
2. Click the **QoS** tab in the details pane.
3. Click **Host Network**.
4. Select the network quality of service entry to remove.

5. Click **Remove**.
6. Click **OK** when prompted.

2.4. CPU QUALITY OF SERVICE

CPU quality of service defines the maximum amount of processing capability a virtual machine can access on the host on which it runs, expressed as a percent of the total processing capability available to that host. Assigning CPU quality of service to a virtual machine allows you to prevent the workload on one virtual machine in a cluster from affecting the processing resources available to other virtual machines in that cluster.

2.4.1. Creating a CPU Quality of Service Entry

Create a CPU quality of service entry.

Procedure 2.7. Creating a CPU Quality of Service Entry

1. Click the **Data Centers** resource tab and select a data center.
2. Click **QoS** in the details pane.
3. Click **CPU**.
4. Click **New**.
5. Enter a name for the quality of service entry in the **QoS Name** field.
6. Enter a description for the quality of service entry in the **Description** field.
7. Enter the maximum processing capability the quality of service entry permits in the **Limit** field, in percentage. Do not include the % symbol.
8. Click **OK**.

You have created a CPU quality of service entry, and can create CPU profiles based on that entry in clusters that belong to the data center.

2.4.2. Removing a CPU Quality of Service Entry

Remove an existing CPU quality of service entry.

Procedure 2.8. Removing a CPU Quality of Service Entry

1. Click the **Data Centers** resource tab and select a data center.
2. Click **QoS** in the details pane.
3. Click **CPU**.
4. Select the CPU quality of service entry to remove.
5. Click **Remove**.
6. Click **OK** when prompted.

You have removed the CPU quality of service entry, and that entry is no longer available. If any CPU profiles were based on that entry, the CPU quality of service entry for those profiles is automatically set to **[unlimited]**.

CHAPTER 3. DATA CENTERS

3.1. INTRODUCTION TO DATA CENTERS

A data center is a logical entity that defines the set of resources used in a specific environment. A data center is considered a container resource, in that it is comprised of logical resources, in the form of clusters and hosts; network resources, in the form of logical networks and physical NICs; and storage resources, in the form of storage domains.

A data center can contain multiple clusters, which can contain multiple hosts; it can have multiple storage domains associated to it; and it can support multiple virtual machines on each of its hosts. A Red Hat Enterprise Virtualization environment can contain multiple data centers; the data center infrastructure allows you to keep these centers separate.

All data centers are managed from the single Administration Portal.

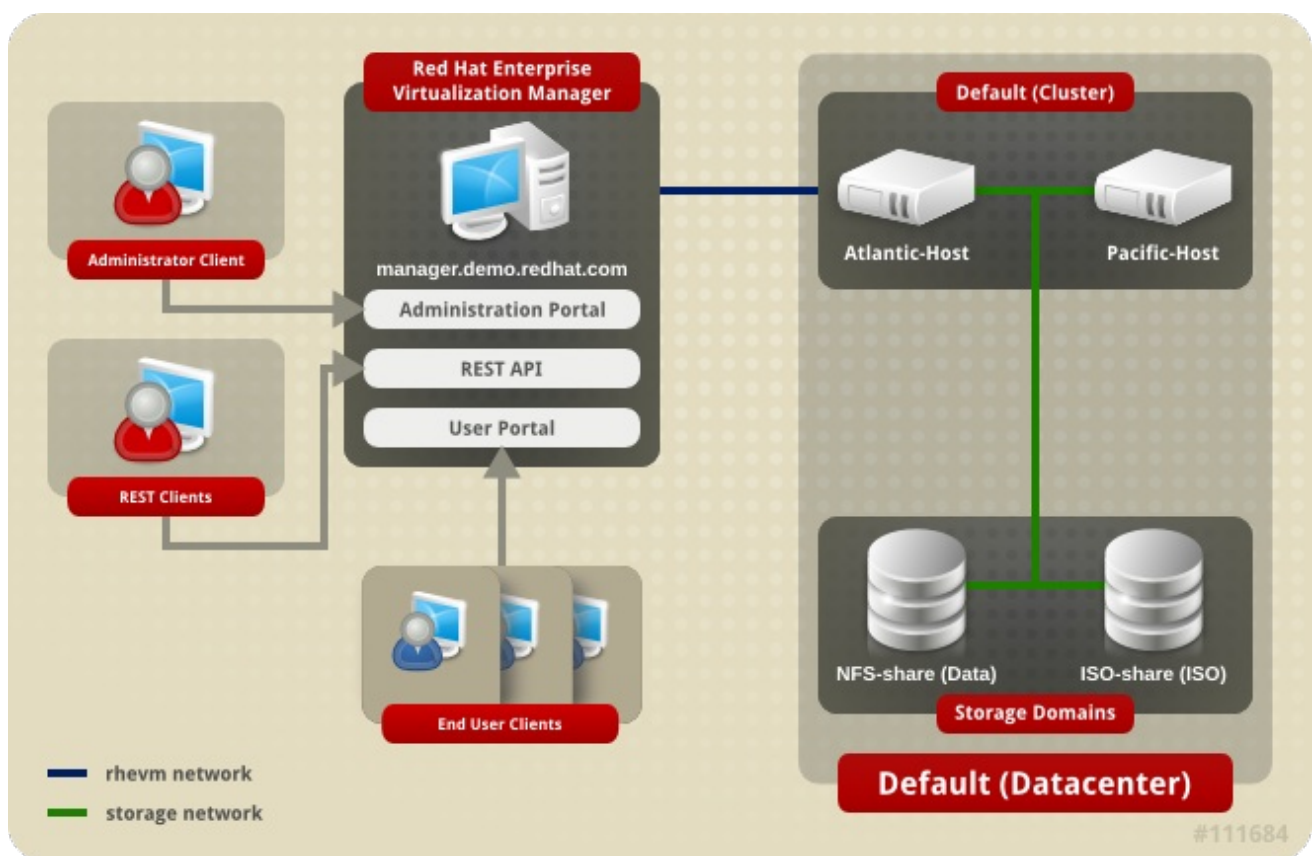
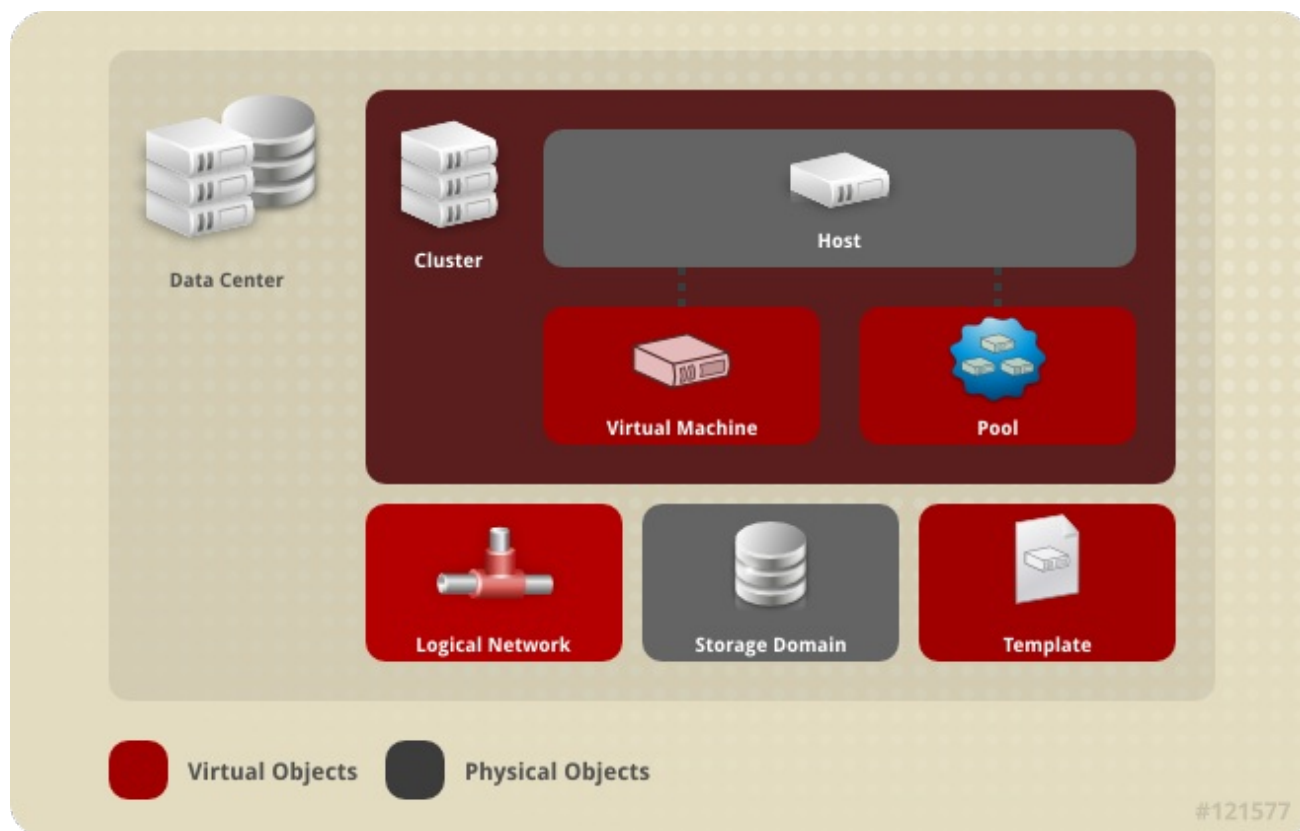


Figure 3.1. Data Centers

Red Hat Enterprise Virtualization creates a default data center during installation. You can configure the default data center, or set up new appropriately named data centers.



#121577

Figure 3.2. Data Center Objects

3.2. THE STORAGE POOL MANAGER

The Storage Pool Manager (SPM) is a role given to one of the hosts in the data center enabling it to manage the storage domains of the data center. The SPM entity can be run on any host in the data center; the Red Hat Enterprise Virtualization Manager grants the role to one of the hosts. The SPM does not preclude the host from its standard operation; a host running as SPM can still host virtual resources.

The SPM entity controls access to storage by coordinating the metadata across the storage domains. This includes creating, deleting, and manipulating virtual disks (images), snapshots, and templates, and allocating storage for sparse block devices (on SAN). This is an exclusive responsibility: only one host can be the SPM in the data center at one time to ensure metadata integrity.

The Red Hat Enterprise Virtualization Manager ensures that the SPM is always available. The Manager moves the SPM role to a different host if the SPM host encounters problems accessing the storage. When the SPM starts, it ensures that it is the only host granted the role; therefore it will acquire a storage-centric lease. This process can take some time.

3.3. SPM PRIORITY

The SPM role uses some of a host's available resources. The SPM priority setting of a host alters the likelihood of the host being assigned the SPM role: a host with high SPM priority will be assigned the SPM role before a host with low SPM priority. Critical virtual machines on hosts with low SPM priority will not have to contend with SPM operations for host resources.

You can change a host's SPM priority by editing the host.

3.4. USING THE EVENTS TAB TO IDENTIFY PROBLEM OBJECTS IN DATA CENTERS

The **Events** tab for a data center displays all events associated with that data center; events include audits, warnings, and errors. The information displayed in the results list will enable you to identify problem objects in your Red Hat Enterprise Virtualization environment.

The **Events** results list has two views: Basic and Advanced. Basic view displays the event icon, the time of the event, and the description of the events. Advanced view displays these also and includes, where applicable, the event ID; the associated user, host, virtual machine, template, data center, storage, and cluster; the Gluster volume, and the correlation ID.

3.5. DATA CENTER TASKS

3.5.1. Creating a New Data Center

This procedure creates a data center in your virtualization environment. The data center requires a functioning cluster, host, and storage domain to operate.



NOTE

The storage **Type** can be edited until the first storage domain is added to the data center. Once a storage domain has been added, the storage **Type** cannot be changed.

If you set the **Compatibility Version** as **3.6**, it cannot be changed to **3.5** at a later time; version regression is not allowed.

Procedure 3.1. Creating a New Data Center

1. Select the **Data Centers** resource tab to list all data centers in the results list.
2. Click **New** to open the **New Data Center** window.
3. Enter the **Name** and **Description** of the data center.
4. Select the storage **Type**, **Compatibility Version**, and **Quota Mode** of the data center from the drop-down menus.
5. Optionally, change the MAC address pool for the data center. The default MAC address pool is preselected by default. For more information on creating MAC address pools see [Section 1.1.5, “MAC Address Pools”](#).
 - a. Click the **MAC Address Pool** tab.
 - b. Select the required MAC address pool from the **MAC Address Pool** drop-down list.
6. Click **OK** to create the data center and open the **New Data Center - Guide Me** window.
7. The **Guide Me** window lists the entities that need to be configured for the data center. Configure these entities or postpone configuration by clicking the **Configure**

Later button; configuration can be resumed by selecting the data center and clicking the **Guide Me** button.

The new data center is added to the virtualization environment. It will remain **Uninitialized** until a cluster, host, and storage domain are configured for it; use **Guide Me** to configure these entities.

3.5.2. Explanation of Settings in the New Data Center and Edit Data Center Windows

The table below describes the settings of a data center as displayed in the **New Data Center** and **Edit Data Center** windows. Invalid entries are outlined in orange when you click **OK**, prohibiting the changes being accepted. In addition, field prompts indicate the expected values or range of values.

Table 3.1. Data Center Properties

Field	Description/Action
Name	The name of the data center. This text field has a 40-character limit and must be a unique name with any combination of uppercase and lowercase letters, numbers, hyphens, and underscores.
Description	The description of the data center. This field is recommended but not mandatory.
Type	<p>The storage type. Choose one of the following:</p> <ul style="list-style-type: none"> • Shared • Local <p>The type of data domain dictates the type of the data center and cannot be changed after creation without significant disruption. Multiple types of storage domains (iSCSI, NFS, FC, POSIX, and Gluster) can be added to the same data center, though local and shared domains cannot be mixed.</p>

Field	Description/Action
Compatibility Version	<p>The version of Red Hat Enterprise Virtualization. Choose one of the following:</p> <ul style="list-style-type: none"> • 3.0 • 3.1 • 3.2 • 3.3 • 3.4 • 3.5 • 3.6 <p>After upgrading the Red Hat Enterprise Virtualization Manager, the hosts, clusters and data centers may still be in the earlier version. Ensure that you have upgraded all the hosts, then the clusters, before you upgrade the Compatibility Level of the data center.</p>
Quota Mode	<p>Quota is a resource limitation tool provided with Red Hat Enterprise Virtualization. Choose one of:</p> <ul style="list-style-type: none"> • Disabled: Select if you do not want to implement Quota • Audit: Select if you want to edit the Quota settings • Enforced: Select to implement Quota
MAC Address Pool	<p>The MAC address pool of the data center. If no other MAC address pool is assigned the default MAC address pool is used. For more information on MAC address pools see Section 1.1.5, “MAC Address Pools”</p>

3.5.3. Re-Initializing a Data Center: Recovery Procedure

This recovery procedure replaces the master data domain of your data center with a new master data domain; necessary in the event of data corruption of your master data domain. Re-initializing a data center allows you to restore all other resources associated with the data center, including clusters, hosts, and non-problematic storage domains.

You can import any backup or exported virtual machines or templates into your new master data domain.

Procedure 3.2. Re-Initializing a Data Center

1. Click the **Data Centers** resource tab and select the data center to re-initialize.
2. Ensure that any storage domains attached to the data center are in maintenance mode.
3. Right-click the data center and select **Re-Initialize Data Center** from the drop-down menu to open the **Data Center Re-Initialize** window.
4. The **Data Center Re-Initialize** window lists all available (detached; in maintenance mode) storage domains. Click the radio button for the storage domain you are adding to the data center.
5. Select the **Approve operation** check box.
6. Click **OK** to close the window and re-initialize the data center.

The storage domain is attached to the data center as the master data domain and activated. You can now import any backup or exported virtual machines or templates into your new master data domain.

3.5.4. Removing a Data Center

An active host is required to remove a data center. Removing a data center will not remove the associated resources.

Procedure 3.3. Removing a Data Center

1. Ensure the storage domains attached to the data center is in maintenance mode.
2. Click the **Data Centers** resource tab and select the data center to remove.
3. Click **Remove** to open the **Remove Data Center(s)** confirmation window.
4. Click **OK**.

3.5.5. Force Removing a Data Center

A data center becomes **Non Responsive** if the attached storage domain is corrupt or if the host becomes **Non Responsive**. You cannot **Remove** the data center under either circumstance.

Force Remove does not require an active host. It also permanently removes the attached storage domain.

It may be necessary to **Destroy** a corrupted storage domain before you can **Force Remove** the data center.

Procedure 3.4. Force Removing a Data Center

1. Click the **Data Centers** resource tab and select the data center to remove.
2. Click **Force Remove** to open the **Force Remove Data Center** confirmation window.
3. Select the **Approve operation** check box.
4. Click **OK**.

The data center and attached storage domain are permanently removed from the Red Hat Enterprise Virtualization environment.

3.5.6. Changing the Data Center Compatibility Version

Red Hat Enterprise Virtualization data centers have a compatibility version. The compatibility version indicates the version of Red Hat Enterprise Virtualization that the data center is intended to be compatible with. All clusters in the data center must support the desired compatibility level.



NOTE

To change the data center compatibility version, you must have first updated all the clusters in your data center to a level that supports your desired compatibility level.

Procedure 3.5. Changing the Data Center Compatibility Version

1. From the Administration Portal, click the **Data Centers** tab.
2. Select the data center to change from the list displayed.
3. Click **Edit**.
4. Change the **Compatibility Version** to the desired value.
5. Click **OK** to open the **Change Data Center Compatibility Version** confirmation window.
6. Click **OK** to confirm.

You have updated the compatibility version of the data center.



WARNING

Upgrading the compatibility will also upgrade all of the storage domains belonging to the data center. If you are upgrading the compatibility version from below 3.1 to a higher version, these storage domains will become unusable with versions older than 3.1.

3.6. DATA CENTERS AND STORAGE DOMAINS

3.6.1. Attaching an Existing Data Domain to a Data Center

Data domains that are **Unattached** can be attached to a data center. Shared storage domains of multiple types (iSCSI, NFS, FC, POSIX, and Gluster) can be added to the same data center.

Procedure 3.6. Attaching an Existing Data Domain to a Data Center

1. Click the **Data Centers** resource tab and select the appropriate data center.
2. Select the **Storage** tab in the details pane to list the storage domains already attached to the data center.
3. Click **Attach Data** to open the **Attach Storage** window.
4. Select the check box for the data domain to attach to the data center. You can select multiple check boxes to attach multiple data domains.
5. Click **OK**.

The data domain is attached to the data center and is automatically activated.

3.6.2. Attaching an Existing ISO domain to a Data Center

An ISO domain that is **Unattached** can be attached to a data center. The ISO domain must be of the same **Storage Type** as the data center.

Only one ISO domain can be attached to a data center.

Procedure 3.7. Attaching an Existing ISO Domain to a Data Center

1. Click the **Data Centers** resource tab and select the appropriate data center.
2. Select the **Storage** tab in the details pane to list the storage domains already attached to the data center.
3. Click **Attach ISO** to open the **Attach ISO Library** window.
4. Click the radio button for the appropriate ISO domain.
5. Click **OK**.

The ISO domain is attached to the data center and is automatically activated.

3.6.3. Attaching an Existing Export Domain to a Data Center

An export domain that is **Unattached** can be attached to a data center. Only one export domain can be attached to a data center.

Procedure 3.8. Attaching an Existing Export Domain to a Data Center

1. Click the **Data Centers** resource tab and select the appropriate data center.
2. Select the **Storage** tab in the details pane to list the storage domains already attached to the data center.
3. Click **Attach Export** to open the **Attach Export Domain** window.
4. Click the radio button for the appropriate Export domain.
5. Click **OK**.

The export domain is attached to the data center and is automatically activated.

3.6.4. Detaching a Storage Domain from a Data Center

Detaching a storage domain from a data center will stop the data center from associating with that storage domain. The storage domain is not removed from the Red Hat Enterprise Virtualization environment; it can be attached to another data center.

Data, such as virtual machines and templates, remains attached to the storage domain.



NOTE

The master storage, if it is the last available storage domain, cannot be removed.

Procedure 3.9. Detaching a Storage Domain from a Data Center

1. Click the **Data Centers** resource tab and select the appropriate data center.
2. Select the **Storage** tab in the details pane to list the storage domains attached to the data center.
3. Select the storage domain to detach. If the storage domain is **Active**, click **Maintenance** to open the **Maintenance Storage Domain(s)** confirmation window.
4. Click **OK** to initiate maintenance mode.
5. Click **Detach** to open the **Detach Storage** confirmation window.
6. Click **OK**.

You have detached the storage domain from the data center. It can take up to several minutes for the storage domain to disappear from the details pane.

3.7. DATA CENTERS AND PERMISSIONS

3.7.1. Managing System Permissions for a Data Center

As the **SuperUser**, the system administrator manages all aspects of the Administration Portal. More specific administrative roles can be assigned to other users. These restricted administrator roles are useful for granting a user administrative privileges that limit them to a specific resource. For example, a **DataCenterAdmin** role has administrator privileges only for the assigned data center with the exception of the storage for that data center, and a **ClusterAdmin** has administrator privileges only for the assigned cluster.

A data center administrator is a system administration role for a specific data center only. This is useful in virtualization environments with multiple data centers where each data center requires an administrator. The **DataCenterAdmin** role is a hierarchical model; a user assigned the data center administrator role for a data center can manage all objects in the data center with the exception of storage for that data center. Use the **Configure** button in the header bar to assign a data center administrator for all data centers in the environment.

The data center administrator role permits the following actions:

- Create and remove clusters associated with the data center.

- Add and remove hosts, virtual machines, and pools associated with the data center.
- Edit user permissions for virtual machines associated with the data center.

**NOTE**

You can only assign roles and permissions to existing users.

You can change the system administrator of a data center by removing the existing system administrator and adding the new system administrator.

3.7.2. Data Center Administrator Roles Explained

Data Center Permission Roles

The table below describes the administrator roles and privileges applicable to data center administration.

Table 3.2. Red Hat Enterprise Virtualization System Administrator Roles

Role	Privileges	Notes
DataCenterAdmin	Data Center Administrator	Can use, create, delete, manage all physical and virtual resources within a specific data center except for storage, including clusters, hosts, templates and virtual machines.
NetworkAdmin	Network Administrator	Can configure and manage the network of a particular data center. A network administrator of a data center inherits network permissions for virtual machines within the data center as well.

3.7.3. Assigning an Administrator or User Role to a Resource

Assign administrator or user roles to resources to allow users to access or manage that resource.

Procedure 3.10. Assigning a Role to a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Click **Add**.
4. Enter the name or user name of an existing user into the **Search** text box and click

- Go.** Select a user from the resulting list of possible matches.
5. Select a role from the **Role to Assign:** drop-down list.
6. Click **OK**.

You have assigned a role to a user; the user now has the inherited permissions of that role enabled for that resource.

3.7.4. Removing an Administrator or User Role from a Resource

Remove an administrator or user role from a resource; the user loses the inherited permissions associated with the role for that resource.

Procedure 3.11. Removing a Role from a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Select the user to remove from the resource.
4. Click **Remove**. The **Remove Permission** window opens to confirm permissions removal.
5. Click **OK**.

You have removed the user's role, and the associated permissions, from the resource.

CHAPTER 4. CLUSTERS

4.1. INTRODUCTION TO CLUSTERS

A cluster is a logical grouping of hosts that share the same storage domains and have the same type of CPU (either Intel or AMD). If the hosts have different generations of CPU models, they use only the features present in all models.

Each cluster in the system must belong to a data center, and each host in the system must belong to a cluster. Virtual machines are dynamically allocated to any host in a cluster and can be migrated between them, according to policies defined on the **Clusters** tab and in the Configuration tool during runtime. The cluster is the highest level at which power and load-sharing policies can be defined.

The number of hosts and number of virtual machines that belong to a cluster are displayed in the results list under **Host Count** and **VM Count**, respectively.

Clusters run virtual machines or Red Hat Gluster Storage Servers. These two purposes are mutually exclusive: A single cluster cannot support virtualization and storage hosts together.

Red Hat Enterprise Virtualization creates a default cluster in the default data center during installation.

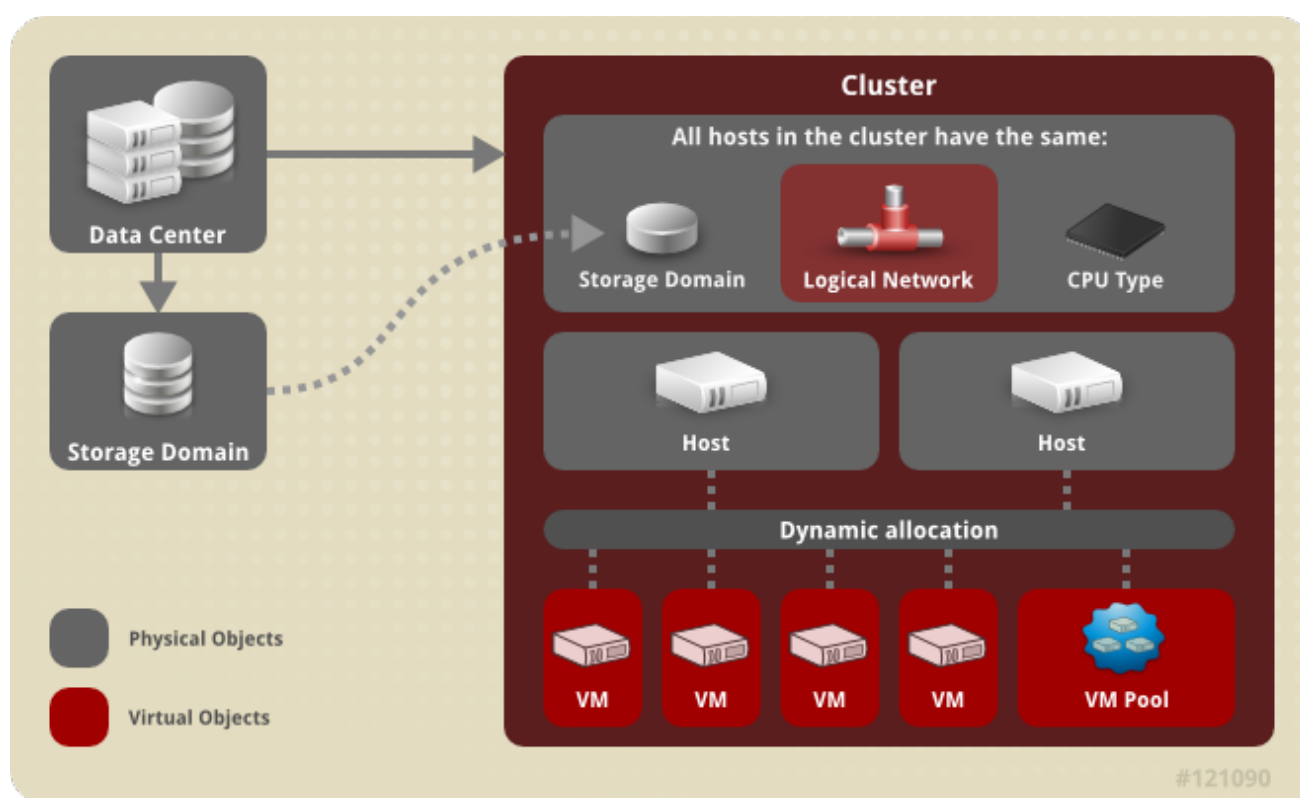


Figure 4.1. Cluster

4.2. CLUSTER TASKS

4.2.1. Creating a New Cluster

A data center can contain multiple clusters, and a cluster can contain multiple hosts. All

hosts in a cluster must be of the same CPU type (Intel or AMD). It is recommended that you create your hosts before you create your cluster to ensure CPU type optimization. However, you can configure the hosts at a later time using the **Guide Me** button.

Procedure 4.1. Creating a New Cluster

1. Select the **Clusters** resource tab.
2. Click **New**.
3. Select the **Data Center** the cluster will belong to from the drop-down list.
4. Enter the **Name** and **Description** of the cluster.
5. Select a network from the **Management Network** drop-down list to assign the management network role.
6. Select the **CPU Architecture** and **CPU Type** from the drop-down lists. It is important to match the CPU processor family with the minimum CPU processor type of the hosts you intend to attach to the cluster, otherwise the host will be non-operational.



NOTE

For both Intel and AMD CPU types, the listed CPU models are in logical order from the oldest to the newest. If your cluster includes hosts with different CPU models, select the oldest CPU model. For more information on each CPU model, see <https://access.redhat.com/solutions/634853>.

7. Select the **Compatibility Version** of the cluster from the drop-down list.
8. Select either the **Enable Virt Service** or **Enable Gluster Service** radio button to define whether the cluster will be populated with virtual machine hosts or with Gluster-enabled nodes. Note that you cannot add Red Hat Enterprise Virtualization Hypervisor hosts to a Gluster-enabled cluster.
9. Optionally select the **Enable to set VM maintenance reason** check box to enable an optional reason field when a virtual machine is shut down from the Manager, allowing the administrator to provide an explanation for the maintenance.
10. Optionally select the **Enable to set Host maintenance reason** check box to enable an optional reason field when a host is placed into maintenance mode from the Manager, allowing the administrator to provide an explanation for the maintenance.
11. Select either the **/dev/random source** (Linux-provided device) or **/dev/hwrng source** (external hardware device) check box to specify the random number generator device that all hosts in the cluster will use.
12. Click the **Optimization** tab to select the memory page sharing threshold for the cluster, and optionally enable CPU thread handling and memory ballooning on the hosts in the cluster.
13. Click the **Resilience Policy** tab to select the virtual machine migration policy.

14. Click the **Scheduling Policy** tab to optionally configure a scheduling policy, configure scheduler optimization settings, enable trusted service for hosts in the cluster, enable HA Reservation, and add a custom serial number policy.
15. Click the **Console** tab to optionally override the globalSPICE proxy, if any, and specify the address of a SPICE proxy for hosts in the cluster.
16. Click the **Fencing policy** tab to enable or disable fencing in the cluster, and select fencing options.
17. Click **OK** to create the cluster and open the **New Cluster - Guide Me** window.
18. The **Guide Me** window lists the entities that need to be configured for the cluster. Configure these entities or postpone configuration by clicking the **Configure Later** button; configuration can be resumed by selecting the cluster and clicking the **Guide Me** button.

The new cluster is added to the virtualization environment.

4.2.2. Explanation of Settings and Controls in the New Cluster and Edit Cluster Windows

4.2.2.1. General Cluster Settings Explained

New Cluster ?

General

Optimization

Resilience Policy

Scheduling Policy

Console

Fencing Policy

Data Center: Default

Name:

Description:

Comment:

Management Network: ovirtmgmt

CPU Architecture: undefined

CPU Type:

Compatibility Version: 3.6

☒ Enable Virt Service

☐ Enable Gluster Service

☐ Enable to set VM maintenance reason

☐ Enable to set Host maintenance reason

Required Random Number Generator sources:

☐ /dev/random source

☐ /dev/hwrng source

OK Cancel

Figure 4.2. New Cluster window

The table below describes the settings for the **General** tab in the **New Cluster** and **Edit Cluster** windows. Invalid entries are outlined in orange when you click **OK**, prohibiting the changes being accepted. In addition, field prompts indicate the expected values or range of

values.

Table 4.1. General Cluster Settings

Field	Description/Action
Data Center	The data center that will contain the cluster. The data center must be created before adding a cluster.
Name	The name of the cluster. This text field has a 40-character limit and must be a unique name with any combination of uppercase and lowercase letters, numbers, hyphens, and underscores.
Description / Comment	The description of the cluster or additional notes. These fields are recommended but not mandatory.
Management Network	The logical network which will be assigned the management network role. The default is ovirtmgmt . On existing clusters, the management network can only be changed via the Manage Networks button in the Logical Networks tab in the details pane.
CPU Architecture	<p>The CPU architecture of the cluster. Different CPU types are available depending on which CPU architecture is selected.</p> <ul style="list-style-type: none"> • undefined: All CPU types are available. • x86_64: All Intel and AMD CPU types are available. • ppc64: Only IBM POWER 8 is available.

Field	Description/Action
CPU Type	<p>The CPU type of the cluster. Choose one of:</p> <ul style="list-style-type: none"> • Intel Conroe Family • Intel Penryn Family • Intel Nehalem Family • Intel Westmere Family • Intel SandyBridge Family • Intel Haswell • AMD Opteron G1 • AMD Opteron G2 • AMD Opteron G3 • AMD Opteron G4 • AMD Opteron G5 • IBM POWER 8 <p>All hosts in a cluster must run either Intel, AMD, or IBM POWER 8 CPU type; this cannot be changed after creation without significant disruption. The CPU type should be set to the oldest CPU model in the cluster. Only features present in all models can be used. For both Intel and AMD CPU types, the listed CPU models are in logical order from the oldest to the newest.</p>
Compatibility Version	<p>The version of Red Hat Enterprise Virtualization. Choose one of:</p> <ul style="list-style-type: none"> • 3.0 • 3.1 • 3.2 • 3.3 • 3.4 • 3.5 • 3.6 <p>You will not be able to select a version older than the version specified for the data center.</p>

Field	Description/Action
Enable Virt Service	If this radio button is selected, hosts in this cluster will be used to run virtual machines.
Enable Gluster Service	If this radio button is selected, hosts in this cluster will be used as Red Hat Gluster Storage Server nodes, and not for running virtual machines. You cannot add a Red Hat Enterprise Virtualization Hypervisor host to a cluster with this option enabled.
Import existing gluster configuration	<p>This check box is only available if the Enable Gluster Service radio button is selected. This option allows you to import an existing Gluster-enabled cluster and all its attached hosts to Red Hat Enterprise Virtualization Manager.</p> <p>The following options are required for each host in the cluster that is being imported:</p> <ul style="list-style-type: none"> • Address: Enter the IP or fully qualified domain name of the Gluster host server. • Fingerprint: Red Hat Enterprise Virtualization Manager fetches the host's fingerprint, to ensure you are connecting with the correct host. • Root Password: Enter the root password required for communicating with the host.
Enable to set VM maintenance reason	If this check box is selected, an optional reason field will appear when a virtual machine in the cluster is shut down from the Manager. This allows you to provide an explanation for the maintenance, which will appear in the logs and when the virtual machine is powered on again.
Enable to set Host maintenance reason	If this check box is selected, an optional reason field will appear when a host in the cluster is moved into maintenance mode from the Manager. This allows you to provide an explanation for the maintenance, which will appear in the logs and when the host is activated again.

Field	Description/Action
Required Random Number Generator sources:	<p>If one of the following check boxes is selected, all hosts in the cluster must have that device available. This enables passthrough of entropy from the random number generator device to virtual machines.</p> <ul style="list-style-type: none"> • /dev/random source - The Linux-provided random number generator. • /dev/hwrng source - An external hardware generator. <p>Note that this feature is only supported on hosts running Red Hat Enterprise Linux 6.6 and later or Red Hat Enterprise Linux 7.0 and later.</p>

4.2.2.2. Optimization Settings Explained

Memory page sharing allows virtual machines to use up to 200% of their allocated memory by utilizing unused memory in other virtual machines. This process is based on the assumption that the virtual machines in your Red Hat Enterprise Virtualization environment will not all be running at full capacity at the same time, allowing unused memory to be temporarily allocated to a particular virtual machine.

CPU Thread Handling allows hosts to run virtual machines with a total number of processor cores greater than number of cores in the host. This is useful for non-CPU-intensive workloads, where allowing a greater number of virtual machines to run can reduce hardware requirements. It also allows virtual machines to run with CPU topologies that would otherwise not be possible, specifically if the number of guest cores is between the number of host cores and number of host threads.

The table below describes the settings for the **Optimization** tab in the **New Cluster** and **Edit Cluster** windows.

Table 4.2. Optimization Settings

Field	Description/Action
-------	--------------------

Field	Description/Action
Memory Optimization	<ul style="list-style-type: none"> • None - Disable memory overcommit: Disables memory page sharing. • For Server Load - Allow scheduling of 150% of physical memory: Sets the memory page sharing threshold to 150% of the system memory on each host. • For Desktop Load - Allow scheduling of 200% of physical memory: Sets the memory page sharing threshold to 200% of the system memory on each host.
CPU Threads	<p>Selecting the Count Threads As Cores check box allows hosts to run virtual machines with a total number of processor cores greater than the number of cores in the host.</p> <p>The exposed host threads would be treated as cores which can be utilized by virtual machines. For example, a 24-core system with 2 threads per core (48 threads total) can run virtual machines with up to 48 cores each, and the algorithms to calculate host CPU load would compare load against twice as many potential utilized cores.</p>

Field	Description/Action
Memory Balloon	<p>Selecting the Enable Memory Balloon Optimization check box enables memory overcommitment on virtual machines running on the hosts in this cluster. When this option is set, the Memory Overcommit Manager (MoM) will start ballooning where and when possible, with a limitation of the guaranteed memory size of every virtual machine.</p> <p>To have a balloon running, the virtual machine needs to have a balloon device with relevant drivers. Each virtual machine in cluster level 3.2 and higher includes a balloon device, unless specifically removed. Each host in this cluster receives a balloon policy update when its status changes to Up. If necessary, you can manually update the balloon policy on a host without having to change the status. See Section 4.2.5, “Updating the MoM Policy on Hosts in a Cluster”.</p> <p>It is important to understand that in some scenarios ballooning may collide with KSM. In such cases MoM will try to adjust the balloon size to minimize collisions. Additionally, in some scenarios ballooning may cause sub-optimal performance for a virtual machine. Administrators are advised to use ballooning optimization with caution.</p>
KSM control	<p>Selecting the Enable KSM check box enables MoM to run Kernel Same-page Merging (KSM) when necessary and when it can yield a memory saving benefit that outweighs its CPU cost.</p>

4.2.2.3. Resilience Policy Settings Explained

The resilience policy sets the virtual machine migration policy in the event of a host becoming non-operational. Virtual machines running on a host that becomes non-operational are live migrated to other hosts in the cluster; this migration is dependent upon your cluster resilience policy. If a host is non-responsive and gets rebooted, virtual machines with high availability are restarted on another host in the cluster. The resilience policy only applies to hosts in a non-operational state.

Table 4.3. Host Failure State Explained

State	Description
Non Operational	<p>Non-operational hosts can be communicated with by the Manager, but have an incorrect configuration, for example a missing logical network. If a host becomes non-operational, the migration of virtual machines depends on the cluster resilience policy.</p>

State	Description
Non Responsive	Non-responsive hosts cannot be communicated with by the Manager. If a host becomes non-responsive, all virtual machines with high availability are restarted on a different host in the cluster.

Virtual machine migration is a network-intensive operation. For instance, on a setup where a host is running ten or more virtual machines, migrating and restarting all of them can be a long and resource-consuming process. Therefore, select the policy action to best suit your setup. If you prefer a conservative approach, disable all migration of virtual machines. Alternatively, if you have many virtual machines, but only several which are running critical workloads, select the option to migrate only highly available virtual machines.

The table below describes the settings for the **Resilience Policy** tab in the **New Cluster** and **Edit Cluster** windows. See [Section 4.2.1, “Creating a New Cluster”](#) for more information on how to set the resilience policy when creating a new cluster.

Table 4.4. Resilience Policy Settings

Field	Description/Action
Migrate Virtual Machines	Migrates all virtual machines in order of their defined priority.
Migrate only Highly Available Virtual Machines	Migrates only highly available virtual machines to prevent overloading other hosts.
Do Not Migrate Virtual Machines	Prevents virtual machines from being migrated.

4.2.2.4. Scheduling Policy Settings Explained

Scheduling policies allow you to specify the usage and distribution of virtual machines between available hosts. Define the scheduling policy to enable automatic load balancing across the hosts in a cluster.

To add a scheduling policy to an existing cluster, click the **Clusters** tab and click the **Edit** button, then click the **Scheduling Policy** tab.

New Cluster ?

General
Optimization
Resilience Policy
Scheduling Policy
Console
Fencing Policy

Select Policy: vm_evenly_distributed

Properties

HighVmCount: 10 -

MigrationThreshold: 5 -

SpmVmGrace: 5 - +

Scheduler Optimization ?

☒ Optimize for Utilization ☐ Optimize for Speed

Additional Properties

☐ Enable Trusted Service

☐ Enable HA Reservation

Provide custom serial number policy ? ☐

Auto Converge migrations: Inherit from global setting

Enable migration compression: Inherit from global setting

OK Cancel

Figure 4.3. Scheduling Policy Settings: vm_evenly_distributed

The table below describes the settings for the **Scheduling Policy** tab.

Table 4.5. Scheduling Policy Tab Properties

Field	Description/Action
-------	--------------------

Field	Description/Action
Select Policy	<p>Select a policy from the drop-down list.</p> <ul style="list-style-type: none"> • none: Set the policy value to none to have no load or power sharing between hosts. This is the default mode. • evenly_distributed: Distributes the memory and CPU processing load evenly across all hosts in the cluster. Additional virtual machines attached to a host will not start if that host has reached the defined Maximum Service Level. • InClusterUpgrade: Distributes virtual machines based on host operating system version. Hosts with a newer operating system than the virtual machine currently runs on are given priority over hosts with the same operating system. Virtual machines that migrate to a host with a newer operating system will not migrate back to an older operating system. A virtual machine can restart on any host in the cluster. The policy allows hosts in the cluster to be upgraded by allowing the cluster to have mixed operating system versions. Preconditions must be met before the policy can be enabled. See the Upgrade Guide for more information. • power_saving: Distributes the memory and CPU processing load across a subset of available hosts to reduce power consumption on underutilized hosts. Hosts with a CPU load below the low utilization value for longer than the defined time interval will migrate all virtual machines to other hosts so that it can be powered down. Additional virtual machines attached to a host will not start if that host has reached the defined high utilization value. • vm_evenly_distributed: Distributes virtual machines evenly between hosts based on a count of the virtual machines. The cluster is considered unbalanced if any host is running more virtual machines than the HighVmCount and there is at least one host with a virtual machine count that falls outside of the MigrationThreshold.

Properties Field	The following properties appear depending on Description/Action and can be edited if necessary:
	<ul style="list-style-type: none"> • HighVmCount: Sets the maximum number of virtual machines that can run on each host. Exceeding this limit qualifies the host as overloaded. The default value is 10. • MigrationThreshold: Defines a buffer before virtual machines are migrated from the host. It is the maximum inclusive difference in virtual machine count between the most highly-utilized host and the least-utilized host. The cluster is balanced when every host in the cluster has a virtual machine count that falls inside the migration threshold. The default value is 5. • SpmVmGrace: Defines the number of slots for virtual machines to be reserved on SPM hosts. The SPM host will have a lower load than other hosts, so this variable defines how many fewer virtual machines than other hosts it can run. The default value is 5. • CpuOverCommitDurationMinutes: Sets the time (in minutes) that a host can run a CPU load outside of the defined utilization values before the scheduling policy takes action. The defined time interval protects against temporary spikes in CPU load activating scheduling policies and instigating unnecessary virtual machine migration. Maximum two characters. The default value is 2. • HighUtilization: Expressed as a percentage. If the host runs with CPU usage at or above the high utilization value for the defined time interval, the Red Hat Enterprise Virtualization Manager migrates virtual machines to other hosts in the cluster until the host's CPU load is below the maximum service threshold. The default value is 80. • LowUtilization: Expressed as a percentage. If the host runs with CPU usage below the low utilization value for the defined time interval, the Red Hat Enterprise Virtualization Manager will migrate virtual machines to other hosts in the cluster. The Manager will power down the original host machine, and restart it again when load balancing requires or there are not enough free hosts in the cluster. The default value is 20.

Field	Description/Action
	<ul style="list-style-type: none"> • ScaleDown: Reduces the impact of the MaxReservation weight function, by dividing a host's score by the specified amount. This is an optional property that can be added to any policy, including none. • HostsInReserve: Specifies a number of hosts to keep running even though there are no running virtual machines on them. This is an optional property that can be added to the power_saving policy. • EnableAutomaticHostPowerManagement: Enables automatic power management for all hosts in the cluster. This is an optional property that can be added to the power_saving policy. The default value is true. • MaxFreeMemoryForOverUtilized: Sets the maximum free memory required in MB for the minimum service level. If the host's memory usage runs at, or above this value, the Red Hat Enterprise Virtualization Manager migrates virtual machines to other hosts in the cluster until the host's available memory is below the minimum service threshold. Setting both MaxFreeMemoryForOverUtilized and MinFreeMemoryForUnderUtilized to 0MB disables memory based balancing. This is an optional property that can be added to the power_saving and evenly_distributed policies. • MinFreeMemoryForUnderUtilized: Sets the minimum free memory required in MB before the host is considered underutilized. If the host's memory usage runs below this value, the Red Hat Enterprise Virtualization Manager migrates virtual machines to other hosts in the cluster and will automatically power down the host machine, and restart it again when load balancing requires or there are not enough free hosts in the cluster. Setting both MaxFreeMemoryForOverUtilized and MinFreeMemoryForUnderUtilized to 0MB disables memory based balancing. This is an optional property that can be added to the power_saving and evenly_distributed policies.

Field	Description/Action
Scheduler Optimization	<p>Optimize scheduling for host weighing/ordering.</p> <ul style="list-style-type: none"> • Optimize for Utilization: Includes weight modules in scheduling to allow best selection. • Optimize for Speed: Skips host weighting in cases where there are more than ten pending requests.
Enable Trusted Service	<p>Enable integration with an OpenAttestation server. Before this can be enabled, use the engine-config tool to enter the OpenAttestation server's details. For more information, see Section 9.4, "Trusted Compute Pools".</p>
Enable HA Reservation	<p>Enable the Manager to monitor cluster capacity for highly available virtual machines. The Manager ensures that appropriate capacity exists within a cluster for virtual machines designated as highly available to migrate in the event that their existing host fails unexpectedly.</p>
Provide custom serial number policy	<p>This check box allows you to specify a serial number policy for the virtual machines in the cluster. Select one of the following options:</p> <ul style="list-style-type: none"> • Host ID: Sets the host's UUID as the virtual machine's serial number. • Vm ID: Sets the virtual machine's UUID as its serial number. • Custom serial number: Allows you to specify a custom serial number.

Field	Description/Action
Auto Converge migrations	<p>This option allows you to set whether auto-convergence is used during live migration of virtual machines in the cluster. Large virtual machines with high workloads can dirty memory more quickly than the transfer rate achieved during live migration, and prevent the migration from converging. Auto-convergence capabilities in QEMU allow you to force convergence of virtual machine migrations. QEMU automatically detects a lack of convergence and triggers a throttle-down of the vCPUs on the virtual machines. Auto-convergence is disabled globally by default.</p> <ul style="list-style-type: none"> • Select Inherit from global setting to use the auto-convergence setting that is set at the global level with engine-config. This option is selected by default. • Select Auto Converge to override the global setting and allow auto-convergence for virtual machines in the cluster. • Select Don't Auto Converge to override the global setting and prevent auto-convergence for virtual machines in the cluster.
Enable migration compression	<p>This option allows you to set whether migration compression is used during live migration of virtual machines in the cluster. This feature uses Xor Binary Zero Run-Length-Encoding to reduce virtual machine downtime and total live migration time for virtual machines running memory write-intensive workloads or for any application with a sparse memory update pattern. Migration compression is disabled globally by default.</p> <ul style="list-style-type: none"> • Select Inherit from global setting to use the compression setting that is set at the global level with engine-config. This option is selected by default. • Select Compress to override the global setting and allow compression for virtual machines in the cluster. • Select Don't compress to override the global setting and prevent compression for virtual machines in the cluster.

When a host's free memory drops below 20%, ballooning commands like `mom.Controllers.Balloon - INFO Ballooning guest:half1 from 1096400 to 1991580` are logged to `/var/log/vdsm/mom.log`. `/var/log/vdsm/mom.log` is the Memory Overcommit Manager log file.

4.2.2.5. Cluster Console Settings Explained

The table below describes the settings for the **Console** tab in the **New Cluster** and **Edit Cluster** windows.

Table 4.6. Console Settings

Field	Description/Action
Define SPICE Proxy for Cluster	Select this check box to enable overriding the SPICE proxy defined in global configuration. This feature is useful in a case where the user (who is, for example, connecting via the User Portal) is outside of the network where the hypervisors reside.
Overridden SPICE proxy address	The proxy by which the SPICE client will connect to virtual machines. The address must be in the following format: <div style="border: 1px solid black; padding: 2px; display: inline-block;">protocol://[host]:[port]</div>

4.2.2.6. Fencing Policy Settings Explained

The table below describes the settings for the **Fencing Policy** tab in the **New Cluster** and **Edit Cluster** windows.

Table 4.7. Fencing Policy Settings

Field	Description/Action
Enable fencing	Enables fencing on the cluster. Fencing is enabled by default, but can be disabled if required; for example, if temporary network issues are occurring or expected, administrators can disable fencing until diagnostics or maintenance activities are completed. Note that if fencing is disabled, highly available virtual machines running on non-responsive hosts will not be restarted elsewhere.
Skip fencing if host has live lease on storage	If this check box is selected, any hosts in the cluster that are Non Responsive and still connected to storage will not be fenced.

Field	Description/Action
Skip fencing on cluster connectivity issues	If this check box is selected, fencing will be temporarily disabled if the percentage of hosts in the cluster that are experiencing connectivity issues is greater than or equal to the defined Threshold . The Threshold value is selected from the drop-down list; available values are 25 , 50 , 75 , and 100 .

4.2.3. Editing a Resource

Summary

Edit the properties of a resource.

Procedure 4.2. Editing a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click **Edit** to open the **Edit** window.
3. Change the necessary properties and click **OK**.

Result

The new properties are saved to the resource. The **Edit** window will not close if a property field is invalid.

4.2.4. Setting Load and Power Management Policies for Hosts in a Cluster

The **evenly_distributed** and **power_saving** scheduling policies allow you to specify acceptable memory and CPU usage values, and the point at which virtual machines must be migrated to or from a host. The **vm_evenly_distributed** scheduling policy distributes virtual machines evenly between hosts based on a count of the virtual machines. Define the scheduling policy to enable automatic load balancing across the hosts in a cluster. For a detailed explanation of each scheduling policy, see [Section 4.2.2.4, “Scheduling Policy Settings Explained”](#).

Procedure 4.3. Setting Load and Power Management Policies for Hosts

1. Use the resource tabs, tree mode, or the search function to find and select the cluster in the results list.
2. Click **Edit** to open the **Edit Cluster** window.

Edit Cluster ⓘ

General
Optimization
Resilience Policy
Scheduling Policy
Console
Fencing Policy

Select Policy: power_saving

Properties

CpuOverCommitDurationMinutes: 2 -

HighUtilization: 80 -

LowUtilization: 20 - +

Scheduler Optimization ⓘ

☒ Optimize for Utilization ☐ Optimize for Speed

Additional Properties

☐ Enable Trusted Service

☐ Enable HA Reservation

Provide custom serial number policy ⓘ ☐

Auto Converge migrations: Inherit from global setting

Enable migration compression: Inherit from global setting

OK Cancel

Figure 4.4. Edit Scheduling Policy

3. Select one of the following policies:

- **none**
- **vm_evenly_distributed**
 - a. Set the maximum number of virtual machines that can run on each host in the **HighVmCount** field.
 - b. Define the maximum acceptable difference between the number of virtual machines on the most highly-utilized host and the number of virtual machines on the least-utilized host in the **MigrationThreshold** field.
 - c. Define the number of slots for virtual machines to be reserved on SPM hosts in the **SpmVmGrace** field.
- **evenly_distributed**
 - a. Set the time (in minutes) that a host can run a CPU load outside of the defined utilization values before the scheduling policy takes action in the **CpuOverCommitDurationMinutes** field.
 - b. Enter the CPU utilization percentage at which virtual machines start migrating to other hosts in the **HighUtilization** field.
 - c. Enter the minimum required free memory in MB at which virtual machines start migrating to other hosts in the **MinFreeMemoryForUnderUtilized**.
 - d. Enter the maximum required free memory in MB at which virtual machines start migrating to other hosts in the **MaxFreeMemoryForOverUtilized**.

- **power_saving**
 - a. Set the time (in minutes) that a host can run a CPU load outside of the defined utilization values before the scheduling policy takes action in the **CpuOverCommitDurationMinutes** field.
 - b. Enter the CPU utilization percentage below which the host will be considered under-utilized in the **LowUtilization** field.
 - c. Enter the CPU utilization percentage at which virtual machines start migrating to other hosts in the **HighUtilization** field.
 - d. Enter the minimum required free memory in MB at which virtual machines start migrating to other hosts in the **MinFreeMemoryForUnderUtilized**.
 - e. Enter the maximum required free memory in MB at which virtual machines start migrating to other hosts in the **MaxFreeMemoryForOverUtilized**.
4. Choose one of the following as the **Scheduler Optimization** for the cluster:
 - Select **Optimize for Utilization** to include weight modules in scheduling to allow best selection.
 - Select **Optimize for Speed** to skip host weighting in cases where there are more than ten pending requests.
 5. If you are using an OpenAttestation server to verify your hosts, and have set up the server's details using the **engine-config** tool, select the **Enable Trusted Service** check box.
 6. Optionally select the **Enable HA Reservation** check box to enable the Manager to monitor cluster capacity for highly available virtual machines.
 7. Optionally select the **Provide custom serial number policy** check box to specify a serial number policy for the virtual machines in the cluster, and then select one of the following options:
 - Select **Host ID** to set the host's UUID as the virtual machine's serial number.
 - Select **Vm ID** to set the virtual machine's UUID as its serial number.
 - Select **Custom serial number**, and then specify a custom serial number in the text field.
 8. Click **OK**.

4.2.5. Updating the MoM Policy on Hosts in a Cluster

The Memory Overcommit Manager handles memory balloon and KSM functions on a host. Changes to these functions at the cluster level are only passed to hosts the next time a host moves to a status of **Up** after being rebooted or in maintenance mode. However, if necessary you can apply important changes to a host immediately by synchronizing the MoM policy while the host is **Up**. The following procedure must be performed on each host individually.

Procedure 4.4. Synchronizing MoM Policy on a Host

1. Click the **Clusters** tab and select the cluster to which the host belongs.
2. Click the **Hosts** tab in the details pane and select the host that requires an updated MoM policy.
3. Click **Sync MoM Policy**.

The MoM policy on the host is updated without having to move the host to maintenance mode and back **Up**.

4.2.6. CPU Profiles

CPU profiles define the maximum amount of processing capability a virtual machine in a cluster can access on the host on which it runs, expressed as a percent of the total processing capability available to that host. CPU profiles are created based on CPU profiles defined under data centers, and are not automatically applied to all virtual machines in a cluster; they must be manually assigned to individual virtual machines for the profile to take effect.

4.2.6.1. Creating a CPU Profile

Create a CPU profile. This procedure assumes you have already defined one or more CPU quality of service entries under the data center to which the cluster belongs.

Procedure 4.5. Creating a CPU Profile

1. Click the **Clusters** resource tab and select a cluster.
2. Click the **CPU Profiles** sub tab in the details pane.
3. Click **New**.
4. Enter a name for the CPU profile in the **Name** field.
5. Enter a description for the CPU profile in the **Description** field.
6. Select the quality of service to apply to the CPU profile from the **QoS** list.
7. Click **OK**.

You have created a CPU profile, and that CPU profile can be applied to virtual machines in the cluster.

4.2.6.2. Removing a CPU Profile

Remove an existing CPU profile from your Red Hat Enterprise Virtualization environment.

Procedure 4.6. Removing a CPU Profile

1. Click the **Clusters** resource tab and select a cluster.
2. Click the **CPU Profiles** sub tab in the details pane.
3. Select the CPU profile to remove.
4. Click **Remove**.

5. Click **OK**.

You have removed a CPU profile, and that CPU profile is no longer available. If the CPU profile was assigned to any virtual machines, those virtual machines are automatically assigned the **default** CPU profile.

4.2.7. Importing an Existing Red Hat Gluster Storage Cluster

You can import a Red Hat Gluster Storage cluster and all hosts belonging to the cluster into Red Hat Enterprise Virtualization Manager.

When you provide details such as the IP address or host name and password of any host in the cluster, the **gluster peer status** command is executed on that host through SSH, then displays a list of hosts that are a part of the cluster. You must manually verify the fingerprint of each host and provide passwords for them. You will not be able to import the cluster if one of the hosts in the cluster is down or unreachable. As the newly imported hosts do not have VDSM installed, the bootstrap script installs all the necessary VDSM packages on the hosts after they have been imported, and reboots them.



IMPORTANT

Currently, a Red Hat Gluster Storage node can only be added to a cluster which has its compatibility level set to **3.1**, **3.2**, or **3.3**.

Procedure 4.7. Importing an Existing Red Hat Gluster Storage Cluster to Red Hat Enterprise Virtualization Manager

1. Select the **Clusters** resource tab to list all clusters in the results list.
2. Click **New** to open the **New Cluster** window.
3. Select the **Data Center** the cluster will belong to from the drop-down menu.
4. Enter the **Name** and **Description** of the cluster.
5. Select the **Enable Gluster Service** radio button and the **Import existing gluster configuration** check box.

The **Import existing gluster configuration** field is displayed only if you select **Enable Gluster Service** radio button.

6. In the **Address** field, enter the hostname or IP address of any server in the cluster.

The host **Fingerprint** displays to ensure you are connecting with the correct host. If a host is unreachable or if there is a network error, an error **Error in fetching fingerprint** displays in the **Fingerprint** field.

7. Enter the **Root Password** for the server, and click **OK**.
8. The **Add Hosts** window opens, and a list of hosts that are a part of the cluster displays.
9. For each host, enter the **Name** and the **Root Password**.
10. If you wish to use the same password for all hosts, select the **Use a Common Password** check box to enter the password in the provided text field.

Click **Apply** to set the entered password all hosts.

Make sure the fingerprints are valid and submit your changes by clicking **OK**.

The bootstrap script installs all the necessary VDSM packages on the hosts after they have been imported, and reboots them. You have now successfully imported an existing Red Hat Gluster Storage cluster into Red Hat Enterprise Virtualization Manager.

4.2.8. Explanation of Settings in the Add Hosts Window

The **Add Hosts** window allows you to specify the details of the hosts imported as part of a Gluster-enabled cluster. This window appears after you have selected the **Enable Gluster Service** check box in the **New Cluster** window and provided the necessary host details.

Table 4.8. Add Gluster Hosts Settings

Field	Description
Use a common password	Tick this check box to use the same password for all hosts belonging to the cluster. Enter the password in the Password field, then click the Apply button to set the password on all hosts.
Name	Enter the name of the host.
Hostname/IP	This field is automatically populated with the fully qualified domain name or IP of the host you provided in the New Cluster window.
Root Password	Enter a password in this field to use a different root password for each host. This field overrides the common password provided for all hosts in the cluster.
Fingerprint	The host fingerprint is displayed to ensure you are connecting with the correct host. This field is automatically populated with the fingerprint of the host you provided in the New Cluster window.

4.2.9. Removing a Cluster

Summary

Move all hosts out of a cluster before removing it.



NOTE

You cannot remove the **Default** cluster, as it holds the **Blank** template. You can however rename the **Default** cluster and add it to a new data center.

Procedure 4.8. Removing a Cluster

1. Use the resource tabs, tree mode, or the search function to find and select the cluster in the results list.
2. Ensure there are no hosts in the cluster.
3. Click **Remove** to open the **Remove Cluster(s)** confirmation window.
4. Click **OK**

Result

The cluster is removed.

4.2.10. Changing the Cluster Compatibility Version

Red Hat Enterprise Virtualization clusters have a compatibility version. The cluster compatibility version indicates the features of Red Hat Enterprise Virtualization supported by all of the hosts in the cluster. The cluster compatibility is set according to the version of the least capable host operating system in the cluster.



NOTE

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level.

Procedure 4.9. Changing the Cluster Compatibility Version

1. From the Administration Portal, click the **Clusters** tab.
2. Select the cluster to change from the list displayed.
3. Click **Edit**.
4. Change the **Compatibility Version** to the desired value.
5. Click **OK** to open the **Change Cluster Compatibility Version** confirmation window.
6. Click **OK** to confirm.

You have updated the compatibility version of the cluster. Once you have updated the compatibility version of all clusters in a data center, you can then change the compatibility version of the data center itself.



WARNING

Upgrading the compatibility will also upgrade all of the storage domains belonging to the data center. If you are upgrading the compatibility version from below 3.1 to a higher version, these storage domains will become unusable with versions older than 3.1.

4.3. CLUSTERS AND PERMISSIONS

4.3.1. Managing System Permissions for a Cluster

As the **SuperUser**, the system administrator manages all aspects of the Administration Portal. More specific administrative roles can be assigned to other users. These restricted administrator roles are useful for granting a user administrative privileges that limit them to a specific resource. For example, a **DataCenterAdmin** role has administrator privileges only for the assigned data center with the exception of the storage for that data center, and a **ClusterAdmin** has administrator privileges only for the assigned cluster.

A cluster administrator is a system administration role for a specific data center only. This is useful in data centers with multiple clusters, where each cluster requires a system administrator. The **ClusterAdmin** role is a hierarchical model: a user assigned the cluster administrator role for a cluster can manage all objects in the cluster. Use the **Configure** button in the header bar to assign a cluster administrator for all clusters in the environment.

The cluster administrator role permits the following actions:

- Create and remove associated clusters.
- Add and remove hosts, virtual machines, and pools associated with the cluster.
- Edit user permissions for virtual machines associated with the cluster.



NOTE

You can only assign roles and permissions to existing users.

You can also change the system administrator of a cluster by removing the existing system administrator and adding the new system administrator.

4.3.2. Cluster Administrator Roles Explained

Cluster Permission Roles

The table below describes the administrator roles and privileges applicable to cluster administration.

Table 4.9. Red Hat Enterprise Virtualization System Administrator Roles

Role	Privileges	Notes
------	------------	-------

Role	Privileges	Notes
ClusterAdmin	Cluster Administrator	<p>Can use, create, delete, manage all physical and virtual resources in a specific cluster, including hosts, templates and virtual machines. Can configure network properties within the cluster such as designating display networks, or marking a network as required or non-required.</p> <p>However, a ClusterAdmin does not have permissions to attach or detach networks from a cluster, to do so NetworkAdmin permissions are required.</p>
NetworkAdmin	Network Administrator	<p>Can configure and manage the network of a particular cluster. A network administrator of a cluster inherits network permissions for virtual machines within the cluster as well.</p>

4.3.3. Assigning an Administrator or User Role to a Resource

Assign administrator or user roles to resources to allow users to access or manage that resource.

Procedure 4.10. Assigning a Role to a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Click **Add**.
4. Enter the name or user name of an existing user into the **Search** text box and click **Go**. Select a user from the resulting list of possible matches.
5. Select a role from the **Role to Assign:** drop-down list.
6. Click **OK**.

You have assigned a role to a user; the user now has the inherited permissions of that role enabled for that resource.

4.3.4. Removing an Administrator or User Role from a Resource

Remove an administrator or user role from a resource; the user loses the inherited permissions associated with the role for that resource.

Procedure 4.11. Removing a Role from a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Select the user to remove from the resource.
4. Click **Remove**. The **Remove Permission** window opens to confirm permissions removal.
5. Click **OK**.

You have removed the user's role, and the associated permissions, from the resource.

CHAPTER 5. LOGICAL NETWORKS

5.1. LOGICAL NETWORK TASKS

5.1.1. Using the Networks Tab

The **Networks** resource tab provides a central location for users to perform logical network-related operations and search for logical networks based on each network's property or association with other resources.

All logical networks in the Red Hat Enterprise Virtualization environment display in the results list of the **Networks** tab. The **New**, **Edit** and **Remove** buttons allow you to create, change the properties of, and delete logical networks within data centers.

Click on each network name and use the **Clusters**, **Hosts**, **Virtual Machines**, **Templates**, and **Permissions** tabs in the details pane to perform functions including:

- Attaching or detaching the networks to clusters and hosts
- Removing network interfaces from virtual machines and templates
- Adding and removing permissions for users to access and manage networks

These functions are also accessible through each individual resource tab.



WARNING

Do not change networking in a data center or a cluster if any hosts are running as this risks making the host unreachable.



IMPORTANT

If you plan to use Red Hat Enterprise Virtualization nodes to provide any services, remember that the services will stop if the Red Hat Enterprise Virtualization environment stops operating.

This applies to all services, but you should be especially aware of the hazards of running the following on Red Hat Enterprise Virtualization:

- Directory Services
- DNS
- Storage

5.1.2. Creating a New Logical Network in a Data Center or Cluster

Create a logical network and define its use in a data center, or in clusters in a data center.

Procedure 5.1. Creating a New Logical Network in a Data Center or Cluster

1. Click the **Data Centers** or **Clusters** resource tabs, and select a data center or cluster in the results list.
2. Click the **Logical Networks** tab of the details pane to list the existing logical networks.
3.
 - From the **Data Centers** details pane, click **New** to open the **New Logical Network** window.
 - From the **Clusters** details pane, click **Add Network** to open the **New Logical Network** window.

4. Enter a **Name**, **Description**, and **Comment** for the logical network.
5. Optionally select the **Create on external provider** check box. Select the **External Provider** from the drop-down list and provide the IP address of the **Physical Network**.

If **Create on external provider** is selected, the **Network Label**, **VM Network**, and **MTU** options are disabled.

6. Enter a new label or select an existing label for the logical network in the **Network Label** text field.
7. Optionally enable **Enable VLAN tagging**.
8. Optionally disable **VM Network**.
9. Set the **MTU** value to **Default (1500)** or **Custom**.
10. From the **Cluster** tab, select the clusters to which the network will be assigned. You can also specify whether the logical network will be a required network.
11. If **Create on external provider** is selected, the **Subnet** tab will be visible. From the **Subnet** tab, select the **Create subnet** and enter a **Name**, **CIDR**, and **Gateway** address, and select an **IP Version** for the subnet that the logical network will provide. You can also add DNS servers as required.
12. From the **vNIC Profiles** tab, add vNIC profiles to the logical network as required.
13. Click **OK**.

You have defined a logical network as a resource required by a cluster or clusters in the data center. If you entered a label for the logical network, it will be automatically added to all host network interfaces with that label.

**NOTE**

When creating a new logical network or making changes to an existing logical network that is used as a display network, any running virtual machines that use that network must be rebooted before the network becomes available or the changes are applied.

5.1.3. Editing a Logical Network

Edit the settings of a logical network.

Procedure 5.2. Editing a Logical Network



IMPORTANT

A logical network cannot be edited or moved to another interface if it is not synchronized with the network configuration on the host. See [Section 5.5.2, “Editing Host Network Interfaces and Assigning Logical Networks to Hosts”](#) on how to synchronize your networks.

1. Click the **Data Centers** resource tab, and select the data center of the logical network in the results list.
2. Click the **Logical Networks** tab in the details pane to list the logical networks in the data center.
3. Select a logical network and click **Edit** to open the **Edit Logical Network** window.
4. Edit the necessary settings.
5. Click **OK** to save the changes.



NOTE

Multi-host network configuration is available on data centers with 3.1-or-higher compatibility, and automatically applies updated network settings to all of the hosts within the data center to which the network is assigned. Changes can only be applied when virtual machines using the network are down. You cannot rename a logical network that is already configured on a host. You cannot disable the **VM Network** option while virtual machines or templates using that network are running.

5.1.4. Removing a Logical Network

You can remove a logical network from the **Networks** resource tab or the **Data Centers** resource tab. The following procedure shows you how to remove logical networks associated to a data center. For a working Red Hat Enterprise Virtualization environment, you must have at least one logical network used as the **ovirtmgmt** management network.

Procedure 5.3. Removing Logical Networks

1. Click the **Data Centers** resource tab, and select the data center of the logical network in the results list.
2. Click the **Logical Networks** tab in the details pane to list the logical networks in the data center.
3. Select a logical network and click **Remove** to open the **Remove Logical Network(s)** window.
4. Optionally, select the **Remove external network(s) from the provider(s) as well** check box to remove the logical network both from the Manager and from the external provider if the network is provided by an external provider.

5. Click **OK**.

The logical network is removed from the Manager and is no longer available.

5.1.5. Viewing or Editing the Gateway for a Logical Network

Users can define the gateway, along with the IP address and subnet mask, for a logical network. This is necessary when multiple networks exist on a host and traffic should be routed through the specified network, rather than the default gateway.

If multiple networks exist on a host and the gateways are not defined, return traffic will be routed through the default gateway, which may not reach the intended destination. This would result in users being unable to ping the host.

Red Hat Enterprise Virtualization handles multiple gateways automatically whenever an interface goes up or down.

Procedure 5.4. Viewing or Editing the Gateway for a Logical Network

1. Click the **Hosts** resource tab, and select the desired host.
2. Click the **Network Interfaces** tab in the details pane to list the network interfaces attached to the host and their configurations.
3. Click the **Setup Host Networks** button to open the **Setup Host Networks** window.
4. Hover your cursor over an assigned logical network and click the pencil icon to open the **Edit Management Network** window.

The **Edit Management Network** window displays the network name, the boot protocol, and the IP, subnet mask, and gateway addresses. The address information can be manually edited by selecting a **Static** boot protocol.

5.1.6. Explanation of Settings and Controls in the New Logical Network and Edit Logical Network Windows

5.1.6.1. Logical Network General Settings Explained

The table below describes the settings for the **General** tab of the **New Logical Network** and **Edit Logical Network** window.

Table 5.1. New Logical Network and Edit Logical Network Settings

Field Name	Description
Name	The name of the logical network. This text field has a 15-character limit and must be a unique name with any combination of uppercase and lowercase letters, numbers, hyphens, and underscores.
Description	The description of the logical network. This text field has a 40-character limit.

Field Name	Description
Comment	A field for adding plain text, human-readable comments regarding the logical network.
Create on external provider	<p>Allows you to create the logical network to an OpenStack Networking instance that has been added to the Manager as an external provider.</p> <p>External Provider - Allows you to select the external provider on which the logical network will be created.</p>
Enable VLAN tagging	VLAN tagging is a security feature that gives all network traffic carried on the logical network a special characteristic. VLAN-tagged traffic cannot be read by interfaces that do not also have that characteristic. Use of VLANs on logical networks also allows a single network interface to be associated with multiple, differently VLAN-tagged logical networks. Enter a numeric value in the text entry field if VLAN tagging is enabled.
VM Network	Select this option if only virtual machines use this network. If the network is used for traffic that does not involve virtual machines, such as storage communications, do not select this check box.
MTU	Choose either Default , which sets the maximum transmission unit (MTU) to the value given in the parenthesis (), or Custom to set a custom MTU for the logical network. You can use this to match the MTU supported by your new logical network to the MTU supported by the hardware it interfaces with. Enter a numeric value in the text entry field if Custom is selected.
Network Label	Allows you to specify a new label for the network or select from existing labels already attached to host network interfaces. If you select an existing label, the logical network will be automatically assigned to all host network interfaces with that label.

5.1.6.2. Logical Network Cluster Settings Explained

The table below describes the settings for the **Cluster** tab of the **New Logical Network** window.

Table 5.2. New Logical Network Settings

Field Name	Description
Attach/Detach Network to/from Cluster(s)	<p>Allows you to attach or detach the logical network from clusters in the data center and specify whether the logical network will be a required network for individual clusters.</p> <p>Name - the name of the cluster to which the settings will apply. This value cannot be edited.</p> <p>Attach All - Allows you to attach or detach the logical network to or from all clusters in the data center. Alternatively, select or clear the Attach check box next to the name of each cluster to attach or detach the logical network to or from a given cluster.</p> <p>Required All - Allows you to specify whether the logical network is a required network on all clusters. Alternatively, select or clear the Required check box next to the name of each cluster to specify whether the logical network is a required network for a given cluster.</p>

5.1.6.3. Logical Network vNIC Profiles Settings Explained

The table below describes the settings for the **vNIC Profiles** tab of the **New Logical Network** window.

Table 5.3. New Logical Network Settings

Field Name	Description
vNIC Profiles	<p>Allows you to specify one or more vNIC profiles for the logical network. You can add or remove a vNIC profile to or from the logical network by clicking the plus or minus button next to the vNIC profile. The first field is for entering a name for the vNIC profile.</p> <p>Public - Allows you to specify whether the profile is available to all users.</p> <p>QoS - Allows you to specify a network quality of service (QoS) profile to the vNIC profile.</p>

5.1.7. Designate a Specific Traffic Type for a Logical Network with the Manage Networks Window

Specify the traffic type for the logical network to optimize the network traffic flow.

Procedure 5.5. Specifying Traffic Types for Logical Networks

1. Click the **Clusters** resource tab, and select a cluster from the results list.
2. Select the **Logical Networks** tab in the details pane to list the logical networks assigned to the cluster.
3. Click **Manage Networks** to open the **Manage Networks** window.

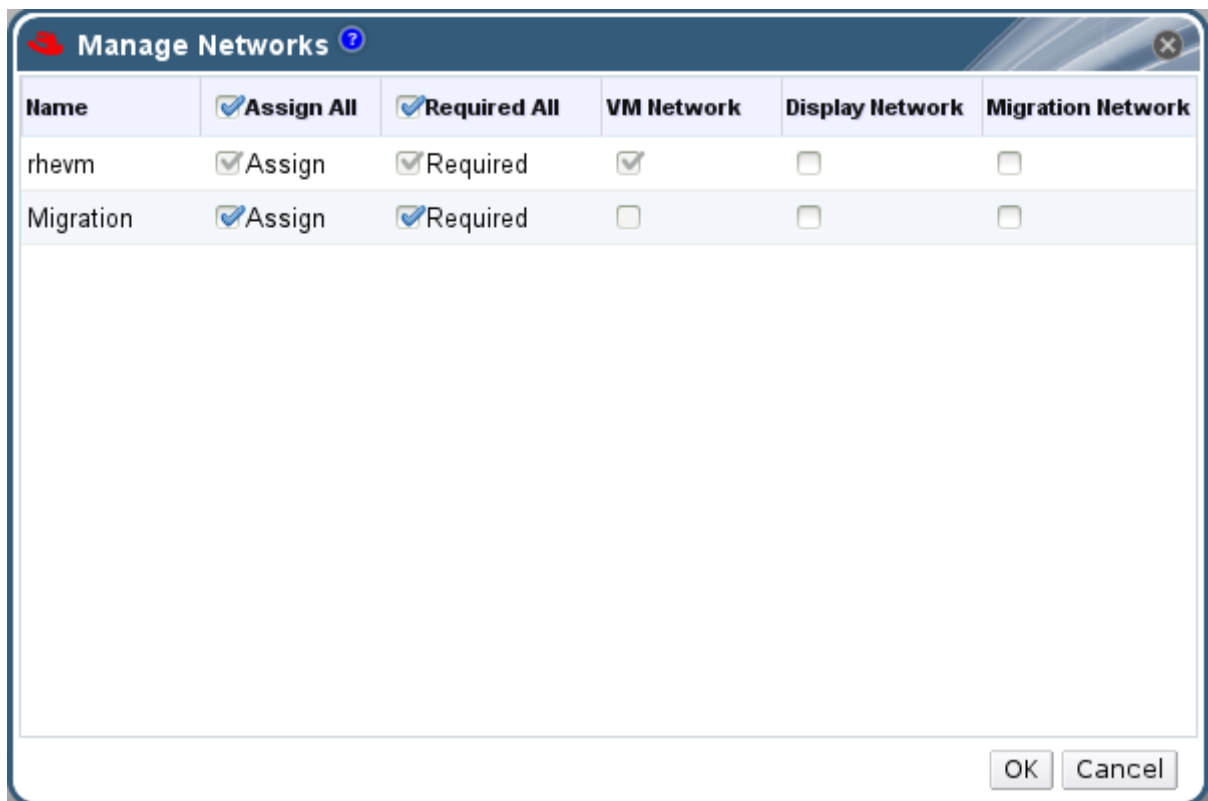


Figure 5.1. Manage Networks

4. Select appropriate check boxes.
5. Click **OK** to save the changes and close the window.

You have optimized the network traffic flow by assigning a specific type of traffic to be carried on a specific logical network.



NOTE

Logical networks offered by external providers must be used as virtual machine networks; they cannot be assigned special cluster roles such as display or migration.

5.1.8. Explanation of Settings in the Manage Networks Window

The table below describes the settings for the **Manage Networks** window.

Table 5.4. Manage Networks Settings

Field	Description/Action
-------	--------------------

Field	Description/Action
Assign	Assigns the logical network to all hosts in the cluster.
Required	A Network marked "required" must remain operational in order for the hosts associated with it to function properly. If a required network ceases to function, any hosts associated with it become non-operational.
VM Network	A logical network marked "VM Network" carries network traffic relevant to the virtual machine network.
Display Network	A logical network marked "Display Network" carries network traffic relevant to SPICE and to the virtual network controller.
Migration Network	A logical network marked "Migration Network" carries virtual machine and storage migration traffic.

5.1.9. Editing the Virtual Function Configuration on a NIC

Single Root I/O Virtualization (SR-IOV) enables a single PCIe endpoint to be used as multiple separate devices. This is achieved through the introduction of two PCIe functions: physical functions (PFs) and virtual functions (VFs). A PCIe card can have between one and eight PFs, but each PF can support many more VFs (dependent on the device).

You can edit the configuration of SR-IOV-capable Network Interface Controllers (NICs) through the Red Hat Enterprise Virtualization Manager, including the number of VFs on each NIC and to specify the virtual networks allowed to access the VFs.


Once VFs have been created, each can be treated as a standalone NIC. This includes having one or more logical networks assigned to them, creating bonded interfaces with them, and to directly assign vNICs to them for direct device passthrough.

A vNIC must have the passthrough property enabled in order to be directly attached to a VF. See [Section 5.2.4, “Enabling Passthrough on a vNIC Profile”](#).

Procedure 5.6. Editing the Virtual Function Configuration on a NIC

1. Select an SR-IOV-capable host and click the **Network Interfaces** tab in the details pane.
2. Click **Setup Host Networks** to open the **Setup Host Networks** window.



3. Select an SR-IOV-capable NIC, marked with a , and click the pencil icon to open the **Edit Virtual Functions (SR-IOV) configuration of NIC** window.

4. To edit the number of virtual functions, click the **Number of VFs setting** drop-down button and edit the **Number of VFs** text field.



IMPORTANT

Changing the number of VFs will delete all previous VFs on the network interface before creating new VFs. This includes any VFs that have virtual machines directly attached.

5. The **All Networks** check box is selected by default, allowing all networks to access the virtual functions. To specify the virtual networks allowed to access the virtual functions, select the **Specific networks** radio button to list all networks. You can then either select the check box for desired networks, or you can use the **Labels** text field to automatically select networks based on one or more network labels.
6. Click **OK** to close the window. Note that the configuration changes will not take effect until you click the **OK** button in the **Setup Host Networks** window.

5.2. VIRTUAL NETWORK INTERFACE CARDS

5.2.1. vNIC Profile Overview

A Virtual Network Interface Card (vNIC) profile is a collection of settings that can be applied to individual virtual network interface cards in the Manager. A vNIC profile allows you to apply Network QoS profiles to a vNIC, enable or disable port mirroring, and add or remove custom properties. A vNIC profile also offers an added layer of administrative flexibility in that permission to use (consume) these profiles can be granted to specific users. In this way, you can control the quality of service that different users receive from a given network.

5.2.2. Creating or Editing a vNIC Profile

Create or edit a Virtual Network Interface Controller (vNIC) profile to regulate network bandwidth for users and groups.



NOTE

If you are enabling or disabling port mirroring, all virtual machines using the associated profile must be in a down state before editing.

Procedure 5.7. Creating or editing a vNIC Profile

1. Click the **Networks** resource tab, and select a logical network in the results list.
2. Select the **vNIC Profiles** tab in the details pane. If you selected the logical network in tree mode, you can select the **vNIC Profiles** tab in the results list.
3. Click **New** or **Edit** to open the **VM Interface Profile** window.

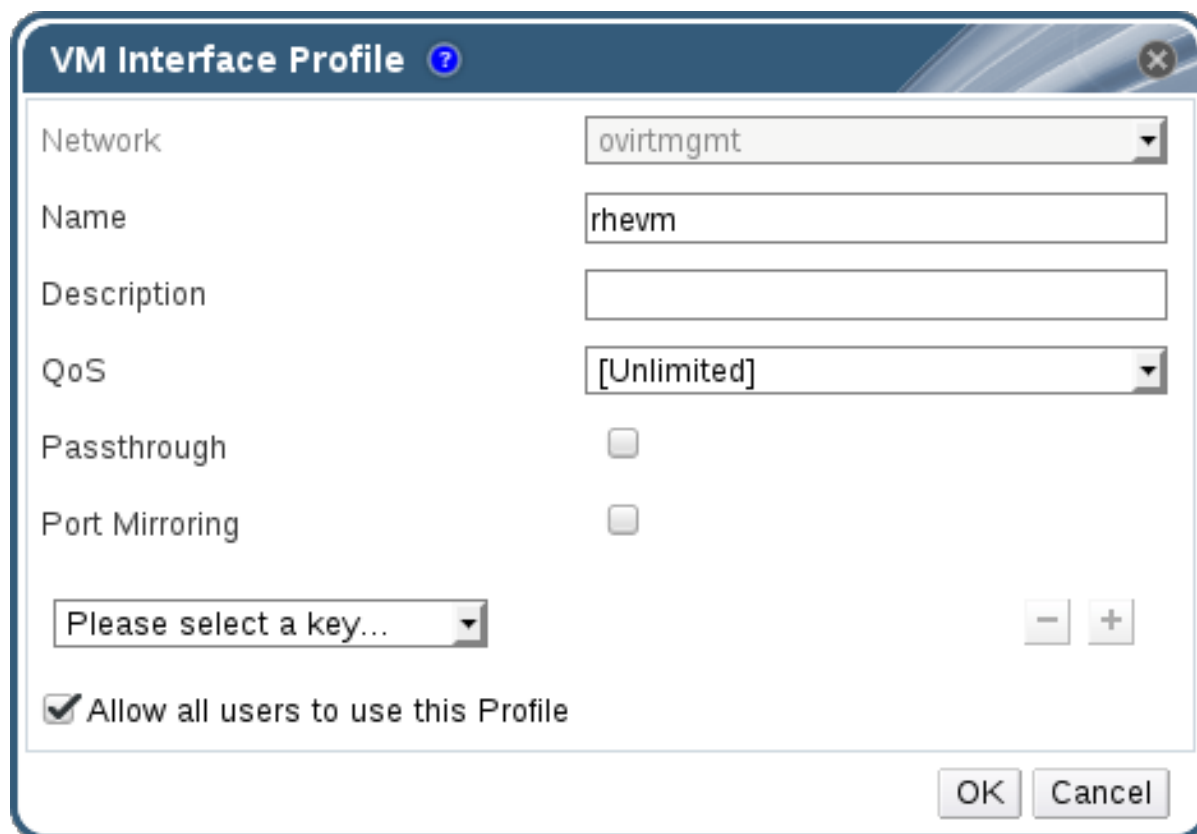


Figure 5.2. The VM Interface Profile window

4. Enter the **Name** and **Description** of the profile.
5. Select the relevant Quality of Service policy from the **QoS** list.
6. Select the **Passthrough** check box to enable passthrough of the vNIC and allow direct device assignment of a virtual function. Enabling the passthrough property will disable QoS and port mirroring as these are not compatible. For more information on passthrough, see [Section 5.2.4, “Enabling Passthrough on a vNIC Profile”](#).
7. Use the **Port Mirroring** and **Allow all users to use this Profile** check boxes to toggle these options.
8. Select a custom property from the custom properties list, which displays **Please select a key...** by default. Use the + and - buttons to add or remove custom properties.
9. Click **OK**.

You have created a vNIC profile. Apply this profile to users and groups to regulate their network bandwidth. Note that if you edited a vNIC profile, you must either restart the virtual machine or hot unplug and then hot plug the vNIC.



NOTE

The guest operating system must support vNIC hot plug and hot unplug.

5.2.3. Explanation of Settings in the VM Interface Profile Window

Table 5.5. VM Interface Profile Window

Field Name	Description
Network	A drop-down menu of the available networks to apply the vNIC profile.
Name	The name of the vNIC profile. This must be a unique name with any combination of uppercase and lowercase letters, numbers, hyphens, and underscores between 1 and 50 characters.
Description	The description of the vNIC profile. This field is recommended but not mandatory.
QoS	A drop-down menu of the available Network Quality of Service policies to apply to the vNIC profile. QoS policies regulate inbound and outbound network traffic of the vNIC.
Passthrough	<p>A check box to toggle the passthrough property. Passthrough allows a vNIC to connect directly to a virtual function of a host NIC. The passthrough property cannot be edited if the vNIC profile is attached to a virtual machine.</p> <p>Both QoS and port mirroring are disabled in the vNIC profile if passthrough is enabled.</p>
Port Mirroring	A check box to toggle port mirroring. Port mirroring copies layer 3 network traffic on the logical network to a virtual interface on a virtual machine. It is not selected by default. For further details, see Port Mirroring in the <i>Technical Reference</i> .
Device Custom Properties	A drop-down menu to select available custom properties to apply to the vNIC profile. Use the + and - buttons to add and remove properties respectively.
Allow all users to use this Profile	A check box to toggle the availability of the profile to all users in the environment. It is selected by default.

5.2.4. Enabling Passthrough on a vNIC Profile

The passthrough property of a vNIC profile enables a vNIC to be directly connected to a virtual function (VF) of an SR-IOV-enabled NIC. The vNIC will then bypass the software network virtualization and connect directly to the VF for direct device assignment.

The passthrough property cannot be enabled if the vNIC profile is already attached to a vNIC; this procedure creates a new profile to avoid this. If a vNIC profile has passthrough enabled, QoS and port mirroring are disabled for the profile.

For more information on SR-IOV, direct device assignment, and the hardware considerations for implementing these in Red Hat Enterprise Virtualization, see [Hardware Considerations for Implementing SR-IOV](#).

Procedure 5.8. Enabling Passthrough

1. Select a logical network from the **Networks** results list and click the **vNIC Profiles** tab in the details pane to list all vNIC profiles for that logical network.
2. Click **New** to open the **VM Interface Profile** window.
3. Enter the **Name** and **Description** of the profile.
4. Select the **Passthrough** check box. This will disable **QoS** and **Port Mirroring**.
5. If necessary, select a custom property from the custom properties list, which displays **Please select a key...** by default. Use the **+** and **-** buttons to add or remove custom properties.
6. Click **OK** to save the profile and close the window.

The vNIC profile is now passthrough-capable. To use this profile to directly attach a virtual machine to a NIC or PCI VF, attach the logical network to the NIC and create a new vNIC on the desired virtual machine that uses the passthrough vNIC profile. For more information on these procedures respectively, see [Section 5.5.2, “Editing Host Network Interfaces and Assigning Logical Networks to Hosts”](#), and [Adding a New Network Interface](#) in the *Virtual Machine Management Guide*.

5.2.5. Removing a vNIC Profile

Remove a vNIC profile to delete it from your virtualized environment.

Procedure 5.9. Removing a vNIC Profile

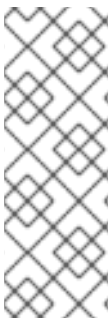
1. Click the **Networks** resource tab, and select a logical network in the results list.
2. Select the **Profiles** tab in the details pane to display available vNIC profiles. If you selected the logical network in tree mode, you can select the **vNIC Profiles** tab in the results list.
3. Select one or more profiles and click **Remove** to open the **Remove VM Interface Profile(s)** window.
4. Click **OK** to remove the profile and close the window.

5.2.6. Assigning Security Groups to vNIC Profiles

**NOTE**

This feature is only available for users who are integrating with OpenStack Neutron. Security groups cannot be created with Red Hat Enterprise Virtualization Manager. You must create security groups within OpenStack. For more information, see the *Red Hat Enterprise Linux OpenStack Platform Administration Guide*, available at https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux_OpenStack_Platform/.

You can assign security groups to the vNIC profile of networks that have been imported from an OpenStack Networking instance and that use the Open vSwitch plug-in. A security group is a collection of strictly enforced rules that allow you to filter inbound and outbound traffic over a network interface. The following procedure outlines how to attach a security group to a vNIC profile.

**NOTE**

A security group is identified using the ID of that security group as registered in the OpenStack Networking instance. You can find the IDs of security groups for a given tenant by running the following command on the system on which OpenStack Networking is installed:

```
# neutron security-group-list
```

Procedure 5.10. Assigning Security Groups to vNIC Profiles

1. Click the **Networks** tab and select a logical network from the results list.
2. Click the **vNIC Profiles** tab in the details pane.
3. Click **New**, or select an existing vNIC profile and click **Edit**, to open the **VM Interface Profile** window.
4. From the custom properties drop-down list, select **SecurityGroups**. Leaving the custom property drop-down blank applies the default security settings, which permit all outbound traffic and intercommunication but deny all inbound traffic from outside of the default security group. Note that removing the **SecurityGroups** property later will not affect the applied security group.
5. In the text field, enter the ID of the security group to attach to the vNIC profile.
6. Click **OK**.

You have attached a security group to the vNIC profile. All traffic through the logical network to which that profile is attached will be filtered in accordance with the rules defined for that security group.

5.2.7. User Permissions for vNIC Profiles

Configure user permissions to assign users to certain vNIC profiles. Assign the **VnicProfileUser** role to a user to enable them to use the profile. Restrict users from certain profiles by removing their permission for that profile.

Procedure 5.11. User Permissions for vNIC Profiles

1. Click the **Networks** tab and select a logical network from the results list.
2. Select the **vNIC Profiles** resource tab to display the vNIC profiles.
3. Select the **Permissions** tab in the details pane to show the current user permissions for the profile.
4. Use the **Add** button to open the **Add Permission to User** window, and the **Remove** button to open the **Remove Permission** window, to affect user permissions for the vNIC profile.

You have configured user permissions for a vNIC profile.

5.2.8. Configuring vNIC Profiles for UCS Integration

Cisco's Unified Computing System (UCS) is used to manage datacenter aspects such as computing, networking and storage resources.

The **vds-m-hook-vmfex-dev** hook allows virtual machines to connect to Cisco's UCS-defined port profiles by configuring the vNIC profile. The UCS-defined port profiles contain the properties and settings used to configure virtual interfaces in UCS. The **vds-m-hook-vmfex-dev** hook is installed by default with VDSM. See [Appendix A, VDSM and Hooks](#) for more information.

When a virtual machine that uses the vNIC profile is created, it will use the Cisco vNIC.

The procedure to configure the vNIC profile for UCS integration involves first configuring a custom device property. When configuring the custom device property, any existing value it contained is overwritten. When combining new and existing custom properties, include all of the custom properties in the command used to set the key's value. Multiple custom properties are separated by a semi-colon.



NOTE

A UCS port profile must be configured in Cisco UCS before configuring the vNIC profile.

Procedure 5.12. Configuring the Custom Device Property

1. On the Red Hat Enterprise Virtualization Manager, configure the **vmfex** custom property and set the cluster compatibility level using **--cver**.

```
# engine-config -s CustomDeviceProperties='{type=interface;prop=
{vmfex=^[a-zA-Z0-9_.-]{2,32}$}' --cver=3.6
```

2. Verify that the **vmfex** custom device property was added.

```
# engine-config -g CustomDeviceProperties
```

3. Restart the engine.

```
# service ovirt-engine restart
```

The vNIC profile to configure can belong to a new or existing logical network. See [Section 5.1.2, “Creating a New Logical Network in a Data Center or Cluster”](#) for instructions to configure a new logical network.

Procedure 5.13. Configuring a vNIC Profile for UCS Integration

1. Click the **Networks** resource tab, and select a logical network in the results list.
2. Select the **vNIC Profiles** tab in the details pane. If you selected the logical network in tree mode, you can select the **vNIC Profiles** tab in the results list.
3. Click **New** or **Edit** to open the **VM Interface Profile** window.
4. Enter the **Name** and **Description** of the profile.
5. Select the **vmfex** custom property from the custom properties list and enter the UCS port profile name.
6. Click **OK**.

5.3. EXTERNAL PROVIDER NETWORKS

5.3.1. Importing Networks From External Providers

If an external provider offering networking services has been registered in the Manager, the networks provided by that provider can be imported into the Manager and used by virtual machines.

Procedure 5.14. Importing a Network From an External Provider

1. Click the **Networks** tab.
2. Click the **Import** button to open the **Import Networks** window.

Import Networks

Network Provider: Neutron NP

Provider Networks

<input type="checkbox"/> Name	Provider Network ID
<input type="checkbox"/> network_002	645661fb-c4c2-4925-a401-fe44c828dbbe
<input type="checkbox"/> network_003	534c43bb-e901-4f02-8bbc-2174f0c91723
<input type="checkbox"/> network_004	e7b743f7-ab7a-45ac-bf74-ddb6fa65e192

↓ ↑

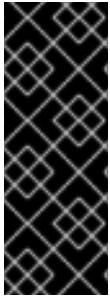
Networks to Import

<input type="checkbox"/> Name	Provider Network ID	Data Center	<input checked="" type="checkbox"/> Allow All
<input type="checkbox"/> network_001	3a10f9c5-7485-4718-862e-135cfe6545e8	34_DC	<input checked="" type="checkbox"/>

Figure 5.3. The Import Networks Window

- From the **Network Provider** drop-down list, select an external provider. The networks offered by that provider are automatically discovered and listed in the **Provider Networks** list.
- Using the check boxes, select the networks to import in the **Provider Networks** list and click the down arrow to move those networks into the **Networks to Import** list.
- It is possible to customize the name of the network that you are importing. To customize the name, click on the network's name in the **Name** column, and change the text.
- From the **Data Center** drop-down list, select the data center into which the networks will be imported.
- Optionally, clear the **Allow All** check box for a network in the **Networks to Import** list to prevent that network from being available to all users.
- Click the **Import** button.

The selected networks are imported into the target data center and can now be used in the Manager.



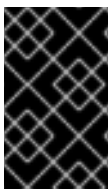
IMPORTANT

External provider discovery and importing are Technology Preview features. Technology Preview features are not fully supported under Red Hat Subscription Service Level Agreements (SLAs), may not be functionally complete, and are not intended for production use. However, these features provide early access to upcoming product innovations, enabling customers to test functionality and provide feedback during the development process.

5.3.2. Limitations to Using External Provider Networks

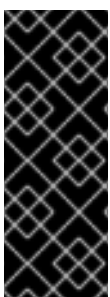
The following limitations apply to using logical networks imported from an external provider in a Red Hat Enterprise Virtualization environment.

- Logical networks offered by external providers must be used as virtual machine networks, and cannot be used as display networks.
- The same logical network can be imported more than once, but only to different data centers.
- You cannot edit logical networks offered by external providers in the Manager. To edit the details of a logical network offered by an external provider, you must edit the logical network directly from the OpenStack Networking instance that provides that logical network.
- Port mirroring is not available for virtual network interface cards connected to logical networks offered by external providers.
- If a virtual machine uses a logical network offered by an external provider, that provider cannot be deleted from the Manager while the logical network is still in use by the virtual machine.
- Networks offered by external providers are non-required. As such, scheduling for clusters in which such logical networks have been imported will not take those logical networks into account during host selection. Moreover, it is the responsibility of the user to ensure the availability of the logical network on hosts in clusters in which such logical networks have been imported.



IMPORTANT

Logical networks imported from external providers are only compatible with Red Hat Enterprise Linux hosts and cannot be assigned to virtual machines running on Red Hat Enterprise Virtualization Hypervisor hosts.



IMPORTANT

External provider discovery and importing are Technology Preview features. Technology Preview features are not fully supported under Red Hat Subscription Service Level Agreements (SLAs), may not be functionally complete, and are not intended for production use. However, these features provide early access to upcoming product innovations, enabling customers to test functionality and provide feedback during the development process.

5.3.3. Configuring Subnets on External Provider Logical Networks

5.3.3.1. Configuring Subnets on External Provider Logical Networks

A logical network provided by an external provider can only assign IP addresses to virtual machines if one or more subnets have been defined on that logical network. If no subnets are defined, virtual machines will not be assigned IP addresses. If there is one subnet, virtual machines will be assigned an IP address from that subnet, and if there are multiple subnets, virtual machines will be assigned an IP address from any of the available subnets. The DHCP service provided by the Neutron instance on which the logical network is hosted is responsible for assigning these IP addresses.

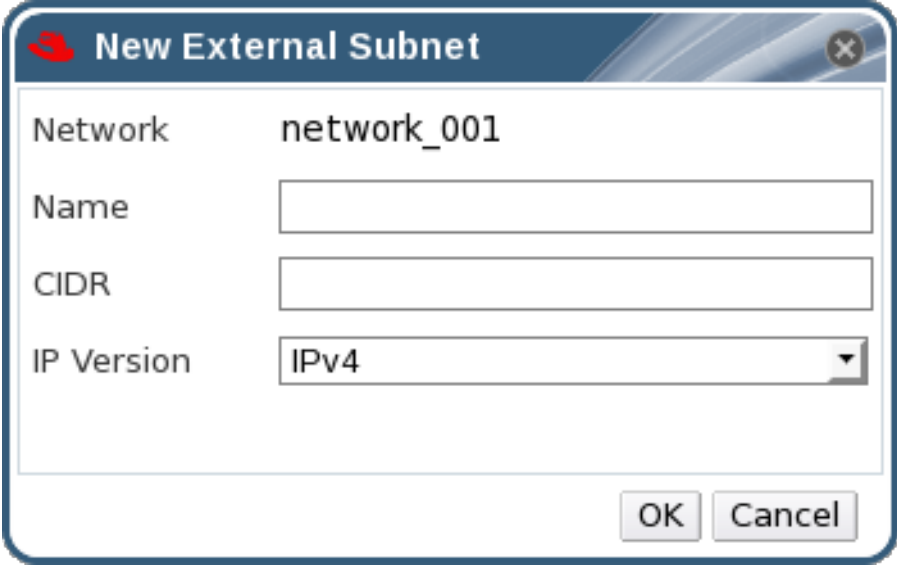
While the Red Hat Enterprise Virtualization Manager automatically discovers predefined subnets on imported logical networks, you can also add or remove subnets to or from logical networks from within the Manager.

5.3.3.2. Adding Subnets to External Provider Logical Networks

Create a subnet on a logical network provided by an external provider.

Procedure 5.15. Adding Subnets to External Provider Logical Networks

1. Click the **Networks** tab.
2. Click the logical network provided by an external provider to which the subnet will be added.
3. Click the **Subnets** tab in the details pane.
4. Click the **New** button to open the **New External Subnet** window.



Network	network_001
Name	<input type="text"/>
CIDR	<input type="text"/>
IP Version	IPv4

OK Cancel

Figure 5.4. The New External Subnet Window

5. Enter a **Name** and **CIDR** for the new subnet.
6. From the **IP Version** drop-down menu, select either **IPv4** or **IPv6**.
7. Click **OK**.

5.3.3.3. Removing Subnets from External Provider Logical Networks

Remove a subnet from a logical network provided by an external provider.

Procedure 5.16. Removing Subnets from External Provider Logical Networks

1. Click the **Networks** tab.
2. Click the logical network provided by an external provider from which the subnet will be removed.
3. Click the **Subnets** tab in the details pane.
4. Click the subnet to remove.
5. Click the **Remove** button and click **OK** when prompted.

5.4. LOGICAL NETWORKS AND PERMISSIONS

5.4.1. Managing System Permissions for a Network

As the **SuperUser**, the system administrator manages all aspects of the Administration Portal. More specific administrative roles can be assigned to other users. These restricted administrator roles are useful for granting a user administrative privileges that limit them to a specific resource. For example, a **DataCenterAdmin** role has administrator privileges only for the assigned data center with the exception of the storage for that data center, and a **ClusterAdmin** has administrator privileges only for the assigned cluster.

A network administrator is a system administration role that can be applied for a specific network, or for all networks on a data center, cluster, host, virtual machine, or template. A network user can perform limited administration roles, such as viewing and attaching networks on a specific virtual machine or template. You can use the **Configure** button in the header bar to assign a network administrator for all networks in the environment.

The network administrator role permits the following actions:

- Create, edit and remove networks.
- Edit the configuration of the network, including configuring port mirroring.
- Attach and detach networks from resources including clusters and virtual machines.

The user who creates a network is automatically assigned **NetworkAdmin** permissions on the created network. You can also change the administrator of a network by removing the existing administrator and adding the new administrator.

5.4.2. Network Administrator and User Roles Explained

Network Permission Roles

The table below describes the administrator and user roles and privileges applicable to network administration.

Table 5.6. Red Hat Enterprise Virtualization Network Administrator and User Roles

Role	Privileges	Notes
NetworkAdmin	Network Administrator for data center, cluster, host, virtual machine, or template. The user who creates a network is automatically assigned NetworkAdmin permissions on the created network.	Can configure and manage the network of a particular data center, cluster, host, virtual machine, or template. A network administrator of a data center or cluster inherits network permissions for virtual pools within the cluster. To configure port mirroring on a virtual machine network, apply the NetworkAdmin role on the network and the UserVmManager role on the virtual machine.
VnicProfileUser	Logical network and network interface user for virtual machine and template.	Can attach or detach network interfaces from specific logical networks.

5.4.3. Assigning an Administrator or User Role to a Resource

Assign administrator or user roles to resources to allow users to access or manage that resource.

Procedure 5.17. Assigning a Role to a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Click **Add**.
4. Enter the name or user name of an existing user into the **Search** text box and click **Go**. Select a user from the resulting list of possible matches.
5. Select a role from the **Role to Assign:** drop-down list.
6. Click **OK**.

You have assigned a role to a user; the user now has the inherited permissions of that role enabled for that resource.

5.4.4. Removing an Administrator or User Role from a Resource

Remove an administrator or user role from a resource; the user loses the inherited permissions associated with the role for that resource.

Procedure 5.18. Removing a Role from a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Select the user to remove from the resource.
4. Click **Remove**. The **Remove Permission** window opens to confirm permissions removal.
5. Click **OK**.

You have removed the user's role, and the associated permissions, from the resource.

5.5. HOSTS AND NETWORKING

5.5.1. Refreshing Host Capabilities

When a network interface card is added to a host, the capabilities of the host must be refreshed to display that network interface card in the Manager.

Procedure 5.19. To Refresh Host Capabilities

1. Use the resource tabs, tree mode, or the search function to find and select a host in the results list.
2. Click the **Refresh Capabilities** button.

The list of network interface cards in the **Network Interfaces** tab of the details pane for the selected host is updated. Any new network interface cards can now be used in the Manager.

5.5.2. Editing Host Network Interfaces and Assigning Logical Networks to Hosts

You can change the settings of physical host network interfaces, move the management network from one physical host network interface to another, and assign logical networks to physical host network interfaces. Bridge and ethtool custom properties are also supported.



IMPORTANT

You cannot assign logical networks offered by external providers to physical host network interfaces; such networks are dynamically assigned to hosts as they are required by virtual machines.

Procedure 5.20. Editing Host Network Interfaces and Assigning Logical Networks to Hosts

1. Click the **Hosts** resource tab, and select the desired host.
2. Click the **Network Interfaces** tab in the details pane.

3. Click the **Setup Host Networks** button to open the **Setup Host Networks** window.
4. Attach a logical network to a physical host network interface by selecting and dragging the logical network into the **Assigned Logical Networks** area next to the physical host network interface.

Alternatively, right-click the logical network and select a network interface from the drop-down menu.

5. Configure the logical network:
 - a. Hover your cursor over an assigned logical network and click the pencil icon to open the **Edit Management Network** window.
 - b. Select a **Boot Protocol** from **None**, **DHCP**, or **Static**. If you selected **Static**, enter the **IP**, **Netmask / Routing Prefix**, and the **Gateway**.



NOTE

Each logical network can have a separate gateway defined from the management network gateway. This ensures traffic that arrives on the logical network will be forwarded using the logical network's gateway instead of the default gateway used by the management network.

- c. To override the default host network quality of service, select **Override QoS** and enter the desired values in the following fields:
 - **Weighted Share**: Signifies how much of the logical link's capacity a specific network should be allocated, relative to the other networks attached to the same logical link. The exact share depends on the sum of shares of all networks on that link. By default this is a number in the range 1-100.
 - **Rate Limit [Mbps]**: The maximum bandwidth to be used by a network.
 - **Committed Rate [Mbps]**: The minimum bandwidth required by a network. The Committed Rate requested is not guaranteed and will vary depending on the network infrastructure and the Committed Rate requested by other networks on the same logical link.

For more information on configuring host network quality of service see [Section 2.3, "Host Network Quality of Service"](#)

- d. To configure a network bridge, click the **Custom Properties** drop-down menu and select **bridge_opts**. Enter a valid key and value with the following syntax: `[key]=[value]`. Separate multiple entries with a whitespace character. The following keys are valid, with the values provided as examples. For more information on these parameters, see [Section B.1, "Explanation of bridge_opts Parameters"](#).

```
forward_delay=1500
gc_timer=3765
group_addr=1:80:c2:0:0:0
group_fwd_mask=0x0
hash_elasticity=4
hash_max=512
```

```

hello_time=200
hello_timer=70
max_age=2000
multicast_last_member_count=2
multicast_last_member_interval=100
multicast_membership_interval=26000
multicast_querier=0
multicast_querier_interval=25500
multicast_query_interval=13000
multicast_query_response_interval=1000
multicast_query_use_ifaddr=0
multicast_router=1
multicast_snooping=1
multicast_startup_query_count=2
multicast_startup_query_interval=3125

```

- e. To configure ethtool properties, click the **Custom Properties** drop-down menu and select **ethtool_opts**. Enter a valid key and value with the following syntax: [key]=[value]. Separate multiple entries with a whitespace character. The **ethtool_opts** option is not available by default, and you need to add it using the engine configuration tool. See [Section B.2, “How to Set Up Red Hat Enterprise Virtualization Manager to Use Ethtool”](#) for more information. See [Red Hat Enterprise Linux 6 Deployment Guide](#) or the manual page for more information on ethtool properties.
- f. To configure Fibre Channel over Ethernet (FCoE), click the **Custom Properties** drop-down menu and select **fcoe**. Enter a valid key and value with the following syntax: [key]=[value]. At least **enable=yes** is required. You can also add **dcb=[yes|no]** and **auto_vlan=[yes|no]**. Separate multiple entries with a whitespace character. The **fcoe** option is not available by default; you need to add it using the engine configuration tool. See [Section B.3, “How to Set Up Red Hat Enterprise Virtualization Manager to Use FCoE”](#) for more information.



NOTE

A separate, dedicated logical network is recommended for use with FCoE.

- g. If your logical network definition is not synchronized with the network configuration on the host, select the **Sync network** check box. A logical network cannot be edited or moved to another interface until it is synchronized.



NOTE

Networks are not considered synchronized if they have one of the following conditions:

- The **VM Network** is different from the physical host network.
- The VLAN identifier is different from the physical host network.
- A **Custom MTU** is set on the logical network, and is different from the physical host network.

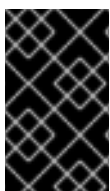
6. Select the **Verify connectivity between Host and Engine** check box to check network connectivity; this action will only work if the host is in maintenance mode.
7. Select the **Save network configuration** check box to make the changes persistent when the environment is rebooted.
8. Click **OK**.

**NOTE**

If not all network interface cards for the host are displayed, click the **Refresh Capabilities** button to update the list of network interface cards available for that host.

5.5.3. Adding Multiple VLANs to a Single Network Interface Using Logical Networks

Multiple VLANs can be added to a single network interface to separate traffic on the one host.

**IMPORTANT**

You must have created more than one logical network, all with the **Enable VLAN tagging** check box selected in the **New Logical Network** or **Edit Logical Network** windows.

Procedure 5.21. Adding Multiple VLANs to a Network Interface using Logical Networks

1. Click the **Hosts** resource tab, and select in the results list a host associated with the cluster to which your VLAN-tagged logical networks are assigned.
2. Click the **Network Interfaces** tab in the details pane to list the physical network interfaces attached to the data center.
3. Click **Setup Host Networks** to open the **Setup Host Networks** window.
4. Drag your VLAN-tagged logical networks into the **Assigned Logical Networks** area next to the physical network interface. The physical network interface can have multiple logical networks assigned due to the VLAN tagging.
5. Edit the logical networks by hovering your cursor over an assigned logical network and clicking the pencil icon to open the **Edit Network** window.

If your logical network definition is not synchronized with the network configuration on the host, select the **Sync network** check box.

Select a **Boot Protocol** from:

- **None**,
- **DHCP**, or
- **Static**,

Provide the **IP** and **Subnet Mask**.

Click **OK**.

6. Select the **Verify connectivity between Host and Engine** check box to run a network check; this will only work if the host is in maintenance mode.
7. Select the **Save network configuration** check box
8. Click **OK**.

Add the logical network to each host in the cluster by editing a NIC on each host in the cluster. After this is done, the network will become operational

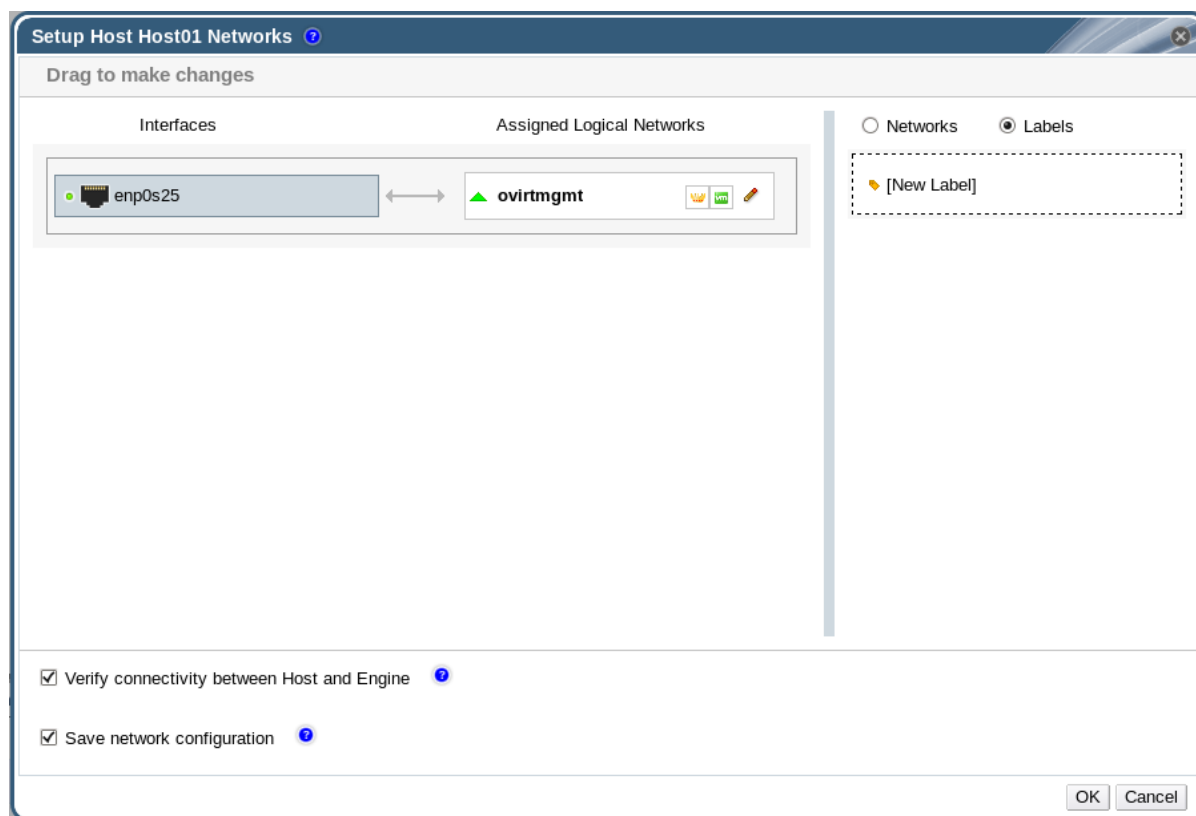
You have added multiple VLAN-tagged logical networks to a single interface. This process can be repeated multiple times, selecting and editing the same network interface each time on each host to add logical networks with different VLAN tags to a single network interface.

5.5.4. Adding Network Labels to Host Network Interfaces

Using network labels allows you to greatly simplify the administrative workload associated with assigning logical networks to host network interfaces.

Procedure 5.22. Adding Network Labels to Host Network Interfaces

1. Click the **Hosts** resource tab, and select in the results list a host associated with the cluster to which your VLAN-tagged logical networks are assigned.
2. Click the **Network Interfaces** tab in the details pane to list the physical network interfaces attached to the data center.
3. Click **Setup Host Networks** to open the **Setup Host Networks** window.
4. Click **Labels**, and right-click **[New Label]**. Select a physical network interface to label.



5. Enter a name for the network label in the **Label** text field.
6. Click **OK**.

You have added a network label to a host network interface. Any newly created logical networks with the same label will be automatically assigned to all host network interfaces with that label. Also, removing a label from a logical network will automatically remove that logical network from all host network interfaces with that label.

5.5.5. Bonds

5.5.5.1. Bonding Logic in Red Hat Enterprise Virtualization

The Red Hat Enterprise Virtualization Manager Administration Portal allows you to create bond devices using a graphical interface. There are several distinct bond creation scenarios, each with its own logic.

Two factors that affect bonding logic are:

- Are either of the devices already carrying logical networks?
- Are the devices carrying compatible logical networks?

Table 5.7. Bonding Scenarios and Their Results

Bonding Scenario	Result
------------------	--------

Bonding Scenario	Result
NIC + NIC	<p>The Create New Bond window is displayed, and you can configure a new bond device.</p> <p>If the network interfaces carry incompatible logical networks, the bonding operation fails until you detach incompatible logical networks from the devices forming your new bond.</p>
NIC + Bond	<p>The NIC is added to the bond device. Logical networks carried by the NIC and the bond are all added to the resultant bond device if they are compatible.</p> <p>If the bond devices carry incompatible logical networks, the bonding operation fails until you detach incompatible logical networks from the devices forming your new bond.</p>
Bond + Bond	<p>If the bond devices are not attached to logical networks, or are attached to compatible logical networks, a new bond device is created. It contains all of the network interfaces, and carries all logical networks, of the component bond devices. The Create New Bond window is displayed, allowing you to configure your new bond.</p> <p>If the bond devices carry incompatible logical networks, the bonding operation fails until you detach incompatible logical networks from the devices forming your new bond.</p>

5.5.5.2. Bonds

A *bond* is an aggregation of multiple network interface cards into a single software-defined device. Because bonded network interfaces combine the transmission capability of the network interface cards included in the bond to act as a single network interface, they can provide greater transmission speed than that of a single network interface card. Also, because all network interface cards in the bond must fail for the bond itself to fail, bonding provides increased fault tolerance. However, one limitation is that the network interface cards that form a bonded network interface must be of the same make and model to ensure that all network interface cards in the bond support the same options and modes.

The packet dispersal algorithm for a bond is determined by the bonding mode used.



IMPORTANT

Modes 1, 2, 3 and 4 support both virtual machine (bridged) and non-virtual machine (bridgeless) network types. Modes 0, 5 and 6 support non-virtual machine (bridgeless) networks only.

Bonding Modes

Red Hat Enterprise Virtualization uses Mode 4 by default, but supports the following common bonding modes:

Mode 0 (round-robin policy)

Transmits packets through network interface cards in sequential order. Packets are transmitted in a loop that begins with the first available network interface card in the bond and end with the last available network interface card in the bond. All subsequent loops then start with the first available network interface card. Mode 0 offers fault tolerance and balances the load across all network interface cards in the bond. However, Mode 0 cannot be used in conjunction with bridges, and is therefore not compatible with virtual machine logical networks.

Mode 1 (active-backup policy)

Sets all network interface cards to a backup state while one network interface card remains active. In the event of failure in the active network interface card, one of the backup network interface cards replaces that network interface card as the only active network interface card in the bond. The MAC address of the bond in Mode 1 is visible on only one port to prevent any confusion that might otherwise be caused if the MAC address of the bond changed to reflect that of the active network interface card. Mode 1 provides fault tolerance and is supported in Red Hat Enterprise Virtualization.

Mode 2 (XOR policy)

Selects the network interface card through which to transmit packets based on the result of an XOR operation on the source and destination MAC addresses modulo network interface card slave count. This calculation ensures that the same network interface card is selected for each destination MAC address used. Mode 2 provides fault tolerance and load balancing and is supported in Red Hat Enterprise Virtualization.

Mode 3 (broadcast policy)

Transmits all packets to all network interface cards. Mode 3 provides fault tolerance and is supported in Red Hat Enterprise Virtualization.

Mode 4 (IEEE 802.3ad policy)

Creates aggregation groups in which the interfaces share the same speed and duplex settings. Mode 4 uses all network interface cards in the active aggregation group in accordance with the IEEE 802.3ad specification and is supported in Red Hat Enterprise Virtualization.

Mode 5 (adaptive transmit load balancing policy)

Ensures the distribution of outgoing traffic accounts for the load on each network interface card in the bond and that the current network interface card receives all incoming traffic. If the network interface card assigned to receive traffic fails, another network interface card is assigned to the role of receiving incoming traffic. Mode 5 cannot be used in conjunction with bridges, therefore it is not compatible with virtual machine logical networks.

Mode 6 (adaptive load balancing policy)

Combines Mode 5 (adaptive transmit load balancing policy) with receive load balancing for IPv4 traffic without any special switch requirements. ARP negotiation is used for balancing the receive load. Mode 6 cannot be used in conjunction with bridges, therefore it is not compatible with virtual machine logical networks.

5.5.5.3. Creating a Bond Device Using the Administration Portal

You can bond compatible network devices together. This type of configuration can increase available bandwidth and reliability. You can bond multiple network interfaces, pre-existing bond devices, and combinations of the two. A bond can also carry both VLAN tagged and non-VLAN traffic.

Procedure 5.23. Creating a Bond Device using the Administration Portal

1. Click the **Hosts** resource tab, and select the host in the results list.
2. Click the **Network Interfaces** tab in the details pane to list the physical network interfaces attached to the host.
3. Click **Setup Host Networks** to open the **Setup Host Networks** window.
4. Select and drag one of the devices over the top of another device and drop it to open the **Create New Bond** window. Alternatively, right-click the device and select another device from the drop-down menu.

If the devices are incompatible, the bond operation fails and suggests how to correct the compatibility issue.

5. Select the **Bond Name** and **Bonding Mode** from the drop-down menus.

Bonding modes 1, 2, 4, and 5 can be selected. Any other mode can be configured using the **Custom** option.

6. Click **OK** to create the bond and close the **Create New Bond** window.
7. Assign a logical network to the newly created bond device.
8. Optionally choose to **Verify connectivity between Host and Engine** and **Save network configuration**.
9. Click **OK** accept the changes and close the **Setup Host Networks** window.

Your network devices are linked into a bond device and can be edited as a single interface. The bond device is listed in the **Network Interfaces** tab of the details pane for the selected host.

Bonding must be enabled for the ports of the switch used by the host. The process by which bonding is enabled is slightly different for each switch; consult the manual provided by your switch vendor for detailed information on how to enable bonding.

5.5.5.4. Example Uses of Custom Bonding Options with Host Interfaces

You can create customized bond devices by selecting **Custom** from the **Bonding Mode** of the **Create New Bond** window. The following examples should be adapted for your needs. For a comprehensive list of bonding options and their descriptions, see the [Linux Ethernet Bonding Driver HOWTO](#) on Kernel.org.

Example 5.1. xmit_hash_policy

This option defines the transmit load balancing policy for bonding modes 2 and 4. For example, if the majority of your traffic is between many different IP addresses, you may want to set a policy to balance by IP address. You can set this load-balancing policy by selecting a **Custom** bonding mode, and entering the following into the text field:

—

```
mode=4 xmit_hash_policy=layer2+3
```

Example 5.2. ARP Monitoring

ARP monitor is useful for systems which can't or don't report link-state properly via ethtool. Set an **arp_interval** on the bond device of the host by selecting a **Custom** bonding mode, and entering the following into the text field:

```
mode=1 arp_interval=1 arp_ip_target=192.168.0.2
```

Example 5.3. Primary

You may want to designate a NIC with higher throughput as the primary interface in a bond device. Designate which NIC is primary by selecting a **Custom** bonding mode, and entering the following into the text field:

```
mode=1 primary=eth0
```

5.5.6. Changing the FQDN of a Host

Use the following procedure to change the fully qualified domain name of hypervisor hosts.

Procedure 5.24. Updating the FQDN of a Hypervisor Host

1. Place the hypervisor into maintenance mode so the virtual machines are live migrated to another hypervisor. See [Section 6.5.7, “Moving a Host to Maintenance Mode”](#) for more information. Alternatively, manually shut down or migrate all the virtual machines to another hypervisor. See [Manually Migrating Virtual Machines](#) in the *Virtual Machine Management Guide* for more information.
2. Click **Remove**, and click **OK** to remove the host from the Administration Portal.
3.
 - For RHEL-based hosts:

- For Red Hat Enterprise Linux 6:

Edit the `/etc/sysconfig/network` file, update the host name, and save.

```
# vi /etc/sysconfig/network
HOSTNAME=NEW_FQDN
```

- For Red Hat Enterprise Linux 7:

Use the **hostnamectl** tool to update the host name. For more options, see [Configure Host Names](#) in the *Red Hat Enterprise Linux 7 Networking Guide*

```
# hostnamectl set-hostname NEW_FQDN
```

- For Red Hat Enterprise Virtualization Hypervisors (RHEV-H):

In the text user interface, select the **Network** screen, press the right arrow key and enter a new host name in the **Hostname** field. Select **<Save>** and press **Enter**.

4. Reboot the host.
5. Re-register the host with the Manager. See [Manually Adding a Hypervisor from the Administration Portal](#) in the *Installation Guide* for more information.

5.5.7. Changing the IP Address of a Red Hat Enterprise Virtualization Hypervisor (RHEV-H)

Procedure 5.25.

1. Place the Hypervisor into maintenance mode so the virtual machines are live migrated to another hypervisor. See [Section 6.5.7, “Moving a Host to Maintenance Mode”](#) for more information. Alternatively, manually shut down or migrate all the virtual machines to another hypervisor. See [Manually Migrating Virtual Machines](#) in the *Virtual Machine Management Guide* for more information.
2. Click **Remove**, and click **OK** to remove the host from the Administration Portal.
3. Log in to your Hypervisor as the **admin** user.
4. Press **F2**, select **OK**, and press **Enter** to enter the rescue shell.
5. Modify the IP address by editing the `/etc/sysconfig/network-scripts/ifcfg-ovirtmgmt` file. For example:

```
# vi /etc/sysconfig/network-scripts/ifcfg-ovirtmgmt
...
BOOTPROTO=none
IPADDR=10.x.x.x
PREFIX=24
...
```

6. Restart the network service and verify that the IP address has been updated.

- For Red Hat Enterprise Linux 6:

```
# service network restart
```

```
# ifconfig ovirtmgmt
```

- For Red Hat Enterprise Linux 7:

```
# systemctl restart network.service
```

```
# ip addr show ovirtmgmt
```

7. Type **exit** to exit the rescue shell and return to the text user interface.

8. Re-register the host with the Manager. See [Manually Adding a Hypervisor from the Administration Portal](#) in the *Installation Guide* for more information.

CHAPTER 6. HOSTS

6.1. INTRODUCTION TO RED HAT ENTERPRISE VIRTUALIZATION HOSTS

Red Hat Enterprise Virtualization Hosts, also known as RHEL-based hypervisors, are the physical servers on which virtual machines run. Full virtualization is provided by using a loadable Linux kernel module called Kernel-based Virtual Machine (KVM).

KVM can concurrently host multiple virtual machines running either Windows or Linux operating systems. Virtual machines run as individual Linux processes and threads on the host machine and are managed remotely by the Red Hat Enterprise Virtualization Manager. A Red Hat Enterprise Virtualization environment has one or more hosts attached to it.

Red Hat Enterprise Virtualization supports two methods of installing hosts. You can use the Red Hat Enterprise Virtualization Hypervisor (RHEV-H) installation media, or install hypervisor packages on a standard Red Hat Enterprise Linux installation.

Red Hat Enterprise Virtualization hosts take advantage of **tuned** profiles, which provide virtualization optimizations. For more information on **tuned**, see the *Red Hat Enterprise Linux 6.0 Performance Tuning Guide*.

The Red Hat Enterprise Virtualization Hypervisor has security features enabled. Security Enhanced Linux (SELinux) and the iptables firewall are fully configured and on by default. The status of SELinux on a selected host is reported under **SELinux mode** in the **General** tab of the details pane. The Manager can open required ports on Red Hat Enterprise Linux hosts when it adds them to the environment.

A host is a physical 64-bit server with the Intel VT or AMD-V extensions running Red Hat Enterprise Linux 6.5 or later AMD64/Intel 64 version.

A physical host on the Red Hat Enterprise Virtualization platform:

- Must belong to only one cluster in the system.
- Must have CPUs that support the AMD-V or Intel VT hardware virtualization extensions.
- Must have CPUs that support all functionality exposed by the virtual CPU type selected upon cluster creation.
- Has a minimum of 2 GB RAM.
- Can have an assigned system administrator with system permissions.

Administrators can receive the latest security advisories from the Red Hat Enterprise Virtualization watch list. Subscribe to the Red Hat Enterprise Virtualization watch list to receive new security advisories for Red Hat Enterprise Virtualization products by email. Subscribe by completing this form:

<http://www.redhat.com/mailman/listinfo/rhev-watch-list/>

6.2. RED HAT ENTERPRISE VIRTUALIZATION HYPERVISOR HOSTS

Red Hat Enterprise Virtualization Hypervisor hosts are installed using a special build of Red Hat Enterprise Linux with only the packages required to host virtual machines. They run stateless, not writing any changes to disk unless explicitly required to.

Red Hat Enterprise Virtualization Hypervisor hosts can be added directly to, and configured by, the Red Hat Enterprise Virtualization Manager. Alternatively a host can be configured locally to connect to the Manager; the Manager then is only used to approve the host to be used in the environment.

Unlike Red Hat Enterprise Linux hosts, Red Hat Enterprise Virtualization Hypervisor hosts cannot be added to clusters that have been enabled for Gluster service for use as Red Hat Gluster Storage nodes.



IMPORTANT

The Red Hat Enterprise Virtualization Hypervisor is a closed system. Use a Red Hat Enterprise Linux host if additional rpm packages are required for your environment.



WARNING

Red Hat strongly recommends not creating untrusted users on Red Hat Enterprise Virtualization Hypervisor hosts, as this can lead to exploitation of local security vulnerabilities.

6.3. SATELLITE HOST PROVIDER HOSTS

Hosts provided by a Satellite host provider can also be used as virtualization hosts by the Red Hat Enterprise Virtualization Manager. After a Satellite host provider has been added to the Manager as an external provider, any hosts that it provides can be added to and used in Red Hat Enterprise Virtualization in the same way as Red Hat Enterprise Virtualization Hypervisor hosts and Red Hat Enterprise Linux hosts.

6.4. RED HAT ENTERPRISE LINUX HOSTS

Red Hat Enterprise Virtualization supports hosts running Red Hat Enterprise Linux Server AMD64/Intel 64 version with Intel VT or AMD-V extensions. For the supported Red Hat Enterprise Linux versions, see [Host Compatibility Matrix](#) in the Installation Guide. To use your Red Hat Enterprise Linux machine as a host, you must also attach the **Red Hat Enterprise Linux Server** entitlement and the **Red Hat Enterprise Virtualization** entitlement.

Adding a host can take some time, as the following steps are completed by the platform: virtualization checks, installation of packages, creation of bridge, and a reboot of the host. Use the details pane to monitor the process as the host and management system establish a connection.



IMPORTANT

Third-party watchdogs should not be installed on Red Hat Enterprise Linux hosts, as they can interfere with the watchdog daemon provided by VDSM.

6.5. HOST TASKS

6.5.1. Adding a Satellite Host Provider Host

The process for adding a Satellite host provider host is almost identical to that of adding a Red Hat Enterprise Linux host except for the method by which the host is identified in the Manager. The following procedure outlines how to add a host provided by a Satellite host provider.

Procedure 6.1. Adding a Satellite Host Provider Host

1. Click the **Hosts** resource tab to list the hosts in the results list.
2. Click **New** to open the **New Host** window.
3. Use the drop-down menu to select the **Host Cluster** for the new host.
4. Select the **Foreman/Satellite** check box to display the options for adding a Satellite host provider host and select the provider from which the host is to be added.
5. Select either **Discovered Hosts** or **Provisioned Hosts**.
 - **Discovered Hosts** (default option): Select the host, host group, and compute resources from the drop-down lists.
 - **Provisioned Hosts**: Select a host from the **Providers Hosts** drop-down list.

Any details regarding the host that can be retrieved from the external provider are automatically set, and can be edited as desired.

6. Enter the **Name**, **Address**, and **SSH Port** (Provisioned Hosts only) of the new host.
7. Select an authentication method to use with the host.
 - Enter the root user's password to use password authentication.
 - Copy the key displayed in the **SSH PublicKey** field to **/root/.ssh/authorized_hosts** on the host to use public key authentication (Provisioned Hosts only).
8. You have now completed the mandatory steps to add a Red Hat Enterprise Linux host. Click the **Advanced Parameters** drop-down button to show the advanced host settings.
 - a. Optionally disable automatic firewall configuration.
 - b. Optionally add a host SSH fingerprint to increase security. You can add it manually, or fetch it automatically.

9. You can configure the **Power Management**, **SPM**, **Console**, and **Network Provider** using the applicable tabs now; however, as these are not fundamental to adding a Red Hat Enterprise Linux host, they are not covered in this procedure.
10. Click **OK** to add the host and close the window.

The new host displays in the list of hosts with a status of **Installing**, and you can view the progress of the installation in the details pane. After installation is complete, the status will update to **Reboot**. The host must be activated for the status to change to **Up**.

6.5.2. Configuring Satellite Errata Management for a Host

Red Hat Enterprise Virtualization can be configured to view errata from Red Hat Satellite. This enables the host administrator to receive updates about available errata, and their importance, in the same dashboard used to manage host configuration. For more information about Red Hat Satellite see the [Red Hat Satellite User Guide](#)

Red Hat Enterprise Virtualization 3.6 and onwards supports errata management with Red Hat Satellite 6.1.



IMPORTANT

Hosts are identified in the Satellite server by their FQDN. Hosts added using an IP address will not be able to report errata. This ensures that an external content host ID does not need to be maintained in Red Hat Enterprise Virtualization.

The Satellite account used to manage the host must have Administrator permissions and a default organization set.

Procedure 6.2. Configuring Satellite Errata Management for a Host

1. Add the Satellite server as an external provider. See [Section 11.2.2, “Adding a Red Hat Satellite Instance for Host Provisioning”](#) for more information.
2. Associate the required host with the Satellite server.



NOTE

The host must be registered to the Satellite server and have the katello-agent package installed.

For more information on how to configure a host registration see [Configuring a Host for Registration](#) in the *Red Hat Satellite User Guide* and for more information on how to register a host and install the katello-agent package see [Registration](#) in the *Red Hat Satellite User Guide*

- a. In the **Hosts** tab, select the host in the results list.
- b. Click **Edit** to open the **Edit Host** window.
- c. Check the **Use Foreman/Satellite** checkbox.
- d. Select the required Satellite server from the drop-down list.

e. Click **OK**.

The host is now configured to show the available errata, and their importance, in the same dashboard used to manage host configuration.

6.5.3. Explanation of Settings and Controls in the New Host and Edit Host Windows

6.5.3.1. Host General Settings Explained

These settings apply when editing the details of a host or adding new Red Hat Enterprise Linux hosts and Satellite host provider hosts.

The **General** settings table contains the information required on the **General** tab of the **New Host** or **Edit Host** window.

Table 6.1. General settings

Field Name	Description
Data Center	The data center to which the host belongs. Red Hat Enterprise Virtualization Hypervisor hosts cannot be added to Gluster-enabled clusters.
Host Cluster	The cluster to which the host belongs.

Field Name	Description
Use Foreman/Satellite	<p>Select or clear this check box to view or hide options for adding hosts provided by Satellite host providers. The following options are also available:</p> <p>Discovered Hosts</p> <ul style="list-style-type: none"> • Discovered Hosts - A drop-down list that is populated with the name of Satellite hosts discovered by the engine. • Host Groups - A drop-down list of host groups available. • Compute Resources - A drop-down list of hypervisors to provide compute resources. <p>Provisioned Hosts</p> <ul style="list-style-type: none"> • Providers Hosts - A drop-down list that is populated with the name of hosts provided by the selected external provider. The entries in this list are filtered in accordance with any search queries that have been input in the Provider search filter. • Provider search filter - A text field that allows you to search for hosts provided by the selected external provider. This option is provider-specific; see provider documentation for details on forming search queries for specific providers. Leave this field blank to view all available hosts.
Name	The name of the cluster. This text field has a 40-character limit and must be a unique name with any combination of uppercase and lowercase letters, numbers, hyphens, and underscores.
Comment	A field for adding plain text, human-readable comments regarding the host.
Address	The IP address, or resolvable hostname of the host.
Password	The password of the host's root user. This can only be given when you add the host; it cannot be edited afterwards.

Field Name	Description
SSH PublicKey	Copy the contents in the text box to the /root/.known_hosts file on the host to use the Manager's ssh key instead of using a password to authenticate with the host.
Automatically configure host firewall	When adding a new host, the Manager can open the required ports on the host's firewall. This is enabled by default. This is an Advanced Parameter .
Use JSON protocol	This is enabled by default. This is an Advanced Parameter .
SSH Fingerprint	You can fetch the host's SSH fingerprint, and compare it with the fingerprint you expect the host to return, ensuring that they match. This is an Advanced Parameter .

6.5.3.2. Host Power Management Settings Explained

The **Power Management** settings table contains the information required on the **Power Management** tab of the **New Host** or **Edit Host** windows.

Table 6.2. Power Management Settings

Field Name	Description
Enable Power Management	Enables power management on the host. Select this check box to enable the rest of the fields in the Power Management tab.
Kdump integration	Prevents the host from fencing while performing a kernel crash dump, so that the crash dump is not interrupted. From Red Hat Enterprise Linux 6.6 and 7.1 onwards, Kdump is available by default. If kdump is available on the host, but its configuration is not valid (the kdump service cannot be started), enabling Kdump integration will cause the host (re)installation to fail. If this is the case, see Section 6.6.4, “fence_kdump Advanced Configuration” .
Disable policy control of power management	Power management is controlled by the Scheduling Policy of the host's cluster . If power management is enabled and the defined low utilization value is reached, the Manager will power down the host machine, and restart it again when load balancing requires or there are not enough free hosts in the cluster. Select this check box to disable policy control.

Field Name	Description
Agents by Sequential Order	<p>Lists the host's fence agents. Fence agents can be sequential, concurrent, or a mix of both.</p> <ul style="list-style-type: none"> • If fence agents are used sequentially, the primary agent is used first to stop or start a host, and if it fails, the secondary agent is used. • If fence agents are used concurrently, both fence agents have to respond to the Stop command for the host to be stopped; if one agent responds to the Start command, the host will go up. <p>Fence agents are sequential by default. Use the up and down buttons to change the sequence in which the fence agents are used.</p> <p>To make two fence agents concurrent, select one fence agent from the Concurrent with drop-down list next to the other fence agent. Additional fence agents can be added to the group of concurrent fence agents by selecting the group from the Concurrent with drop-down list next to the additional fence agent.</p>
Add Fence Agent	<p>Click the plus (+) button to add a new fence agent. The Edit fence agent window opens. See the table below for more information on the fields in this window.</p>
Power Management Proxy Preference	<p>By default, specifies that the Manager will search for a fencing proxy within the same cluster as the host, and if no fencing proxy is found, the Manager will search in the same dc (data center). Use the up and down buttons to change the sequence in which these resources are used. This field is available under Advanced Parameters.</p>

The following table contains the information required in the **Edit fence agent** window.

Table 6.3. Edit fence agent Settings

Field Name	Description
Address	The address to access your host's power management device. Either a resolvable hostname or an IP address.
User Name	User account with which to access the power management device. You can set up a user on the device, or use the default user.

Field Name	Description
Password	Password for the user accessing the power management device.
Type	<p>The type of power management device in your host.</p> <p>Choose one of the following:</p> <ul style="list-style-type: none"> • apc - APC MasterSwitch network power switch. Not for use with APC 5.x power switch devices. • apc_snmp - Use with APC 5.x power switch devices. • bladecenter - IBM Bladecenter Remote Supervisor Adapter. • cisco_ucs - Cisco Unified Computing System. • drac5 - Dell Remote Access Controller for Dell computers. • drac7 - Dell Remote Access Controller for Dell computers. • eps - ePowerSwitch 8M+ network power switch. • hpblade - HP BladeSystem. • ilo, ilo2, ilo3, ilo4 - HP Integrated Lights-Out. • ipmilan - Intelligent Platform Management Interface and Sun Integrated Lights Out Management devices. • rsa - IBM Remote Supervisor Adapter. • rsb - Fujitsu-Siemens RSB management interface. • wti - WTI Network Power Switch.
SSH Port	The port number used by the power management device to communicate with the host.
Slot	The number used to identify the blade of the power management device.

Field Name	Description
Service Profile	The service profile name used to identify the blade of the power management device. This field appears instead of Slot when the device type is cisco_ucs .
Options	<p>Power management device specific options. Enter these as 'key=value'. See the documentation of your host's power management device for the options available.</p> <p>For Red Hat Enterprise Linux 7 hosts, if you are using cisco_ucs as the power management device, you also need to append ssl_insecure=1 to the Options field.</p>
Secure	Select this check box to allow the power management device to connect securely to the host. This can be done via ssh, ssl, or other authentication protocols depending on the power management agent.

6.5.3.3. SPM Priority Settings Explained

The **SPM** settings table details the information required on the **SPM** tab of the **New Host** or **Edit Host** window.

Table 6.4. SPM settings

Field Name	Description
SPM Priority	Defines the likelihood that the host will be given the role of Storage Pool Manager (SPM). The options are Low , Normal , and High priority. Low priority means that there is a reduced likelihood of the host being assigned the role of SPM, and High priority means there is an increased likelihood. The default setting is Normal.

6.5.3.4. Host Console Settings Explained

The **Console** settings table details the information required on the **Console** tab of the **New Host** or **Edit Host** window.

Table 6.5. Console settings

Field Name	Description
Override display address	Select this check box to override the display addresses of the host. This feature is useful in a case where the hosts are defined by internal IP and are behind a NAT firewall. When a user connects to a virtual machine from outside of the internal network, instead of returning the private address of the host on which the virtual machine is running, the machine returns a public IP or FQDN (which is resolved in the external network to the public IP).
Display address	The display address specified here will be used for all virtual machines running on this host. The address must be in the format of a fully qualified domain name or IP.

6.5.4. Configuring Host Power Management Settings

Configure your host power management device settings to perform host life-cycle operations (stop, start, restart) from the Administration Portal.

It is necessary to configure host power management in order to utilize host high availability and virtual machine high availability.

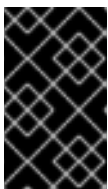


IMPORTANT

Ensure that your host is in **maintenance mode** before configuring power management settings. Otherwise, all running virtual machines on that host will be stopped ungracefully upon restarting the host, which can cause disruptions in production environments. A warning dialog will appear if you have not correctly set your host to **maintenance mode**.

Procedure 6.3. Configuring Power Management Settings

1. In the **Hosts** tab, select the host in the results list.
2. Click **Edit** to open the **Edit Host** window.
3. Click the **Power Management** tab to display the Power Management settings.
4. Select the **Enable Power Management** check box to enable the fields.
5. Select the **Kdump integration** check box to prevent the host from fencing while performing a kernel crash dump.



IMPORTANT

When you enable **Kdump integration** on an existing host, the host must be reinstalled for kdump to be configured. See [Section 6.5.10, “Reinstalling Virtualization Hosts”](#).

6. Optionally, select the **Disable policy control of power management** check box if you do not want your host's power management to be controlled by the **Scheduling Policy** of the host's **cluster**.
7. Click the plus (+) button to add a new power management device. The **Edit fence agent** window opens.
8. Enter the **Address**, **User Name**, and **Password** of the power management device into the appropriate fields.
9. Select the power management device **Type** from the drop-down list.
10. Enter the **SSH Port** number used by the power management device to communicate with the host.
11. Enter the **Slot** number used to identify the blade of the power management device.
12. Enter the **Options** for the power management device. Use a comma-separated list of 'key=value' entries.
13. Select the **Secure** check box to enable the power management device to connect securely to the host.
14. Click **Test** to ensure the settings are correct. *Test Succeeded, Host Status is: on* will display upon successful verification.
15. Click **OK** to close the **Edit fence agent** window.
16. In the **Power Management** tab, optionally expand the **Advanced Parameters** and use the up and down buttons to specify the order in which the Manager will search the host's **cluster** and **dc** (datacenter) for a fencing proxy.
17. Click **OK**.

The **Power Management** drop-down menu is now enabled in the Administration Portal.

6.5.5. Configuring Host Storage Pool Manager Settings

The Storage Pool Manager (SPM) is a management role given to one of the hosts in a data center to maintain access control over the storage domains. The SPM must always be available, and the SPM role will be assigned to another host if the SPM host becomes unavailable. As the SPM role uses some of the host's available resources, it is important to prioritize hosts that can afford the resources.

The Storage Pool Manager (SPM) priority setting of a host alters the likelihood of the host being assigned the SPM role: a host with high SPM priority will be assigned the SPM role before a host with low SPM priority.

Procedure 6.4. Configuring SPM settings

1. Click the **Hosts** resource tab, and select a host from the results list.
2. Click **Edit** to open the **Edit Host** window.
3. Click the **SPM** tab to display the **SPM Priority** settings.
4. Use the radio buttons to select the appropriate SPM priority for the host.

5. Click **OK** to save the settings and close the window.

You have configured the SPM priority of the host.

6.5.6. Editing a Resource

Edit the properties of a resource.

Procedure 6.5. Editing a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click **Edit** to open the **Edit** window.
3. Change the necessary properties and click **OK**.

The new properties are saved to the resource. The **Edit** window will not close if a property field is invalid.

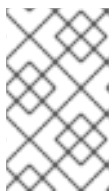
6.5.7. Moving a Host to Maintenance Mode

Many common maintenance tasks, including network configuration and deployment of software updates, require that hosts be placed into maintenance mode. Hosts should be placed into maintenance mode before any event that might cause VDSM to stop working properly, such as a reboot, or issues with networking or storage.

When a host is placed into maintenance mode the Red Hat Enterprise Virtualization Manager attempts to migrate all running virtual machines to alternative hosts. The standard prerequisites for live migration apply, in particular there must be at least one active host in the cluster with capacity to run the migrated virtual machines.

Procedure 6.6. Placing a Host into Maintenance Mode

1. Click the **Hosts** resource tab, and select the desired host.
2. Click **Maintenance** to open the **Maintenance Host(s)** confirmation window.
3. Optionally, enter a **Reason** for moving the host into maintenance mode in the **Maintenance Host(s)** confirmation window. This allows you to provide an explanation for the maintenance, which will appear in the logs and when the host is activated again.



NOTE

The host maintenance **Reason** field will only appear if it has been enabled in the cluster settings. See [Section 4.2.2.1, “General Cluster Settings Explained”](#) for more information.

4. Click **OK** to initiate maintenance mode.

All running virtual machines are migrated to alternative hosts. If the host is the Storage Pool Manager (SPM), the SPM role is migrated to another host. The **Status** field of the host changes to **Preparing for Maintenance**, and finally **Maintenance** when the operation completes successfully. VDSM does not stop while the host is in maintenance mode.

**NOTE**

If migration fails on any virtual machine, click **Activate** on the host to stop the operation placing it into maintenance mode, then click **Cancel Migration** on the virtual machine to stop the migration.

6.5.8. Activating a Host from Maintenance Mode

A host that has been placed into maintenance mode, or recently added to the environment, must be activated before it can be used. Activation may fail if the host is not ready; ensure that all tasks are complete before attempting to activate the host.

Procedure 6.7. Activating a Host from Maintenance Mode

1. Click the **Hosts** resources tab and select the host.
2. Click **Activate**.

The host status changes to **Unassigned**, and finally **Up** when the operation is complete. Virtual machines can now run on the host. Virtual machines that were migrated off the host when it was placed into maintenance mode are not automatically migrated back to the host when it is activated, but can be migrated manually. If the host was the Storage Pool Manager (SPM) before being placed into maintenance mode, the SPM role does not return automatically when the host is activated.

6.5.9. Removing a Host

Remove a host from your virtualized environment.

Procedure 6.8. Removing a host

1. In the Administration Portal, click the **Hosts** resource tab and select the host in the results list.
2. Place the host into maintenance mode.
3. Click **Remove** to open the **Remove Host(s)** confirmation window.
4. Select the **Force Remove** check box if the host is part of a Red Hat Gluster Storage cluster and has volume bricks on it, or if the host is non-responsive.
5. Click **OK**.

Your host has been removed from the environment and is no longer visible in the **Hosts** tab.

6.5.10. Reinstalling Virtualization Hosts

Reinstall Red Hat Enterprise Virtualization Hypervisors and Red Hat Enterprise Linux hosts from the Administration Portal. Use this procedure to reinstall hypervisors from the same version of the hypervisor ISO image from which it is currently installed; the procedure reinstalls VDSM on Red Hat Enterprise Linux Hosts. This includes stopping and restarting the hypervisor. If migration is enabled at cluster level, virtual machines are automatically migrated to another host in the cluster; as a result, it is recommended that host reinstalls are performed at a time when the hypervisor's usage is relatively low.

The cluster to which the hypervisor belongs must have sufficient memory reserve in order for its hosts to perform maintenance. Moving a host with live virtual machines to maintenance in a cluster that lacks sufficient memory causes the virtual machine migration operation to hang and then fail. You can reduce the memory usage of this operation by shutting down some or all virtual machines before moving the host to maintenance.



IMPORTANT

Ensure that the cluster contains more than one host before performing a reinstall. Do not attempt to reinstall all the hosts at the same time, as one host must remain available to perform Storage Pool Manager (SPM) tasks.

Procedure 6.9. Reinstalling Red Hat Enterprise Virtualization Hypervisors and Red Hat Enterprise Linux Hosts

1. Use the **Hosts** resource tab, tree mode, or the search function to find and select the host in the results list.
2. Click **Maintenance**. If migration is enabled at cluster level, any virtual machines running on the host are migrated to other hosts. If the host is the SPM, this function is moved to another host. The status of the host changes as it enters maintenance mode.
3. Click **Reinstall** to open the **Install Host** window.
4. Click **OK** to reinstall the host.

Once successfully reinstalled, the host displays a status of **Up**. Any virtual machines that were migrated off the host, are at this point able to be migrated back to it.



IMPORTANT

After a Red Hat Enterprise Virtualization Hypervisor is successfully registered to the Red Hat Enterprise Virtualization Manager and then reinstalled, it may erroneously appear in the Administration Portal with the status of **Install Failed**. Click **Activate**, and the Hypervisor will change to an **Up** status and be ready for use.

6.5.11. Customizing Hosts with Tags

You can use tags to store information about your hosts. You can then search for hosts based on tags.

Procedure 6.10. Customizing hosts with tags

1. Use the **Hosts** resource tab, tree mode, or the search function to find and select the host in the results list.
2. Click **Assign Tags** to open the **Assign Tags** window.

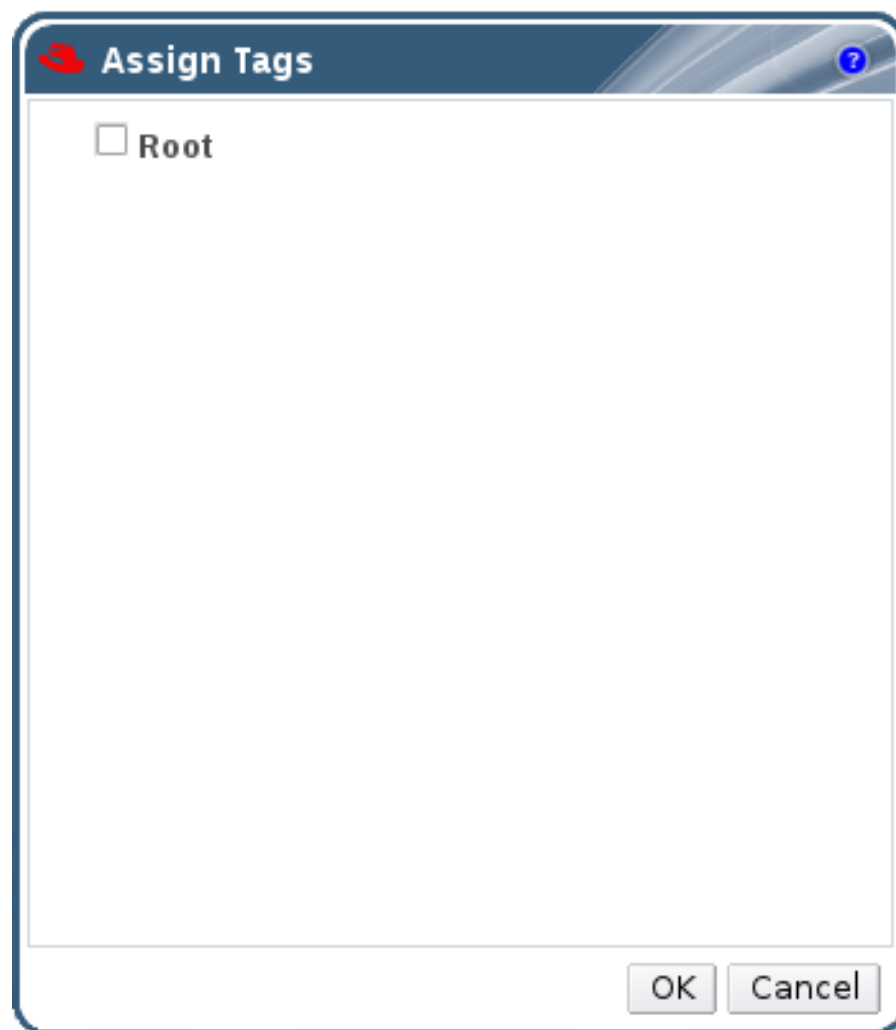


Figure 6.1. Assign Tags Window

3. The **Assign Tags** window lists all available tags. Select the check boxes of applicable tags.
4. Click **OK** to assign the tags and close the window.

You have added extra, searchable information about your host as tags.

6.5.12. Viewing Host Errata





Errata for each host can be viewed after the Red Hat Enterprise Virtualization host has been configured to receive errata information from the Red Hat Satellite server. For more information on configuring a host to receive errata information see [Section 6.5.2, “Configuring Satellite Errata Management for a Host”](#)

Procedure 6.11. Viewing Host Errata

1. Click the **Hosts** resource tab, and select a host from the results list.
2. Click the **General** tab in the details pane.
3. Click the **Errata** sub-tab in the **General** tab.

6.5.13. Viewing the Health Status of a Host

Hosts have an external health status in addition to their regular **Status**. The external health status is reported by plug-ins or external systems, or set by an administrator, and appears to the left of the host's **Name** as one of the following icons:

- **OK:** No icon
- **Info:** 
- **Warning:** 
- **Error:** 
- **Failure:** 

To view further details about the host's health status, select the host and click the **Events** sub-tab.

The host's health status can also be viewed using the REST API. A **GET** request on a host will include the **external_status** element, which contains the health status.

You can set a host's health status in the REST API via the **events** collection. For more information, see [Adding Events](#) in the *REST API Guide*.

6.5.14. Viewing Host Devices

You can view the host devices for each host in the details pane. If the host has been configured for direct device assignment, these devices can be directly attached to virtual machines for improved performance.

For more information on the hardware requirements for direct device assignment, see [Additional Hardware Considerations for Using Device Assignment](#) in *Red Hat Enterprise Virtualization Hardware Considerations for Implementing SR-IOV*.

For more information on configuring the host for direct device assignment, see [Configuring a Hypervisor Host for PCI Passthrough](#) in the *Installation Guide*.

For more information on attaching host devices to virtual machines, see [Host Devices](#) in the *Virtual Machine Management Guide*.

Procedure 6.12. Viewing Host Devices

1. Use the **Hosts** resource tab, tree mode, or the search function to find and select a host from the results list.
2. Click the **Host Devices** tab in the details pane.

The details pane lists the details of the host devices, including whether the device is attached to a virtual machine, and currently in use by that virtual machine.

6.5.15. Preparing Host and Guest Systems for GPU Passthrough

The Graphics Processing Unit (GPU) device from a host can be directly assigned to a virtual machine. Before this can be achieved, both the host and the virtual machine require amendments to their **grub** configuration files. Both machines also require reboot for the changes to take effect.

This procedure is relevant for hosts with either x86_64 or ppc64le architecture.

For more information on the hardware requirements for direct device assignment, see [PCI Device Requirements](#) in the *Installation Guide*.

This procedure assumes that the server has been configured properly to allow for device assignment. See [Configuring a Hypervisor Host for PCI Passthrough](#) in the *Installation Guide*.

Procedure 6.13. Preparing a Host for GPU Passthrough

1. Log in to the host server and find the device *vendor ID:product ID*. In this example, the IDs are **10de:13ba** and **10de:0fbc**.

```
# lspci -nn
...
01:00.0 VGA compatible controller [0300]: NVIDIA Corporation GM107GL
[Quadro K2200] [10de:13ba] (rev a2)
01:00.1 Audio device [0403]: NVIDIA Corporation Device [10de:0fbc]
(rev a1)
...
```

2. Edit the grub configuration file and append *pci-stub.ids=xxxx:xxxx* to the end of the **GRUB_CMDLINE_LINUX** line.

```
# vi /etc/default/grub
...
GRUB_CMDLINE_LINUX="nofb splash=quiet console=tty0 ... pci-
stub.ids=10de:13ba,10de:0fbc"
...
```

Blacklist the corresponding drivers on the host. In this example, nVidia's nouveau driver is being blacklisted by an additional amendment to the **GRUB_CMDLINE_LINUX** line.

```
# vi /etc/default/grub
...
GRUB_CMDLINE_LINUX="nofb splash=quiet console=tty0 ... pci-
stub.ids=10de:13ba,10de:0fbc rdblacklist=nouveau"
...
```

Save the **grub** configuration file.

3. Refresh the **grub.cfg** file and reboot the server for these changes to take effect:

```
# grub2-mkconfig -o /boot/grub2/grub.cfg
```

```
# reboot
```

4. Confirm the device is bound to the **pci-stub** driver with the **lspci** command:

```
# lspci -nnk
...
01:00.0 VGA compatible controller [0300]: NVIDIA Corporation GM107GL
```



```
[Quadro K2200] [10de:13ba] (rev a2)
    Subsystem: NVIDIA Corporation Device [10de:1097]
    Kernel driver in use: pci-stub
01:00.1 Audio device [0403]: NVIDIA Corporation Device [10de:0fbc]
(rev a1)
    Subsystem: NVIDIA Corporation Device [10de:1097]
    Kernel driver in use: pci-stub
...
```

Proceed to the next procedure to configure GPU passthrough on the guest system side.

Procedure 6.14. Preparing a Guest Virtual Machine for GPU Passthrough

- For Linux
 - a. Only proprietary GPU drivers are supported. Black list the corresponding open source driver in the **grub** configuration file. For example:

```
$ vi /etc/default/grub
...
GRUB_CMDLINE_LINUX="nofb splash=quiet console=tty0 ...
rdblacklist=nouveau"
...
```

- b. Locate the GPU BusID. In this example, is BusID is **00:09.0**.

```
# lspci | grep VGA
00:09.0 VGA compatible controller: NVIDIA Corporation GK106GL
[Quadro K4000] (rev a1)
```

- c. Edit the **/etc/X11/xorg.conf** file and append the following content:

```
Section "Device"
Identifier "Device0"
Driver "nvidia"
VendorName "NVIDIA Corporation"
BusID "PCI:0:9:0"
EndSection
```

- d. Restart the virtual machine.

- For Windows
 - a. Download and install the corresponding drivers for the device. For example, for Nvidia drivers, go to [NVIDIA Driver Downloads](#).
 - b. Restart the virtual machine.

The host GPU can now be directly assigned to the prepared virtual machine. For more information on assigning host devices to virtual machines, see [Host Devices](#) in the *Virtual Machine Management Guide*.

6.6. HOST RESILIENCE

6.6.1. Host High Availability

The Red Hat Enterprise Virtualization Manager uses fencing to keep the hosts in a cluster responsive. A **Non Responsive** host is different from a **Non Operational** host. **Non Operational** hosts can be communicated with by the Manager, but have an incorrect configuration, for example a missing logical network. **Non Responsive** hosts cannot be communicated with by the Manager.

If a host with a power management device loses communication with the Manager, it can be fenced (rebooted) from the Administration Portal. All the virtual machines running on that host are stopped, and highly available virtual machines are started on a different host.

All power management operations are done using a proxy host, as opposed to directly by the Red Hat Enterprise Virtualization Manager. At least two hosts are required for power management operations.

Fencing allows a cluster to react to unexpected host failures as well as enforce power saving, load balancing, and virtual machine availability policies. You should configure the fencing parameters for your host's power management device and test their correctness from time to time.

Hosts can be fenced automatically using the power management parameters, or manually by right-clicking on a host and using the options on the menu. In a fencing operation, an unresponsive host is rebooted, and if the host does not return to an active status within a prescribed time, it remains unresponsive pending manual intervention and troubleshooting.

If the host is required to run virtual machines that are highly available, power management must be enabled and configured.

6.6.2. Power Management by Proxy in Red Hat Enterprise Virtualization

The Red Hat Enterprise Virtualization Manager does not communicate directly with fence agents. Instead, the Manager uses a proxy to send power management commands to a host power management device. The Manager uses VDSM to execute power management device actions, so another host in the environment is used as a fencing proxy.

You can select between:

- Any host in the same cluster as the host requiring fencing.
- Any host in the same data center as the host requiring fencing.

A viable fencing proxy host has a status of either *UP* or *Maintenance*.

6.6.3. Setting Fencing Parameters on a Host

The parameters for host fencing are set using the **Power Management** fields on the **New Host** or **Edit Host** windows. Power management enables the system to fence a troublesome host using an additional interface such as a Remote Access Card (RAC).

All power management operations are done using a proxy host, as opposed to directly by the Red Hat Enterprise Virtualization Manager. At least two hosts are required for power management operations.

Procedure 6.15. Setting fencing parameters on a host

1. Use the **Hosts** resource tab, tree mode, or the search function to find and select the host in the results list.
2. Click **Edit** to open the **Edit Host** window.
3. Click the **Power Management** tab.

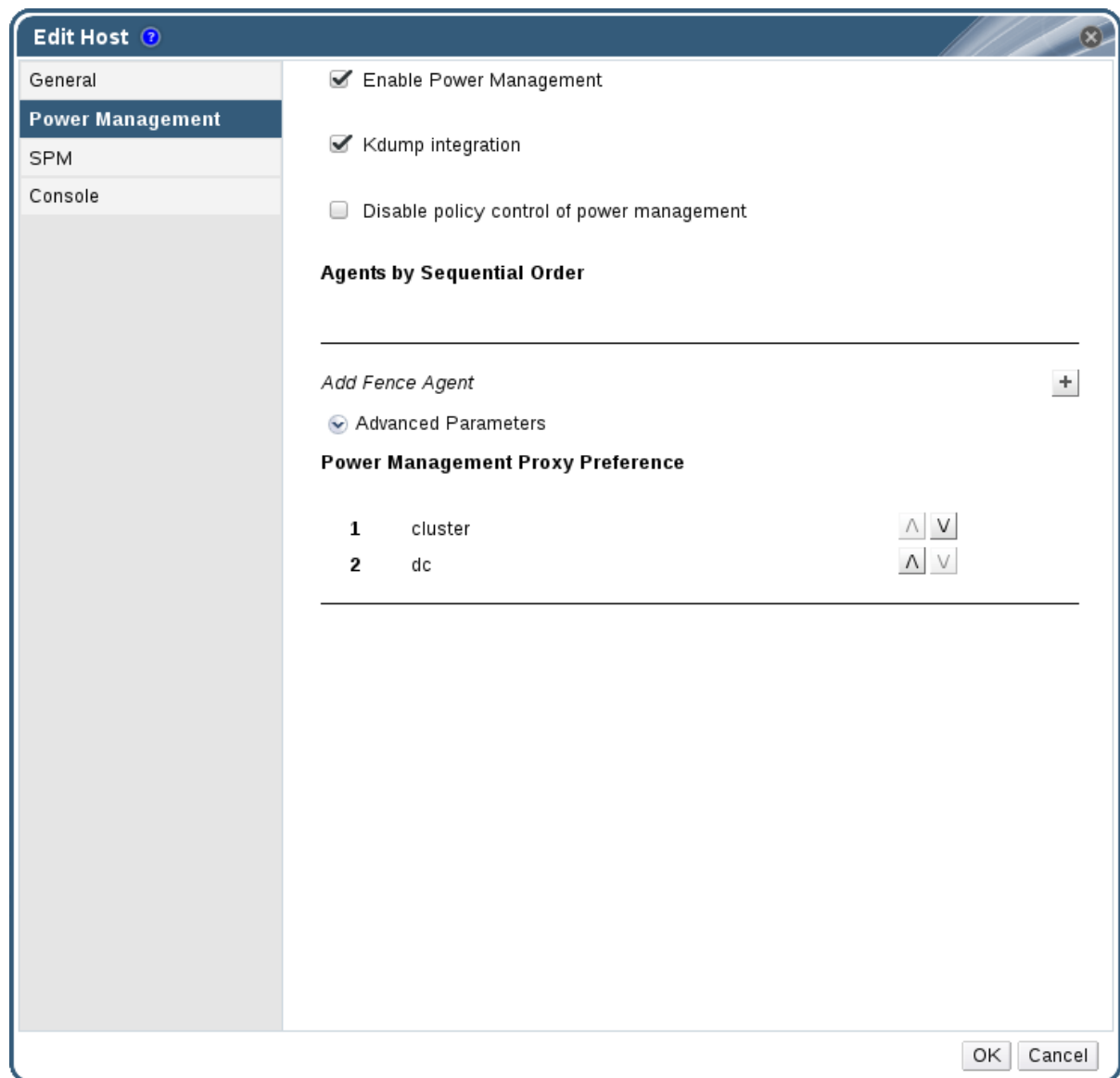
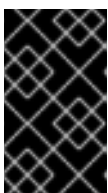


Figure 6.2. Power Management Settings

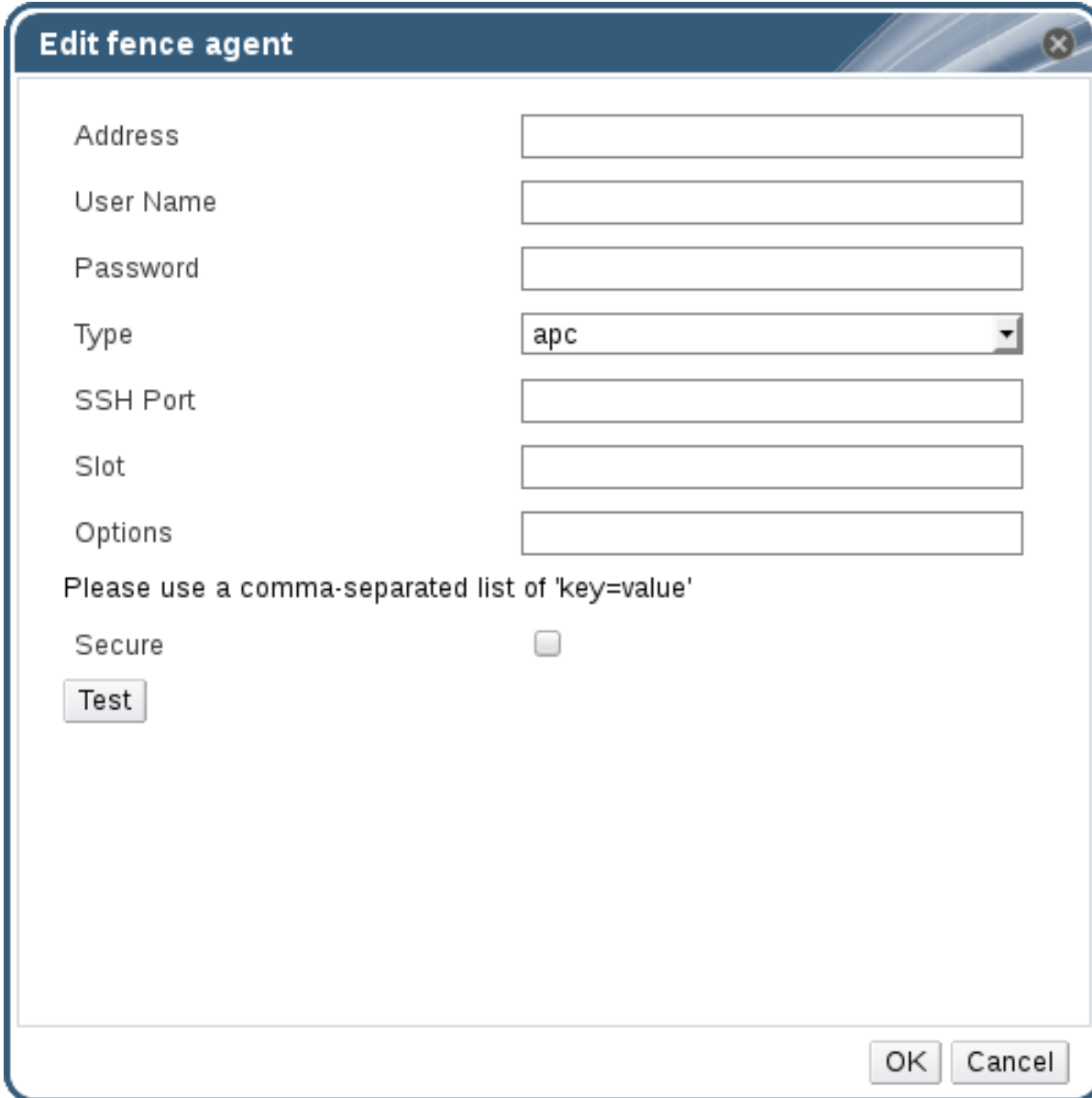
4. Select the **Enable Power Management** check box to enable the fields.
5. Select the **Kdump integration** check box to prevent the host from fencing while performing a kernel crash dump.



IMPORTANT

When you enable **Kdump integration** on an existing host, the host must be reinstalled for kdump to be configured. See [Section 6.5.10, “Reinstalling Virtualization Hosts”](#).

6. Optionally, select the **Disable policy control of power management** check box if you do not want your host's power management to be controlled by the **Scheduling Policy** of the host's cluster.
7. Click the plus (+) button to add a new power management device. The **Edit fence agent** window opens.



Edit fence agent

Address

User Name

Password

Type

SSH Port

Slot

Options

Please use a comma-separated list of 'key=value'

Secure ☐

Figure 6.3. Edit fence agent

8. Enter the **Address**, **User Name**, and **Password** of the power management device.
9. Select the power management device **Type** from the drop-down list.



NOTE

In Red Hat Enterprise Virtualization 3.5 and above, you can use a custom power management device. For more information on how to set up a custom power management device, see <https://access.redhat.com/articles/1238743>.

10. Enter the **SSH Port** number used by the power management device to communicate with the host.
11. Enter the **Slot** number used to identify the blade of the power management device.
12. Enter the **Options** for the power management device. Use a comma-separated list of 'key=value' entries.
13. Select the **Secure** check box to enable the power management device to connect securely to the host.
14. Click the **Test** button to ensure the settings are correct. *Test Succeeded, Host Status is: on* will display upon successful verification.



WARNING

Power management parameters (userid, password, options, etc) are tested by Red Hat Enterprise Virtualization Manager only during setup and manually after that. If you choose to ignore alerts about incorrect parameters, or if the parameters are changed on the power management hardware without the corresponding change in Red Hat Enterprise Virtualization Manager, fencing is likely to fail when most needed.

15. Click **OK** to close the **Edit fence agent** window.
16. In the **Power Management** tab, optionally expand the **Advanced Parameters** and use the up and down buttons to specify the order in which the Manager will search the host's **cluster** and **dc** (datacenter) for a fencing proxy.
17. Click **OK**.

You are returned to the list of hosts. Note that the exclamation mark next to the host's name has now disappeared, signifying that power management has been successfully configured.

6.6.4. fence_kdump Advanced Configuration

kdump

The kdump service is available by default on new Red Hat Enterprise Linux 6.6 and later or 7.1 and later hosts and Hypervisors. On older hosts, **Kdump integration** cannot be enabled; these hosts must be upgraded in order to use this feature.

Select a host to view the status of the kdump service in the **General** tab of the details pane:

- **Enabled:** kdump is configured properly and the kdump service is running.
- **Disabled:** the kdump service is not running (in this case kdump integration will not work properly).

- **Unknown:** happens only for hosts with an older VDSM version that does not report kdump status.

For more information on installing and using kdump, see the [Kernel Crash Dump Guide](#) for Red Hat Enterprise Linux 7, or the [kdump Crash Recovery Service](#) section of the Deployment Guide for Red Hat Enterprise Linux 6.

fence_kdump

Enabling **Kdump integration** in the **Power Management** tab of the **New Host** or **Edit Host** window configures a standard fence_kdump setup. If the environment's network configuration is simple and the Manager's FQDN is resolvable on all hosts, the default fence_kdump settings are sufficient for use.

However, there are some cases where advanced configuration of fence_kdump is necessary. Environments with more complex networking may require manual changes to the configuration of the Manager, fence_kdump listener, or both. For example, if the Manager's FQDN is not resolvable on all hosts with **Kdump integration** enabled, you can set a proper host name or IP address using **engine-config**:

```
engine-config -s FenceKdumpDestinationAddress=A.B.C.D
```

The following example cases may also require configuration changes:

- The Manager has two NICs, where one of these is public-facing, and the second is the preferred destination for fence_kdump messages.
- You need to execute the fence_kdump listener on a different IP or port.
- You need to set a custom interval for fence_kdump notification messages, to prevent possible packet loss.

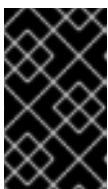
Customized fence_kdump detection settings are recommended for advanced users only, as changes to the default configuration are only necessary in more complex networking setups. For configuration options for the fence_kdump listener see [Section 6.6.4.1, “fence_kdump listener Configuration”](#). For configuration of kdump on the Manager see [Section 6.6.4.2, “Configuring fence_kdump on the Manager”](#).

6.6.4.1. fence_kdump listener Configuration

Edit the configuration of the fence_kdump listener. This is only necessary in cases where the default configuration is not sufficient.

Procedure 6.16. Manually Configuring the fence_kdump Listener

1. Create a new file (for example, **my-fence-kdump.conf**) in **/etc/ovirt-engine/ovirt-fence-kdump-listener.conf.d/**
2. Enter your customization with the syntax *OPTION=value* and save the file.



IMPORTANT

The edited values must also be changed in **engine-config** as outlined in the fence_kdump Listener Configuration Options table in [Section 6.6.4.2, “Configuring fence_kdump on the Manager”](#).

3. Restart the fence_kdump listener:

```
# service ovirt-fence-kdump-listener restart
```

The following options can be customized if required:

Table 6.6. fence_kdump Listener Configuration Options

Variable	Description	Default	Note
LISTENER_ADDRESS	Defines the IP address to receive fence_kdump messages on.	0.0.0.0	If the value of this parameter is changed, it must match the value of FenceKdumpDestinationAddress in engine-config .
LISTENER_PORT	Defines the port to receive fence_kdump messages on.	7410	If the value of this parameter is changed, it must match the value of FenceKdumpDestinationPort in engine-config .
HEARTBEAT_INTERVAL	Defines the interval in seconds of the listener's heartbeat updates.	30	If the value of this parameter is changed, it must be half the size or smaller than the value of FenceKdumpListenerTimeout in engine-config .
SESSION_SYNC_INTERVAL	Defines the interval in seconds to synchronize the listener's host kdumping sessions in memory to the database.	5	If the value of this parameter is changed, it must be half the size or smaller than the value of KdumpStartedTimeout in engine-config .
REOPEN_DB_CONNECTION_INTERVAL	Defines the interval in seconds to reopen the database connection which was previously unavailable.	30	-

Variable	Description	Default	Note
KDUMP_FINISHED_TIMEOUT	Defines the maximum timeout in seconds after the last received message from kdumping hosts after which the host kdump flow is marked as FINISHED.	60	If the value of this parameter is changed, it must be double the size or higher than the value of FenceKdumpMessageInterval in engine-config .

6.6.4.2. Configuring fence_kdump on the Manager

Edit the Manager's kdump configuration. This is only necessary in cases where the default configuration is not sufficient. The current configuration values can be found using:

```
# engine-config -g OPTION
```

Procedure 6.17. Manually Configuring Kdump with engine-config

1. Edit kdump's configuration using the **engine-config** command:

```
# engine-config -s OPTION=value
```



IMPORTANT

The edited values must also be changed in the fence_kdump listener configuration file as outlined in the **Kdump Configuration Options** table. See [Section 6.6.4.1, “fence_kdump listener Configuration”](#).

2. Restart the **ovirt-engine** service:

```
# service ovirt-engine restart
```

3. Reinstall all hosts with **Kdump integration** enabled, if required (see the table below).

The following options can be configured using **engine-config**:

Table 6.7. Kdump Configuration Options

Variable	Description	Default	Note
----------	-------------	---------	------

Variable	Description	Default	Note
FenceKdumpDestinationAddress	Defines the hostname(s) or IP address(es) to send fence_kdump messages to. If empty, the Manager's FQDN is used.	Empty string (Manager FQDN is used)	If the value of this parameter is changed, it must match the value of LISTENER_ADDRESS in the fence_kdump listener configuration file, and all hosts with Kdump integration enabled must be reinstalled.
FenceKdumpDestinationPort	Defines the port to send fence_kdump messages to.	7410	If the value of this parameter is changed, it must match the value of LISTENER_PORT in the fence_kdump listener configuration file, and all hosts with Kdump integration enabled must be reinstalled.
FenceKdumpMessageInterval	Defines the interval in seconds between messages sent by fence_kdump.	5	If the value of this parameter is changed, it must be half the size or smaller than the value of KDUMP_FINISHED_TIMEOUT in the fence_kdump listener configuration file, and all hosts with Kdump integration enabled must be reinstalled.
FenceKdumpListenerTimeout	Defines the maximum timeout in seconds since the last heartbeat to consider the fence_kdump listener alive.	90	If the value of this parameter is changed, it must be double the size or higher than the value of HEARTBEAT_INTERVAL in the fence_kdump listener configuration file.

Variable	Description	Default	Note
KdumpStartedTimeout	Defines the maximum timeout in seconds to wait until the first message from the kdumping host is received (to detect that host kdump flow has started).	30	If the value of this parameter is changed, it must be double the size or higher than the value of SESSION_SYNC_INTERVAL in the fence_kdump listener configuration file, and FenceKdumpMessageInterval .

6.6.5. Soft-Fencing Hosts

Hosts can sometimes become non-responsive due to an unexpected problem, and though VDSM is unable to respond to requests, the virtual machines that depend upon VDSM remain alive and accessible. In these situations, restarting VDSM returns VDSM to a responsive state and resolves this issue.

Red Hat Enterprise Virtualization 3.3 introduced "soft-fencing over SSH". Prior to Red Hat Enterprise Virtualization 3.3, non-responsive hosts were fenced only by external fencing devices. In Red Hat Enterprise Virtualization 3.3 and above, the fencing process has been expanded to include "SSH Soft Fencing", a process where the Manager attempts to restart VDSM via SSH on non-responsive hosts. If the Manager fails to restart VDSM via SSH, the responsibility for fencing falls to the external fencing agent if an external fencing agent has been configured.

Soft-fencing over SSH works as follows. Fencing must be configured and enabled on the host, and a valid proxy host (a second host, in an UP state, in the data center) must exist. When the connection between the Manager and the host times out, the following happens:

1. On the first network failure, the status of the host changes to "connecting".
2. The Manager then makes three attempts to ask VDSM for its status, or it waits for an interval determined by the load on the host. The formula for determining the length of the interval is configured by the configuration values `TimeoutToResetVdsInSeconds` (the default is 60 seconds) + `[DelayResetPerVmInSeconds (the default is 0.5 seconds)]*(the count of running virtual machines on host) + [DelayResetForSpmInSeconds (the default is 20 seconds)] * 1` (if host runs as SPM) or 0 (if the host does not run as SPM). To give VDSM the maximum amount of time to respond, the Manager chooses the longer of the two options mentioned above (three attempts to retrieve the status of VDSM or the interval determined by the above formula).
3. If the host does not respond when that interval has elapsed, **vdsmd restart** is executed via SSH.
4. If **vdsmd restart** does not succeed in re-establishing the connection between the host and the Manager, the status of the host changes to **Non Responsive** and, if power management is configured, fencing is handed off to the external fencing agent.

**NOTE**

Soft-fencing over SSH can be executed on hosts that have no power management configured. This is distinct from "fencing": fencing can be executed only on hosts that have power management configured.

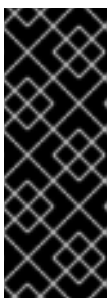
6.6.6. Using Host Power Management Functions

Summary

When power management has been configured for a host, you can access a number of options from the Administration Portal interface. While each power management device has its own customizable options, they all support the basic options to start, stop, and restart a host.

Procedure 6.18. Using Host Power Management Functions

1. Use the **Hosts** resource tab, tree mode, or the search function to find and select the host in the results list.
2. Click the **Power Management** drop-down menu.
3. Select one of the following options:
 - **Restart**: This option stops the host and waits until the host's status changes to **Down**. When the agent has verified that the host is down, the highly available virtual machines are restarted on another host in the cluster. The agent then restarts this host. When the host is ready for use its status displays as **Up**.
 - **Start**: This option starts the host and lets it join a cluster. When it is ready for use its status displays as **Up**.
 - **Stop**: This option powers off the host. Before using this option, ensure that the virtual machines running on the host have been migrated to other hosts in the cluster. Otherwise the virtual machines will crash and only the highly available virtual machines will be restarted on another host. When the host has been stopped its status displays as **Non-Operational**.

**IMPORTANT**

When two fencing agents are defined on a host, they can be used concurrently or sequentially. For concurrent agents, both agents have to respond to the Stop command for the host to be stopped; and when one agent responds to the Start command, the host will go up. For sequential agents, to start or stop a host, the primary agent is used first; if it fails, the secondary agent is used.

4. Selecting one of the above options opens a confirmation window. Click **OK** to confirm and proceed.

Result

The selected action is performed.

6.6.7. Manually Fencing or Isolating a Non Responsive Host

Summary

If a host unpredictably goes into a non-responsive state, for example, due to a hardware failure; it can significantly affect the performance of the environment. If you do not have a power management device, or it is incorrectly configured, you can reboot the host manually.



WARNING

Do not use the **Confirm host has been rebooted** option unless you have manually rebooted the host. Using this option while the host is still running can lead to a virtual machine image corruption.

Procedure 6.19. Manually fencing or isolating a non-responsive host

1. On the **Hosts** tab, select the host. The status must display as **non-responsive**.
2. Manually reboot the host. This could mean physically entering the lab and rebooting the host.
3. On the Administration Portal, right-click the host entry and select the **Confirm Host has been rebooted** button.
4. A message displays prompting you to ensure that the host has been shut down or rebooted. Select the **Approve Operation** check box and click **OK**.

Result

You have manually rebooted your host, allowing highly available virtual machines to be started on active hosts. You confirmed your manual fencing action in the Administrator Portal, and the host is back online.

6.7. HOSTS AND PERMISSIONS

6.7.1. Managing System Permissions for a Host

As the **SuperUser**, the system administrator manages all aspects of the Administration Portal. More specific administrative roles can be assigned to other users. These restricted administrator roles are useful for granting a user administrative privileges that limit them to a specific resource. For example, a **DataCenterAdmin** role has administrator privileges only for the assigned data center with the exception of the storage for that data center, and a **ClusterAdmin** has administrator privileges only for the assigned cluster.

A host administrator is a system administration role for a specific host only. This is useful in clusters with multiple hosts, where each host requires a system administrator. You can use the **Configure** button in the header bar to assign a host administrator for all hosts in the environment.

The host administrator role permits the following actions:

- Edit the configuration of the host.

- Set up the logical networks.
- Remove the host.

You can also change the system administrator of a host by removing the existing system administrator and adding the new system administrator.

6.7.2. Host Administrator Roles Explained

Host Permission Roles

The table below describes the administrator roles and privileges applicable to host administration.

Table 6.8. Red Hat Enterprise Virtualization System Administrator Roles

Role	Privileges	Notes
HostAdmin	Host Administrator	Can configure, manage, and remove a specific host. Can also perform network-related operations on a specific host.

6.7.3. Assigning an Administrator or User Role to a Resource

Assign administrator or user roles to resources to allow users to access or manage that resource.

Procedure 6.20. Assigning a Role to a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Click **Add**.
4. Enter the name or user name of an existing user into the **Search** text box and click **Go**. Select a user from the resulting list of possible matches.
5. Select a role from the **Role to Assign:** drop-down list.
6. Click **OK**.

You have assigned a role to a user; the user now has the inherited permissions of that role enabled for that resource.

6.7.4. Removing an Administrator or User Role from a Resource

Remove an administrator or user role from a resource; the user loses the inherited permissions associated with the role for that resource.

Procedure 6.21. Removing a Role from a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Select the user to remove from the resource.
4. Click **Remove**. The **Remove Permission** window opens to confirm permissions removal.
5. Click **OK**.

You have removed the user's role, and the associated permissions, from the resource.

CHAPTER 7. STORAGE

Red Hat Enterprise Virtualization uses a centralized storage system for virtual machine disk images, ISO files and snapshots. Storage networking can be implemented using:

- Network File System (NFS)
- GlusterFS exports
- Other POSIX compliant file systems
- Internet Small Computer System Interface (iSCSI)
- Local storage attached directly to the virtualization hosts
- Fibre Channel Protocol (FCP)
- Parallel NFS (pNFS)

Setting up storage is a prerequisite for a new data center because a data center cannot be initialized unless storage domains are attached and activated.

As a Red Hat Enterprise Virtualization system administrator, you need to create, configure, attach and maintain storage for the virtualized enterprise. You should be familiar with the storage types and their use. Read your storage array vendor's guides, and see the [Red Hat Enterprise Linux Storage Administration Guide](#) for more information on the concepts, protocols, requirements or general usage of storage.

Red Hat Enterprise Virtualization enables you to assign and manage storage using the Administration Portal's **Storage** tab. The **Storage** results list displays all the storage domains, and the details pane shows general information about the domain.

To add storage domains you must be able to successfully access the Administration Portal, and there must be at least one host connected with a status of **Up**.

Red Hat Enterprise Virtualization has three types of storage domains:

- **Data Domain:** A data domain holds the virtual hard disks and OVF files of all the virtual machines and templates in a data center. In addition, snapshots of the virtual machines are also stored in the data domain.

The data domain cannot be shared across data centers. Data domains of multiple types (iSCSI, NFS, FC, POSIX, and Gluster) can be added to the same data center, provided they are all shared, rather than local, domains.

You must attach a data domain to a data center before you can attach domains of other types to it.

- **ISO Domain:** ISO domains store ISO files (or logical CDs) used to install and boot operating systems and applications for the virtual machines. An ISO domain removes the data center's need for physical media. An ISO domain can be shared across different data centers. ISO domains can only be NFS-based. Only one ISO domain can be added to a data center.
- **Export Domain:** Export domains are temporary storage repositories that are used to copy and move images between data centers and Red Hat Enterprise Virtualization environments. Export domains can be used to backup virtual

machines. An export domain can be moved between data centers, however, it can only be active in one data center at a time. Export domains can only be NFS-based. Only one export domain can be added to a data center.



IMPORTANT

Only commence configuring and attaching storage for your Red Hat Enterprise Virtualization environment once you have determined the storage needs of your data center(s).

7.1. UNDERSTANDING STORAGE DOMAINS

A storage domain is a collection of images that have a common storage interface. A storage domain contains complete images of templates and virtual machines (including snapshots), or ISO files. A storage domain can be made of either block devices (SAN - iSCSI or FCP) or a file system (NAS - NFS, GlusterFS, or other POSIX compliant file systems).

On NFS, all virtual disks, templates, and snapshots are files.

On SAN (iSCSI/FCP), each virtual disk, template or snapshot is a logical volume. Block devices are aggregated into a logical entity called a volume group, and then divided by LVM (Logical Volume Manager) into logical volumes for use as virtual hard disks. See *Red Hat Enterprise Linux Logical Volume Manager Administration Guide* for more information on LVM.

Virtual disks can have one of two formats, either QCOW2 or RAW. The type of storage can be either Sparse or Preallocated. Snapshots are always sparse but can be taken for disks created either as RAW or sparse.

Virtual machines that share the same storage domain can be migrated between hosts that belong to the same cluster.

7.2. PREPARING AND ADDING NFS STORAGE

7.2.1. Preparing NFS Storage

Set up NFS shares that will serve as a data domain on a Red Hat Enterprise Linux server. It is not necessary to create an ISO domain if one was created during the Red Hat Enterprise Virtualization Manager installation procedure.

For information on the setup and configuration of NFS on Red Hat Enterprise Linux, see [Network File System \(NFS\)](#) in the *Red Hat Enterprise Linux 6 Storage Administration Guide* or [Network File System \(NFS\)](#) in the *Red Hat Enterprise Linux 7 Storage Administration Guide*.

Specific system user accounts and system user groups are required by Red Hat Enterprise Virtualization so the Manager can store data in the storage domains represented by the exported directories.

Procedure 7.1. Configuring the Required System User Accounts and System User Groups

1. Create the group `kvm`:


```
# groupadd kvm -g 36
```

2. Create the user **vdsm** in the group **kvm**:

```
# useradd vdsm -u 36 -g 36
```

3. Set the ownership of your exported directories to 36:36, which gives vdsm:kvm ownership:

```
# chown -R 36:36 /exports/data
# chown -R 36:36 /exports/export
```

4. Change the mode of the directories so that read and write access is granted to the owner, and so that read and execute access is granted to the group and other users:

```
# chmod 0755 /exports/data
# chmod 0755 /exports/export
```

For more information on the required system users and groups see [Appendix G, System Accounts](#).

7.2.2. Attaching NFS Storage

Attach an NFS storage domain to the data center in your Red Hat Enterprise Virtualization environment. This storage domain provides storage for virtualized guest images and ISO boot media. This procedure assumes that you have already exported shares. You must create the data domain before creating the export domain. Use the same procedure to create the export domain, selecting **Export / NFS** in the **Domain Function / Storage Type** list.

1. In the Red Hat Enterprise Virtualization Manager Administration Portal, click the **Storage** resource tab.
2. Click **New Domain**.

New Domain ?

Data Center: Default (V3) | Name:

Domain Function: Data | Description:

Storage Type: NFS | Comment:

Use Host: Host1

Export Path:
E.g.: myserver.mydomain.com:/my/local/path

▶ Custom Connection Parameters

▶ Advanced Parameters

OK Cancel

Figure 7.1. The New Domain Window

3. Enter a **Name** for the storage domain.
4. Accept the default values for the **Data Center**, **Domain Function**, **Storage Type**, **Format**, and **Use Host** lists.
5. Enter the **Export Path** to be used for the storage domain.

The export path should be in the format of *192.168.0.10:/data* or *domain.example.com:/data*.

6. Optionally, you can configure the advanced parameters.
 - a. Click **Advanced Parameters**.
 - b. Enter a percentage value into the **Warning Low Space Indicator** field. If the free space available on the storage domain is below this percentage, warning messages are displayed to the user and logged.
 - c. Enter a GB value into the **Critical Space Action Blocker** field. If the free space available on the storage domain is below this value, error messages are displayed to the user and logged, and any new action that consumes space, even temporarily, will be blocked.

- d. Select the **Wipe After Delete** check box to enable the wipe after delete option. This option can be edited after the domain is created, but doing so will not change the wipe after delete property of disks that already exist.

7. Click **OK**.

The new NFS data domain is displayed in the **Storage** tab with a status of **Locked** until the disk is prepared. The data domain is then automatically attached to the data center.

7.2.3. Increasing NFS Storage

To increase the amount of NFS storage, you can either create a new storage domain and add it to an existing data center, or increase the available free space on the NFS server. For the former option, see [Section 7.2.2, “Attaching NFS Storage”](#). The following procedure explains how to increase the available free space on the existing NFS server.

Procedure 7.2. Increasing an Existing NFS Storage Domain

1. Click the **Storage** resource tab and select an NFS storage domain.
2. In the details pane, click the **Data Center** tab and click the **Maintenance** button to place the storage domain into maintenance mode. This unmounts the existing share and makes it possible to resize the storage domain.
3. On the NFS server, resize the storage. For Red Hat Enterprise Linux 6 systems, see [Red Hat Enterprise Linux 6 Storage Administration Guide](#). For Red Hat Enterprise Linux 7 systems, see [Red Hat Enterprise Linux 7 Storage Administration Guide](#).
4. In the details pane, click the **Data Center** tab and click the **Activate** button to mount the storage domain.

7.3. PREPARING AND ADDING LOCAL STORAGE

7.3.1. Preparing Local Storage

A local storage domain can be set up on a host. When you set up a host to use local storage, the host automatically gets added to a new data center and cluster that no other hosts can be added to. Multiple host clusters require that all hosts have access to all storage domains, which is not possible with local storage. Virtual machines created in a single host cluster cannot be migrated, fenced or scheduled. For more information on the required system users and groups see [Appendix G, System Accounts](#).



IMPORTANT

On Red Hat Enterprise Virtualization Hypervisors the only path permitted for use as local storage is **/data/images**. This directory already exists with the correct permissions on Hypervisor installations. The steps in this procedure are only required when preparing local storage on Red Hat Enterprise Linux virtualization hosts.

Procedure 7.3. Preparing Local Storage

1. On the virtualization host, create the directory to be used for the local storage.

```
# mkdir -p /data/images
```

2. Ensure that the directory has permissions allowing read/write access to the **vdsm** user (UID 36) and **kvm** group (GID 36).

```
# chown 36:36 /data /data/images
```

```
# chmod 0755 /data /data/images
```

Your local storage is ready to be added to the Red Hat Enterprise Virtualization environment.

7.3.2. Adding Local Storage

Storage local to your host has been prepared. Now use the Manager to add it to the host.

Adding local storage to a host in this manner causes the host to be put in a new data center and cluster. The local storage configuration window combines the creation of a data center, a cluster, and storage into a single process.

Procedure 7.4. Adding Local Storage

1. Click the **Hosts** resource tab, and select a host in the results list.
2. Click **Maintenance** to open the **Maintenance Host(s)** confirmation window.
3. Click **OK** to initiate maintenance mode.
4. Click **Configure Local Storage** to open the **Configure Local Storage** window.

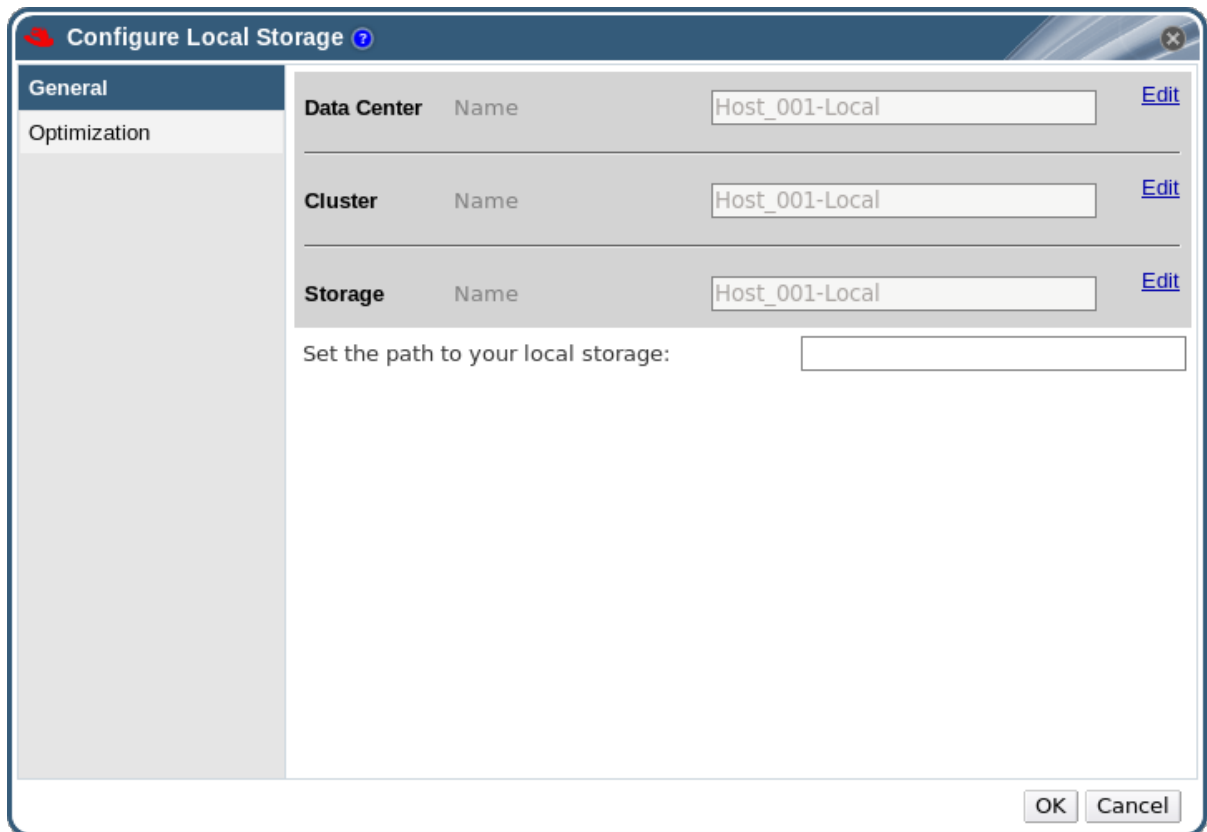


Figure 7.2. Configure Local Storage Window

5. Click the **Edit** buttons next to the **Data Center**, **Cluster**, and **Storage** fields to configure and name the local storage domain.
6. Set the path to your local storage in the text entry field.
7. If applicable, select the **Optimization** tab to configure the memory optimization policy for the new local storage cluster.
8. Click **OK** to save the settings and close the window.

Your host comes online in a data center of its own.

7.4. ADDING POSIX COMPLIANT FILE SYSTEM STORAGE

Red Hat Enterprise Virtualization 3.1 and higher supports the use of POSIX (native) file systems for storage. POSIX file system support allows you to mount file systems using the same mount options that you would normally use when mounting them manually from the command line. This functionality is intended to allow access to storage not exposed using NFS, iSCSI, or FCP.

Any POSIX compliant filesystem used as a storage domain in Red Hat Enterprise Virtualization **MUST** support sparse files and direct I/O. The Common Internet File System (CIFS), for example, does not support direct I/O, making it incompatible with Red Hat Enterprise Virtualization.



IMPORTANT

Do *not* mount NFS storage by creating a POSIX compliant file system Storage Domain. Always create an NFS Storage Domain instead.

7.4.1. Attaching POSIX Compliant File System Storage

You want to use a POSIX compliant file system that is not exposed using NFS, iSCSI, or FCP as a storage domain.

Procedure 7.5. Attaching POSIX Compliant File System Storage

1. Click the **Storage** resource tab to list the existing storage domains in the results list.
2. Click **New Domain** to open the **New Domain** window.

Figure 7.3. POSIX Storage

3. Enter the **Name** for the storage domain.
4. Select the **Data Center** to be associated with the storage domain. The Data Center selected must be of type **POSIX (POSIX compliant FS)**. Alternatively, select **(none)**.
5. Select **Data / POSIX compliant FS** from the **Domain Function / Storage Type** drop-down menu.

If applicable, select the **Format** from the drop-down menu.

6. Select a host from the **Use Host** drop-down menu. Only hosts within the selected data center will be listed. The host that you select will be used to connect the storage domain.
7. Enter the **Path** to the POSIX file system, as you would normally provide it to the **mount** command.
8. Enter the **VFS Type**, as you would normally provide it to the **mount** command using the **-t** argument. See **man mount** for a list of valid VFS types.
9. Enter additional **Mount Options**, as you would normally provide them to the **mount** command using the **-o** argument. The mount options should be provided in a comma-separated list. See **man mount** for a list of valid mount options.
10. Optionally, you can configure the advanced parameters.
 - a. Click **Advanced Parameters**.
 - b. Enter a percentage value into the **Warning Low Space Indicator** field. If the free space available on the storage domain is below this percentage, warning messages are displayed to the user and logged.
 - c. Enter a GB value into the **Critical Space Action Blocker** field. If the free space available on the storage domain is below this value, error messages are displayed to the user and logged, and any new action that consumes space, even temporarily, will be blocked.
 - d. Select the **Wipe After Delete** check box to enable the wipe after delete option. This option can be edited after the domain is created, but doing so will not change the wipe after delete property of disks that already exist.
11. Click **OK** to attach the new Storage Domain and close the window.

7.5. ADDING BLOCK STORAGE

7.5.1. Adding iSCSI Storage

Red Hat Enterprise Virtualization platform supports iSCSI storage by creating a storage domain from a volume group made of pre-existing LUNs. Neither volume groups nor LUNs can be attached to more than one storage domain at a time.

For information on the setup and configuration of iSCSI on Red Hat Enterprise Linux, see [iSCSI Target Creation](#) in the *Red Hat Enterprise Linux 6 Storage Administration Guide* or [Online Storage Management](#) in the *Red Hat Enterprise Linux 7 Storage Administration Guide*.

Procedure 7.6. Adding iSCSI Storage

1. Click the **Storage** resource tab to list the existing storage domains in the results list.
2. Click the **New Domain** button to open the **New Domain** window.
3. Enter the **Name** of the new storage domain.

Figure 7.4. New iSCSI Domain

4. Use the **Data Center** drop-down menu to select an data center.
5. Use the drop-down menus to select the **Domain Function** and the **Storage Type**. The storage domain types that are not compatible with the chosen domain function are not available.
6. Select an active host in the **Use Host** field. If this is not the first data domain in a data center, you must select the data center's SPM host.



IMPORTANT

All communication to the storage domain is through the selected host and not directly from the Red Hat Enterprise Virtualization Manager. At least one active host must exist in the system and be attached to the chosen data center. All hosts must have access to the storage device before the storage domain can be configured.

7. The Red Hat Enterprise Virtualization Manager is able to map either iSCSI targets to LUNs, or LUNs to iSCSI targets. The **New Domain** window automatically displays known targets with unused LUNs when iSCSI is selected as the storage type. If the target that you are adding storage from is not listed then you can use target discovery to find it, otherwise proceed to the next step.

iSCSI Target Discovery

1. Click **Discover Targets** to enable target discovery options. When targets have been discovered and logged in to, the **New Domain** window automatically displays targets with LUNs unused by the environment.



NOTE

LUNs used externally to the environment are also displayed.

You can use the **Discover Targets** options to add LUNs on many targets, or multiple paths to the same LUNs.

2. Enter the fully qualified domain name or IP address of the iSCSI host in the **Address** field.
3. Enter the port to connect to the host on when browsing for targets in the **Port** field. The default is **3260**.
4. If the Challenge Handshake Authentication Protocol (CHAP) is being used to secure the storage, select the **User Authentication** check box. Enter the **CHAP user name** and **CHAP password**.

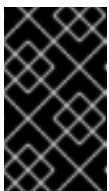


NOTE

It is now possible to use the REST API to define specific credentials to each iSCSI target per host. See [Defining Credentials to an iSCSI Target](#) in the *REST API Guide* for more information.

5. Click the **Discover** button.
6. Select the target to use from the discovery results and click the **Login** button.

Alternatively, click the **Login All** to log in to all of the discovered targets.



IMPORTANT

If more than one path access is required, ensure to discover and log in to the target through all the required paths. Modifying a storage domain to add additional paths is currently not supported.

8. Click the **+** button next to the desired target. This will expand the entry and display all unused LUNs attached to the target.
9. Select the check box for each LUN that you are using to create the storage domain.
10. Optionally, you can configure the advanced parameters.
 - a. Click **Advanced Parameters**.
 - b. Enter a percentage value into the **Warning Low Space Indicator** field. If the free space available on the storage domain is below this percentage, warning messages are displayed to the user and logged.

- c. Enter a GB value into the **Critical Space Action Blocker** field. If the free space available on the storage domain is below this value, error messages are displayed to the user and logged, and any new action that consumes space, even temporarily, will be blocked.
- d. Select the **Wipe After Delete** check box to enable the wipe after delete option. This option can be edited after the domain is created, but doing so will not change the wipe after delete property of disks that already exist.

11. Click **OK** to create the storage domain and close the window.

If you have configured multiple storage connection paths to the same target, follow the procedure in [Section 7.5.2, “Configuring iSCSI Multipathing”](#) to complete iSCSI bonding.

7.5.2. Configuring iSCSI Multipathing

The **iSCSI Multipathing** enables you to create and manage groups of logical networks and iSCSI storage connections. To prevent host downtime due to network path failure, configure multiple network paths between hosts and iSCSI storage. Once configured, the Manager connects each host in the data center to each bonded target via NICs/VLANs related to logical networks of the same iSCSI Bond. You can also specify which networks to use for storage traffic, instead of allowing hosts to route traffic through a default network. This option is only available in the Administration Portal after at least one iSCSI storage domain has been attached to a data center.

Prerequisites

- Ensure you have created an iSCSI storage domain and discovered and logged into all the paths to the iSCSI target(s).
- Ensure you have created **Non-Required** logical networks to bond with the iSCSI storage connections. You can configure multiple logical networks or bond networks to allow network failover.

Procedure 7.7. Configuring iSCSI Multipathing

1. Click the **Data Centers** tab and select a data center from the results list.
2. In the details pane, click the **iSCSI Multipathing** tab.
3. Click **Add**.
4. In the **Add iSCSI Bond** window, enter a **Name** and a **Description** for the bond.
5. Select the networks to be used for the bond from the **Logical Networks** list. The networks must be **Non-Required** networks.



NOTE

To change a network's **Required** designation, from the Administration Portal, select a network, click the **Cluster** tab, and click the **Manage Networks** button.

6. Select the storage domain to be accessed via the chosen networks from the **Storage Targets** list. Ensure to select all paths to the same target.

7. Click **OK**.

All hosts in the data center are connected to the selected iSCSI target through the selected logical networks.

7.5.3. Adding FCP Storage

Red Hat Enterprise Virtualization platform supports SAN storage by creating a storage domain from a volume group made of pre-existing LUNs. Neither volume groups nor LUNs can be attached to more than one storage domain at a time.

Red Hat Enterprise Virtualization system administrators need a working knowledge of Storage Area Networks (SAN) concepts. SAN usually uses Fibre Channel Protocol (FCP) for traffic between hosts and shared external storage. For this reason, SAN may occasionally be referred to as FCP storage.

For information regarding the setup and configuration of FCP or multipathing on Red Hat Enterprise Linux, see the [Storage Administration Guide](#) and [DM Multipath Guide](#).

The following procedure shows you how to attach existing FCP storage to your Red Hat Enterprise Virtualization environment as a data domain. For more information on other supported storage types, see [Chapter 7, Storage](#).

Procedure 7.8. Adding FCP Storage

1. Click the **Storage** resource tab to list all storage domains.
2. Click **New Domain** to open the **New Domain** window.
3. Enter the **Name** of the storage domain.

New Domain ?

Data CenterDefault (V3)

Domain FunctionData

Storage TypeFibre Channel

Use HostHost1

Name

Description

Comment

<input type="checkbox"/> LUN ID	Dev. Size	Additional Size	#path	Vendor ID	Product ID	Serial
---------------------------------	-----------	-----------------	-------	-----------	------------	--------

> Advanced Parameters

OKCancel

Figure 7.5. Adding FCP Storage

4. Use the **Data Center** drop-down menu to select an FCP data center.

If you do not yet have an appropriate FCP data center, select **(none)**.

5. Use the drop-down menus to select the **Domain Function** and the **Storage Type**. The storage domain types that are not compatible with the chosen data center are not available.
6. Select an active host in the **Use Host** field. If this is not the first data domain in a data center, you must select the data center's SPM host.



IMPORTANT

All communication to the storage domain is through the selected host and not directly from the Red Hat Enterprise Virtualization Manager. At least one active host must exist in the system and be attached to the chosen data center. All hosts must have access to the storage device before the storage domain can be configured.

- The **New Domain** window automatically displays known targets with unused LUNs when **Data / Fibre Channel** is selected as the storage type. Select the **LUN ID** check box to select all of the available LUNs.

8. Optionally, you can configure the advanced parameters.
 - a. Click **Advanced Parameters**.
 - b. Enter a percentage value into the **Warning Low Space Indicator** field. If the free space available on the storage domain is below this percentage, warning messages are displayed to the user and logged.
 - c. Enter a GB value into the **Critical Space Action Blocker** field. If the free space available on the storage domain is below this value, error messages are displayed to the user and logged, and any new action that consumes space, even temporarily, will be blocked.
 - d. Select the **Wipe After Delete** check box to enable the wipe after delete option. This option can be edited after the domain is created, but doing so will not change the wipe after delete property of disks that already exist.
9. Click **OK** to create the storage domain and close the window.

The new FCP data domain displays on the **Storage** tab. It will remain with a **Locked** status while it is being prepared for use. When ready, it is automatically attached to the data center.

7.5.4. Increasing iSCSI or FCP Storage

There are multiple ways to increase iSCSI or FCP storage size:

- Create a new storage domain with new LUNs and add it to an existing datacenter. See [Section 7.5.1, “Adding iSCSI Storage”](#).
- Create new LUNs and add them to an existing storage domain.
- Expand the storage domain by resizing the underlying LUNs.

For information about creating, configuring, or resizing iSCSI storage on Red Hat Enterprise Linux 6 systems, see [Red Hat Enterprise Linux 6 Storage Administration Guide](#). For Red Hat Enterprise Linux 7 systems, see [Red Hat Enterprise Linux 7 Storage Administration Guide](#).

The following procedure explains how to expand storage area network (SAN) storage by adding a new LUN to an existing storage domain.

Procedure 7.9. Increasing an Existing iSCSI or FCP Storage Domain

1. Create a new LUN on the SAN.
2. Click the **Storage** resource tab and select an iSCSI or FCP domain.
3. Click the **Edit** button.
4. Click on **Targets > LUNs**, and click the **Discover Targets** expansion button.
5. Enter the connection information for the storage server and click the **Discover** button to initiate the connection.
6. Click on **LUNs > Targets** and select the check box of the newly available LUN.
7. Click **OK** to add the LUN to the selected storage domain.

This will increase the storage domain by the size of the added LUN.

When expanding the storage domain by resizing the underlying LUNs, the LUNs must also be refreshed in the Red Hat Enterprise Virtualization Administration Portal.

Procedure 7.10. Refreshing the LUN Size

1. Click the **Storage** resource tab and select an iSCSI or FCP domain.
2. Click the **Edit** button.
3. Click on **LUNs > Targets**.
4. In the **Additional Size** column, click the **Add *Additional_Storage_Size*** button of the LUN to refresh.
5. Click **OK** to refresh the LUN to indicate the new storage size.

7.5.5. Unusable LUNs in Red Hat Enterprise Virtualization

In certain circumstances, the Red Hat Enterprise Virtualization Manager will not allow you to use a LUN to create a storage domain or virtual machine hard disk.

- LUNs that are already part of the current Red Hat Enterprise Virtualization environment are automatically prevented from being used.

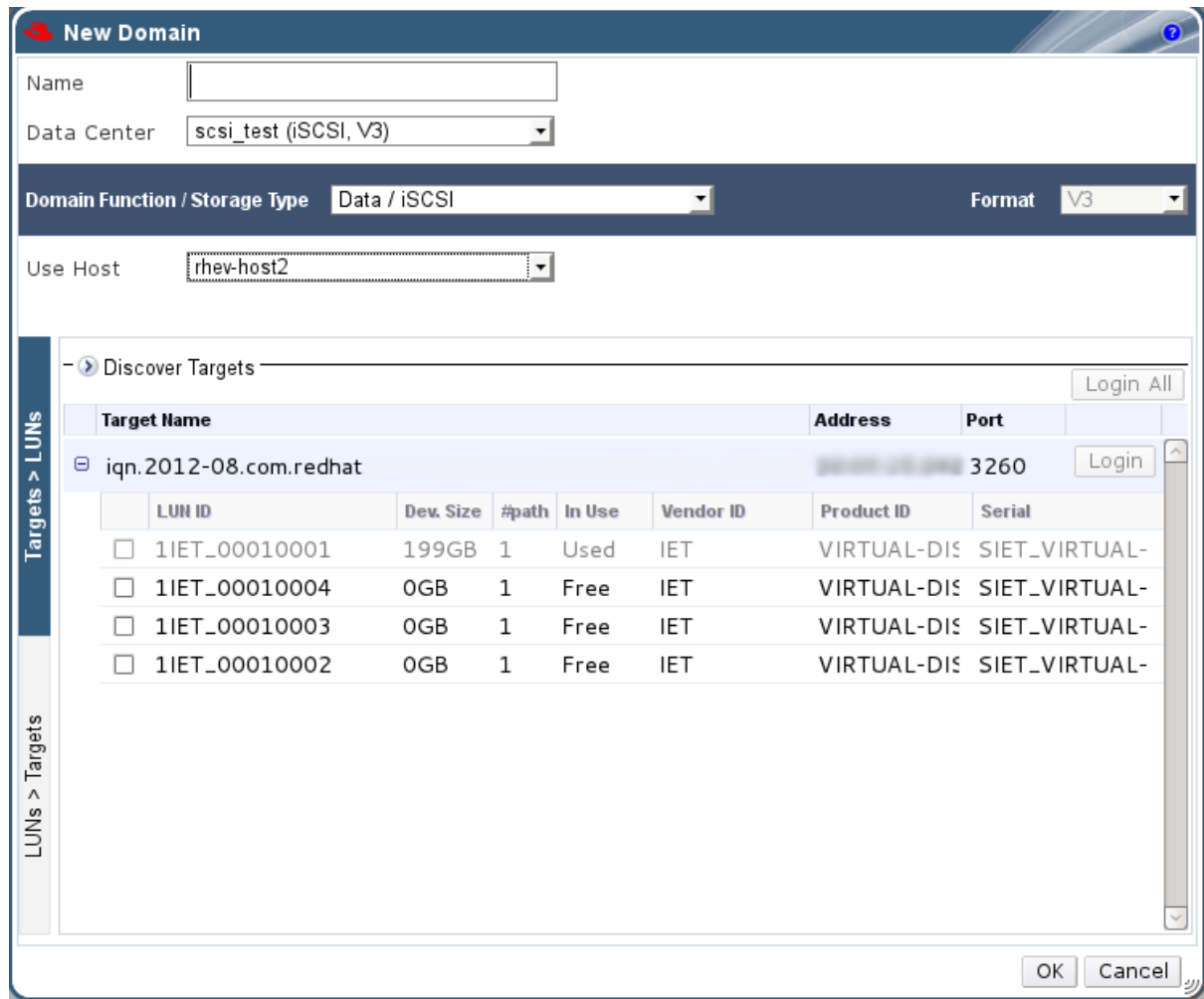


Figure 7.6. Unusable LUNs in the Red Hat Enterprise Virtualization Administration Portal

- LUNs that are already being used by the SPM host will also display as in use. You can choose to forcefully override the contents of these LUNs, but the operation is not guaranteed to succeed.

7.6. IMPORTING EXISTING STORAGE DOMAINS

7.6.1. Overview of Importing Existing Storage Domains

In addition to adding new storage domains that contain no data, you can also import existing storage domains and access the data they contain. The ability to import storage domains allows you to recover data in the event of a failure in the Manager database, and to migrate data from one data center or environment to another.

The following is an overview of importing each storage domain type:

Data

Importing an existing data storage domain allows you to access all of the virtual machines and templates that the data storage domain contains. After you import the storage domain, you must manually import each virtual machine and template into the destination data center. The process for importing the virtual machines and templates that a data storage domain contains is similar to that for an export storage domain. However, because data storage domains contain all the virtual machines and templates

in a given data center, importing data storage domains is recommended for data recovery or large-scale migration of virtual machines between data centers or environments.



IMPORTANT

You can only import existing data storage domains that were attached to data centers with a compatibility level of 3.5 or higher.

ISO

Importing an existing ISO storage domain allows you to access all of the ISO files and virtual diskettes that the ISO storage domain contains. No additional action is required after importing the storage domain to access these resources; you can attach them to virtual machines as required.

Export

Importing an existing export storage domain allows you to access all of the virtual machine images and templates that the export storage domain contains. Because export domains are designed for exporting and importing virtual machine images and templates, importing export storage domains is recommended method of migrating small numbers of virtual machines and templates inside an environment or between environments. For information on exporting and importing virtual machines and templates to and from export storage domains, see [Exporting and Importing Virtual Machines and Templates](#) in the *Virtual Machine Management Guide*.

7.6.2. Importing Storage Domains

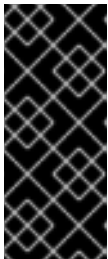
Import a storage domain that was previously attached to a data center in the same environment or in a different environment. This procedure assumes the storage domain is no longer attached to any data center in any environment, to avoid data corruption. To import and attach an existing data storage domain to a data center, the target data center must be initialized, and must have a compatibility level of 3.5 or higher.

Procedure 7.11. Importing a Storage Domain

1. Click the **Storage** resource tab.
2. Click **Import Domain**.

Figure 7.7. The Import Pre-Configured Domain window

3. Select the data center to which to attach the storage domain from the **Data Center** drop-down list.
4. Enter a name for the storage domain.
5. Select the **Domain Function** and **Storage Type** from the appropriate drop-down lists.
6. Select a host from the **Use host** drop-down list.



IMPORTANT

All communication to the storage domain is through the selected host and not directly from the Red Hat Enterprise Virtualization Manager. At least one active host must exist in the system and be attached to the chosen data center. All hosts must have access to the storage device before the storage domain can be configured.

7. Enter the details of the storage domain.

**NOTE**

The fields for specifying the details of the storage domain change in accordance with the value you select in the **Domain Function / Storage Type** list. These options are the same as those available for adding a new storage domain. For more information on these options, see [Section 7.1, “Understanding Storage Domains”](#).

8. Select the **Activate Domain in Data Center** check box to activate the storage domain after attaching it to the selected data center.
9. Click **OK**.

The storage domain is imported, and is displayed in the **Storage** tab. You can now import virtual machines and templates from the storage domain to the data center.

7.6.3. Migrating Storage Domains between Data Centers in the Same Environment

Migrate a storage domain from one data center to another in the same Red Hat Enterprise Virtualization environment to allow the destination data center to access the data contained in the storage domain. This procedure involves detaching the storage domain from one data center, and attaching it to a different data center.

Procedure 7.12. Migrating a Storage Domain between Data Centers in the Same Environment

1. Shut down all virtual machines running on the required storage domain.
2. Click the **Storage** resource tab and select the storage domain from the results list.
3. Click the **Data Center** tab in the details pane.
4. Click **Maintenance**, then click **OK** to move the storage domain to maintenance mode.
5. Click **Detach**, then click **OK** to detach the storage domain from the source data center.
6. Click **Attach**.
7. Select the destination data center and click **OK**.

The storage domain is attached to the destination data center and is automatically activated. You can now import virtual machines and templates from the storage domain to the destination data center.

7.6.4. Migrating Storage Domains between Data Centers in Different Environments

Migrate a storage domain from one Red Hat Enterprise Virtualization environment to another to allow the destination environment to access the data contained in the storage domain. This procedure involves removing the storage domain from one Red Hat Enterprise Virtualization environment, and importing it into a different environment. To import and attach an existing data storage domain to a data center, the target data center must have a compatibility level of 3.5 or higher.

Procedure 7.13. Migrating a Storage Domain between Data Centers in Different Environments

1. Log in to the Administration Portal of the source environment.
2. Shut down all virtual machines running on the required storage domain.
3. Click the **Storage** resource tab and select the storage domain from the results list.
4. Click the **Data Center** tab in the details pane.
5. Click **Maintenance**, then click **OK** to move the storage domain to maintenance mode.
6. Click **Detach**, then click **OK** to detach the storage domain from the source data center.
7. Click **Remove**.
8. In the **Remove Storage(s)** window, ensure the **Format Domain, i.e. Storage Content will be lost!** check box is not selected. This step preserves the data in the storage domain for later use.
9. Click **OK** to remove the storage domain from the source environment.
10. Log in to the Administration Portal of the destination environment.
11. Click the **Storage** resource tab.
12. Click **Import Domain**.

Import Pre-Configured Domain ?

Data Center: Default (V3) | Name: Data

Domain Function: Data | Description:

Storage Type: NFS | Comment:

Use Host: virt-ecs-04

Export Path: storage.example.com:/storage/data
E.g.: myserver.mydomain.com:/my/local/path

Custom Connection Parameters

It is recommended to keep the default values in the fields below unchanged.

NFS Version: V3 (default)

Retransmissions (#):

Timeout (deciseconds):

Additional mount options:

Advanced Parameters

Warning Low Space Indicator (%): 10

Critical Space Action Blocker (GB): 5

Wipe After Delete: ☐

☒ Activate Domain in Data Center

OK Cancel

Figure 7.8. The Import Pre-Configured Domain window

13. Select the destination data center from the **Data Center** drop-down list.
14. Enter a name for the storage domain.
15. Select the **Domain Function** and **Storage Type** from the appropriate drop-down lists.
16. Select a host from the **Use Host** drop-down list.
17. Enter the details of the storage domain.



NOTE

The fields for specifying the details of the storage domain change in accordance with the value you select in the **Storage Type** drop-down list. These options are the same as those available for adding a new storage domain. For more information on these options, see [Section 7.1, “Understanding Storage Domains”](#).

18. Select the **Activate Domain in Data Center** check box to automatically activate the storage domain when it is attached.
19. Click **OK**.

The storage domain is attached to the destination data center in the new Red Hat Enterprise Virtualization environment and is automatically activated. You can now import virtual machines and templates from the imported storage domain to the destination data center.

7.6.5. Importing Virtual Machines from Imported Data Storage Domains

Import a virtual machine from a data storage domain you have imported into your Red Hat Enterprise Virtualization environment. This procedure assumes that the imported data storage domain has been attached to a data center and has been activated.

Procedure 7.14. Importing Virtual Machines from an Imported Data Storage Domain

1. Click the **Storage** resource tab.
2. Click the imported data storage domain.
3. Click the **VM Import** tab in the details pane.
4. Select one or more virtual machines to import.
5. Click **Import**.
6. Select the cluster into which the virtual machines are imported from the **Cluster** list.
7. Click **OK**.

You have imported one or more virtual machines into your environment. The imported virtual machines no longer appear in the list under the **VM Import** tab.

7.6.6. Importing Templates from Imported Data Storage Domains

Import a template from a data storage domain you have imported into your Red Hat Enterprise Virtualization environment. This procedure assumes that the imported data storage domain has been attached to a data center and has been activated.

Procedure 7.15. Importing Templates from an Imported Data Storage Domain

1. Click the **Storage** resource tab.
2. Click the imported data storage domain.
3. Click the **Template Import** tab in the details pane.
4. Select one or more templates to import.
5. Click **Import**.
6. Select the cluster into which the templates are imported from the **Cluster** list.
7. Click **OK**.

You have imported one or more templates into your environment. The imported templates no longer appear in the list under the **Template Import** tab.

7.7. STORAGE TASKS

7.7.1. Populating the ISO Storage Domain

An ISO storage domain is attached to a data center. ISO images must be uploaded to it. Red Hat Enterprise Virtualization provides an ISO uploader tool that ensures that the images are uploaded into the correct directory path, with the correct user permissions.

The creation of ISO images from physical media is not described in this document. It is assumed that you have access to the images required for your environment.

Procedure 7.16. Populating the ISO Storage Domain

1. Copy the required ISO image to a temporary directory on the system running Red Hat Enterprise Virtualization Manager.
2. Log in to the system running Red Hat Enterprise Virtualization Manager as the **root** user.
3. Use the **engine-iso-uploader** command to upload the ISO image. This action will take some time. The amount of time varies depending on the size of the image being uploaded and available network bandwidth.

Example 7.1. ISO Uploader Usage

In this example the ISO image **RHEL6.iso** is uploaded to the ISO domain called **ISODomain** using NFS. The command will prompt for an administrative user name and password. The user name must be provided in the form *user name@domain*.

```
# engine-iso-uploader --iso-domain=ISODomain upload RHEL6.iso
```

The ISO image is uploaded and appears in the ISO storage domain specified. It is also available in the list of available boot media when creating virtual machines in the data center to which the storage domain is attached.

7.7.2. Moving Storage Domains to Maintenance Mode

Detaching and removing storage domains requires that they be in maintenance mode. This is required to redesignate another data domain as the master data domain.

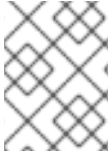
Expanding iSCSI domains by adding more LUNs can only be done when the domain is active.

Procedure 7.17. Moving storage domains to maintenance mode

1. Shut down all the virtual machines running on the storage domain.
2. Click the **Storage** resource tab and select a storage domain.
3. Click the **Data Centers** tab in the details pane.

4. Click **Maintenance** to open the **Storage Domain maintenance** confirmation window.
5. Click **OK** to initiate maintenance mode. The storage domain is deactivated and has an **Inactive** status in the results list.

You can now edit, detach, remove, or reactivate the inactive storage domains from the data center.



NOTE

You can also activate, detach and place domains into maintenance mode using the **Storage** tab on the details pane of the data center it is associated with.

7.7.3. Editing Storage Domains

You can edit storage domain parameters through the Administration Portal. Depending on the state of the storage domain, either active or inactive, different fields are available for editing. Fields such as **Data Center**, **Domain Function**, **Storage Type**, and **Format** cannot be changed.

- **Active:** When the storage domain is in an active state, the **Name**, **Description**, **Comment**, **Warning Low Space Indicator (%)**, **Critical Space Action Blocker (GB)**, and **Wipe After Delete** fields can be edited. The **Name** field can only be edited while the storage domain is active. All other fields can also be edited while the storage domain is inactive.
- **Inactive:** When the storage domain is in maintenance mode or unattached, thus in an inactive state, you can edit all fields except **Name**, **Data Center**, **Domain Function**, **Storage Type**, and **Format**. The storage domain must be inactive to edit storage connections, mount options, and other advanced parameters. This is only supported for NFS, POSIX, and Local storage types.



NOTE

iSCSI storage connections cannot be edited via the Administration Portal, but can be edited via the REST API. See [Updating an iSCSI Storage Connection](#).

Procedure 7.18. Editing an Active Storage Domain

1. Click the **Storage** tab and select a storage domain.
2. Click **Edit**.
3. Edit the available fields as required.
4. Click **OK**.

Procedure 7.19. Editing an Inactive Storage Domain

1. Click the **Storage** tab and select a storage domain.
2. If the storage domain is active, click the **Data Center** tab in the details pane and click **Maintenance**.

3. Click **Edit**.
4. Edit the storage path and other details as required. The new connection details must be of the same storage type as the original connection.
5. Click **OK**.
6. Click the **Data Center** tab in the details pane and click **Activate**.

7.7.4. Activating Storage Domains from Maintenance Mode

If you have been making changes to a data center's storage, you have to put storage domains into maintenance mode. Activate a storage domain to resume using it.

1. Click the **Storage** resource tab and select an inactive storage domain in the results list.
2. Click the **Data Centers** tab in the details pane.
3. Select the appropriate storage domain and click **Activate**.



IMPORTANT

If you attempt to activate the ISO domain before activating the data domain, an error message displays and the domain is not activated.

7.7.5. Removing a Storage Domain

You have a storage domain in your data center that you want to remove from the virtualized environment.

Procedure 7.20. Removing a Storage Domain

1. Click the **Storage** resource tab and select the appropriate storage domain in the results list.
2. Move the domain into maintenance mode to deactivate it.
3. Detach the domain from the data center.
4. Click **Remove** to open the **Remove Storage** confirmation window.
5. Select a host from the list.
6. Click **OK** to remove the storage domain and close the window.

The storage domain is permanently removed from the environment.

7.7.6. Destroying a Storage Domain

A storage domain encountering errors may not be able to be removed through the normal procedure. Destroying a storage domain will forcibly remove the storage domain from the virtualized environment without reference to the export directory.

When the storage domain is destroyed, you are required to manually fix the export directory of the storage domain before it can be used again.

Procedure 7.21. Destroying a Storage Domain

1. Use the **Storage** resource tab, tree mode, or the search function to find and select the appropriate storage domain in the results list.
2. Right-click the storage domain and select **Destroy** to open the **Destroy Storage Domain** confirmation window.
3. Select the **Approve operation** check box and click **OK** to destroy the storage domain and close the window.

The storage domain has been destroyed. Manually clean the export directory for the storage domain to recycle it.

7.7.7. Detaching a Storage Domain from a Data Center

Detach a storage domain from the data center to migrate virtual machines and templates to another data center.

Procedure 7.22. Detaching a Storage Domain from the Data Center

1. Click the **Storage** resource tab, and select a storage domain from the results list.
2. Click the **Data Centers** tab in the details pane and select the storage domain.
3. Click **Maintenance** to open the **Maintenance Storage Domain(s)** confirmation window.
4. Click **OK** to initiate maintenance mode.
5. Click **Detach** to open the **Detach Storage** confirmation window.
6. Click **OK** to detach the storage domain.

The storage domain has been detached from the data center, ready to be attached to another data center.

7.7.8. Attaching a Storage Domain to a Data Center

Attach a storage domain to a data center.

Procedure 7.23. Attaching a Storage Domain to a Data Center

1. Click the **Storage** resource tab, and select a storage domain from the results list.
2. Click the **Data Centers** tab in the details pane.
3. Click **Attach** to open the **Attach to Data Center** window.
4. Select the radio button of the appropriate data center.
5. Click **OK** to attach the storage domain.

The storage domain is attached to the data center and is automatically activated.

7.7.9. Disk Profiles

Disk profiles define the maximum level of throughput and the maximum level of input and output operations for a virtual disk in a storage domain. Disk profiles are created based on storage profiles defined under data centers, and must be manually assigned to individual virtual disks for the profile to take effect.

7.7.9.1. Creating a Disk Profile

Create a disk profile. This procedure assumes you have already defined one or more storage quality of service entries under the data center to which the storage domain belongs.

Procedure 7.24. Creating a Disk Profile

1. Click the **Storage** resource tab and select a data storage domain.
2. Click the **Disk Profiles** sub tab in the details pane.
3. Click **New**.
4. Enter a name for the disk profile in the **Name** field.
5. Enter a description for the disk profile in the **Description** field.
6. Select the quality of service to apply to the disk profile from the **QoS** list.
7. Click **OK**.

You have created a disk profile, and that disk profile can be applied to new virtual disks hosted in the data storage domain.

7.7.9.2. Removing a Disk Profile

Remove an existing disk profile from your Red Hat Enterprise Virtualization environment.





Procedure 7.25. Removing a Disk Profile

1. Click the **Storage** resource tab and select a data storage domain.
2. Click the **Disk Profiles** sub tab in the details pane.
3. Select the disk profile to remove.
4. Click **Remove**.
5. Click **OK**.

You have removed a disk profile, and that disk profile is no longer available. If the disk profile was assigned to any virtual disks, the disk profile is removed from those virtual disks.

7.7.10. Viewing the Health Status of a Storage Domain

Storage domains have an external health status in addition to their regular **Status**. The external health status is reported by plug-ins or external systems, or set by an administrator, and appears to the left of the storage domain's **Name** as one of the following icons:

- **OK:** No icon
- **Info:** 
- **Warning:** 
- **Error:** 
- **Failure:** 

To view further details about the storage domain's health status, select the storage domain and click the **Events** sub-tab.

The storage domain's health status can also be viewed using the REST API. A **GET** request on a storage domain will include the **external_status** element, which contains the health status.

You can set a storage domain's health status in the REST API via the **events** collection. For more information, see [Adding Events](#) in the *REST API Guide*.

7.8. STORAGE AND PERMISSIONS

7.8.1. Managing System Permissions for a Storage Domain

As the **SuperUser**, the system administrator manages all aspects of the Administration Portal. More specific administrative roles can be assigned to other users. These restricted administrator roles are useful for granting a user administrative privileges that limit them to a specific resource. For example, a **DataCenterAdmin** role has administrator privileges only for the assigned data center with the exception of the storage for that data center, and a **ClusterAdmin** has administrator privileges only for the assigned cluster.

A storage administrator is a system administration role for a specific storage domain only. This is useful in data centers with multiple storage domains, where each storage domain requires a system administrator. Use the **Configure** button in the header bar to assign a storage administrator for all storage domains in the environment.

The storage domain administrator role permits the following actions:

- Edit the configuration of the storage domain.
- Move the storage domain into maintenance mode.
- Remove the storage domain.



NOTE

You can only assign roles and permissions to existing users.

You can also change the system administrator of a storage domain by removing the existing system administrator and adding the new system administrator.

7.8.2. Storage Administrator Roles Explained

Storage Domain Permission Roles

The table below describes the administrator roles and privileges applicable to storage domain administration.

Table 7.1. Red Hat Enterprise Virtualization System Administrator Roles

Role	Privileges	Notes
StorageAdmin	Storage Administrator	Can create, delete, configure and manage a specific storage domain.
GlusterAdmin	Gluster Storage Administrator	Can create, delete, configure and manage Gluster storage volumes.

7.8.3. Assigning an Administrator or User Role to a Resource

Assign administrator or user roles to resources to allow users to access or manage that resource.

Procedure 7.26. Assigning a Role to a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Click **Add**.
4. Enter the name or user name of an existing user into the **Search** text box and click **Go**. Select a user from the resulting list of possible matches.
5. Select a role from the **Role to Assign**: drop-down list.
6. Click **OK**.

You have assigned a role to a user; the user now has the inherited permissions of that role enabled for that resource.

7.8.4. Removing an Administrator or User Role from a Resource

Remove an administrator or user role from a resource; the user loses the inherited permissions associated with the role for that resource.

Procedure 7.27. Removing a Role from a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Select the user to remove from the resource.
4. Click **Remove**. The **Remove Permission** window opens to confirm permissions removal.
5. Click **OK**.

You have removed the user's role, and the associated permissions, from the resource.

CHAPTER 8. WORKING WITH RED HAT GLUSTER STORAGE

8.1. RED HAT GLUSTER STORAGE NODES

8.1.1. Adding Red Hat Gluster Storage Nodes

Add Red Hat Gluster Storage nodes to Gluster-enabled clusters and incorporate GlusterFS volumes and bricks into your Red Hat Enterprise Virtualization environment.

This procedure presumes that you have a Gluster-enabled cluster of the appropriate **Compatibility Version** and a Red Hat Gluster Storage node already set up. For information on setting up a Red Hat Gluster Storage node, see the [Red Hat Gluster Storage Installation Guide](#). For more information on the compatibility matrix, see the [Configuring Red Hat Enterprise Virtualization with Red Hat Storage Guide](#).

Procedure 8.1. Adding a Red Hat Gluster Storage Node

1. Click the **Hosts** resource tab to list the hosts in the results list.
2. Click **New** to open the **New Host** window.
3. Use the drop-down menus to select the **Data Center** and **Host Cluster** for the Red Hat Gluster Storage node.
4. Enter the **Name**, **Address**, and **SSH Port** of the Red Hat Gluster Storage node.
5. Select an authentication method to use with the Red Hat Gluster Storage node.
 - Enter the root user's password to use password authentication.
 - Copy the key displayed in the **SSH PublicKey** field to `/root/.ssh/authorized_keys` on the Red Hat Gluster Storage node to use public key authentication.
6. Click **OK** to add the node and close the window.

You have added a Red Hat Gluster Storage node to your Red Hat Enterprise Virtualization environment. You can now use the volume and brick resources of the node in your environment.

8.1.2. Removing a Red Hat Gluster Storage Node

Remove a Red Hat Gluster Storage node from your Red Hat Enterprise Virtualization environment.

Procedure 8.2. Removing a Red Hat Gluster Storage Node

1. Use the **Hosts** resource tab, tree mode, or the search function to find and select the Red Hat Gluster Storage node in the results list.
2. Click **Maintenance** to open the **Maintenance Host(s)** confirmation window.
3. Click **OK** to move the host to maintenance mode.

4. Click **Remove** to open the **Remove Host(s)** confirmation window.
5. Select the **Force Remove** check box if the node has volume bricks on it, or if the node is non-responsive.
6. Click **OK** to remove the node and close the window.

Your Red Hat Gluster Storage node has been removed from the environment and is no longer visible in the **Hosts** tab.

8.2. USING RED HAT GLUSTER STORAGE AS A STORAGE DOMAIN

8.2.1. Introduction to Red Hat Gluster Storage (GlusterFS) Volumes

Red Hat Gluster Storage volumes combine storage from more than one Red Hat Gluster Storage server into a single global namespace. A volume is a collection of bricks, where each brick is a mountpoint or directory on a Red Hat Gluster Storage Server in the trusted storage pool.

Most of the management operations of Red Hat Gluster Storage happen on the volume.

You can use the Administration Portal to create and start new volumes. You can monitor volumes in your Red Hat Gluster Storage cluster from the **Volumes** tab.

While volumes can be created and managed from the Administration Portal, bricks must be created on the individual Red Hat Gluster Storage nodes before they can be added to volumes using the Administration Portal

8.2.2. Gluster Storage Terminology

Table 8.1. Data Center Properties

Term	Definition
Brick	<p>A brick is the GlusterFS basic unit of storage, represented by an export directory on a server in the trusted storage pool. A Brick is expressed by combining a server with an export directory in the following format:</p> <p>SERVER:EXPORT</p> <p>For example:</p> <p>myhostname:/exports/myexportdir/</p>
Block Storage	<p>Block special files or block devices correspond to devices through which the system moves data in the form of blocks. These device nodes often represent addressable devices such as hard disks, CD-ROM drives, or memory-regions. Red Hat Gluster Storage supports XFS file system with extended attributes.</p>

Term	Definition
Cluster	A trusted pool of linked computers, working together closely thus in many respects forming a single computer. In Red Hat Gluster Storage terminology a cluster is called a trusted storage pool.
Client	The machine that mounts the volume (this may also be a server).
Distributed File System	A file system that allows multiple clients to concurrently access data spread across multiple servers/bricks in a trusted storage pool. Data sharing among multiple locations is fundamental to all distributed file systems.
Geo-Replication	Geo-replication provides a continuous, asynchronous, and incremental replication service from site to another over Local Area Networks (LAN), Wide Area Network (WAN), and across the Internet.
glusterd	The Gluster management daemon that needs to run on all servers in the trusted storage pool.
Metadata	Metadata is data providing information about one or more other pieces of data.
N-way Replication	Local synchronous data replication typically deployed across campus or Amazon Web Services Availability Zones.
Namespace	Namespace is an abstract container or environment created to hold a logical grouping of unique identifiers or symbols. Each Red Hat Gluster Storage trusted storage pool exposes a single namespace as a POSIX mount point that contains every file in the trusted storage pool.
POSIX	Portable Operating System Interface (for Unix) is the name of a family of related standards specified by the IEEE to define the application programming interface (API), along with shell and utilities interfaces for software compatible with variants of the UNIX operating system. Red Hat Gluster Storage exports a fully POSIX compatible file system.
RAID	Redundant Array of Inexpensive Disks (RAID) is a technology that provides increased storage reliability through redundancy, combining multiple low-cost, less-reliable disk drives components into a logical unit where all drives in the array are interdependent.

Term	Definition
RRDNS	Round Robin Domain Name Service (RRDNS) is a method to distribute load across application servers. RRDNS is implemented by creating multiple A records with the same name and different IP addresses in the zone file of a DNS server.
Server	The machine (virtual or bare-metal) which hosts the actual file system in which data will be stored.
Scale-Up Storage	Increases the capacity of the storage device, but only in a single dimension. An example might be adding additional disk capacity to a single computer in a trusted storage pool.
Scale-Out Storage	Increases the capability of a storage device in multiple dimensions. For example adding a server to a trusted storage pool increases CPU, disk capacity, and throughput for the trusted storage pool.
Subvolume	A subvolume is a brick after being processed by at least one translator.
Translator	A translator connects to one or more subvolumes, does something with them, and offers a subvolume connection.
Trusted Storage Pool	A storage pool is a trusted network of storage servers. When you start the first server, the storage pool consists of that server alone.
User Space	Applications running in user space do not directly interact with hardware, instead using the kernel to moderate access. User Space applications are generally more portable than applications in kernel space. Gluster is a user space application.
Virtual File System (VFS)	VFS is a kernel software layer that handles all system calls related to the standard Linux file system. It provides a common interface to several kinds of file systems.
Volume File	The volume file is a configuration file used by GlusterFS process. The volume file will usually be located at: <code>/var/lib/glusterd/vols/VOLNAME.</code>
Volume	A volume is a logical collection of bricks. Most of the Gluster management operations happen on the volume.

8.2.3. Attaching a Red Hat Gluster Storage Volume as a Storage Domain

Add a Red Hat Gluster Storage volume to the Red Hat Enterprise Virtualization Manager to be used directly as a storage domain. This differs from adding a Red Hat Storage Gluster node, which enables control over the volumes and bricks of the node from within the Red Hat Enterprise Virtualization Manager, and does not require a Gluster-enabled cluster.

The host requires the `glusterfs`, `glusterfs-fuse`, and `glusterfs-cli` packages to be installed in order to mount the volume. The `glusterfs-cli` package is available from the **rh-common-rpms** channel on the Customer Portal.

For information on setting up a Red Hat Gluster Storage node, see the [Red Hat Gluster Storage Installation Guide](#). For more information on preparing a host to be used with Red Hat Storage Gluster volumes, see the [Configuring Red Hat Enterprise Virtualization with Red Hat Gluster Storage Guide](#). For more information on the compatibility matrix, see the [Configuring Red Hat Enterprise Virtualization with Red Hat Storage Guide](#).

Procedure 8.3. Adding a Red Hat Gluster Storage Volume as a Storage Domain

1. Click the **Storage** resource tab to list the existing storage domains in the results list.
2. Click **New Domain** to open the **New Domain** window.

Data Center	Default (V3)	Name	RHGS_SD
Domain Function	Data	Description	Red Hat Gluster Storage
Storage Type	GlusterFS	Comment	
Use Host	Host01		

For data integrity make sure that the server is configured with Quorum (both client and server Quorum)

Path:

E.g.: myserver.mydomain.com:/myvolumename

VFS Type:

Mount Options:

Advanced Parameters

Warning Low Space Indicator (%):

Critical Space Action Blocker (GB):

Format:

Wipe After Delete: ☐

OK Cancel

Figure 8.1. Red Hat Gluster Storage

3. Enter the **Name** for the storage domain.
4. Select the **Data Center** to be associated with the storage domain.
5. Select **Data** from the **Domain Function** drop-down list.
6. Select **GlusterFS** from the **Storage Type** drop-down list.
7. Select a host from the **Use Host** drop-down list. Only hosts within the selected data center will be listed. To mount the volume, the host that you select must have the `glusterfs` and `glusterfs-fuse` packages installed.
8. In the **Path** field, enter the IP address or FQDN of the Red Hat Gluster Storage server and the volume name separated by a colon.
9. Enter additional **Mount Options**, as you would normally provide them to the `mount` command using the `-o` argument. The mount options should be provided in a comma-separated list. See `man mount` for a list of valid mount options.
10. Optionally, you can configure the advanced parameters.
 - a. Click **Advanced Parameters**.
 - b. Enter a percentage value into the **Warning Low Space Indicator** field. If the free space available on the storage domain is below this percentage, warning messages are displayed to the user and logged.
 - c. Enter a GB value into the **Critical Space Action Blocker** field. If the free space available on the storage domain is below this value, error messages are displayed to the user and logged, and any new action that consumes space, even temporarily, will be blocked.
 - d. Select the **Wipe After Delete** check box to enable the wipe after delete option. This option can be edited after the domain is created, but doing so will not change the wipe after delete property of disks that already exist.
11. Click **OK** to mount the volume as a storage domain and close the window.

8.2.4. Creating a Storage Volume

You can create new volumes using the Administration Portal. When creating a new volume, you must specify the bricks that comprise the volume and specify whether the volume is to be distributed, replicated, or striped.

You must create brick directories or mountpoints before you can add them to volumes.



IMPORTANT

It is recommended that you use replicated volumes, where bricks exported from different hosts are combined into a volume. Replicated volumes create copies of files across multiple bricks in the volume, preventing data loss when a host is fenced.

Procedure 8.4. Creating A Storage Volume

1. Click the **Volumes** resource tab to list existing volumes in the results list.

2. Click **New** to open the **New Volume** window.
3. Use the drop-down menus to select the **Data Center** and **Volume Cluster**.
4. Enter the **Name** of the volume.
5. Use the drop-down menu to select the **Type** of the volume.
6. If active, select the appropriate **Transport Type** check box.
7. Click the **Add Bricks** button to select bricks to add to the volume. Bricks must be created externally on the Red Hat Gluster Storage nodes.
8. If active, use the **Gluster**, **NFS**, and **CIFS** check boxes to select the appropriate access protocols used for the volume.
9. Enter the volume access control as a comma-separated list of IP addresses or hostnames in the **Allow Access From** field.

You can use the * wildcard to specify ranges of IP addresses or hostnames.

10. Select the **Optimize for Virt Store** option to set the parameters to optimize your volume for virtual machine storage. Select this if you intend to use this volume as a storage domain.
11. Click **OK** to create the volume. The new volume is added and displays on the **Volume** tab.

You have added a Red Hat Gluster Storage volume. You can now use it for storage.

8.2.5. Adding Bricks to a Volume

Summary

You can expand your volumes by adding new bricks. You need to add at least one brick to a distributed volume, multiples of two bricks to replicated volumes, and multiples of four bricks to striped volumes when expanding your storage space.

Procedure 8.5. Adding Bricks to a Volume

1. On the **Volumes** tab on the navigation pane, select the volume to which you want to add bricks.
2. Click the **Bricks** tab from the Details pane.
3. Click **Add Bricks** to open the **Add Bricks** window.
4. Use the **Server** drop-down menu to select the server on which the brick resides.
5. Enter the path of the **Brick Directory**. The directory must already exist.
6. Click **Add**. The brick appears in the list of bricks in the volume, with server addresses and brick directory names.
7. Click **OK**.

Result

The new bricks are added to the volume and the bricks display in the volume's **Bricks** tab.

8.2.6. Explanation of Settings in the Add Bricks Window

Table 8.2. Add Bricks Tab Properties

Field Name	Description
Volume Type	Displays the type of volume. This field cannot be changed; it was set when you created the volume.
Server	The server where the bricks are hosted.
Brick Directory	The brick directory or mountpoint.

8.2.7. Optimizing Red Hat Gluster Storage Volumes to Store Virtual Machine Images

Optimize a Red Hat Gluster Storage volume to store virtual machine images using the Administration Portal.

To optimize a volume for storing virtual machines, the Manager sets a number of virtualization-specific parameters for the volume.



IMPORTANT

Red Hat Gluster Storage currently supports Red Hat Enterprise Virtualization 3.3 and above. All Gluster clusters and hosts must be attached to data centers that are compatible with versions higher than 3.3.

Volumes can be optimized to store virtual machines during creation by selecting the **Optimize for Virt Store** check box, or after creation using the **Optimize for Virt Store** button from the **Volumes** resource tab.



IMPORTANT

If a volume is replicated across three or more nodes, ensure the volume is optimized for virtual storage to avoid data inconsistencies across the nodes.

An alternate method is to access one of the Red Hat Gluster Storage nodes and set the volume group to **virt**. This sets the **cluster.quorum-type** parameter to **auto**, and the **cluster.server-quorum-type** parameter to **server**.

```
# gluster volume set VOLUME_NAME group virt
```

Verify the status of the volume by listing the volume information:

```
# gluster volume info VOLUME_NAME
```

8.2.8. Starting Volumes

Summary

After a volume has been created or an existing volume has been stopped, it needs to be started before it can be used.

Procedure 8.6. Starting Volumes

1. In the **Volumes** tab, select the volume to be started.

You can select multiple volumes to start by using **Shift** or **Ctrl** key.

2. Click the **Start** button.

The volume status changes to **Up**.

Result

You can now use your volume for virtual machine storage.

8.2.9. Tuning Volumes

Summary

Tuning volumes allows you to affect their performance. To tune volumes, you add options to them.

Procedure 8.7. Tuning Volumes

1. Click the **Volumes** tab.

A list of volumes displays.

2. Select the volume that you want to tune, and click the **Volume Options** tab from the Details pane.

The **Volume Options** tab displays a list of options set for the volume.

3. Click **Add** to set an option. The **Add Option** dialog box displays. Select the Option Key from the drop down list and enter the option value.

4. Click **OK**.

The option is set and displays in the **Volume Options** tab.

Result

You have tuned the options for your storage volume.

8.2.10. Editing Volume Options

Summary

You have tuned your volume by adding options to it. You can change the options for your storage volume.

Procedure 8.8. Editing Volume Options

1. Click the **Volumes** tab.

A list of volumes displays.

2. Select the volume that you want to edit, and click the **Volume Options** tab from the Details pane.

The **Volume Options** tab displays a list of options set for the volume.

3. Select the option you want to edit. Click **Edit**. The **Edit Option** dialog box displays. Enter a new value for the option.

4. Click **OK**.

The edited option displays in the **Volume Options** tab.

Result

You have changed the options on your volume.

8.2.11. Reset Volume Options

Summary

You can reset options to revert them to their default values.

1. Click the **Volumes** tab.

A list of volumes displays.

2. Select the volume and click the **Volume Options** tab from the Details pane.

The **Volume Options** tab displays a list of options set for the volume.

3. Select the option you want to reset. Click **Reset**. A dialog box displays, prompting to confirm the reset option.

4. Click **OK**.

The selected option is reset.



NOTE

You can reset all volume options by clicking **Reset All** button. A dialog box displays, prompting to confirm the reset option. Click **OK**. All volume options are reset for the selected volume.

Result

You have reset volume options to default.

8.2.12. Removing Bricks from a Volume

Summary

You can shrink volumes, as needed, while the cluster is online and available. For example, you might need to remove a brick that has become inaccessible in a distributed volume due to hardware or network failure.

Procedure 8.9. Removing Bricks from a Volume

1. On the **Volumes** tab on the navigation pane, select the volume from which you wish to remove bricks.
2. Click the **Bricks** tab from the Details pane.
3. Select the bricks you wish to remove. Click **Remove Bricks**.
4. A window opens, prompting to confirm the deletion. Click **OK** to confirm.

Result

The bricks are removed from the volume.

8.2.13. Stopping Red Hat Gluster Storage Volumes

After a volume has been started, it can be stopped.

Procedure 8.10. Stopping Volumes

1. In the **Volumes** tab, select the volume to be stopped.

You can select multiple volumes to stop by using **Shift** or **Ctrl** key.
2. Click **Stop**.

8.2.14. Deleting Red Hat Gluster Storage Volumes

You can delete a volume or multiple volumes from your cluster.

1. In the **Volumes** tab, select the volume to be deleted.
2. Click **Remove**. A dialog box displays, prompting to confirm the deletion. Click **OK**.

8.2.15. Rebalancing Volumes

Summary

If a volume has been expanded or shrunk by adding or removing bricks to or from that volume, the data on the volume must be rebalanced amongst the servers.

Procedure 8.11. Rebalancing a Volume

1. Click the **Volumes** tab.

A list of volumes displays.
2. Select the volume to rebalance.
3. Click **Rebalance**.

Result

The selected volume is rebalanced.

8.3. CLUSTERS AND GLUSTER HOOKS

8.3.1. Managing Gluster Hooks

Gluster hooks are volume life cycle extensions. You can manage Gluster hooks from the Manager. The content of the hook can be viewed if the hook content type is **Text**.

Through the Manager, you can perform the following:

- View a list of hooks available in the hosts.
- View the content and status of hooks.
- Enable or disable hooks.
- Resolve hook conflicts.

8.3.2. Listing Hooks

Summary

List the Gluster hooks in your environment.

Procedure 8.12. Listing a Hook

1. Use the **Cluster** resource tab, tree mode, or the search function to find and select a cluster in the results list.
2. Select the **Gluster Hooks** sub-tab to list the hooks in the details pane.

Result

You have listed the Gluster hooks in your environment.

8.3.3. Viewing the Content of Hooks

Summary

View the content of a Gluster hook in your environment.

Procedure 8.13. Viewing the Content of a Hook

1. Use the **Cluster** resource tab, tree mode, or the search function to find and select a cluster in the results list.
2. Select the **Gluster Hooks** sub-tab to list the hooks in the details pane.
3. Select a hook with content type **Text** and click the **View Content** button to open the **Hook Content** window.

Result

You have viewed the content of a hook in your environment.

8.3.4. Enabling or Disabling Hooks

Summary

Toggle the activity of a Gluster hook by enabling or disabling it.

Procedure 8.14. Enabling or Disabling a Hook

1. Use the **Cluster** resource tab, tree mode, or the search function to find and select a cluster in the results list.
2. Select the **Gluster Hooks** sub-tab to list the hooks in the details pane.
3. Select a hook and click one of the **Enable** or **Disable** buttons. The hook is enabled or disabled on all nodes of the cluster.

Result

You have toggled the activity of a Gluster hook in your environment.

8.3.5. Refreshing Hooks

Summary

By default, the Manager checks the status of installed hooks on the engine and on all servers in the cluster and detects new hooks by running a periodic job every hour. You can refresh hooks manually by clicking the **Sync** button.

Procedure 8.15. Refreshing a Hook

1. Use the **Cluster** resource tab, tree mode, or the search function to find and select a cluster in the results list.
2. Select the **Gluster Hooks** sub-tab to list the hooks in the details pane.
3. Click the **Sync** button.

Result

The hooks are synchronized and updated in the details pane.

8.3.6. Resolving Conflicts

The hooks are displayed in the **Gluster Hooks** sub-tab of the **Cluster** tab. Hooks causing a conflict are displayed with an exclamation mark. This denotes either that there is a conflict in the content or the status of the hook across the servers in the cluster, or that the hook script is missing in one or more servers. These conflicts can be resolved via the Manager. The hooks in the servers are periodically synchronized with engine database and the following conflicts can occur for the hooks:

- Content Conflict - the content of the hook is different across servers.
- Missing Conflict - one or more servers of the cluster do not have the hook.
- Status Conflict - the status of the hook is different across servers.
- Multiple Conflicts - a hook has a combination of two or more of the aforementioned conflicts.

8.3.7. Resolving Content Conflicts

Summary

A hook that is not consistent across the servers and engine will be flagged as having a conflict. To resolve the conflict, you must select a version of the hook to be copied across all servers and the engine.

Procedure 8.16. Resolving a Content Conflict

1. Use the **Cluster** resource tab, tree mode, or the search function to find and select a cluster in the results list.
2. Select the **Gluster Hooks** sub-tab to list the hooks in the details pane.
3. Select the conflicting hook and click the **Resolve Conflicts** button to open the **Resolve Conflicts** window.
4. Select the engine or a server from the list of sources to view the content of that hook and establish which version of the hook to copy.



NOTE

The content of the hook will be overwritten in all servers and in the engine.

5. Use the **Use content from** drop-down menu to select the preferred server or the engine.
6. Click **OK** to resolve the conflict and close the window.

Result

The hook from the selected server is copied across all servers and the engine to be consistent across the environment.

8.3.8. Resolving Missing Hook Conflicts

Summary

A hook that is not present on all the servers and the engine will be flagged as having a conflict. To resolve the conflict, either select a version of the hook to be copied across all servers and the engine, or remove the missing hook entirely.

Procedure 8.17. Resolving a Missing Hook Conflict

1. Use the **Cluster** resource tab, tree mode, or the search function to find and select a cluster in the results list.
2. Select the **Gluster Hooks** sub-tab to list the hooks in the details pane.
3. Select the conflicting hook and click the **Resolve Conflicts** button to open the **Resolve Conflicts** window.
4. Select any source with a status of **Enabled** to view the content of the hook.
5. Select the appropriate radio button, either **Copy the hook to all the servers** or

Remove the missing hook. The latter will remove the hook from the engine and all servers.

6. Click **OK** to resolve the conflict and close the window.

Result

Depending on your chosen resolution, the hook has either been removed from the environment entirely, or has been copied across all servers and the engine to be consistent across the environment.

8.3.9. Resolving Status Conflicts

Summary

A hook that does not have a consistent status across the servers and engine will be flagged as having a conflict. To resolve the conflict, select a status to be enforced across all servers in the environment.

Procedure 8.18. Resolving a Status Conflict

1. Use the **Cluster** resource tab, tree mode, or the search function to find and select a cluster in the results list.
2. Select the **Gluster Hooks** sub-tab to list the hooks in the details pane.
3. Select the conflicting hook and click the **Resolve Conflicts** button to open the **Resolve Conflicts** window.
4. Set **Hook Status** to **Enable** or **Disable**.
5. Click **OK** to resolve the conflict and close the window.

Result

The selected status for the hook is enforced across the engine and the servers to be consistent across the environment.

8.3.10. Resolving Multiple Conflicts

Summary

A hook may have a combination of two or more conflicts. These can all be resolved concurrently or independently through the **Resolve Conflicts** window. This procedure will resolve all conflicts for the hook so that it is consistent across the engine and all servers in the environment.

Procedure 8.19. Resolving Multiple Conflicts

1. Use the **Cluster** resource tab, tree mode, or the search function to find and select a cluster in the results list.
2. Select the **Gluster Hooks** sub-tab to list the hooks in the details pane.
3. Select the conflicting hook and click the **Resolve Conflicts** button to open the **Resolve Conflicts** window.

4. Choose a resolution to each of the affecting conflicts, as per the appropriate procedure.
5. Click **OK** to resolve the conflicts and close the window.

Result

You have resolved all of the conflicts so that the hook is consistent across the engine and all servers.

8.3.11. Managing Gluster Sync

The Gluster Sync feature periodically fetches the latest cluster configuration from GlusterFS and syncs the same with the engine DB. This process can be performed through the Manager. When a cluster is selected, the user is provided with the option to import hosts or detach existing hosts from the selected cluster. You can perform Gluster Sync if there is a host in the cluster.



NOTE

The Manager continuously monitors if hosts are added to or removed from the storage cluster. If the addition or removal of a host is detected, an action item is shown in the **General** tab for the cluster, where you can either choose to **Import** the host into or **Detach** the host from the cluster.

CHAPTER 9. POOLS

9.1. INTRODUCTION TO VIRTUAL MACHINE POOLS

A virtual machine pool is a group of virtual machines that are all clones of the same template and that can be used on demand by any user in a given group. Virtual machine pools allow administrators to rapidly configure a set of generalized virtual machines for users.

Users access a virtual machine pool by taking a virtual machine from the pool. When a user takes a virtual machine from a pool, they are provided with any one of the virtual machines in the pool if any are available. That virtual machine will have the same operating system and configuration as that of the template on which the pool was based, but users may not receive the same member of the pool each time they take a virtual machine. Users can also take multiple virtual machines from the same virtual machine pool depending on the configuration of that pool.

Virtual machines in a virtual machine pool are stateless, meaning that data is not persistent across reboots. However, if a user configures console options for a virtual machine taken from a virtual machine pool, those options will be set as the default for that user for that virtual machine pool.

In principle, virtual machines in a pool are started when taken by a user, and shut down when the user is finished. However, virtual machine pools can also contain pre-started virtual machines. Pre-started virtual machines are kept in an up state, and remain idle until they are taken by a user. This allows users to start using such virtual machines immediately, but these virtual machines will consume system resources even while not in use due to being idle.



NOTE

Virtual machines taken from a pool are not stateless when accessed from the Administration Portal. This is because administrators need to be able to write changes to the disk if necessary.

9.2. VIRTUAL MACHINE POOL TASKS

9.2.1. Creating a Virtual Machine Pool

You can create a virtual machine pool that contains multiple virtual machines that have been created based on a common template.

Procedure 9.1. Creating a Virtual Machine Pool

1. Click the **Pools** tab.
2. Click the **New** button to open the **New Pool** window.
3. Use the drop down-list to select the **Cluster** or use the selected default.
4. Use the **Template** drop-down menu to select the required template and version or use the selected default. A template provides standard settings for all the virtual machines in the pool.

5. Use the **Operating System** drop-down list to select an **Operating System** or use the default provided by the template.
6. Use the **Optimized for** drop-down list to optimize virtual machines for either **Desktop** use or **Server** use.
7. Enter a **Name** and **Description**, any **Comments**, and the **Number of VMs** for the pool.
8. Enter the number of virtual machines to be prestarted in the **Prestarted VMs** field.
9. Select the **Maximum number of VMs per user** that a single user is allowed to run in a session. The minimum is one.
10. Select the **Delete Protection** check box to enable delete protection.
11. Optionally, click the **Show Advanced Options** button and perform the following steps:
 - a. Click the **Type** tab and select a **Pool Type**:
 - **Manual** - The administrator is responsible for explicitly returning the virtual machine to the pool. The virtual machine reverts to the original base image after the administrator returns it to the pool.
 - **Automatic** - When the virtual machine is shut down, it automatically reverts to its base image and is returned to the virtual machine pool.
 - b. Select the **Console** tab. At the bottom of the tab window, select the **Override SPICE Proxy** check box to enable the **Overridden SPICE proxy address** text field. Specify the address of a SPICE proxy to override the global SPICE proxy.
12. Click **OK**.

You have created and configured a virtual machine pool with the specified number of identical virtual machines. You can view these virtual machines in the **Virtual Machines** resource tab, or in the details pane of the **Pools** resource tab; a virtual machine in a pool is distinguished from independent virtual machines by its icon.

9.2.2. Explanation of Settings and Controls in the New Pool and Edit Pool Windows

9.2.2.1. New Pool and Edit Pool General Settings Explained

The following table details the information required on the **General** tab of the **New Pool** and **Edit Pool** windows that are specific to virtual machine pools. All other settings are identical to those in the **New Virtual Machine** window.

Table 9.1. General settings

Field Name	Description
Template	The template on which the virtual machine pool is based.

Field Name	Description
Description	A meaningful description of the virtual machine pool.
Comment	A field for adding plain text human-readable comments regarding the virtual machine pool.
Prestarted VMs	Allows you to specify the number of virtual machines in the virtual machine pool that will be started before they are taken and kept in that state to be taken by users. The value of this field must be between 0 and the total number of virtual machines in the virtual machine pool.
Number of VMs/Increase number of VMs in pool by	Allows you to specify the number of virtual machines to be created and made available in the virtual machine pool. In the edit window it allows you to increase the number of virtual machines in the virtual machine pool by the specified number. By default, the maximum number of virtual machines you can create in a pool is 1000. This value can be configured using the MaxVmsInPool key of the engine-config command.
Maximum number of VMs per user	Allows you to specify the maximum number of virtual machines a single user can take from the virtual machine pool at any one time. The value of this field must be between 1 and 32,767 .
Delete Protection	Allows you to prevent the virtual machines in the pool from being deleted.

9.2.2.2. New and Edit Pool Type Settings Explained

The following table details the information required on the **Type** tab of the **New Pool** and **Edit Pool** windows.

Table 9.2. Type settings

Field Name	Description
------------	-------------

Field Name	Description
Pool Type	<p>This drop-down menu allows you to specify the type of the virtual machine pool. The following options are available:</p> <ul style="list-style-type: none"> • Automatic: After a user finishes using a virtual machine taken from a virtual machine pool, that virtual machine is automatically returned to the virtual machine pool. • Manual: After a user finishes using a virtual machine taken from a virtual machine pool, that virtual machine is only returned to the virtual machine pool when an administrator manually returns the virtual machine.

9.2.2.3. New Pool and Edit Pool Console Settings Explained

The following table details the information required on the **Console** tab of the **New Pool** or **Edit Pool** window that is specific to virtual machine pools. All other settings are identical to those in the **New Virtual Machine** and **Edit Virtual Machine** windows.

Table 9.3. Console settings

Field Name	Description
Override SPICE proxy	<p>Select this check box to enable overriding the SPICE proxy defined in global configuration. This feature is useful in a case where the user (who is, for example, connecting via the User Portal) is outside of the network where the hypervisors reside.</p>
Overridden SPICE proxy address	<p>The proxy by which the SPICE client will connect to virtual machines. This proxy overrides both the global SPICE proxy defined for the Red Hat Enterprise Virtualization environment and the SPICE proxy defined for the cluster to which the virtual machine pool belongs, if any. The address must be in the following format:</p> <pre>protocol://[host]:[port]</pre>

9.2.3. Editing a Virtual Machine Pool

9.2.3.1. Editing a Virtual Machine Pool

After a virtual machine pool has been created, its properties can be edited. The properties available when editing a virtual machine pool are identical to those available when creating

a new virtual machine pool except that the **Number of VMs** property is replaced by **Increase number of VMs in pool by**.

Procedure 9.2. Editing a Virtual Machine Pool

1. Click the **Pools** resource tab, and select a virtual machine pool from the results list.
2. Click **Edit** to open the **Edit Pool** window.
3. Edit the properties of the virtual machine pool.
4. Click **Ok**.

9.2.3.2. Prestarting Virtual Machines in a Pool

The virtual machines in a virtual machine pool are powered down by default. When a user requests a virtual machine from a pool, a machine is powered up and assigned to the user. In contrast, a prestarted virtual machine is already running and waiting to be assigned to a user, decreasing the amount of time a user has to wait before being able to access a machine. When a prestarted virtual machine is shut down it is returned to the pool and restored to its original state. The maximum number of prestarted virtual machines is the number of virtual machines in the pool.

Prestarted virtual machines are suitable for environments in which users require immediate access to virtual machines which are not specifically assigned to them. Only automatic pools can have prestarted virtual machines.

Procedure 9.3. Prestarting Virtual Machines in a Pool

1. Use the **Pools** resource tab, tree mode, or the search function to find and select the virtual machine pool in the results list.
2. Click **Edit** to open the **Edit Pool** window.
3. Enter the number of virtual machines to be prestarted in the **Prestarted VMs** field.
4. Select the **Pool** tab. Ensure **Pool Type** is set to **Automatic**.
5. Click **OK**.

You have set a number of prestarted virtual machines in a pool. The prestarted machines are running and available for use.

9.2.3.3. Adding Virtual Machines to a Virtual Machine Pool

If you require more virtual machines than originally provisioned in a virtual machine pool, add more machines to the pool.

Procedure 9.4. Adding Virtual Machines to a Virtual Machine Pool

1. Use the **Pools** resource tab, tree mode, or the search function to find and select the virtual machine pool in the results list.
2. Click **Edit** to open the **Edit Pool** window.

3. Enter the number of additional virtual machines to add in the **Increase number of VMs in pool by** field.
4. Click **OK**.

You have added more virtual machines to the virtual machine pool.

9.2.3.4. Detaching Virtual Machines from a Virtual Machine Pool

You can detach virtual machines from a virtual machine pool. Detaching a virtual machine removes it from the pool to become an independent virtual machine.

Procedure 9.5. Detaching Virtual Machines from a Virtual Machine Pool

1. Use the **Pools** resource tab, tree mode, or the search function to find and select the virtual machine pool in the results list.
2. Ensure the virtual machine has a status of **Down** because you cannot detach a running virtual machine.

Click the **Virtual Machines** tab in the details pane to list the virtual machines in the pool.

3. Select one or more virtual machines and click **Detach** to open the **Detach Virtual Machine(s)** confirmation window.
4. Click **OK** to detach the virtual machine from the pool.



NOTE

The virtual machine still exists in the environment and can be viewed and accessed from the **Virtual Machines** resource tab. Note that the icon changes to denote that the detached virtual machine is an independent virtual machine.

You have detached a virtual machine from the virtual machine pool.

9.2.4. Removing a Virtual Machine Pool

You can remove a virtual machine pool from a data center. You must first either delete or detach all of the virtual machines in the pool. Detaching virtual machines from the pool will preserve them as independent virtual machines.

Procedure 9.6. Removing a Virtual Machine Pool

1. Use the **Pools** resource tab, tree mode, or the search function to find and select the virtual machine pool in the results list.
2. Click **Remove** to open the **Remove Pool(s)** confirmation window.
3. Click **OK** to remove the pool.

You have removed the pool from the data center.

9.3. POOLS AND PERMISSIONS

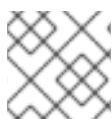
9.3.1. Managing System Permissions for a Virtual Machine Pool

As the **SuperUser**, the system administrator manages all aspects of the Administration Portal. More specific administrative roles can be assigned to other users. These restricted administrator roles are useful for granting a user administrative privileges that limit them to a specific resource. For example, a **DataCenterAdmin** role has administrator privileges only for the assigned data center with the exception of the storage for that data center, and a **ClusterAdmin** has administrator privileges only for the assigned cluster.

A virtual machine pool administrator is a system administration role for virtual machine pools in a data center. This role can be applied to specific virtual machine pools, to a data center, or to the whole virtualized environment; this is useful to allow different users to manage certain virtual machine pool resources.

The virtual machine pool administrator role permits the following actions:

- Create, edit, and remove pools.
- Add and detach virtual machines from the pool.



NOTE

You can only assign roles and permissions to existing users.

9.3.2. Virtual Machine Pool Administrator Roles Explained

Pool Permission Roles

The table below describes the administrator roles and privileges applicable to pool administration.

Table 9.4. Red Hat Enterprise Virtualization System Administrator Roles

Role	Privileges	Notes
VmPoolAdmin	System Administrator role of a virtual pool.	Can create, delete, and configure a virtual pool, assign and remove virtual pool users, and perform basic operations on a virtual machine.
ClusterAdmin	Cluster Administrator	Can use, create, delete, manage all virtual machine pools in a specific cluster.

9.3.3. Assigning an Administrator or User Role to a Resource

Assign administrator or user roles to resources to allow users to access or manage that resource.

Procedure 9.7. Assigning a Role to a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Click **Add**.
4. Enter the name or user name of an existing user into the **Search** text box and click **Go**. Select a user from the resulting list of possible matches.
5. Select a role from the **Role to Assign:** drop-down list.
6. Click **OK**.

You have assigned a role to a user; the user now has the inherited permissions of that role enabled for that resource.

9.3.4. Removing an Administrator or User Role from a Resource

Remove an administrator or user role from a resource; the user loses the inherited permissions associated with the role for that resource.

Procedure 9.8. Removing a Role from a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Select the user to remove from the resource.
4. Click **Remove**. The **Remove Permission** window opens to confirm permissions removal.
5. Click **OK**.

You have removed the user's role, and the associated permissions, from the resource.

9.4. TRUSTED COMPUTE POOLS

Trusted compute pools are secure clusters based on Intel Trusted Execution Technology (Intel TXT). Trusted clusters only allow hosts that are verified by Intel's OpenAttestation, which measures the integrity of the host's hardware and software against a White List database. Trusted hosts and the virtual machines running on them can be assigned tasks that require higher security. For more information on Intel TXT, trusted systems, and attestation, see <https://software.intel.com/en-us/articles/intel-trusted-execution-technology-intel-txt-enabling-guide>.

Creating a trusted compute pool involves the following steps:

- Configuring the Manager to communicate with an OpenAttestation server.
- Creating a trusted cluster that can only run trusted hosts.

- Adding trusted hosts to the trusted cluster. Hosts must be running the OpenAttestation agent to be verified as trusted by the OpenAttestation sever.

For information on installing an OpenAttestation server, installing the OpenAttestation agent on hosts, and creating a White List database, see <https://github.com/OpenAttestation/OpenAttestation/wiki>.

9.4.1. Connecting an OpenAttestation Server to the Manager

Before you can create a trusted cluster, the Red Hat Enterprise Virtualization Manager must be configured to recognize the OpenAttestation server. Use **engine-config** to add the OpenAttestation server's FQDN or IP address:

```
# engine-config -s AttestationServer=attestationserver.example.com
```

The following settings can also be changed if required:

Table 9.5. OpenAttestation Settings for engine-config

Option	Default Value	Description
AttestationServer	oat-server	The FQDN or IP address of the OpenAttestation server. This must be set for the Manager to communicate with the OpenAttestation server.
AttestationPort	8443	The port used by the OpenAttestation server to communicate with the Manager.
AttestationTruststore	TrustStore.jks	The trust store used for securing communication with the OpenAttestation server.
AttestationTruststorePass	password	The password used to access the trust store.
AttestationFirstStageSize	10	Used for quick initialization. Changing this value without good reason is not recommended.
SecureConnectionWithOATServer	true	Enables or disables secure communication with OpenAttestation servers.
PollUri	AttestationService/resources/PollHosts	The URI used for accessing the OpenAttestation service.

9.4.2. Creating a Trusted Cluster

Trusted clusters communicate with an OpenAttestation server to assess the security of hosts. When a host is added to a trusted cluster, the OpenAttestation server measures the host's hardware and software against a White List database. Virtual machines can be migrated between trusted hosts in the trusted cluster, allowing for high availability in a secure environment.

Procedure 9.9. Creating a Trusted Cluster

1. Select the **Clusters** tab.
2. Click **New**.
3. Enter a **Name** for the cluster.
4. Select the **Enable Virt Service** radio button.
5. In the **Scheduling Policy** tab, select the **Enable Trusted Service** check box.
6. Click **OK**.

9.4.3. Adding a Trusted Host

Red Hat Enterprise Linux hosts can be added to trusted clusters and measured against a White List database by the OpenAttestation server. Hosts must meet the following requirements to be trusted by the OpenAttestation server:

- Intel TXT is enabled in the BIOS.
- The OpenAttestation agent is installed and running.
- Software running on the host matches the OpenAttestation server's White List database.

Procedure 9.10. Adding a Trusted Host

1. Select the **Hosts** tab.
2. Click **New**.
3. Select a trusted cluster from the **Host Cluster** drop-down list.
4. Enter a **Name** for the host.
5. Enter the **Address** of the host.
6. Enter the host's root **Password**.
7. Click **OK**.

After the host is added to the trusted cluster, it is assessed by the OpenAttestation server. If a host is not trusted by the OpenAttestation server, it will move to a **Non Operational** state and should be removed from the trusted cluster.

CHAPTER 10. VIRTUAL MACHINE DISKS

10.1. UNDERSTANDING VIRTUAL MACHINE STORAGE

Red Hat Enterprise Virtualization supports three storage types: NFS, iSCSI and FCP.

In each type, a host known as the Storage Pool Manager (SPM) manages access between hosts and storage. The SPM host is the only node that has full access within the storage pool; the SPM can modify the storage domain metadata, and the pool's metadata. All other hosts can only access virtual machine hard disk image data.

By default in an NFS, local, or POSIX compliant data center, the SPM creates the virtual disk using a thin provisioned format as a file in a file system.

In iSCSI and other block-based data centers, the SPM creates a volume group on top of the Logical Unit Numbers (LUNs) provided, and makes logical volumes to use as virtual machine disks. Virtual machine disks on block-based storage are preallocated by default.

If the virtual disk is preallocated, a logical volume of the specified size in GB is created. The virtual machine can be mounted on a Red Hat Enterprise Linux server using **kpartx**, **vgscan**, **vgchange** or **mount** to investigate the virtual machine's processes or problems.

If the virtual disk is thinly provisioned, a 1 GB logical volume is created. The logical volume is continuously monitored by the host on which the virtual machine is running. As soon as the usage nears a threshold the host notifies the SPM, and the SPM extends the logical volume by 1 GB. The host is responsible for resuming the virtual machine after the logical volume has been extended. If the virtual machine goes into a paused state it means that the SPM could not extend the disk in time. This occurs if the SPM is too busy or if there is not enough storage space.

A virtual disk with a preallocated (RAW) format has significantly faster write speeds than a virtual disk with a thin provisioning (QCOW2) format. Thin provisioning takes significantly less time to create a virtual disk. The thin provision format is suitable for non-I/O intensive virtual machines. The preallocated format is recommended for virtual machines with high I/O writes. If a virtual machine is able to write more than 1 GB every four seconds, use preallocated disks where possible.

10.2. UNDERSTANDING VIRTUAL DISKS

Red Hat Enterprise Virtualization features **Preallocated** (thick provisioned) and **Sparse** (thin provisioned) storage options.

- Preallocated

A preallocated virtual disk allocates all the storage required for a virtual machine up front. For example, a 20 GB preallocated logical volume created for the data partition of a virtual machine will take up 20 GB of storage space immediately upon creation.

- Sparse

A sparse allocation allows an administrator to define the total storage to be assigned to the virtual machine, but the storage is only allocated when required.

For example, a 20 GB thin provisioned logical volume would take up 0 GB of storage

space when first created. When the operating system is installed it may take up the size of the installed file, and would continue to grow as data is added up to a maximum of 20 GB size.

The size of a disk is listed in the **Disks** sub-tab for each virtual machine and template. The **Virtual Size** of a disk is the total amount of disk space that the virtual machine can use; it is the number that you enter in the **Size(GB)** field when a disk is created or edited. The **Actual Size** of a disk is the amount of disk space that has been allocated to the virtual machine so far. Preallocated disks show the same value for both fields. Sparse disks may show a different value in the **Actual Size** field from the value in the **Virtual Size** field, depending on how much of the disk space has been allocated.



NOTE

When creating a Cinder virtual disk, the format and type of the disk are handled internally by Cinder and are not managed by Red Hat Enterprise Virtualization.

The possible combinations of storage types and formats are described in the following table.

Table 10.1. Permitted Storage Combinations

Storage	Format	Type	Note
NFS or iSCSI/FCP	RAW or QCOW2	Sparse or Preallocated	
NFS	RAW	Preallocated	A file with an initial size which equals the amount of storage defined for the virtual disk, and has no formatting.
NFS	RAW	Sparse	A file with an initial size which is close to zero, and has no formatting.
NFS	QCOW2	Sparse	A file with an initial size which is close to zero, and has QCOW2 formatting. Subsequent layers will be QCOW2 formatted.

Storage	Format	Type	Note
NFS or iSCSI/FCP	RAW or QCOW2	Sparse or Preallocated	
SAN	RAW	Preallocated	A block device with an initial size which equals the amount of storage defined for the virtual disk, and has no formatting.
SAN	QCOW2	Sparse	A block device with an initial size which is much smaller than the size defined for the virtual disk (currently 1 GB), and has QCOW2 formatting for which space is allocated as needed (currently in 1 GB increments).

10.3. SETTINGS TO WIPE VIRTUAL DISKS AFTER DELETION

The **wipe_after_delete** flag, viewed in the Administration Portal as the **Wipe After Delete** check box will replace used data with zeros when a virtual disk is deleted. If it is set to false, which is the default, deleting the disk will open up those blocks for re-use but will not wipe the data. It is, therefore, possible for this data to be recovered because the blocks have not been returned to zero.

The **wipe_after_delete** flag only works on block storage. On file storage, for example NFS, the option does nothing because the file system will ensure that no data exists.

Enabling **wipe_after_delete** for virtual disks is more secure, and is recommended if the virtual disk has contained any sensitive data. This is a more intensive operation and users may experience degradation in performance and prolonged delete times.



NOTE

The wipe after delete functionality is not the same as secure delete, and cannot guarantee that the data is removed from the storage, just that new disks created on same storage will not expose data from old disks.

The **wipe_after_delete** flag default can be changed to **true** during the setup process (see [Configuring the Red Hat Enterprise Virtualization Manager](#) in the *Installation Guide*), or by using the engine configuration tool on the Red Hat Enterprise Virtualization Manager. Restart the engine for the setting change to take effect.

Procedure 10.1. Setting SANWipeAfterDelete to Default to True Using the Engine Configuration Tool

1. Run the engine configuration tool with the **--set** action:

```
# engine-config --set SANWipeAfterDelete=true
```

2. Restart the engine for the change to take effect:

```
# service ovirt-engine restart
```

The **/var/log/vdsm/vdsm.log** file located on the Red Hat Enterprise Virtualization host can be checked to confirm that a virtual disk was successfully wiped and deleted.

For a successful wipe, the log file will contain the entry, ***storage_domain_id/volume_id was zeroed and will be deleted***. For example:

```
a9cb0625-d5dc-49ab-8ad1-72722e82b0bf/a49351a7-15d8-4932-8d67-512a369f9d61
was zeroed and will be deleted
```

For a successful deletion, the log file will contain the entry, ***finished with VG:storage_domain_id LVs: list_of_volume_ids, img: image_id***. For example:

```
finished with VG:a9cb0625-d5dc-49ab-8ad1-72722e82b0bf LVs: {'a49351a7-
15d8-4932-8d67-512a369f9d61': ImgsPar(imgs=['11f8b3be-fa96-4f6a-bb83-
14c9b12b6e0d'], parent='00000000-0000-0000-0000-000000000000')}, img:
11f8b3be-fa96-4f6a-bb83-14c9b12b6e0d
```

An unsuccessful wipe will display a log message ***zeroing storage_domain_id/volume_id failed. Zero and remove this volume manually***, and an unsuccessful delete will display ***Remove failed for some of VG: storage_domain_id zeroed volumes: list_of_volume_ids***.

10.4. SHAREABLE DISKS IN RED HAT ENTERPRISE VIRTUALIZATION

Some applications require storage to be shared between servers. Red Hat Enterprise Virtualization allows you to mark virtual machine hard disks as **Shareable** and attach those disks to virtual machines. That way a single virtual disk can be used by multiple cluster-aware guests.

Shared disks are not to be used in every situation. For applications like clustered database servers, and other highly available services, shared disks are appropriate. Attaching a shared disk to multiple guests that are not cluster-aware is likely to cause data corruption because their reads and writes to the disk are not coordinated.

You cannot take a snapshot of a shared disk. Virtual disks that have snapshots taken of them cannot later be marked shareable.

You can mark a disk shareable either when you create it, or by editing the disk later.

10.5. READ ONLY DISKS IN RED HAT ENTERPRISE VIRTUALIZATION

Some applications require administrators to share data with read-only rights. You can do this when creating or editing a disk attached to a virtual machine via the **Disks** tab in the

details pane of the virtual machine and selecting the **Read Only** check box. That way, a single disk can be read by multiple cluster-aware guests, while an administrator maintains writing privileges.

You cannot change the read-only status of a disk while the virtual machine is running.



IMPORTANT

Mounting a journaled file system requires read-write access. Using the **Read Only** option is not appropriate for virtual machine disks that contain such file systems (e.g. **EXT3**, **EXT4**, or **XFS**).

10.6. VIRTUAL DISK TASKS

10.6.1. Creating Floating Virtual Disks

You can create a virtual disk that does not belong to any virtual machines. You can then attach this disk to a single virtual machine, or to multiple virtual machines if the disk is shareable.

Image disk creation is managed entirely by the Manager. **Direct LUN** disks require externally prepared targets that already exist. **Cinder** disks require access to an instance of OpenStack Volume that has been added to the Red Hat Enterprise Virtualization environment using the **External Providers** window; see [Section 11.2.5, “Adding an OpenStack Volume \(Cinder\) Instance for Storage Management”](#) for more information.

Procedure 10.2. Creating Floating Virtual Disks

1. Select the **Disks** resource tab.
2. Click **New**.

Figure 10.1. Add Virtual Disk Window

3. Use the radio buttons to specify whether the virtual disk will be an **Image**, **Direct LUN**, or **Cinder** disk.
4. Select the options required for your virtual disk. The options change based on the disk type selected. See [Section 10.6.2, “Explanation of Settings in the New Virtual Disk Window”](#) for more details on each option for each disk type.
5. Click **OK**.

10.6.2. Explanation of Settings in the New Virtual Disk Window

Table 10.2. New Virtual Disk Settings: Image

Field Name	Description
Size(GB)	The size of the new virtual disk in GB.
Alias	The name of the virtual disk, limited to 40 characters.
Description	A description of the virtual disk. This field is recommended but not mandatory.

Field Name	Description
Interface	The virtual interface the disk presents to virtual machines. VirtIO is faster, but requires drivers. Red Hat Enterprise Linux 5 and higher include these drivers. Windows does not include these drivers, but they can be installed from the guest tools ISO or virtual floppy disk. IDE devices do not require special drivers.
Data Center	The data center in which the virtual disk will be available.
Storage Domain	The storage domain in which the virtual disk will be stored. The drop-down list shows all storage domains available in the given data center, and also shows the total space and currently available space in the storage domain.
Allocation Policy	<p>The provisioning policy for the new virtual disk.</p> <ul style="list-style-type: none"> • Preallocated allocates the entire size of the disk on the storage domain at the time the virtual disk is created. The virtual size and the actual size of a preallocated disk are the same. Preallocated virtual disks take more time to create than thinly provisioned virtual disks, but have better read and write performance. Preallocated virtual disks are recommended for servers and other I/O intensive virtual machines. If a virtual machine is able to write more than 1 GB every four seconds, use preallocated disks where possible. • Thin Provision allocates 1 GB at the time the virtual disk is created and sets a maximum limit on the size to which the disk can grow. The virtual size of the disk is the maximum limit; the actual size of the disk is the space that has been allocated so far. Thinly provisioned disks are faster to create than preallocated disks and allow for storage over-commitment. Thinly provisioned virtual disks are recommended for desktops.

Field Name	Description
Disk Profile	The disk profile assigned to the virtual disk. Disk profiles define the maximum amount of throughput and the maximum level of input and output operations for a virtual disk in a storage domain. Disk profiles are defined on the storage domain level based on storage quality of service entries created for data centers.
Wipe After Delete	Allows you to enable enhanced security for deletion of sensitive material when the virtual disk is deleted.
Bootable	Allows you to enable the bootable flag on the virtual disk.
Shareable	Allows you to attach the virtual disk to more than one virtual machine at a time.

The **Direct LUN** settings can be displayed in either **Targets > LUNs** or **LUNs > Targets**. **Targets > LUNs** sorts available LUNs according to the host on which they are discovered, whereas **LUNs > Targets** displays a single list of LUNs.

Table 10.3. New Virtual Disk Settings: Direct LUN

Field Name	Description
Alias	The name of the virtual disk, limited to 40 characters.
Description	<p>A description of the virtual disk. This field is recommended but not mandatory. By default the last 4 characters of the LUN ID is inserted into the field.</p> <p>The default behavior can be configured by setting the PopulateDirectLUNDiskDescriptionWithLUNId configuration key to the appropriate value using the engine-config command. The configuration key can be set to -1 for the full LUN ID to be used, or 0 for this feature to be ignored. A positive integer populates the description with the corresponding number of characters of the LUN ID. See Section 17.3.2, “Syntax for the engine-config Command” for more information.</p>

Field Name	Description
Interface	The virtual interface the disk presents to virtual machines. VirtIO is faster, but requires drivers. Red Hat Enterprise Linux 5 and higher include these drivers. Windows does not include these drivers, but they can be installed from the guest tools ISO or virtual floppy disk. IDE devices do not require special drivers.
Data Center	The data center in which the virtual disk will be available.
Use Host	The host on which the LUN will be mounted. You can select any host in the data center.
Storage Type	The type of external LUN to add. You can select from either iSCSI or Fibre Channel .
Discover Targets	<p>This section can be expanded when you are using iSCSI external LUNs and Targets > LUNs is selected.</p> <p>Address - The host name or IP address of the target server.</p> <p>Port - The port by which to attempt a connection to the target server. The default port is 3260.</p> <p>User Authentication - The iSCSI server requires User Authentication. The User Authentication field is visible when you are using iSCSI external LUNs.</p> <p>CHAP user name - The user name of a user with permission to log in to LUNs. This field is accessible when the User Authentication check box is selected.</p> <p>CHAP password - The password of a user with permission to log in to LUNs. This field is accessible when the User Authentication check box is selected.</p>
Bootable	Allows you to enable the bootable flag on the virtual disk.
Shareable	Allows you to attach the virtual disk to more than one virtual machine at a time.

Field Name	Description
Enable SCSI Pass-Through	Available when the Interface is set to VirtIO-SCSI . Selecting this check box enables passthrough of a physical SCSI device to the virtual disk. A VirtIO-SCSI interface with SCSI passthrough enabled automatically includes SCSI discard support. When this check box is not selected, the virtual disk uses an emulated SCSI device.
Allow Privileged SCSI I/O	Available when the Enable SCSI Pass-Through check box is selected. Selecting this check box enables unfiltered SCSI Generic I/O (SG_IO) access, allowing privileged SG_IO commands on the disk. This is required for persistent reservations.

Fill in the fields in the **Discover Targets** section and click **Discover** to discover the target server. You can then click the **Login All** button to list the available LUNs on the target server and, using the radio buttons next to each LUN, select the LUN to add.

Using LUNs directly as virtual machine hard disk images removes a layer of abstraction between your virtual machines and their data.

The following considerations must be made when using a direct LUN as a virtual machine hard disk image:

- Live storage migration of direct LUN hard disk images is not supported.
- Direct LUN disks are not included in virtual machine exports.
- Direct LUN disks are not included in virtual machine snapshots.

The **Cinder** settings form will be disabled if there are no available OpenStack Volume storage domains on which you have permissions to create a disk in the relevant Data Center. **Cinder** disks require access to an instance of OpenStack Volume that has been added to the Red Hat Enterprise Virtualization environment using the **External Providers** window; see [Section 11.2.5, “Adding an OpenStack Volume \(Cinder\) Instance for Storage Management”](#) for more information.

Table 10.4. New Virtual Disk Settings: Cinder

Field Name	Description
Size(GB)	The size of the new virtual disk in GB.
Alias	The name of the virtual disk, limited to 40 characters.

Field Name	Description
Description	A description of the virtual disk. This field is recommended but not mandatory.
Interface	The virtual interface the disk presents to virtual machines. VirtIO is faster, but requires drivers. Red Hat Enterprise Linux 5 and higher include these drivers. Windows does not include these drivers, but they can be installed from the guest tools ISO or virtual floppy disk. IDE devices do not require special drivers.
Data Center	The data center in which the virtual disk will be available.
Storage Domain	The storage domain in which the virtual disk will be stored. The drop-down list shows all storage domains available in the given data center, and also shows the total space and currently available space in the storage domain.
Volume Type	The volume type of the virtual disk. The drop-down list shows all available volume types. The volume type will be managed and configured on OpenStack Cinder.
Bootable	Allows you to enable the bootable flag on the virtual disk.
Shareable	Allows you to attach the virtual disk to more than one virtual machine at a time.

10.6.3. Overview of Live Storage Migration

Virtual machine disks can be migrated from one storage domain to another while the virtual machine to which they are attached is running. This is referred to as live storage migration. When a disk attached to a running virtual machine is migrated, a snapshot of that disk's image chain is created in the source storage domain, and the entire image chain is replicated in the destination storage domain. As such, ensure that you have sufficient storage space in both the source storage domain and the destination storage domain to host both the disk image chain and the snapshot. A new snapshot is created on each live storage migration attempt, even when the migration fails.

Consider the following when using live storage migration:

- Live storage migration creates a snapshot.
- You can live migrate multiple disks at one time.
- Multiple disks for the same virtual machine can reside across more than one storage domain, but the image chain for each disk must reside on a single storage domain.

- In data centers with a compatibility version of 3.6, you can live migrate disks between any two storage domains in the same data center. In data centers with a compatibility version of 3.1, 3.2, 3.3, 3.4, or 3.5, you can live migrate disks only between two file-based domains (NFS, POSIX, and GlusterFS) in the same data center or between two block-based domains (FCP and iSCSI) in the same data center. Live storage migration is not supported in data centers with a compatibility version of 3.0.
- You cannot live migrate direct LUN hard disk images or disks marked as shareable.

10.6.4. Moving a Virtual Disk

Move a virtual disk that is attached to a virtual machine or acts as a floating virtual disk from one storage domain to another. You can move a virtual disk that is attached to a running virtual machine; this is referred to as live storage migration. Alternatively, shut down the virtual machine before continuing. For more information on live storage migration, see [Section 10.6.3, “Overview of Live Storage Migration”](#).

Consider the following when moving a disk:

- You can move multiple disks at the same time.
- If the virtual machine is shut down, you can move disks between any two storage domains in the same data center. In data centers with a compatibility version of 3.6, you can also move disks attached to running virtual machines between any two storage domains in the same data center. In data centers with a compatibility version of 3.1, 3.2, 3.3, 3.4, or 3.5, you can move disks attached to running virtual machines only between two file-based domains (NFS, POSIX, and GlusterFS) in the same data center or between two block-based domains (FCP and iSCSI) in the same data center. Live storage migration is not supported in data centers with a compatibility version of 3.0.
- If the virtual disk is attached to a virtual machine that was created based on a template and used the thin provisioning storage allocation option, you must copy the disks for the template on which the virtual machine was based to the same storage domain as the virtual disk.

Procedure 10.3. Moving a Virtual Disk

1. Select the **Disks** tab.
2. Select one or more virtual disks to move.
3. Click **Move** to open the **Move Disk(s)** window.
4. From the **Target** list, select the storage domain to which the virtual disk(s) will be moved.
5. From the **Disk Profile** list, select a profile for the disk(s), if applicable.
6. Click **OK**.

The virtual disks are moved to the target storage domain, and have a status of **Locked** while being moved. If you moved a disk that is connected to a running virtual machine, a snapshot of that disk is created automatically, and is visible in the **Snapshots** tab of the details pane for that virtual machine. For information on removing the snapshot, see [Deleting a Snapshot](#).

10.6.5. Copying a Virtual Disk

Summary

You can copy a virtual disk from one storage domain to another. The copied disk can be attached to virtual machines.

Procedure 10.4. Copying a Virtual Disk

1. Select the **Disks** tab.
2. Select the virtual disks to copy.
3. Click the **Copy** button to open the **Copy Disk(s)** window.
4. Optionally, enter an alias in the **Alias** text field.
5. Use the **Target** drop-down menus to select the storage domain to which the virtual disk will be copied.
6. Click **OK**.

Result

The virtual disks are copied to the target storage domain, and have a status of **Locked** while being copied.

10.6.6. Importing a Virtual Disk Image from an OpenStack Image Service

Summary

Virtual disk images managed by an OpenStack Image Service can be imported into the Red Hat Enterprise Virtualization Manager if that OpenStack Image Service has been added to the Manager as an external provider.

1. Click the **Storage** resource tab and select the OpenStack Image Service domain from the results list.
2. Select the image to import in the **Images** tab of the details pane.
3. Click **Import** to open the **Import Image(s)** window.
4. From the **Data Center** drop-down menu, select the data center into which the virtual disk image will be imported.
5. From the **Domain Name** drop-down menu, select the storage domain in which the virtual disk image will be stored.
6. Optionally, select a quota from the **Quota** drop-down menu to apply a quota to the virtual disk image.
7. Click **OK** to import the image.

Result

The image is imported as a floating disk and is displayed in the results list of the **Disks** resource tab. It can now be attached to a virtual machine.

10.6.7. Exporting a Virtual Machine Disk to an OpenStack Image Service

Summary

Virtual machine disks can be exported to an OpenStack Image Service that has been added to the Manager as an external provider.

1. Click the **Disks** resource tab.
2. Select the disks to export.
3. Click the **Export** button to open the **Export Image(s)** window.
4. From the **Domain Name** drop-down list, select the OpenStack Image Service to which the disks will be exported.
5. From the **Quota** drop-down list, select a quota for the disks if a quota is to be applied.
6. Click **OK**.

Result

The virtual machine disks are exported to the specified OpenStack Image Service where they are managed as virtual machine disk images.



IMPORTANT

Virtual machine disks can only be exported if they do not have multiple volumes, are not thinly provisioned, and do not have any snapshots.

10.7. VIRTUAL DISKS AND PERMISSIONS

10.7.1. Managing System Permissions for a Virtual Disk

As the **SuperUser**, the system administrator manages all aspects of the Administration Portal. More specific administrative roles can be assigned to other users. These restricted administrator roles are useful for granting a user administrative privileges that limit them to a specific resource. For example, a **DataCenterAdmin** role has administrator privileges only for the assigned data center with the exception of the storage for that data center, and a **ClusterAdmin** has administrator privileges only for the assigned cluster.

Red Hat Enterprise Virtualization Manager provides two default virtual disk user roles, but no default virtual disk administrator roles. One of these user roles, the **DiskCreator** role, enables the administration of virtual disks from the User Portal. This role can be applied to specific virtual machines, to a data center, to a specific storage domain, or to the whole virtualized environment; this is useful to allow different users to manage different virtual resources.

The virtual disk creator role permits the following actions:

- Create, edit, and remove virtual disks associated with a virtual machine or other resources.
- Edit user permissions for virtual disks.

**NOTE**

You can only assign roles and permissions to existing users.

10.7.2. Virtual Disk User Roles Explained

Virtual Disk User Permission Roles

The table below describes the user roles and privileges applicable to using and administrating virtual machine disks in the User Portal.

Table 10.5. Red Hat Enterprise Virtualization System Administrator Roles

Role	Privileges	Notes
DiskOperator	Virtual disk user.	Can use, view and edit virtual disks. Inherits permissions to use the virtual machine to which the virtual disk is attached.
DiskCreator	Can create, edit, manage and remove virtual machine disks within assigned clusters or data centers.	This role is not applied to a specific virtual disk; apply this role to a user for the whole environment with the Configure window. Alternatively apply this role for specific data centers, clusters, or storage domains.

10.7.3. Assigning an Administrator or User Role to a Resource

Assign administrator or user roles to resources to allow users to access or manage that resource.

Procedure 10.5. Assigning a Role to a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Click **Add**.
4. Enter the name or user name of an existing user into the **Search** text box and click **Go**. Select a user from the resulting list of possible matches.
5. Select a role from the **Role to Assign:** drop-down list.

6. Click **OK**.

You have assigned a role to a user; the user now has the inherited permissions of that role enabled for that resource.

10.7.4. Removing an Administrator or User Role from a Resource

Remove an administrator or user role from a resource; the user loses the inherited permissions associated with the role for that resource.

Procedure 10.6. Removing a Role from a Resource

1. Use the resource tabs, tree mode, or the search function to find and select the resource in the results list.
2. Click the **Permissions** tab in the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.
3. Select the user to remove from the resource.
4. Click **Remove**. The **Remove Permission** window opens to confirm permissions removal.
5. Click **OK**.

You have removed the user's role, and the associated permissions, from the resource.

CHAPTER 11. EXTERNAL PROVIDERS

11.1. INTRODUCTION TO EXTERNAL PROVIDERS IN RED HAT ENTERPRISE VIRTUALIZATION

In addition to resources managed by the Red Hat Enterprise Virtualization Manager itself, Red Hat Enterprise Virtualization can also take advantage of resources managed by external sources. The providers of these resources, known as external providers, can provide resources such as virtualization hosts, virtual machine images, and networks.

Red Hat Enterprise Virtualization currently supports the following external providers:

Red Hat Satellite for Host Provisioning

Satellite is a tool for managing all aspects of the life cycle of both physical and virtual hosts. In Red Hat Enterprise Virtualization, hosts managed by Satellite can be added to and used by the Red Hat Enterprise Virtualization Manager as virtualization hosts. After you add a Satellite instance to the Manager, the hosts managed by the Satellite instance can be added by searching for available hosts on that Satellite instance when adding a new host.

OpenStack Image Service (Glance) for Image Management

OpenStack Image Service provides a catalog of virtual machine images. In Red Hat Enterprise Virtualization, these images can be imported into the Red Hat Enterprise Virtualization Manager and used as floating disks or attached to virtual machines and converted into templates. After you add an OpenStack Image Service to the Manager, it appears as a storage domain that is not attached to any data center. Virtual machine disks in a Red Hat Enterprise Virtualization environment can also be exported to an OpenStack Image Service as virtual machine disk images.

OpenStack Networking (Neutron) for Network Provisioning

OpenStack Networking provides software-defined networks. In Red Hat Enterprise Virtualization, networks provided by OpenStack Networking can be imported into the Red Hat Enterprise Virtualization Manager and used to carry all types of traffic and create complicated network topologies. After you add OpenStack Networking to the Manager, you can access the networks provided by OpenStack Networking by manually importing them.

OpenStack Volume (Cinder) for Storage Management

OpenStack Volume provides persistent block storage management for virtual hard drives. The OpenStack Cinder volumes are provisioned by Ceph Storage. In Red Hat Enterprise Virtualization, you can create disks on OpenStack Volume storage that can be used as floating disks or attached to virtual machines. After you add OpenStack Volume to the Manager, you can create a disk on the storage provided by OpenStack Volume.

VMware for Virtual Machine Provisioning

Virtual machines created in VMware can be converted using V2V (virt-v2v) and imported into a Red Hat Enterprise Virtualization environment. After you add a VMware provider to the Manager, you can import the virtual machines it provides. V2V conversion is performed on a designated proxy host as part of the import operation.



NOTE

Before you can add external providers to your Red Hat Enterprise Virtualization environment, you must set up each of the external providers to be added. See [Deploying OpenStack: Enterprise Environments \(Red Hat Enterprise Linux OpenStack Platform Installer\)](#) for information on how to set up a Foreman instance and provision Red Hat Enterprise Linux OpenStack Platform components that can then be used as external providers.

11.2. ADDING EXTERNAL PROVIDERS

11.2.1. Adding an External Provider

All external resource providers are added using a single window that adapts to your input. You must add the resource provider before you can use the resources it provides in your Red Hat Enterprise Virtualization environment.

11.2.2. Adding a Red Hat Satellite Instance for Host Provisioning

Add a Satellite instance for host provisioning to the Red Hat Enterprise Virtualization Manager. Red Hat Enterprise Virtualization 3.6 and onwards is supported with Red Hat Satellite 6.1.

Procedure 11.1. Adding a Satellite Instance for Host Provisioning

1. Select the **External Providers** entry in the tree pane.
2. Click **Add** to open the **Add Provider** window.

Figure 11.1. The Add Provider Window

3. Enter a **Name** and **Description**.
4. From the **Type** list, ensure that **Foreman/Satellite** is selected.
5. Enter the URL or fully qualified domain name of the machine on which the Satellite instance is installed in the **Provider URL** text field. You do not need to specify a port number.

**IMPORTANT**

IP addresses cannot be used to add a Satellite instance.

6. Enter the **Username** and **Password** for the Satellite instance. You must use the same user name and password as you would use to log in to the Satellite provisioning portal.
7. Test the credentials:
 - a. Click **Test** to test whether you can authenticate successfully with the Satellite instance using the provided credentials.
 - b. If the Satellite instance uses SSL, the **Import provider certificates** window opens; click **OK** to import the certificate that the Satellite instance provides.

**IMPORTANT**

You must import the certificate that the Satellite instance provides to ensure the Manager can communicate with the instance.

8. Click **OK**.

You have added the Satellite instance to the Red Hat Enterprise Virtualization Manager, and can work with the hosts it provides.

11.2.3. Adding an OpenStack Image (Glance) Instance for Image Management

Add an OpenStack Image (Glance) instance for image management to the Red Hat Enterprise Virtualization Manager.

Procedure 11.2. Adding an OpenStack Image (Glance) Instance for Image Management

1. Select the **External Providers** entry in the tree pane.
2. Click **Add** to open the **Add Provider** window.

Figure 11.2. The Add Provider Window

3. Enter a **Name** and **Description**.
4. From the **Type** list, select **OpenStack Image**.
5. Enter the URL or fully qualified domain name of the machine on which the OpenStack Image instance is installed in the **Provider URL** text field.
6. Optionally, select the **Requires Authentication** check box and enter the **Username**, **Password**, **Tenant Name**, and **Authentication URL** for the OpenStack Image instance. You must use the user name and password for the OpenStack Image user registered in Keystone, the tenant of which the OpenStack Image instance is a member, and the URL and port of the Keystone server.
7. Test the credentials:
 - a. Click **Test** to test whether you can authenticate successfully with the OpenStack Image instance using the provided credentials.
 - b. If the OpenStack Image instance uses SSL, the **Import provider certificates** window opens; click **OK** to import the certificate that the OpenStack Image instance provides.



IMPORTANT

You must import the certificate that the OpenStack Image instance provides to ensure the Manager can communicate with the instance.

- Click **OK**.

You have added the OpenStack Image instance to the Red Hat Enterprise Virtualization Manager, and can work with the images it provides.

11.2.4. Adding an OpenStack Networking (Neutron) Instance for Network Provisioning

Add an OpenStack Networking (Neutron) instance for network provisioning to the Red Hat Enterprise Virtualization Manager.

Procedure 11.3. Adding an OpenStack Networking (Neutron) Instance for Network Provisioning

- Select the **External Providers** entry in the tree pane.
- Click **Add** to open the **Add Provider** window.

Add Provider ⓘ

General

Agent Configuration

Name: Neutron_NP

Description:

Type: OpenStack Networking

Networking Plugin: Open vSwitch

Provider URL: http://XX.XX.XX.XX:9696

☒ Requires Authentication

Username: neutron

Password:

Tenant Name: services

Authentication URL: http://XX.XX.XX.XX:35357

✓ Test succeeded, managed to access provider.

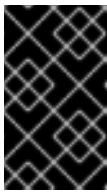
Test

OK Cancel

Figure 11.3. The Add Provider Window

- Enter a **Name** and **Description**.
- From the **Type** list, select **OpenStack Networking**.
- Ensure that **Open vSwitch** is selected in the **Networking Plugin** field.
- Enter the URL or fully qualified domain name of the machine on which the OpenStack Networking instance is installed in the **Provider URL** text field, followed by the port number.

7. Optionally, select the **Requires Authentication** check box and enter the **Username**, **Password**, **Tenant Name**, and **Authentication URL** for the OpenStack Networking instance. You must use the user name and password for the OpenStack Networking user registered in Keystone, the tenant of which the OpenStack Networking instance is a member, and the URL and port of the Keystone server.
8. Test the credentials:
 - a. Click **Test** to test whether you can authenticate successfully with the OpenStack Networking instance using the provided credentials.
 - b. If the OpenStack Networking instance uses SSL, the **Import provider certificates** window opens; click **OK** to import the certificate that the OpenStack Networking instance provides.



IMPORTANT

You must import the certificate that the OpenStack Networking instance provides to ensure the Manager can communicate with the instance.

9. Click the **Agent Configuration** tab.

Add Provider ?

General

Agent Configuration

Interface Mappings ?

Messaging Broker Configuration

Broker Type: RabbitMQ

Host: XX.XX.XX.XX

Port: 5762

Username: neutron

Password:

OK Cancel

Figure 11.4. The Agent Configuration Tab

10. Enter a comma-separated list of interface mappings for the Open vSwitch agent in the **Interface Mappings** field.
11. Select the message broker type that the OpenStack Networking instance uses from the **Broker Type** list.

12. Enter the URL or fully qualified domain name of the host on which the message broker is hosted in the **Host** field.
13. Enter the **Port** by which to connect to the message broker. This port number will be 5762 by default if the message broker is not configured to use SSL, and 5761 if it is configured to use SSL.
14. Enter the **Username** and **Password** of the OpenStack Networking user registered in the message broker instance.
15. Click **OK**.

You have added the OpenStack Networking instance to the Red Hat Enterprise Virtualization Manager, and can use the networks it provides.

11.2.5. Adding an OpenStack Volume (Cinder) Instance for Storage Management

Add an OpenStack Volume (Cinder) instance for storage management to the Red Hat Enterprise Virtualization Manager. The OpenStack Cinder volumes are provisioned by Ceph Storage.

Procedure 11.4. Adding an OpenStack Volume (Cinder) Instance for Storage Management

1. Select the **External Providers** entry in the tree pane.
2. Click **Add** to open the **Add Provider** window.

Add Provider ?

General

Name: Cinder_VP

Description:

Type: OpenStack Volume

Data Center: Default

Provider URL: http://XX.XX.XX.XX:8776

☒ Requires Authentication

Username: cinder

Password:

Tenant Name: services

Authentication URL: http://XX.XX.XX.XX:35357/v2.0

✓ Test succeeded, managed to access provider.

Test OK Cancel

Figure 11.5. The Add Provider Window

3. Enter a **Name** and **Description**.
4. From the **Type** list, select **OpenStack Volume**.
5. Select the **Data Center** to which OpenStack Volume storage volumes will be attached.
6. Enter the URL or fully qualified domain name of the machine on which the OpenStack Volume instance is installed, followed by the port number, in the **Provider URL** text field.
7. Optionally, select the **Requires Authentication** check box and enter the **Username**, **Password**, **Tenant Name**, and **Authentication URL** for the OpenStack Volume instance. You must use the user name and password for the OpenStack Volume user registered in Keystone, the tenant of which the OpenStack Volume instance is a member, and the URL, port, and API version of the Keystone server.
8. Click **Test** to test whether you can authenticate successfully with the OpenStack Volume instance using the provided credentials.
9. Click **OK**.
10. If client Ceph authentication (**cephx**) is enabled, you must also complete the following steps. The **cephx** protocol is enabled by default.
 - a. On your Ceph server, create a new secret key for the **client.cinder** user using the **ceph auth get-or-create** command. See [Cephx Config Reference](#) for more information on **cephx**, and [Managing Users](#) for more information on creating keys for new users. If a key already exists for the **client.cinder** user, retrieve it using the same command.
 - b. In the Administration Portal, select the newly-created Cinder external provider from the **Providers** list.
 - c. Click the **Authentication Keys** sub-tab.
 - d. Click **New**.
 - e. Enter the secret key in the **Value** field.
 - f. Copy the automatically-generated **UUID**, or enter an existing UUID in the text field.
 - g. On your Cinder server, add the UUID from the previous step and the **cinder** user to **/etc/cinder/cinder.conf**:

```

rbd_secret_uuid = UUID
rbd_user = cinder

```

You have added the OpenStack Volume instance to the Red Hat Enterprise Virtualization Manager, and can work with the storage volumes it provides. See [Section 10.6.1, “Creating Floating Virtual Disks”](#) for more information about creating a OpenStack Volume (Cinder) disk.

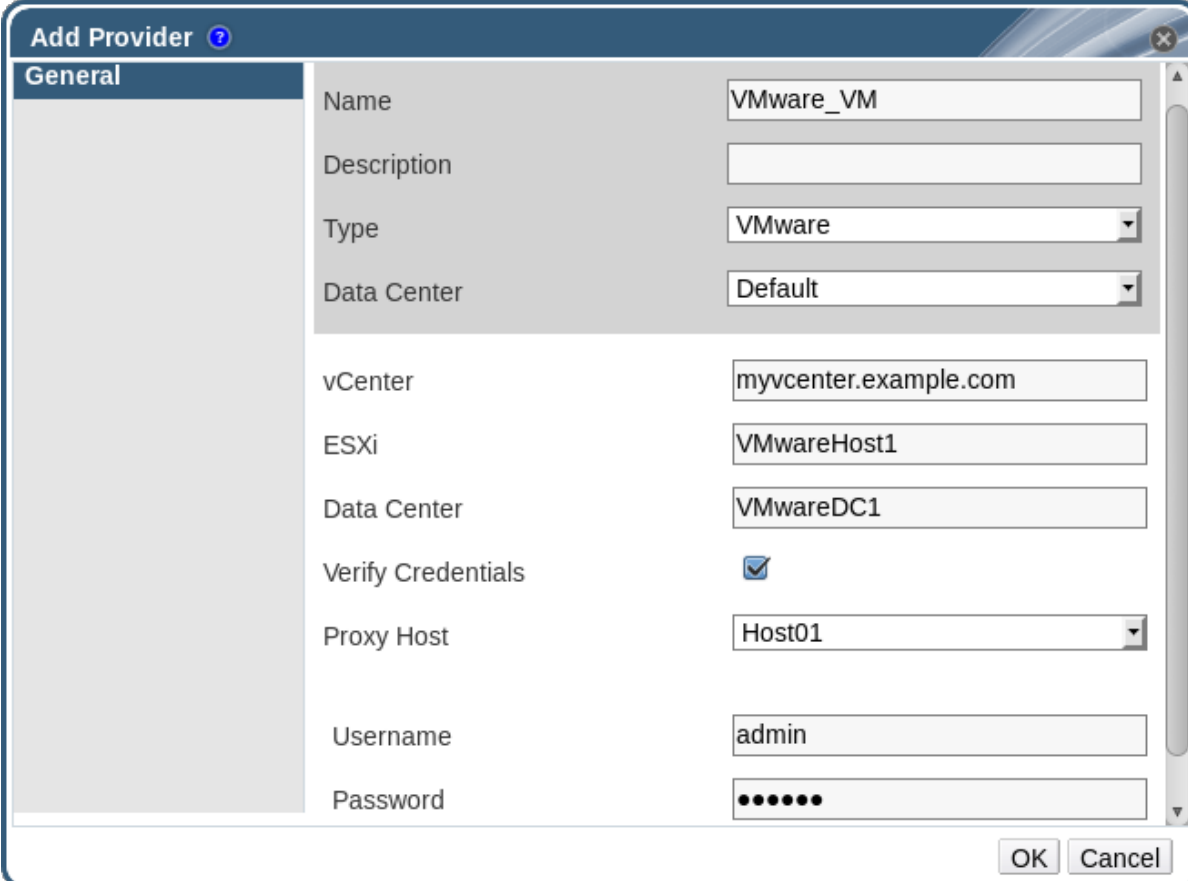
11.2.6. Adding a VMware Instance as a Virtual Machine Provider

Add a VMware vCenter instance to import virtual machines from VMware to the Red Hat Enterprise Virtualization Manager.

Red Hat Enterprise Virtualization uses V2V to convert VMware virtual machines to the correct format before they are imported. You must install the `virt-v2v` package on a least one Red Hat Enterprise Linux 7.2 host in a data center with version 3.6 compatibility. This package is available in the base **rhel-7-server-rpms** repository.

Procedure 11.5. Adding a VMware vCenter Instance as a Virtual Machine Provider

1. Select the **External Providers** entry in the tree pane.
2. Click **Add** to open the **Add Provider** window.



The screenshot shows the 'Add Provider' dialog box. The 'General' tab is active. The fields are as follows:

Field	Value
Name	VMware_VM
Description	
Type	VMware
Data Center	Default
vCenter	myvcenter.example.com
ESXi	VMwareHost1
Data Center	VMwareDC1
Verify Credentials	<input checked="" type="checkbox"/>
Proxy Host	Host01
Username	admin
Password	•••••

Buttons: OK, Cancel

Figure 11.6. The Add Provider Window

3. Enter a **Name** and **Description**.
4. From the **Type** list, select **VMware**.
5. Select the **Data Center** into which VMware virtual machines will be imported, or select **Any Data Center** to instead specify the destination data center during individual import operations (using the **Import** function in the **Virtual Machines** tab).
6. Enter the IP address or fully qualified domain name of the VMware vCenter instance in the **vCenter** field.
7. Enter the IP address or fully qualified domain name of the host from which the virtual machines will be imported in the **ESXi** field.

8. Enter the name of the data center in which the specified ESXi host resides in the **Data Center** field.
9. Optionally, select the **Verify Credentials** check box to verify the ESXi host's certificate.
10. Select a host in the chosen data center with virt-v2v installed to serve as the **Proxy Host** during virtual machine import operations. This host must also be able to connect to the network of the VMware vCenter external provider. If you selected **Any Data Center** above, you cannot choose the host here, but instead can specify a host during individual import operations (using the **Import** function in the **Virtual Machines** tab).
11. Enter the **Username** and **Password** for the VMware vCenter instance. The user must have access to the VMware data center and ESXi host on which the virtual machines reside.
12. Test the credentials:
 - a. Click **Test** to test whether you can authenticate successfully with the VMware vCenter instance using the provided credentials.
 - b. If the VMware vCenter instance uses SSL, the **Import provider certificates** window opens; click **OK** to import the certificate that the VMware vCenter instance provides.



IMPORTANT

You must import the certificate that the VMware vCenter instance provides to ensure the Manager can communicate with the instance.

13. Click **OK**.

You have added the VMware vCenter instance to the Red Hat Enterprise Virtualization Manager, and can import the virtual machines it provides. See [Importing a Virtual Machine from a VMware Provider](#) for more information.

11.2.7. Add Provider General Settings Explained

The **General** tab in the **Add Provider** window allows you to register the core details of the external provider.

Table 11.1. Add Provider: General Settings

Setting	Explanation
Name	A name to represent the provider in the Manager.
Description	A plain text, human-readable description of the provider.
Type	

Setting	The type of external provider. Changing this Explanation the available fields for configuring the provider.
	<p>Foreman/Satellite</p> <ul style="list-style-type: none"> • Provider URL: The URL or fully qualified domain name of the machine that hosts the Satellite instance. You do not need to add the port number to the end of the URL or fully qualified domain name. • Requires Authentication: Allows you to specify whether authentication is required for the provider. Authentication is mandatory when Foreman/Satellite is selected. • Username: A user name for connecting to the Satellite instance. This user name must be the user name used to log in to the provisioning portal on the Satellite instance. By default, this user name is admin. • Password: The password against which the above user name is to be authenticated. This password must be the password used to log in to the provisioning portal on the Satellite instance. <p>OpenStack Image</p> <ul style="list-style-type: none"> • Provider URL: The URL or fully qualified domain name of the machine on which the OpenStack Image service is hosted. You must add the port number for the OpenStack Image service to the end of the URL or fully qualified domain name. By default, this port number is 9292. • Requires Authentication: Allows you to specify whether authentication is required to access the OpenStack Image service. • Username: A user name for connecting to the OpenStack Image service. This user name must be the user name for the OpenStack Image service registered in the Keystone instance of which the OpenStack Image service is a member. By default, this user name is glance. • Password: The password against which the above user name is to be authenticated. This password must be the password for the OpenStack Image service registered in the Keystone instance of which the OpenStack Image service is a member.

Setting	Explanation
	<ul style="list-style-type: none"> • Tenant Name: The name of the OpenStack tenant of which the OpenStack Image service is a member. By default, this is services. • Authentication URL: The URL and port of the Keystone server with which the OpenStack Image service authenticates. <p>OpenStack Networking</p> <ul style="list-style-type: none"> • Networking Plugin: The networking plugin with which to connect to the OpenStack Networking server. Open vSwitch is the only option, and is selected by default. • Provider URL: The URL or fully qualified domain name of the machine on which the OpenStack Networking instance is hosted. You must add the port number for the OpenStack Networking instance to the end of the URL or fully qualified domain name. By default, this port number is 9696. • Requires Authentication: Allows you to specify whether authentication is required to access the OpenStack Networking service. • Username: A user name for connecting to the OpenStack Networking instance. This user name must be the user name for OpenStack Networking registered in the Keystone instance of which the OpenStack Networking instance is a member. By default, this user name is neutron. • Password: The password against which the above user name is to be authenticated. This password must be the password for OpenStack Networking registered in the Keystone instance of which the OpenStack Networking instance is a member. • Tenant Name: The name of the OpenStack tenant of which the OpenStack Networking instance is a member. By default, this is services. • Authentication URL: The URL and port of the Keystone server with which the OpenStack Networking instance authenticates. <p>OpenStack Volume</p> <ul style="list-style-type: none"> • Data Center: The data center to which OpenStack Volume storage volumes will be attached.

Setting	Explanation
	<ul style="list-style-type: none"> • Provider URL: The URL or fully qualified domain name of the machine on which the OpenStack Volume instance is hosted. You must add the port number for the OpenStack Volume instance to the end of the URL or fully qualified domain name. By default, this port number is 8776. • Requires Authentication: Allows you to specify whether authentication is required to access the OpenStack Volume service. • Username: A user name for connecting to the OpenStack Volume instance. This user name must be the user name for OpenStack Volume registered in the Keystone instance of which the OpenStack Volume instance is a member. By default, this user name is cinder. • Password: The password against which the above user name is to be authenticated. This password must be the password for OpenStack Volume registered in the Keystone instance of which the OpenStack Volume instance is a member. • Tenant Name: The name of the OpenStack tenant of which the OpenStack Volume instance is a member. By default, this is services. • Authentication URL: The URL and port of the Keystone server with which the OpenStack Volume instance authenticates. <p>VMware</p> <ul style="list-style-type: none"> • Data Center: Specify the data center into which VMware virtual machines will be imported, or select Any Data Center to instead specify the destination data center during individual import operations (using the Import function in the Virtual Machines tab). • vCenter: The IP address or fully qualified domain name of the VMware vCenter instance. • ESXi: The IP address or fully qualified domain name of the host from which the virtual machines will be imported. • Data Center: The name of the data center in which the specified ESXi host resides.

Setting	Explanation
	<ul style="list-style-type: none"> • Verify Credentials: Specify whether the ESXi host's certificate will be verified on connection. • Proxy Host: Select a host in the chosen data center with virt-v2v installed to serve as the host during virtual machine import operations. This host must also be able to connect to the network of the VMware vCenter external provider. If you selected Any Data Center, you cannot choose the host here, but instead can specify a host during individual import operations (using the Import function in the Virtual Machines tab). • Username: A user name for connecting to the VMware vCenter instance. The user must have access to the VMware data center and ESXi host on which the virtual machines reside. • Password: The password against which the above user name is to be authenticated.
Test	Allows users to test the specified credentials. This button is available to all provider types.

11.2.8. Add Provider Agent Configuration Settings Explained

The **Agent Configuration** tab in the **Add Provider** window allows users to register details for networking plugins. This tab is only available for the **OpenStack Networking** provider type.

Table 11.2. Add Provider: General Settings

Setting	Explanation
Interface Mappings	A comma-separated list of mappings in the format of <i>label:interface</i> .
Broker Type	The message broker type that the OpenStack Networking instance uses. Select RabbitMQ or Qpid .
Host	The URL or fully qualified domain name of the machine on which the message broker is installed.
Port	The remote port by which a connection with the above host is to be made. By default, this port is 5762 if SSL is not enabled on the host, and 5761 if SSL is enabled.

Setting	Explanation
Username	A user name for authenticating the OpenStack Networking instance with the above message broker. By default, this user name is neutron .
Password	The password against which the above user name is to be authenticated.

11.3. EDITING EXTERNAL PROVIDERS

11.3.1. Editing an External Provider

Summary

This procedure describes how to edit external providers.

Procedure 11.6. Editing an External Provider

1. Select the **External Providers** entry in the tree pane.
2. Select the external provider to edit.
3. Click the **Edit** button to open the **Edit Provider** window.
4. Change the current values for the provider to the preferred values.
5. Click **OK**.

Result

You have updated the details for an external provider.

11.4. REMOVING EXTERNAL PROVIDERS

11.4.1. Removing an External Provider

Summary

This procedure describes how to remove external providers.

Procedure 11.7. Removing an External Provider

1. Select the **External Providers** entry in the tree pane.
2. Select the external provider to remove.
3. Click **Remove**.
4. Click **OK** in the **Remove Provider(s)** window to confirm the removal of this provider.

Result

You have removed an external provider.

PART II. ADMINISTERING THE ENVIRONMENT

CHAPTER 12. BACKUPS AND MIGRATION

12.1. BACKING UP AND RESTORING THE RED HAT ENTERPRISE VIRTUALIZATION MANAGER

12.1.1. Backing up Red Hat Enterprise Virtualization Manager - Overview

Use the **engine-backup** tool to take regular backups of the Red Hat Enterprise Virtualization Manager. The tool backs up the engine database and configuration files into a single file and can be run without interrupting the **ovirt-engine** service. You can specify additional options to modify the backup settings according to your requirements. Take time to plan your backups as the backup options used affects the options available when you need to restore an environment.

12.1.2. Syntax for the engine-backup Command

The **engine-backup** command works in one of two basic modes:

```
# engine-backup --mode=backup
```

```
# engine-backup --mode=restore
```

These two modes are further extended by a set of parameters that allow you to specify the scope of the backup and different credentials for the engine database. Run **engine-backup --help** for a full list of parameters and their function.

Table 12.1. Basic Options

Option	Description
--mode	Specifies whether the command will perform a backup operation or a restore operation. Two options are available - backup , and restore . This is a required parameter.
--file	Specifies the path and name of a file into which backups are to be taken in backup mode, and the path and name of a file from which to read backup data in restore mode. This is a required parameter in both backup mode and restore mode.
--log	Specifies the path and name of a file into which logs of the backup or restore operation are to be written. This parameter is required in both backup mode and restore mode.

Option	Description
--scope	Specifies the scope of the backup or restore operation. There are five options: all , which backs up or restores all databases and configuration data; files , which backs up or restores only files on the system; db , which backs up or restores only the Manager database; dwhdb , which backs up or restores only the Data Warehouse database; and reportsdb , which backs up or restores only the Reports database. The default scope is all . The --scope parameter can be specified multiple times in the same engine-backup command.

Table 12.2. Manager Database Options

Option	Description
--provision-db	Creates a PostgreSQL database for the Manager database backup to be restored to. This is a required parameter when restoring a backup on a remote host or fresh installation that does not have a PostgreSQL database already configured.
--change-db-credentials	Allows you to specify alternate credentials for restoring the Manager database using credentials other than those stored in the backup itself. See engine-backup --help for the additional parameters required by this parameter.
--restore-permissions or --no-restore-permissions	Restores (or does not restore) the permissions of database users. One of these parameters is required when restoring a backup.

Table 12.3. Backup Options

Option	Description
--fast-restore	The default backup option used. Allows you to back up and restore a back up faster than the other available options. See engine-backup --help for more backup fine-tuning options.

Option	Description
--small-size	Allows you to back up your database using the least amount of disk space. However, it will take more time to back up and restore compared to the --fast-restore option.

12.1.3. Creating a Backup with the engine-backup Command

The Red Hat Enterprise Virtualization Manager can be backed up using the **engine-backup** command while the Manager is active. Append one of the following options to **--scope** to specify which backup to perform:

- **all**: A full backup of all databases and configuration files on the Manager
- **files**: A backup of only the files on the system
- **db**: A backup of only the Manager database
- **dwhdb**: A backup of only the Data Warehouse database
- **reportsdb**: A backup of only the Reports database



IMPORTANT

To restore a database to a fresh installation of Red Hat Enterprise Virtualization Manager, a database backup alone is not sufficient; the Manager also requires access to the configuration files. Any backup that specifies a scope other than the default, **all**, must be accompanied by the **files** scope, or a filesystem backup.

Procedure 12.1. Example Usage of the engine-backup Command

1. Log on to the machine running the Red Hat Enterprise Virtualization Manager.
2. Create a backup:

Example 12.1. Creating a Full Backup

```
# engine-backup --scope=all --mode=backup --file=file_name --log=log_file_name
```

Example 12.2. Creating a Manager Database Backup

```
# engine-backup --scope=files --scope=db --mode=backup --file=file_name --log=log_file_name
```

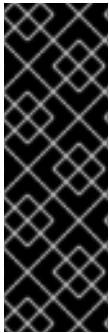
Replace the **db** option with **dwhdb** or **reportsdb** to back up the Data Warehouse database or the Reports database.

A **tar** file containing a backup is created using the path and file name provided.

The **tar** files containing the backups can now be used to restore the environment.

12.1.4. Restoring a Backup with the **engine-backup** Command

While the process for restoring a backup using the **engine-backup** command is straightforward, it involves several additional steps in comparison to that for creating a backup depending on the destination to which the backup is to be restored. For example, the **engine-backup** command can be used to restore backups to fresh installations of Red Hat Enterprise Virtualization, on top of existing installations of Red Hat Enterprise Virtualization, and using local or remote databases.



IMPORTANT

Backups can only be restored to environments of the same major release as that of the backup. For example, a backup of a Red Hat Enterprise Virtualization version 3.3 environment can only be restored to another Red Hat Enterprise Virtualization version 3.3 environment. To view the version of Red Hat Enterprise Virtualization contained in a backup file, unpack the backup file and read the value in the **version** file located in the root directory of the unpacked files.

12.1.5. Restoring a Backup to a Fresh Installation

The **engine-backup** command can be used to restore a backup to a fresh installation of the Red Hat Enterprise Virtualization Manager. The following procedure must be performed on a machine on which the base operating system has been installed and the required packages for the Red Hat Enterprise Virtualization Manager have been installed, but the **engine-setup** command has not yet been run. This procedure assumes that the backup file or files can be accessed from the machine on which the backup is to be restored.

Procedure 12.2. Restoring a Backup to a Fresh Installation

1. Log on to the machine on which the Red Hat Enterprise Virtualization Manager is installed. If you are restoring the engine database to a remote host, you will need to log on to and perform the relevant actions on that host. Likewise, if also restoring Reports and the Data Warehouse to a remote host, you will need to log on to and perform the relevant actions on that host.
2. Restore a complete backup or a database-only backup.

- Restore a complete backup:

```
# engine-backup --mode=restore --file=file_name --
log=log_file_name --provision-db --no-restore-permissions
```

If Reports and Data Warehouse are also being restored as part of the complete backup, provision the additional databases:

```
engine-backup --mode=restore --file=file_name --log=log_file_name
--provision-db --provision-reports-db --provision-dwh-db --no-
restore-permissions
```

- Restore a database-only backup by restoring the configuration files and database backup:

```
# engine-backup --mode=restore --scope=files --scope=db --
file=file_name --log=log_file_name --provision-db --no-restore-
permissions
```

The example above restores a backup of the Manager database.

```
# engine-backup --mode=restore --scope=files --scope=reportsdb --
file=file_name --log=log_file_name --provision-reports-db --no-
restore-permissions
```

The example above restores a backup of the Reports database.

```
# engine-backup --mode=restore --scope=files --scope=dwhdb --
file=file_name --log=log_file_name --provision-dwh-db --no-
restore-permissions
```

The example above restores a backup of the Data Warehouse database.

If successful, the following output displays:

```
You should now run engine-setup.
Done.
```

3. Log on to the Manager machine. Run the following command and follow the prompts to configure the restored Manager:

```
# engine-setup
```

The Red Hat Enterprise Virtualization Manager has been restored to the version preserved in the backup. To change the fully qualified domain name of the new Red Hat Enterprise Virtualization system, see [Section 17.1.1, “The oVirt Engine Rename Tool”](#).

12.1.6. Restoring a Backup to Overwrite an Existing Installation

The **engine-backup** command can restore a backup to a machine on which the Red Hat Enterprise Virtualization Manager has already been installed and set up. This is useful when you have taken a backup up of an installation, performed changes on that installation and then want to restore the installation from the backup.



IMPORTANT

When restoring a backup to overwrite an existing installation, you must run the **engine-cleanup** command to clean up the existing installation before using the **engine-backup** command. Because the **engine-cleanup** command only cleans the engine database, and does not drop the database or delete the user that owns that database, you do not need to create a new database or specify the database credentials because the user and database already exist.

Procedure 12.3. Restoring a Backup to Overwrite an Existing Installation

1. Log on to the machine on which the Red Hat Enterprise Virtualization Manager is installed.

2. Run the following command and follow the prompts to remove the configuration files for and clean the database associated with the Manager:

```
# engine-cleanup
```

3. Restore a full backup or a database-only backup:

- Restore a full backup:

```
# engine-backup --mode=restore --file=file_name --  
log=log_file_name
```

- Restore a database-only backup by restoring the configuration files and the database backup:

```
# engine-backup --mode=restore --scope=files --scope=db --  
file=file_name --log=log_file_name
```

The example above restores a backup of the Manager database. If necessary, also restore the Reports and Data Warehouse databases:

```
# engine-backup --mode=restore --scope=reportsdb --scope=dwhdb --  
file=file_name --log=log_file_name
```

If successful, the following output displays:

```
You should now run engine-setup.  
Done.
```

4. Run the following command and follow the prompts to reconfigure the firewall and ensure the **ovirt-engine** service is correctly configured:

```
# engine-setup
```

The engine database and configuration files for the Red Hat Enterprise Virtualization Manager have been restored to the version in the backup.

12.1.7. Restoring a Backup with Different Credentials

Summary

The **engine-backup** command can restore a backup to a machine on which the Red Hat Enterprise Virtualization Manager has already been installed and set up, but the credentials of the database in the backup are different to those of the database on the machine on which the backup is to be restored. This is useful when you have taken a backup of an installation and want to restore the installation from the backup to a different system.



IMPORTANT

When restoring a backup to overwrite an existing installation, you must run the **engine-cleanup** command to clean up the existing installation before using the **engine-backup** command. Because the **engine-cleanup** command only cleans the engine database, and does not drop the database or delete the user that owns that database, you do not need to create a new database or specify the database credentials because the user and database already exist. However, if the credentials for the owner of the engine database are not known, you must change them before you can restore the backup.

Procedure 12.4. Restoring a Backup with Different Credentials

1. Log on to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Run the following command and follow the prompts to remove the configuration files for and clean the database associated with the Manager:

```
# engine-cleanup
```

3. Change the password for the owner of the engine database if the credentials of that user are not known:

1. Enter the postgresql command line:

```
# su postgres
$ psql
```

2. Change the password of the user that owns the **engine** database:

```
postgres=# alter role user_name encrypted password
'new_password';
```

Repeat this for the users that own the **ovirt_engine_reports** and **ovirt_engine_dwh** databases if necessary.

4. Restore a complete backup or a database-only backup with the **--change-db-credentials** parameter to pass the credentials of the new database. The *database_location* for a database local to the Manager is **localhost**.



NOTE

The following examples use a **--*password** option for each database without specifying a password, which will prompt for a password for each database. Passwords can be supplied for these options in the command itself, however this is not recommended as the password will then be stored in the shell history. Alternatively, **--*passfile=password_file** options can be used for each database to securely pass the passwords to the **engine-backup** tool without the need for interactive prompts.

- Restore a complete backup:

–

```
# engine-backup --mode=restore --file=file_name --
log=log_file_name --change-db-credentials --db-
host=database_location --db-name=database_name --db-user=engine -
-db-password
```

If Reports and Data Warehouse are also being restored as part of the complete backup, include the revised credentials for the two additional databases:

```
engine-backup --mode=restore --file=file_name --log=log_file_name
--change-db-credentials --db-host=database_location --db-
name=database_name --db-user=engine --db-password --change-
reports-db-credentials --reports-db-host=database_location --
reports-db-name=database_name --reports-db-
user=ovirt_engine_reports --reports-db-password --change-dwh-db-
credentials --dwh-db-host=database_location --dwh-db-
name=database_name --dwh-db-user=ovirt_engine_history --dwh-db-
password
```

- Restore a database-only backup by restoring the configuration files and the database backup:

```
# engine-backup --mode=restore --scope=files --scope=db --
file=file_name --log=log_file_name --change-db-credentials --db-
host=database_location --db-name=database_name --db-user=engine -
-db-password
```

The example above restores a backup of the Manager database.

```
# engine-backup --mode=restore --scope=files --scope=reportsdb --
file=file_name --log=log_file_name --change-reports-db-
credentials --reports-db-host=database_location --reports-db-
name=database_name --reports-db-user=ovirt_engine_reports --
reports-db-password
```

The example above restores a backup of the Reports database.

```
# engine-backup --mode=restore --scope=files --scope=dwhdb --
file=file_name --log=log_file_name --change-dwh-db-credentials --
dwh-db-host=database_location --dwh-db-name=database_name --dwh-
db-user=ovirt_engine_history --dwh-db-password
```

The example above restores a backup of the Data Warehouse database.

If successful, the following output displays:

```
You should now run engine-setup.
Done.
```

5. Run the following command and follow the prompts to reconfigure the firewall and ensure the **ovirt-engine** service is correctly configured:

```
# engine-setup
```

Result

The engine database and configuration files for the Red Hat Enterprise Virtualization Manager have been restored to the version in the backup using the supplied credentials, and the Manager has been configured to use the new database.

12.1.8. Migrating the Engine Database to a Remote Server Database

You can migrate the **engine** database to a remote database server after the Red Hat Enterprise Virtualization Manager has been initially configured.

This task is split into two procedures. The first procedure, preparing the remote PostgreSQL database, is a necessary prerequisite for the migration itself and presumes that the server has Red Hat Enterprise Linux installed and has been configured with the appropriate subscriptions.

The second procedure, migrating the database, uses PostgreSQL **pg_dump** and **pg_restore** commands to handle the database backup and restore. As such, it is necessary to edit the **/etc/ovirt-engine/engine.conf.d/10-setup-database.conf** file with the updated information. At a minimum, you must update the location of the new database server. If the database name, role name, or password are modified for the new database server, these values must also be updated in the **10-setup-database.conf** file. This procedure uses the default **engine** database settings to minimize modification of this file.

Procedure 12.5. Preparing the Remote PostgreSQL Database for use with the Red Hat Enterprise Virtualization Manager

1. Log in to the remote database server and install the PostgreSQL server package:

```
# yum install postgresql-server
```

2. Initialize the PostgreSQL database, start the **postgresql** service, and ensure that this service starts on boot:

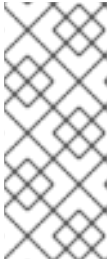
```
# service postgresql initdb
# service postgresql start
# chkconfig postgresql on
```

3. Connect to the **psql** command line interface as the **postgres** user:

```
# su - postgres
$ psql
```

4. Create a user for the Manager to use when it writes to and reads from the database. The default user name on the Manager is **engine**:

```
postgres=# create role user_name with login encrypted password
'password';
```


**NOTE**

The password for the **engine** user is located in plain text in `/etc/ovirt-engine/engine.conf.d/10-setup-database.conf`. Any password can be used when creating the role on the new server, however if a different password is used then this file must be updated with the new password.

5. Create a database in which to store data about the Red Hat Enterprise Virtualization environment. The default database name on the Manager is **engine**, and the default user name is **engine**:

```
postgres=# create database database_name owner user_name template
template0 encoding 'UTF8' lc_collate 'en_US.UTF-8' lc_ctype
'en_US.UTF-8';
```

6. Ensure the database can be accessed remotely by enabling md5 client authentication. Edit the `/var/lib/pgsql/data/pg_hba.conf` file, and add the following line immediately underneath the line starting with **local** at the bottom of the file, replacing `X.X.X.X` with the IP address of the Manager:

```
host database_name user_name X.X.X.X/32 md5
```

7. Allow TCP/IP connections to the database. Edit the `/var/lib/pgsql/data/postgresql.conf` file and add the following line:

```
listen_addresses='*'
```

This example configures the **postgresql** service to listen for connections on all interfaces. You can specify an interface by giving its IP address.

8. Open the default port used for PostgreSQL database connections, and save the updated firewall rules:

```
# iptables -I INPUT 5 -p tcp --dport 5432 -j ACCEPT
# service iptables save
```

9. Restart the **postgresql** service:

```
# service postgresql restart
```

Optionally, set up SSL to secure database connections using the instructions at <http://www.postgresql.org/docs/8.4/static/ssl-tcp.html#SSL-FILE-USAGE>.

Procedure 12.6. Migrating the Database

1. Log in to the Red Hat Enterprise Virtualization Manager machine and stop the **ovirt-engine** service so that it does not interfere with the engine backup:

```
# service ovirt-engine stop
```

2. Create the **engine** database backup using the PostgreSQL **pg_dump** command:

```
# su - postgres -c 'pg_dump -F c engine -f /tmp/engine.dump'
```

3. Copy the backup file to the new database server. The target directory must allow write access for the **postgres** user:

```
# scp /tmp/engine.dump root@new.database.server.com:/tmp/engine.dump
```

4. Log in to the new database server and restore the database using the PostgreSQL **pg_restore** command:

```
# su - postgres -c 'pg_restore -d engine /tmp/engine.dump'
```

5. Log in to the Manager server and update the **/etc/ovirt-engine/engine.conf.d/10-setup-database.conf** and replace the **localhost** value of **ENGINE_DB_HOST** with the IP address of the new database server. If the engine name, role name, or password differ on the new database server, update those values in this file.
6. Now that the database has been migrated, start the **ovirt-engine** service:

```
# service ovirt-engine start
```

12.2. BACKING UP AND RESTORING VIRTUAL MACHINES USING THE BACKUP AND RESTORE API

12.2.1. The Backup and Restore API

The backup and restore API is a collection of functions that allows you to perform full or file-level backup and restoration of virtual machines. The API combines several components of Red Hat Enterprise Virtualization, such as live snapshots and the REST API, to create and work with temporary volumes that can be attached to a virtual machine containing backup software provided by an independent software provider.

For supported third-party backup vendors, consult the Red Hat Enterprise Virtualization Ecosystem at [Red Hat Marketplace](#).



NOTE

For information on how to work with the REST API, see [The Backup and Restore API](#) in the *REST API Guide*.

12.2.2. Backing Up a Virtual Machine

Use the backup and restore API to back up a virtual machine. This procedure assumes you have two virtual machines: the virtual machine to back up, and a virtual machine on which the software for managing the backup is installed.

Procedure 12.7. Backing Up a Virtual Machine

1. Using the REST API, create a snapshot of the virtual machine to back up:

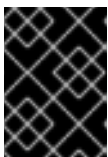
```
POST /api/vms/11111111-1111-1111-1111-111111111111/snapshots/
HTTP/1.1
Accept: application/xml
Content-type: application/xml

<snapshot>
  <description>BACKUP</description>
</snapshot>
```



NOTE

When you take a snapshot of a virtual machine, a copy of the configuration data of the virtual machine as at the time the snapshot was taken is stored in the **data** attribute of the **configuration** attribute in **initialization** under the snapshot.



IMPORTANT

You cannot take snapshots of disks that are marked as shareable or that are based on direct LUN disks.

2. Retrieve the configuration data of the virtual machine from the **data** attribute under the snapshot:

```
GET /api/vms/11111111-1111-1111-1111-
111111111111/snapshots/11111111-1111-1111-1111-111111111111 HTTP/1.1
Accept: application/xml
Content-type: application/xml
```

3. Identify the disk ID and snapshot ID of the snapshot:

```
GET /api/vms/11111111-1111-1111-1111-
111111111111/snapshots/11111111-1111-1111-1111-111111111111/disks
HTTP/1.1
Accept: application/xml
Content-type: application/xml
```

4. Attach the snapshot to the backup virtual machine and activate the disk:

```
POST /api/vms/22222222-2222-2222-2222-222222222222/disks/ HTTP/1.1
Accept: application/xml
Content-type: application/xml

<disk id="11111111-1111-1111-1111-111111111111">
  <snapshot id="11111111-1111-1111-1111-111111111111"/>
  <active>true</active>
</disk>
```

5. Use the backup software on the backup virtual machine to back up the data on the snapshot disk.
6. Detach the snapshot disk from the backup virtual machine:

```
DELETE /api/vms/22222222-2222-2222-2222-222222222222/disks/11111111-1111-1111-1111-111111111111 HTTP/1.1
Accept: application/xml
Content-type: application/xml

<action>
  <detach>true</detach>
</action>
```

7. Optionally, delete the snapshot:

```
DELETE /api/vms/11111111-1111-1111-1111-111111111111/snapshots/11111111-1111-1111-1111-111111111111 HTTP/1.1
Accept: application/xml
Content-type: application/xml
```

You have backed up the state of a virtual machine at a fixed point in time using backup software installed on a separate virtual machine.

12.2.3. Restoring a Virtual Machine

Restore a virtual machine that has been backed up using the backup and restore API. This procedure assumes you have a backup virtual machine on which the software used to manage the previous backup is installed.

Procedure 12.8. Restoring a Virtual Machine

1. In the Administration Portal, create a floating disk on which to restore the backup. See [Section 10.6.1, “Creating Floating Virtual Disks”](#) for details on how to create a floating disk.
2. Attach the disk to the backup virtual machine:

```
POST /api/vms/22222222-2222-2222-2222-222222222222/disks/ HTTP/1.1
Accept: application/xml
Content-type: application/xml

<disk id="11111111-1111-1111-1111-111111111111">
</disk>
```

3. Use the backup software to restore the backup to the disk.
4. Detach the disk from the backup virtual machine:

```
DELETE /api/vms/22222222-2222-2222-2222-222222222222/disks/11111111-1111-1111-1111-111111111111 HTTP/1.1
Accept: application/xml
Content-type: application/xml

<action>
  <detach>true</detach>
</action>
```

5. Create a new virtual machine using the configuration data of the virtual machine

being restored:

```
POST /api/vms/ HTTP/1.1
Accept: application/xml
Content-type: application/xml

<vm>
  <cluster>
    <name>cluster_name</name>
  </cluster>
  <name>NAME</name>
  ...
</vm>
```

6. Attach the disk to the new virtual machine:

```
POST /api/vms/33333333-3333-3333-3333-333333333333/disks/ HTTP/1.1
Accept: application/xml
Content-type: application/xml

<disk id="11111111-1111-1111-1111-111111111111">
</disk>
```

You have restored a virtual machine using a backup that was created using the backup and restore API.

CHAPTER 13. ERRATA MANAGEMENT WITH RED HAT SATELLITE

Red Hat Enterprise Virtualization can be configured to view errata from Red Hat Satellite in the Red Hat Enterprise Virtualization Manager. This enables the administrator to receive updates about available errata, and their importance, for hosts, virtual machines, and the Manager once they have been associated with a Red Hat Satellite provider. Administrators can then choose to apply the updates by running an update on the required host, virtual machine, or on the Manager. For more information about Red Hat Satellite see the [Red Hat Satellite User Guide](#).

Red Hat Enterprise Virtualization 3.6 and onwards supports errata management with Red Hat Satellite 6.1.



IMPORTANT

The Manager, hosts, and virtual machines are identified in the Satellite server by their FQDN. This ensures that external content host IDs do not need to be maintained in Red Hat Enterprise Virtualization.

The Satellite account used to manage the Manager, hosts and virtual machines must have Administrator permissions and a default organization set.

Procedure 13.1. Configuring Red Hat Enterprise Virtualization Errata

To associate a Manager, host, and virtual machine with a Red Hat Satellite provider first the Manager must be associated with a provider. Then the host is associated with the same provider and configured. Finally, the virtual machine is associated with the same provider and configured.

1. Associate the Manager by adding the required Satellite server as an external provider. See [Section 11.2.2, “Adding a Red Hat Satellite Instance for Host Provisioning”](#) for more information.



NOTE

The Manager must be registered to the Satellite server as a content host and have the katello-agent package installed.

For more information on how to configure a host registration see [Configuring a Host for Registration](#) in the *Red Hat Satellite User Guide* and for more information on how to register a host and install the katello-agent package see [Registration](#) in the *Red Hat Satellite User Guide*

2. Optionally, configure the required hosts to display available errata. See [Section 6.5.2, “Configuring Satellite Errata Management for a Host”](#) for more information.
3. Optionally, configure the required virtual machines to display available errata. The associated host needs to be configured prior to configuring the required virtual machines. See [Configuring Red Hat Satellite Errata Management for a Virtual Machine](#) in the *Virtual Machine Management Guide* for more information.

Procedure 13.2. Viewing Red Hat Enterprise Virtualization Manager Errata

1. Select the **Errata** entry in the tree pane.
2. Click the **Security**, **Bugs**, or **Enhancements** checkboxes to view only those errata types.

For more information on viewing available errata for hosts see [Section 6.5.12, “Viewing Host Errata”](#) and for virtual machines see [Viewing Red Hat Satellite Errata Management for a Virtual Machine](#) in the *Virtual Machine Management Guide*

CHAPTER 14. USERS AND ROLES

14.1. INTRODUCTION TO USERS

In Red Hat Enterprise Virtualization, there are two types of user domains: local domain and external domain. A default local domain called the **internal** domain and a default user **admin** is created during the the Manager installation process.

You can create additional users on the **internal** domain using **ovirt-aaa-jdbc-tool**. User accounts created on local domains are known as local users. You can also attach external directory servers such as Red Hat Directory Server, Active Directory, OpenLDAP, and many other supported options to your Red Hat Enterprise Virtualization environment and use them as external domains. User accounts created on external domains are known as directory users.

Both local users and directory users need to be assigned with appropriate roles and permissions through the Administration Portal before they can function in the environment. There are two main types of user roles: end user and administrator. An end user role uses and manages virtual resources from the User Portal. An administrator role maintains the system infrastructure using the Administration Portal. The roles can be assigned to the users for individual resources like virtual machines and hosts, or on a hierarchy of objects like clusters and data centers.

14.2. INTRODUCTION TO DIRECTORY SERVERS

During installation, Red Hat Enterprise Virtualization Manager creates an **admin** user on the **internal** domain. The user is also referred to as **admin@internal**. This account is intended for use when initially configuring the environment and for troubleshooting. After you have attached an external directory server, added the directory users, and assigned them with appropriate roles and permissions, the **admin@internal** user can be disabled if it is not required.

If you are upgrading from an existing environment that uses directory servers configured using the domain management tool, it is highly recommended to migrate to the new extension-based provider as the domain management tool will not be supported in future versions of Red Hat Enterprise Virtualization.

For more information on migrating from the legacy provider to the new extension-based provider, see [Section 14.5, “Migrating from the Legacy Provider to the New Extension-Based Provider”](#).

The directory servers supported for use with Red Hat Enterprise Virtualization 3.6 are:

- 389ds
- 389ds RFC-2307 Schema
- Active Directory
- FreeIPA
- Red Hat Identity Management (IdM)
- Novell eDirectory RFC-2307 Schema
- OpenLDAP RFC-2307 Schema

- OpenLDAP Standard Schema
- Oracle Unified Directory RFC-2307 Schema
- RFC-2307 Schema (Generic)
- Red Hat Directory Server (RHDS)
- Red Hat Directory Server (RHDS) RFC-2307 Schema
- iPlanet



IMPORTANT

It is not possible to install Red Hat Enterprise Virtualization Manager (rhev) and IdM (ipa-server) on the same system. IdM is incompatible with `themod_ssl` package, which is required by Red Hat Enterprise Virtualization Manager.



IMPORTANT

If you are using Active Directory as your directory server, and you want to use **sysprep** in the creation of templates and virtual machines, then the Red Hat Enterprise Virtualization administrative user must be delegated control over the Domain to:

- Join a computer to the domain
- Modify the membership of a group

For information on creation of user accounts in Active Directory, see <http://technet.microsoft.com/en-us/library/cc732336.aspx>.

For information on delegation of control in Active Directory, see <http://technet.microsoft.com/en-us/library/cc732524.aspx>.

14.3. CONFIGURING AN EXTERNAL LDAP PROVIDER

14.3.1. Configuring an External LDAP Provider (Interactive Setup)

The **ovirt-engine-extension-aaa-ldap** extension allows users to customize their external directory setup easily. The **ovirt-engine-extension-aaa-ldap** extension supports many different LDAP server types, and an interactive setup script is provided to assist you with the setup for most LDAP types.

If the LDAP server type is not listed in the interactive setup script, or you want to do more customization, you can manually edit the configuration files. See [Section 14.3.3, “Configuring an External LDAP Provider \(Manual Method\)”](#) for more information.

For an Active Directory example, see [Section 14.3.2, “Attaching an Active Directory”](#).



NOTE

The domain management tool, **engine-manage-domains**, used in previous versions of Red Hat Enterprise Virtualization is not supported after 3.6.

Prerequisites:

- You need to know the domain name of the DNS or the LDAP server. Round-robin and failover policies are also supported.
- To set up secure connection between the LDAP server and the Manager, ensure a PEM-encoded CA certificate has been prepared. See [Section D.2, “Setting Up SSL or TLS Connections between the Manager and an LDAP Server”](#) for more information.
- Unless anonymous search is supported, a user with permissions to browse all users and groups must be available on the directory server to be used as the search user. Note down the search user's distinguished name (DN). Do not use the administrative user for the directory server.
- Have at least one set of account name and password ready to perform search and login queries to the LDAP server.

Procedure 14.1. Configuring an External LDAP Provider

1. On the Red Hat Enterprise Virtualization Manager, install the LDAP extension package:

```
# yum install ovirt-engine-extension-aaa-ldap-setup
```

2. Run **ovirt-engine-extension-aaa-ldap-setup** to start the interactive setup:

```
# ovirt-engine-extension-aaa-ldap-setup
```

3. Specify a profile name. The profile name is visible to users on the login page. This example uses **redhat.com**.

**NOTE**

To rename the profile after the domain has been configured, edit the **ovirt.engine.aaa.authn.profile.name** attribute in the **/etc/ovirt-engine/extensions.d/redhat.com-authn.properties** file. Restart the engine service for the changes to take effect.

```
Please specify profile name that will be visible to users:redhat.com
```

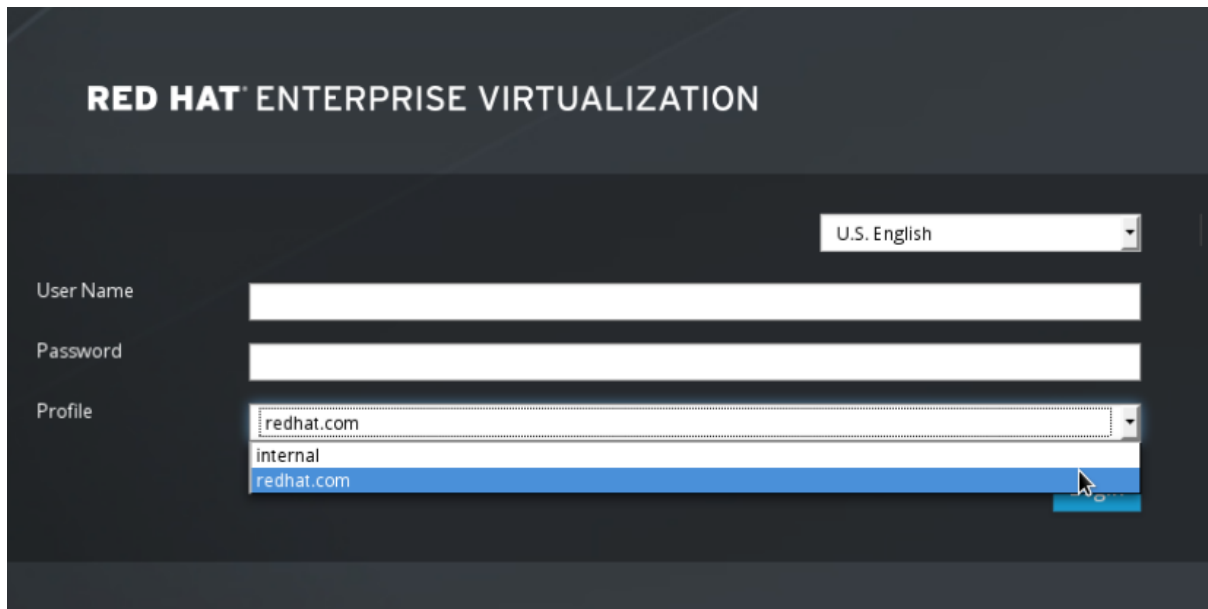


Figure 14.1. The Administration Portal Login Page



NOTE

Users need to select the desired profile from the drop-down list when logging in for the first time. The information is then stored in browser cookies and preselected the next time the user logs in.

4. Select an LDAP type by entering the corresponding number. If you are not sure which schema your LDAP server is, select the standard schema of your LDAP server type. For Active Directory, follow the procedure at [Section 14.3.2, “Attaching an Active Directory”](#).

```
Available LDAP implementations:
1 - 389ds
2 - 389ds RFC-2307 Schema
3 - Active Directory
4 - IPA
5 - Novell eDirectory RFC-2307 Schema
6 - OpenLDAP RFC-2307 Schema
7 - OpenLDAP Standard Schema
8 - Oracle Unified Directory RFC-2307 Schema
9 - RFC-2307 Schema (Generic)
10 - RHDS
11 - RHDS RFC-2307 Schema
12 - iPlanet
Please select: 10
```

5. Press **Enter** to accept the default and configure domain name resolution for your LDAP server name:

```
It is highly recommended to use DNS resolution for LDAP server.
If for some reason you intend to use hosts or plain address disable
DNS usage.
Use DNS (Yes, No) [Yes]:
```

6. Select a DNS policy method by entering the corresponding number:

```
1 - Single server
2 - DNS domain LDAP SRV record
3 - Round-robin between multiple hosts
4 - Failover between multiple hosts
Please select:
```

- For option 1, the DNS servers listed in `/etc/resolv.conf` is used to resolve the IP address. Ensure the `/etc/resolv.conf` file is updated with the correct DNS servers.

Enter the fully qualified domain name (FQDN) or the IP address of the LDAP server. You can use the **dig** command with the SRV record to find out the domain name. An SRV record takes the following format: `_service._protocol.domain name`. For example: **dig _ldap._tcp.redhat.com SRV**.

- For option 2, enter the domain name of the DNS server. A DNS search is performed to look up the SRV records to find out the domain name of the LDAP server.
 - For option 3, enter a space-separated list of LDAP servers. Use either the FQDN or IP address of the servers. This policy provides load-balancing between the LDAP servers. Queries are distributed among all LDAP servers according to the round-robin algorithm.
 - For option 4, enter a space-separated list of LDAP servers. Use either the FQDN or IP address of the servers. This policy defines the first LDAP server to be the default LDAP server to respond to queries. If the first server is not available, the query will go to the next LDAP server on the list.
7. Select the secure connection method your LDAP server supports and specify the method to obtain a PEM-encoded CA certificate. The file option allows you to provide the full path to the certificate. The URL option allows you to specify a URL to the certificate. Use the inline option to paste the content of the certificate in the terminal. The system option allows you to specify the default location for all CA files. If the insecure mode is selected, the connection is still encrypted using TLS but certificate validation is skipped.

NOTE:

It is highly recommended to use secure protocol to access the LDAP server.

Protocol startTLS is the standard recommended method to do so.

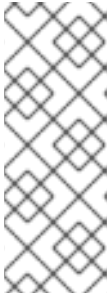
Only in cases in which the startTLS is not supported, fallback to non standard ldaps protocol.

Use plain for test environments only.

Please select protocol to use (startTLS, ldaps, plain) [startTLS]: *startTLS*

Please select method to obtain PEM encoded CA certificate (File, URL, Inline, System, Insecure): *File*

Please enter the password:

**NOTE**

LDAPS stands for Lightweight Directory Access Protocol Over Secure Socket Links. For SSL connections, select the **ldaps** option.

For more information on creating a PEM-encoded CA certificate, see [Section D.2, “Setting Up SSL or TLS Connections between the Manager and an LDAP Server”](#).

8. Enter the search user distinguished name (DN). The user must have permissions to browse all users and groups on the directory server. The search user must be specified in LDAP annotation. If anonymous search is allowed, press **Enter** without any input.

```
Enter search user DN (empty for anonymous):
uid=user1,ou=Users,dc=test,dc=redhat,dc=com
Enter search user password:
```

9. Test the search and login function to ensure the your LDAP server is connected to your Red Hat Enterprise Virtualization environment properly. For the login query, enter the account name and password. For the search query, select **Principal** for user accounts, and select **Group** for group accounts. Enter **Yes** to **Resolve Groups** if you want the group account information for the user account to be returned. Select **Done** to complete the setup. Three configuration files are created and displayed in the screen output.

NOTE:

It is highly recommended to test drive the configuration before applying it into engine.

Perform at least one Login sequence and one Search sequence.

Select test sequence to execute (Done, Abort, Login, Search)

[Abort]: Login

Enter search user name: *testuser1*

Enter search user password:

[INFO] Executing login sequence...

...

Select test sequence to execute (Done, Abort, Login, Search)

[Abort]: Search

Select entity to search (Principal, Group) [Principal]:

Term to search, trailing '*' is allowed: *testuser1*

Resolve Groups (Yes, No) [No]:

[INFO] Executing login sequence...

...

Select test sequence to execute (Done, Abort, Login, Search)

[Abort]: Done

[INFO] Stage: Transaction setup

[INFO] Stage: Misc configuration

[INFO] Stage: Package installation

[INFO] Stage: Misc configuration

[INFO] Stage: Transaction commit

[INFO] Stage: Closing up

CONFIGURATION SUMMARY

Profile name is: *redhat.com*

The following files were created:

/etc/ovirt-engine/aaa/redhat.com.properties

```

        /etc/ovirt-engine/extensions.d/redhat.com-
authz.properties
        /etc/ovirt-engine/extensions.d/redhat.com-
authn.properties
[ INFO ] Stage: Clean up
        Log file is available at /tmp/ovirt-engine-extension-aaa-
ldap-setup-20160114064955-1yar9i.log:
[ INFO ] Stage: Pre-termination
[ INFO ] Stage: Termination

```

- Restart the engine service. The profile you have created is now available on the Administration Portal and the User Portal login pages. To assign the user accounts on the LDAP server appropriate roles and permissions, for example to log in to the User Portal, see [Section 14.7, “Administering User Tasks From the Administration Portal”](#).

```
# service ovirt-engine restart
```



NOTE

For more information, see the LDAP authentication and authorization extension README file at **/usr/share/doc/ovirt-engine-extension-aaa-ldap-version**.

14.3.2. Attaching an Active Directory

Prerequisites:

- You need to know the Active Directory forest name. The forest name is also known as the root domain name.
- You need to either add the DNS server that can resolve the Active Directory forest name to the **/etc/resolv.conf** file on the Manager, or note down the Active Directory DNS servers and enter them when prompted by the interactive setup script.
- To set up secure connection between the LDAP server and the Manager, ensure a PEM-encoded CA certificate has been prepared. See [Section D.2, “Setting Up SSL or TLS Connections between the Manager and an LDAP Server”](#) for more information.
- Unless anonymous search is supported, a user with permissions to browse all users and groups must be available on the Active Directory to be used as the search user. Note down the search user's distinguished name (DN). Do not use the administrative user for the Active Directory.
- Have at least one set of account name and password ready to perform search and login queries to the Active Directory.

Procedure 14.2. Configuring an External LDAP Provider

- On the Red Hat Enterprise Virtualization Manager, install the LDAP extension package:

```
# yum install ovirt-engine-extension-aaa-ldap-setup
```

2. Run **ovirt-engine-extension-aaa-ldap-setup** to start the interactive setup:

```
# ovirt-engine-extension-aaa-ldap-setup
```

3. Specify a profile name. The profile name is visible to users on the login page. This example uses **redhat.com**.

```
Please specify profile name that will be visible to users:redhat.com
```

Figure 14.2. The Administration Portal Login Page



NOTE

Users need to select the desired profile from the drop-down list when logging in for the first time. The information is then stored in browser cookies and preselected the next time the user logs in.

4. Select an LDAP type by entering the corresponding number. The LDAP related questions after this step is different for different LDAP types.

```
Available LDAP implementations:
1 - 389ds
2 - 389ds RFC-2307 Schema
3 - Active Directory
4 - IPA
5 - Novell eDirectory RFC-2307 Schema
6 - OpenLDAP RFC-2307 Schema
7 - OpenLDAP Standard Schema
8 - Oracle Unified Directory RFC-2307 Schema
9 - RFC-2307 Schema (Generic)
10 - RHDS
11 - RHDS RFC-2307 Schema
12 - iPlanet
Please select: 3
```

5. Enter the Active Directory forest name. If the forest name is not resolvable by your

Manager's DNS, the script prompts you to enter a space-separated list of Active Directory DNS server names.

```
Please enter Active Directory Forest name: ad-example.redhat.com
[ INFO ] Resolving Global Catalog SRV record for ad-
example.redhat.com
[ INFO ] Resolving LDAP SRV record for ad-example.redhat.com
```

6. Select the secure connection method your LDAP server supports and specify the method to obtain a PEM-encoded CA certificate. The file option allows you to provide the full path to the certificate. The URL option allows you to specify a URL to the certificate. Use the inline option to paste the content of the certificate in the terminal. The system option allows you to specify the location for all CA files. The insecure option allows you to use startTLS in insecure mode.

NOTE:

It is highly recommended to use secure protocol to access the LDAP server.

Protocol startTLS is the standard recommended method to do so.

Only in cases in which the startTLS is not supported, fallback to non standard ldaps protocol.

Use plain for test environments only.

Please select protocol to use (startTLS, ldaps, plain) [startTLS]:
startTLS

Please select method to obtain PEM encoded CA certificate (File, URL, Inline, System, Insecure): *File*

Please enter the password:



NOTE

LDAPS stands for Lightweight Directory Access Protocol Over Secure Socket Links. For SSL connections, select the **ldaps** option.

For more information on creating a PEM-encoded CA certificate, see [Section D.2, “Setting Up SSL or TLS Connections between the Manager and an LDAP Server”](#).

7. Enter the search user distinguished name (DN). The user must have permissions to browse all users and groups on the directory server. The search user must be of LDAP annotation. If anonymous search is allowed, press **Enter** without any input.

```
Enter search user DN (empty for anonymous):
```

```
uid=user1,ou=Users,dc=test,dc=redhat,dc=com
```

```
Enter search user password:
```

8. Test the search and login function to ensure your LDAP server is connected to your Red Hat Enterprise Virtualization environment properly. For the login query, enter the account name and password. For the search query, select **Principal** for user accounts, and select **Group** for group accounts. Enter **Yes** to **Resolve Groups** if you want the group account information for the user account to be returned. Select **Done** to complete the setup. Three configuration files are created and displayed in the screen output.

NOTE:

It is highly recommended to test drive the configuration before applying it into engine.

Perform at least one Login sequence and one Search sequence.
Select test sequence to execute (Done, Abort, Login, Search)

[Abort]: Login

Enter search user name: *testuser1*

Enter search user password:

[INFO] Executing login sequence...

...

Select test sequence to execute (Done, Abort, Login, Search)

[Abort]: Search

Select entity to search (Principal, Group) [Principal]:

Term to search, trailing '*' is allowed: *testuser1*

Resolve Groups (Yes, No) [No]:

[INFO] Executing login sequence...

...

Select test sequence to execute (Done, Abort, Login, Search)

[Abort]: Done

[INFO] Stage: Transaction setup

[INFO] Stage: Misc configuration

[INFO] Stage: Package installation

[INFO] Stage: Misc configuration

[INFO] Stage: Transaction commit

[INFO] Stage: Closing up

CONFIGURATION SUMMARY

Profile name is: *redhat.com*

The following files were created:

/etc/ovirt-engine/aaa/redhat.com.properties

/etc/ovirt-engine/extensions.d/redhat.com-

authz.properties

/etc/ovirt-engine/extensions.d/redhat.com-

authn.properties

[INFO] Stage: Clean up

Log file is available at */tmp/ovirt-engine-extension-aaa-*

ldap-setup-20160114064955-1yar9i.log:

[INFO] Stage: Pre-termination

[INFO] Stage: Termination

9. The profile you have created is now available on the Administration Portal and the User Portal login pages. To assign the user accounts on the LDAP server appropriate roles and permissions, for example to log in to the User Portal, see [Section 14.7, “Administering User Tasks From the Administration Portal”](#).

**NOTE**

For more information, see the LDAP authentication and authorization extension README file at */usr/share/doc/ovirt-engine-extension-aaa-ldap-version*.

14.3.3. Configuring an External LDAP Provider (Manual Method)

The **ovirt-engine-extension-aaa-ldap** extension uses the LDAP protocol to access directory servers and is fully customizable. Kerberos authentication is not required unless you want to enable the single sign-on to the User Portal or the Administration Portal

feature.

If the interactive setup method in the previous section does not cover your use case, you can manually modify the configuration files to attach your LDAP server. The following procedure uses generic details. Specific values depend on your setup.

Procedure 14.3. Configuring an External LDAP Provider Manually

1. On the Red Hat Enterprise Virtualization Manager, install the LDAP extension package:

```
# yum install ovirt-engine-extension-aaa-ldap
```

2. Copy the LDAP configuration template file into the **/etc/ovirt-engine** directory. Template files are available for active directories (**ad**) and other directory types (**simple**). This example uses the simple configuration template.

```
# cp -r /usr/share/ovirt-engine-extension-aaa-ldap/examples/simple/.  
/etc/ovirt-engine
```

3. Rename the configuration files to match the profile name you want visible to users on the Administration Portal and the User Portal login pages:

```
# mv /etc/ovirt-engine/aaa/profile1.properties /etc/ovirt-  
engine/aaa/example.properties  
# mv /etc/ovirt-engine/extensions.d/profile1-authn.properties  
/etc/ovirt-engine/extensions.d/example-authn.properties  
# mv /etc/ovirt-engine/extensions.d/profile1-authz.properties  
/etc/ovirt-engine/extensions.d/example-authz.properties
```

4. Edit the LDAP property configuration file by uncommenting an LDAP server type and updating the domain and passwords fields:

```
# vi /etc/ovirt-engine/aaa/example.properties
```

Example 14.1. Example profile: LDAP server section

```
# Select one  
#  
include = <openldap.properties>  
#include = <389ds.properties>  
#include = <rhds.properties>  
#include = <ipa.properties>  
#include = <iplanet.properties>  
#include = <rfc2307-389ds.properties>  
#include = <rfc2307-rhds.properties>  
#include = <rfc2307-openldap.properties>  
#include = <rfc2307-edir.properties>  
#include = <rfc2307-generic.properties>  
  
# Server  
#  
vars.server = ldap1.company.com
```

```
# Search user and its password.
#
vars.user = uid=search,cn=users,cn=accounts,dc=company,dc=com
vars.password = 123456

pool.default.serverset.single.server = ${global:vars.server}
pool.default.auth.simple.bindDN = ${global:vars.user}
pool.default.auth.simple.password = ${global:vars.password}
```

To use TLS or SSL protocol to interact with the LDAP server, obtain the root CA certificate for the LDAP server and use it to create a public keystore file. Uncomment the following lines and specify the full path to the public keystore file and the password to access the file.



NOTE

For more information on creating a public keystore file, see [Section D.2, “Setting Up SSL or TLS Connections between the Manager and an LDAP Server”](#).

Example 14.2. Example profile: keystore section

```
# Create keystore, import certificate chain and uncomment
# if using tls.
pool.default.ssl.startTLS = true
pool.default.ssl.truststore.file = /full/path/to/myrootca.jks
pool.default.ssl.truststore.password = password
```

5. Review the authentication configuration file. The profile name visible to users on the Administration Portal and the User Portal login pages is defined by **ovirt.engine.aaa.authn.profile.name**. The configuration profile location must match the LDAP configuration file location. All fields can be left as default.

```
# vi /etc/ovirt-engine/extensions.d/example-authn.properties
```

Example 14.3. Example authentication configuration file

```
ovirt.engine.extension.name = example-authn
ovirt.engine.extension.bindings.method = jbossmodule
ovirt.engine.extension.binding.jbossmodule.module =
org.ovirt.engine-extensions.aaa.ldap
ovirt.engine.extension.binding.jbossmodule.class =
org.ovirt.engineextensions.aaa.ldap.AuthnExtension
ovirt.engine.extension.provides =
org.ovirt.engine.api.extensions.aaa.Authn
ovirt.engine.aaa.authn.profile.name = example
ovirt.engine.aaa.authn.authz.plugin = example-authz
config.profile.file.1 = ../aaa/example.properties
```

- Review the authorization configuration file. The configuration profile location must match the LDAP configuration file location. All fields can be left as default.

```
# vi /etc/ovirt-engine/extensions.d/example-authz.properties
```

Example 14.4. Example authorization configuration file

```
ovirt.engine.extension.name = example-authz
ovirt.engine.extension.bindings.method = jbossmodule
ovirt.engine.extension.binding.jbossmodule.module =
org.ovirt.engine-extensions.aaa.ldap
ovirt.engine.extension.binding.jbossmodule.class =
org.ovirt.engineextensions.aaa.ldap.AuthzExtension
ovirt.engine.extension.provides =
org.ovirt.engine.api.extensions.aaa.Authz
config.profile.file.1 = ../aaa/example.properties
```

- Ensure that the ownership and permissions of the configuration profile are appropriate:

```
# chown ovirt:ovirt /etc/ovirt-engine/aaa/example.properties
```

```
# chmod 600 /etc/ovirt-engine/aaa/example.properties
```

- Restart the engine service:

```
# service ovirt-engine restart
```

- The *example* profile you have created is now available on the Administration Portal and the User Portal login pages. To give the user accounts on the LDAP server appropriate permissions, for example to log in to the User Portal, see the [Red Hat Enterprise Virtualization Manager User Tasks](#) section of the *Red Hat Enterprise Virtualization Administration Guide*.



NOTE

For more information, see the LDAP authentication and authorization extension README file at `/usr/share/doc/ovirt-engine-extension-aaa-ldap-version`.

14.4. CONFIGURING LDAP AND KERBEROS FOR SINGLE SIGN-ON

Single sign-on allows users to log in to the User Portal or the Administration Portal without re-typing their passwords. Authentication credentials are obtained from the Kerberos server. To configure single sign-on to the Administration Portal and the User Portal, you need to configure two extensions and one Apache module: **ovirt-engine-extension-aaa-misc** and **ovirt-engine-extension-aaa-ldap**, and **mod_auth_kerb** respectively. You can configure single sign-on that does not involve Kerberos, however this is outside the scope of this documentation.



NOTE

If single sign-on to the User Portal is enabled, single sign-on to virtual machines will not be possible. With single sign-on to the User Portal enabled, the User Portal does not need to accept a password, thus the password cannot be delegated to sign in to virtual machines.

This example assumes the following:

- The existing Key Distribution Center (KDC) server uses the MIT version of Kerberos 5.
- You have administrative rights to the KDC server.
- The Kerberos client is installed on the Red Hat Enterprise Virtualization Manager and user machines.
- The **kadmin** utility is used to create Kerberos service principals and **keytab** files.

This procedure involves the following components:

On the KDC server

- Create a service principal and a **keytab** file for the Apache service on the Red Hat Enterprise Virtualization Manager.

On the Red Hat Enterprise Virtualization Manager

- Install the authentication and authorization extension packages and the Apache Kerberos authentication module.
- Configure the extension files.

Procedure 14.4. Configuring Kerberos for the Apache Service

1. On the KDC server, use the **kadmin** utility to create a service principal for the Apache service on the Red Hat Enterprise Virtualization Manager. The service principal is a reference ID to the KDC for the Apache service.

```
# kadmin
kadmin> addprinc -randkey HTTP/fqdn-of-rhevm@REALM.COM
```

2. Generate a **keytab** file for the Apache service. The **keytab** file stores the shared secret key.

```
kadmin> ktadd -k /tmp/http.keytab HTTP/fqdn-of-rhevm@REALM.COM
```

```
kadmin> quit
```

3. Copy the **keytab** file from the KDC server to the Red Hat Enterprise Virtualization Manager:

```
# scp /tmp/http.keytab root@rhevm.example.com:/etc/httpd
```

Procedure 14.5. Configuring Single Sign-on to the User Portal or Administration Portal

1. On the Red Hat Enterprise Virtualization Manager, ensure that the ownership and permissions for the keytab are appropriate:

```
# chown apache /etc/httpd/http.keytab
```

```
# chmod 400 /etc/httpd/http.keytab
```

2. Install the authentication extension package, LDAP extension package, and the **mod_auth_kerb** authentication module:

```
# yum install ovirt-engine-extension-aaa-misc ovirt-engine-extension-aaa-ldap mod_auth_kerb
```

3. Copy the SSO configuration template file into the **/etc/ovirt-engine** directory. Template files are available for Active Directory (**ad-sso**) and other directory types (**simple-sso**). This example uses the simple SSO configuration template.

```
# cp -r /usr/share/ovirt-engine-extension-aaa-ldap/examples/simple-sso/. /etc/ovirt-engine
```

4. Move **ovirt-sso.conf** into the Apache configuration directory:

```
# mv /etc/ovirt-engine/aaa/ovirt-sso.conf /etc/httpd/conf.d
```

5. Edit the authentication method file for Apache to use Kerberos for authentication:

```
# vi /etc/httpd/conf.d/ovirt-sso.conf
```

Example 14.5. Example authentication method file

```
<LocationMatch ^(/ovirt-engine/(webadmin|userportal|api)|/api)>
  RewriteEngine on
  RewriteCond %{LA-U:REMOTE_USER} ^(.*)$
  RewriteRule ^(.*)$ - [L,P,E=REMOTE_USER:%1]
  RequestHeader set X-Remote-User %{REMOTE_USER}s

  AuthType Kerberos
  AuthName "Kerberos Login"
  Krb5Keytab /etc/httpd/http.keytab
  KrbAuthRealms REALM.COM
  Require valid-user
</LocationMatch>
```

6. Rename the configuration files to match the profile name you want visible to users on the Administration Portal and the User Portal login pages:

```
# mv /etc/ovirt-engine/aaa/profile1.properties /etc/ovirt-engine/aaa/example.properties
```

```
# mv /etc/ovirt-engine/extensions.d/profile1-http-authn.properties
/etc/ovirt-engine/extensions.d/example-http-authn.properties
```

```
# mv /etc/ovirt-engine/extensions.d/profile1-http-mapping.properties
/etc/ovirt-engine/extensions.d/example-http-mapping.properties
```

```
# mv /etc/ovirt-engine/extensions.d/profile1-authz.properties
/etc/ovirt-engine/extensions.d/example-authz.properties
```

7. Edit the LDAP property configuration file by uncommenting an LDAP server type and updating the domain and passwords fields:

```
# vi /etc/ovirt-engine/aaa/example.properties
```

Example 14.6. Example profile: LDAP server section

```
# Select one
include = <openldap.properties>
#include = <389ds.properties>
#include = <rhds.properties>
#include = <ipa.properties>
#include = <iplanet.properties>
#include = <rfc2307-389ds.properties>
#include = <rfc2307-rhds.properties>
#include = <rfc2307-openldap.properties>
#include = <rfc2307-edir.properties>
#include = <rfc2307-generic.properties>

# Server
#
vars.server = ldap1.company.com

# Search user and its password.
#
vars.user = uid=search,cn=users,cn=accounts,dc=company,dc=com
vars.password = 123456

pool.default.serverset.single.server = ${global:vars.server}
pool.default.auth.simple.bindDN = ${global:vars.user}
pool.default.auth.simple.password = ${global:vars.password}
```

To use TLS or SSL protocol to interact with the LDAP server, obtain the root CA certificate for the LDAP server and use it to create a public keystore file. Uncomment the following lines and specify the full path to the public keystore file and the password to access the file.



NOTE

For more information on creating a public keystore file, see [Section D.2, “Setting Up SSL or TLS Connections between the Manager and an LDAP Server”](#).

Example 14.7. Example profile: keystore section

```
# Create keystore, import certificate chain and uncomment
# if using ssl/tls.
pool.default.ssl.startTLS = true
pool.default.ssl.truststore.file = /full/path/to/myrootca.jks
pool.default.ssl.truststore.password = password
```

8. Review the authentication configuration file. The profile name visible to users on the Administration Portal and the User Portal login pages is defined by **ovirt.engine.aaa.authn.profile.name**. The configuration profile location must match the LDAP configuration file location. All fields can be left as default.

```
# vi /etc/ovirt-engine/extensions.d/example-http-authn.properties
```

Example 14.8. Example authentication configuration file

```
ovirt.engine.extension.name = example-http-authn
ovirt.engine.extension.bindings.method = jbossmodule
ovirt.engine.extension.binding.jbossmodule.module =
org.ovirt.engine-extensions.aaa.misc
ovirt.engine.extension.binding.jbossmodule.class =
org.ovirt.engineextensions.aaa.misc.http.AuthnExtension
ovirt.engine.extension.provides =
org.ovirt.engine.api.extensions.aaa.Authn
ovirt.engine.aaa.authn.profile.name = example-http
ovirt.engine.aaa.authn.authz.plugin = example-authz
ovirt.engine.aaa.authn.mapping.plugin = example-http-mapping
config.artifact.name = HEADER
config.artifact.arg = X-Remote-User
```

9. Review the authorization configuration file. The configuration profile location must match the LDAP configuration file location. All fields can be left as default.

```
# vi /etc/ovirt-engine/extensions.d/example-authz.properties
```

Example 14.9. Example authorization configuration file

```
ovirt.engine.extension.name = example-authz
ovirt.engine.extension.bindings.method = jbossmodule
ovirt.engine.extension.binding.jbossmodule.module =
org.ovirt.engine-extensions.aaa.ldap
ovirt.engine.extension.binding.jbossmodule.class =
org.ovirt.engineextensions.aaa.ldap.AuthzExtension
ovirt.engine.extension.provides =
org.ovirt.engine.api.extensions.aaa.Authz
config.profile.file.1 = ../aaa/example.properties
```

10. Review the authentication mapping configuration file. The configuration profile

location must match the LDAP configuration file location. The configuration profile extension name must match the **ovirt.engine.aaa.authn.mapping.plugin** value in the authentication configuration file. All fields can be left as default.

```
# vi /etc/ovirt-engine/extensions.d/example-http-mapping.properties
```

Example 14.10. Example authentication mapping configuration file

```
ovirt.engine.extension.name = example-http-mapping
ovirt.engine.extension.bindings.method = jbossmodule
ovirt.engine.extension.binding.jbossmodule.module =
org.ovirt.engine-extensions.aaa.misc
ovirt.engine.extension.binding.jbossmodule.class =
org.ovirt.engineextensions.aaa.misc.mapping.MappingExtension
ovirt.engine.extension.provides =
org.ovirt.engine.api.extensions.aaa.Mapping
config.mapAuthRecord.type = regex
config.mapAuthRecord.regex.mustMatch = true
config.mapAuthRecord.regex.pattern = ^(?<user>.*)((\\\\"(?(at>)?)
<suffix>.*)@.*)|(?<realm>@.*))$
config.mapAuthRecord.regex.replacement = ${user}${at}${suffix}
```

11. Ensure that the ownership and permissions of the configuration files are appropriate:

```
# chown ovirt:ovirt /etc/ovirt-engine/aaa/example.properties
```

```
# chown ovirt:ovirt /etc/ovirt-engine/extensions.d/example-http-  
authn.properties
```

```
# chown ovirt:ovirt /etc/ovirt-engine/extensions.d/example-http-  
mapping.properties
```

```
# chown ovirt:ovirt /etc/ovirt-engine/extensions.d/example-  
authz.properties
```

```
# chmod 600 /etc/ovirt-engine/aaa/example.properties
```

```
# chmod 640 /etc/ovirt-engine/extensions.d/example-http-  
authn.properties
```

```
# chmod 640 /etc/ovirt-engine/extensions.d/example-http-  
mapping.properties
```

```
# chmod 640 /etc/ovirt-engine/extensions.d/example-authz.properties
```

12. Restart the Apache service and the engine service:

```
# service httpd restart
```

```
# service ovirt-engine restart
```

14.5. MIGRATING FROM THE LEGACY PROVIDER TO THE NEW EXTENSION-BASED PROVIDER

Directory servers configured using the domain management tool are not supported after Red Hat Enterprise Virtualization 3.6. If your directory servers are configured using the domain management tool, it is highly recommended to migrate to the new extension-based provider. Two options are available:

- Attach the directory server using the new extension-based provider, verify that it is working, and remove the old directory server profile configured using the domain management tool.
- An upstream tool is also available to assist with automating the migration. The migration tool can be downloaded at <https://github.com/machacekondra/ovirt-engine-kerbldap-migration/releases>. Currently this option is only supported by opening a support case with Red Hat.

Procedure 14.6. Manually Migration from the Legacy Provider to the New Extension-Based Provider

1. Use the interactive setup tool to attach directory servers using the new extension-based provider. See [Section 14.3.1, “Configuring an External LDAP Provider \(Interactive Setup\)”](#) for more information. The interactive setup script asks you to perform search and login queries to verify that the setup was successful. You can also log in to the Administration Portal to verify if the directory server has been successfully attached. At this stage the same directory server is attached twice: Once using the legacy provider with the domain management tool, and once using the new extension-based provider. To distinguish between the two, the profile name must not be the same. You can rename the profile name after the legacy profile has been removed.
2. After verifying that the new setup was successful, remove the old directory server profile:

```
# engine-manage-domains delete --domain=directory.demo.example.com
```

3. Log in to the Administration Portal, and remove all users and groups related to the old profile. Users defined in the removed domain will no longer be able to authenticate with the Red Hat Enterprise Virtualization Manager. The entries for the affected users will remain defined in the Red Hat Enterprise Virtualization Manager until they are explicitly removed from the Administration Portal.
4. Optionally rename the profile name of the directory server to the one originally used. Restart the engine service:

```
# vi /etc/ovirt-engine/extensions.d/profile1-authn.properties
ovirt.engine.aaa.authn.profile.name = New_profile_name
```

```
# service ovirt-engine restart
```

14.6. USER AUTHORIZATION

14.6.1. User Authorization Model

Red Hat Enterprise Virtualization applies authorization controls based on the combination of the three components:

- The user performing the action
- The type of action being performed
- The object on which the action is being performed

14.6.2. User Actions

For an action to be successfully performed, the **user** must have the appropriate **permission** for the **object** being acted upon. Each type of action corresponds to a **permission**. There are many different permissions in the system, so for simplicity:

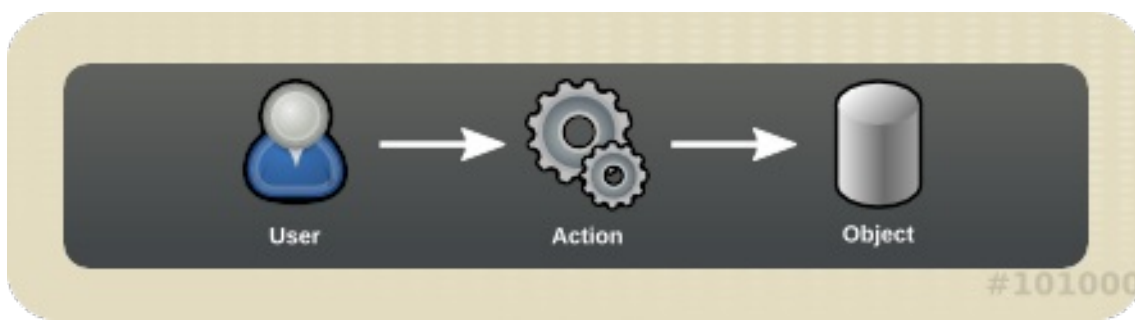
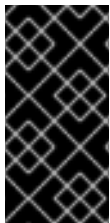


Figure 14.3. Actions



IMPORTANT

Some actions are performed on more than one object. For example, copying a template to another storage domain will impact both the template and the destination storage domain. The user performing an action must have appropriate permissions for all objects the action impacts.

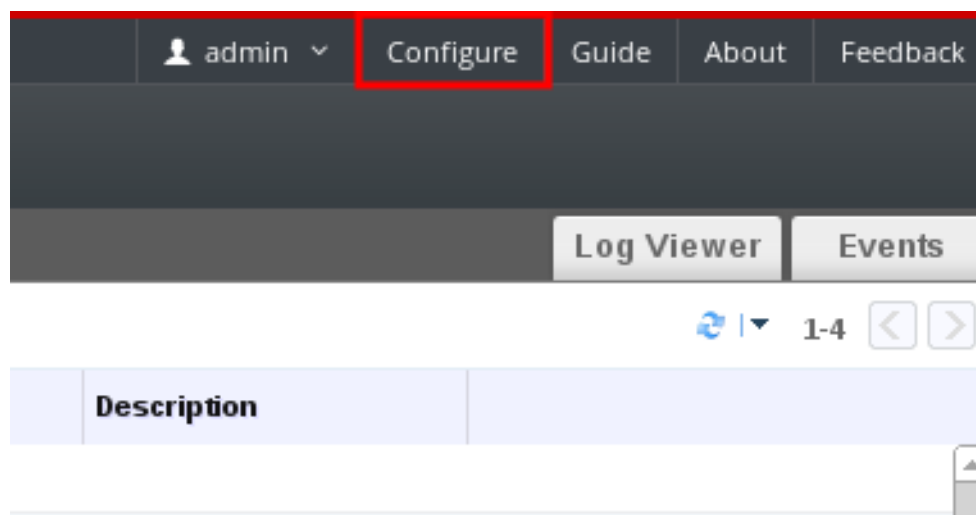
14.7. ADMINISTERING USER TASKS FROM THE ADMINISTRATION PORTAL

14.7.1. Adding Users and Assigning User Portal Permissions

Users must be created already before they can be added and assigned roles and permissions. The roles and permissions assigned in this procedure give the user the permission to log in to the User Portal and to start creating virtual machines. The procedure also applies to group accounts.

Procedure 14.7. Adding Users and Assigning User Portal Permissions

1. On the header bar, click **Configure** to open the **Configure** window. Click **System Permissions**.



2. Click **Add** to open the **Add System Permission to User** window.
3. Select a profile under **Search**. The profile is the domain you want to search. Enter a name or part of a name in the search text field, and click **GO**. Alternatively, click **GO** to view a list of all users and groups.
4. Select the check boxes for the appropriate users or groups.
5. Select an appropriate role to assign under **Role to Assign**. The **UserRole** role gives the user account the permission to log in to the User Portal.
6. Click **OK**.

Log in to the User Portal to verify that the user account has the permissions to log in.

14.7.2. Viewing User Information

You can view detailed information about each user in the **Users** tab.

Procedure 14.8. Viewing User Information

1. Click the **Users** tab to display the list of authorized users.
2. Select the user, or perform a search if the user is not visible on the results list.
3. The details pane displays for the selected user, usually with the **General** tab displaying general information, such as the domain name, email and status of the user.
4. The other tabs allow you to view groups, permissions, quotas, and events for the user.

For example, to view the groups to which the user belongs, click the **Directory Groups** tab.

14.7.3. Viewing User Permissions on Resources

Users can be assigned permissions on specific resources or a hierarchy of resources. You can view the assigned users and their permissions on each resource.

Procedure 14.9. Viewing User Permissions on Resources

1. Click the resource tabs, and select a resource in the results list.
2. Click the **Permissions** tab of the details pane to list the assigned users, the user's role, and the inherited permissions for the selected resource.

14.7.4. Removing Users

When a user account is no longer required, remove it from Red Hat Enterprise Virtualization.

Procedure 14.10. Removing Users

1. Click the **Users** tab to display the list of authorized users.
2. Select the user to be removed. Ensure the user is not running any virtual machines.
3. Click the **Remove** button. A message displays prompting you to confirm the removal. Click **OK**.

The user is removed from Red Hat Enterprise Virtualization, but not from the external directory.

14.7.5. Viewing Logged In Users

In Red Hat Enterprise Virtualization 3.6 and later you can view the users who are currently logged in. Click the **Guest Information** entry in the tree pane to view the details of the session for each logged in user.

14.7.6. Terminating a User Session

In Red Hat Enterprise Virtualization 3.6 and later you can terminate the session of a user who is currently logged in.

Procedure 14.11. Terminating a User Session

1. Click the **Guest Information** entry in the tree pane.
2. Select the user session to be terminated.
3. Click **Terminate Session**.
4. Click **OK**.

14.8. ADMINISTERING USER TASKS FROM THE COMMAND LINE**14.8.1. Managing Users**

You can use the **ovirt-aaa-jdbc-tool** tool to manage user accounts on the internal domain. Changes made using the tool take effect immediately and do not require you to restart the **ovirt-engine** service. For a full list of user options, run **ovirt-aaa-jdbc-tool user --help**. Common examples are provided in this section.

Procedure 14.12. Creating a User

This procedure shows you how to create a user, set the user password, and add it to your Red Hat Enterprise Virtualization environment.

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Create a new user account. Optionally use **--attribute** to specify account details. For a full list of options, run **ovirt-aaa-jdbc-tool user add --help**.

```
# ovirt-aaa-jdbc-tool user add test1 --attribute=firstName=John --
attribute=lastName=Doe
adding user test1...
user added successfully
```

3. Set a password. You must set a value for **--password-valid-to**, otherwise the password expiry time defaults to the current time. The date format is **yyyy-MM-dd HH:mm:ssX**. In this example, **-0800** stands for GMT minus 8 hours. For more options, run **ovirt-aaa-jdbc-tool user password-reset --help**.

```
# ovirt-aaa-jdbc-tool user password-reset test1 --password-valid-
to="2025-08-01 12:00:00-0800"
Password:
updating user test1...
user updated successfully
```



NOTE

By default, the password policy for user accounts on the internal domain has the following restrictions:

- A minimum of 6 characters.
- Three previous passwords used cannot be set again during the password change.

For more information on the password policy and other default settings, run **ovirt-aaa-jdbc-tool settings show**.

4. Add the newly created user in the Administration Portal and assign the user appropriate roles and permissions. See [Section 14.7.1, “Adding Users and Assigning User Portal Permissions”](#) for more information.

Procedure 14.13. Viewing User Information

This procedure shows you how to view user account information. More information is displayed than in the Administration Portal, **Users** tab.

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Run the following command:

```
# ovirt-aaa-jdbc-tool user show test1
```

Procedure 14.14. Editing User Information

This procedure shows you how to update user account information.

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Run the following command to edit user information. This example updates the email address.

```
# ovirt-aaa-jdbc-tool user edit test1 --
attribute=email=jdoe@example.com
```

Procedure 14.15. Removing a User

This procedure shows you how to delete a user account

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Delete the user:

```
# ovirt-aaa-jdbc-tool user delete test1
```

3. Remove the user from the Administration Portal. See [Section 14.7.4, “Removing Users”](#) for more information.

14.8.2. Changing the Password for the Internal Administrative User

To reset the password of the internal administrative user (**admin@internal**), use the **ovirt-aaa-jdbc-tool** tool. You do not need to restart the **ovirt-engine** service for the password change to take effect.

By default, the password policy for user accounts on the internal domain has the following restrictions:

- A minimum of 6 characters.
- Three previous passwords used cannot be set again during the password change.

For more information on the password policy and other default settings, run **ovirt-aaa-jdbc-tool settings show**.

Procedure 14.16. Resetting the Password for the Internal Administrative User

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. To change the password in interactive mode, run the following command. You must set a value for **--password-valid-to**, otherwise the password expiry time defaults to the current time. The date format is **yyyy-MM-dd HH:mm:ssX**. In this example, **Z**

stands for UTC time. For more options, run **ovirt-aaa-jdbc-tool user password-reset --help**.

```
# ovirt-aaa-jdbc-tool user password-reset admin --password-valid-  
to="2025-08-01 12:00:00Z"
```

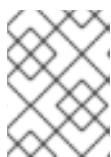
14.8.3. Disabling the Internal Administrative User

You can disable users on the local domains including the **admin@internal** user created during **engine-setup**. Make sure you have at least one user in the environment with full administrative permissions before disabling the default **admin** user.

Procedure 14.17. Disabling the Internal Administrative User

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Make sure another user with the **SuperUser** role has been added to the environment. See [Section 14.7.1, “Adding Users and Assigning User Portal Permissions”](#) for more information.
3. Disable the default **admin** user:

```
# ovirt-aaa-jdbc-tool user edit admin --flag=+disabled
```



NOTE

To enable a disabled user, run **ovirt-aaa-jdbc-tool user edit *username* --flag=-disabled**

14.8.4. Managing Groups

You can use the **ovirt-aaa-jdbc-tool** tool to manage group accounts on your internal domain. Managing group accounts is similar to managing user accounts. For a full list of group options, run **ovirt-aaa-jdbc-tool group --help**. Common examples are provided in this section.

Procedure 14.18. Creating a Group

This procedure shows you how to create a group account, add users to the group, and view the details of the group.

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Create a new group:

```
# ovirt-aaa-jdbc-tool group add group1
```

3. Add users to the group. The users must be created already.

```
# ovirt-aaa-jdbc-tool group-manage useradd group1 --user=test1
```


**NOTE**

For a full list of the group-manage options, run **ovirt-aaa-jdbc-tool group-manage --help**.

4. View group account details:

```
# ovirt-aaa-jdbc-tool group show group1
```

5. Add the newly created group in the Administration Portal and assign the group appropriate roles and permissions. The users in the group inherit the roles and permissions of the group. See [Section 14.7.1, “Adding Users and Assigning User Portal Permissions”](#) for more information.

Procedure 14.19. Creating Nested Groups

This procedure shows you how to create groups within groups.

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Create the first group:

```
# ovirt-aaa-jdbc-tool group add group1
```

3. Create the second group:

```
# ovirt-aaa-jdbc-tool group add group1-1
```

4. Add the second group to the first group:

```
# ovirt-aaa-jdbc-tool group-manage groupadd group1 --group=group1-1
```

5. Add the first group in the Administration Portal and assign the group appropriate roles and permissions. See [Section 14.7.1, “Adding Users and Assigning User Portal Permissions”](#) for more information.

14.8.5. Querying Users and Groups

The **query** module allows you to query user and group information. For a full list of options, run **ovirt-aaa-jdbc-tool query --help**.

Procedure 14.20. Listing All User or Group Account Details

This procedure shows you how to list all account information.

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2.
 - List all user account details:

```
# ovirt-aaa-jdbc-tool query --what=user
```

- List all group account details:

```
# ovirt-aaa-jdbc-tool query --what=group
```

Procedure 14.21. Listing Filtered Account Details

This procedure shows you how to apply filters when listing account information.

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. ◦ List user account details with names that start with the character j.

```
# ovirt-aaa-jdbc-tool query --what=user --pattern="name=j*"
```

- List groups that have the department attribute set to *marketing*:

```
# ovirt-aaa-jdbc-tool query --what=group --  
pattern="department=marketing"
```

14.8.6. Managing Account Settings

To change the default account settings, use the **ovirt-aaa-jdbc-tool settings** module.

Procedure 14.22. Updating Account Settings

This procedure shows you how to update the default account settings.

1. Log in to the machine on which the Red Hat Enterprise Virtualization Manager is installed.
2. Run the following command to show all the settings available:

```
# ovirt-aaa-jdbc-tool setting show
```

3. Change the desired settings:
 - This example updates the default log in session time to 60 minutes for all user accounts. The default value is 10080 minutes.

```
# ovirt-aaa-jdbc-tool setting set --name=MAX_LOGIN_MINUTES --  
value=60
```

- This example updates the number of failed login attempts a user can perform before the user account is locked. The default value is 5.

```
# ovirt-aaa-jdbc-tool setting set --  
name=MAX_FAILURES_SINCE_SUCCESS --value=3
```

**NOTE**

To unlock a locked user account, run **ovirt-aaa-jdbc-tool user unlock test1**.

14.9. CONFIGURING ADDITIONAL LOCAL DOMAINS

Creating additional local domains other than the default **internal** domain is also supported. This can be done using the **ovirt-engine-extension-aaa-jdbc** extension and allows you to create multiple domains without attaching external directory servers, though the use case may not be common for enterprise environments.

Additionally created local domains will not get upgraded automatically during standard Red Hat Enterprise Virtualization upgrades and need to be upgraded manually for each future release. For more information on creating additional local domains and how to upgrade the domains, see the README file at **/usr/share/doc/ovirt-engine-extension-aaa-jdbc-version/README.admin**.

CHAPTER 15. QUOTAS AND SERVICE LEVEL AGREEMENT POLICY

15.1. INTRODUCTION TO QUOTA

Quota is a resource limitation tool provided with Red Hat Enterprise Virtualization. Quota may be thought of as a layer of limitations on top of the layer of limitations set by User Permissions.

Quota is a data center object.

Quota allows administrators of Red Hat Enterprise Virtualization environments to limit user access to memory, CPU, and storage. Quota defines the memory resources and storage resources an administrator can assign users. As a result users may draw on only the resources assigned to them. When the quota resources are exhausted, Red Hat Enterprise Virtualization does not permit further user actions.

There are two different kinds of Quota:

Table 15.1. The Two Different Kinds of Quota

Quota type	Definition
Run-time Quota	This quota limits the consumption of runtime resources, like CPU and memory.
Storage Quota	This quota limits the amount of storage available.

Quota, like SELinux, has three modes:

Table 15.2. Quota Modes

Quota Mode	Function
Enforced	This mode puts into effect the Quota that you have set in audit mode, limiting resources to the group or user affected by the quota.
Audit	This mode allows you to change Quota settings. Choose this mode to increase or decrease the amount of runtime quota and the amount of storage quota available to users affected by it.
Disabled	This mode turns off the runtime and storage limitations defined by the quota.

When a user attempts to run a virtual machine, the specifications of the virtual machine are compared to the storage allowance and the runtime allowance set in the applicable quota.

If starting a virtual machine causes the aggregated resources of all running virtual machines covered by a quota to exceed the allowance defined in the quota, then the Manager refuses to run the virtual machine.

When a user creates a new disk, the requested disk size is added to the aggregated disk usage of all the other disks covered by the applicable quota. If the new disk takes the total aggregated disk usage above the amount allowed by the quota, disk creation fails.

Quota allows for resource sharing of the same hardware. It supports hard and soft thresholds. Administrators can use a quota to set thresholds on resources. These thresholds appear, from the user's point of view, as 100% usage of that resource. To prevent failures when the customer unexpectedly exceeds this threshold, the interface supports a "grace" amount by which the threshold can be briefly exceeded. Exceeding the threshold results in a warning sent to the customer.

IMPORTANT

Quota imposes limitations upon the running of virtual machines. Ignoring these limitations is likely to result in a situation in which you cannot use your virtual machines and virtual disks.

When quota is running in enforced mode, virtual machines and disks that do not have quotas assigned cannot be used.

To power on a virtual machine, a quota must be assigned to that virtual machine.

To create a snapshot of a virtual machine, the disk associated with the virtual machine must have a quota assigned.

When creating a template from a virtual machine, you are prompted to select the quota that you want the template to consume. This allows you to set the template (and all future machines created from the template) to consume a different quota than the virtual machine and disk from which the template is generated.

15.2. SHARED QUOTA AND INDIVIDUALLY DEFINED QUOTA

Users with SuperUser permissions can create quotas for individual users or quotas for groups.

Group quotas can be set for Active Directory users. If a group of ten users are given a quota of 1 TB of storage and one of the ten users fills the entire terabyte, then the entire group will be in excess of the quota and none of the ten users will be able to use any of the storage associated with their group.

An individual user's quota is set for only the individual. Once the individual user has used up all of his or her storage or runtime quota, the user will be in excess of the quota and the user will no longer be able to use the storage associated with his or her quota.

15.3. QUOTA ACCOUNTING

When a quota is assigned to a consumer or a resource, each action by that consumer or on the resource involving storage, vCPU, or memory results in quota consumption or quota release.

Since the quota acts as an upper bound that limits the user's access to resources, the quota calculations may differ from the actual current use of the user. The quota is calculated for the max growth potential and not the current usage.

Example 15.1. Accounting example

A user runs a virtual machine with 1 vCPU and 1024 MB memory. The action consumes 1 vCPU and 1024 MB of the quota assigned to that user. When the virtual machine is stopped 1 vCPU and 1024 MB of RAM are released back to the quota assigned to that user. Run-time quota consumption is accounted for only during the actual run-time of the consumer.

A user creates a virtual thin provision disk of 10 GB. The actual disk usage may indicate only 3 GB of that disk are actually in use. The quota consumption, however, would be 10 GB, the max growth potential of that disk.

15.4. ENABLING AND CHANGING A QUOTA MODE IN A DATA CENTER

This procedure enables or changes the quota mode in a data center. You must select a quota mode before you can define quotas. You must be logged in to the Administration Portal to follow the steps of this procedure.

Use **Audit** mode to test your quota to make sure it works as you expect it to. You do not need to have your quota in **Audit** mode to create or change a quota.

Procedure 15.1. Enabling and Changing Quota in a Data Center

1. Click the **Data Centers** tab in the Navigation Pane.
2. From the list of data centers displayed in the Navigation Pane, choose the data center whose quota policy you plan to edit.
3. Click **Edit** in the top left of the Navigation Pane.

An **Edit Data Center** window opens.

4. In the **Quota Mode** drop-down, change the quota mode to **Enforced**.
5. Click **OK**.

You have now enabled a quota mode at the Data Center level. If you set the quota mode to **Audit** during testing, then you must change it to **Enforced** in order for the quota settings to take effect.

15.5. CREATING A NEW QUOTA POLICY

You have enabled quota mode, either in Audit or Enforcing mode. You want to define a quota policy to manage resource usage in your data center.

Procedure 15.2. Creating a New Quota Policy

1. In tree mode, select the data center. The **Quota** tab appears in the Navigation Pane.

2. Click the **Quota** tab in the Navigation Pane.
3. Click **Add** in the Navigation Pane. The **New Quota** window opens.
4. Fill in the **Name** field with a meaningful name.

Fill in the **Description** field with a meaningful name.

5. In the **Memory & CPU** section of the **New Quota** window, use the green slider to set **Cluster Threshold**.
6. In the **Memory & CPU** section of the **New Quota** window, use the blue slider to set **Cluster Grace**.
7. Select the **All Clusters** or the **Specific Clusters** radio button. If you select **Specific Clusters**, select the check box of the clusters that you want to add a quota policy to.
8. Click **Edit** to open the **Edit Quota** window.
9. Under the **Memory** field, select either the **Unlimited** radio button (to allow limitless use of Memory resources in the cluster), or select the **limit to** radio button to set the amount of memory set by this quota. If you select the **limit to** radio button, input a memory quota in megabytes (MB) in the **MB** field.
10. Under the **CPU** field, select either the **Unlimited** radio button or the **limit to** radio button to set the amount of CPU set by this quota. If you select the **limit to** radio button, input a number of vCPUs in the **vCpus** field.
11. Click **OK** in the **Edit Quota** window.
12. In the **Storage** section of the **New Quota** window, use the green slider to set **Storage Threshold**.
13. In the **Storage** section of the **New Quota** window, use the blue slider to set **Storage Grace**.
14. Select the **All Storage Domains** or the **Specific Storage Domains** radio button. If you select **Specific Storage Domains**, select the check box of the storage domains that you want to add a quota policy to.
15. Click **Edit** to open the **Edit Quota** window.
16. Under the **Storage Quota** field, select either the **Unlimited** radio button (to allow limitless use of Storage) or the **limit to** radio button to set the amount of storage to which quota will limit users. If you select the **limit to** radio button, input a storage quota size in gigabytes (GB) in the **GB** field.
17. Click **OK** in the **Edit Quota** window. You are returned to the **New Quota** window.
18. Click **OK** in the **New Quota** window.

Result

You have created a new quota policy.

15.6. EXPLANATION OF QUOTA THRESHOLD SETTINGS

Table 15.3. Quota thresholds and grace

Setting	Definition
Cluster Threshold	The amount of cluster resources available per data center.
Cluster Grace	The amount of the cluster available for the data center after exhausting the data center's Cluster Threshold.
Storage Threshold	The amount of storage resources available per data center.
Storage Grace	The amount of storage available for the data center after exhausting the data center's Storage Threshold.

If a quota is set to 100 GB with 20% Grace, then consumers are blocked from using storage after they use 120 GB of storage. If the same quota has a Threshold set at 70%, then consumers receive a warning when they exceed 70 GB of storage consumption (but they remain able to consume storage until they reach 120 GB of storage consumption.) Both "Threshold" and "Grace" are set relative to the quota. "Threshold" may be thought of as the "soft limit", and exceeding it generates a warning. "Grace" may be thought of as the "hard limit", and exceeding it makes it impossible to consume any more storage resources.

15.7. ASSIGNING A QUOTA TO AN OBJECT

Summary

This procedure explains how to associate a virtual machine with a quota.

Procedure 15.3. Assigning a Quota to a Virtual Machine

1. In the navigation pane, select the Virtual Machine to which you plan to add a quota.
2. Click **Edit**. The **Edit Virtual Machine** window appears.
3. Select the quota you want the virtual machine to consume. Use the **Quota** drop-down to do this.
4. Click **OK**.

Result

You have designated a quota for the virtual machine you selected.

Summary

This procedure explains how to associate a virtual machine disk with a quota.

Procedure 15.4. Assigning a Quota to a Virtual Disk

1. In the navigation pane, select the Virtual Machine whose disk(s) you plan to add a quota.

2. In the details pane, select the disk you plan to associate with a quota.
3. Click **Edit**. The **Edit Virtual Disk** window appears.
4. Select the quota you want the virtual disk to consume.
5. Click **OK**.

Result

You have designated a quota for the virtual disk you selected.



IMPORTANT

Quota must be selected for all objects associated with a virtual machine, in order for that virtual machine to work. If you fail to select a quota for the objects associated with a virtual machine, the virtual machine will not work. The error that the Manager throws in this situation is generic, which makes it difficult to know if the error was thrown because you did not associate a quota with all of the objects associated with the virtual machine. It is not possible to take snapshots of virtual machines that do not have an assigned quota. It is not possible to create templates of virtual machines whose virtual disks do not have assigned quotas.

15.8. USING QUOTA TO LIMIT RESOURCES BY USER

Summary

This procedure describes how to use quotas to limit the resources a user has access to.

Procedure 15.5. Assigning a User to a Quota

1. In the tree, click the Data Center with the quota you want to associate with a User.
2. Click the **Quota** tab in the navigation pane.
3. Select the target quota in the list in the navigation pane.
4. Click the **Consumers** tab in the details pane.
5. Click **Add** at the top of the details pane.
6. In the **Search** field, type the name of the user you want to associate with the quota.
7. Click **GO**.
8. Select the check box at the left side of the row containing the name of the target user.
9. Click **OK** in the bottom right of the **Assign Users and Groups to Quota** window.

Result

After a short time, the user will appear in the **Consumers** tab of the details pane.

15.9. EDITING QUOTAS

Summary

This procedure describes how to change existing quotas.

Procedure 15.6. Editing Quotas

1. On the tree pane, click on the data center whose quota you want to edit.
2. Click on the **Quota** tab in the Navigation Pane.
3. Click the name of the quota you want to edit.
4. Click **Edit** in the Navigation pane.
5. An **Edit Quota** window opens. If required, enter a meaningful name in the **Name** field.
6. If required, you can enter a meaningful description in the **Description** field.
7. Select either the **All Clusters** radio button or the **Specific Clusters** radio button. Move the **Cluster Threshold** and **Cluster Grace** sliders to the desired positions on the **Memory & CPU** slider.
8. Select either the **All Storage Domains** radio button or the **Specific Storage Domains** radio button. Move the **Storage Threshold** and **Storage Grace** sliders to the desired positions on the **Storage** slider.
9. Click **OK** in the **Edit Quota** window to confirm the new quota settings.

Result

You have changed an existing quota.

15.10. REMOVING QUOTAS

Summary

This procedure describes how to remove quotas.

Procedure 15.7. Removing Quotas

1. On the tree pane, click on the data center whose quota you want to edit.
2. Click on the **Quota** tab in the Navigation Pane.
3. Click the name of the quota you want to remove.
4. Click **Remove** at the top of the Navigation pane, under the row of tabs.
5. Click **OK** in the **Remove Quota(s)** window to confirm the removal of this quota.

Result

You have removed a quota.

15.11. SERVICE LEVEL AGREEMENT POLICY ENFORCEMENT

Summary

This procedure describes how to set service level agreement CPU features.

Procedure 15.8. Setting a Service Level Agreement CPU Policy

1. Select **New VM** in the Navigation Pane.
2. Select **Show Advanced Options**.
3. Select the **Resource Allocation** tab.

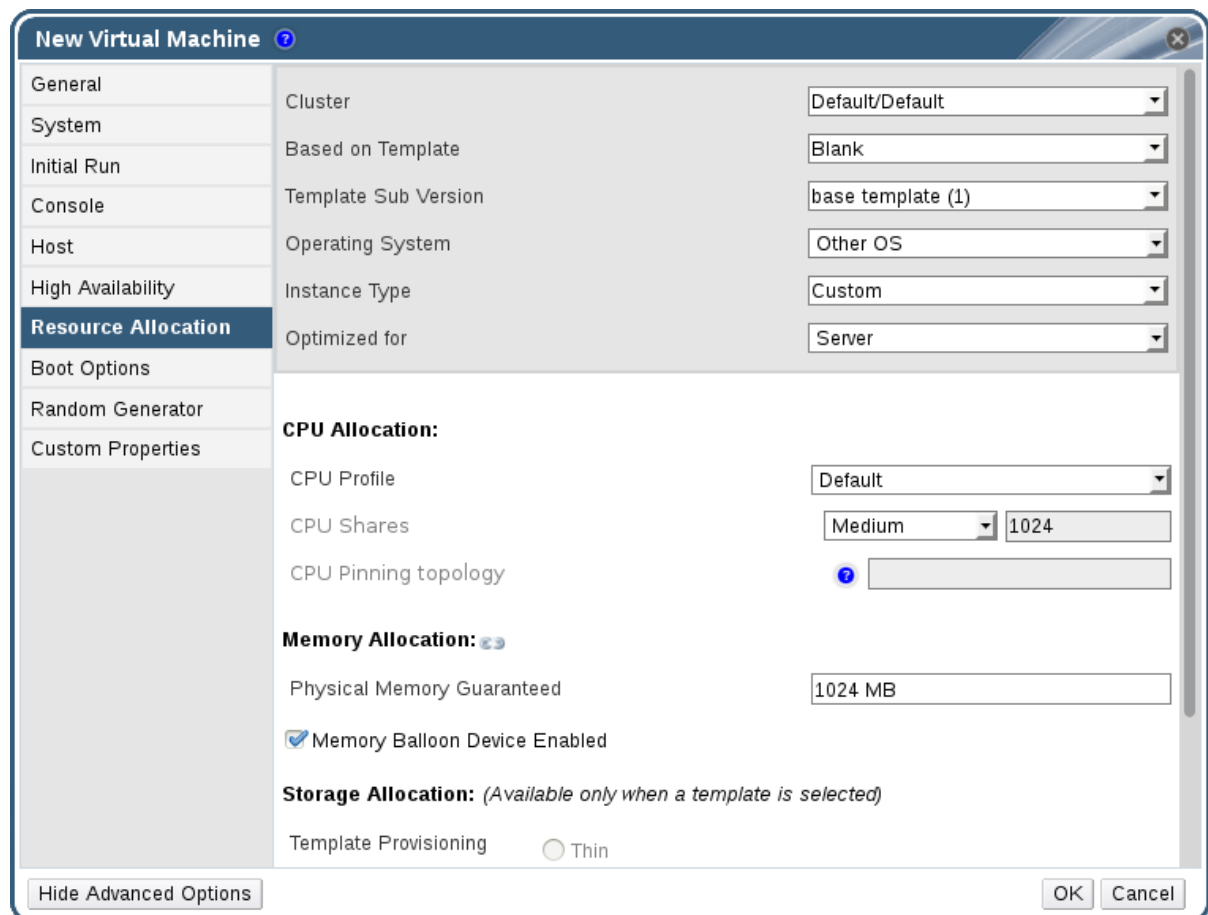


Figure 15.1. Service Level Agreement Policy Enforcement - CPU Allocation Menu

4. Specify **CPU Shares**. Possible options are **Low**, **Medium**, **High**, **Custom**, and **Disabled**. Virtual machines set to **High** receive twice as many shares as **Medium**, and virtual machines set to **Medium** receive twice as many shares as virtual machines set to **Low**. **Disabled** instructs VDSM to use an older algorithm for determining share dispensation; usually the number of shares dispensed under these conditions is 1020.

Result

You have set a service level agreement CPU policy. The CPU consumption of users is now governed by the policy you have set.

CHAPTER 16. EVENT NOTIFICATIONS

16.1. CONFIGURING EVENT NOTIFICATIONS IN THE ADMINISTRATION PORTAL

Summary

The Red Hat Enterprise Virtualization Manager can notify designated users via email when specific events occur in the environment that the Red Hat Enterprise Virtualization Manager manages. To use this functionality, you must set up a mail transfer agent to deliver messages. Only email notifications can be configured through the Administration Portal. SNMP traps must be configured on the Manager machine.

Procedure 16.1. Configuring Event Notifications

1. Ensure you have set up the mail transfer agent with the appropriate variables.
2. Use the **Users** resource tab, tree mode, or the search function to find and select the user to which event notifications will be sent.
3. Click the **Event Notifier** tab in the details pane to list the events for which the user will be notified. This list is blank if you have not configured any event notifications for that user.
4. Click **Manage Events** to open the **Add Event Notification** window.

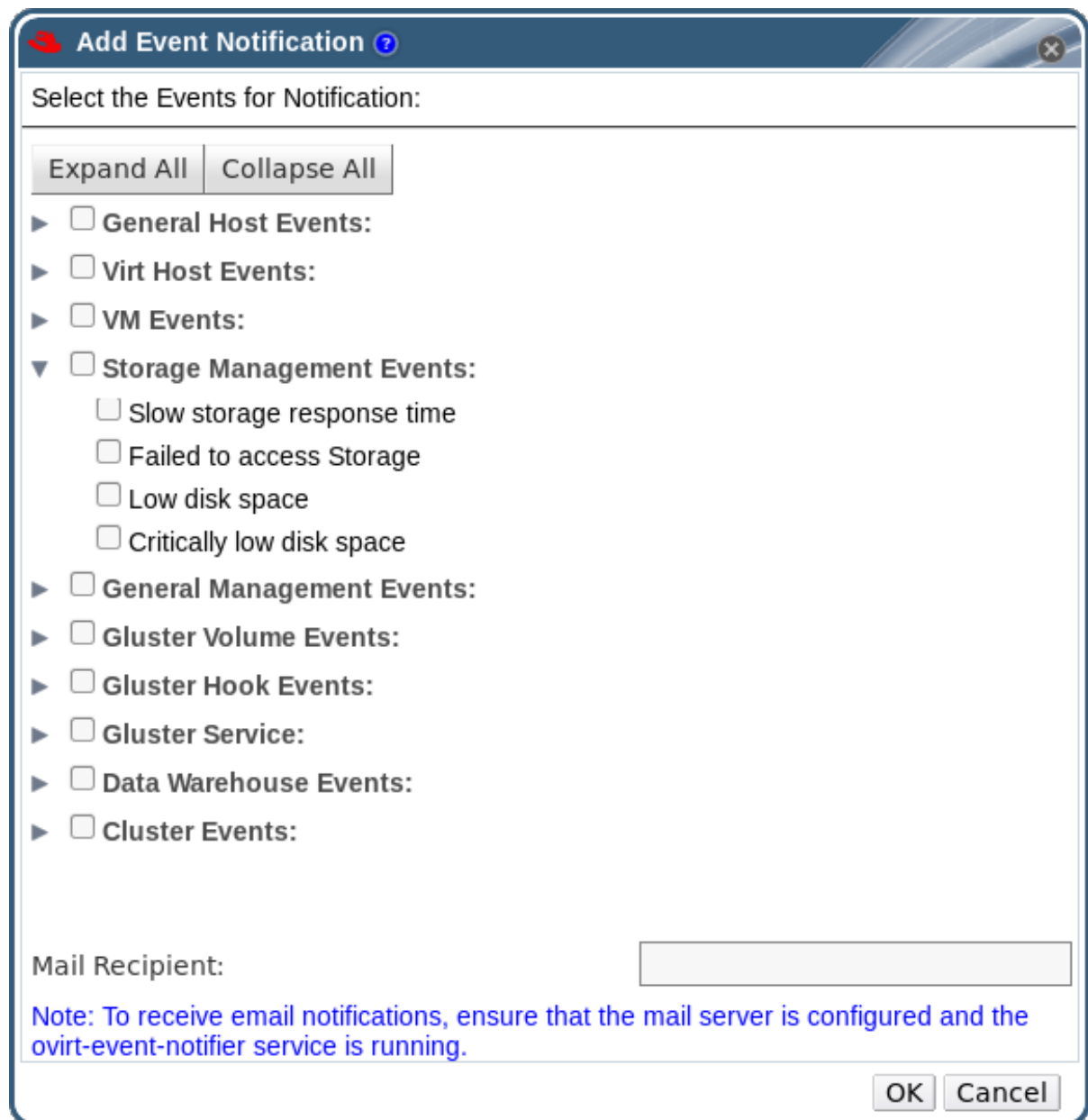


Figure 16.1. The Add Events Notification Window

5. Use the **Expand All** button or the subject-specific expansion buttons to view the events.
6. Select the appropriate check boxes.
7. Enter an email address in the **Mail Recipient** field.
8. Click **OK** to save changes and close the window.
9. Add and start the **ovirt-engine-notifier** service on the Red Hat Enterprise Virtualization Manager. This activates the changes you have made:

```
# chkconfig --add ovirt-engine-notifier
# chkconfig ovirt-engine-notifier on
# service ovirt-engine-notifier restart
```

Result

The specified user now receives emails based on events in the Red Hat Enterprise Virtualization environment. The selected events display on the **Event Notifier** tab for that user.

16.2. CANCELING EVENT NOTIFICATIONS IN THE ADMINISTRATION PORTAL

Summary

A user has configured some unnecessary email notifications and wants them canceled.

Procedure 16.2. Canceling Event Notifications

1. In the **Users** tab, select the user or the user group.
2. Select the **Event Notifier** tab in the details pane to list events for which the user receives email notifications.
3. Click **Manage Events** to open the **Add Event Notification** window.
4. Use the **Expand All** button, or the subject-specific expansion buttons, to view the events.
5. Clear the appropriate check boxes to remove notification for that event.
6. Click **OK** to save changes and close the window.

Result

You have canceled unnecessary event notifications for the user.

16.3. PARAMETERS FOR EVENT NOTIFICATIONS IN OVIRT-ENGINE-NOTIFIER.CONF

The event notifier configuration file can be found in `/usr/share/ovirt-engine/services/ovirt-engine-notifier/ovirt-engine-notifier.conf`.

Table 16.1. ovirt-engine-notifier.conf variables

Variable Name	Default	Remarks
SENSITIVE_KEYS	none	A comma-separated list of keys that will not be logged.
JBOSS_HOME	/usr/share/jbossas	The location of the JBoss application server used by the Manager.
ENGINE_ETC	/etc/ovirt-engine	The location of the etc directory used by the Manager.
ENGINE_LOG	/var/log/ovirt-engine	The location of the logs directory used by the Manager.

Variable Name	Default	Remarks
ENGINE_USR	/usr/share/ovirt-engine	The location of the usr directory used by the Manager.
ENGINE_JAVA_MODULEPATH	\${ENGINE_USR}/modules	The file path to which the JBoss modules are appended.
NOTIFIER_DEBUG_ADDRESS	none	The address of a machine that can be used to perform remote debugging of the Java virtual machine that the notifier uses.
NOTIFIER_STOP_TIME	30	The time, in seconds, after which the service will time out.
NOTIFIER_STOP_INTERVAL	1	The time, in seconds, by which the timeout counter will be incremented.
INTERVAL_IN_SECONDS	120	The interval in seconds between instances of dispatching messages to subscribers.
IDLE_INTERVAL	30	The interval, in seconds, between which low-priority tasks will be performed.
DAYS_TO_KEEP_HISTORY	0	This variable sets the number of days dispatched events will be preserved in the history table. If this variable is not set, events remain on the history table indefinitely.
FAILED_QUERIES_NOTIFICATION_THRESHOLD	30	The number of failed queries after which a notification email is sent. A notification email is sent after the first failure to fetch notifications, and then once every time the number of failures specified by this variable is reached. If you specify a value of 0 or 1 , an email will be sent with each failure.
FAILED_QUERIES_NOTIFICATION_RECIPIENTS	none	The email addresses of the recipients to which notification emails will be sent. Email addresses must be separated by a comma. This entry has been deprecated by the FILTER variable.

Variable Name	Default	Remarks
DAYS_TO_SEND_ON_STARTUP	0	The number of days of old events that will be processed and sent when the notifier starts.
FILTER	exclude:*	The algorithm used to determine the triggers for and recipients of email notifications. The value for this variable comprises a combination of include or exclude , the event, and the recipient. For example, include:VDC_START(smtp:mail@example.com) \${FILTER}
MAIL_SERVER	none	The SMTP mail server address. Required.
MAIL_PORT	25	The port used for communication. Possible values include 25 for plain SMTP, 465 for SMTP with SSL, and 587 for SMTP with TLS.
MAIL_USER	none	If SSL is enabled to authenticate the user, then this variable must be set. This variable is also used to specify the "from" user address when the MAIL_FROM variable is not set. Some mail servers do not support this functionality. The address is in RFC822 format.
SENSITIVE_KEYS	\${SENSITIVE_KEYS},MAIL_PASSWORD	Required to authenticate the user if the mail server requires authentication or if SSL or TLS is enabled.
MAIL_PASSWORD	none	Required to authenticate the user if the mail server requires authentication or if SSL or TLS is enabled.
MAIL_SMTP_ENCRYPTION	none	The type of encryption to be used in communication. Possible values are none, ssl, tls .
HTML_MESSAGE_FORMAT	false	The mail server sends messages in HTML format if this variable is set to true .

Variable Name	Default	Remarks
MAIL_FROM	none	This variable specifies a sender address in RFC822 format, if supported by the mail server.
MAIL_REPLY_TO	none	This variable specifies reply-to addresses in RFC822 format on sent mail, if supported by the mail server.
MAIL_SEND_INTERVAL	1	The number of SMTP messages to be sent for each IDLE_INTERVAL
MAIL_RETRIES	4	The number of times to attempt to send an email before failing.
SNMP_MANAGER	none	The IP addresses or fully qualified domain names of machines that will act as the SNMP managers. Entries must be separated by a space and can contain a port number. For example, manager1.example.com manager2.example.com:164
SNMP_COMMUNITY	public	The default SNMP community.
SNMP_OID	1.3.6.1.4.1.2312.13.1.1	The default trap object identifiers for alerts. All trap types are sent, appended with event information, to the SNMP manager when this OID is defined. Note that changing the default trap prevents generated traps from complying with the Manager's management information base.
ENGINE_INTERVAL_IN_SECONDS	300	The interval, in seconds, between monitoring the machine on which the Manager is installed. The interval is measured from the time the monitoring is complete.
ENGINE_MONITOR_RETRIES	3	The number of times the notifier attempts to monitor the status of the machine on which the Manager is installed in a given interval after a failure.

Variable Name	Default	Remarks
ENGINE_TIMEOUT_IN_SECONDS	30	The time, in seconds, to wait before the notifier attempts to monitor the status of the machine on which the Manager is installed in a given interval after a failure.
IS_HTTPS_PROTOCOL	false	This entry must be set to true if JBoss is being run in secured mode.
SSL_PROTOCOL	TLS	The protocol used by JBoss configuration connector when SSL is enabled.
SSL_IGNORE_CERTIFICATE_ERRORS	false	This value must be set to true if JBoss is running in secure mode and SSL errors is to be ignored.
SSL_IGNORE_HOST_VERIFICATION	false	This value must be set to true if JBoss is running in secure mode and host name verification is to be ignored.
REPEAT_NON_RESPONSIVE_NOTIFICATION	false	This variable specifies whether repeated failure messages will be sent to subscribers if the machine on which the Manager is installed is non-responsive.
ENGINE_PID	/var/lib/ovirt-engine/ovirt-engine.pid	The path and file name of the PID of the Manager.

16.4. CONFIGURING THE RED HAT ENTERPRISE VIRTUALIZATION MANAGER TO SEND SNMP TRAPS

Configure your Red Hat Enterprise Virtualization Manager to send Simple Network Management Protocol traps to one or more external SNMP managers. SNMP traps contain system event information; they are used to monitor your Red Hat Enterprise Virtualization environment. The number and type of traps sent to the SNMP manager can be defined within the Red Hat Enterprise Virtualization Manager.

This procedure assumes that you have configured one or more external SNMP managers to receive traps, and that you have the following details:

- The IP addresses or fully qualified domain names of machines that will act as SNMP managers. Optionally, determine the port through which the manager receives trap notifications; by default, this is UDP port 162.

- The SNMP community. Multiple SNMP managers can belong to a single community. Management systems and agents can communicate only if they are within the same community. The default community is **public**.
- The trap object identifier for alerts. The Red Hat Enterprise Virtualization Manager provides a default OID of 1.3.6.1.4.1.2312.13.1.1. All trap types are sent, appended with event information, to the SNMP manager when this OID is defined. Note that changing the default trap prevents generated traps from complying with the Manager's management information base.



NOTE

The Red Hat Enterprise Virtualization Manager provides management information bases at `/usr/share/doc/ovirt-engine/mibs/OVIRT-MIB.txt` and `/usr/share/doc/ovirt-engine/mibs/REDHAT-MIB.txt`. Load the MIBs in your SNMP manager before proceeding.

Default SNMP configuration values exist on the Manager in the events notification daemon configuration file `/usr/share/ovirt-engine/services/ovirt-engine-notifier/ovirt-engine-notifier.conf`. The values outlined in the following procedure are based on the default or example values provided in that file. It is recommended that you define an override file, rather than edit the `ovirt-engine-notifier.conf` file, to persist your configuration options across system changes, like upgrades.

Procedure 16.3. Configuring SNMP Traps on the Manager

1. On the Manager, create the SNMP configuration file:

```
# vi /etc/ovirt-engine/notifier/notifier.conf.d/20-snmp.conf
```

2. Specify the SNMP manager(s), the SNMP community, and the OID in the following format:

```
SNMP_MANAGERS="manager1.example.com manager2.example.com:162"
SNMP_COMMUNITY=public
SNMP_OID=1.3.6.1.4.1.2312.13.1.1
```

3. Define which events to send to the SNMP manager:

Example 16.1. Event Examples

Send all events to the default SNMP profile:

```
FILTER="include:*(snmp:) ${FILTER}"
```

Send all events with the severity **ERROR** or **ALERT** to the default SNMP profile:

```
FILTER="include:*ERROR(snmp:) ${FILTER}"
```

```
FILTER="include:*ALERT(snmp:) ${FILTER}"
```

Send events for `VDC_START` to the specified email address:

-

```
FILTER="include:VDC_START(snmp:mail@example.com) ${FILTER}"
```

Send events for everything but `VDC_START` to the default SNMP profile:

```
FILTER="exclude:VDC_START include:*(snmp:) ${FILTER}"
```

This is the default filter defined in **`ovirt-engine-notifier.conf`**; if you do not disable this filter or apply overriding filters, no notifications will be sent:

```
FILTER="exclude:*"
```

`VDC_START` is an example of the audit log messages available. A full list of audit log messages can be found in **`/usr/share/doc/ovirt-engine/AuditLogMessages.properties`**. Alternatively, filter results within your SNMP manager.

4. Save the file.
5. Start the **`ovirt-engine-notifier`** service, and ensure that this service starts on boot:

```
# service ovirt-engine-notifier start
# chkconfig ovirt-engine-notifier on
```

Check your SNMP manager to ensure that traps are being received.



NOTE

`SNMP_MANAGERS`, **`MAIL_SERVER`**, or both must be properly defined in **`/usr/share/ovirt-engine/services/ovirt-engine-notifier/ovirt-engine-notifier.conf`** or in an override file in order for the notifier service to run.

CHAPTER 17. UTILITIES

17.1. THE OVIRT ENGINE RENAME TOOL

17.1.1. The oVirt Engine Rename Tool

When the **engine-setup** command is run in a clean environment, the command generates a number of certificates and keys that use the fully qualified domain name of the Manager supplied during the setup process. If the fully qualified domain name of the Manager must be changed later on (for example, due to migration of the machine hosting the Manager to a different domain), the records of the fully qualified domain name must be updated to reflect the new name. The **ovirt-engine-rename** command automates this task.

The **ovirt-engine-rename** command updates records of the fully qualified domain name of the Manager in the following locations:

- /etc/ovirt-engine/engine.conf.d/10-setup-protocols.conf
- /etc/ovirt-engine/imageuploader.conf.d/10-engine-setup.conf
- /etc/ovirt-engine/isouploader.conf.d/10-engine-setup.conf
- /etc/ovirt-engine/logcollector.conf.d/10-engine-setup.conf
- /etc/pki/ovirt-engine/cert.conf
- /etc/pki/ovirt-engine/cert.template
- /etc/pki/ovirt-engine/certs/apache.cer
- /etc/pki/ovirt-engine/keys/apache.key.nopass
- /etc/pki/ovirt-engine/keys/apache.p12



WARNING

While the **ovirt-engine-rename** command creates a new certificate for the web server on which the Manager runs, it does not affect the certificate for the engine or the certificate authority. Due to this, there is some risk involved in using the **ovirt-engine-rename** command, particularly in environments that have been upgraded from Red Hat Enterprise Virtualization version 3.2 and earlier. Therefore, changing the fully qualified domain name of the Manager by running **engine-cleanup** and **engine-setup** is recommended where possible.

17.1.2. Syntax for the oVirt Engine Rename Command

The basic syntax for the **ovirt-engine-rename** command is:

```
# /usr/share/ovirt-engine/setup/bin/ovirt-engine-rename
```

■

The command also accepts the following options:

--newname=[new name]

Allows you to specify the new fully qualified domain name for the Manager without user interaction.

--log=[file]

Allows you to specify the path and name of a file into which logs of the rename operation are to be written.

--config=[file]

Allows you to specify the path and file name of a configuration file to load into the rename operation.

--config-append=[file]

Allows you to specify the path and file name of a configuration file to append to the rename operation. This option can be used to specify the path and file name of an answer file.

--generate-answer=[file]

Allows you to specify the path and file name of a file into which your answers to and the values changed by the **ovirt-engine-rename** command are recorded.

17.1.3. Using the oVirt Engine Rename Tool

Summary

You can use the **ovirt-engine-rename** command to update records of the fully qualified domain name of the Manager.

The tool checks whether the Manager provides a local ISO or Data storage domain. If it does, the tool prompts the user to eject, shut down, or place into maintenance mode any virtual machine or storage domain connected to the storage before continuing with the operation. This ensures that virtual machines do not lose connectivity with their virtual disks, and prevents ISO storage domains from losing connectivity during the renaming process.

Procedure 17.1. Renaming the Red Hat Enterprise Virtualization Manager

1. Prepare all DNS and other relevant records for the new fully qualified domain name.
2. Update the DHCP server configuration if DHCP is used.
3. Update the host name on the Manager.
4. Run the following command:

```
# /usr/share/ovirt-engine/setup/bin/ovirt-engine-rename
```

5. When prompted, press **Enter** to stop the engine service:

During execution engine service will be stopped (OK, Cancel) [OK]:

6. When prompted, enter the new fully qualified domain name for the Manager:

New fully qualified server name: *[new name]*

Result

The **ovirt-engine-rename** command updates records of the fully qualified domain name of the Manager.

17.2. THE DOMAIN MANAGEMENT TOOL

17.2.1. The Domain Management Tool

Red Hat Enterprise Virtualization Manager authenticates users using directory services. To add users to Red Hat Enterprise Virtualization Manager you must first use the internal **admin** user to add the directory service that the users must be authenticated against. You add and remove directory services domains using the included domain management tool, **engine-manage-domains**.

The **engine-manage-domains** command is only accessible on the machine on which Red Hat Enterprise Virtualization Manager is installed. The **engine-manage-domains** command must be run as the **root** user.

IMPORTANT

Red Hat Enterprise Virtualization 3.6 is the last version to support this tool. Use the LDAP provider implementation to configure directory servers for authenticating and authorizing users. See [Section 14.3.1, “Configuring an External LDAP Provider \(Interactive Setup\)”](#) for more information.

An upstream tool is available to assist with migrating from the old implementation to the new implementation. See <https://github.com/machacekondra/ovirt-engine-kerbldap-migration/releases> for more information.

17.2.2. Syntax for the Domain Management Tool

The usage syntax is:

```
engine-manage-domains ACTION [options]
```

Available actions are:

add

Add a domain to Red Hat Enterprise Virtualization Manager's directory services configuration.

edit

Edit a domain in Red Hat Enterprise Virtualization Manager's directory services configuration.

delete

Delete a domain from Red Hat Enterprise Virtualization Manager's directory services configuration.

validate

Validate Red Hat Enterprise Virtualization Manager's directory services configuration. This command attempts to authenticate each domain in the configuration using the configured user name and password.

list

List Red Hat Enterprise Virtualization Manager's current directory services configuration.

These options can be combined with the actions on the command line:

--add-permissions

Specifies that the domain user will be given the **SuperUser** role in Red Hat Enterprise Virtualization Manager. By default, if the **--add-permissions** parameter is not specified, the **SuperUser** role is not assigned to the domain user. The **--add-permissions** option is optional. It is only valid when used in combination with the **add** and **edit** actions.

--change-password-msg=[MSG]

Specifies the message that is returned to the user at login when their password has expired. This allows you to direct users to a specific URL (must begin with http or https) where their password can be changed. The **--change-password-msg** option is optional, and is only valid when used in combination with the **add** and **edit** actions.

--config-file=[FILE]

Specifies an alternate configuration file that the command must use. The **--config-file** parameter is always optional.

--domain=[DOMAIN]

The domain on which the action will be performed. The **--domain** parameter is mandatory for the **add**, **edit**, and **delete** actions.

--force

Forces the command to skip confirmation of delete operations.

--ldap-servers=[SERVERS]

A comma delimited list of LDAP servers to be set to the domain.

--log-file=[LOG_FILE]

The name of a file into which to write logs for an operation.

--log-level=[LOG_LEVEL]

The log level. You can choose either **DEBUG** (the default option), **INFO**, **WARN**, or **ERROR**. These options are case insensitive.

--log4j-config=[LOG4J_FILE]

A `log4j.xml` file from which to read logging configuration information.

--provider=[PROVIDER]

The LDAP provider type of the directory server for the domain. Valid values are:

- **ad** - Microsoft Active Directory.
- **ipa** - Identity Management (IdM).
- **rhds** - Red Hat Directory Server. Red Hat Directory Server does not come with Kerberos. Red Hat Enterprise Virtualization requires Kerberos authentication. Red Hat Directory Server must be running as a service inside a Kerberos domain to provide directory services to the Manager.



NOTE

To use Red Hat Directory Server as your directory server, you must have the **memberof** plug-in installed in Red Hat Directory Server. To use the **memberof** plug-in, your users must be **inetuser**.

- **itds** - IBM Tivoli Directory Server.
- **oldap** - OpenLDAP.

--report

When used in conjunction with the **validate** action, this command outputs a report of all validation errors encountered.

--resolve-kdc

Resolve key distribution center servers using DNS.

--user=[USER]

Specifies the domain user to use. The **--user** parameter is mandatory for **add**, and optional for **edit**.

--password-file=[FILE]

Specifies that the domain user's password is on the first line of the provided file. This option, or the **--interactive** option, must be used to provide the password for use with the **add** action.

For further details on usage, see the **engine-manage-domains** command's help output:

```
# engine-manage-domains --help
```

17.2.3. Using the Domain Management Tool

The following examples demonstrate the use of the **engine-manage-domains** command to perform basic manipulation of the Red Hat Enterprise Virtualization Manager domain configuration.

17.2.4. Listing Domains in Configuration

The **engine-manage-domains** command lists the directory services domains defined in the Red Hat Enterprise Virtualization Manager configuration. This command prints the domain, the user name in User Principal Name (UPN) format, and whether the domain is local or remote for each configuration entry.

Example 17.1. engine-manage-domains List Action

```
# engine-manage-domains list
Domain: directory.demo.redhat.com
  User name: admin@DIRECTORY.DEMO.REDHAT.COM
  This domain is a remote domain.
```

17.2.5. Adding Domains to Configuration

In this example, the **engine-manage-domains** command is used to add the **IdM** domain **directory.demo.redhat.com** to the Red Hat Enterprise Virtualization Manager configuration. The configuration is set to use the **admin** user when querying the domain; the password is provided interactively.

Example 17.2. engine-manage-domains Add Action

```
# engine-manage-domains add --domain=directory.demo.redhat.com --
provider=IPA --user=admin
loaded template kr5.conf file
setting default_tkt_encypes
setting realms
setting domain realm
success
User guid is: 80b71bae-98a1-11e0-8f20-525400866c73
Successfully added domain directory.demo.redhat.com. oVirt Engine
restart is required in order for the changes to take place (service
ovirt-engine restart).
```

17.2.6. Editing a Domain in the Configuration

In this example, the **engine-manage-domains** command is used to edit the **directory.demo.redhat.com** domain in the Red Hat Enterprise Virtualization Manager configuration. The configuration is updated to use the **admin** user when querying this domain; the password is provided interactively.

Example 17.3. engine-manage-domains Edit Action

```
# engine-manage-domains -action=edit -domain=directory.demo.redhat.com -
user=admin -interactive
loaded template kr5.conf file
setting default_tkt_encypes
setting realms
setting domain realm
success
```

```
User guide is: 80b71bae-98a1-11e0-8f20-525400866c73
Successfully edited domain directory.demo.redhat.com. oVirt Engine
restart is required in order for the changes to take place (service
ovirt-engine restart).
```

17.2.7. Validating Domain Configuration

In this example, the **engine-manage-domains** command is used to validate the Red Hat Enterprise Virtualization Manager configuration. The command attempts to log into each listed domain with the credentials provided in the configuration. The domain is reported as valid if the attempt is successful.

Example 17.4. engine-manage-domains Validate Action

```
# engine-manage-domains validate
User guide is: 80b71bae-98a1-11e0-8f20-525400866c73
Domain directory.demo.redhat.com is valid.
```

17.2.8. Deleting a Domain from the Configuration

In this example, the **engine-manage-domains** command is used to remove the **directory.demo.redhat.com** domain from the Red Hat Enterprise Virtualization Manager configuration. Users defined in the removed domain will no longer be able to authenticate with the Red Hat Enterprise Virtualization Manager. The entries for the affected users will remain defined in the Red Hat Enterprise Virtualization Manager until they are explicitly removed.

The domain being removed in this example is the last one listed in the Red Hat Enterprise Virtualization Manager configuration. A warning is displayed highlighting this fact and that only the **admin** user from the **internal** domain will be able to log in until another domain is added.

Example 17.5. engine-manage-domains Delete Action

```
# engine-manage-domains delete --domain=directory.demo.redhat.com
WARNING: Domain directory.demo.redhat.com is the last domain in the
configuration. After deleting it you will have to either add another
domain, or to use the internal admin user in order to login.
Successfully deleted domain directory.demo.redhat.com. Please remove all
users and groups of this domain using the Administration portal or the
API.
```

17.3. THE ENGINE CONFIGURATION TOOL

17.3.1. The Engine Configuration Tool

The engine configuration tool is a command-line utility for configuring global settings for your Red Hat Enterprise Virtualization environment. The tool interacts with a list of key-value mappings that are stored in the engine database, and allows you to retrieve and set

the value of individual keys, and retrieve a list of all available configuration keys and values. Furthermore, different values can be stored for each configuration level in your Red Hat Enterprise Virtualization environment.



NOTE

Neither the Red Hat Enterprise Virtualization Manager nor Red Hat JBoss Enterprise Application Platform need to be running to retrieve or set the value of a configuration key. Because the configuration key value-key mappings are stored in the engine database, they can be updated while the **postgresql** service is running. Changes are then applied when the **ovirt-engine** service is restarted.

17.3.2. Syntax for the engine-config Command

You can run the engine configuration tool from the machine on which the Red Hat Enterprise Virtualization Manager is installed. For detailed information on usage, print the help output for the command:

```
# engine-config --help
```

Common tasks

List available configuration keys

```
# engine-config --list
```

List available configuration values

```
# engine-config --all
```

Retrieve value of configuration key

```
# engine-config --get [KEY_NAME]
```

Replace *[KEY_NAME]* with the name of the preferred key to retrieve the value for the given version of the key. Use the **--cver** parameter to specify the configuration version of the value to be retrieved. If no version is provided, values for all existing versions are returned.

Set value of configuration key

```
# engine-config --set [KEY_NAME]=[KEY_VALUE] --cver=[VERSION]
```

Replace *[KEY_NAME]* with the name of the specific key to set, and replace *[KEY_VALUE]* with the value to be set. You must specify the *[VERSION]* in environments with more than one configuration version.

Restart the ovirt-engine service to load changes

The **ovirt-engine** service needs to be restarted for your changes to take effect.

```
# service ovirt-engine restart
```

17.4. THE IMAGE UPLOADER TOOL

17.4.1. The Image Uploader Tool

The **engine-image-uploader** command allows you to list export storage domains and upload virtual machine images in OVF or OVA format to an export storage domain and have them automatically recognized in the Red Hat Enterprise Virtualization Manager.

An OVA is a **tar** archive of the OVF files.



NOTE

The image uploader only supports gzip-compressed OVF files, or OVA files, created by Red Hat Enterprise Virtualization.

The OVF contains images and master directories in the following format:

```
| -- images
|   |-- [Image Group UUID]
|       |-- [Image UUID (this is the disk image)]
|       |-- [Image UUID (this is the disk image)].meta
| -- master
|   |-- vms
|       |-- [UUID]
|       |-- [UUID].ovf
```

17.4.2. Syntax for the engine-image-uploader Command

The basic syntax for the image uploader command is:

```
engine-image-uploader [options] list
engine-image-uploader [options] upload [file].[file]...[file]
```

The image uploader command supports two actions - **list**, and **upload**.

- The **list** action lists the export storage domains to which images can be uploaded.
- The **upload** action uploads images to the specified export storage domain.

You must specify one of the above actions when you use the image uploader command. Moreover, you must specify at least one local file to use the **upload** action.

There are several parameters to further refine the **engine-image-uploader** command. You can set defaults for any of these parameters in the **/etc/ovirt-engine/imageuploader.conf** file.

General Options

-h, --help

Displays information on how to use the image uploader command.

`--conf-file=[PATH]`

Sets `[PATH]` as the configuration file the command will use. The default is `/etc/ovirt-engine/imageuploader.conf`.

`--log-file=[PATH]`

Sets `[PATH]` as the specific file name the command will use to write log output. The default is `/var/log/ovirt-engine/ovirt-image-uploader-[date].log`.

`--cert-file=[PATH]`

Sets `[PATH]` as the certificate for validating the engine. The default is `/etc/pki/ovirt-engine/ca.pem`.

`--insecure`

Specifies that no attempt will be made to verify the engine.

`--quiet`

Sets quiet mode, reducing console output to a minimum.

`-v, --verbose`

Sets verbose mode, providing more console output.

`-f, --force`

Force mode is necessary when the source file being uploaded has the same file name as an existing file in the destination export domain. This option forces the existing file to be overwritten.

Red Hat Enterprise Virtualization Manager Options

`-u [USER], --user=[USER]`

Specifies the user whose credentials will be used to execute the command. The `[USER]` is specified in the format `[username]@[domain]`. The user must exist in the specified domain and be known to the Red Hat Enterprise Virtualization Manager.

`-r [FQDN], --engine=[FQDN]`

Specifies the IP address or fully qualified domain name of the Red Hat Enterprise Virtualization Manager from which the images will be uploaded. It is assumed that the image uploader is being run from the same machine on which the Red Hat Enterprise Virtualization Manager is installed. The default value is `localhost:443`.

Export Storage Domain Options

The following options specify the export domain to which the images will be uploaded. These options cannot be used together; you must use either the `-e` option or the `-n` option.

`-e [EXPORT_DOMAIN], --export-domain=[EXPORT_DOMAIN]`

Sets the storage domain *EXPORT_DOMAIN* as the destination for uploads.

-n [NFSSERVER], --nfs-server=[NFSSERVER]

Sets the NFS path *[NFSSERVER]* as the destination for uploads.

Import Options

The following options allow you to customize which attributes of the images being uploaded are included when the image is uploaded to the export domain.

-i, --ovf-id

Specifies that the UUID of the image will not be updated. By default, the command generates a new UUID for images that are uploaded. This ensures there is no conflict between the id of the image being uploaded and the images already in the environment.

-d, --disk-instance-id

Specifies that the instance ID for each disk in the image will not be renamed. By default, the command generates new UUIDs for disks in images that are uploaded. This ensures there are no conflicts between the disks on the image being uploaded and the disks already in the environment.

-m, --mac-address

Specifies that network components in the image will not be removed from the image. By default, the command removes network interface cards from image being uploaded to prevent conflicts with network cards on other virtual machines already in the environment. If you do not use this option, you can use the Administration Portal to add network interface cards to newly imported images and the Manager will ensure there are no MAC address conflicts.

-N [NEW_IMAGE_NAME], --name=[NEW_IMAGE_NAME]

Specifies a new name for the image being uploaded.

17.4.3. Creating an OVF Archive That is Compatible With the Image Uploader

Summary

You can create files that can be uploaded using the **engine-image-uploader** tool.

Procedure 17.2. Creating an OVF Archive That is Compatible With the Image Uploader

1. Use the Manager to create an empty export domain. An empty export domain makes it easy to see which directory contains your virtual machine.
2. Export your virtual machine to the empty export domain you just created.
3. Log in to the storage server that serves as the export domain, find the root of the NFS share and change to the subdirectory under that mount point. You started with a new export domain, there is only one directory under the exported directory. It

contains the **images/** and **master/** directories.

4. Run the **tar -zcvf my.ovf images/ master/** command to create the tar/gzip OVF archive.
5. Anyone you give the resulting OVF file to (in this example, called **my.ovf**) can import it to Red Hat Enterprise Virtualization Manager using the **engine-image-uploader** command.

Result

You have created a compressed OVF image file that can be distributed. Anyone you give it to can use the **engine-image-uploader** command to upload your image into their Red Hat Enterprise Virtualization environment.

17.4.4. Basic engine-image-uploader Usage Examples

The following is an example of how to use the engine uploader command to list export storage domains:

Example 17.6. Listing export storage domains using the image uploader

```
# engine-image-uploader list
Please provide the REST API password for the admin@internal oVirt Engine
user (CTRL+D to abort):
Export Storage Domain Name | Datacenter | Export Domain Status
myexportdom                | Myowndc   | active
```

The following is an example of how to upload an Open Virtualization Format (OVF) file:

Example 17.7. Uploading a file using the image uploader

```
# engine-image-uploader -e myexportdom upload myrhel6.ovf
Please provide the REST API password for the admin@internal oVirt Engine
user (CTRL+D to abort):
```

17.5. THE USB FILTER EDITOR

17.5.1. Installing the USB Filter Editor

Summary

The USB Filter Editor is a Windows tool used to configure the **usbfilter.txt** policy file. The policy rules defined in this file allow or deny automatic pass-through of specific USB devices from client machines to virtual machines managed using the Red Hat Enterprise Virtualization Manager. The policy file resides on the Red Hat Enterprise Virtualization Manager in the following location:

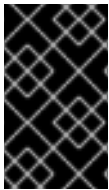
/etc/ovirt-engine/usbfilter.txt

Changes to USB filter policies do not take effect unless the **ovirt-engine** service on the Red Hat Enterprise Virtualization Manager server is restarted.

Download the **USBFilterEditor.msi** file from the Content Delivery Network:
<https://rhn.redhat.com/rhn/software/channel/downloads/Download.do?cid=20703>. The file works with Red Hat Enterprise Virtualization 3.0 and above.

Procedure 17.3. Installing the USB Filter Editor

1. On a Windows machine, launch the **USBFilterEditor.msi** installer obtained from the Content Delivery Network.
2. Follow the steps of the installation wizard. Unless otherwise specified, the USB Filter Editor will be installed by default in either **C:\Program Files\RedHat\USB Filter Editor** or **C:\Program Files(x86)\RedHat\USB Filter Editor** depending on your version of Windows.
3. A USB Filter Editor shortcut icon is created on your desktop.



IMPORTANT

Use a Secure Copy (SCP) client to import and export filter policies from the Red Hat Enterprise Virtualization Manager. A Secure Copy tool for Windows machines is WinSCP (<http://winscp.net>).

Result

The default USB device policy provides virtual machines with basic access to USB devices; update the policy to allow the use of additional USB devices.

17.5.2. The USB Filter Editor Interface

- Double-click the USB Filter Editor shortcut icon on your desktop.

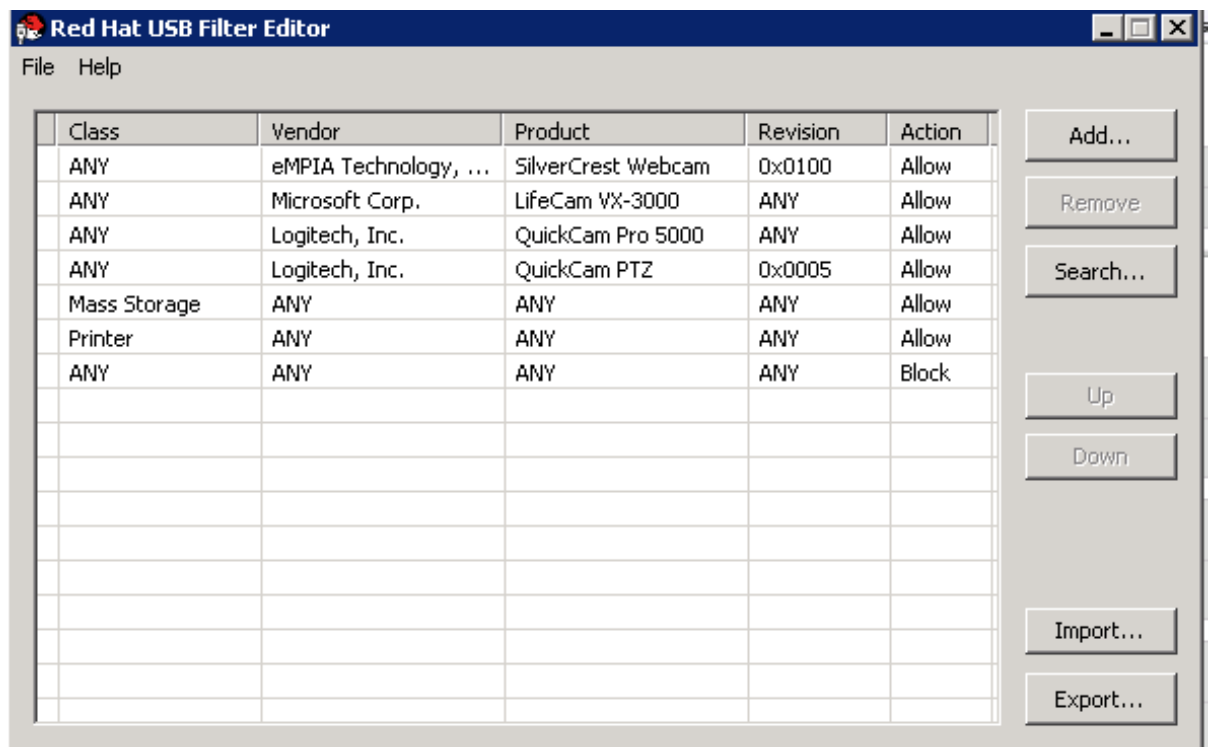


Figure 17.1. Red Hat USB Filter Editor

The **Red Hat USB Filter Editor** interface displays the **Class**, **Vendor**, **Product**, **Revision**, and **Action** for each USB device. Permitted USB devices are set to **Allow** in the **Action** column; prohibited devices are set to **Block**.

Table 17.1. USB Editor Fields

Name	Description
Class	Type of USB device; for example, printers, mass storage controllers.
Vendor	The manufacturer of the selected type of device.
Product	The specific USB device model.
Revision	The revision of the product.
Action	Allow or block the specified device.

The USB device policy rules are processed in their listed order. Use the **Up** and **Down** buttons to move devices higher or lower in the list. The universal **Block** rule needs to remain as the lowest entry to ensure all USB devices are denied unless explicitly allowed in the USB Filter Editor.

17.5.3. Adding a USB Policy

Summary

Add a USB policy to the USB Filter Editor.

Double-click the USB Filter Editor shortcut icon on your desktop to open the editor.

Procedure 17.4. Adding a USB Policy

1. Click the **Add** button. The **Edit USB Criteria** window opens:

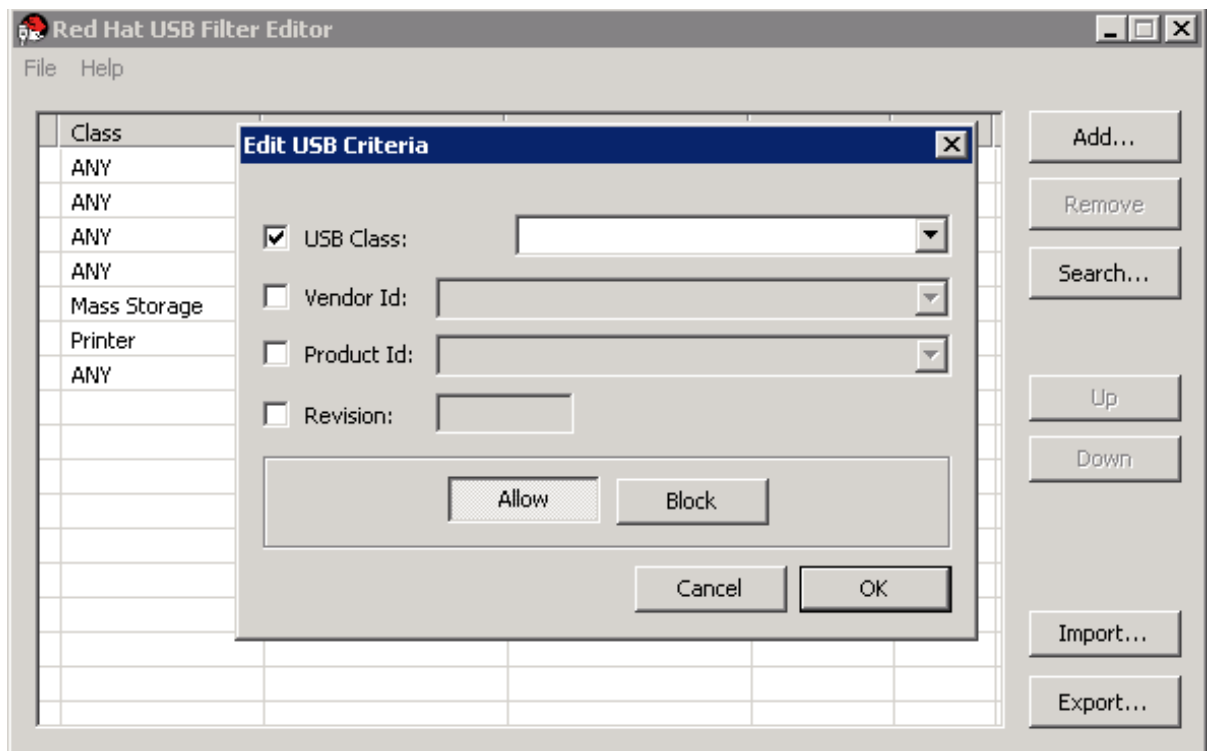


Figure 17.2. Edit USB Criteria

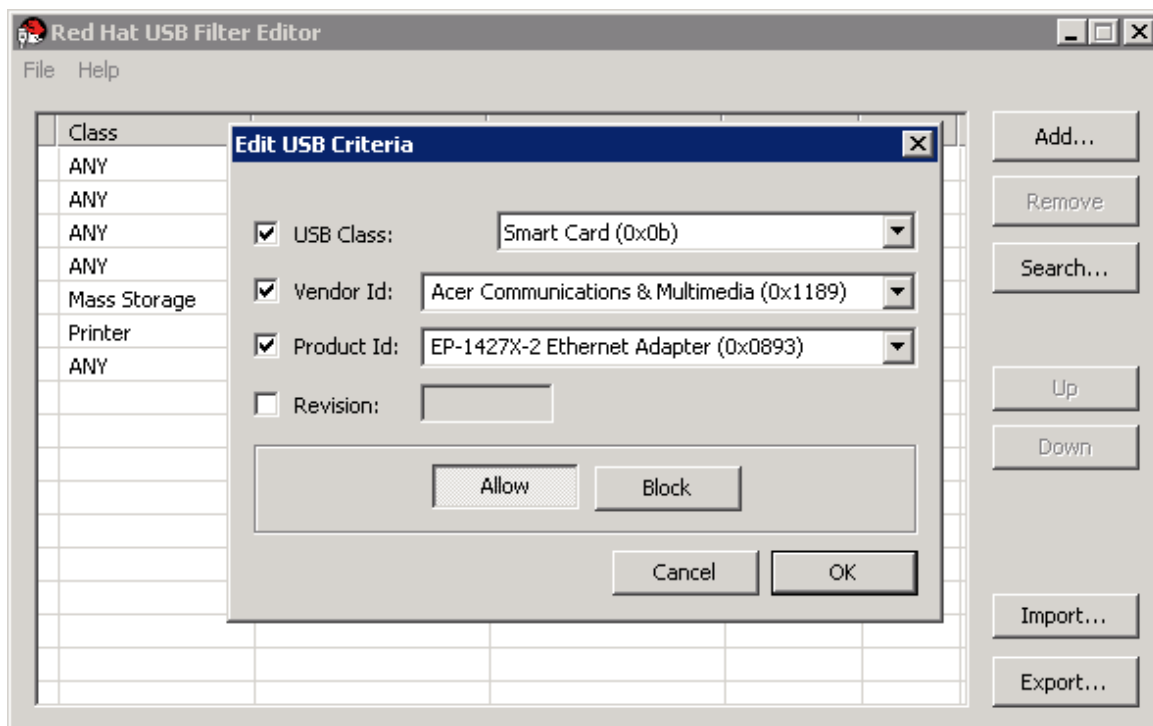
2. Use the **USB Class**, **Vendor ID**, **Product ID**, and **Revision** check boxes and lists to specify the device.

Click the **Allow** button to permit virtual machines use of the USB device; click the **Block** button to prohibit the USB device from virtual machines.

Click **OK** to add the selected filter rule to the list and close the window.

Example 17.8. Adding a Device

The following is an example of how to add USB Class **Smartcard**, device **EP-1427X-2 Ethernet Adapter**, from manufacturer **Acer Communications & Multimedia** to the list of allowed devices.



3. Click **File** → **Save** to save the changes.

Result

You have added a USB policy to the USB Filter Editor. USB filter policies need to be exported to the Red Hat Enterprise Virtualization Manager to take effect.

17.5.4. Removing a USB Policy

Summary

Remove a USB policy from the USB Filter Editor.

Double-click the USB Filter Editor shortcut icon on your desktop to open the editor.

Procedure 17.5. Removing a USB Policy

1. Select the policy to be removed.

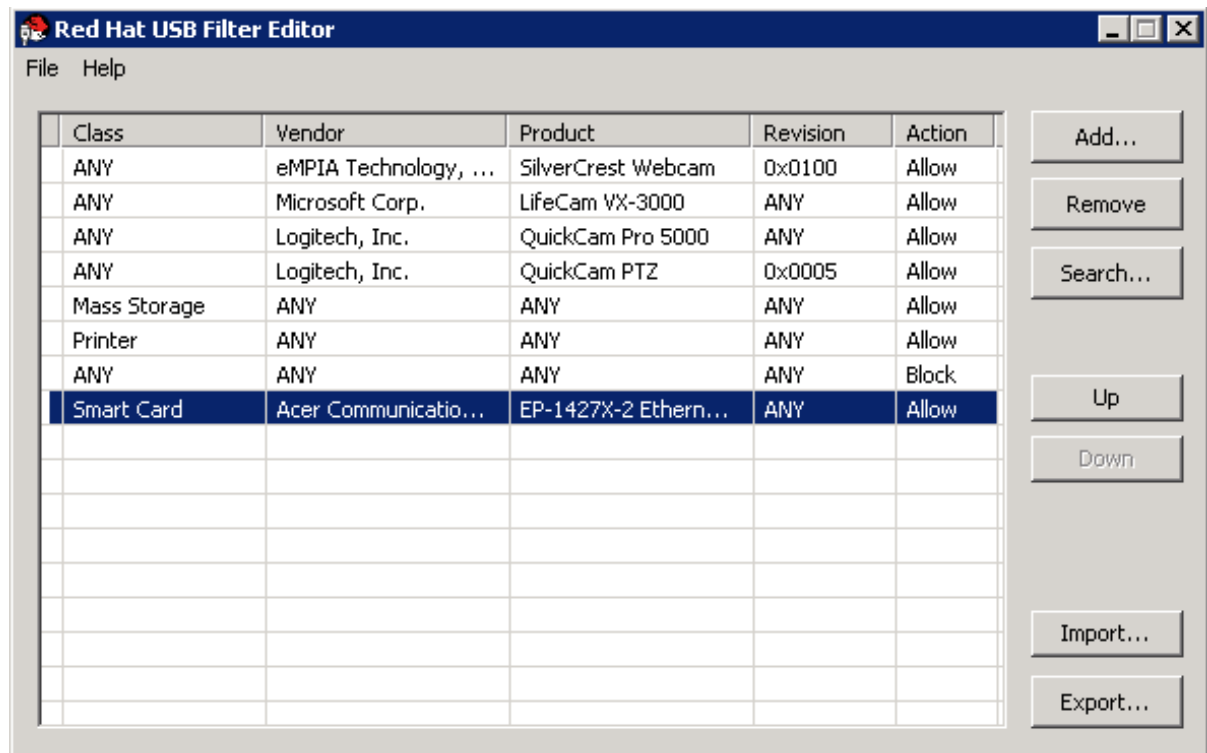


Figure 17.3. Select USB Policy

2. Click **Remove**. A message displays prompting you to confirm that you want to remove the policy.

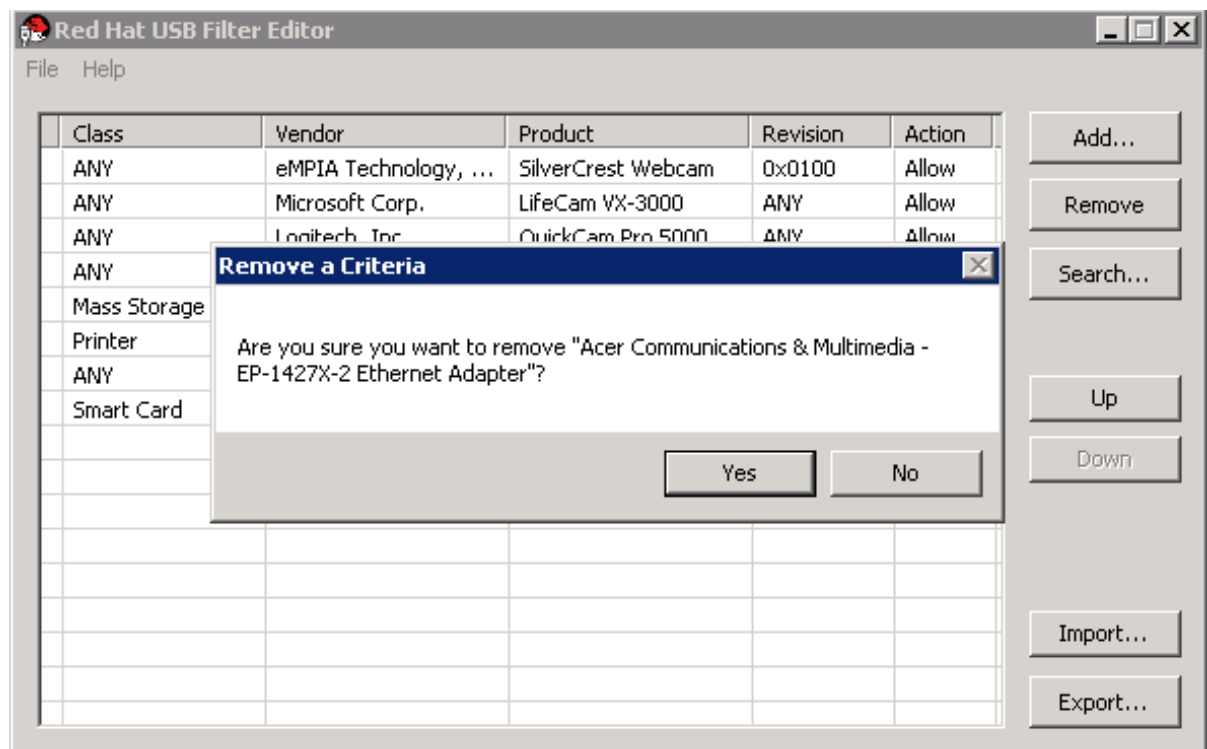


Figure 17.4. Edit USB Criteria

3. Click **Yes** to confirm that you want to remove the policy.
4. Click **File** → **Save** to save the changes.

Result

You have removed a USB policy from the USB Filter Editor. USB filter policies need to be exported to the Red Hat Enterprise Virtualization Manager to take effect.

17.5.5. Searching for USB Device Policies

Summary

Search for attached USB devices to either allow or block them in the USB Filter Editor.

Double-click the USB Filter Editor shortcut icon on your desktop to open the editor.

Procedure 17.6. Searching for USB Device Policies

1. Click **Search**. The **Attached USB Devices** window displays a list of all the attached devices.

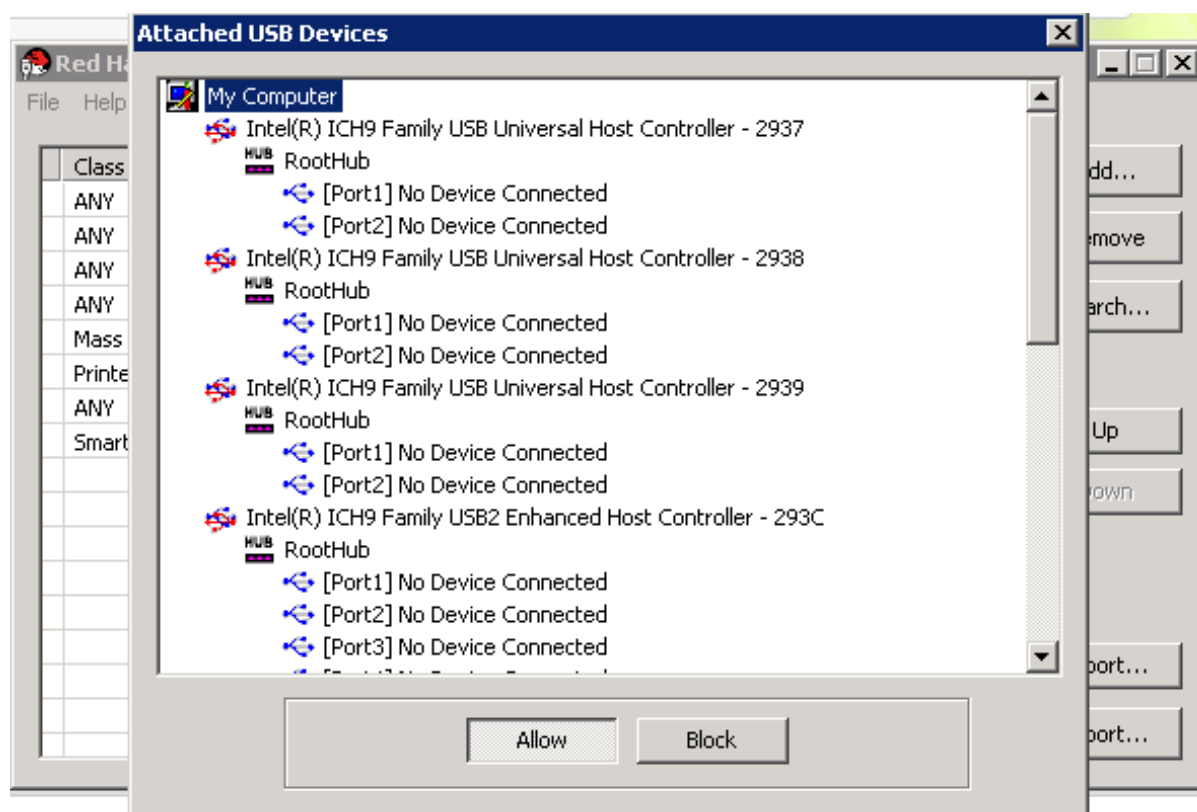


Figure 17.5. Attached USB Devices

2. Select the device and click **Allow** or **Block** as appropriate. Double-click the selected device to close the window. A policy rule for the device is added to the list.
3. Use the **Up** and **Down** buttons to change the position of the new policy rule in the list.
4. Click **File** → **Save** to save the changes.

Result

You have searched the attached USB devices. USB filter policies need to be exported to the Red Hat Enterprise Virtualization Manager to take effect.

17.5.6. Exporting a USB Policy

Summary

USB device policy changes need to be exported and uploaded to the Red Hat Enterprise Virtualization Manager for the updated policy to take effect. Upload the policy and restart the **ovirt-engine** service.

Double-click the USB Filter Editor shortcut icon on your desktop to open the editor.

Procedure 17.7. Exporting a USB Policy

1. Click **Export**; the **Save As** window opens.
2. Save the file with a file name of **usbfilter.txt**.
3. Using a Secure Copy client, such as WinSCP, upload the **usbfilter.txt** file to the server running Red Hat Enterprise Virtualization Manager. The file must be placed in the following directory on the server:

```
/etc/ovirt-engine/
```

4. As the **root** user on the server running Red Hat Enterprise Virtualization Manager, restart the **ovirt-engine** service.

```
# service ovirt-engine restart
```

Result

The USB device policy will now be implemented on virtual machines running in the Red Hat Enterprise Virtualization environment.

17.5.7. Importing a USB Policy

Summary

An existing USB device policy must be downloaded and imported into the USB Filter Editor before you can edit it.

Procedure 17.8. Importing a USB Policy

1. Using a Secure Copy client, such as WinSCP, upload the **usbfilter.txt** file to the server running Red Hat Enterprise Virtualization Manager. The file must be placed in the following directory on the server:

```
/etc/ovirt-engine/
```

2. Double-click the USB Filter Editor shortcut icon on your desktop to open the editor.
3. Click **Import** to open the **Open** window.
4. Open the **usbfilter.txt** file that was downloaded from the server.

Result

You are able to edit the USB device policy in the USB Filter Editor.

17.6. THE LOG COLLECTOR TOOL

17.6.1. Log Collector

A log collection tool is included in the Red Hat Enterprise Virtualization Manager. This allows you to easily collect relevant logs from across the Red Hat Enterprise Virtualization environment when requesting support.

The log collection command is **engine-log-collector**. You are required to log in as the **root** user and provide the administration credentials for the Red Hat Enterprise Virtualization environment. The **engine-log-collector -h** command displays usage information, including a list of all valid options for the **engine-log-collector** command.

17.6.2. Syntax for engine-log-collector Command

The basic syntax for the log collector command is:

```
engine-log-collector [options] list [all, clusters, datacenters]
engine-log-collector [options] collect
```

The two supported modes of operation are **list** and **collect**.

- The **list** parameter lists either the hosts, clusters, or data centers attached to the Red Hat Enterprise Virtualization Manager. You are able to filter the log collection based on the listed objects.
- The **collect** parameter performs log collection from the Red Hat Enterprise Virtualization Manager. The collected logs are placed in an archive file under the **/tmp/logcollector** directory. The **engine-log-collector** command assigns each log a specific file name.

Unless another parameter is specified, the default action is to list the available hosts together with the data center and cluster to which they belong. You will be prompted to enter user names and passwords to retrieve certain logs.

There are numerous parameters to further refine the **engine-log-collector** command.

General options

--version

Displays the version number of the command in use and returns to prompt.

-h, --help

Displays command usage information and returns to prompt.

--conf-file=PATH

Sets *PATH* as the configuration file the tool is to use.

--local-tmp=PATH

Sets *PATH* as the directory in which logs are saved. The default directory is **/tmp/logcollector**.

--ticket-number=TICKET

Sets *TICKET* as the ticket, or case number, to associate with the SOS report.

--upload=FTP_SERVER

Sets *FTP_SERVER* as the destination for retrieved logs to be sent using FTP. Do not use this option unless advised to by a Red Hat support representative.

--log-file=PATH

Sets *PATH* as the specific file name the command should use for the log output.

--quiet

Sets quiet mode, reducing console output to a minimum. Quiet mode is off by default.

-v, --verbose

Sets verbose mode, providing more console output. Verbose mode is off by default.

Red Hat Enterprise Virtualization Manager Options

These options filter the log collection and specify authentication details for the Red Hat Enterprise Virtualization Manager.

These parameters can be combined for specific commands. For example, **engine-log-collector --user=admin@internal --cluster ClusterA,ClusterB --hosts "SalesHost"*** specifies the user as **admin@internal** and limits the log collection to only **SalesHost** hosts in clusters **A** and **B**.

--no-hypervisors

Omits virtualization hosts from the log collection.

-u USER, --user=USER

Sets the user name for login. The *USER* is specified in the format *user@domain*, where *user* is the user name and *domain* is the directory services domain in use. The user must exist in directory services and be known to the Red Hat Enterprise Virtualization Manager.

-r FQDN, --rhevm=FQDN

Sets the fully qualified domain name of the Red Hat Enterprise Virtualization Manager server from which to collect logs, where *FQDN* is replaced by the fully qualified domain name of the Manager. It is assumed that the log collector is being run on the same local host as the Red Hat Enterprise Virtualization Manager; the default value is **localhost**.

-c CLUSTER, --cluster=CLUSTER

Collects logs from the virtualization hosts in the nominated *CLUSTER* in addition to logs from the Red Hat Enterprise Virtualization Manager. The cluster(s) for inclusion must be specified in a comma-separated list of cluster names or match patterns.

-d DATACENTER, --data-center=DATACENTER

Collects logs from the virtualization hosts in the nominated *DATACENTER* in addition to logs from the Red Hat Enterprise Virtualization Manager. The data center(s) for inclusion must be specified in a comma-separated list of data center names or match patterns.

-H HOSTS_LIST, --hosts=HOSTS_LIST

Collects logs from the virtualization hosts in the nominated *HOSTS_LIST* in addition to logs from the Red Hat Enterprise Virtualization Manager. The hosts for inclusion must be

specified in a comma-separated list of host names, fully qualified domain names, or IP addresses. Match patterns are also valid.

SOS Report Options

The log collector uses the JBoss SOS plugin. Use the following options to activate data collection from the JMX console.

--jboss-home=JBOSS_HOME

JBoss installation directory path. The default is `/var/lib/jbossas`.

--java-home=JAVA_HOME

Java installation directory path. The default is `/usr/lib/jvm/java`.

--jboss-profile=JBOSS_PROFILE

Displays a quoted and space-separated list of server profiles; limits log collection to specified profiles. The default is `'rhevm-slimmed'`.

--enable-jmx

Enables the collection of run-time metrics from Red Hat Enterprise Virtualization's JBoss JMX interface.

--jboss-user=JBOSS_USER

User with permissions to invoke JBoss JMX. The default is `admin`.

--jboss-logsize=LOG_SIZE

Maximum size in MB for the retrieved log files.

--jboss-stdjar=STATE

Sets collection of JAR statistics for JBoss standard JARs. Replace `STATE` with `on` or `off`. The default is `on`.

--jboss-servjar=STATE

Sets collection of JAR statistics from any server configuration directories. Replace `STATE` with `on` or `off`. The default is `on`.

--jboss-twiddle=STATE

Sets collection of twiddle data on or off. Twiddle is the JBoss tool used to collect data from the JMX invoker. Replace `STATE` with `on` or `off`. The default is `on`.

--jboss-appxml=XML_LIST

Displays a quoted and space-separated list of applications with XML descriptions to be retrieved. Default is `all`.

SSH Configuration

--ssh-port=PORT

Sets `PORT` as the port to use for SSH connections with virtualization hosts.

-k KEYFILE, --key-file=KEYFILE

Sets *KEYFILE* as the public SSH key to be used for accessing the virtualization hosts.

--max-connections=MAX_CONNECTIONS

Sets *MAX_CONNECTIONS* as the maximum concurrent SSH connections for logs from virtualization hosts. The default is **10**.

PostgreSQL Database Options

The database user name and database name must be specified, using the **pg-user** and **dbname** parameters, if they have been changed from the default values.

Use the **pg-dbhost** parameter if the database is not on the local host. Use the optional **pg-host-key** parameter to collect remote logs. The PostgreSQL SOS plugin must be installed on the database server for remote log collection to be successful.

--no-postgresql

Disables collection of database. The log collector will connect to the Red Hat Enterprise Virtualization Manager PostgreSQL database and include the data in the log report unless the **--no-postgresql** parameter is specified.

--pg-user=USER

Sets *USER* as the user name to use for connections with the database server. The default is **postgres**.

--pg-dbname=DBNAME

Sets *DBNAME* as the database name to use for connections with the database server. The default is **rhev**.

--pg-dbhost=DBHOST

Sets *DBHOST* as the host name for the database server. The default is **localhost**.

--pg-host-key=KEYFILE

Sets *KEYFILE* as the public identity file (private key) for the database server. This value is not set by default; it is required only where the database does not exist on the local host.

17.6.3. Basic Log Collector Usage

When the **engine-log-collector** command is run without specifying any additional parameters, its default behavior is to collect all logs from the Red Hat Enterprise Virtualization Manager and its attached hosts. It will also collect database logs unless the **--no-postgresql** parameter is added. In the following example, log collector is run to collect all logs from the Red Hat Enterprise Virtualization Manager and three attached hosts.

Example 17.9. Log Collector Usage

```
# engine-log-collector
INFO: Gathering oVirt Engine information...
```

```
INFO: Gathering PostgreSQL the oVirt Engine database and log files from
localhost...
Please provide REST API password for the admin@internal oVirt Engine
user (CTRL+D to abort):
About to collect information from 3 hypervisors. Continue? (Y/n):
INFO: Gathering information from selected hypervisors...
INFO: collecting information from 192.168.122.250
INFO: collecting information from 192.168.122.251
INFO: collecting information from 192.168.122.252
INFO: finished collecting information from 192.168.122.250
INFO: finished collecting information from 192.168.122.251
INFO: finished collecting information from 192.168.122.252
Creating compressed archive...
INFO Log files have been collected and placed in
/tmp/logcollector/sosreport-rhn-account-20110804121320-ce2a.tar.xz.
The MD5 for this file is 6d741b78925998caff29020df2b2ce2a and its size
is 26.7M
```

17.7. THE ISO UPLOADER TOOL

17.7.1. The ISO Uploader Tool

The ISO uploader is a tool for uploading ISO images to the ISO storage domain. It is installed as part of the Red Hat Enterprise Virtualization Manager.

The ISO uploader command is **engine-iso-uploader**. You must log in as the **root** user and provide the administration credentials for the Red Hat Enterprise Virtualization environment to use this command. The **engine-iso-uploader -h** command displays usage information, including a list of all valid options for the **engine-iso-uploader** command.

17.7.2. Syntax for the engine-iso-uploader Command

The basic syntax for the ISO uploader command is:

```
engine-iso-uploader [options] list
engine-iso-uploader [options] upload [file].[file]...[file]
```

The ISO uploader command supports two actions - **list**, and **upload**.

- The **list** action lists the ISO storage domains to which ISO files can be uploaded. The Red Hat Enterprise Virtualization Manager creates this list on the machine on which the Manager is installed during the installation process.
- The **upload** action uploads a single ISO file or multiple ISO files separated by spaces to the specified ISO storage domain. NFS is used by default, but SSH is also available.

You must specify one of the above actions when you use the ISO uploader command. Moreover, you must specify at least one local file to use the **upload** action.

There are several parameters to further refine the **engine-iso-uploader** command.

General Options

--version

Displays the version of the ISO uploader command.

-h, --help

Displays information on how to use the ISO uploader command.

--conf-file=[PATH]

Sets *[PATH]* as the configuration file the command will use. The default is **/etc/ovirt-engine/isouploader.conf**.

--log-file=[PATH]

Sets *[PATH]* as the specific file name the command will use to write log output. The default is **/var/log/ovirt-engine/ovirt-iso-uploader/ovirt-iso-uploader[*date*].log**.

--cert-file=[PATH]

Sets *[PATH]* as the certificate for validating the engine. The default is **/etc/pki/ovirt-engine/ca.pem**.

--insecure

Specifies that no attempt will be made to verify the engine.

--noSSL

Specifies that SSL will not be used to connect to the engine.

--quiet

Sets quiet mode, reducing console output to a minimum.

-v, --verbose

Sets verbose mode, providing more console output.

-f, --force

Force mode is necessary when the source file being uploaded has the same file name as an existing file in the destination ISO domain. This option forces the existing file to be overwritten.

Red Hat Enterprise Virtualization Manager Options**-u [USER], --user=[USER]**

Specifies the user whose credentials will be used to execute the command. The *[USER]* is specified in the format *[username]@[domain]*. The user must exist in the specified domain and be known to the Red Hat Enterprise Virtualization Manager.

-r [FQDN], --engine=[FQDN]

Specifies the IP address or fully qualified domain name of the Red Hat Enterprise Virtualization Manager from which the images will be uploaded. It is assumed that the image uploader is being run from the same machine on which the Red Hat Enterprise Virtualization Manager is installed. The default value is **localhost:443**.

ISO Storage Domain Options

The following options specify the ISO domain to which the images will be uploaded. These options cannot be used together; you must use either the **-i** option or the **-n** option.

-i, --iso-domain=[ISODOMAIN]

Sets the storage domain *[ISODOMAIN]* as the destination for uploads.

-n, --nfs-server=[NFSSERVER]

Sets the NFS path *[NFSSERVER]* as the destination for uploads.

Connection Options

The ISO uploader uses NFS as default to upload files. These options specify SSH file transfer instead.

--ssh-user=[USER]

Sets *[USER]* as the SSH user name to use for the upload. The default is **root**.

--ssh-port=[PORT]

Sets *[PORT]* as the port to use when connecting to SSH.

-k [KEYFILE], --key-file=[KEYFILE]

Sets *[KEYFILE]* as the public key to use for SSH authentication. You will be prompted to enter the password of the user specified with **--ssh-user=[USER]** if no key is set.

17.7.3. Specifying an NFS Server

Example 17.10. Uploading to an NFS Server

```
# engine-iso-uploader --nfs-server=storage.demo.redhat.com:/iso/path
upload RHEL6.0.iso
```

17.7.4. Basic ISO Uploader Usage

The example below demonstrates the ISO uploader and the list parameter. The first command lists the available ISO storage domains; the **admin@internal** user is used because no user was specified in the command. The second command uploads an ISO file over NFS to the specified ISO domain.

Example 17.11. List Domains and Upload Image

```
# engine-iso-uploader list
Please provide the REST API password for the admin@internal oVirt Engine
user (CTRL+D to abort):
ISO Storage Domain Name | Datacenter          | ISO Domain Status
ISODomain               | Default             | active
```

```
# engine-iso-uploader --iso-domain=[ISODomain] upload [RHEL6.iso]
Please provide the REST API password for the admin@internal oVirt Engine
user (CTRL+D to abort):
```

17.7.5. Uploading the VirtIO and Guest Tool Image Files to an ISO Storage Domain

The example below demonstrates the command to upload the **virtio-win.iso**, **virtio-win_x86.vfd**, **virtio-win_amd64.vfd**, and **rhev-tools-setup.iso** image files to the **ISODomain**.

Example 17.12. Uploading the VirtIO and Guest Tool Image Files

```
# engine-iso-uploader --iso-domain=[ISODomain] upload
/usr/share/virtio-win/virtio-win.iso /usr/share/virtio-win/virtio-
win_x86.vfd /usr/share/virtio-win/virtio-win_amd64.vfd /usr/share/rhev-
guest-tools-iso/rhev-tools-setup.iso
```

17.7.6. VirtIO and Guest Tool Image Files

The virtio-win ISO and Virtual Floppy Drive (VFD) images, which contain the VirtIO drivers for Windows virtual machines, and the rhev-tools-setup ISO, which contains the Red Hat Enterprise Virtualization Guest Tools for Windows virtual machines, are copied to an ISO storage domain upon installation and configuration of the domain.

These image files provide software that can be installed on virtual machines to improve performance and usability. The most recent virtio-win and rhev-tools-setup files can be accessed via the following symbolic links on the file system of the Red Hat Enterprise Virtualization Manager:

- **/usr/share/virtio-win/virtio-win.iso**
- **/usr/share/virtio-win/virtio-win_x86.vfd**
- **/usr/share/virtio-win/virtio-win_amd64.vfd**
- **/usr/share/rhev-guest-tools-iso/rhev-tools-setup.iso**

These image files must be manually uploaded to ISO storage domains that were not created locally by the installation process. Use the **engine-iso-uploader** command to upload these images to your ISO storage domain. Once uploaded, the image files can be attached to and used by virtual machines.

PART III. GATHERING INFORMATION ABOUT THE ENVIRONMENT

CHAPTER 18. LOG FILES

18.1. RED HAT ENTERPRISE VIRTUALIZATION MANAGER INSTALLATION LOG FILES

Table 18.1. Installation

Log File	Description
<code>/var/log/ovirt-engine/engine-cleanup-yyyy_mm_dd_hh_mm_ss.log</code>	Log from the engine-cleanup command. This is the command used to reset a Red Hat Enterprise Virtualization Manager installation. A log is generated each time the command is run. The date and time of the run is used in the filename to allow multiple logs to exist.
<code>/var/log/ovirt-engine/engine-db-install-yyyy_mm_dd_hh_mm_ss.log</code>	Log from the engine-setup command detailing the creation and configuration of the rhev database.
<code>/var/log/ovirt-engine/rhev-dwh-setup-yyyy_mm_dd_hh_mm_ss.log</code>	Log from the rhev-dwh-setup command. This is the command used to create the ovirt_engine_history database for reporting. A log is generated each time the command is run. The date and time of the run is used in the filename to allow multiple logs to exist concurrently.
<code>/var/log/ovirt-engine/ovirt-engine-reports-setup-yyyy_mm_dd_hh_mm_ss.log</code>	Log from the rhev-reports-setup command. This is the command used to install the Red Hat Enterprise Virtualization Manager Reports modules. A log is generated each time the command is run. The date and time of the run is used in the filename to allow multiple logs to exist concurrently.
<code>/var/log/ovirt-engine/setup/ovirt-engine-setup-yyyymmddhhmmss.log</code>	Log from the engine-setup command. A log is generated each time the command is run. The date and time of the run is used in the filename to allow multiple logs to exist concurrently.

18.2. RED HAT ENTERPRISE VIRTUALIZATION MANAGER LOG FILES

Table 18.2. Service Activity

Log File	Description
----------	-------------

Log File	Description
<code>/var/log/ovirt-engine/engine.log</code>	Reflects all Red Hat Enterprise Virtualization Manager GUI crashes, Active Directory lookups, Database issues, and other events.
<code>/var/log/ovirt-engine/host-deploy</code>	Log files from hosts deployed from the Red Hat Enterprise Virtualization Manager.
<code>/var/lib/ovirt-engine/setup-history.txt</code>	Tracks the installation and upgrade of packages associated with the Red Hat Enterprise Virtualization Manager.

18.3. SPICE LOG FILES

SPICE log files are useful when troubleshooting SPICE connection issues. To start SPICE debugging, change the log level to **debugging**. Then, identify the log location.

Both the clients used to access the guest machines and the guest machines themselves have SPICE log files. For client side logs, if a SPICE client was launched using a browser plug-in, debugging is generally controlled by environment variables. If a SPICE client is launched using the native client, for which a **console.vv** file is downloaded, use the **remote-viewer** command to enable debugging and generate log output.

18.3.1. SPICE Logs for Hypervisor SPICE Servers

Table 18.3. SPICE Logs for Hypervisor SPICE Servers

Log Type	Log Location	To Change Log Level:
Host/Hypervisor SPICE Server	<code>/var/log/libvirt/qemu/(guest_name).log</code>	Run export SPICE_DEBUG_LEVEL=5 on the host/hypervisor prior to launching the guest.

18.3.2. SPICE Logs for Guest Machines

Table 18.4. SPICE Logs for Guest Machines

Log Type	Log Location	To Change Log Level:
Windows Guest	<code>C:\Windows\Temp\vdagent.log</code> <code>C:\Windows\Temp\vdservice.log</code>	Not applicable
Red Hat Enterprise Linux Guest	<code>/var/log/spice-vdagent.log</code>	Create a <code>/etc/sysconfig/spice-vdagentd</code> file with this entry: SPICE_VDAGENTD_EXTRA_ARGS="-d -d"

Log Type	Log Location	To Change Log Level:
----------	--------------	----------------------

18.3.3. SPICE Logs for SPICE Clients Launched Using Browser Plug-ins

For SPICE client launched using browser plug-ins, the log location and change log level instructions are different depending on the OS type, OS version, and system type.

Table 18.5. SPICE Logs for Client Machines (Browser Plug-ins)

Log Type	Log Location	To Change Log Level:
SPICE Client (Windows 7)	C:\Windows\Temp\spicex.log	<ol style="list-style-type: none"> 1. Click the Computer main menu item, and select Computer. 2. Click System properties, and select Advanced system settings. 3. Select Advanced, and click Environment Variables. 4. Find the User or System variables, and add a New variable called SPICEX_DEBUG_LEVEL with a value of 4.
SPICE Client (Red Hat Enterprise Linux 6)	~/home/.spicec/spice-xpi.log	Edit the /etc/spice/logger.ini file and change the log4j.rootCategory variable from INFO, R to DEBUG, R .
SPICE Client (Red Hat Enterprise Linux 7)	~/xsession-errors	<p>Launch Firefox from the command line with debug options: G_MESSAGES_DEBUG=all SPICE_DEBUG=1 firefox.</p> <p>Touch the ~/xsession-errors file.</p>

Log Type	Log Location	To Change Log Level:
USB Redirector on Windows Client	C:\Windows\Temp\usbclerk.log	Not applicable.

18.3.4. SPICE Logs for SPICE Clients Launched Using console.vv Files

For Linux client machines:

1. Enable SPICE debugging by running the **remote-viewer** command with the **--spice-debug** option. When prompted, enter the connection URL, for example, `spice://[virtual_machine_IP]:[port]`.

```
# remote-viewer --spice-debug
```

2. To view logs, download the **console.vv** file and run the **remote-viewer** command with the **--spice-debug** option and specify the full path to the **console.vv** file.

```
# remote-viewer --spice-debug /path/to/console.vv
```

For Windows client machines:

1. Download the **debug-helper.exe** file and move it to the same directory as the **remote-viewer.exe** file. For example, the `C:\Users\[user name]\AppData\Local\virt-viewer\bin` directory.
2. Execute the **debug-helper.exe** file to install the GNU Debugger (GDB).
3. Enable SPICE debugging by executing the **debug-helper.exe** file.

```
debug-helper.exe remote-viewer.exe --spice-controller
```

4. To view logs, connect to the virtual machine, and you will see a command prompt running GDB that prints standard output and standard error of **remote-viewer**.

18.4. RED HAT ENTERPRISE VIRTUALIZATION HOST LOG FILES

Table 18.6.

Log File	Description
<code>/var/log/vdsm/libvirt.log</code>	Log file for libvirt .
<code>/var/log/vdsm/spm-lock.log</code>	Log file detailing the host's ability to obtain a lease on the Storage Pool Manager role. The log details when the host has acquired, released, renewed, or failed to renew the lease.

Log File	Description
<code>/var/log/vdsm/vdsm.log</code>	Log file for VDSM, the Manager's agent on the virtualization host(s).
<code>/tmp/ovirt-host-deploy-@DATE@.log</code>	Host deployment log, copied to engine as <code>/var/log/ovirt-engine/host-deploy/ovirt-@DATE@-@HOST@-@CORRELATION_ID@.log</code> after the host has been successfully deployed.

18.5. SETTING UP A VIRTUALIZATION HOST LOGGING SERVER

Red Hat Enterprise Virtualization hosts generate and update log files, recording their actions and problems. Collecting these log files centrally simplifies debugging.

This procedure should be used on your centralized log server. You could use a separate logging server, or use this procedure to enable host logging on the Red Hat Enterprise Virtualization Manager.

Procedure 18.1. Setting up a Virtualization Host Logging Server

1. Configure SELinux to allow **rsyslog** traffic.

```
# semanage port -a -t syslogd_port_t -p udp 514
```

2. Edit `/etc/rsyslog.conf` and add the following lines:

```
$template TmplAuth, "/var/log/%fromhost%/secure"
$template TmplMsg, "/var/log/%fromhost%/messages"

$RuleSet remote
authpriv.* ?TmplAuth
*.info,mail.none;authpriv.none,cron.none ?TmplMsg
$RuleSet RSYSLOG_DefaultRuleset
$InputUDPServerBindRuleset remote
```

Uncomment the following:

```
#$ModLoad imudp
#$UDPServerRun 514
```

3. Restart the rsyslog service:

```
# service rsyslog restart
```

Your centralized log server is now configured to receive and store the **messages** and **secure** logs from your virtualization hosts.

CHAPTER 19. PROXIES

19.1. SPICE PROXY

19.1.1. SPICE Proxy Overview

The SPICE Proxy is a tool used to connect SPICE Clients to virtual machines when the SPICE Clients are outside the network that connects the hypervisors. Setting up a SPICE Proxy consists of installing **Squid** on a machine and configuring **iptables** to allow proxy traffic through the firewall. Turning a SPICE Proxy on consists of using **engine-config** on the Manager to set the key **SpiceProxyDefault** to a value consisting of the name and port of the proxy. Turning a SPICE Proxy off consists of using **engine-config** on the Manager to remove the value to which the key **SpiceProxyDefault** has been set.



IMPORTANT

The SPICE Proxy can only be used in conjunction with the standalone SPICE client, and cannot be used to connect to virtual machines using SPICE HTML5 or noVNC.

19.1.2. SPICE Proxy Machine Setup

This procedure explains how to set up a machine as a SPICE Proxy. A SPICE Proxy makes it possible to connect to the Red Hat Enterprise Virtualization network from outside the network. We use **Squid** in this procedure to provide proxy services.

Procedure 19.1. Installing Squid on Red Hat Enterprise Linux

1. Install **Squid** on the Proxy machine:

```
# yum install squid
```

2. Open **/etc/squid/squid.conf**. Change:

```
http_access deny CONNECT !SSL_ports
```

to:

```
http_access deny CONNECT !Safe_ports
```

3. Start the proxy:

```
# service squid start
```

4. Open the default squid port:

```
# iptables -A INPUT -p tcp --dport 3128 -j ACCEPT
```

5. Make this iptables rule persistent:

```
# service iptables save
```

You have now set up a machine as a SPICE proxy. Before connecting to the Red Hat Enterprise Virtualization network from outside the network, activate the SPICE proxy.

19.1.3. Turning on SPICE Proxy

This procedure explains how to activate (or turn on) the SPICE proxy.

Procedure 19.2. Activating SPICE Proxy

1. On the Manager, use the engine-config tool to set a proxy:

```
# engine-config -s SpiceProxyDefault=someProxy
```

2. Restart the **ovirt-engine** service:

```
# service ovirt-engine restart
```

The proxy must have this form:

```
protocol://[host]:[port]
```



NOTE

Only SPICE clients shipped with Red Hat Enterprise Linux 6.7, Red Hat Enterprise Linux 7.2, or newer support HTTPS proxies. Older clients only support HTTP. If HTTPS is specified for older clients, the client will ignore the proxy setting and attempt a direct connection to the hypervisor.

SPICE Proxy is now activated (turned on). It is now possible to connect to the Red Hat Enterprise Virtualization network through the SPICE proxy.

19.1.4. Turning Off a SPICE Proxy

This procedure explains how to turn off (deactivate) a SPICE proxy.

Procedure 19.3. Turning Off a SPICE Proxy

1. Log in to the Manager:

```
$ ssh root@[IP of Manager]
```

2. Run the following command to clear the SPICE proxy:

```
# engine-config -s SpiceProxyDefault=""
```

3. Restart the Manager:

```
# service ovirt-engine restart
```

SPICE proxy is now deactivated (turned off). It is no longer possible to connect to the Red Hat Enterprise Virtualization network through the SPICE proxy.

19.2. SQUID PROXY

19.2.1. Installing and Configuring a Squid Proxy

Summary

This section explains how to install and configure a Squid proxy to the User Portal. A Squid proxy server is used as a content accelerator. It caches frequently-viewed content, reducing bandwidth and improving response times.

Procedure 19.4. Configuring a Squid Proxy

1. Obtain a keypair and certificate for the HTTPS port of the Squid proxy server. You can obtain this keypair the same way that you would obtain a keypair for another SSL/TLS service. The keypair is in the form of two PEM files which contain the private key and the signed certificate. For this procedure, we assume that they are named **proxy.key** and **proxy.cer**.



NOTE

The keypair and certificate can also be generated using the certificate authority of the engine. If you already have the private key and certificate for the proxy and do not want to generate it with the engine certificate authority, skip to the next step.

2. Choose a host name for the proxy. Then, choose the other components of the distinguished name of the certificate for the proxy.



NOTE

It is good practice to use the same country and same organization name used by the engine itself. Find this information by logging in to the machine where the Manager is installed and running the following command:

```
# openssl x509 -in /etc/pki/ovirt-engine/ca.pem -noout -subject
```

This command outputs something like this:

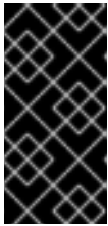
```
subject= /C=US/O=Example Inc./CN=engine.example.com.81108
```

The relevant part here is **/C=US/O=Example Inc..** Use this to build the complete distinguished name for the certificate for the proxy:

```
/C=US/O=Example Inc./CN=proxy.example.com
```


3. Log in to the proxy machine and generate a certificate signing request:

```
# openssl req -newkey rsa:2048 -subj '/C=US/O=Example
Inc./CN=proxy.example.com' -nodes -keyout proxy.key -out proxy.req
```



IMPORTANT

You must include the quotes around the distinguished name for the certificate. The **-nodes** option ensures that the private key is not encrypted; this means that you do not need to enter the password to start the proxy server.

The command generates two files: **proxy.key** and **proxy.req**. **proxy.key** is the private key. Keep this file safe. **proxy.req** is the certificate signing request. **proxy.req** does not require any special protection.

4. To generate the signed certificate, copy the certificate signing request file from the proxy machine to the Manager machine:

```
# scp proxy.req engine.example.com:/etc/pki/ovirt-engine/requests/.
```

5. Log in to the Manager machine and sign the certificate:

```
# /usr/share/ovirt-engine/bin/pki-enroll-request.sh --name=proxy --
days=3650 --subject='/C=US/O=Example Inc./CN=proxy.example.com'
```

This signs the certificate and makes it valid for 10 years (3650 days). Set the certificate to expire earlier, if you prefer.

6. The generated certificate file is available in the directory **/etc/pki/ovirt-engine/certs** and should be named **proxy.cer**. On the proxy machine, copy this file from the Manager machine to your current directory:

```
# scp engine.example.com:/etc/pki/ovirt-engine/certs/proxy.cer .
```

7. Ensure both **proxy.key** and **proxy.cer** are present on the proxy machine:

```
# ls -l proxy.key proxy.cer
```

8. Install the Squid proxy server package on the proxy machine:

```
# yum install squid
```

9. Move the private key and signed certificate to a place where the proxy can access them, for example to the **/etc/squid** directory:

```
# cp proxy.key proxy.cer /etc/squid/.
```

10. Set permissions so that the **squid** user can read these files:

```
# chgrp squid /etc/squid/proxy.*
# chmod 640 /etc/squid/proxy.*
```

11. The Squid proxy must verify the certificate used by the engine. Copy the Manager certificate to the proxy machine. This example uses the file path **/etc/squid**:

```
# scp engine.example.com:/etc/pki/ovirt-engine/ca.pem /etc/squid/.
```

**NOTE**

The default CA certificate is located in **/etc/pki/ovirt-engine/ca.pem** on the Manager machine.

12. Set permissions so that the **squid** user can read the certificate file:

```
# chgrp squid /etc/squid/ca.pem
# chmod 640 /etc/squid/ca.pem
```

13. If SELinux is in enforcing mode, change the context of port 443 using the **semanage** tool to permit Squid to use port 443:

```
# yum install policycoreutils-python
# semanage port -m -p tcp -t http_cache_port_t 443
```

14. Replace the existing Squid configuration file with the following:

```
https_port 443 key=/etc/squid/proxy.key cert=/etc/squid/proxy.cer
ssl-bump defaultsite=engine.example.com
cache_peer engine.example.com parent 443 0 no-query originserver ssl
sslcafile=/etc/squid/ca.pem name=engine
cache_peer_access engine allow all
ssl_bump allow all
http_access allow all
```

15. Restart the Squid proxy server:

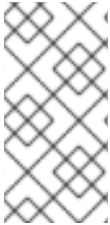
```
# service squid restart
```

16. Connect to the User Portal using the complete URL, for instance:

```
https://proxy.example.com/UserPortal/org.ovirt.engine.ui.userportal.
UserPortal/UserPortal.html
```

**NOTE**

Shorter URLs, for example **https://proxy.example.com/UserPortal**, will not work. These shorter URLs are redirected to the long URL by the application server, using the 302 response code and the Location header. The version of **Squid** in Red Hat Enterprise Linux does not support rewriting these headers.

**NOTE**

Squid Proxy in the default configuration will terminate its connection after 15 idle minutes. To increase the amount of time before Squid Proxy terminates its idle connection, adjust the **read_timeout** option in **squid.conf** (for instance **read_timeout 10 hours**).

19.3. WEBSOCKET PROXY

19.3.1. Websocket Proxy Overview

The websocket proxy allows users to connect to virtual machines via noVNC and SPICE HTML5 consoles. Previously, the websocket proxy could only run on the Red Hat Enterprise Virtualization Manager machine, but now the proxy can run on any machine that has access to the network.

The websocket proxy can be installed and configured on the Red Hat Enterprise Virtualization Manager machine during the initial configuration (see [Configuring the Red Hat Enterprise Virtualization Manager](#) in the *Installation Guide*), or on a separate machine (see [Installing a Websocket Proxy on a Separate Machine](#) in the *Installation Guide*).

The websocket proxy can also be migrated from the Manager machine to a separate machine. See [Section 19.3.2, “Migrating the Websocket Proxy to a Separate Machine”](#).

**NOTE**

SPICE HTML5 support is a Technology Preview feature. Technology Preview features are not fully supported under Red Hat Subscription Service Level Agreements (SLAs), may not be functionally complete, and are not intended for production use. However, these features provide early access to upcoming product innovations, enabling customers to test functionality and provide feedback during the development process.

19.3.2. Migrating the Websocket Proxy to a Separate Machine

For security or performance reasons the websocket proxy can run on a separate machine that does not run Red Hat Enterprise Virtualization Manager. The procedure to migrate the websocket proxy from the Manager machine to a separate machine involves removing the websocket proxy configuration from the Manager machine, then installing the proxy on the separate machine.

The **engine-cleanup** command can be used to remove the websocket proxy from the Manager machine.

Procedure 19.5. Migrating the Websocket Proxy to a Separate Machine

1. On the Manager machine, run **engine-cleanup** to remove the required configuration.

```
# engine-cleanup
```

2. Type **No** when asked to remove all components and press **Enter**.

```
Do you want to remove all components? (Yes, No) [Yes]: No
```

3. Type **No** when asked to remove the engine and press**Enter**.

```
Do you want to remove the engine? (Yes, No) [Yes]: No
```

4. Type **Yes** when asked to remove the websocket proxy and press**Enter**.

```
Do you want to remove the WebSocket proxy? (Yes, No) [No]: Yes
```

Select **No** if asked to remove any other components.

5. Install and configure the proxy on the separate machine. See [Installing a Websocket Proxy on a Separate Machine](#) in the *Installation Guide* for instructions.

APPENDIX A. VDSM AND HOOKS

A.1. VDSM

The VDSM service is used by the Red Hat Enterprise Virtualization Manager to manage Red Hat Enterprise Virtualization Hypervisors and Red Hat Enterprise Linux hosts. VDSM manages and monitors the host's storage, memory and network resources. It also coordinates virtual machine creation, statistics gathering, log collection and other host administration tasks. VDSM is run as a daemon on each hypervisor host managed by Red Hat Enterprise Virtualization Manager. It answers XML-RPC calls from clients. The Red Hat Enterprise Virtualization Manager functions as a VDSM client.

A.2. VDSM HOOKS

VDSM is extensible via hooks. Hooks are scripts executed on the host when key events occur. When a supported event occurs VDSM runs any executable hook scripts in `/usr/libexec/vdsm/hooks/nn_event-name` on the host in alphanumeric order. By convention each hook script is assigned a two digit number, included at the front of the file name, to ensure that the order in which the scripts will be run in is clear. You are able to create hook scripts in any programming language, Python will however be used for the examples contained in this chapter.

Note that all scripts defined on the host for the event are executed. If you require that a given hook is only executed for a subset of the virtual machines which run on the host then you must ensure that the hook script itself handles this requirement by evaluating the **Custom Properties** associated with the virtual machine.



WARNING

VDSM hooks can interfere with the operation of Red Hat Enterprise Virtualization. A bug in a VDSM hook has the potential to cause virtual machine crashes and loss of data. VDSM hooks should be implemented with caution and tested rigorously. The Hooks API is new and subject to significant change in the future.

A.3. EXTENDING VDSM WITH HOOKS

This chapter describes how to extend VDSM with event-driven hooks. Extending VDSM with hooks is an experimental technology, and this chapter is intended for experienced developers. Note that at this time hooks are not able to run on Red Hat Enterprise Virtualization Hypervisors, they must only be used on Red Hat Enterprise Linux hosts. By setting custom properties on virtual machines it is possible to pass additional parameters, specific to a given virtual machine, to the hook scripts.

A.4. SUPPORTED VDSM EVENTS

Table A.1. Supported VDSM Events

Name	Description
before_vm_start	Before virtual machine starts.
after_vm_start	After virtual machine starts.
before_vm_cont	Before virtual machine continues.
after_vm_cont	After virtual machine continues.
before_vm_pause	Before virtual machine pauses.
after_vm_pause	After virtual machine pauses.
before_vm_hibernate	Before virtual machine hibernates.
after_vm_hibernate	After virtual machine hibernates.
before_vm_dehibernate	Before virtual machine dehibernates.
after_vm_dehibernate	After virtual machine dehibernates.
before_vm_migrate_source	Before virtual machine migration, run on the source hypervisor host from which the migration is occurring.
after_vm_migrate_source	After virtual machine migration, run on the source hypervisor host from which the migration is occurring.
before_vm_migrate_destination	Before virtual machine migration, run on the destination hypervisor host to which the migration is occurring.
after_vm_migrate_destination	After virtual machine migration, run on the destination hypervisor host to which the migration is occurring.
after_vm_destroy	After virtual machine destruction.
before_vdsm_start	Before VDSM is started on the hypervisor host. before_vdsm_start hooks are executed as the user root, and do not inherit the environment of the VDSM process.
after_vdsm_stop	After VDSM is stopped on the hypervisor host. after_vdsm_stop hooks are executed as the user root, and do not inherit the environment of the VDSM process.

Name	Description
before_nic_hotplug	Before the NIC is hot plugged into the virtual machine.
after_nic_hotplug	After the NIC is hot plugged into the virtual machine.
before_nic_hotunplug	Before the NIC is hot unplugged from the virtual machine
after_nic_hotunplug	After the NIC is hot unplugged from the virtual machine.
after_nic_hotplug_fail	After hot plugging the NIC to the virtual machine fails.
after_nic_hotunplug_fail	After hot unplugging the NIC from the virtual machine fails.
before_disk_hotplug	Before the disk is hot plugged into the virtual machine.
after_disk_hotplug	After the disk is hot plugged into the virtual machine.
before_disk_hotunplug	Before the disk is hot unplugged from the virtual machine
after_disk_hotunplug	After the disk is hot unplugged from the virtual machine.
after_disk_hotplug_fail	After hot plugging the disk to the virtual machine fails.
after_disk_hotunplug_fail	After hot unplugging the disk from the virtual machine fails.
before_device_create	Before creating a device that supports custom properties.
after_device_create	After creating a device that supports custom properties.
before_update_device	Before updating a device that supports custom properties.
after_update_device	After updating a device that supports custom properties.

Name	Description
<code>before_device_destroy</code>	Before destroying a device that supports custom properties.
<code>after_device_destroy</code>	After destroying a device that supports custom properties.
<code>before_device_migrate_destination</code>	Before device migration, run on the destination hypervisor host to which the migration is occurring.
<code>after_device_migrate_destination</code>	After device migration, run on the destination hypervisor host to which the migration is occurring.
<code>before_device_migrate_source</code>	Before device migration, run on the source hypervisor host from which the migration is occurring.
<code>after_device_migrate_source</code>	After device migration, run on the source hypervisor host from which the migration is occurring.

A.5. THE VDSM HOOK ENVIRONMENT

Most hook scripts are run as the **vds**m user and inherit the environment of the VDSM process. The exceptions are hook scripts triggered by the **before_vds**m_start and **after_vds**m_stop events. Hook scripts triggered by these events run as the **root** user and do not inherit the environment of the VDSM process.

A.6. THE VDSM HOOK DOMAIN XML OBJECT

When hook scripts are started, the `_hook_domxml` variable is appended to the environment. This variable contains the path of the libvirt domain XML representation of the relevant virtual machine. Several hooks are an exception to this rule, as outlined below.

The `_hook_domxml` variable of the following hooks contains the XML representation of the NIC and not the virtual machine.

- `*_nic_hotplug_*`
- `*_nic_hotunplug_*`
- `*_update_device`
- `*_device_create`
- `*_device_migrate_*`



IMPORTANT

The **before_migration_destination** and **before_dehibernation** hooks currently receive the XML of the domain from the source host. The XML of the domain at the destination will have various differences.

The libvirt domain XML format is used by VDSM to define virtual machines. Details on the libvirt domain XML format can be found at <http://libvirt.org/formatdomain.html>. The UUID of the virtual machine may be deduced from the domain XML, but it is also available as the environment variable **vmId**.

A.7. DEFINING CUSTOM PROPERTIES

The custom properties that are accepted by the Red Hat Enterprise Virtualization Manager - and in turn passed to custom hooks - are defined using the **engine-config** command. Run this command as the **root** user on the host where Red Hat Enterprise Virtualization Manager is installed.

The **UserDefinedVMProperties** and **CustomDeviceProperties** configuration keys are used to store the names of the custom properties supported. Regular expressions defining the valid values for each named custom property are also contained in these configuration keys.

Multiple custom properties are separated by a semi-colon. Note that when setting the configuration key, any existing value it contained is overwritten. When combining new and existing custom properties, all of the custom properties in the command used to set the key's value must be included.

Once the configuration key has been updated, the **ovirt-engine** service must be restarted for the new values to take effect.

Example A.1. Virtual Machine Properties - Defining the *smartcard* Custom Property

1. Check the existing custom properties defined by the **UserDefinedVMProperties** configuration key using the following command:

```
# engine-config -g UserDefinedVMProperties
```

As shown by the output below, the custom property **memory** is already defined. The regular expression **^[0-9]+\$** ensures that the custom property will only ever contain numeric characters.

```
# engine-config -g UserDefinedVMProperties
UserDefinedVMProperties: version: 3.0
UserDefinedVMProperties: version: 3.1
UserDefinedVMProperties: version: 3.2
UserDefinedVMProperties: version: 3.3
UserDefinedVMProperties : memory=^[0-9]+$ version: 3.2
```

2. Because the **memory** custom property is already defined in the **UserDefinedVMProperties** configuration key, the new custom property must be appended to it. The additional custom property, **smartcard**, is added to the

configuration key's value. The new custom property is able to hold a value of **true** or **false**.

```
# engine-config -s UserDefinedVMProperties='memory=^[0-9]+$;smartcard=^(true|false)$' --cver=3.2
```

3. Verify that the custom properties defined by the **UserDefinedVMProperties** configuration key have been updated correctly.

```
# engine-config -g UserDefinedVMProperties
UserDefinedVMProperties: version: 3.0
UserDefinedVMProperties: version: 3.1
UserDefinedVMProperties: version: 3.2
UserDefinedVMProperties: version: 3.3
UserDefinedVMProperties : memory=^[0-9]+$;smartcard=^(true|false)$
version: 3.2
```

4. Finally, the **ovirt-engine** service must be restarted for the configuration change to take effect.

```
# service ovirt-engine restart
```

Example A.2. Device Properties - Defining the *interface* Custom Property

1. Check the existing custom properties defined by the **CustomDeviceProperties** configuration key using the following command:

```
# engine-config -g CustomDeviceProperties
```

As shown by the output below, no custom properties have yet been defined.

```
# engine-config -g CustomDeviceProperties
CustomDeviceProperties: version: 3.0
CustomDeviceProperties: version: 3.1
CustomDeviceProperties: version: 3.2
CustomDeviceProperties: version: 3.3
```

2. The **interface** custom property does not already exist, so it can be appended as is. In this example, the value of the **speed** sub-property is set to a range of 0 to 99999, and the value of the **duplex** sub-property is set to a selection of either **full** or **half**.

```
# engine-config -s CustomDeviceProperties="{type=interface;prop={speed=^[0-9]{1,5}};$;duplex=^(full|half)$}" --cver=3.3
```

3. Verify that the custom properties defined by the **CustomDeviceProperties** configuration key have been updated correctly.

```
# engine-config -g CustomDeviceProperties
UserDefinedVMProperties: version: 3.0
UserDefinedVMProperties: version: 3.1
```

```
UserDefinedVMProperties: version: 3.2
UserDefinedVMProperties : {type=interface;prop={speed=^([0-9]
{1,5})$;duplex=^(full|half)$}} version: 3.3
```

4. Finally, the **ovirt-engine** service must be restarted for the configuration change to take effect.

```
# service ovirt-engine restart
```

A.8. SETTING VIRTUAL MACHINE CUSTOM PROPERTIES

Once custom properties are defined in the Red Hat Enterprise Virtualization Manager, you can begin setting them on virtual machines. Custom properties are set on the **Custom Properties** tab of the **New Virtual Machine** and **Edit Virtual Machine** windows in the Administration Portal.

You can also set custom properties from the **Run Virtual Machine(s)** dialog box. Custom properties set from the **Run Virtual Machine(s)** dialog box will only apply to the virtual machine until it is next shutdown.

The **Custom Properties** tab provides a facility for you to select from the list of defined custom properties. Once you select a custom property key an additional field will display allowing you to enter a value for that key. Add additional key/value pairs by clicking the + button and remove them by clicking the - button.

A.9. EVALUATING VIRTUAL MACHINE CUSTOM PROPERTIES IN A VDSM HOOK

Each key set in the **Custom Properties** field for a virtual machine is appended as an environment variable when calling hook scripts. Although the regular expressions used to validate the **Custom Properties** field provide some protection you should ensure that your scripts also validate that the inputs provided match their expectations.

Example A.3. Evaluating Custom Properties

This short Python example checks for the existence of the custom property **key1**. If the custom property is set then the value is printed to standard error. If the custom property is not set then no action is taken.

```
#!/usr/bin/python

import os
import sys

if os.environ.has_key('key1'):
    sys.stderr.write('key1 value was : %s\n' % os.environ['key1'])
else:
    sys.exit(0)
```

A.10. USING THE VDSM HOOKING MODULE

VDSM ships with a Python hooking module, providing helper functions for VDSM hook scripts. This module is provided as an example, and is only relevant to VDSM hooks written in Python.

The hooking module supports reading of a virtual machine's libvirt XML into a DOM object. Hook scripts can then use Python's built in `xml.dom` library (<http://docs.python.org/release/2.6/library/xml.dom.html>) to manipulate the object.

The modified object can then be saved back to libvirt XML using the hooking module. The hooking module provides the following functions to support hook development:

Table A.2. Hooking module functions

Name	Argument	Description
tobool	string	Converts a string "true" or "false" to a Boolean value
read_domxml	-	Reads the virtual machine's libvirt XML into a DOM object
write_domxml	DOM object	Writes the virtual machine's libvirt XML from a DOM object

A.11. VDSM HOOK EXECUTION

before_vm_start scripts can edit the domain XML in order to change VDSM's definition of a virtual machine before it reaches libvirt. Caution must be exercised in doing so. Hook scripts have the potential to disrupt the operation of VDSM, and buggy scripts can result in outages to the Red Hat Enterprise Virtualization environment. In particular, ensure you never change the UUID of the domain, and do not attempt to remove a device from the domain without sufficient background knowledge.

Both **before_vdsm_start** and **after_vdsm_stop** hook scripts are run as the **root** user. Other hook scripts that require **root** access to the system must be written to use the **sudo** command for privilege escalation. To support this the **/etc/sudoers** must be updated to allow the **vdsm** user to use **sudo** without reentering a password. This is required as hook scripts are executed non-interactively.

Example A.4. Configuring sudo for VDSM Hooks

In this example the **sudo** command will be configured to allow the **vdsm** user to run the **/bin/chown** command as **root**.

1. Log into the virtualization host as **root**.
2. Open the **/etc/sudoers** file in a text editor.
3. Add this line to the file:

```
vdsm ALL=(ALL) NOPASSWD: /bin/chown
```

This specifies that the **vds**m user has the ability to run the **/bin/chown** command as the **root** user. The **NOPASSWD** parameter indicates that the user will not be prompted to enter their password when calling **sudo**.

Once this configuration change has been made VDSM hooks are able to use the **sudo** command to run **/bin/chown** as **root**. This Python code uses **sudo** to execute **/bin/chown** as **root** on the file **/my_file**.

```
retcode = subprocess.call( ["/usr/bin/sudo", "/bin/chown", "root",
"/my_file"] )
```

The standard error stream of hook scripts is collected in VDSM's log. This information is used to debug hook scripts.

A.12. VDSM HOOK RETURN CODES

Hook scripts must return one of the return codes shown in [Table A.3, “Hook Return Codes”](#). The return code will determine whether further hook scripts are processed by VDSM.

Table A.3. Hook Return Codes

Code	Description
0	The hook script ended successfully
1	The hook script failed, other hooks should be processed
2	The hook script failed, no further hooks should be processed
>2	Reserved

A.13. VDSM HOOK EXAMPLES

The example hook scripts provided in this section are strictly not supported by Red Hat. You must ensure that any and all hook scripts that you install to your system, regardless of source, are thoroughly tested for your environment.

Example A.5. NUMA Node Tuning

Purpose:

This hook script allows for tuning the allocation of memory on a NUMA host based on the **numaset** custom property. Where the custom property is not set no action is taken.

Configuration String:

```
numaset=^(interleave|strict|preferred):[\^]?d+(-\d+)?(,[\^]?d+(-\d+)?)*$
```

The regular expression used allows the **numaset** custom property for a given virtual machine to specify both the allocation mode (**interleave**, **strict**, **preferred**) and the node to use. The two values are separated by a colon (:). The regular expression allows specification of the **nodeset** as:

- that a specific node (**numaset=strict:1**, specifies that only node 1 be used), or
- that a range of nodes be used (**numaset=strict:1-4**, specifies that nodes 1 through 4 be used), or
- that a specific node not be used (**numaset=strict:^3**, specifies that node 3 not be used), or
- any comma-separated combination of the above (**numaset=strict:1-4,6**, specifies that nodes 1 to 4, and 6 be used).

Script:

/usr/libexec/vdsm/hooks/before_vm_start/50_numa

```
#!/usr/bin/python

import os
import sys
import hooking
import traceback

...
numa hook
=====
add numa support for domain xml:

<numatune>
    <memory mode="strict" nodeset="1-4,^3" />
</numatune>

memory=interleave|strict|preferred

numaset="1" (use one NUMA node)
numaset="1-4" (use 1-4 NUMA nodes)
numaset="^3" (don't use NUMA node 3)
numaset="1-4,^3,6" (or combinations)

syntax:
    numa=strict:1-4
...

if os.environ.has_key('numa'):
    try:
        mode, nodeset = os.environ['numa'].split(':')

        domxml = hooking.read_domxml()

        domain = domxml.getElementsByTagName('domain')[0]
        numas = domxml.getElementsByTagName('numatune')

        if not len(numas) > 0:
```

```
numatune = domxml.createElement('numatune')
domain.appendChild(numatune)

memory = domxml.createElement('memory')
memory.setAttribute('mode', mode)
memory.setAttribute('nodeset', nodeset)
numatune.appendChild(memory)

hooking.write_domxml(domxml)
else:
    sys.stderr.write('numa: numa already exists in domain xml')
    sys.exit(2)
except:
    sys.stderr.write('numa: [unexpected error]: %s\n' %
traceback.format_exc())
    sys.exit(2)
```

APPENDIX B. CUSTOM NETWORK PROPERTIES

B.1. EXPLANATION OF BRIDGE_OPTS PARAMETERS

Table B.1. bridge_opts parameters

Parameter	Description
forward_delay	Sets the time, in deciseconds, a bridge will spend in the listening and learning states. If no switching loop is discovered in this time, the bridge will enter forwarding state. This allows time to inspect the traffic and layout of the network before normal network operation.
gc_timer	Sets the garbage collection time, in deciseconds, after which the forwarding database is checked and cleared of timed-out entries.
group_addr	Set to zero when sending a general query. Set to the IP multicast address when sending a group-specific query, or group-and-source-specific query.
group_fwd_mask	Enables bridge to forward link local group addresses. Changing this value from the default will allow non-standard bridging behavior.
hash_elasticity	The maximum chain length permitted in the hash table. Does not take effect until the next new multicast group is added. If this cannot be satisfied after rehashing, a hash collision occurs and snooping is disabled.
hash_max	The maximum amount of buckets in the hash table. This takes effect immediately and cannot be set to a value less than the current number of multicast group entries. Value must be a power of two.
hello_time	Sets the time interval, in deciseconds, between sending 'hello' messages, announcing bridge position in the network topology. Applies only if this bridge is the Spanning Tree root bridge.
hello_timer	Time, in deciseconds, since last 'hello' message was sent.

Parameter	Description
max_age	Sets the maximum time, in deciseconds, to receive a 'hello' message from another root bridge before that bridge is considered dead and takeover begins.
multicast_last_member_count	Sets the number of 'last member' queries sent to the multicast group after receiving a 'leave group' message from a host.
multicast_last_member_interval	Sets the time, in deciseconds, between 'last member' queries.
multicast_membership_interval	Sets the time, in deciseconds, that a bridge will wait to hear from a member of a multicast group before it stops sending multicast traffic to the host.
multicast_querier	Sets whether the bridge actively runs a multicast querier or not. When a bridge receives a 'multicast host membership' query from another network host, that host is tracked based on the time that the query was received plus the multicast query interval time. If the bridge later attempts to forward traffic for that multicast membership, or is communicating with a querying multicast router, this timer confirms the validity of the querier. If valid, the multicast traffic is delivered via the bridge's existing multicast membership table; if no longer valid, the traffic is sent via all bridge ports. Broadcast domains with, or expecting, multicast memberships should run at least one multicast querier for improved performance.
multicast_querier_interval	Sets the maximum time, in deciseconds, between last 'multicast host membership' query received from a host to ensure it is still valid.
multicast_query_use_ifaddr	Boolean. Defaults to '0', in which case the querier uses 0.0.0.0 as source address for IPv4 messages. Changing this sets the bridge IP as the source address.

Parameter	Description
<code>multicast_query_interval</code>	Sets the time, in deciseconds, between query messages sent by the bridge to ensure validity of multicast memberships. At this time, or if the bridge is asked to send a multicast query for that membership, the bridge checks its own multicast querier state based on the time that a check was requested plus <code>multicast_query_interval</code> . If a multicast query for this membership has been sent within the last <code>multicast_query_interval</code> , it is not sent again.
<code>multicast_query_response_interval</code>	Length of time, in deciseconds, a host is allowed to respond to a query once it has been sent. Must be less than or equal to the value of the <code>multicast_query_interval</code> .
<code>multicast_router</code>	Allows you to enable or disable ports as having multicast routers attached. A port with one or more multicast routers will receive all multicast traffic. A value of 0 disables completely, a value of 1 enables the system to automatically detect the presence of routers based on queries, and a value of 2 enables ports to always receive all multicast traffic.
<code>multicast_snooping</code>	Toggles whether snooping is enabled or disabled. Snooping allows the bridge to listen to the network traffic between routers and hosts to maintain a map to filter multicast traffic to the appropriate links. This option allows the user to re-enable snooping if it was automatically disabled due to hash collisions, however snooping will not be re-enabled if the hash collision has not been resolved.
<code>multicast_startup_query_count</code>	Sets the number of queries sent out at startup to determine membership information.
<code>multicast_startup_query_interval</code>	Sets the time, in deciseconds, between queries sent out at startup to determine membership information.

B.2. HOW TO SET UP RED HAT ENTERPRISE VIRTUALIZATION MANAGER TO USE ETHTOOL

You can configure `ethtool` properties for host network interface cards from the Administration Portal. The **`ethtool_opts`** key is not available by default and needs to be added to the Manager using the engine configuration tool. You also need to install the required VDSM hook package on the hosts.

Procedure B.1. Adding the `ethtool_opts` Key to the Manager

1. On the Manager, run the following command to add the key:

```
# engine-config -s
UserDefinedNetworkCustomProperties=ethtool_opts=.* --cver=3.6
```

2. Restart the **ovirt-engine** service:

```
# service ovirt-engine restart
```

3. On the hosts that you want to configure `ethtool` properties, install the VDSM hook package. The package is available by default on Red Hat Enterprise Virtualization Hypervisor but needs to be installed on Red Hat Enterprise Linux hosts.

```
# yum install vdsmd-hook-ethtool-options
```

The **ethtool_opts** key is now available in the Administration Portal. See [Section 5.5.2, “Editing Host Network Interfaces and Assigning Logical Networks to Hosts”](#) to apply `ethtool` properties to logical networks.

B.3. HOW TO SET UP RED HAT ENTERPRISE VIRTUALIZATION MANAGER TO USE FCOE

You can configure Fibre Channel over Ethernet (FCoE) properties for host network interface cards from the Administration Portal. The **fcoe** key is not available by default and needs to be added to the Manager using the engine configuration tool. You can check whether **fcoe** has already been enabled by running the following command:

```
# engine-config -g UserDefinedNetworkCustomProperties
```

You also need to install the required VDSM hook package on the hosts. Depending on the FCoE card on the hosts, special configuration may also be needed; see [Configuring a Fibre Channel over Ethernet Interface](#) in the *Red Hat Enterprise Linux Storage Administration Guide*.

Procedure B.2. Adding the `fcoe` Key to the Manager

1. On the Manager, run the following command to add the key:

```
# engine-config -s
UserDefinedNetworkCustomProperties='fcoe=^((enable|dcb|auto_vlan)=
(yes|no),?)*$'
```

2. Restart the **ovirt-engine** service:

```
# service ovirt-engine restart
```

3. Install the VDSM hook package on each of the Red Hat Enterprise Linux hosts on which you want to configure FCoE properties. The package is available by default on Red Hat Enterprise Virtualization Hypervisors.

```
# yum install vdsd-hook-fcoe
```

The **fcoe** key is now available in the Administration Portal. See [Section 5.5.2, “Editing Host Network Interfaces and Assigning Logical Networks to Hosts”](#) to apply FCoE properties to logical networks.

APPENDIX C. RED HAT ENTERPRISE VIRTUALIZATION USER INTERFACE PLUGINS

C.1. RED HAT ENTERPRISE VIRTUALIZATION USER INTERFACE PLUG-INS

Red Hat Enterprise Virtualization supports plug-ins that expose non-standard features. This makes it easier to use the Red Hat Enterprise Virtualization Administration Portal to integrate with other systems. Each interface plug-in represents a set of user interface extensions that can be packaged and distributed for use with Red Hat Enterprise Virtualization.

Red Hat Enterprise Virtualization's User Interface plug-ins integrate with the Administration Portal directly on the client using the JavaScript programming language. Plug-ins are invoked by the Administration Portal and executed in the web browser's JavaScript runtime. User Interface plug-ins can use the JavaScript language and its libraries.

At key events during runtime, the Administration Portal invokes individual plug-ins via event handler functions representing Administration-Portal-to-plug-in communication. Although the Administration Portal supports multiple event-handler functions, a plug-in declares functions which are of interest only to its implementation. Each plug-in must register relevant event handler functions as part of the plug-in bootstrap sequence before the plug-in is put to use by the administration portal.

To facilitate the plug-in-to-Administration-Portal communication that drives the User Interface extension, the Administration Portal exposes the plug-in API as a global (top-level) `pluginApi` JavaScript object that individual plug-ins can consume. Each plug-in obtains a separate `pluginApi` instance, allowing the Administration Portal to control plug-in API-function invocation for each plug-in with respect to the plug-in's life cycle.

C.2. RED HAT ENTERPRISE VIRTUALIZATION USER INTERFACE PLUGIN LIFECYCLE

C.2.1. Red Hat Enterprise Virtualization User Interface Plug-in Life cycle

The basic life cycle of a User Interface Plug-in divides into three stages:

1. Plug-in discovery.
2. Plug-in loading.
3. Plug-in bootstrapping.

C.2.2. Red Hat Enterprise Virtualization User Interface Plug-in Discovery

Creating plug-in descriptors is the first step in the plug-in discovery process. Plug-in descriptors contain important plug-in metadata and optional default plug-in-specific configurations.

As part of handling administration portal HTML page requests (**HTTP GET**), User Interface plug-in infrastructure attempts to discover and load plug-in descriptors from your local file

system. For each plug-in descriptor, the infrastructure also attempts to load corresponding plug-in user configurations used to override default plug-in-specific configurations (if any exist) and tweak plug-in runtime behavior. Plug-in user configuration is optional. After loading descriptors and corresponding user configuration files, oVirt Engine aggregates User Interface plug-in data and embeds it into the administration portal HTML page for runtime evaluation.

By default, plug-in descriptors reside in `$ENGINE_USR/ui-plug-ins`, with a default mapping of `ENGINE_USR=/usr/share/ovirt-engine` as defined by oVirt Engine local configuration. Plug-in descriptors are expected to comply with JSON format specifications, but plug-in descriptors allow Java/C++ style comments (of both `/*` and `//` varieties) in addition to the JSON format specifications.

By default, plug-in user configuration files reside in `$ENGINE_ETC/ui-plug-ins`, with a default mapping of `ENGINE_ETC=/etc/ovirt-engine` as defined by oVirt Engine local configuration. Plug-in user configuration files are expected to comply with same content format rules as plug-in descriptors.



NOTE

Plug-in user configuration files generally follow the `<descriptorFileName>-config.json` naming convention.

C.2.3. Red Hat Enterprise Virtualization User Interface Plug-in Loading

After a plug-in has been discovered and its data is embedded into the administration portal HTML page, administration portal tries to load the plug-in as part of application startup (unless you have configured it not to load as part of application startup).

For each plug-in that has been discovered, the administration portal creates an HTML iframe element that is used to load its host page. The plug-in host page is necessary to begin the plug-in bootstrap process, which (the bootstrap process) is used to evaluate the plug-in code in the context of the plug-in's iframe element. User interface plug-in infrastructure supports serving plug-in resource files (such as the plug-in host page) from the local file system. The plug-in host page is loaded into the iframe element and the plug-in code is evaluated. After the plug-in code is evaluated, the plug-in communicates with the administration portal by means of the plug-in API.

C.2.4. Red Hat Enterprise Virtualization User Interface Plug-in Bootstrapping

A typical plug-in bootstrap sequence consists of following steps:

Procedure C.1. Plug-in Bootstrap Sequence

1. Obtain `pluginApi` instance for the given plug-in
2. Obtain runtime plug-in configuration object (optional)
3. Register relevant event handler functions
4. Notify UI plug-in infrastructure to proceed with plug-in initialization

The following code snippet illustrates the above mentioned steps in practice:

```
// Access plug-in API using 'parent' due to this code being evaluated
// within the context of an iframe element.
// As 'parent.pluginApi' is subject to Same-Origin Policy, this will only
// work when WebAdmin HTML page and plug-in
// host page are served from same origin. WebAdmin HTML page and plug-in
// host page will always be on same origin
// when using UI plug-in infrastructure support to serve plug-in resource
// files.
var api = parent.pluginApi('MyPlugin');

// Runtime configuration object associated with the plug-in (or an empty
// object).
var config = api.configObject();

// Register event handler function(s) for later invocation by UI plug-in
// infrastructure.
api.register({
    // UiInit event handler function.
    UiInit: function() {
        // Handle UiInit event.
        window.alert('Favorite music band is ' + config.band);
    }
});

// Notify UI plug-in infrastructure to proceed with plug-in
// initialization.
api.ready();
```

C.3. USER INTERFACE PLUGIN-RELATED FILES AND THEIR LOCATIONS

Table C.1. UI Plugin-related Files and their Locations

File	Location	Remarks
Plug-in descriptor files (meta-data)	<code>/usr/share/ovirt-engine/ui-plugins/my-plugin.json</code>	
Plug-in user configuration files	<code>/etc/ovirt-engine/ui-plugins/my-plugin-config.json</code>	
Plug-in resource files	<code>/usr/share/ovirt-engine/ui-plugins/<resourcePath>/PluginHostPage.html</code>	<code><resourcePath></code> is defined by the corresponding attribute in the plug-in descriptor.

C.4. EXAMPLE USER INTERFACE PLUG-IN DEPLOYMENT

Follow these instructions to create a user interface plug-in that runs a **Hello World!** program when you sign in to the Red Hat Enterprise Virtualization Manager administration portal.

Procedure C.2. Deploying a Hello World! Plug-in

1. Create a plug-in descriptor by creating the following file in the Manager at `/usr/share/ovirt-engine/ui-plugins/helloWorld.json`:

```
{
  "name": "HelloWorld",
  "url": "/ovirt-engine/webadmin/plugin/HelloWorld/start.html",
  "resourcePath": "hello-files"
}
```

2. Create the plug-in host page by creating the following file in the Manager at `/usr/share/ovirt-engine/ui-plugins/hello-files/start.html`:

```
<!DOCTYPE html><html><head>
<script>
  var api = parent.pluginApi('HelloWorld');
  api.register({
    UiInit: function() { window.alert('Hello world'); }
  });
  api.ready();
</script>
</head><body></body></html>
```

If you have successfully implemented the **Hello World!** plug-in, you will see this screen when you sign in to the administration portal:

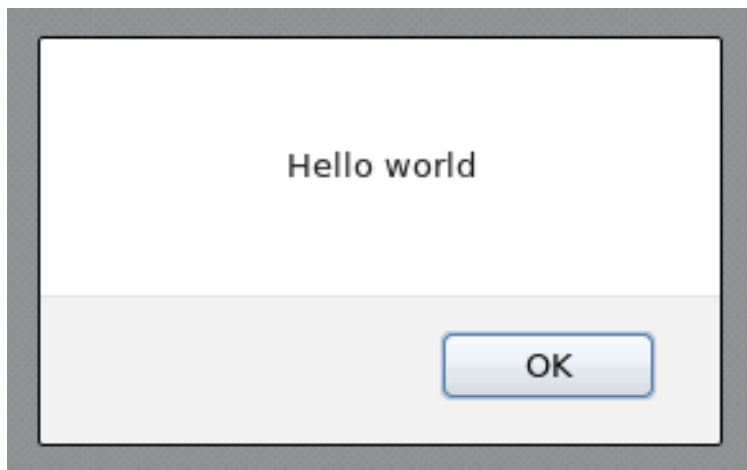


Figure C.1. A Successful Implementation of the Hello World! Plug-in

C.5. INSTALLING THE RED HAT SUPPORT PLUG-IN

The Red Hat Support Plug-in provides access to Red Hat Access services from the Red Hat Enterprise Virtualization Administration Portal.

Procedure C.3. Installing the Red Hat Support Plug-in

**NOTE**

The Red Hat Support Plug-in is installed by default in Red Hat Enterprise Virtualization 3.3. The Red Hat Support Plug-in is not installed by default in Red Hat Enterprise Virtualization 3.2. It is not necessary to run this procedure in Red Hat Enterprise Virtualization 3.3.

- Use **yum** to install the `redhat-support-plugin-rhev` plug-in:

```
# yum install redhat-support-plugin-rhev
```

C.6. USING RED HAT SUPPORT PLUG-IN

The Red Hat Access Plug-in allows you to use Red Hat access services from the Red Hat Enterprise Virtualization Administration Portal. You must log in using your Red Hat login credentials. The Red Hat Access Plug-in detects when you are not logged in; if you are not logged in, a login window opens.

**NOTE**

Red Hat Enterprise Virtualization Administration Portal credentials are not the same as a user's Red Hat login.

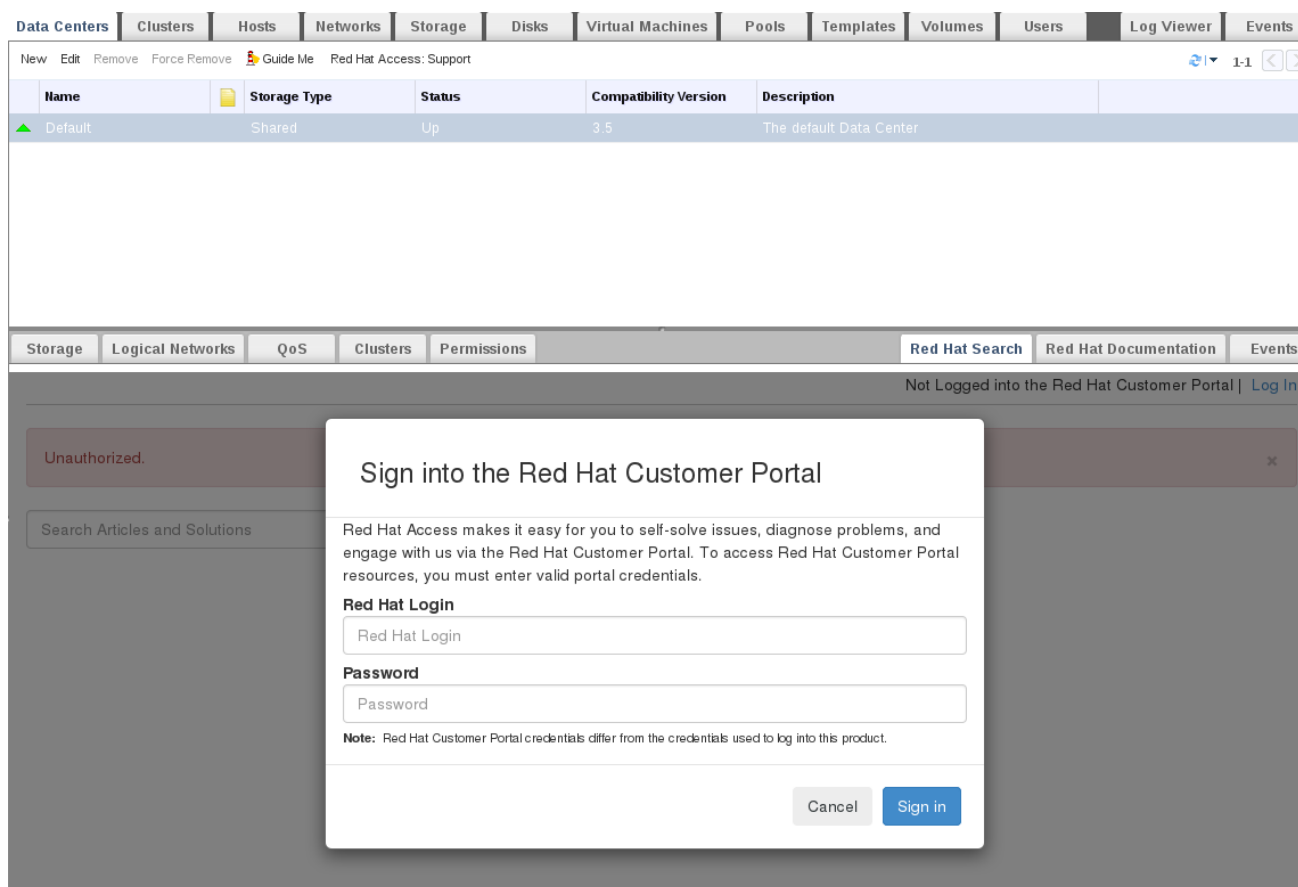


Figure C.2. Red Hat Support Plug-in - Login Window

After logging in, you will be able to access the Red Hat Customer Portal. Red Hat Support Plug-in is available in the details pane as well as in several context menus in the Red Hat Enterprise Virtualization Administration Portal. Search the Red Hat Access database using

the Search bar. Search results display in the left-hand navigation list in the details pane.

The screenshot shows the Red Hat Enterprise Virtualization Administrator Portal interface. At the top, there is a navigation bar with tabs for Data Centers, Clusters, Hosts, Networks, Storage, Disks, Virtual Machines, Pools, Templates, Volumes, Users, Log Viewer, and Events. Below this, a toolbar contains buttons for New, Edit, Remove, Force Remove, Guide Me, and Red Hat Access: Support. A table lists Data Centers with columns for Name, Storage Type, Status, Compatibility Version, and Description. The 'Default' Data Center is shown with a Shared Storage Type and Up Status. Below the table, a search bar contains the text 'RHEV'. To the right of the search bar, a 'Search' button is visible. Below the search bar, a list of recommendations is shown, including 'RHEV - Disable SSL between RHEV-H and RHEV-M', 'RHEV-H ハイパーバイザーでタイムゾーンを変更できますか?', and 'RHEV: Troubleshooting RHEV-M Installation'. To the right of the recommendations, the search results are displayed under the heading 'Environment', showing 'Red Hat Enterprise Virtualization Manager (RHEV-M) v.3.0'. Below this, the 'Issue' section states: 'If you have problems when you try to install a RHEV-M, use the following tech brief to troubleshoot your RHEV-M installation.' The 'Resolution' section provides a link to a tech brief: 'https://access.redhat.com/knowledge/techbriefs/troubleshooting-red-hat-enterprise-virtualization-manager-installation-rhev-30'.

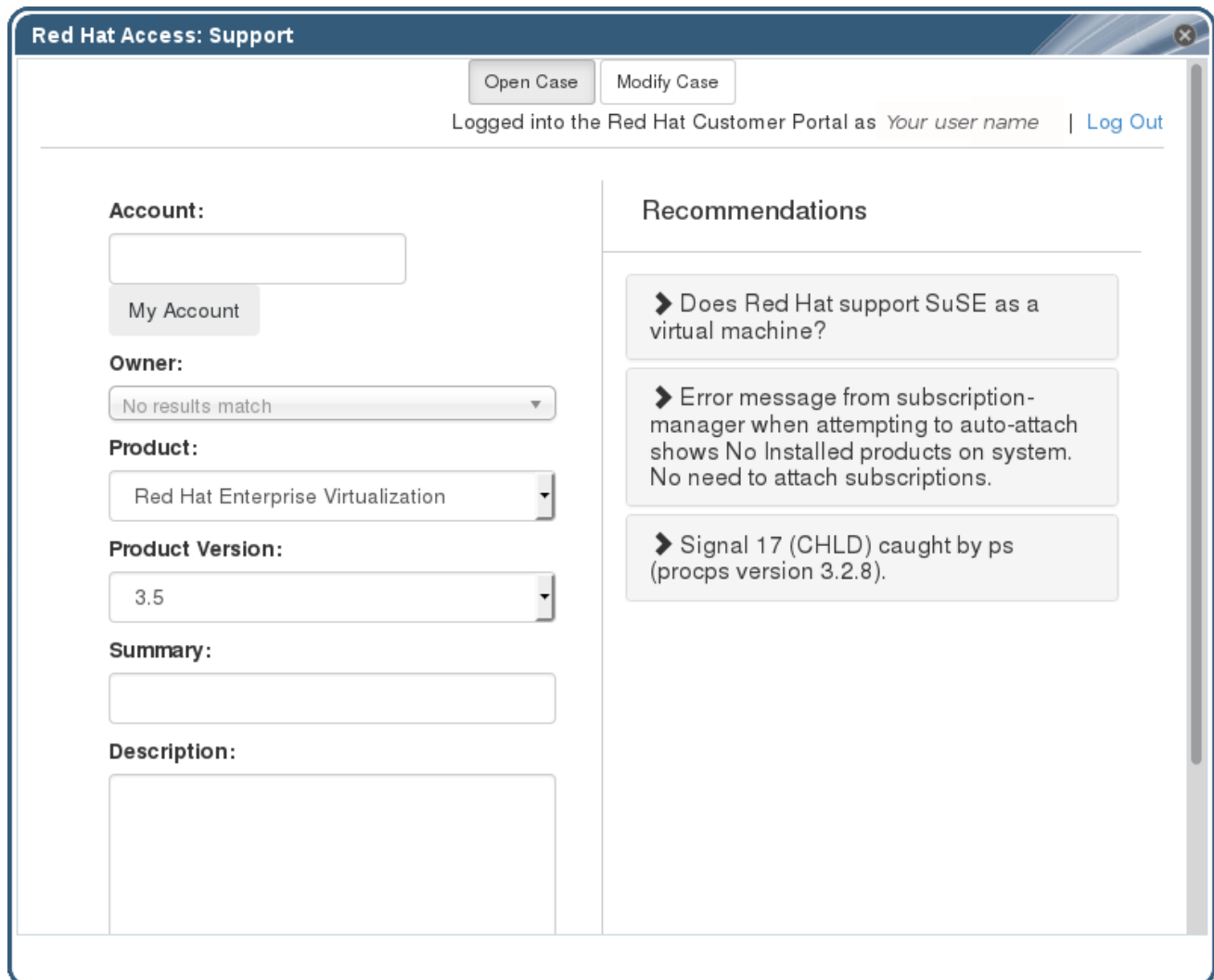
Figure C.3. Red Hat Support Plug-in - Query Results in the Left-Hand Navigation List

Right-click on context menus in the Red Hat Enterprise Virtualization Administrator Portal to access the Red Hat Support Plug-in.

The screenshot shows the Red Hat Enterprise Virtualization Administrator Portal interface. At the top, there is a navigation bar with tabs for Data Centers, Clusters, Hosts, Networks, Storage, and Disks. Below this, a toolbar contains buttons for New, Edit, Remove, Force Remove, Guide Me, and Red Hat Access: Support. A table lists Data Centers with columns for Name, Storage Type, and Status. The 'Default' Data Center is shown with a Shared Storage Type and Un Status. A right-click context menu is open over the 'Default' Data Center, showing options: New, Edit, Remove, Force Remove, Guide Me, Re-Initialize Data Center, and Red Hat Access: Support. The 'Red Hat Access: Support' option is highlighted.

Figure C.4. Right-clicking on a Context Menu to Access Red Hat Support Plug-in

Open a new support case or modify an existing case by selecting the **Open New Support Case** or **Modify Existing Case** buttons.



The screenshot shows the 'Red Hat Access: Support' window. At the top, there are two buttons: 'Open Case' and 'Modify Case'. Below them, a status bar indicates 'Logged into the Red Hat Customer Portal as Your user name' with a 'Log Out' link. The main content area is divided into two columns. The left column contains form fields for 'Account:', 'Owner:', 'Product:', 'Product Version:', 'Summary:', and 'Description:'. The 'Account:' field has a text input and a 'My Account' button. The 'Owner:' field is a dropdown menu showing 'No results match'. The 'Product:' field is a dropdown menu showing 'Red Hat Enterprise Virtualization'. The 'Product Version:' field is a dropdown menu showing '3.5'. The 'Summary:' field has a text input. The 'Description:' field has a larger text input. The right column is titled 'Recommendations' and contains three items, each with a right-pointing arrow icon: 'Does Red Hat support SuSE as a virtual machine?', 'Error message from subscription-manager when attempting to auto-attach shows No Installed products on system. No need to attach subscriptions.', and 'Signal 17 (CHLD) caught by ps (procps version 3.2.8)'.

Figure C.5. Red Hat Support Plug-in - Opening a New Support Case

Select the **Red Hat Documentation** tab to open the documentation relevant to the part of the Administration Portal currently on the screen.

The screenshot displays the Red Hat Support Plug-in interface. At the top, a navigation bar includes tabs for Data Centers, Clusters, Hosts, Networks, Storage, Disks, Virtual Machines, Pools, Templates, Volumes, Users, Log Viewer, and Events. Below this, a toolbar contains options like New, Edit, Remove, Force Remove, Guide Me, and Red Hat Access: Support. A table lists data centers with columns for Name, Storage Type, Status, Compatibility Version, and Description. The table shows one entry: 'Default' with 'Shared' storage type, 'Up' status, and compatibility version '3.5'. Below the table, another navigation bar includes Storage, Logical Networks, QoS, Clusters, Permissions, Red Hat Search, Red Hat Documentation, and Events. The main content area features the Red Hat logo, the title 'Administration Guide', and a list of chapters under 'Chapter 4. Data Centers'. The first chapter, '4.1. Introduction to Data Centers', is highlighted. The text below the chapter title states: 'A data center is a logical entity that defines the set of resources used in a specific environment. A data center is considered a container resource, in that it is comprised of logical resources, in the form of clusters and hosts; network resources, in the form of logical networks and physical NICs; and storage resources, in the form of storage domains.'

Name	Storage Type	Status	Compatibility Version	Description
Default	Shared	Up	3.5	The default Data Center

Administration Guide

Chapter 4. Data Centers

- [4.1. Introduction to Data Centers](#)
- [4.2. The Storage Pool Manager](#)
- [4.3. SPM Priority](#)
- [4.4. Using the Events Tab to Identify Problem Objects in Data Centers](#)
- [4.5. Data Center Tasks](#)
- [4.6. Data Centers and Storage Domains](#)
- [4.7. Data Centers and Permissions](#)

4.1. Introduction to Data Centers

A data center is a logical entity that defines the set of resources used in a specific environment. A data center is considered a container resource, in that it is comprised of logical resources, in the form of clusters and hosts; network resources, in the form of logical networks and physical NICs; and storage resources, in the form of storage domains.

Figure C.6. Red Hat Support Plug-in - Accessing Documentation

APPENDIX D. RED HAT ENTERPRISE VIRTUALIZATION AND SSL

D.1. REPLACING THE RED HAT ENTERPRISE VIRTUALIZATION MANAGER SSL CERTIFICATE



WARNING

Do not change the permissions and ownerships for the `/etc/pki` directory or any subdirectories. The permission for the `/etc/pki` and the `/etc/pki/ovirt-engine` directory must remain as the default 755.

You want to use your organization's commercially signed certificate to identify your Red Hat Enterprise Virtualization Manager to users connecting over HTTPS.



NOTE

Using a commercially issued certificate for https connections does not affect the certificate used for authentication between your Manager and hosts, they will continue to use the self-signed certificate generated by the Manager.

Prerequisites

This procedure requires a PEM formatted certificate from your commercial certificate issuing authority, a `.nokey` file, and a `.cer` file. The `.nokey` and `.cer` files are sometimes distributed as a certificate-key bundle in the P12 format.

This procedure assumes that you have a certificate-key bundle in the *P12* format.

Procedure D.1. Replacing the Red Hat Enterprise Virtualization Manager Apache SSL Certificate

1. The Manager has been configured to use `/etc/pki/ovirt-engine/apache-ca.pem`, which is symbolically linked to `/etc/pki/ovirt-engine/ca.pem`. Remove the symbolic link.

```
# rm /etc/pki/ovirt-engine/apache-ca.pem
```

2. Save your commercially issued certificate as `/etc/pki/ovirt-engine/apache-ca.pem`. The certificate chain must be complete up to the root certificate. The chain order is important and should be from the last intermediate certificate to the root certificate.

```
mv YOUR-3RD-PARTY-CERT.pem /etc/pki/ovirt-engine/apache-ca.pem
```

3. Move your *P12* bundle to `/etc/pki/ovirt-engine/keys/apache.p12`.

4. Extract the key from the bundle.

```
# openssl pkcs12 -in /etc/pki/ovirt-engine/keys/apache.p12 -nocerts
-nodes > /etc/pki/ovirt-engine/keys/apache.key.nopass
```

5. Extract the certificate from the bundle.

```
# openssl pkcs12 -in /etc/pki/ovirt-engine/keys/apache.p12 -nokeys >
/etc/pki/ovirt-engine/certs/apache.cer
```

6. Restart the Apache server.

```
# service httpd restart
```

Your users can now connect to the portals without being warned about the authenticity of the certificate used to encrypt https traffic.

IMPORTANT

Replacing the certificate can cause the log collector to fail, as documented in <https://access.redhat.com/solutions/458713>. To avoid this failure, edit the log collector's configuration:

1. Export the CA certificate from the CA server and copy it to the Red Hat Enterprise Virtualization Manager server.
2. Point the log collector to the new location by adding the following to `/etc/ovirt-engine/logcollector.conf`:

```
cert-file=/path/to/new/CA/file
```

D.2. SETTING UP SSL OR TLS CONNECTIONS BETWEEN THE MANAGER AND AN LDAP SERVER

To set up a secure connection between the Red Hat Enterprise Virtualization Manager and an LDAP server, obtain the root CA certificate of the LDAP server, copy the root CA certificate to the Manager, and create a PEM-encoded CA certificate. The keystore type can be any Java-supported type. The following procedure uses the Java KeyStore (JKS) format.

NOTE

For more information on creating a PEM-encoded CA certificate and importing certificates, see the **X.509 CERTIFICATE TRUST STORE** section of the README file at `/usr/share/doc/ovirt-engine-extension-aaa-ldap-version`.

Procedure D.2. Creating a PEM-encoded CA certificate

1. On the Red Hat Enterprise Virtualization Manager, copy the root CA certificate of the LDAP server to the `/tmp` directory and import the root CA certificate using **keytool** to create a PEM-encoded CA certificate. The following command imports the root CA certificate at `/tmp/myrootca.pem` and creates a PEM-encoded CA certificate `myrootca.jks` under `/etc/ovirt-engine/aaa/`. Note down the certificate's location and

password. If you are using the interactive setup tool, this is all the information you need. If you are configuring the LDAP server manually, follow the rest of the procedure to update the configuration files.

```
$ keytool -importcert -noprompt -trustcacerts -alias myrootca -file
/tmp/myrootca.pem -keystore /etc/ovirt-engine/aaa/myrootca.jks -
storepass password
```

2. Update the **/etc/ovirt-engine/aaa/profile1.properties** file with the certificate information:



NOTE

`${local:_basedir}` is the directory where the LDAP property configuration file resides and points to the **/etc/ovirt-engine/aaa** directory. If you created the PEM-encoded CA certificate in a different directory, replace **`${local:_basedir}`** with the full path to the certificate.

- To use startTLS (recommended):

```
# Create keystore, import certificate chain and uncomment
pool.default.ssl.startTLS = true
pool.default.ssl.truststore.file = ${local:_basedir}/myrootca.jks
pool.default.ssl.truststore.password = password
```

- To use SSL:

```
# Create keystore, import certificate chain and uncomment
pool.default.serverset.single.port = 636
pool.default.ssl.enable = true
pool.default.ssl.truststore.file = ${local:_basedir}/myrootca.jks
pool.default.ssl.truststore.password = password
```

To continue configuring an external LDAP provider, see [Section 14.3.1, “Configuring an External LDAP Provider \(Interactive Setup\)”](#). To continue configuring LDAP and Kerberos for Single Sign-on, see [Section 14.4, “Configuring LDAP and Kerberos for Single Sign-on”](#).

APPENDIX E. USING SEARCH, BOOKMARKS, AND TAGS

E.1. SEARCHES

E.1.1. Performing Searches in Red Hat Enterprise Virtualization

The Administration Portal enables the management of thousands of resources, such as virtual machines, hosts, users, and more. To perform a search, enter the search query (free-text or syntax-based) into the search bar. Search queries can be saved as bookmarks for future reuse, so you do not have to reenter a search query each time the specific search results are required. Searches are not case sensitive.

E.1.2. Search Syntax and Examples

The syntax of the search queries for Red Hat Enterprise Virtualization resources is as follows:

result type: {criteria} [sortby sort_spec]

Syntax Examples

The following examples describe how the search query is used and help you to understand how Red Hat Enterprise Virtualization assists with building search queries.

Table E.1. Example Search Queries

Example	Result
Hosts: Vms.status = up	Displays a list of all hosts running virtual machines that are up.
Vms: domain = qa.company.com	Displays a list of all virtual machines running on the specified domain.
Vms: users.name = Mary	Displays a list of all virtual machines belonging to users with the user name Mary.
Events: severity > normal sortby time	Displays the list of all Events whose severity is higher than Normal, sorted by time.

E.1.3. Search Auto-Completion

The Administration Portal provides auto-completion to help you create valid and powerful search queries. As you type each part of a search query, a drop-down list of choices for the next part of the search opens below the Search Bar. You can either select from the list and then continue typing/selecting the next part of the search, or ignore the options and continue entering your query manually.

The following table specifies by example how the Administration Portal auto-completion assists in constructing a query:

Hosts: `Vms.status = down`

Table E.2. Example Search Queries Using Auto-Completion

Input	List Items Displayed	Action
h	Hosts (1 option only)	Select Hosts or; Type Hosts
Hosts:	All host properties	Type v
Hosts: v	host properties starting with a v	Select Vms or type Vms
Hosts: Vms	All virtual machine properties	Type s
Hosts: Vms.s	All virtual machine properties beginning with s	Select status or type status
Hosts: Vms.status	= =!	Select or type =
Hosts: Vms.status =	All status values	Select or type down

E.1.4. Search Result Type Options

The result type allows you to search for resources of any of the following types:

- **Vms** for a list of virtual machines
- **Host** for a list of hosts
- **Pools** for a list of pools
- **Template** for a list of templates
- **Event** for a list of events
- **Users** for a list of users
- **Cluster** for a list of clusters
- **Datacenter** for a list of data centers
- **Storage** for a list of storage domains

As each type of resource has a unique set of properties and a set of other resource types that it is associated with, each search type has a set of valid syntax combinations. You can also use the auto-complete feature to create valid queries easily.

E.1.5. Search Criteria

You can specify the search criteria after the colon in the query. The syntax of **{criteria}** is as follows:

<prop><operator><value>

or

<obj - type><prop><operator><value>

Examples

The following table describes the parts of the syntax:

Table E.3. Example Search Criteria

Part	Description	Values	Example	Note
prop	The property of the searched-for resource. Can also be the property of a resource type (see obj - type), or <i>tag</i> (custom tag).	Limit your search to objects with a certain property. For example, search for objects with a <i>status</i> property.	Status	N/A
obj-type	A resource type that can be associated with the searched-for resource.	These are system objects, like data centers and virtual machines.	Users	N/A
operator	Comparison operators.	= != (not equal) > < >= <=	N/A	Value options depend on obj-type.

Part	Description	Values	Example	Note
Value	What the expression is being compared to.	String Integer Ranking Date (formatted according to Regional Settings)	Jones 256 normal	<ul style="list-style-type: none"> Wildcard s can be used within strings. " " (two sets of quotation marks with no space between them) can be used to represent an uninitialized (empty) string. Double quotes should be used around a string or date containing spaces

E.1.6. Search: Multiple Criteria and Wildcards

Wildcards can be used in the **<value>** part of the syntax for strings. For example, to find all users beginning with **m**, enter **m***.

You can perform a search having two criteria by using the Boolean operators **AND** and **OR**. For example:

Vms: users.name = m* AND status = Up

This query returns all running virtual machines for users whose names begin with "m".

Vms: users.name = m* AND tag = "paris-loc"

This query returns all virtual machines tagged with "paris-loc" for users whose names begin with "m".

When two criteria are specified without **AND** or **OR**, **AND** is implied. **AND** precedes **OR**, and **OR** precedes implied **AND**.

E.1.7. Search: Determining Search Order

You can determine the sort order of the returned information by using **sortby**. Sort direction (**asc** for ascending, **desc** for descending) can be included.

For example:

```
events: severity > normal sortby time desc
```

This query returns all Events whose severity is higher than Normal, sorted by time (descending order).

E.1.8. Searching for Data Centers

The following table describes all search options for Data Centers.

Table E.4. Searching for Data Centers

Property (of resource or resource-type)	Type	Description (Reference)
Clusters. <i>clusters-prop</i>	Depends on property type	The property of the clusters associated with the data center.
name	String	The name of the data center.
description	String	A description of the data center.
type	String	The type of data center.
status	List	The availability of the data center.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

```
Datcenter: type = nfs and status != up
```

This example returns a list of data centers with:

- A storage type of NFS and status other than up

E.1.9. Searching for Clusters

The following table describes all search options for clusters.

Table E.5. Searching Clusters

Property (of resource or resource-type)	Type	Description (Reference)
<code>Datacenter.datacenter-prop</code>	Depends on property type	The property of the data center associated with the cluster.
<code>Datacenter</code>	String	The data center to which the cluster belongs.
<code>name</code>	String	The unique name that identifies the clusters on the network.
<code>description</code>	String	The description of the cluster.
<code>initialized</code>	String	True or False indicating the status of the cluster.
<code>sortby</code>	List	Sorts the returned results by one of the resource properties.
<code>page</code>	Integer	The page number of results to display.

Example

Clusters: `initialized = true` or `name = Default`

This example returns a list of clusters which are:

- initialized; or
- named Default

E.1.10. Searching for Hosts

The following table describes all search options for hosts.

Table E.6. Searching for Hosts

Property (of resource or resource-type)	Type	Description (Reference)
<code>Vms.Vms-prop</code>	Depends on property type	The property of the virtual machines associated with the host.
<code>Templates.templates-prop</code>	Depends on property type	The property of the templates associated with the host.

Property (of resource or resource-type)	Type	Description (Reference)
Events. <i>events-prop</i>	Depends on property type	The property of the events associated with the host.
Users. <i>users-prop</i>	Depends on property type	The property of the users associated with the host.
name	String	The name of the host.
status	List	The availability of the host.
external_status	String	The health status of the host as reported by external systems and plug-ins.
cluster	String	The cluster to which the host belongs.
address	String	The unique name that identifies the host on the network.
cpu_usage	Integer	The percent of processing power used.
mem_usage	Integer	The percentage of memory used.
network_usage	Integer	The percentage of network usage.
load	Integer	Jobs waiting to be executed in the <i>run-queue</i> per processor, in a given time slice.
version	Integer	The version number of the operating system.
cpus	Integer	The number of CPUs on the host.
memory	Integer	The amount of memory available.
cpu_speed	Integer	The processing speed of the CPU.

Property (of resource or resource-type)	Type	Description (Reference)
cpu_model	String	The type of CPU.
active_vms	Integer	The number of virtual machines currently running.
migrating_vms	Integer	The number of virtual machines currently being migrated.
committed_mem	Integer	The percentage of committed memory.
tag	String	The tag assigned to the host.
type	String	The type of host.
datacenter	String	The data center to which the host belongs.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Hosts: cluster = Default and Vms.os = rhel6

This example returns a list of hosts which:

- Are part of the Default cluster and host virtual machines running the Red Hat Enterprise Linux 6 operating system.

E.1.11. Searching for Networks

The following table describes all search options for networks.

Table E.7. Searching for Networks

Property (of resource or resource-type)	Type	Description (Reference)
Cluster_network.clusternetwork-k-prop	Depends on property type	The property of the cluster associated with the network.

Property (of resource or resource-type)	Type	Description (Reference)
Host_Network. <i>hostnetwork-prop</i>	Depends on property type	The property of the host associated with the network.
name	String	The human readable name that identifies the network.
description	String	Keywords or text describing the network, optionally used when creating the network.
vlanid	Integer	The VLAN ID of the network.
stp	String	Whether Spanning Tree Protocol (STP) is enabled or disabled for the network.
mtu	Integer	The maximum transmission unit for the logical network.
vmnetwork	String	Whether the network is only used for virtual machine traffic.
datacenter	String	The data center to which the network is attached.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Network: `mtu > 1500` and `vmnetwork = true`

This example returns a list of networks:

- with a maximum transmission unit greater than 1500 bytes
- which are set up for use by only virtual machines.

E.1.12. Searching for Storage

The following table describes all search options for storage.

Table E.8. Searching for Storage

Property (of resource or resource-type)	Type	Description (Reference)
Hosts. <i>hosts-prop</i>	Depends on property type	The property of the hosts associated with the storage.
Clusters. <i>clusters-prop</i>	Depends on property type	The property of the clusters associated with the storage.
name	String	The unique name that identifies the storage on the network.
status	String	The status of the storage domain.
external_status	String	The health status of the storage domain as reported by external systems and plug-ins.
datacenter	String	The data center to which the storage belongs.
type	String	The type of the storage.
size	Integer	The size of the storage.
used	Integer	The amount of the storage that is used.
committed	Integer	The amount of the storage that is committed.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Storage: size > 200 or used < 50

This example returns a list of storage with:

- total storage space greater than 200 GB; or
- used storage space less than 50 GB.

E.1.13. Searching for Disks

The following table describes all search options for disks.

Table E.9. Searching for Disks

Property (of resource or resource-type)	Type	Description (Reference)
<code>Datacenters.datacenters-prop</code>	Depends on property type	The property of the data centers associated with the disk.
<code>Storages.storages-prop</code>	Depends on property type	The property of the storage associated with the disk.
<code>alias</code>	String	The human readable name that identifies the storage on the network.
<code>description</code>	String	Keywords or text describing the disk, optionally used when creating the disk.
<code>provisioned_size</code>	Integer	The virtual size of the disk.
<code>size</code>	Integer	The size of the disk.
<code>actual_size</code>	Integer	The actual size allocated to the disk.
<code>creation_date</code>	Integer	The date the disk was created.
<code>bootable</code>	String	Whether the disk can or cannot be booted. Valid values are one of 0 , 1 , yes , or no
<code>shareable</code>	String	Whether the disk can or cannot be attached to more than one virtual machine at a time. Valid values are one of 0 , 1 , yes , or no
<code>format</code>	String	The format of the disk. Can be one of unused , unassigned , cow , or raw .

Property (of resource or resource-type)	Type	Description (Reference)
status	String	The status of the disk. Can be one of unassigned , ok , locked , invalid , or illegal .
disk_type	String	The type of the disk. Can be one of image or lun .
number_of_vms	Integer	The number of virtual machine(s) to which the disk is attached.
vm_names	String	The name(s) of the virtual machine(s) to which the disk is attached.
quota	String	The name of the quota enforced on the virtual disk.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Disks: format = cow and provisioned_size > 8

This example returns a list of virtual disks with:

- QCOW, also known as thin provisioning, format; and
- an allocated disk size greater than 8 GB.

E.1.14. Searching for Volumes

The following table describes all search options for volumes.

Table E.10. Searching for Volumes

Property (of resource or resource-type)	Type	Description (Reference)
Volume. <i>cluster-prop</i>	Depends on property type	The property of the clusters associated with the volume.

Property (of resource or resource-type)	Type	Description (Reference)
Cluster	String	The name of the cluster associated with the volume.
name	String	The human readable name that identifies the volume.
type	String	Can be one of distribute, replicate, distributed_replicate, stripe, or distributed_stripe.
transport_type	Integer	Can be one of TCP or RDMA.
replica_count	Integer	Number of replica.
stripe_count	Integer	Number of stripes.
status	String	The status of the volume. Can be one of Up or Down.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Volume: transport_type = rdma and stripe_count >= 2

This example returns a list of volumes with:

- Transport type set to RDMA; and
- with 2 or more stripes.

E.1.15. Searching for Virtual Machines

The following table describes all search options for virtual machines.

Table E.11. Searching for Virtual Machines

Property (of resource or resource-type)	Type	Description (Reference)
---	------	-------------------------

Property (of resource or resource-type)	Type	Description (Reference)
Hosts. <i>hosts-prop</i>	Depends on property type	The property of the hosts associated with the virtual machine.
Templates. <i>templates-prop</i>	Depends on property type	The property of the templates associated with the virtual machine.
Events. <i>events-prop</i>	Depends on property type	The property of the events associated with the virtual machine.
Users. <i>users-prop</i>	Depends on property type	The property of the users associated with the virtual machine.
Storage. <i>storage-prop</i>	Depends on the property type	The property of storage devices associated with the virtual machine.
Vnic. <i>mac-prop</i>	Depends on the property type	The property of the MAC address associated with the virtual machine.
name	String	The name of the virtual machine.
status	List	The availability of the virtual machine.
ip	Integer	The IP address of the virtual machine.
uptime	Integer	The number of minutes that the virtual machine has been running.
domain	String	The domain (usually Active Directory domain) that groups these machines.
os	String	The operating system selected when the virtual machine was created.
creationdate	Date	The date on which the virtual machine was created.

Property (of resource or resource-type)	Type	Description (Reference)
address	String	The unique name that identifies the virtual machine on the network.
cpu_usage	Integer	The percent of processing power used.
mem_usage	Integer	The percentage of memory used.
network_usage	Integer	The percentage of network used.
memory	Integer	The maximum memory defined.
apps	String	The applications currently installed on the virtual machine.
cluster	List	The cluster to which the virtual machine belongs.
pool	List	The virtual machine pool to which the virtual machine belongs.
loggedinuser	String	The name of the user currently logged in to the virtual machine.
tag	List	The tags to which the virtual machine belongs.
datacenter	String	The data center to which the virtual machine belongs.
type	List	The virtual machine type (server or desktop).
quota	String	The name of the quota associated with the virtual machine.

Property (of resource or resource-type)	Type	Description (Reference)
description	String	Keywords or text describing the virtual machine, optionally used when creating the virtual machine.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Vms: template.name = Win* and user.name = ""

This example returns a list of virtual machines, where:

- The template on which the virtual machine is based begins with Win and the virtual machine is assigned to any user.

Example

Vms: cluster = Default and os = windows7

This example returns a list of virtual machines, where:

- The cluster to which the virtual machine belongs is named Default and the virtual machine is running the Windows 7 operating system.

E.1.16. Searching for Pools

The following table describes all search options for Pools.

Table E.12. Searching for Pools

Property (of resource or resource-type)	Type	Description (Reference)
name	String	The name of the pool.
description	String	The description of the pool.
type	List	The type of pool.
sortby	List	Sorts the returned results by one of the resource properties.

Property (of resource or resource-type)	Type	Description (Reference)
page	Integer	The page number of results to display.

Example

Pools: type = automatic

This example returns a list of pools with:

- Type of automatic

E.1.17. Searching for Templates

The following table describes all search options for templates.

Table E.13. Searching for Templates

Property (of resource or resource-type)	Type	Description (Reference)
<i>Vms.Vms-prop</i>	String	The property of the virtual machines associated with the template.
<i>Hosts.hosts-prop</i>	String	The property of the hosts associated with the template.
<i>Events.events-prop</i>	String	The property of the events associated with the template.
<i>Users.users-prop</i>	String	The property of the users associated with the template.
name	String	The name of the template.
domain	String	The domain of the template.
os	String	The type of operating system.
creationdate	Integer	The date on which the template was created. Date format is <i>mm/dd/yy</i> .
childcount	Integer	The number of virtual machines created from the template.

Property (of resource or resource-type)	Type	Description (Reference)
mem	Integer	Defined memory.
description	String	The description of the template.
status	String	The status of the template.
cluster	String	The cluster associated with the template.
datacenter	String	The data center associated with the template.
quota	String	The quota associated with the template.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Template: `Events.severity >= normal` and `Vms.uptime > 0`

This example returns a list of templates, where:

- Events of normal or greater severity have occurred on virtual machines derived from the template, and the virtual machines are still running.

E.1.18. Searching for Users

The following table describes all search options for users.

Table E.14. Searching for Users

Property (of resource or resource-type)	Type	Description (Reference)
<i>Vms.Vms-prop</i>	Depends on property type	The property of the virtual machines associated with the user.
<i>Hosts.hosts-prop</i>	Depends on property type	The property of the hosts associated with the user.

Property (of resource or resource-type)	Type	Description (Reference)
Templates. <i>templates-prop</i>	Depends on property type	The property of the templates associated with the user.
Events. <i>events-prop</i>	Depends on property type	The property of the events associated with the user.
name	String	The name of the user.
lastname	String	The last name of the user.
username	String	The unique name of the user.
department	String	The department to which the user belongs.
group	String	The group to which the user belongs.
title	String	The title of the user.
status	String	The status of the user.
role	String	The role of the user.
tag	String	The tag to which the user belongs.
pool	String	The pool to which the user belongs.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Users: Events.severity > normal and Vms.status = up or Vms.status = pause

This example returns a list of users where:

- Events of greater than normal severity have occurred on their virtual machines AND the virtual machines are still running; or
- The users' virtual machines are paused.

E.1.19. Searching for Events

The following table describes all search options you can use to search for events. Auto-completion is offered for many options as appropriate.

Table E.15. Searching for Events

Property (of resource or resource-type)	Type	Description (Reference)
<i>Vms.Vms-prop</i>	Depends on property type	The property of the virtual machines associated with the event.
<i>Hosts.hosts-prop</i>	Depends on property type	The property of the hosts associated with the event.
<i>Templates.templates-prop</i>	Depends on property type	The property of the templates associated with the event.
<i>Users.users-prop</i>	Depends on property type	The property of the users associated with the event.
<i>Clusters.clusters-prop</i>	Depends on property type	The property of the clusters associated with the event.
<i>Volumes.Volumes-prop</i>	Depends on property type	The property of the volumes associated with the event.
type	List	Type of the event.
severity	List	The severity of the event: Warning/Error/Normal.
message	String	Description of the event type.
time	List	Day the event occurred.
username	String	The user name associated with the event.
event_host	String	The host associated with the event.
event_vm	String	The virtual machine associated with the event.
event_template	String	The template associated with the event.

Property (of resource or resource-type)	Type	Description (Reference)
event_storage	String	The storage associated with the event.
event_datacenter	String	The data center associated with the event.
event_volume	String	The volume associated with the event.
correlation_id	Integer	The identification number of the event.
sortby	List	Sorts the returned results by one of the resource properties.
page	Integer	The page number of results to display.

Example

Events: Vms.name = testdesktop and Hosts.name = gonzo.example.com

This example returns a list of events, where:

- The event occurred on the virtual machine named **testdesktop** while it was running on the host **gonzo.example.com**.

E.2. BOOKMARKS

E.2.1. Saving a Query String as a Bookmark

A bookmark can be used to remember a search query, and shared with other users.

Procedure E.1. Saving a Query String as a Bookmark

1. Enter the desired search query in the search bar and perform the search.
2. Click the star-shaped **Bookmark** button to the right of the search bar to open the **New Bookmark** window.

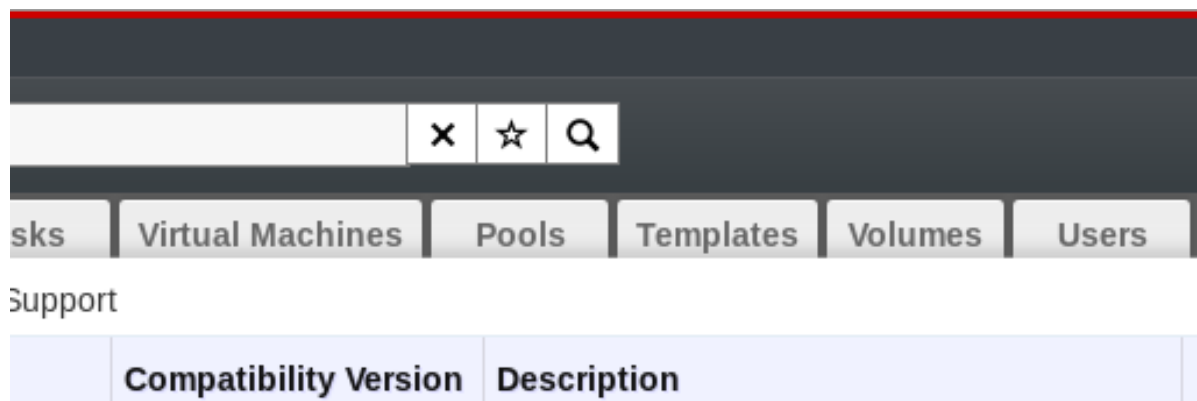


Figure E.1. Bookmark Icon

3. Enter the **Name** of the bookmark.
4. Edit the **Search string** field (if applicable).
5. Click **OK** to save the query as a bookmark and close the window.
6. The search query is saved and displays in the **Bookmarks** pane.

You have saved a search query as a bookmark for future reuse. Use the **Bookmark** pane to find and select the bookmark.

E.2.2. Editing a Bookmark

You can modify the name and search string of a bookmark.

Procedure E.2. Editing a Bookmark

1. Click the **Bookmarks** tab on the far left side of the screen.
2. Select the bookmark you wish to edit.
3. Click the **Edit** button to open the **Edit Bookmark** window.
4. Change the **Name** and **Search string** fields as necessary.
5. Click **OK** to save the edited bookmark.

You have edited a bookmarked search query.

E.2.3. Deleting a Bookmark

When a bookmark is no longer needed, remove it.

Procedure E.3. Deleting a Bookmark

1. Click the **Bookmarks** tab on the far left side of the screen.
2. Select the bookmark you wish to remove.
3. Click the **Remove** button to open the **Remove Bookmark** window.
4. Click **OK** to remove the selected bookmark.

You have removed a bookmarked search query.

E.3. TAGS

E.3.1. Using Tags to Customize Interactions with Red Hat Enterprise Virtualization

After your Red Hat Enterprise Virtualization platform is set up and configured to your requirements, you can customize the way you work with it using tags. Tags provide one key advantage to system administrators: they allow system resources to be arranged into groups or categories. This is useful when many objects exist in the virtualization environment and the administrator would like to concentrate on a specific set of them.

This section describes how to create and edit tags, assign them to hosts or virtual machines and search using the tags as criteria. Tags can be arranged in a hierarchy that matches a structure, to fit the needs of the enterprise.

Administration Portal Tags can be created, modified, and removed using the **Tags** pane.

E.3.2. Creating a Tag

Create tags so you can filter search results using tags.

Procedure E.4. Creating a Tag

1. Click the **Tags** tab on the left side of the screen.
2. Select the node under which you wish to create the tag. For example, to create it at the highest level, click the **root** node.
3. Click the **New** button to open the **New Tag** window.
4. Enter the **Name** and **Description** of the new tag.
5. Click **OK** to create the tag.

The new tag is created and displays on the **Tags** tab.

E.3.3. Modifying a Tag

You can edit the name and description of a tag.

Procedure E.5. Modifying a Tag

1. Click the **Tags** tab on the left side of the screen.
2. Select the tag you wish to modify.
3. Click **Edit** to open the **Edit Tag** window.
4. Change the **Name** and **Description** fields as necessary.
5. Click **OK** to save the edited tag.

You have modified the properties of a tag.

E.3.4. Deleting a Tag

When a tag is no longer needed, remove it.

Procedure E.6. Deleting a Tag

1. Click the **Tags** tab on the left side of the screen.
2. Select the tag you wish to delete.
3. Click **Remove** to open the **Remove Tag(s)** window. The message warns you that removing the tag will also remove all descendants of the tag.
4. Click **OK** to delete the selected tag.

You have removed the tag and all its descendants. The tag is also removed from all the objects that it was attached to.

E.3.5. Adding and Removing Tags to and from Objects

You can assign tags to and remove tags from hosts, virtual machines, and users.

Procedure E.7. Adding and Removing Tags to and from Objects

1. Click the resource tab, and select the object(s) you wish to tag or untag.
2. Click the **Assign Tags** button to open the **Assign Tags** window.
3. Select the check box to assign a tag to the object, or clear the check box to detach the tag from the object.
4. Click **OK**.

The specified tag is now added or removed as a custom property of the selected object(s).

E.3.6. Searching for Objects Using Tags

- Enter a search query using **tag** as the property and the desired value or set of values as criteria for the search.

The objects tagged with the specified criteria are listed in the results list.

APPENDIX F. BRANDING

F.1. BRANDING

F.1.1. Re-Branding the Manager

Various aspects of the Red Hat Enterprise Virtualization Manager can be customized, such as the icons used by and text displayed in pop-up windows and the links shown on the Welcome Page. This allows you to re-brand the Manager and gives you fine-grained control over the end look and feel presented to administrators and users.

The files required to customize the Manager are located in the **/etc/ovirt-engine/branding/** directory on the system on which the Manager is installed. The files comprise a set of cascading style sheet files that are used to style various aspects of the graphical user interface and a set of properties files that contain messages and links that are incorporated into various components of the Manager.

To customize a component, edit the file for that component and save the changes. The next time you open or refresh that component, the changes will be applied.

F.1.2. Login Screen

The login screen is the login screen used by both the Administration Portal and User Portal. The elements of the login screen that can be customized are as follows:

- The border
- The header image on the left
- The header image on the right
- The header text

The classes for the login screen are located in **common.css**.

F.1.3. Administration Portal Screen

The administration portal screen is the main screen that is shown when you log into the Administration Portal. The elements of the administration portal screen that can be customized are as follows:

- The logo
- The left background image
- The center background image
- The right background image
- The text to the right of the logo

The classes for the administration portal screen are located in **web_admin.css**.

F.1.4. User Portal Screen

The user portal screen is the screen that is shown when you log into the User Portal. The elements of the user portal screen that can be customized are as follows:

- The logo
- The center background image
- The right background image
- The border around the main grid
- The text above the **Logged in user** label

The classes for the user portal screen are located in **user_portal.css**.

F.1.5. Pop-Up Windows

Pop-up windows are all windows in the Manager that allow you to create, edit or update an entity such as a host or virtual machine. The elements of pop-up windows that can be customized are as follows:

- The border
- The header image on the left
- The header center image (repeated)

The classes for pop-up windows are located in **common.css**.

F.1.6. Tabs

There are two types of tab elements in the User Portal - the main tabs for switching between the Basic view and the Extended view, and the tabs on the left side of the screen when the Extended view is selected. Many pop-up windows in the Administration Portal also include tabs. The elements of these tabs that can be customized are as follows:

- Active
- Inactive

The classes for tabs are located in **common.css** and **user_portal.css**.

F.1.7. The Welcome Page

The Welcome Page is the page that is initially displayed when you visit the homepage of the Manager. In addition to customizing the overall look and feel, you can also make other changes such as adding links to the page for additional documentation or internal websites by editing a template file. The elements of the Welcome Page that can be customized are as follows:

- The page title
- The header (left, center and right)
- The error message

- The link to forward and the associated message for that link

The classes for the Welcome Page are located in **welcome_style.css**.

The Template File

The template file for the Welcome Page is a regular HTML file of the name **welcome_page.template** that does not contain **HTML**, **HEAD** or **BODY** tags. This file is inserted directly into the Welcome Page itself, and acts as a container for the content that is displayed in the Welcome Page. As such, you must edit this file to add new links or change the content itself. Another feature of the template file is that it contains placeholder text such as **{user_portal}** that is replaced by corresponding text in the **messages.properties** file when the Welcome Page is processed.

F.1.8. The Page Not Found Page

The Page Not Found page is a page that is displayed when you open a link to a page that cannot be found in the Red Hat Enterprise Virtualization Manager. The elements of the Page Not Found page that can be customized are as follows:

- The page title
- The header (left, center and right)
- The error message
- The link to forward and the associated message for that link

The classes for the Page Not Found page are located in **welcome_style.css**.

APPENDIX G. SYSTEM ACCOUNTS

G.1. SYSTEM ACCOUNTS

G.1.1. Red Hat Enterprise Virtualization Manager User Accounts

A number of system user accounts are created to support Red Hat Enterprise Virtualization when the `rhev` package is installed. Each system user has a default user identifier (UID). The system user accounts created are:

- The **vds** user (UID **36**). Required for support tools that mount and access NFS storage domains.
- The **ovirt** user (UID **108**). Owner of the **ovirt-engine** Red Hat JBoss Enterprise Application Platform instance.
- The **ovirt-vmconsole** user (UID **498**). Required for the guest serial console.

G.1.2. Red Hat Enterprise Virtualization Manager Groups

A number of system user groups are created to support Red Hat Enterprise Virtualization when the `rhev` package is installed. Each system user group has a default group identifier (GID). The system user groups created are:

- The **kvm** group (GID **36**). Group members include:
 - The **vds** user.
- The **ovirt** group (GID **108**). Group members include:
 - The **ovirt** user.
- The **ovirt-vmconsole** group (GID **498**). Group members include:
 - The **ovirt-vmconsole** user.

G.1.3. Virtualization Host User Accounts

A number of system user accounts are created on the virtualization host when the `vds` and `qemu-kvm-rhev` packages are installed. Each system user has a default user identifier (UID). The system user accounts created are:

- The **vds** user (UID **36**).
- The **qemu** user (UID **107**).
- The **sanlock** user (UID **179**).
- The **ovirt-vmconsole** user (UID **498**).

Red Hat Enterprise Virtualization Hypervisor hosts also define an **admin** user (UID **500**) that is not created on Red Hat Enterprise Linux virtualization hosts. The **admin** user is created with the required permissions to run commands as the **root** user using the **sudo** command. The **vds** user, which is present on both types of virtualization hosts, is also given access to the **sudo** command.

**IMPORTANT**

The user identifiers (UIDs) and group identifiers (GIDs) allocated may vary between systems. The **vdsm** user is fixed to a UID of **36** and the **kvm** group is fixed to a GID of **36**.

If UID **36** or GID **36** is already used by another account on the system a conflict will arise during installation of the **vdsm** and **qemu-kvm-rhev** packages.

G.1.4. Virtualization Host Groups

A number of system user groups are created on the virtualization host when the **vdsm** and **qemu-kvm-rhev** packages are installed. Each system user group has a default group identifier (GID). The system user groups created are:

- The **kvm** group (GID **36**). Group members include:
 - The **qemu** user.
 - The **sanlock** user.
- The **qemu** group (GID **107**). Group members include:
 - The **vdsm** user.
 - The **sanlock** user.
- The **ovirt-vmconsole** group (GID **498**). Group members include:
 - The **ovirt-vmconsole** user.

**IMPORTANT**

The user identifiers (UIDs) and group identifiers (GIDs) allocated may vary between systems. The **vdsm** user is fixed to a UID of **36** and the **kvm** group is fixed to a GID of **36**.

If UID **36** or GID **36** is already used by another account on the system a conflict will arise during installation of the **vdsm** and **qemu-kvm-rhev** packages.

APPENDIX H. REVISION HISTORY

Revision 3.6-23	Tue 3 Jan 2017	Red Hat Enterprise Virtualization Documentation Team
BZ#1373313 - Removed an incorrect step when adding a host.		
Revision 3.6-22	Wed 14 Dec 2016	Red Hat Enterprise Virtualization Documentation Team
BZ#1353475 - Replaced the sections on preparing storage with links to the Red Hat Enterprise Linux <i>Storage Administration Guide</i> .		
Revision 3.6-21	Fri 2 Dec 2016	Red Hat Enterprise Virtualization Documentation Team
BZ#1385724 - Updated the instructions for SSO configuration.		
BZ#1364266 - Updated the instructions for upgrading hosts in a cluster from Red Hat Enterprise Linux 6 to Red Hat Enterprise Linux 7.		
Revision 3.6-20	Thu 27 Oct 2016	Red Hat Enterprise Virtualization Documentation Team
BZ#1370030 - Added instructions for configuring FCoE on host network interfaces.		
BZ#1308713 - Updated the backup and restore information.		
BZ#1389135 - Added a warning about the security risks of untrusted users on RHEV-H.		
Revision 3.6-19	Mon 22 Aug 2016	Red Hat Enterprise Virtualization Documentation Team
BZ#1322343 - Added more information on direct device assignment.		
Revision 3.6-18	Wed 27 Jul 2016	Red Hat Enterprise Virtualization Documentation Team
BZ#978631 - Added more information on Trusted Compute Pools and OpenAttestation.		
BZ#1351827 - Corrected the links in the Errata Management with Satellite chapter.		
BZ#1353824 - Updated the OS requirement for hosts and linked to the host compatibility matrix section.		
BZ#1359544 - Updated the links to the Storage Administration Guide and DM Multipath Guide.		
BZ#1343903 - Removed a note about compatability versions and live storage migration as it no longer applies.		
BZ#1302509 - Added an explanation of the gateway setting for non-management networks.		
Revision 3.6-17	Wed 29 Jun 2016	Red Hat Enterprise Virtualization Documentation Team
BZ#1309180 - Updated virtual machine pool procedures and tables to match the UI.		
BZ#1322699 - Updated bonds section to state that both VLAN-tagged and non-VLAN networks can be used together on the same bond.		
BZ#1317514 - Clarified SPICE compatibility with HTTPS.		
BZ#1303812 - Added information about sealing virtual machines		
BZ#1347501 - Documentation changes for Satellite integration.		
Revision 3.6-16	Tue 21 Jun 2016	Red Hat Enterprise Virtualization Documentation Team

[BZ#1306117](#) - Added instructions to view Satellite server errata in the Manager.

Revision 3.6-15**Wed 25 May 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1312224](#) - Updated engine-backup examples to show that the `--scope` parameter can be used multiple times in one command.

[BZ#1301447](#) - Added information on the `InClusterUpgrade` scheduling policy.

[BZ#1305153](#) - Updated iSCSI storage instructions.

Revision 3.6-14**Tue 03 May 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1285347](#) - Added information about the memory based filtering option for scheduling.

[BZ#1306495](#) - Added information about migrating storage domains between data centers in the same environment and between data centers in different environments.

Revision 3.6-13**Wed 13 Apr 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1303484](#) - Added information about how to confirm that a virtual disk has been wiped correctly when the wipe after delete option is selected.

[BZ#1302539](#) - Added a section about MAC address pools.

[BZ#1302712](#) - Added instructions for refreshing LUN size.

[BZ#1259625](#) - Added an admonition about third-party watchdogs.

[BZ#1306132](#) - Added instructions for configuring vNIC profiles for UCS integration.

[BZ#1168288](#) - Added a note about hot plugging support.

[BZ#1313217](#) - Added a note about the `ovirt-engine-rename` tool checking for local ISO and Data storage domains.

Revision 3.6-12**Wed 23 Mar 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1121840](#) - Added a description of the websocket proxy and instructions for migrating it to a separate machine.

Revision 3.6-11**Wed 09 Mar 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1207510](#) - Updated information on system users and groups.

[BZ#1302707](#) - Added information about Machine type and CPU type being configurable at the virtual machine level.

[BZ#1255730](#) - Added a note to Attaching a Red Hat Gluster Storage Volume as a Storage Domain that the `glusterfs-cli` package is required.

[BZ#1311826](#) - Added information about the device passthrough option, added new topics for Editing the Virtual Function Configuration on a NIC and Enabling Passthrough on a vNIC Profile.

[BZ#1285799](#) - Added information on viewing host devices, and preparing host and guest systems for GPU passthrough.

Revision 3.6-10**Tue 01 Mar 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1302519](#) - Added information on creating additional local domains.

Revision 3.6-9**Mon 22 Feb 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1075522](#) - Added information and procedures for Host Network Quality of Service.

Revision 3.6-8**Fri 19 Feb 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1296393](#) - Added content for the 'ovirt-engine-extension-aaa-ldap' extension.

[BZ#1250877](#) - Added steps for ethtool configuration.

Revision 3.6-7**Mon 08 Feb 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1285344](#) - Added information regarding external health status of hosts and storage domains.

[BZ#1252755](#) - Updated the procedure for copying virtual disks.

[BZ#1302722](#) - Removed references to Windows XP and variations of Windows 2003.

[BZ#1236984](#) - Added information about the new VmImporterExporter role.

[BZ#1252738](#) - Updated the description field for adding a LUN disk.

Revision 3.6-6**Mon 25 Jan 2016****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1283074](#) - Updated the Explanation of Settings in the New Virtual Disk Window tables.

[BZ#978712](#) - Added a procedure for attaching a Gluster storage volume as a storage domain.

[BZ#1276715](#) - Removed references to UserVmManager being able to migrate virtual machines.

[BZ#1268304](#) - Replaced the NetworkUser role with the VnicProfileUser role.

[BZ#1273261](#) - Added information on local user management.

[BZ#1292309](#) - Added information on bridge_opts parameters.

Revision 3.6-5**Thu 10 Dec 2015****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1284288](#) - Changed references to the 'rhev' management network to 'ovirtmgmt'.

[BZ#1213289](#) - Added conceptual information regarding host maintenance mode.

[BZ#1271237](#) - Updated the Editing VM Pool content.

[BZ#1177141](#) - Updated the backup overview.

Revision 3.6-4**Wed 2 Dec 2015****Red Hat Enterprise
Virtualization Documentation
Team**

[BZ#1285598](#) - Added procedure 'Migrating the Engine Database to a Remote Server Database'.

[BZ#1084008](#) - Clarification of the port mirroring content.

[BZ#1253562](#) - Updated external providers content to include Cinder, VMware, and separate keystone endpoints.

[BZ#1202130](#) - Added information on creating a public keystore file.

[BZ#1285340](#) - Added information on the management network option for clusters.

Revision 3.6-3**Wed 18 Nov 2015****Red Hat Enterprise
Virtualization Documentation
Team**

Final revision for Red Hat Enterprise Virtualization 3.6 beta.

Revision 3.6-2**Wed 11 Nov 2015****Red Hat Enterprise
Virtualization Documentation
Team**

- [BZ#1275130](#) - Updated procedure for labeling Network Interfaces to match Administration Portal.
- [BZ#1252766](#) - Updated version numbers for 3.6 release.
- [BZ#1253531](#) - Added information about uploading an icon for a virtual machine.
- [BZ#1255223](#) - Added new live migration features.
- [BZ#1250778](#) - Added steps for specifying thresholds to the procedures for creating storage domains.
- [BZ#1250784](#) - Added a step for 'wipe after delete' to the procedures for creating storage domains.
- [BZ#1252748](#) - Added the Cinder option to the virtual disk section.
- [BZ#1255229](#) - Added new power management options and updated the power management settings table.
- [BZ#1234784](#) - Added information on the Sync MoM Policy button.
- [BZ#1261694](#) - Changed "cluster policy" to "scheduling policy".
- [BZ#1270140](#) - Restructured the networking content into a single chapter.
- [BZ#1250781](#) - Added information on viewing logged in users and terminating user sessions.
- [BZ#1250777](#) - Added information on specifying a reason when setting a host to maintenance mode.
- [BZ#1250780](#) - Updated the back up and restore procedures to make the examples clearer.
- [BZ#1230042](#) - Updated content on editing storage domains.

Revision 3.6-1

Tue 11 Aug 2015

**Red Hat Enterprise
Virtualization Documentation
Team**

Initial creation for the Red Hat Enterprise Virtualization 3.6 release.