

Red Hat Enterprise Virtualization 3.0 Evaluation Guide

Evaluation Tutorials for Red Hat Enterprise Virtualization



Cheryn Tan

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Edition 1

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This document is a step-by-step evaluation of Red Hat Enterprise Virtualization. It shows you how to use your existing resources to quickly deploy a scalable cloud solution for your enterprise.

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Preface

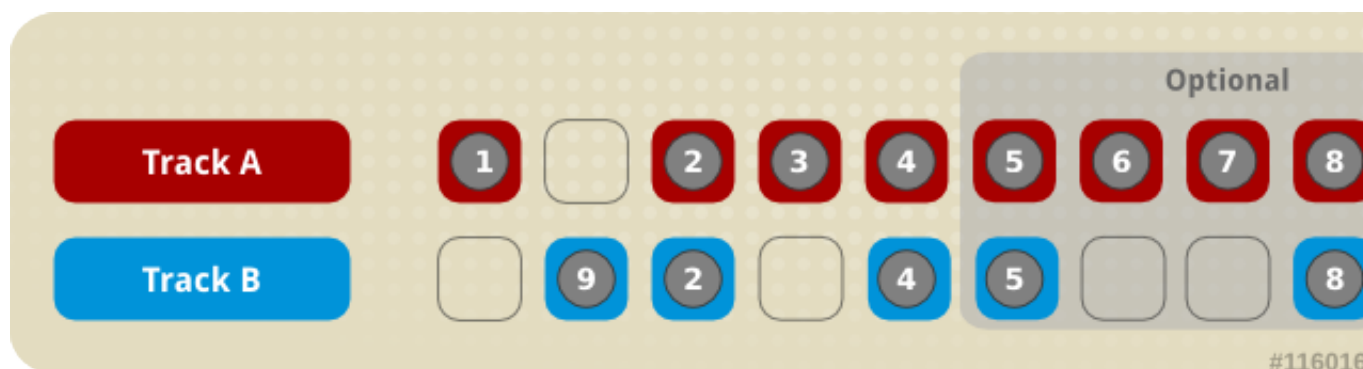
The Red Hat Enterprise Virtualization platform provides fully integrated management across virtual machines on an enterprise scale. It is based on the leading open source virtualization platform and provides advanced technical capabilities.

1. About this Guide

This document is specially designed for potential users to evaluate Red Hat Enterprise Virtualization. Red Hat Enterprise Virtualization is supported by a complete and detailed documentation suite and online help.

This guide consists of nine specific tutorials which demonstrate the functionality and features of Red Hat Enterprise Virtualization, including the centralized management interface, the multi-level permission administration system, the virtual desktop end user experience, highly available clusters and virtual machine live migration.

The tutorials are organized into two tracks, reflecting the hardware availability of common enterprise environments. Track A consists of four basic labs and four advanced labs, while Track B consists of three basic labs and two advanced labs. Select a track that matches your hardware environment, and follow the labs to make an independent and in depth assessment of Red Hat Enterprise Virtualization.



1.1. Audience

This document has been written for potential users to evaluate the Red Hat Enterprise Virtualization platform. To complete the tracks a Red Hat Enterprise Virtualization evaluation license is required. If you do not have an evaluation license, please contact your sales representative.

This document is intended for Linux or Windows system administrators with an advanced level of system administration, preferably including familiarity with virtual machine operations.

2. Document Conventions

This manual uses several conventions to highlight certain words and phrases and draw attention to specific pieces of information.

In PDF and paper editions, this manual uses typefaces drawn from the *Liberation Fonts*¹ set. The Liberation Fonts set is also used in HTML editions if the set is installed on your system. If not,

¹ <https://fedorahosted.org/liberation-fonts/>

alternative but equivalent typefaces are displayed. Note: Red Hat Enterprise Linux 5 and later includes the Liberation Fonts set by default.

2.1. Typographic Conventions

Four typographic conventions are used to call attention to specific words and phrases. These conventions, and the circumstances they apply to, are as follows.

Mono-spaced Bold

Used to highlight system input, including shell commands, file names and paths. Also used to highlight keycaps and key combinations. For example:

To see the contents of the file **my_next_bestselling_novel** in your current working directory, enter the **cat my_next_bestselling_novel** command at the shell prompt and press **Enter** to execute the command.

The above includes a file name, a shell command and a keycap, all presented in mono-spaced bold and all distinguishable thanks to context.

Key combinations can be distinguished from keycaps by the hyphen connecting each part of a key combination. For example:

Press **Enter** to execute the command.

Press **Ctrl+Alt+F2** to switch to the first virtual terminal. Press **Ctrl+Alt+F1** to return to your X-Windows session.

The first paragraph highlights the particular keycap to press. The second highlights two key combinations (each a set of three keycaps with each set pressed simultaneously).

If source code is discussed, class names, methods, functions, variable names and returned values mentioned within a paragraph will be presented as above, in **mono-spaced bold**. For example:

File-related classes include **filesystem** for file systems, **file** for files, and **dir** for directories. Each class has its own associated set of permissions.

Proportional Bold

This denotes words or phrases encountered on a system, including application names; dialog box text; labeled buttons; check-box and radio button labels; menu titles and sub-menu titles. For example:

Choose **System** → **Preferences** → **Mouse** from the main menu bar to launch **Mouse Preferences**. In the **Buttons** tab, click the **Left-handed mouse** check box and click **Close** to switch the primary mouse button from the left to the right (making the mouse suitable for use in the left hand).

To insert a special character into a **gedit** file, choose **Applications** → **Accessories** → **Character Map** from the main menu bar. Next, choose **Search** → **Find...** from the **Character Map** menu bar, type the name of the character in the **Search** field and click **Next**. The character you sought will be highlighted in the **Character Table**. Double-click this highlighted character to place it in the **Text to copy** field and then click the **Copy** button. Now switch back to your document and choose **Edit** → **Paste** from the **gedit** menu bar.

The above text includes application names; system-wide menu names and items; application-specific menu names; and buttons and text found within a GUI interface, all presented in proportional bold and all distinguishable by context.

Mono-spaced Bold Italic* or *Proportional Bold Italic

Whether mono-spaced bold or proportional bold, the addition of italics indicates replaceable or variable text. Italics denotes text you do not input literally or displayed text that changes depending on circumstance. For example:

To connect to a remote machine using ssh, type **ssh *username@domain.name*** at a shell prompt. If the remote machine is **example.com** and your username on that machine is john, type **ssh john@example.com**.

The **mount -o remount *file-system*** command remounts the named file system. For example, to remount the **/home** file system, the command is **mount -o remount /home**.

To see the version of a currently installed package, use the **rpm -q *package*** command. It will return a result as follows: ***package-version-release***.

Note the words in bold italics above — username, domain.name, file-system, package, version and release. Each word is a placeholder, either for text you enter when issuing a command or for text displayed by the system.

Aside from standard usage for presenting the title of a work, italics denotes the first use of a new and important term. For example:

Publican is a *DocBook* publishing system.

2.2. Pull-quote Conventions

Terminal output and source code listings are set off visually from the surrounding text.

Output sent to a terminal is set in **mono-spaced roman** and presented thus:

```
books      Desktop  documentation  drafts  mss    photos  stuff  svn
books_tests Desktop1  downloads      images  notes  scripts svgs
```

Source-code listings are also set in **mono-spaced roman** but add syntax highlighting as follows:

```
package org.jboss.book.jca.ex1;

import javax.naming.InitialContext;

public class ExClient
{
    public static void main(String args[])
        throws Exception
    {
        InitialContext iniCtx = new InitialContext();
        Object          ref    = iniCtx.lookup("EchoBean");
        EchoHome        home   = (EchoHome) ref;
        Echo             echo   = home.create();

        System.out.println("Created Echo");

        System.out.println("Echo.echo('Hello') = " + echo.echo("Hello"));
    }
}
```

2.3. Notes and Warnings

Finally, we use three visual styles to draw attention to information that might otherwise be overlooked.



Note

Notes are tips, shortcuts or alternative approaches to the task at hand. Ignoring a note should have no negative consequences, but you might miss out on a trick that makes your life easier.



Important

Important boxes detail things that are easily missed: configuration changes that only apply to the current session, or services that need restarting before an update will apply. Ignoring a box labeled 'Important' will not cause data loss but may cause irritation and frustration.



Warning

Warnings should not be ignored. Ignoring warnings will most likely cause data loss.

3. We Need Feedback!

If you find a typographical error in this manual, or if you have thought of a way to make this manual better, we would love to hear from you! Please submit a report in Bugzilla: <http://bugzilla.redhat.com/> against the product **Red Hat Enterprise Virtualization Manager**.

When submitting a bug report, be sure to mention the manual's identifier: *Guides-Evaluation*.

If you have a suggestion for improving the documentation, try to be as specific as possible when describing it. If you have found an error, include the section number and some of the surrounding text so we can find it easily.

Introduction

This guide gets you started on a full featured Red Hat Enterprise Virtualization deployment using your existing resources. From installing a hypervisor, setting up shared storage and running a fully functional virtual machine, see how you can implement virtualization in your own organization. The tutorials are organized to reflect typical deployments from a small office with a few hosts, to a large enterprise with multiple data centers, and you can even test out a single host version at home. The tracks and tutorials are color coded to provide clear paths through this guide.

Once you have completed the tutorials (labs), arrange your own tracks for further evaluation or training. The tracks are suggested examples only. Use them to understand how to deploy Red Hat Enterprise Virtualization, and then work with our Red Hat Enterprise Virtualization solution architects to build your own unique environments.

Depending on your needs, use one of these tracks to evaluate Red Hat Enterprise Virtualization for your organization:

Evaluation Tracks

- If you have shared storage, and two physical servers to install hosts, use [Section 1, “Track A: Standard Setup”](#).
- If you have one physical server to install a host, use [Section 2, “Track B: Minimal Setup”](#).

For both the tracks you need an evaluation license and a valid Red Hat Network subscription to the Red Hat Enterprise Virtualization and Red Hat Enterprise Linux channels. Contact your sales representative if you do not have both of the above.

1. Track A: Standard Setup

Use Track A to install and configure a basic working Red Hat Enterprise Virtualization environment on several hosts using shared storage.

Track A consists of four basic labs and four advanced (optional) labs. In the basic labs, you learn how to create virtual machines and assign them to users. After you have completed the basic labs, you can do the advanced labs, if you wish.

The advanced labs describe how to apply Red Hat Enterprise Virtualization to real-life enterprise operations. For example, protect against hardware failure for mission-critical operations by using high availability. If you have employees with different responsibilities, assign different levels of user permissions to virtual machines, storage and servers. If you have a number of existing hosts, you can learn how to reconfigure Red Hat Enterprise Linux servers to be used as virtual machine hosts. You will also learn how to provision virtual desktops for end users.

If you have three to four physical servers and one shared storage resource, set up a Red Hat Enterprise Virtualization environment by following the labs in Track A - Standard Setup. The labs in this track are color coded red, so to determine if a lab is part of Track A, look for a red square in the diagram at the start of each lab.

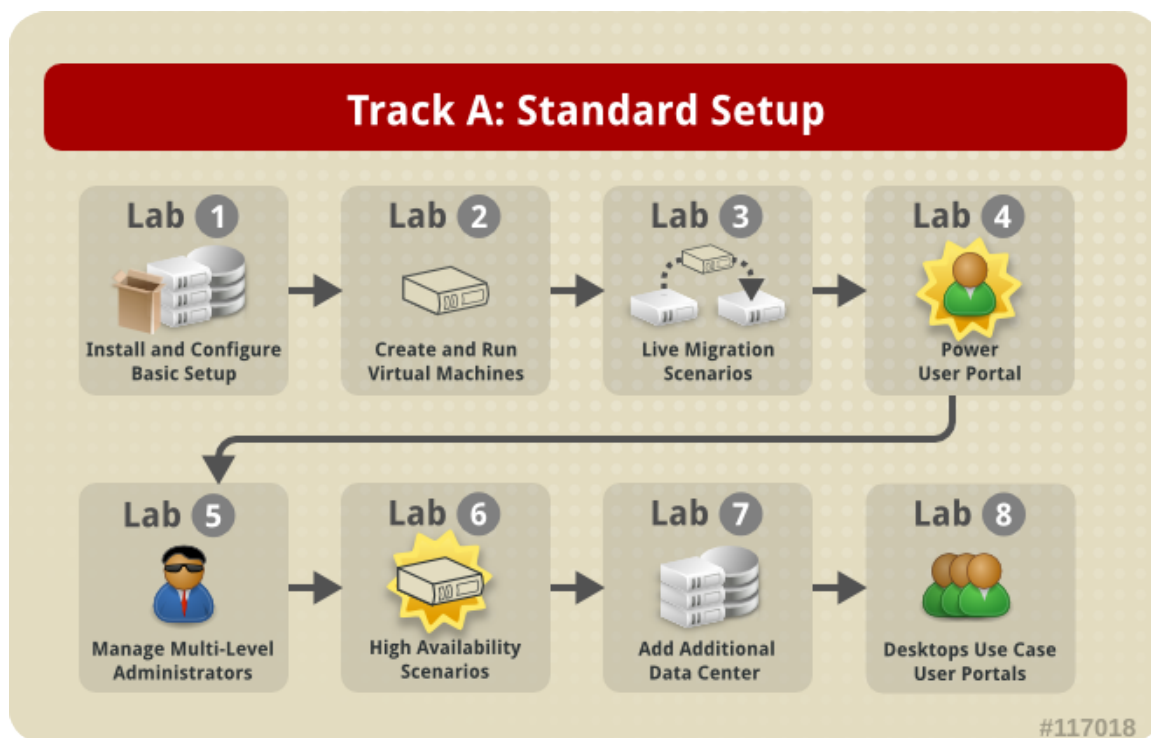


Figure 1. Evaluation Track A

After you complete Track A, you will have the following environment with two virtual machines hosts, shared storage, a network, two portals, end-user clients and a host running the Red Hat Enterprise Virtualization Manager.

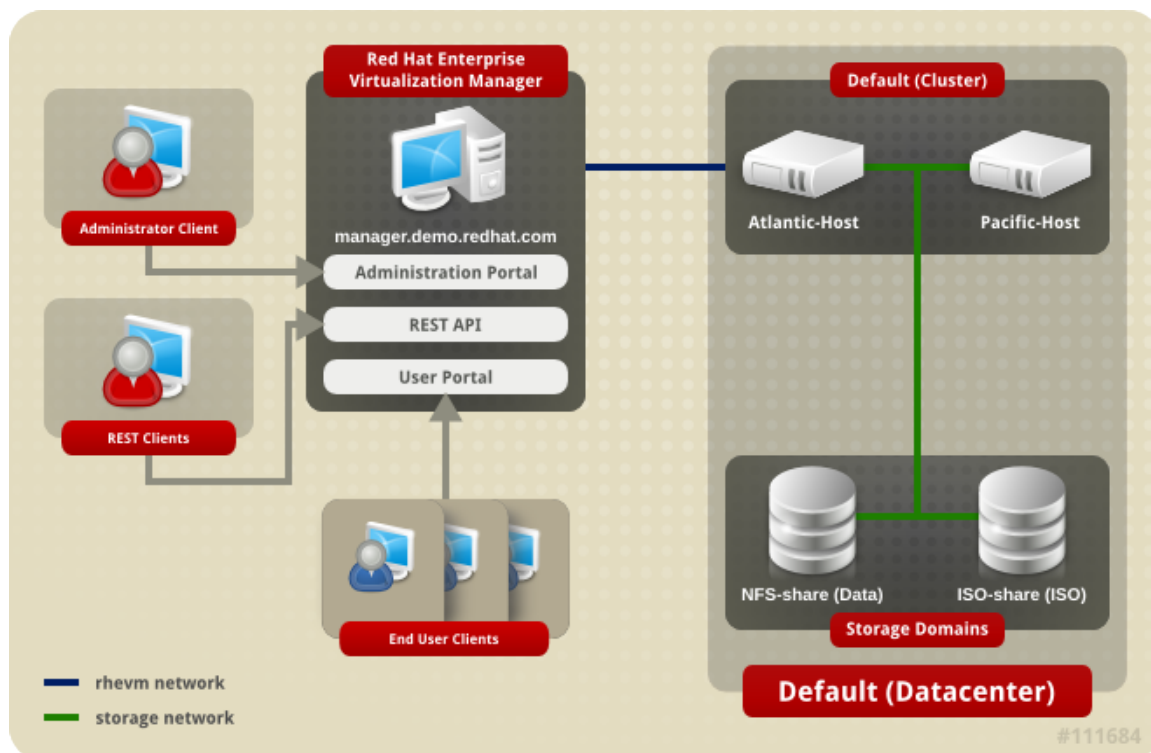


Figure 2. Red Hat Enterprise Virtualization Standard Setup

Track A - Standard Setup Labs

- [Lab 1 - Install and Configure Basic Setup](#) — Install the Red Hat Enterprise Virtualization Manager and Red Hat Enterprise Virtualization Hypervisor, configure storage and define networks (75 minutes).
- [Lab 2 - Create Virtual Machines](#) — Create virtual machines and templates from the administration portal (25 minutes).
- [Lab 3 - Live Migration Scenarios](#) — Configure automatic virtual machine live migration during hardware downtime (10 minutes).
- [Lab 4 - Power User Portal](#) — Create and manage virtual machines from the power user portal (35 minutes).

While the basic labs allow you to evaluate how Red Hat Enterprise Virtualization can be deployed in your environment, the advanced labs show you how to optimize your Red Hat Enterprise Virtualization setup. Note that the advanced labs have additional hardware requirements, which are listed at the start of each advanced lab.

Track A - Advanced Labs (optional)

- [Lab 5 - Manage Multi-Level Administrators](#) — Manage administrators for each component of Red Hat Enterprise Virtualization (10 minutes).
- [Lab 6 - High Availability Scenarios](#) — Configure power management and high availability (30 minutes).
- [Lab 7 - Add Additional Data Center](#) — Create an additional data center with Red Hat Enterprise Linux hosts. (35 minutes)
- [Lab 8 - Virtual Desktops](#) — Access desktop pools using the SPICE connection protocol (50 minutes).

1.1. Track A Requirements

Both the tracks assume that you have an evaluation license and a valid Red Hat Network subscription to the Red Hat Enterprise Virtualization and Red Hat Enterprise Linux channels. Contact your sales representative if you do not have both of the above. Before you begin Track A, ensure that you have the following with the recommended values:

Red Hat Enterprise Virtualization Manager

- Minimum - Dual core server with 4 GB RAM, 25 GB free disk space and 1 Gbps network interface.
- Recommended - Dual Sockets/Quad core server with 16 GB RAM, 50 GB free disk space on multiple disk spindles and 1 Gbps network interface.

The breakdown of the server requirements is:

- Red Hat Enterprise Linux 6 operating system: 1 GB RAM and 5 GB local disk space
- Manager: 3 GB RAM, 3 GB local disk space and 1 Gbps network controller bandwidth
- Local ISO domain: 15 GB disk space



Important — Supported Locales

The Red Hat Enterprise Virtualization Manager setup script, **rhevms-setup**, supports the **en_US.UTF-8**, **en_US.utf8**, and **en_US.utf-8** locales. Ensure that you install the Red Hat Enterprise Virtualization Manager on a system where the locale in use is one of these supported values.

- A valid Red Hat Network subscription to the following channels:
 - **rhel-x86_64-server-6-rhevms-3**
 - **jbappplatform-5-x86_64-server-6-rpm**
 - **rhel-x86_64-server-supplementary-6**
- A client to connect to Red Hat Enterprise Virtualization Manager with:
 - Microsoft Windows (7, XP, 2003 or 2008) with Internet Explorer 7 and above
 - Microsoft .NET Framework 4

Red Hat Enterprise Virtualization Hosts

- Minimum - Dual Core server, 10 GB RAM and 10 GB Storage, 1 Gbps network interface
- Recommended - Dual socket server, 16 GB RAM and 50 GB storage, two 1 Gbps network interfaces

The breakdown of the server requirements is:

- For each host: AMD-V or Intel VT enabled, AMD64 or Intel 64 extensions, minimum 1 GB RAM, 3 GB free storage and 1 Gbps network interface.
- For virtual machines running on each host: 8 GB RAM to run four virtual machines.
- A valid Red Hat Network subscription to the **rhel-x86_64-server-6-rhevms** channel.

Storage and Networking

- At least one of the supported storage types (NFS, iSCSI or FCP).
- At least three static IP addresses: One for the Red Hat Enterprise Virtualization Manager server and one for each server running Red Hat Enterprise Virtualization Hypervisor.
- DNS service which can resolve (forward and reverse) all the IP addresses.
- An existing DHCP server which can allocate network addresses for the virtual machines.
- Display subnet (extra Network Interface Card on both servers) to create a new display network in addition to the default existing management network.

Virtual Machines

- Installation images for creating virtual machines, depending on which operating system you wish to use.
 - Red Hat Enterprise Linux 3, 4, 5 or 6.

- Microsoft Windows XP, 7, 2003 or 2008.
- Valid licenses or subscription entitlements for each operating system.
- At least one valid user account in the IPA directory or Active Directory.

2. Track B: Minimal Setup

Track B enables you to install and configure a minimal Red Hat Enterprise Virtualization setup on a single host using local storage. It consists of three basic labs and two optional advanced labs. In the basic labs, you learn how to create virtual machines and assign them to users.

After you have completed the minimal setup, do the advanced labs, if you wish. In the advanced labs, you can use the multi-level administration system to assign different levels of user permissions, which is ideal for a company with diverse employee roles. You will also learn how to provision virtual desktops for end users.

If you have two physical servers and no shared storage, set up a Red Hat Enterprise Virtualization environment by following the labs in Track B - Minimal Setup. The labs in this track are color coded blue, so to determine if a lab is part of Track B, look for a blue square in the diagram at the start of each lab.

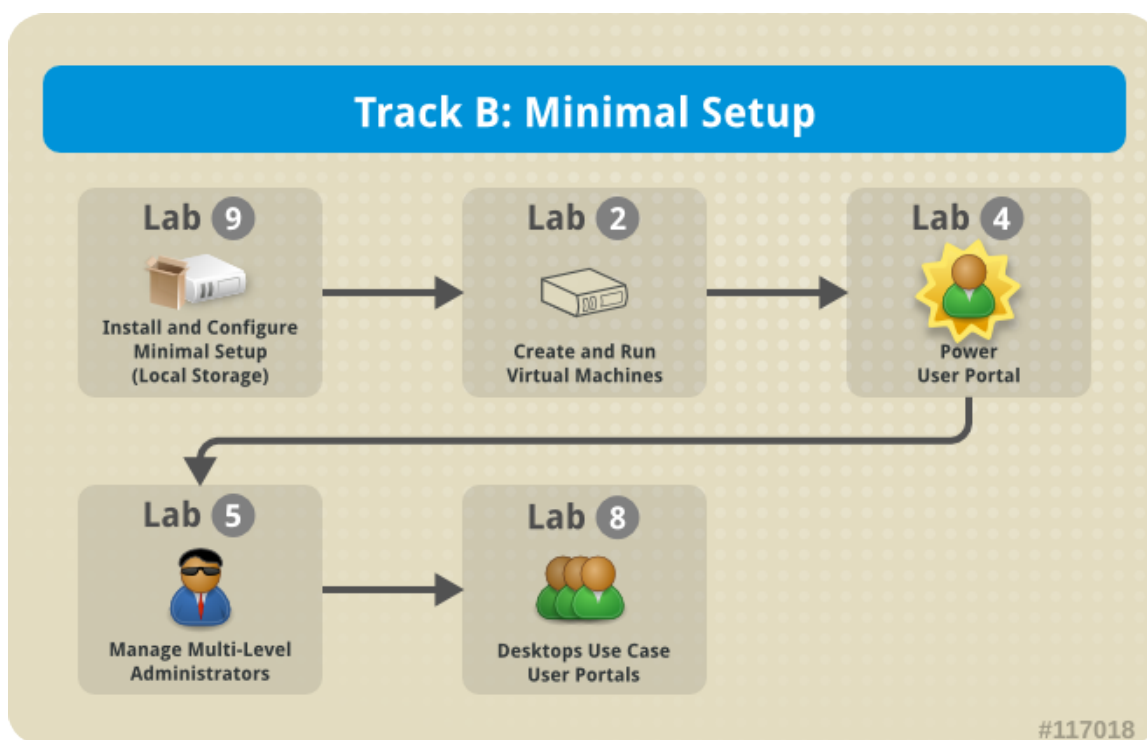


Figure 3. Workflow for Evaluation Track B

After you complete Track B, you will have the following environment with one virtual machine host, local storage, a network, two portals, end-user clients and a host running the Red Hat Enterprise Virtualization Manager.

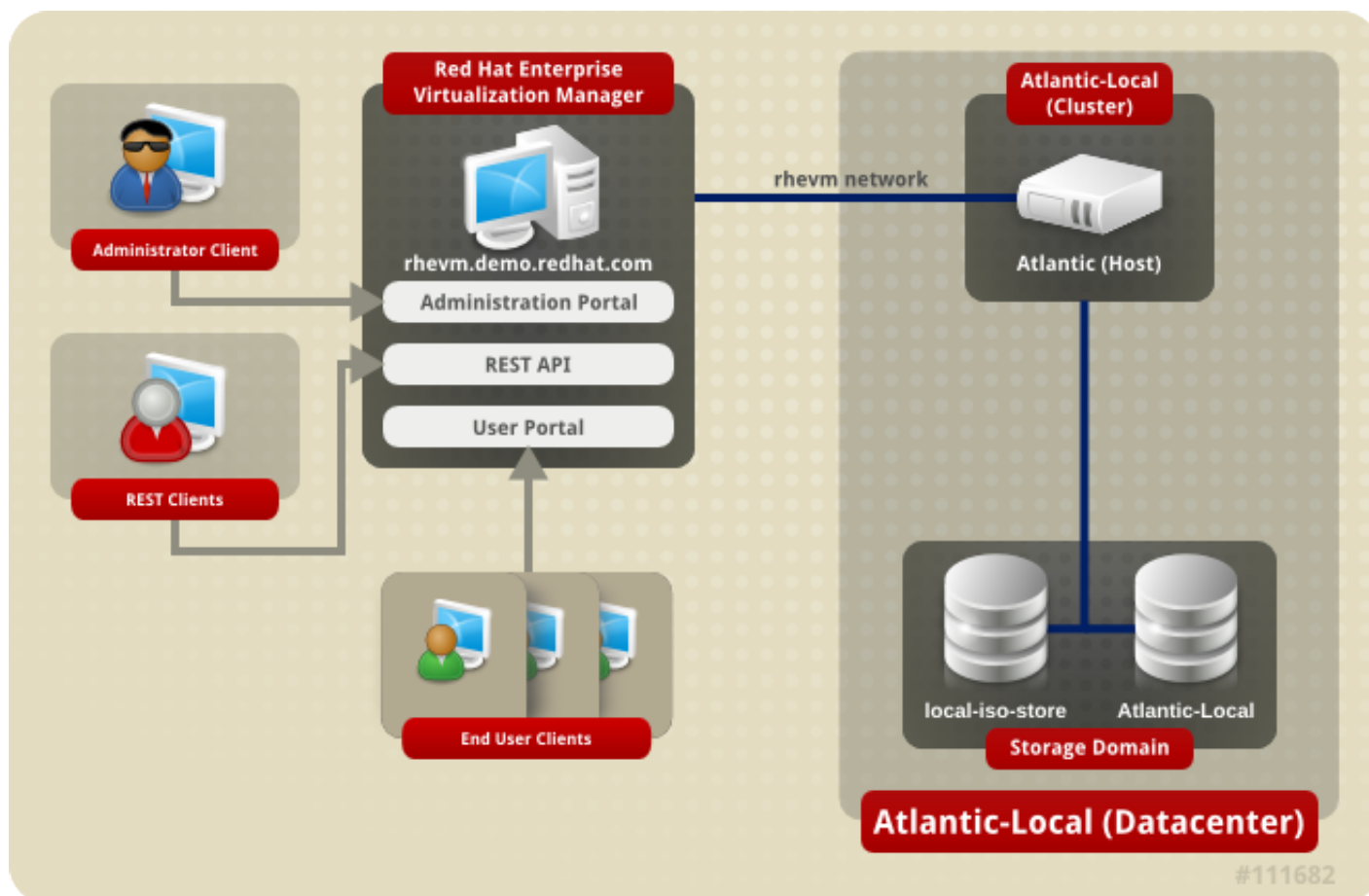


Figure 4. Red Hat Enterprise Virtualization Minimal Setup

Track B - Minimal Setup Labs

- [Lab 9 - Install and Configure Minimal Setup](#) — Install the Red Hat Enterprise Virtualization Manager and Red Hat Enterprise Virtualization Hypervisor using minimal hardware (60 minutes).
- [Lab 2 - Create Virtual Machines](#) — Create virtual machines and templates from the administration portal (25 minutes).
- [Lab 4 - Power User Portal](#) — Create and manage virtual machines from the power user portal (35 minutes).

Track B - Advanced Lab (optional)

- [Lab 5 - Manage Multi-Level Administrators](#) — Manage administrators for each component of Red Hat Enterprise Virtualization (10 minutes).
- [Lab 8 - Virtual Desktops](#) — Access desktop pools using the SPICE connection protocol (50 minutes).

2.1. Track B Requirements

Both the tracks assume that you have an evaluation license and a valid Red Hat Network subscription to the Red Hat Enterprise Virtualization and Red Hat Enterprise Linux channels. Contact your sales representative if you do not have both of the above. Before you begin Track B, ensure that you have the following requirements with the recommended values:

Red Hat Enterprise Virtualization Manager

- Minimum - Dual core server with 4 GB RAM, with 25 GB free disk space and 1 Gbps network interface.
- Recommended - Dual Sockets/Quad core server with 16 GB RAM, 50 GB free disk space on multiple disk spindles and 1 Gbps network interface.

The breakdown of the server requirements are as below:

- For the Manager: 3 GB memory, 3 GB local disk space, 1 Gbps network controller bandwidth
- For the Red Hat Enterprise Linux 6 operating system: 1 GB memory, 5 GB local disk space
- For the local ISO domain: 15 GB disk space



Important — Supported Locales

The Red Hat Enterprise Virtualization Manager setup script, **rhevms-setup**, supports the **en_US.UTF-8**, **en_US.utf8**, and **en_US.utf-8** locales. Ensure that you install the Red Hat Enterprise Virtualization Manager on a system where the locale in use is one of these supported values.

- A valid Red Hat Network subscription to the following channels:
 - **rhel-x86_64-server-6-rhevms-3**
 - **jbappplatform-5-x86_64-server-6-rpm**
 - **rhel-x86_64-server-supplementary-6**
- One client for connecting to Red Hat Enterprise Virtualization Manager.
 - Microsoft Windows (7, XP, 2003 or 2008) with Internet Explorer 7 and above
 - Microsoft .NET Framework 4

Red Hat Enterprise Virtualization Host

- Minimum - Dual Core server, 10 GB RAM and 10 GB Storage, 1 Gbps network interface.
- Recommended - Dual socket server, 16 GB RAM and 50 GB storage, two 1 Gbps network interfaces.

The breakdown of the server requirements is:

- For each host: AMD-V or Intel VT enabled, AMD64 or Intel 64 extensions, minimum 1 GB RAM, 3 GB free storage and 1 Gbps network interface.
- For virtual machines running on the host: 8 GB RAM to run four virtual machines.
- A valid Red Hat Network subscription to the **rhel-x86_64-server-6-rhevms** channel.

Storage and Networking

- Two static IP addresses: One for the Red Hat Enterprise Virtualization Manager server and one for the Red Hat Enterprise Virtualization Hypervisor.
- One name (DNS) Server which can resolve (forward and reverse) all the IP addresses.

- A DHCP server for the virtual machines.

Virtual Machines

- Installation images for creating virtual machines, depending on which operating system you wish to use.
 - Red Hat Enterprise Linux 3, 4, 5 or 6.
 - Microsoft Windows XP, 7, 2003 or 2008.
- Valid licenses or subscription entitlements for each operating system.
- At least one valid user account in the IPA directory or Active Directory.

3. Summary

At the end of this chapter you have selected the track you are going to follow, and set up the requirements for either a standard setup or a minimal setup. You can now move on to the appropriate lab. For example, to start Track A, proceed to Lab 1.

Lab 1 - Install and Configure Basic Setup



Lab 1 on Track A sets up the basic infrastructure to support virtualization, and shows you how to install and configure the hosts, storage and networks in readiness for the virtual machines. The goal of this lab is an environment that is ready for you to create and provision virtual machines.

This lab is intended for Track A, and requires three servers and shared storage. To successfully complete this lab, ensure that you have read [Section 1.1, “Track A Requirements”](#), where the complete requirements for this lab are listed, and complied with its recommendations.

Lab 1 - Objectives

To achieve the goal of this lab, you will install and set up Red Hat Enterprise Virtualization with multiple hosts and shared storage, you will learn to configure networks and add ISOs. This lab should take you about 75 minutes.

[Section 1, “Install Red Hat Enterprise Virtualization Manager”](#) shows you how to install the Red Hat Enterprise Virtualization Manager on a server running Red Hat Enterprise Linux. (12 minutes*)

[Section 2, “Install Red Hat Enterprise Virtualization Hypervisor”](#) shows you how to install and configure Red Hat Enterprise Virtualization Hypervisors for use with Red Hat Enterprise Virtualization Manager. (20 minutes*)

[Section 3, “Connect to Red Hat Enterprise Virtualization Manager”](#) shows you how to configure a client machine to connect to the Red Hat Enterprise Virtualization Manager administration portal. (8 minutes)

[Section 4, “Approve the Red Hat Enterprise Virtualization Hypervisor”](#) shows you how to approve the hosts for use from the Red Hat Enterprise Virtualization Manager. (10 minutes)

[Section 5, “Configure Logical Networks”](#) shows you how to define networks for the storage devices and add them to the hosts. (5 minutes)

[Section 6, “Configure Storage”](#) shows you how to define NFS, iSCSI or FCP storage and attach the domains to the data center. (10 minutes)

[Section 7, “Attach and Populate ISO Domain”](#) shows you how to attach the predefined ISO domain to the data center and upload ISO images to the repository. (10 minutes)

* The time required to download packages from the Red Hat Network depends on the bandwidth of your connection to RHN, therefore it has not been included in the estimated time.

Lab 1 - Configuration

The following figure and table list the environment parameters and object names which will be used consistently throughout this lab. It is strongly recommended that you use these entities in your

Lab 1 - Install and Configure Basic Setup

evaluation environment to ensure the names are resolvable. You may alter them if necessary, but make sure you have an equivalent name for each component.

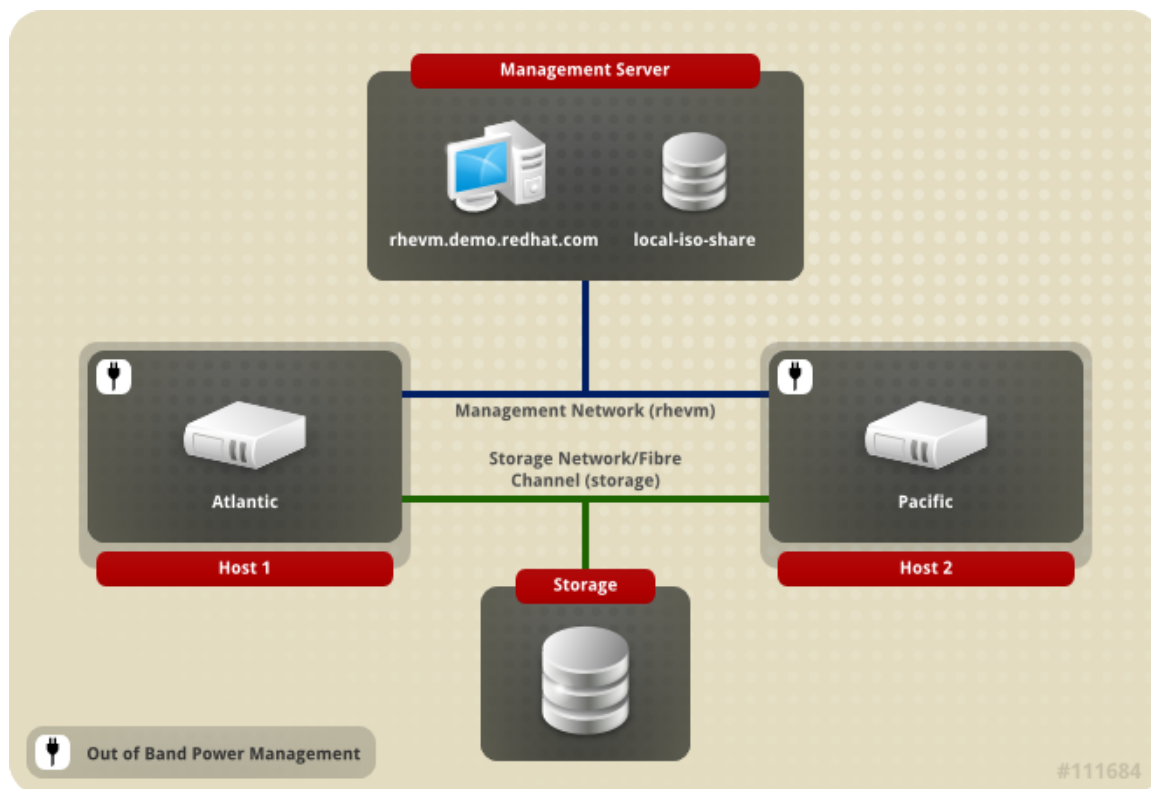


Table 1. Lab component names

Component	Name	IP (if applicable)	Fully Qualified Domain Name
Domain Services	-	-	demo.redhat.com
Red Hat Enterprise Virtualization Manager	-	-	rhevmdemo.redhat.com
Domain Name System	-	23.23.2.1	-
Storage Network	storage	10.23.1.0/24	-
Management Network	rhevmdemo	10.35.3.0/24	-
Red Hat Enterprise Virtualization Hypervisor 1	Atlantic	-	-
Red Hat Enterprise Virtualization Hypervisor 2	Pacific	-	-
Administrator User Name	admin	-	-
NFS Storage Domain	NFS-share	-	-
iSCSI Storage Domain	iSCSI-share	-	-
FCP Storage Domain	FCP-share	-	-
ISO Storage Domain	local-iso-share	-	-

1. Install Red Hat Enterprise Virtualization Manager

The Red Hat Enterprise Virtualization Manager is the control center of the Red Hat Enterprise Virtualization environment. It allows you to define hosts, configure data centers, add storage, define networks, create virtual machines, manage user permissions and use templates from one central location.

The Red Hat Enterprise Virtualization Manager must be installed on a server running Red Hat Enterprise Linux 6, with minimum 4 GB RAM, 25 GB free disk space and 1 Gbps network interface (see [Section 1.1, “Track A Requirements”](#)).

To install Red Hat Enterprise Virtualization Manager

1. Install Red Hat Enterprise Linux 6 on a server. When prompted for the software packages to install, select the default **Basic Server** option. See the *Red Hat Enterprise Linux Installation Guide* for more details.



Important

During installation, set the fully qualified domain name (FQDN) for the server as **rhev.m.demo.redhat.com**.

2. If the *classpathx-jaf* package has been installed, it must be removed because it conflicts with some of the components required to support JBoss in Red Hat Enterprise Virtualization Manager. Run:

```
# yum remove classpathx-jaf
```

3. If your server has not been registered with the Red Hat Network, run:

```
# rhn_register
```

To complete registration successfully you need to supply your Red Hat Network username and password. Follow the onscreen prompts to complete registration of the system.

After you have registered your server, update all the packages on it. Run:

```
# yum -y update
```

Reboot your server for the updates to be applied.

4. Subscribe the server to the required channels for Red Hat Enterprise Virtualization Manager:
 - The **Red Hat Enterprise Virtualization Manager (v.3 x86_64)** channel, also referred to as **rhel-x86_64-server-6-rhev.m-3**, provides Red Hat Enterprise Virtualization Manager.
 - The **JBoss Application Platform (v 5 in rpm)** channel, also referred to as **jbappplatform-5-x86_64-server-6-rpm**, provides the supported release of the application platform on which the manager runs.

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- The **RHEL Server Supplementary (v. 6 64-bit x86_64)** channel, also referred to as **rhel-x86_64-server-supplementary-6**, provides the supported version of the Java Runtime Environment (JRE).

To do so, run the following command:

```
# rhn-channel -v -u YOUR-RHN-USERNAME -a -c rhel-x86_64-server-6-rhev-3 -c  
jbappplatform-5-x86_64-server-6-rpm -c rhel-x86_64-server-supplementary-6
```

5. You are now ready to install the Red Hat Enterprise Virtualization Manager. Run the following command:

```
# yum -y install rhvm
```

This command will download the Red Hat Enterprise Virtualization Manager installation software and resolve all dependencies.

6. When the packages have finished downloading, run the installer:

```
# rhvm-setup
```



Important — Supported Locales

rhvm-setup supports the **en_US.UTF-8**, **en_US.utf8**, and **en_US.utf-8** locales. You will not be able to run this installer on a system where the locale in use is not one of these supported values.

7. The installer will take you through a series of interactive questions as listed in the following example. If you do not enter a value when prompted, the installer uses the default settings which are stated in [] brackets.

Example 1. Red Hat Enterprise Virtualization Manager installation

```
Welcome to RHEV Manager setup utility
HTTP Port [8080] :
HTTPS Port [8443] :
Host fully qualified domain name, note that this name should be fully resolvable
[rhvm.demo.redhat.com] :
Password for Administrator (admin@internal) :
Database password (required for secure authentication with the locally created
database) :
Confirm password :
Organization Name for the Certificate: Red Hat
The default storage type you will be using ['NFS'| 'FC'| 'ISCSI'] [NFS] : ISCSI
Should the installer configure NFS share on this server to be used as an ISO Domain?
['yes'| 'no'] [no] : yes
Mount point path: /data/iso
Display name for the ISO Domain: local-iso-share
Firewall ports need to be opened.
You can let the installer configure iptables automatically overriding the current
configuration. The old configuration will be backed up.
```



```
Alternately you can configure the firewall later using an example iptables file found
under /usr/share/rhev/conf/iptables.example
Configure iptables ? ['yes'| 'no']: yes
```

Important points to note:

- The default ports **8080** and **8443** must be available to access the manager on HTTP and HTTPS respectively.
 - If you elect to configure an NFS share it will be exported from the machine on which the manager is being installed.
 - The storage type that you select will be used to create a data center and cluster. You will then be able to attach storage to these from the Administration Portal.
8. You are then presented with a summary of the configurations you have selected. Type yes to accept them.

Example 2. Confirm Manager installation settings

```
RHEV Manager will be installed using the following configuration:
=====
http-port:                8080
https-port:               8443
host-fqdn:                rhevm.demo.redhat.com
auth-pass:                *****
db-pass:                  *****
org-name:                 Red Hat
default-dc-type:          ISCSI
nfs-mp:                   /data/iso
iso-domain-name:          local-iso-share
override-iptables:       yes
Proceed with the configuration listed above? (yes|no): yes
```

9. The installation commences. It may take a few minutes. When complete, the following message displays, indicating that the installation was successful.

Example 3. Successful installation

```
Installing:
Creating JBoss Profile...          [ DONE ]
Creating CA...                    [ DONE ]
Setting Database Security...       [ DONE ]
Creating Database...              [ DONE ]
Updating the Default Data Center Storage Type... [ DONE ]
Editing JBoss Configuration...     [ DONE ]
Editing RHEV Manager Configuration... [ DONE ]
Configuring the Default ISO Domain... [ DONE ]
Starting JBoss Service...         [ DONE ]
Configuring Firewall (iptables)... [ DONE ]

**** Installation completed successfully ****
```

Your Red Hat Enterprise Virtualization Manager is now up and running. You can log in to the Red Hat Enterprise Virtualization Manager's web administration portal with the username **admin** (the administrative user configured during installation) in the **internal** domain.



Important

The **internal** domain is automatically created upon installation, however no new users can be added to this domain. To authenticate new users, you need an external directory service. Red Hat Enterprise Virtualization supports IPA and Active Directory, and provides a utility called **rhevmanage-domains** to attach new directories to the system. You will use this tool in subsequent labs.

2. Install Red Hat Enterprise Virtualization Hypervisor

You have now successfully installed Red Hat Enterprise Virtualization Manager. The next step is to install your Red Hat Enterprise Virtualization Hypervisor hosts, which will be used to run your virtual machines. Note that you have to perform this installation once on each physical server used as a host.

While this lab describes the use of Red Hat Enterprise Virtualization Hypervisor hosts, you can also use Red Hat Enterprise Linux servers as virtual machine hosts. See [To install a Red Hat Enterprise Linux 6 host](#) for details. In addition, if you wish to use installation methods other than ISO images (including network or PXE boot), see the *Red Hat Enterprise Linux — Hypervisor Deployment Guide*.

Before installing the Red Hat Enterprise Virtualization Hypervisor, you need to download the hypervisor image from the Red Hat Network and create a bootable CD with the image. This procedure can be performed on any machine running Red Hat Enterprise Linux.

To prepare a Red Hat Enterprise Virtualization Hypervisor installation CD

1. Download the latest version of the *rhev-hypervisor** package from Red Hat Network. The list of hypervisor packages is located at the **Red Hat Enterprise Virtualization Hypervisor (v.6 x86-64)** channel.
2. Install the RPM on a Red Hat Enterprise Linux system. You must log in as the **root** user and navigate to the location of the downloaded file to perform this step.

```
# yum localinstall rhev-hypervisor*.rpm
```

3. Insert a blank CD into your CD writer. Use the *cdrecord* utility to burn the hypervisor ISO image onto your disc. Run:

```
# cdrecord dev=/dev/cdrw /usr/share/rhev-hypervisor/rhev-hypervisor.iso
```

You have created a Red Hat Enterprise Virtualization Hypervisor installation CD, now you can use it to boot the machine designated as your hypervisor host. This lab describes the interactive installation where you are prompted to configure your settings in a graphical interface. Use the following keys to navigate around the installation screen:

Menu Navigation Keys

- Use the **Up** and **Down** arrow keys to navigate between selections. Your selections are highlighted in white.
- The **Tab** key allows you to move between fields.
- Use the **Spacebar** to tick checkboxes, which are represented by [] brackets. A marked checkbox displays with an asterisk (*).

- To proceed with the selected configurations, press the **Enter** key.

To install Red Hat Enterprise Virtualization Hypervisors

1. Insert the Red Hat Enterprise Virtualization Hypervisor installation CD into your CD-ROM drive of the machine designated as a host. Reboot the machine. When the boot splash screen displays, press the **Tab** key and select **Boot** to boot from the hypervisor installation media. Press **Enter**.
2. On the installation confirmation screen, select **Install RHEV Hypervisor** and press **Enter**.
3. The installer automatically detects the drives attached to the system. The disk selected for booting the hypervisor is highlighted in white. Ensure that the local disk is highlighted, otherwise use the arrow keys to select the correct disk. Select **Continue** and press **Enter**.
4. You are prompted to select the drive on which the hypervisor is to be installed. Ensure that the local disk is highlighted, otherwise use the arrow keys to select the correct disk. While multiple installation drives can be used, select only one for this evaluation. Select **Continue** and press **Enter**.
5. Enter a password for local console access and confirm it. Select **Install** and press **Enter**. The Red Hat Enterprise Virtualization Hypervisor partitions the local drive, then commences installation.
6. Once installation is complete, a dialog prompts you to **Reboot** the hypervisor. Press **Enter** to confirm. Remove the installation disc.
7. After the hypervisor has rebooted, you will be taken to a login shell. Log in as the **admin** user with the password you provided during installation to enter the Red Hat Enterprise Virtualization Hypervisor management console.
8. On the hypervisor management console, there are eight tabs on the left. Press the **Up** and **Down** keys to navigate between them and **Enter** to access them.
 - a. Select the **Network** tab. Fill in the required fields as shown in the following example. Substitute the **DNS Server** address according to your environment.

```

RHEV Hypervisor 6.2-0.12.el6
atlantic.demo.redhat.com

Status
Network
Security
Logging
Kernel Dump
Remote Storage
RHEV-M
Red Hat Network

System Identification
Hostname: atlantic.demo.redhat.com_____
DNS Server 1: 23.2.2.1_____
DNS Server 2: 23.2.2.11_____
NTP Server 1: 0.rhel.pool.ntp.org_____
NTP Server 2: 1.rhel.pool.ntp.org_____

Device Status Model MAC Address
eth0 Unconfigured unknown 52:54:00:a4:14:0b

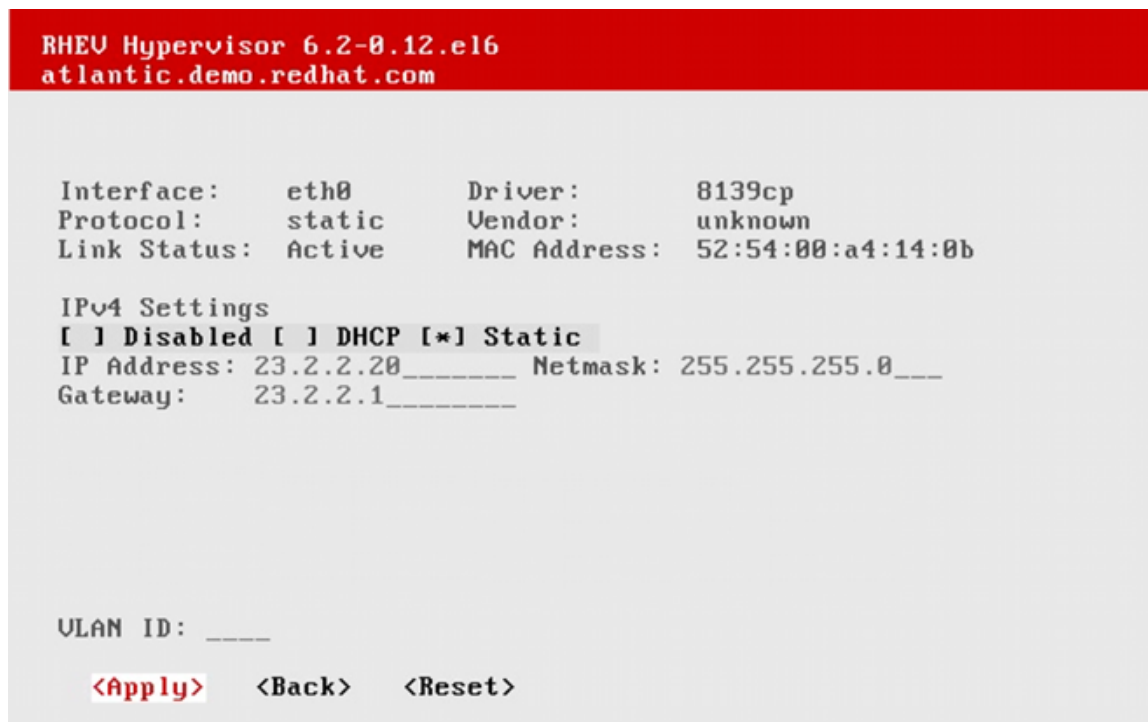
<Flash Lights to Identify> <Apply> <Reset>
  
```

Figure 5. Configure Hypervisor network settings

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After you have filled in the fields, select **Apply** and press **Enter**. This saves your network settings.

- b. For this document, the **eth0** device will be used to set up the management network. Select it and press **Enter** to access the interface configuration menu. Fill in the required fields as shown in the following example.



The screenshot shows the RHEV Hypervisor network configuration interface. At the top, a red banner displays "RHEV Hypervisor 6.2-0.12.el6" and "atlantic.demo.redhat.com". Below this, the interface configuration for the **eth0** device is shown. The configuration includes the interface name (**eth0**), driver (**8139cp**), protocol (**static**), vendor (**unknown**), link status (**Active**), and MAC address (**52:54:00:a4:14:0b**). Under the **IPv4 Settings** section, the **Static** option is selected, and the IP address is set to **23.2.2.20**, the netmask to **255.255.255.0**, and the gateway to **23.2.2.1**. At the bottom, there is a field for **ULAN ID** and three buttons: **<Apply>**, **<Back>**, and **<Reset>**.

Figure 6. Configure management network interface

Under **IPv4 Settings**, select **DHCP** or **Static** IP addressing and press **Spacebar** to mark the option as enabled. If using static IP addressing you must also provide the **IP Address**, **Netmask**, and **Gateway**. Select **Apply** and press **Enter**.

A dialog prompts you to confirm your network settings, select **OK** and press **Enter**.

- c. Select the **RHEV-M** tab. Configure the following options:
 - In the **Management Server** field, enter **rhev.m.demo.redhat.com**.
 - In the **Management Server Port** field, enter **8443**.
 - Tick the **Connect to the RHEV Manager and Validate Certificate** checkbox.
 - The **Set RHEV-M Admin Password** field allows you to specify the root password for the hypervisor, and enable SSH password authentication from the Red Hat Enterprise Virtualization Manager. You do not have to fill in this field for this document.

Select **Apply** and press **Enter**. A dialog displays, asking you to connect the hypervisor to the Red Hat Enterprise Virtualization Manager and validate its certificate. Select **Approve** and press **Enter**. A message will display notifying you that the Manager configuration has been successfully updated.

- d. Under the **Red Hat Network** tab, you can register the host with the Red Hat Network. This enables the host to run Red Hat Enterprise Linux virtual machines with proper RHN

entitlements. However, for the purposes of this document, the evaluation subscriptions will be used for the guests.

- e. Accept all other default settings. For information on security, logging, and kernel dump configuration, refer to the *Red Hat Enterprise Linux 6 Hypervisor Deployment Guide*. The guide also covers non-interactive hypervisor installation.
- f. Finally, select the **Status** tab. Select **Restart** and press **Enter** to reboot the host and apply all changes.

You have now successfully installed a Red Hat Enterprise Virtualization Hypervisor. Repeat the above steps for each hypervisor you wish to use. The following sections will provide instructions on how to approve the hypervisors for use with the Red Hat Enterprise Virtualization Manager.

3. Connect to Red Hat Enterprise Virtualization Manager

Now that you have installed the Red Hat Enterprise Virtualization Manager and Hypervisors, you can log in to the Manager administration portal to start using the Hypervisors and configure your virtualization environment.

Before logging in to the administration portal, you must install .NET Framework 4 and modify the default security settings on the machine used to access the web administration portal. These steps enable your client to connect to the Red Hat Enterprise Virtualization Manager. The example below is applicable for Windows Server 2008 R2, but you can also use Windows XP and Windows 7.

To configure Windows client to access the administration portal

1. To install .NET Framework 4, download it from <http://www.microsoft.com/download/en/details.aspx?id=17718>. Run this executable as a user with administration access to the system.
2. Next, disable Internet Explorer Enhanced Security Configuration. Click **Start** → **Administrative Tools** → **Server Manager**. On the **Security Information** pane in the **Server Manager** window, click **Configure IE ESC**. Select **Off** for Administrators and Users to disable the security configuration. Click **OK**.
3. To add the administration portal to the browser's list of trusted sites, open a browser and click on **Tools** → **Internet Options**. Click on the **Security** tab.
 - a. Select **Trusted Sites**. Click **Sites** to display the **Trusted Sites** dialog. Enter the URL for your administration portal in the **Add this website to the zone** textbox. Click **Add**, then **Close**.
 - b. Click the **Custom Level...** button. Locate the **XAML browser applications** item in the list, ensure that it is set to **Enable**, then click **OK**.
4. Restart Internet Explorer to access the administration portal.

You can use Internet Explorer 7 and above to connect to the administration portal. The following example is applicable to Internet Explorer 9.

To connect to Red Hat Enterprise Virtualization Manager administration portal

1. Open a web browser and navigate to `https://demo.redhat.com:8443/RHEVManager`.
2. If this is your first time connecting to the administration portal, Red Hat Enterprise Virtualization Manager will issue security certificates for your browser. Click the link labeled **this certificate** to trust the **ca.cer** certificate. A bar displays at the bottom of the browser, click **Open** to launch the **Certificate** dialog. Click **Install Certificate** and select to place the certificate in **Trusted Root Certification Authorities** store.

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- Back on the browser screen, click the link labeled **here** and follow the prompts to install the **RHEV-GUI-CertificateInstaller** executable. A bar displays at the bottom of the browser again, this time click **Run**. Note that the actual certificate installation is preceded by an ActiveX installation.

When complete, a new link labeled **here** appears. Click on it to reload the administration portal.

- The portal login screen displays. Enter the administrator's **User Name** and **Password** that you provided during installation, and ensure that your domain is set to **Internal**. Click **Login**.

You have now successfully logged in to the Red Hat Enterprise Virtualization web administration portal. Here, you can manage and monitor all your virtual resources through a graphical user interface.

3.1. The Administration Portal Graphical User Interface

The administration portal graphical interface has two modes: Tree mode and flat mode. Tree mode allows you to browse the object hierarchy of a data center, and is the recommended manner of operation. On the other hand, flat mode is used for objects which are not in the data centers hierarchy, for example the Users tab which does not appear in tree mode.

The functions of the administration portal GUI are described in the following figure and list:

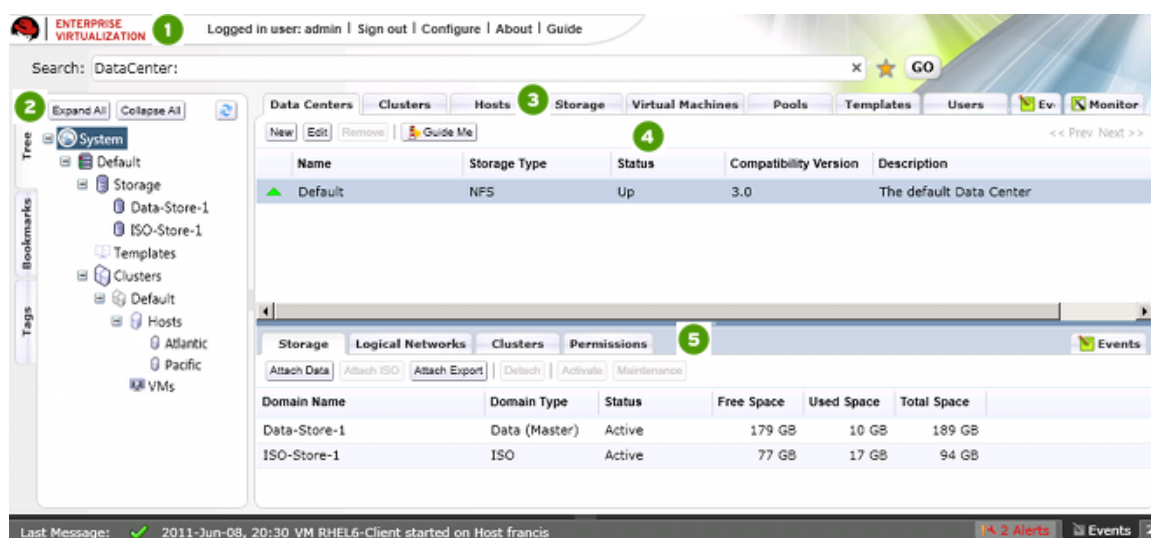


Figure 7. Administration Portal Features

- Header:** This bar contains the name of the logged in user, the sign out button, the option to configure user roles.
- Navigation Pane:** This pane allows you to navigate between the Tree, Bookmarks and Tags tabs. In the Tree tab, tree mode allows you to see the entire system tree and provides a visual representation your virtualization environment's architecture.
- Resources Tabs:** These tabs allow you to access the resources of Red Hat Enterprise Virtualization. You should already have a Default Data Center, a Default Cluster, a Host waiting to be approved, and available Storage waiting to be attached to the data center.
- Results List:** When you select a tab, this list displays the available resources. You can perform a task on an individual item or multiple items by selecting the item(s) and then clicking the relevant action button. If an action is not possible, the button is disabled.
- Details Pane:** When you select a resource, this pane displays its details in several subtabs. These subtabs also contain action buttons which you can use to make changes to the selected resource.

Once you are familiar with the layout of the administration portal, you can start configuring your virtual environment. Begin by approving your Hypervisor hosts for use, as detailed in the next section.

4. Approve the Red Hat Enterprise Virtualization Hypervisor

At this point you should already have a Default data center and a Default cluster, which have been automatically created during the Manager installation. In addition, the Red Hat Enterprise Virtualization Hypervisors you installed in [Section 2, “Install Red Hat Enterprise Virtualization Hypervisor”](#) should have been automatically detected by the Red Hat Enterprise Virtualization Manager, and attached to the Default cluster of the Default data center.

However, before they can be used, they require a click of approval from the administration portal. Perform the following procedure for each hypervisor.

To approve the Red Hat Enterprise Virtualization Hypervisor hosts

1. Navigate to the **Tree** pane and click the **Expand All** button. Under the **Default** cluster, click the **Hosts** icon. The **Hosts** tab displays a list of available hypervisors.

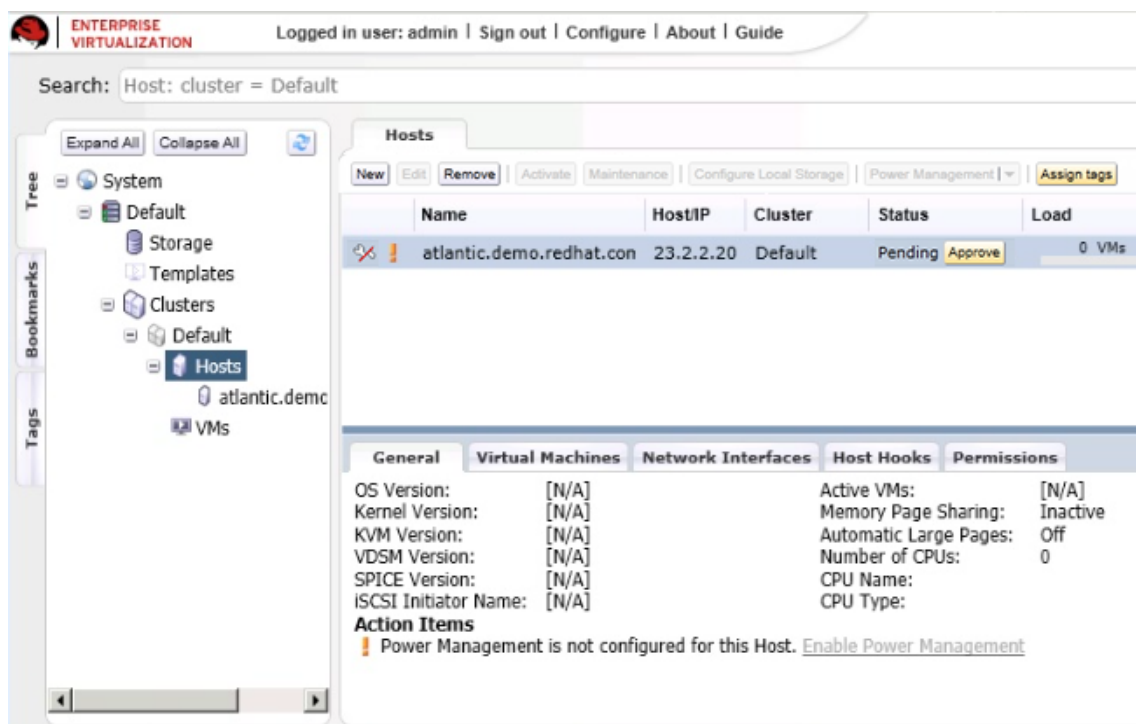


Figure 8. Red Hat Enterprise Virtualization Hypervisor pending approval

2. Select your hypervisor and click the **Approve** button. The **Edit and Approve Host** dialog displays. Accept the defaults or make changes as necessary, then click **OK**.

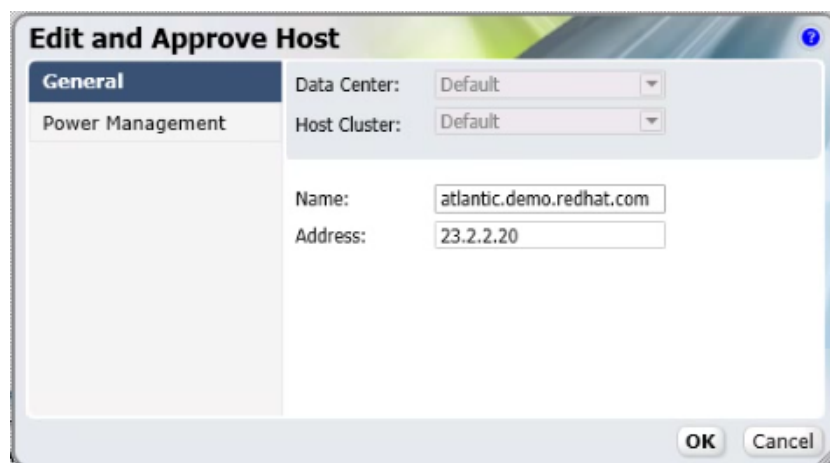


Figure 9. Approve Red Hat Enterprise Virtualization Hypervisor

3. A dialog appears, indicating that you have not configured Power Management for this host. For the purpose of this lab, click **OK** to continue. The host goes through a brief installation cycle. When complete, the host status changes from **Non Operational** to **Up**.

Note that both the Red Hat Enterprise Virtualization Hypervisors that you have approved were attached to the same host cluster, which means that they share the same network infrastructure, the same storage and the same type of CPU, therefore they can migrate virtual machines from one to the other. You can learn how to create new host clusters in Advanced Lab 7 - Add Additional Data Center.

Now that you have finished configuring your physical servers for use as the Manager, Hypervisors and administration portal client respectively, you are ready to customize and deploy virtual resources including logical networks, storage domains and virtual machines.

5. Configure Logical Networks

Now that you have a data center with hosts grouped in a cluster, you need to define and apply the networking layer. When you installed the system, a management network was already defined. However new networks, for example data, storage or display can be added to enhance network speed and performance. In addition, other networks can be used to segregate virtual machine traffic from the management networks, or isolate traffic between groups of virtual machines in the same cluster. In Red Hat Enterprise Virtualization Manager, network definition, type and function are encapsulated in a logical entity called a Logical Network.

A logical network is assigned as a required resource of a cluster in a data center, and by extension all hosts in a cluster must have the same set of logical networks implemented. The implementation itself may vary from host to host (IP and bonding properties). Therefore, to configure a network, you need to first define the network and then apply this network to each host. By default the management network (rhevm) is defined for a data center.

In this lab, you will create an additional storage network and add it to your hosts. In the following example you will define additional network for the storage, which will be useful when using NAS storage like NFS or iSCSI.

To define logical networks in a cluster

1. Navigate to the **Tree** pane and click the **Expand All** button. Under System, click **Default**. On the results list, the **Default** data center displays.
2. On the details pane, select the **Logical Networks** subtab. This displays the existing logical networks. At this stage only the default **rhevm** network is listed.

- Click **New**. The **New Logical Network** dialog displays.

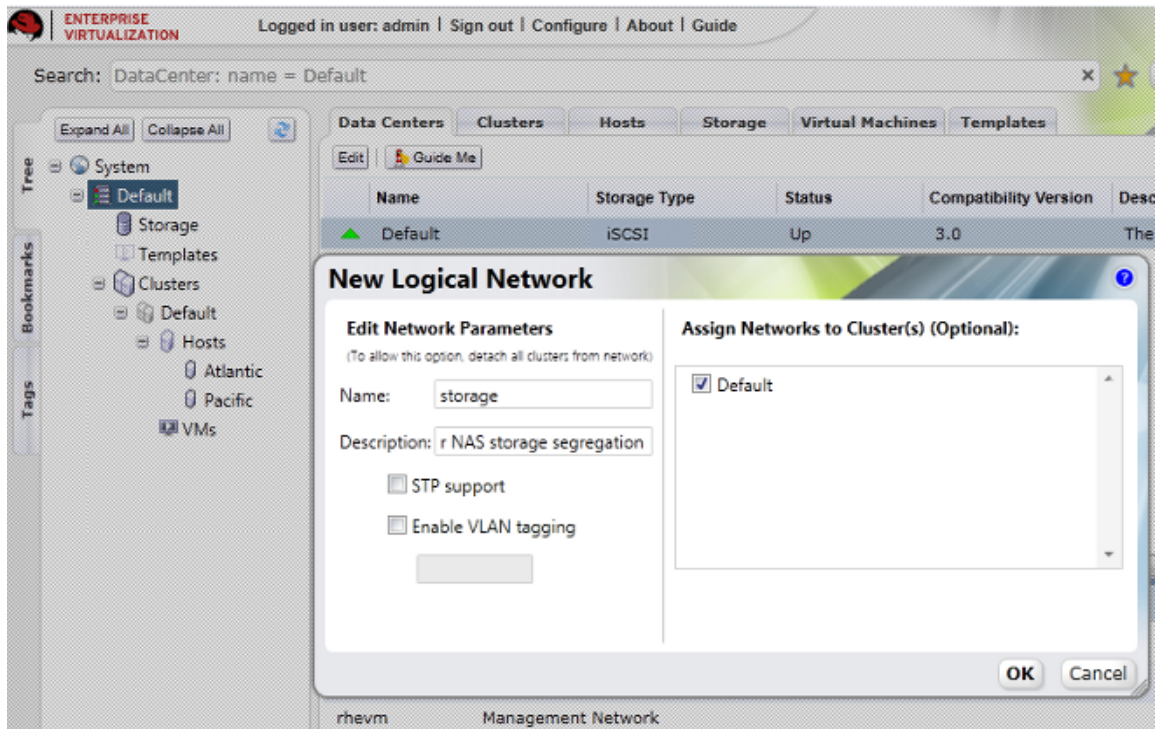


Figure 10. New Logical Network

Fill in the **Name** and **Description** fields, and tick the **Assign Networks to Cluster(s) - Default** checkbox to automatically add the Storage network to the Default data center.

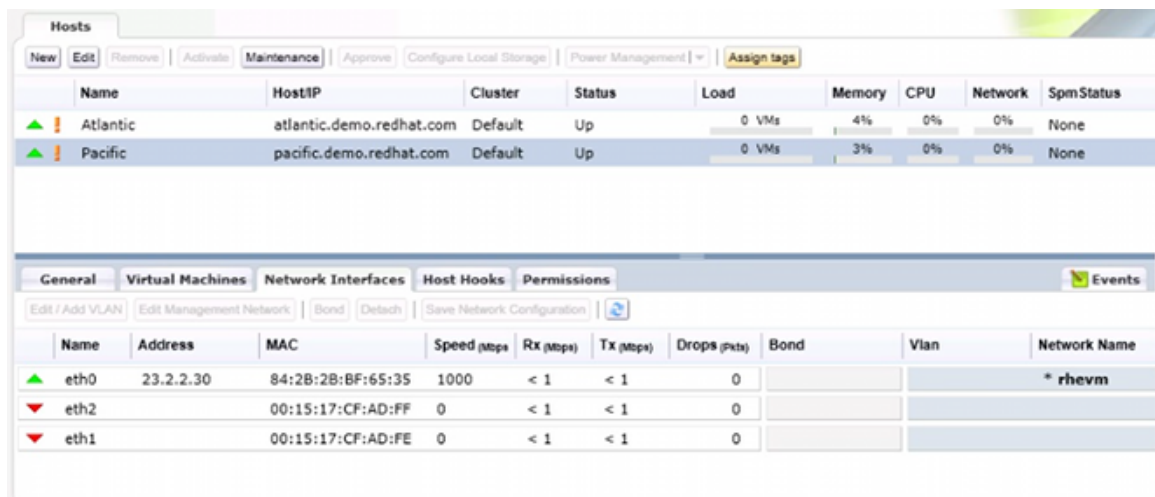
- Click **OK** to create the new logical network.

Now that you have defined this network as a resource required by the default cluster in the data center, it is time to add this resource to the hosts in the cluster.

To add network to hosts

- Back on the **Tree** pane, click **Default** → **Clusters** → **Default** → **Hosts**. The **Hosts** tab displays a list of available hosts.
- For each of your installed hosts, perform the following tasks:
 - Click on the host. On the details pane, select the **Network Interfaces** tab.
 - A list of network interfaces available for this host displays. One of them will already have the management network (rhevm) configured.

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Name	HostIP	Cluster	Status	Load	Memory	CPU	Network	SpmStatus
Atlantic	atlantic.demo.redhat.com	Default	Up	0 VMs	4%	0%	0%	None
Pacific	pacific.demo.redhat.com	Default	Up	0 VMs	3%	0%	0%	None

Name	Address	MAC	Speed (Mbps)	Rx (Mbps)	Tx (Mbps)	Drops (pkts)	Bond	Vlan	Network Name
eth0	23.2.2.30	84:2B:2B:BF:65:35	1000	< 1	< 1	0			* rhvm
eth2		00:15:17:CF:AD:FF	0	< 1	< 1	0			
eth1		00:15:17:CF:AD:FE	0	< 1	< 1	0			

Figure 11. Available network interfaces

- c. Select the interface on which to configure the Storage network and click the **Edit/ Add VLAN** button. The **Edit Network Interface** dialog displays.

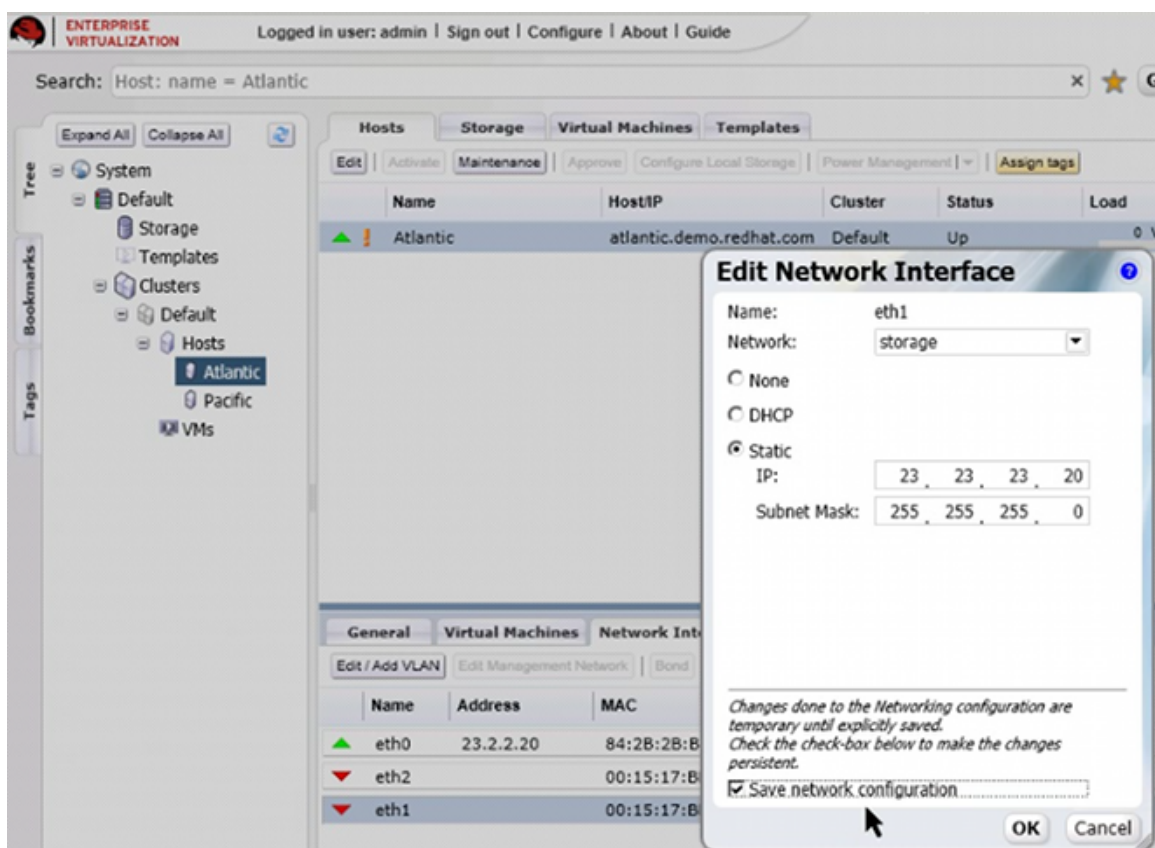


Figure 12. Edit network interface

Configure the following options:

- Under **Network**, select your newly created storage network.
- Select the **Static** radio button. Enter the **IP** and **Subnet Mask** you have prepared as part of the prerequisites to this lab.
- Tick the **Save network configuration** checkbox.

- d. Click **OK**.

You have now added a new storage network to your data center, and attached the network to your hosts. On the **Logical Networks** tab of the **Default** data center, you should have at least two networks - **rhevm** and **storage**. Now, you can add storage to the system.

6. Configure Storage

After configuring your logical networks, you need to add storage to your data center.

Red Hat Enterprise Virtualization uses a centralized shared storage system for virtual machine disk images and snapshots. Storage can be implemented using Network File System (NFS), Internet Small Computer System Interface (iSCSI) or Fibre Channel Protocol (FCP). Storage definition, type and function, are encapsulated in a logical entity called a **Storage Domain**. Multiple storage domains can be used in a Red Hat Enterprise Virtualization environment.

For this lab you will use two types of storage domains. The first is an NFS share for ISO images of installation media. You have already created this ISO domain during the Red Hat Enterprise Virtualization Manager installation.

The second storage domain will be used to hold virtual machine disk images. For this domain, you need at least one of the supported storage types. You have already set a default storage type during installation as described in [Example 1, “Red Hat Enterprise Virtualization Manager installation”](#). Ensure that you use the same type when creating your data domain.

Select your next step by checking the storage type you should use:

1. Navigate to the **Tree** pane and click the **Expand All** button. Under System, click **Default**. On the results list, the **Default** data center displays.
2. On the data center entry, the **Storage Type** column displays the type you should add.
3. Now that you have verified the storage type, create the storage domain:
 - For NFS storage, refer to [Section 6.1, “Create an NFS Data Domain”](#).
 - For iSCSI storage, refer to [Section 6.2, “Create an iSCSI Data Domain”](#).
 - For FCP storage, refer to [Section 6.3, “Create an FCP Data Domain”](#).

6.1. Create an NFS Data Domain

Because you have selected NFS as your default storage type during the Manager installation, you will now create an NFS storage domain. An NFS type storage domain is a mounted NFS share that is attached to a data center and used to provide storage for virtual machine disk images.



Important

If you are using NFS storage, you must first create and export the directories to be used as storage domains from the NFS server. These directories must have their numerical user and group ownership set to 36:36 on the NFS server, to correspond to the vdsim user and kvm group respectively on the Red Hat Enterprise Virtualization Manager server. In addition, these directories must be exported with the read write options (rw). For more information see the *Red Hat Enterprise Virtualization Installation Guide*.

To add NFS storage

1. Navigate to the **Tree** pane and click the **Expand All** button. Under System, select the **Default** data center and click on **Storage**. The available storage domains display on the results list. Click **New Domain**.
2. The **New Storage** dialog box displays.

New Domain

Name:

Data Center: (NFS, V1)

Domain Function / Storage Type: Format:

Use Host:

Export path:
Please use 'FQDN:/path' or 'IP:/path'
Example 'server.example.com:/export/VMs'

Figure 13. Add NFS Storage

Configure the following options:

- a. **Name:** Enter **NFS-share**.
- b. **Data Center:** The **Default** data center is already pre-selected.
- c. **Domain Function / Storage Type:** The **Data/ NFS** option is already pre-selected because during installation you set NFS as your data center's default storage type. The storage domain types which are not compatible with the Data Center will not be available.
- d. **Use Host:** Select any of the hosts from the drop down menu. Only hosts which belong in this data center will display in this list.
- e. **Export Path:** Enter the IP address or a resolvable hostname of the chosen host. The export path should be in the format of **192.168.0.10:/Images/NFS-Share** or **domain.example.com:/Images/NFS-Share**.

- Click **OK**. The new **NFS-share** 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.

You have created an NFS storage domain. Now, you need to attach an ISO domain to the data center and upload installation images so you can use them to create virtual machines. Proceed to [Section 7, “Attach and Populate ISO Domain”](#).

6.2. Create an iSCSI Data Domain

Because you have selected iSCSI as your default storage type during the Manager installation, you will now create an iSCSI storage domain. Red Hat Enterprise Virtualization platform supports iSCSI storage domains spanning multiple pre-defined Logical Unit Numbers (LUNs).

To add iSCSI storage

- Navigate to the **Tree** pane and click the **Expand All** button. Under System, select the **Default** data center and click on **Storage**. The available storage domains display on the results list. Click **New Domain**.
- The **New Domain** dialog box displays.

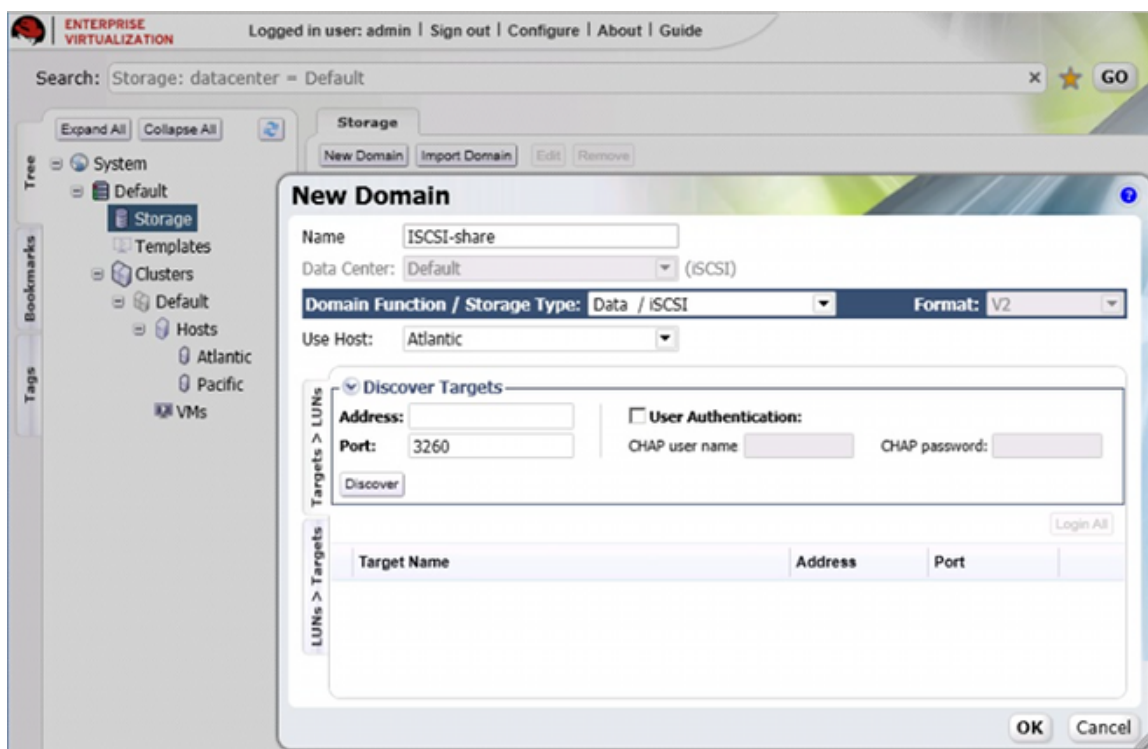


Figure 14. Add iSCSI Storage

Configure the following options:

- Name:** Enter **iSCSI-share**.
- Data Center:** The **Default** data center is already pre-selected.
- Domain Function / Storage Type:** The **Data/ iSCSI** option is already pre-selected because during installation you set iSCSI as your data center's default storage type. The storage domain types which are not compatible with the Data Center will not be available.

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- d. **Use Host:** Select any of the available hosts from the drop down menu. Only hosts which belong in this data center will display in this list.
3. To connect to the iSCSI target, enter the required information under the **Discover Targets** bar.

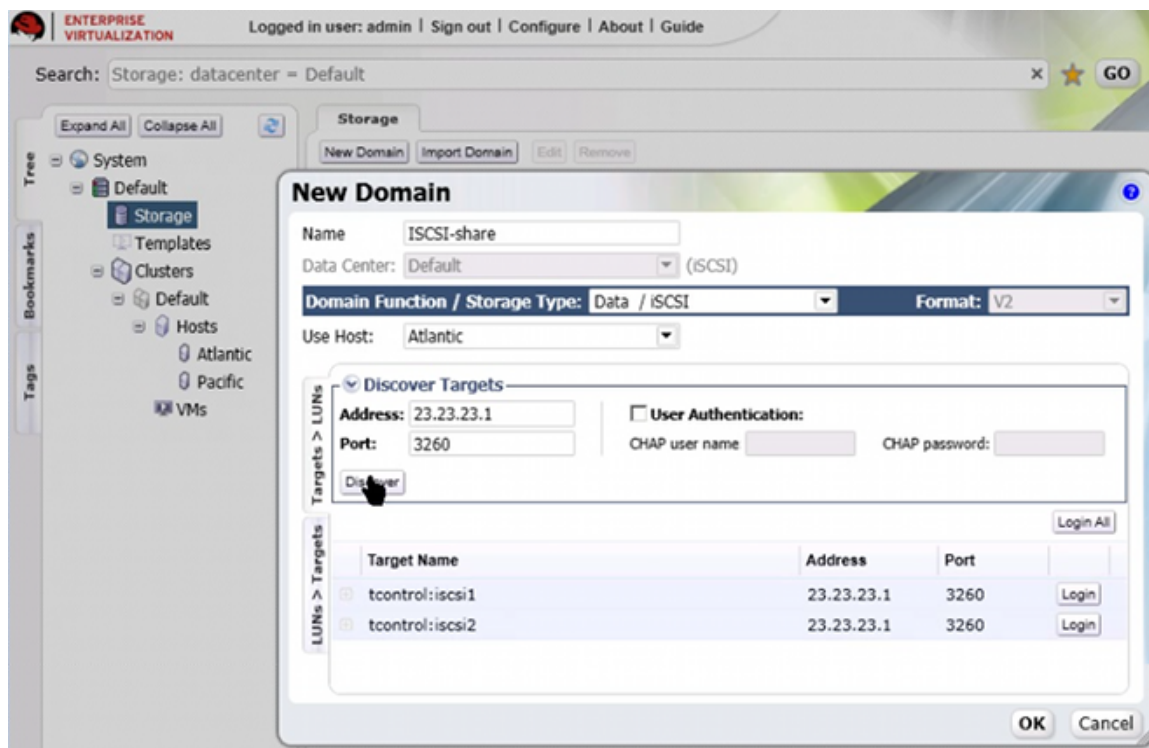


Figure 15. Discover iSCSI target

- a. **Address:** Enter the address of the iSCSI target.
- b. **Port:** Select the port to connect to. The default is 3260.
- c. **User Authentication:** If required, enter the username and password.

Click the **Discover** button to find the targets. The iSCSI targets display in the results list with a **Login** button for each target.

4. Click **Login** on the first target to display the list of existing LUNs. Click the + icon under the Target Name to expand the LUN list. Tick the **Add LUN** checkbox to use the selected LUN as the iSCSI data domain.

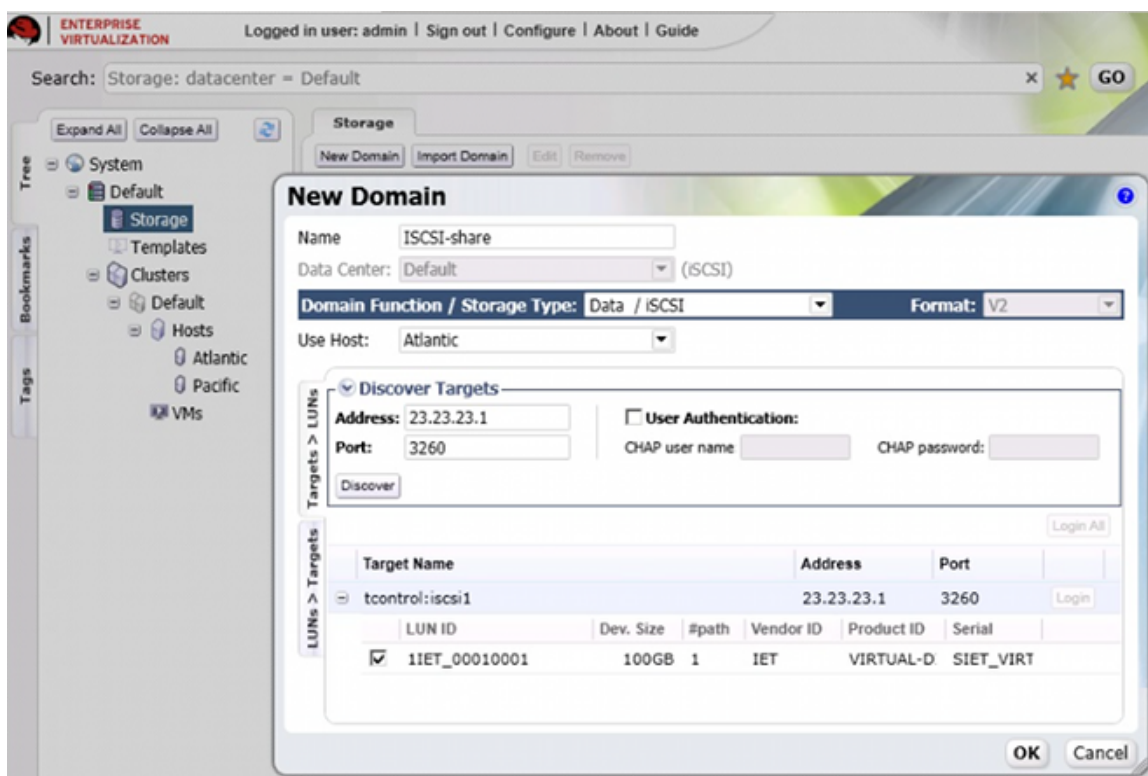


Figure 16. Attach LUNs to iSCSI domain

- Click **OK**. The new **iSCSI-share** 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.

You have created an iSCSI storage domain. Now, you need to attach an ISO domain to the data center and upload installation images so you can use them to create virtual machines. Proceed to [Section 7, “Attach and Populate ISO Domain”](#).

6.3. Create an FCP Data Domain

Because you have selected FCP as your default storage type during the Manager installation, you will now create an FCP storage domain. Red Hat Enterprise Virtualization platform supports FCP storage domains spanning multiple pre-defined Logical Unit Numbers (LUNs).

To add FCP storage

- Navigate to the **Tree** pane and click the **Expand All** button. Under **System**, select the **Default** data center and click on **Storage**. The available storage domains display on the results list. Click **New Domain**.
- The **New Domain** dialog box displays.

New Domain

Name:

Data Center: (Fibre Channel)

Domain Function / Storage Type: Format:

Use Host:

LUN ID	Dev. Size	#path	Vendor ID	Product ID	Serial
--------	-----------	-------	-----------	------------	--------

OK Cancel

Figure 17. Add FCP Storage

Configure the following options:

- Name:** Enter **FCP-share**.
 - Data Center:** The **Default** data center is already pre-selected.
 - Domain Function / Storage Type:** The **Data/ Fibre Channel** option is already pre-selected because during installation you set FC as your data center's default storage type. The storage domain types which are not compatible with the Data Center will not be available.
 - Use Host:** Select any of the hosts from the drop down menu. Only hosts which belong in this data center will display in this list. Ensure that the LUN you intend to use is available on the host you select.
 - The list of existing LUNs display. On the selected LUN, tick the **Add LUN** checkbox to use it as the FCP data domain.
- Click **OK**. The new **FCP-share** 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.

You have created an FCP storage domain. Now, you need to attach an ISO domain to the data center and upload installation images so you can use them to create virtual machines. Proceed to [Section 7, "Attach and Populate ISO Domain"](#).

7. Attach and Populate ISO Domain

You have defined your first storage domain to store virtual guest data, now it is time to configure your second storage domain, which will be used to store installation images for creating virtual machines. You have already created a local ISO domain during the installation of the Red Hat Enterprise Virtualization Manager. To use this ISO domain, attach it to the Default data center.

To attach the ISO domain

- Navigate to the **Tree** pane and click the **Expand All** button. Click **Default**. On the results list, the **Default** data center displays.

- On the details pane, select the **Storage** tab and click the **Attach ISO** button.
- The **Attach ISO Library** dialog appears with the available ISO domain. Select the **local-iso-share** domain and click **OK**.

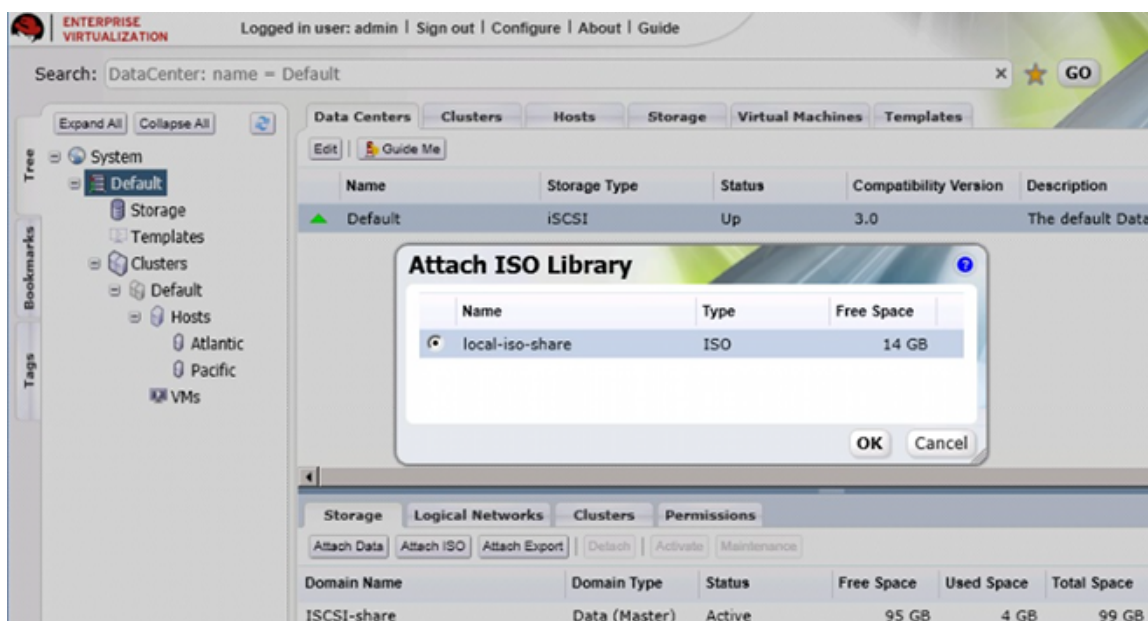


Figure 18. Attach ISO Library

- The ISO domain appears in the results list of the **Storage** tab. It displays with the *Locked* status as the domain is being validated, then transits to *Inactive*.
- Select the ISO domain and click the **Activate** button. The status changes to *Locked* and then to *Active*.

Media images (CD-ROM or DVD-ROM in the form of ISO images) must be available in the ISO repository for the virtual machines to use. To do so, Red Hat Enterprise Virtualization provides a utility that copies the images and sets the appropriate permissions on the file. For this lab, both the file provided to the utility and the ISO share have to be accessible from the Red Hat Enterprise Virtualization Manager.

Log in to the Red Hat Enterprise Virtualization Manager server console to upload images to the ISO domain.

To upload ISO images

- Create or acquire the appropriate ISO images from boot media. Ensure the path to these images is accessible from the Red Hat Enterprise Virtualization Manager server.
- The next step is to upload these files. First, determine the available ISO domains by running:

```
# rhvm-iso-uploader list
```

You will be prompted to provide the admin user password which you are using to connect to the administration portal. The tool lists the name of the ISO domain that you have already attached in the previous lab:

```
ISO Storage Domain List:
local-iso-share
```

Lab 1 - Install and Configure Basic Setup

Now you have all the information required to upload the required files. To copy your installation images to the ISO domain, run:

```
# rhvm-iso-uploader upload -i local-iso-share [file1] [file2] .... [fileN]
```

3. After the images have been loaded, check that they are available for use in the Manager administration portal.
 - a. Navigate to the **Tree** and click the **Expand All** button. Click **Storage**
 - b. On the **Storage** tab, click **local-iso-share** to display its details pane.
 - c. Select the **Images** subtab. The list of available images should be populated with the files which you have uploaded. In addition, the **RHEV-toolsSetup.iso** and **virtio-win.vfd** images should have been automatically uploaded during installation.

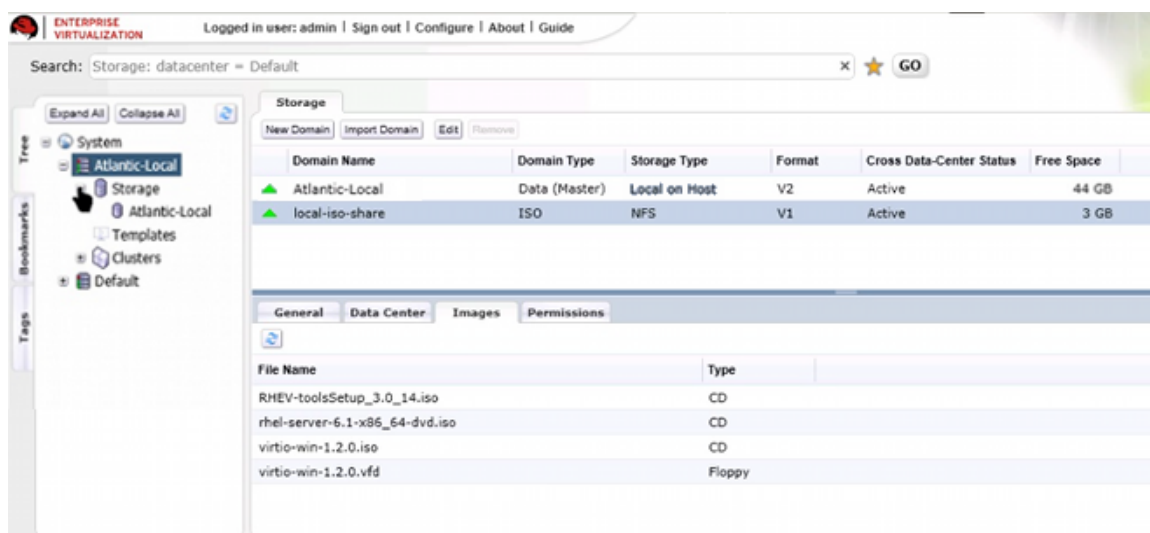


Figure 19. Uploaded ISO images

Now that you have successfully prepared the ISO domain for use, you have completed Lab 1 and are ready to start creating virtual machines.

8. Lab 1 - Summary

You have reached your first Track A goal of setting up and configuring the infrastructure required to create and run virtual machines. You have successfully installed the Red Hat Enterprise Virtualization Manager and Red Hat Enterprise Virtualization Hypervisors, defined logical networks for storage devices, attached storage domains to the data center, and prepared ISO images.

The next lab [Lab 2 - Create Virtual Machines](#) on Track A teaches you how to create Red Hat Enterprise Linux virtual machines and templates.

Lab **1**



**Install and
Configure
Basic Setup**

Next
2

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Lab 2 - Create Virtual Machines



Lab 2 shows you how to create Red Hat Enterprise Linux virtual machines and use templates. The goal of this lab is to have at least two running virtual machines, and be able to connect to them.

This lab assumes that you have successfully installed and configured Red Hat Enterprise Virtualization, and have the necessary Red Hat Enterprise Linux installation images. You should have completed [Lab 1 - Install and Configure Basic Setup](#) if you are on Track A or [Lab 9 - Install and Configure Minimal Setup](#) if you are on Track B.

Lab 2 - Objectives

This lab takes you through the tasks necessary to create Red Hat Enterprise Linux virtual machines. In addition, you will learn how to create and use virtual machine templates. This lab should take you about 25 minutes.

[Section 1, "Create a Red Hat Enterprise Linux Virtual Machine"](#) shows you how to create a new Red Hat Enterprise Linux virtual machine, configure storage and networking, and install the operating system. (10 minutes)

[Section 2, "Create a Red Hat Enterprise Linux Template"](#) shows you how to use the Red Hat Enterprise Linux virtual machine as a basis to create a template. (10 minutes)

[Section 3, "Clone a Red Hat Enterprise Linux Virtual Machine"](#) shows you how to clone a virtual machine from the Red Hat Enterprise Linux template. (5 minutes)

1. Create a Red Hat Enterprise Linux Virtual Machine

In your current configuration, you should have at least one host available for running virtual machines, and the required installation images in your ISO domain. This section guides you through the creation of a Red Hat Enterprise Linux 6 virtual server. You will perform a normal attended installation using a virtual DVD.

To create a Red Hat Enterprise Linux server

1. Navigate to the **Tree** pane and click **Expand All**. Click the **VMs** icon in the **Default** cluster under the **Default** data center. On the **Virtual Machines** tab, click **New Server**.

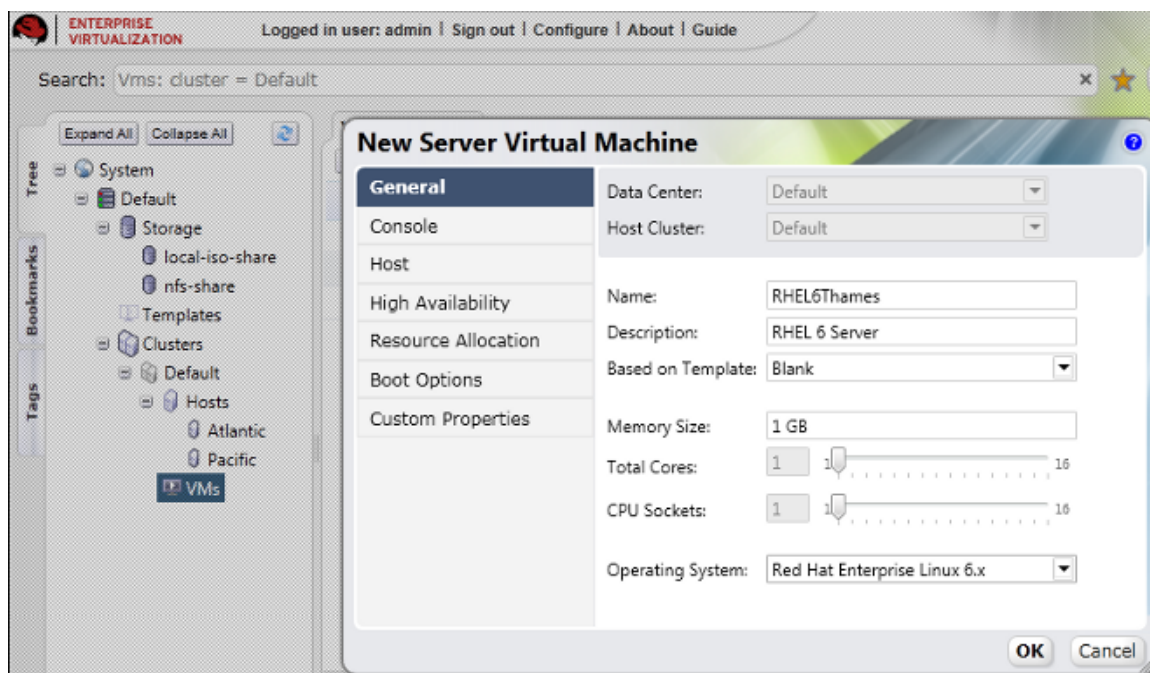


Figure 20. Create new Red Hat Enterprise Linux server

Fill in the **Name** field, set the **Memory Size** to **1 GB**, and set the **Operating System** to **Red Hat Enterprise Linux 6.x**. You may alter other settings but this example retains the defaults. Click **OK** to create the virtual machine.

2. A **New Virtual Machine - Guide Me** window opens. This allows you to define networks for the virtual machine. Click **Configure Network Interfaces**.

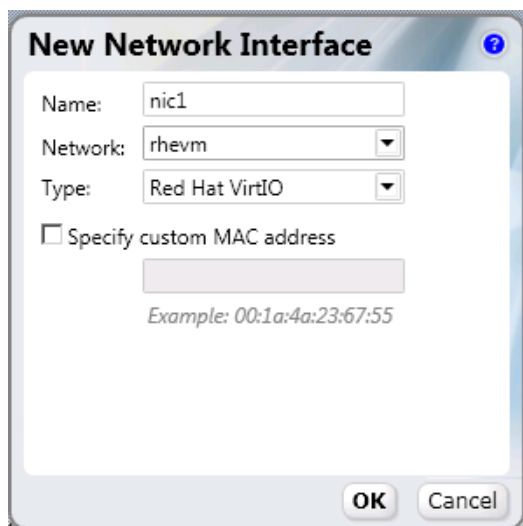


Figure 21. New Network Interface configurations

Retain all the default settings and click **OK**.



Note

Red Hat VirtIO is the default selection for Red Hat Enterprise Linux virtual machines. This para-virtualizes network traffic to the guest and improves performance.

3. You are returned to the **Guide Me** window. This time, click **Configure Virtual Disks** to add storage to the virtual machine.




Figure 22. New Virtual Disk configurations

In the **Size (GB)** field, enter 15. Retain all other default settings and click **OK**.

4. Click **Configure Later** to close the Guide Me window. Your new Red Hat Enterprise Linux 6 virtual machine displays in the **Virtual Machines** tab.

You have now created your first Red Hat Enterprise Linux virtual machine. Before you can use your virtual machine, install an operating system on it.

To install the Red Hat Enterprise Linux operating system

1. Before you can use your virtual machine, you have to install an operating system on it. To do so, right click the virtual machine and select **Run Once**. Configure the following options:
 - **Attach CD:** Red Hat Enterprise Linux 6
 - **Boot Sequence:** CD-ROM
 - **Display protocol:** SPICE
2. Retain the default settings for the other options and click **OK** to start the virtual machine.
3. Select the virtual machine and click the **Console** () icon. As this is your first time connecting to the virtual machine, allow the installation of SPICE ActiveX and the SPICE client.

4. After the SPICE plugins have been installed, select the virtual machine and click **Console** again. This displays a window to the virtual machine, where you will be prompted to begin the installation process. For further instructions, see the *Red Hat Enterprise Linux Installation Guide*.
5. After the installation has completed, reboot the virtual machine.

You can now connect to your Red Hat Enterprise Linux 6 virtual machine and start using it.

2. Create a Red Hat Enterprise Linux Template

Now that you have created a Red Hat Enterprise Linux virtual machine, you can save its settings into a template. This template will retain the original virtual machine's configurations, including virtual disk and network interface settings, operating systems and applications. You can use this template to rapidly create replicas of the original virtual machine.

Before your virtual machine can be used to create a template, it has to be sealed. This ensures that machine-specific settings are not propagated through the template.

To prepare a Red Hat Enterprise Linux virtual machine for use as a template

1. Connect to the Red Hat Enterprise Linux 6 virtual machine to be used as a template. Flag the system for reconfiguration by running the following command as root:

```
# touch /.unconfigured
```

2. Remove ssh host keys. Run:

```
# rm -rf /etc/ssh/ssh_host_*
```

3. Shut down the virtual machine. Run:

```
# poweroff
```

4. The virtual machine has now been sealed, and is ready to be used as a template for Linux virtual machines.

To create a template from a Red Hat Enterprise Linux virtual machine

1. Back in the administration portal, click the **VMs** icon on the **Virtual Machines** tab, select the sealed Red Hat Enterprise Linux 6 virtual machine. Ensure that its status is **Down**.
2. Click **Make Template**. The **New Virtual Machine Template** displays.

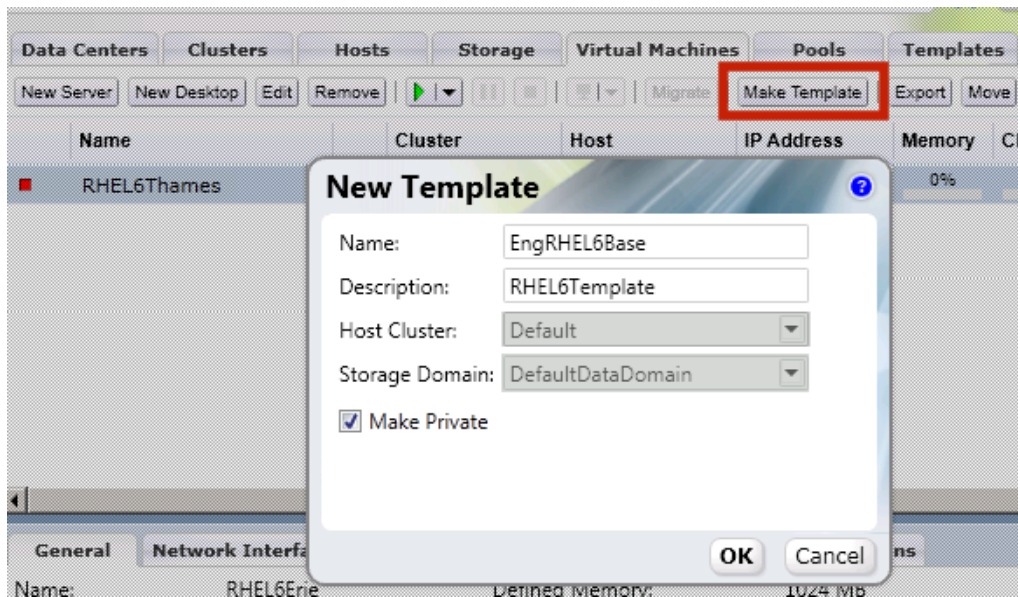


Figure 23. Make new virtual machine template

Enter a suitable **Name** and **Description** for the template. Retain all the other default settings and click **OK**.

3. On the **Tree** pane, click **Templates**. On the **Templates** tab, the template displays the "Image Locked" status icon while it is being created. During this time, the action buttons for the template remain disabled. Once created, the action buttons are enabled and the template is ready for use.

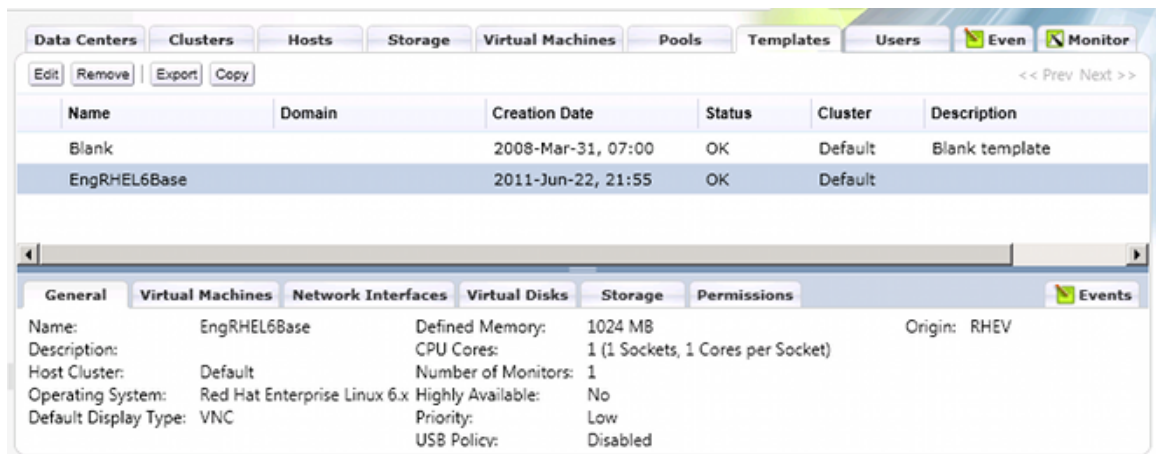


Figure 24. New Red Hat Enterprise Linux template

You have prepared a virtual machine template for use. You can now clone Red Hat Enterprise Linux virtual machines using this template.

3. Clone a Red Hat Enterprise Linux Virtual Machine

In the previous section, you created a Red Hat Enterprise Linux template complete with pre-configured storage, networking and operating system settings. Now, you will use this template to deploy a pre-installed virtual machine.

To clone a Red Hat Enterprise Linux virtual machine from a template

1. Navigate to the **Tree** pane and click **Expand All**. Click the **VMs** icon in the **Default** cluster under the **Default** data center. On the **Virtual Machines** tab, click **New Server**.

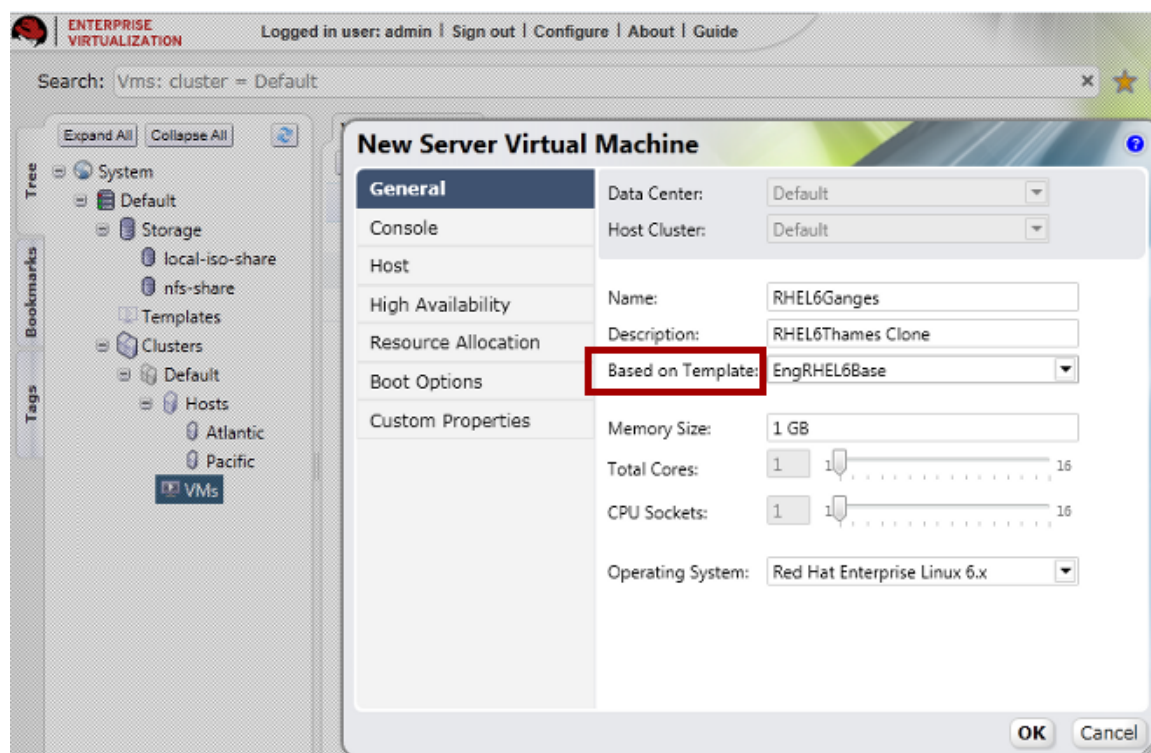



Figure 25. Clone a Linux server

- a. On the **General** tab, select your newly created Red Hat Enterprise Linux template from the **Based on Template** list.
 - b. Enter a suitable **Name** and **Description**, and accept the default values inherited from the template in the rest of the fields. You can change them if needed.
 - c. Click the **Resource Allocation** tab. On the **Provisioning** field, click the drop down menu and select the *Clone* option. Set the clone method under **Disk** to *Preallocated*.
2. Retain all other default settings and click **OK** to create the virtual machine. The virtual machine displays in the Virtual Machines list with a status of "Image Locked" until the virtual disk is created. The virtual disk and networking settings are inherited from the template, and do not have to be reconfigured.
 3. Click the **Run**  icon to turn it on. This time, the **Run Once** steps are not required as the operating system has already been installed onto the virtual machine hard drive. Click the green **Console** button to connect to the virtual machine.

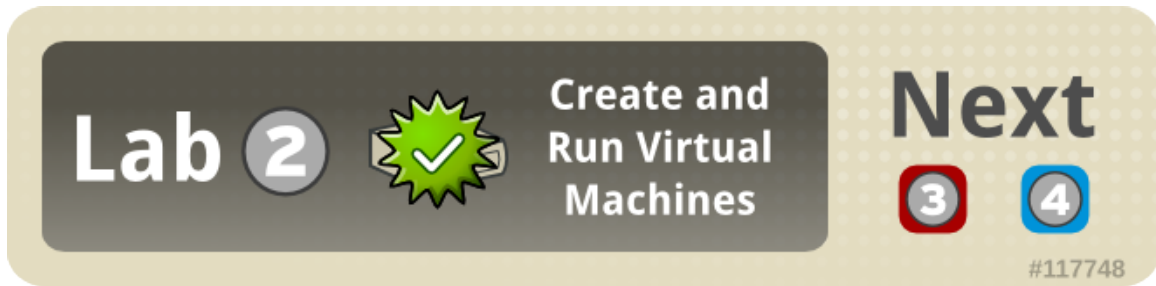
You have now learned how to create Red Hat Enterprise Linux virtual machines from scratch and based on a template. Next, you will learn how to access these virtual machines from a user portal.

4. Lab 2 - Summary

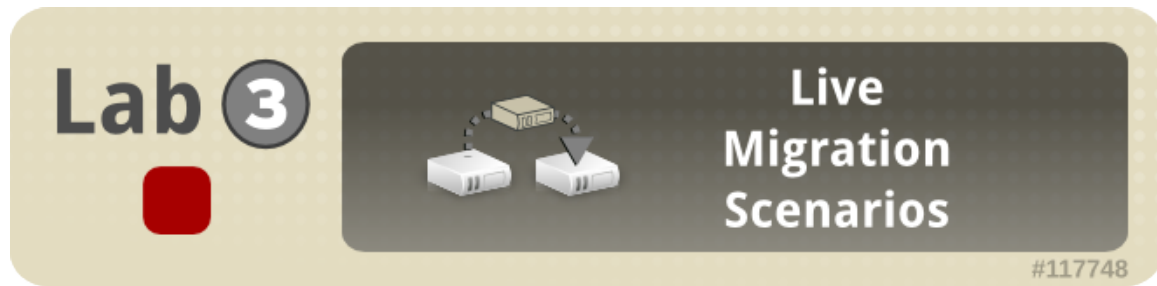
You have reached your second Track A and second Track B goals respectively to create and prepare virtual machines for use. In this lab, you have successfully created Red Hat Enterprise Linux virtual machines, installed operating systems, defined storage and networks for the virtual machines, and utilized templates to deploy virtual machines.

- The next lab on Track A [Lab 3 - Live Migration Scenarios](#) teaches you how to activate virtual machine live migration for occasions when your hardware is experiencing downtime.

- The next lab on Track B [Lab 4 - Power User Portal](#) teaches you how to create and manage virtual machines in the Power User Portal.



Lab 3 - Live Migration Scenarios



Live migration enables you to move a virtual machine to another host while the machine and its applications are still running. You can activate automatic live migration for occasions when you perform hardware maintenance or if your hosts become non-operational, and your virtual machines will be migrated with no interruptions or delay. At the end of this lab you will have configured cluster policies and be able to balance your hosts' workloads.

This lab is intended for Track A. It assumes that you have successfully completed [Lab 2 - Create Virtual Machines](#), and have at least two virtual machines running on your hosts.

Lab 3 - Objectives

This lab takes you through the tasks of optimizing your host clusters so you can activate virtual machine live migration when necessary. This lab should take you about 10 minutes.

[Section 1, "Activate Live Migration"](#) shows you how to live migrate virtual machines from host to host. (2 minutes)

[Section 2, "Move Host into Maintenance"](#) demonstrates virtual machine automatic live migration when a host is placed in maintenance mode. (3 minutes)

[Section 3, "Define Cluster Policy"](#) shows you how to define a cluster power saving policy, then demonstrates virtual machine live migration when a host is loaded beyond its threshold. (5 minutes)

1. Activate Live Migration

Now that you have several virtual machines running on each host, you can configure live migration. This provides a backup for the virtual machines - if they are running mission critical workloads, and cannot be powered off, you need to ensure that they must always have a host available to run on. Live migration allows you to move virtual machines to different hosts should the host they are running on experience scheduled or unscheduled downtime, without causing the virtual machine's operations to be suspended.

In this example, you will see how virtual machines are live migrated from one host to any of the available hosts in the same cluster.

To live migrate virtual machines

1. Navigate to the **Tree** pane and click **Expand All**. Under **Clusters**, click the **VMs** icon. The list of available virtual machines is displayed in the **Virtual Machines** tab.
2. Select one or more virtual machines and click **Migrate**. The **Migrate Virtual Machines** dialog displays.

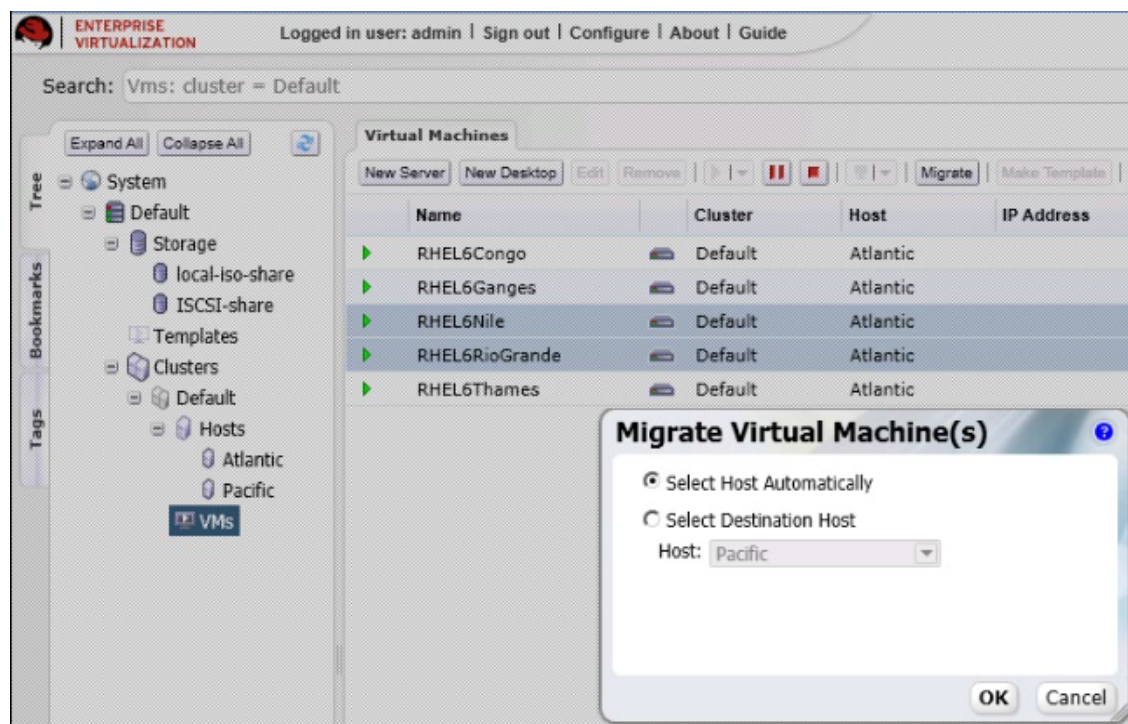


Figure 26. Live migrate a virtual machine to another host

You can select a target host, or allow the system to automatically select one of the available hosts in the cluster. In this case, use the default option.

3. Click **OK**. The virtual machines will live migrate to another host in the cluster.

2. Move Host into Maintenance

In the previous section you watched a user-triggered live migration of virtual machines. Manually activating live migration is useful for occasions when hosts are brought down for maintenance. The virtual machines on the host which is being placed into maintenance can be automatically live migrated to another host in the cluster, provided that power management has been properly configured for the hosts. More information on configuring power management can be found in Advanced Lab 6 - High Availability Scenarios.

To move a host into maintenance mode

1. Navigate to the **Tree** pane and click **Expand All**. Under **Clusters**, click the **Hosts** icon. The list of available hosts is displayed in the **Hosts** tab.
2. Select the host and click the **Maintenance** button. In this example, select the **Atlantic** host.

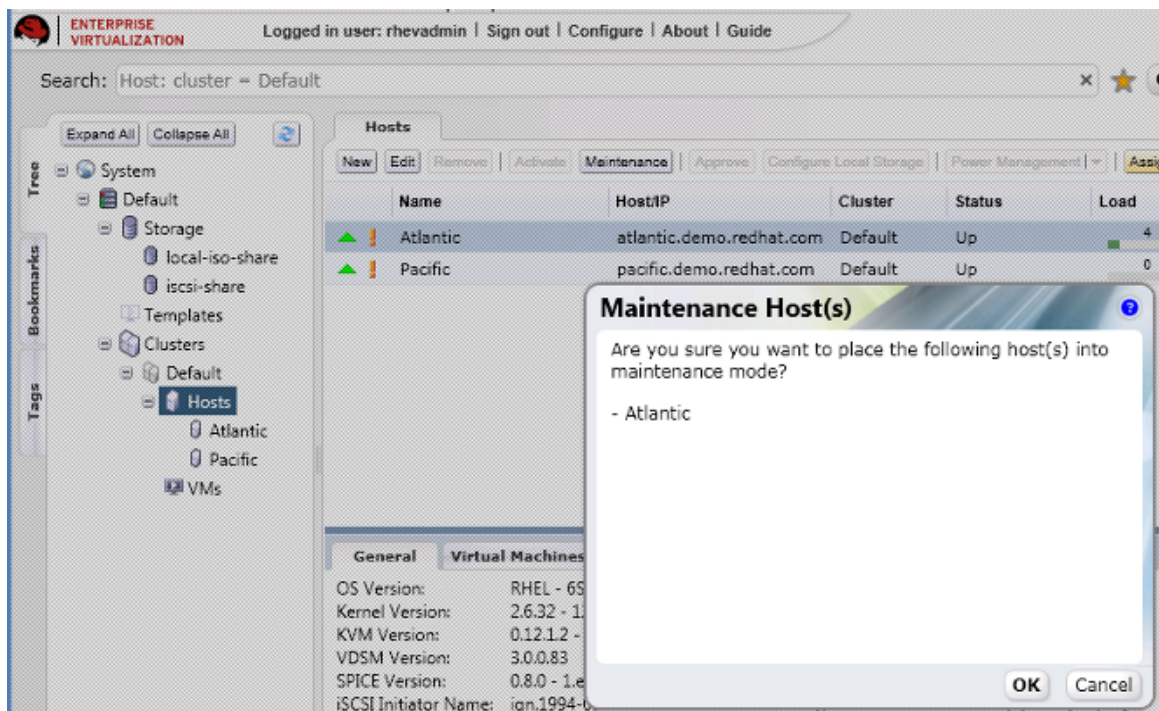


Figure 27. Move a host into maintenance

3. Click **OK**. This migrates all virtual machines to alternative hosts, and places the **Atlantic** host into maintenance. The **Status** field of the host changes to *Preparing for Maintenance*, followed by *Maintenance*. The icon changes to indicate that the host is in maintenance.
4. Now, it is safe to perform an upgrade, or any other schedule maintenance, on the host. After you have completed your maintenance, reactivate the host by selecting it and clicking the **Activate** button.

3. Define Cluster Policy

Until now, you have worked without a specific cluster policy. The virtual machines were started on a host selected on round robin logic — as long as there are available resources on the host, virtual machines can be migrated onto it. Furthermore, there was no load balancing of running virtual machines. For example, a virtual machine will remain on the host it was run initially unless it is specifically moved, either by user triggered migration (maintenance mode or manual virtual machine migration) or by a system high availability event (this will be explained in the advanced High Availability lab). Cluster policy allows you to better control the scheduling of virtual machines and to perform load balancing.

Two types of policies are available:

- **Even Distribution:** You can set a maximum service level threshold for the hosts in the cluster. If a host is above the threshold, then the Red Hat Enterprise Virtualization Manager will live migrate virtual machines off this host to other hosts in the cluster, as long as the other hosts' loads are below this threshold. This affects the scheduling of running new machines in a similar manner.
- **Power Saving:** This is a superset of the even distribution policy. A low threshold is set for consolidating virtual machines. If a server in the cluster drops below the threshold, then the virtual machines on this server are live migrated to other servers in the cluster, as long as the other servers are not above the maximum service level threshold.

In the following example you will set and test both thresholds.

To configure cluster load and power management policies

1. Navigate to the **Tree** pane and click **Expand All**. Click the **Default** cluster icon, the **Clusters** tab displays in the results list. Select the **Default** cluster to display its details pane.
2. On the **General** subtab, you can see that the policy is set to None. Click **Edit Policy**. The **Edit Policy** dialog displays.
3. Use the slider to set the thresholds. In this example, you will select the **Power Saving** policy, and set the minimum and maximum levels to 30% and 70% respectively.

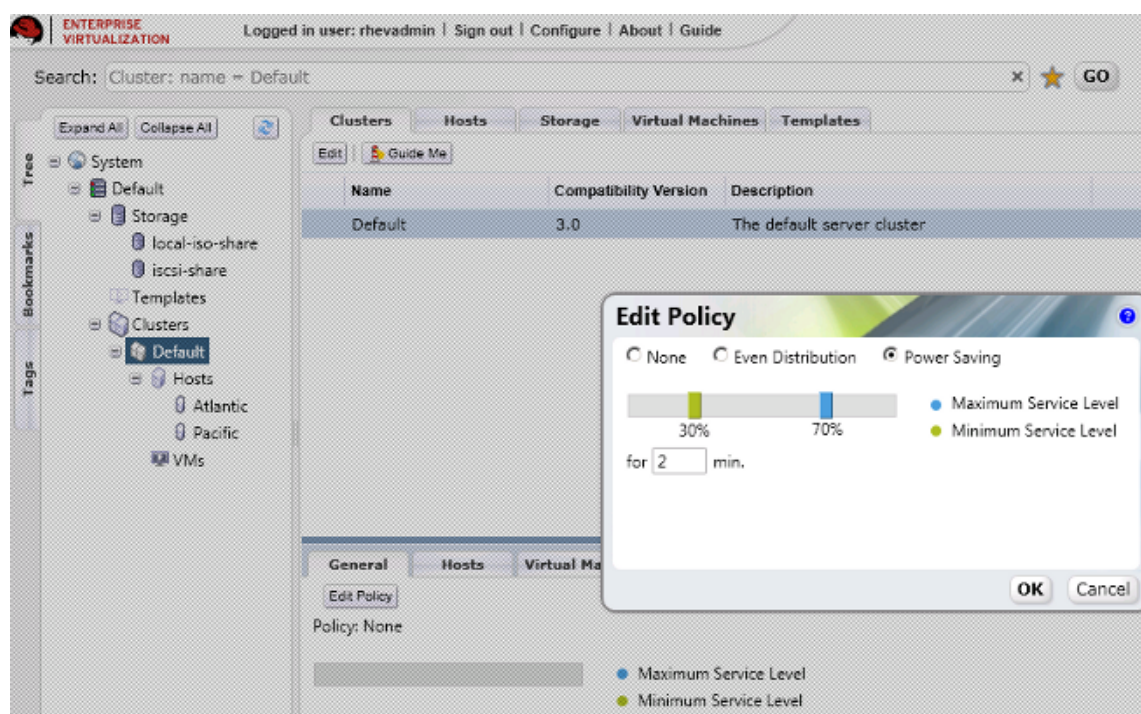


Figure 28. Define power saving policy for host cluster

4. You can also set the time (in minutes) that a host should remain under or above the specified thresholds before the policy is applied. This is to prevent a transient load from triggering unnecessary load balancing. Set this according to the desired response time, this example retains the defaults.
5. Click **OK** to set the policy for the cluster.

Now you can test these new settings. After the maintenance lab you now have a host (Atlantic) that does not have any virtual machines running. Select one of the Red Hat Enterprise Linux virtual machines and load it, then watch as the hosts in the cluster balance the virtual machines' workloads.

To test cluster policies

1. Select one of your Red Hat Enterprise Linux virtual machines and click the **Console** icon.
2. Load it. This example uses multiple threads of the **dd** command each copying 1G of data. You can use any other methods to load your virtual machine.

```
# dd if=/dev/vda of=tmp bs=32 count 30000000 &
# dd if=/dev/vda of=tmp1 bs=32 count 30000000 &
# dd if=/dev/vda of=tmp2 bs=32 count 30000000 &
# dd if=/dev/vda of=tmp3 bs=32 count 30000000 &
# dd if=/dev/vda of=tmp4 bs=32 count 30000000 &
```


Depending on your host resources, you may need to load more than one virtual machine in order to load the host. Alternatively, change the number of cores assigned to the loaded virtual machine so that it is equal to the number of cores available on the host, then increase the number of concurrent threads.

3. On the administration portal, click **Hosts** on the **Tree** pane. On the **Hosts** tab, you can see the number of virtual machines on each host.

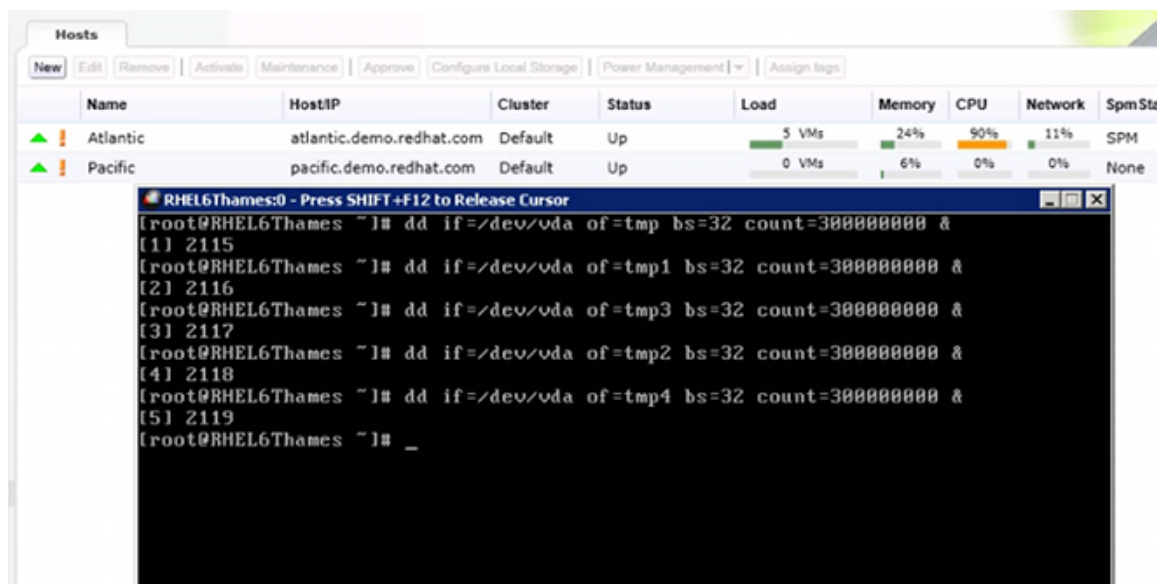


Figure 29. Hosts balancing virtual machine load

Wait until the wait time expires while the threshold is exceeded. You will see the unloaded virtual machines migrate to the vacant host trying to reduce the load.

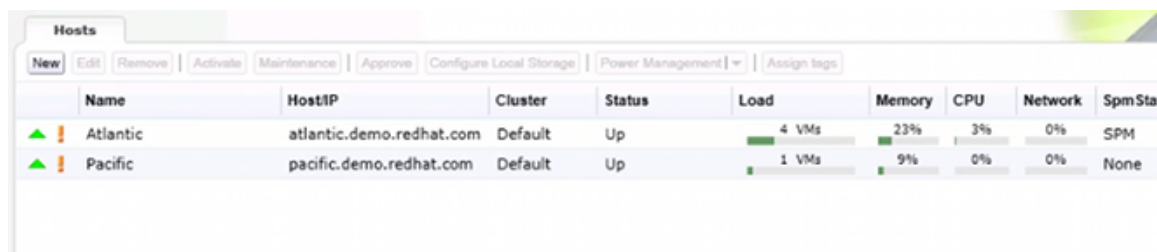


Figure 30. Virtual machines migrating to vacant host

4. After the load reduces wait again, and make sure all the virtual machines are unloaded. You will see that virtual machines consolidate to a single host (as long as there is enough memory resources to accommodate all the virtual machines).

4. Lab 3 - Summary

You have reached your third Track A goal to configure cluster policies for virtual machine live migration. In this lab, you have live migrated virtual machines when a host is brought down for maintenance, and configured a cluster policy to activate virtual machine live migration when the host's workload exceeds its defined threshold.

The next lab on Track A [Lab 4 - Power User Portal](#) teaches you how to create and manage virtual machines in the Power User Portal.

Lab 3



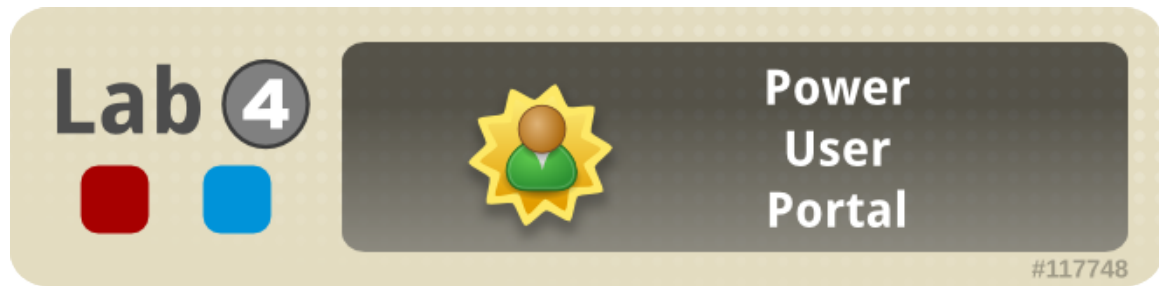
Live Migration Scenarios

Next

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Lab 4 - Power User Portal



The power user portal is a trimmed down version of the administration portal, tailored for end user self provisioning of virtual machines. It is simultaneously a gateway for logging in to virtual machines, and also a platform to create virtual machines and manage resources specific to those virtual machines. This lab illustrates the functions of the power user portal, which is available to users with `PowerUserRole` permissions. At the end of this lab you will be able to create and manage virtual machines from the power user portal.

This lab assumes that you have correctly installed and configured Red Hat Enterprise Virtualization so you can log in to the power user portal. You should have at least two running virtual machines in your environment. You should have successfully completed [Lab 3 - Live Migration Scenarios](#) if you are on Track A or [Lab 2 - Create Virtual Machines](#) if you are on Track B.

To log in to the power user portal, all you need is either a Red Hat Enterprise Linux client running Mozilla Firefox 3.5 and higher (you can use your Manager server) or a Windows client running Internet Explorer 7 and higher (you can use your administration portal client).

Lab 4 - Objectives

This lab takes you through the tasks necessary to create virtual machines from the power user portal and assign user permissions. This lab should take you about 35 minutes.

[Section 1, "Add IPA Domain"](#) shows you how to attach an IPA domain to the Red Hat Enterprise Virtualization Manager and create IPA user accounts. (15 minutes)

[Section 2, "Assign PowerUserRole Permissions"](#) shows you how to assign privileges for a user to access the power user portal. (2 minutes)

[Section 3, "Log in to the Power User Portal"](#) shows you how to install required SPICE plugins and log in to the power user portal. (3 minutes)

[Section 4, "Create a Red Hat Enterprise Linux Virtual Machine"](#) shows you how to create a Red Hat Enterprise Linux virtual machine based on an existing template. (5 minutes)

[Section 5, "Access a Virtual Machine"](#) shows you how to connect to a virtual machine. (3 minutes)

[Section 6, "Create a Virtual Machine Template"](#) shows you how to create a virtual machine template from the power user portal. (5 minutes)

[Section 7, "Verify Permissions"](#) shows you how to view permissions on virtual machines and templates. (2 minutes)

1. Add IPA Domain

Previously, you have logged in to the administration portal as the **admin** user on the **internal** domain, which was automatically set up during the installation of the Red Hat Enterprise Virtualization

Manager. However, to authenticate new users, you need an external directory service. The term directory service refers to the collection of software, hardware, and processes that store information about an enterprise, subscribers, or both, and make that information available to users. Red Hat Enterprise Virtualization supports IPA and Active Directory.

This lab assumes that you already have an existing IPA directory service. However if you need further assistance to install and configure IPA, see the *Red Hat Enterprise Linux — Enterprise Identity Management Guide*. In this lab, you will attach an IPA domain to the Red Hat Enterprise Virtualization Manager using the **rhevmanage-domains** tool, and create users in the IPA directory. Alternatively, if you have an Active Directory setup, you can attach it to the manager and use it for this lab. See [Section 1, “Add Active Directory Domain”](#), and then proceed to [Section 2, “Assign PowerUserRole Permissions”](#).

Perform the following procedure on the Red Hat Enterprise Virtualization Manager server.

To add an IPA domain

1. Log in to the Red Hat Enterprise Virtualization Manager server console.
2. Run the following command, and provide the domain administrator password when prompted:

```
# rhevm-manage-domains -action=add -domain=ipadomain.demo.redhat.com -user=admin -interactive
```

3. Restart the service for the changes to be applied across the system.

```
# service jbossas restart
```

Restarting the JBoss service disconnects you from the administration portal. After a few minutes, the restart completes, and the IPA domain is added to the Red Hat Enterprise Virtualization Manager.

1.1. Add New Users in the IPA Directory

Before you can add users in the Red Hat Enterprise Virtualization Manager, you must first add them in the IPA directory. For this track, you need at least two users. The names used in this guide are **rhepower** and **rhevuser**. Perform the following procedure on the Manager server.

1. To add users you must first authenticate as the directory server administrator. Use the **kinit admin** command to do this, entering the administrator password when prompted.

```
$ kinit admin
Password for admin@DIRECTORY.DEMO.REDHAT.COM:
```

2. To add a user interactively use the **ipa user-add** command. The command will prompt you for all values required to create the user.

```
$ ipa user-add
First name: RHEV
Last name: User
User login [rhevuser]:
-----
Added user "rhevuser"
-----
User login: rhevuser
First name: RHEV
```

```
Last name: User
Full name: RHEV User
Display name: RHEV User
Initials: RU
Home directory: /home/rhevuser
GECOS field: rhevuser
Login shell: /bin/sh
Kerberos principal: rhevuser@DIRECTORY.DEMO.REDHAT.COM
UID: 1316000004
```

3. To allow the new user to log in you must set their initial password. Use the **ipa passwd** command, followed by the username for which you are setting the password, to do this.

```
$ ipa passwd rhevuser
Password:
Enter Password again to verify:
-----
Changed password for "rhevuser@DIRECTORY.DEMO.REDHAT.COM"
-----
```

4. A new user has been added to the directory server and their password has been set. You are now able to add them to the Red Hat Enterprise Virtualization Manager. For this track, repeat steps 2 and 3 for another user called **rhevpower** and as necessary if you wish to use other users.

Now, you know how to create users for Red Hat Enterprise Virtualization. Next, you will learn how to assign roles and privileges to these users.

2. Assign PowerUserRole Permissions

A Power User can perform some administrative functions in the User Portal, including creating and editing virtual machines, creating templates, and working with snapshots. In addition, a Power User who creates a virtual machine from the User Portal will be automatically assigned to the virtual machine. A Power User has permissions for the assigned virtual machine only, not for all virtual machines in the enterprise.

In Red Hat Enterprise Virtualization Manager, permissions are set on system objects, including data centers, clusters and virtual machines. This permission is user specific, while the scope of permission is defined by the user role. You will learn more about permissions in [Lab 5 - Manage Multi-Level Administrators](#).

For a user to log in to the power user portal, the user must have power user permissions on any system object. However, in order to allow a user to create both virtual machines and templates, as you are going to do in this lab, the permission has to be assigned for the data center level.

Perform this procedure in the administration portal as the **admin** user in the **internal** domain.

To assign PowerUserRole permissions on a data center

1. On the **Tree** pane, click **Expand All** and select the **Default** data center. On the **Data Center** tab, select the **Default** data center to display the details pane, and click the **Permissions** subtab.

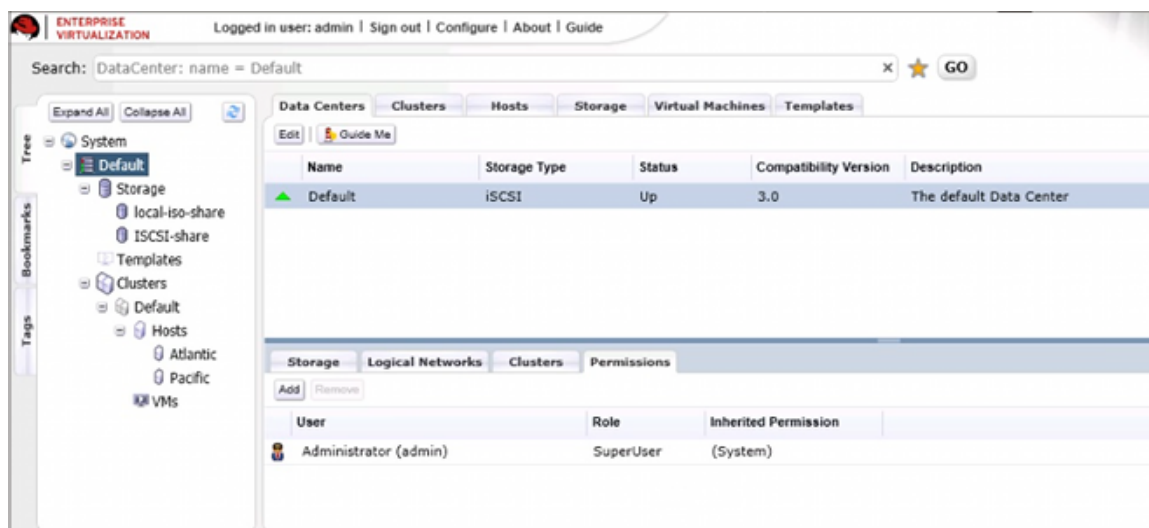


Figure 31. Add permission to user

- Click **Add** to add an existing user. The **Add Permission to User** dialog displays. Under the **Search** fields, select **ipadomain.demo.redhat.com** on the drop-down menu and enter **rhevpower** in the textbox. Click **Go**.
- Select the checkbox of **rhevpower** to be assigned the permissions. Select the **Assign role to user** drop-down list and select **PowerUserRole**.



Figure 32. Add PowerUserRole permission

- Click **OK**. The name of the user displays in the **Permissions** tab, with an icon and the assigned role.

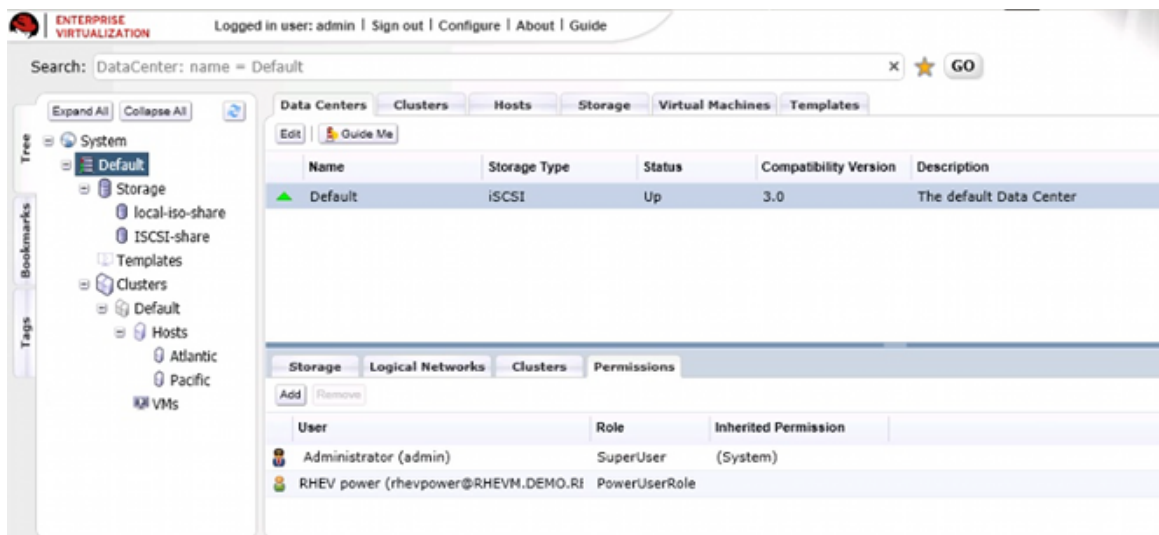


Figure 33. List of user permissions

While you have assigned permissions for the user **rhevpower** to make administrative changes to the data center, this user does not automatically inherit power user permissions for the existing virtual machines in the data center. To do so, repeat the previous procedure, substituting data center for the existing virtual machines.

To assign PowerUserRole permissions on an existing virtual machine

1. On the **Tree** pane, select the **VMs** icon under the **Default** data center. A list of virtual machine displays in the **Virtual Machines** tab. Select the first virtual machine you created, **RHEL6Thames**.
2. Click the **Permissions** subtab on the details pane and click **Add**. The **Add Permission to User** dialog displays. Under the **Search** fields, select **ipadomain.demo.redhat.com** on the drop-down menu and enter **rhevpower** in the textbox. Click **Go**.
3. Select the checkbox of rhevpower to be assigned the permissions and select **PowerUserRole** from the list of permissions. Click **OK**.

You have now enabled **rhevpower** to create virtual machines in the Default data center from the power user portal.

3. Log in to the Power User Portal

Now that you have created a Power User who has full permissions to an existing virtual machine, log in as **rhevpower** to the User Portal. You can use either the same client that you are using for the administration portal, or any Red Hat Enterprise Linux client running Mozilla Firefox.

If you are using a Red Hat Enterprise Linux client, install the SPICE plug-in before logging in to the User Portal. Run:

```
# yum install spice-xpi
```

To log in to the User Portal

1. Open your browser and navigate to `https://rhevm.demo.redhat.com:8443/UserPortal`.
2. The login screen displays. Enter your **User Name** and **Password**, and select the **ipadomain.demo.redhat.com** domain in the drop-down menu. Click **Login**.

Lab 4 - Power User Portal

You have now successfully logged into the User Portal. Here, you can access and monitor all the virtual machines that are available to you. The functions are briefly described in the following figure and list:

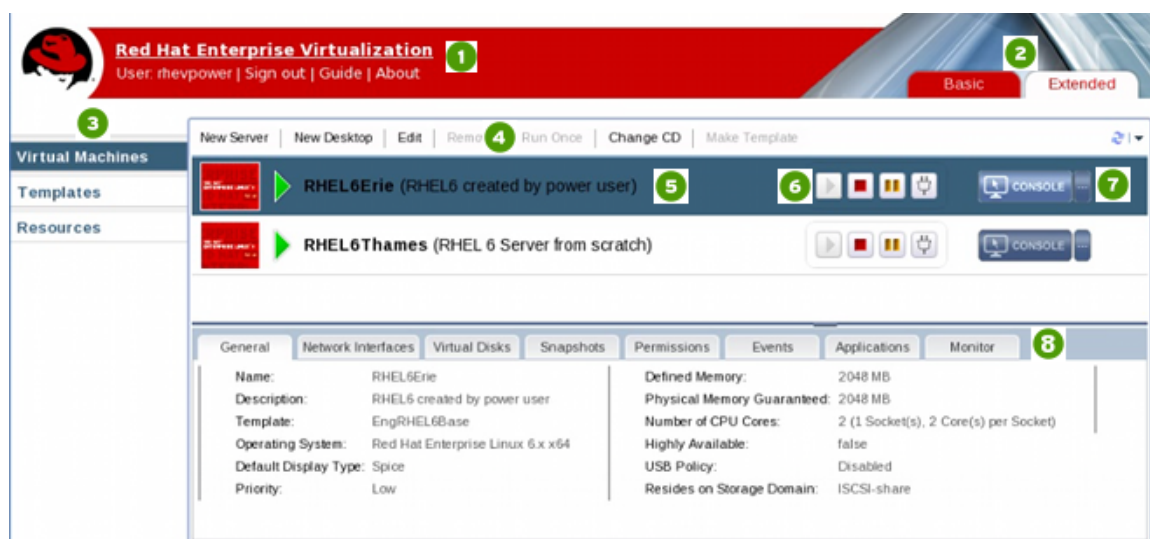


Figure 34. The Power User Portal

1. **Title bar:** This bar displays the name of the User logged in to the portal and the Sign out button.
2. **Portal view:** The Extended view of the User Portal displays by default for power users. You can also switch to the Basic view, which is the default for users with basic permissions. You will be using the Basic portal in Advanced Lab 8 - Virtual Desktops.
3. **Navigation pane:** This pane toggles between displaying Virtual Machines, Templates and Resources. When a tab is selected, the available virtual resources display. This example uses the Virtual Machines tab.
4. **Management bar:** The buttons on this bar enable you to create and make changes to virtual machines.
5. **Virtual machine name:** This list displays the virtual machine's name, operating system logo and status of the virtual machine (running, paused or powered off).
6. **Power buttons:** These buttons allow you to play, stop, pause or power off a virtual machine.
7. **Connect button:** The Console button allows you to connect to virtual machines.
8. **Details pane:** Clicking on a virtual machine displays its statistics in this pane. You can view a virtual machine's details in the General, Events, Applications and Monitor subtabs, and make configuration changes in the Network Interfaces, Virtual Disks, Snapshots and Permissions subtabs.

Once you are familiar with the layout of the power user portal, you can start creating virtual machines, as instructed in the next section.

4. Create a Red Hat Enterprise Linux Virtual Machine

As a Power User you can create, edit and remove virtual machines from the user portal. This includes virtual desktops and virtual servers. You can also create and manage virtual disks and network interfaces of the virtual machines assigned to you.

Here, you will create a virtual machine using the template created in [Section 2, “Create a Red Hat Enterprise Linux Template”](#). Using a template, creating a virtual machine in the power user portal only requires selecting a name and an operating system, and finalizing the creation with the click of a button. As the template has been marked public, it is available to **rhevpower** who has permissions to the data center on which the template resides.

To create a Linux desktop virtual machine

1. Ensure that you are on the **Extended** User Portal. Click **New Server**. A **New Server Virtual Machine** window displays.

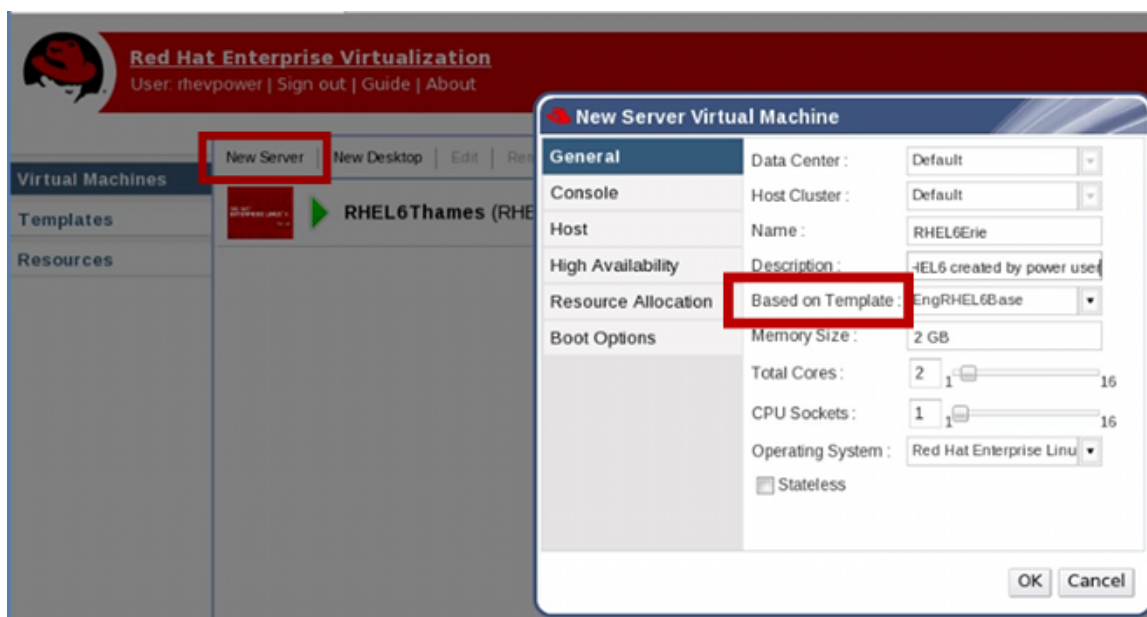


Figure 35. New Server

- a. On the **General** tab, select the *EngRHEL6Base* template from the **Based On Template** field.
 - b. Enter a suitable **Name** and **Description**, and accept the default values inherited from the template in the rest of the fields. You can change them if needed.
 - c. Click the **Resource Allocation** tab. On the **Provisioning** field, click the drop down menu and select the *Clone* option. Set the clone method under **Disks** to *Preallocated*.
2. Retain all other default settings and click **OK** to create the virtual machine.

You have now created your first virtual machine in the power user portal. This virtual machine inherits all the settings from the template, so the storage, networks and operating system have already been set up.

5. Access a Virtual Machine

Now that you have created a virtual machine in the power user portal, you can turn it on and connect to it.

To open a virtual machine console

1. Select **RHEL6Erie** and click the Play button. The virtual machine powers up.
2. When the virtual machine is turned on, the green Play symbol appears next to its name. The virtual machine is now ready for connection.



Figure 36. Virtual machine turned on

3. Click the **Console** button to connect to the virtual machine.
4. A SPICE console window of the virtual machine displays. You can now use the virtual machine in the same way you would use a physical desktop.

After you have finished using the virtual machine, log out of it and close the SPICE console window. You are returned to the user portal.

6. Create a Virtual Machine Template

You already know how to make templates in the administration portal, now you can learn to create templates in the power user portal. As before, if you create a public template, it can be accessed by all users authorized to access the data center on which the template resides. Alternatively, marking it private will make the template available only to you.

To make a template from a virtual machine

1. On the **Virtual Machines** tab, select the virtual machine you wish to use as a basis to create a template. Ensure that it is powered down, then click **Make Template**.

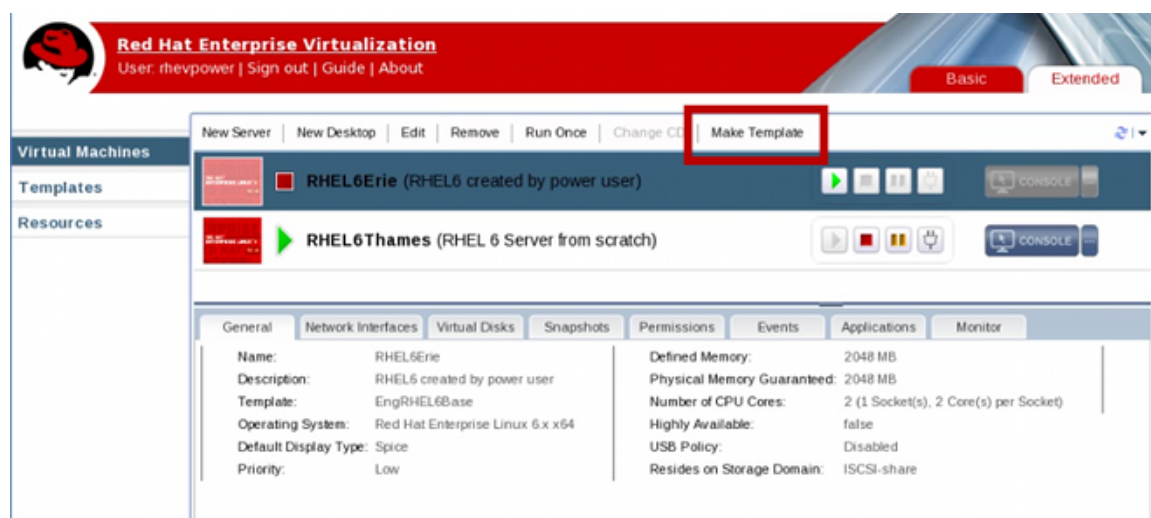


Figure 37. Make Template

2. The **New Template** dialog displays.

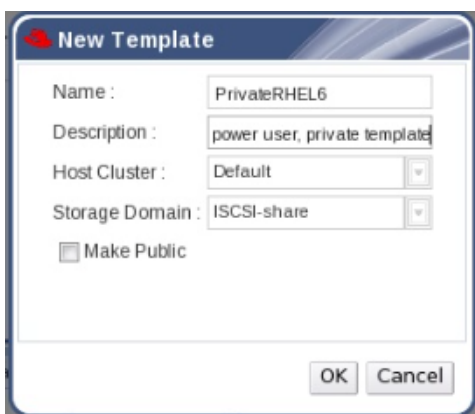


Figure 38. Create New Template

Enter information in the following fields:

- **Name:** Name of the new template.
 - **Description:** Description of the new template.
 - **Host Cluster:** The host cluster for the virtual machines using this template.
 - **Storage Domain:** The storage domain for the virtual machines using the template.
 - **Make Public:** Ticking this checkbox allows the template to be accessed by all users. For this lab, leave this checkbox unmarked.
3. Click **OK**. The virtual machine will be locked while the template is being created. Once created, select the **Templates** tab in the navigation pane. The newly created template displays in the results list.

7. Verify Permissions

Now that you have created a virtual machine and a template in the power user portal, make sure that the changes you made have been applied in the Red Hat Enterprise Virtualization Manager administration portal.

Perform this procedure in the administration portal as the **admin** user.

Virtual Machine

1. Select the **Virtual Machines** tab. Verify that the virtual machine you created from the User Portal, **RHEL6Erie**, appears in the results list.
2. Click on the **RHEL6Erie** virtual machine and look at the details pane. Click on the **Permissions** tab and check if the user named **rhevpower** has inherited **UserVmManager** permissions for this virtual machine.

Template

1. Select the **Templates** tab. Verify that the template you created from the User Portal, appears in the results list.
2. Click on the **PrivateRHEL6** template and look at the details pane. Click on the **Permissions** tab. As the creator of the template, **rhevpower** should have inherited **PowerUserRole** permissions. Meanwhile **admin**, as the administrative user for all components in the system, should have inherited **SuperUser** permissions for the template. Nobody else can use this template unless they are given permissions by the existing permitted users.

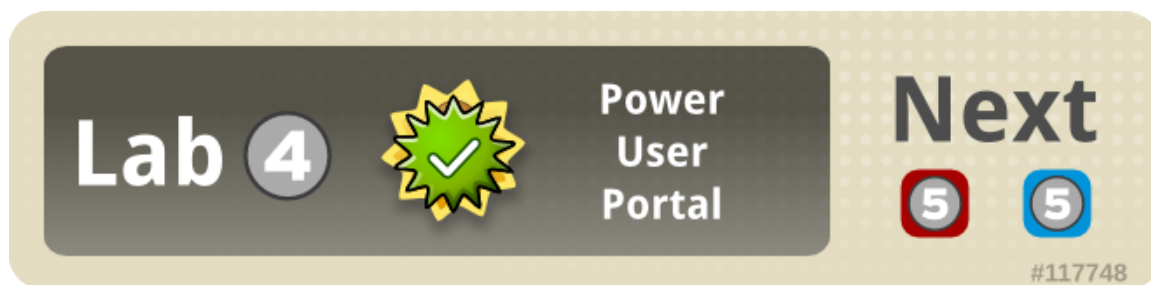
3. In contrast, click on the **EngRHEL6Base** template, which was marked public. On the **Permissions** tab, **Everyone** has been assigned **UserTemplateBasedVm** permissions, meaning that all users in the system can access this template.

8. Lab 4 - Summary

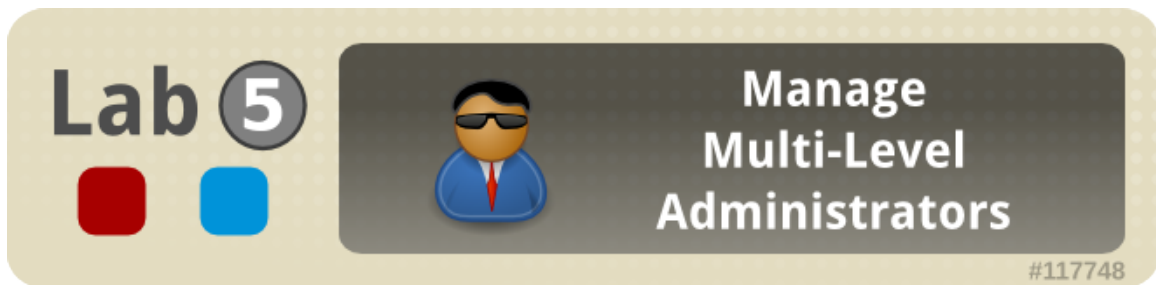
You have now completed [Lab 4 - Power User Portal](#). In this lab, you have successfully created virtual machines from the power user portal and assigned permissions for users to access virtual machines and templates.

This is the last basic lab for Tracks A and B. However, you can proceed with the Advanced Labs, which demonstrate further features of Red Hat Enterprise Virtualization, including a flexible system to manage administrative users, power saving policies, and methods of deploying Red Hat Enterprise Virtualization in a large organization.

- If you are on [Section 1, "Track A: Standard Setup"](#), go to [Lab 5 - Manage Multi-Level Administrators](#). This lab introduces you to Red Hat Enterprise Virtualization's fine grained user management system, where you can assign administrative permissions to users for different virtual components.
- If you are on [Section 2, "Track B: Minimal Setup"](#), go to [Lab 5 - Manage Multi-Level Administrators](#). This lab introduces you to Red Hat Enterprise Virtualization's fine grained user management system, where you can assign administrative permissions to users for different virtual components.



Lab 5 - Manage Multi-Level Administrators



This lab introduces you to Red Hat Enterprise Virtualization's multi-level administration system. Multi-level administration presents a hierarchy of permissions that can be configured to provide finely grained levels of permissions as required by your enterprise. You have already been partially introduced to this system when you granted permissions to users on virtual machines and data centers in [Lab 4 - Power User Portal](#).

Permissions enable users to perform actions on objects, where objects are either individual objects or container objects. Any permissions that apply to a container object also apply to all members of that container. For example, when a host administrator role is applied to a user on a specific host, the user will have permissions to perform any of the available host operations, but on the assigned host only. However, if a host administrator role is applied on a data center to a user, the user will gain permissions to perform host operations on all hosts within the cluster of the data center. If there are additional host clusters in the data center, the user will not be able to make changes to the hosts.

This lab assumes that you have successfully completed the basic labs of [Section 1, "Track A: Standard Setup"](#) or [Section 2, "Track B: Minimal Setup"](#). You should have correctly installed and configured Red Hat Enterprise Virtualization, and have several user accounts in either the IPA or the AD domain.

Lab 5 - Objectives

This lab takes you through the tasks necessary to assign permissions for users to make configuration changes in the administration portal. This lab should take you about 10 minutes.

[Section 1, "Define Storage Administrator"](#) shows you how to assign StorageAdmin permissions for a virtual machine to a user. (2 minutes)

[Section 2, "Define Virtual Machine Administrator"](#) shows you how to assign PowerUserRole permissions for a virtual machine to a user. (2 minutes)

[Section 3, "Verify User Permissions"](#) shows you how to log in to the User Portal and perform a few functions to verify the relevant user privileges have been assigned. (3 minutes)

[Section 4, "Create Custom Roles"](#) shows you how to create a custom role and define permissions for the role. (3 minutes)

Lab 5 - Requirements

In addition to the requirements stipulated in [Section 1.1, "Track A Requirements"](#) (for Track A) or [Section 2.1, "Track B Requirements"](#) (for Track B) ensure that you have at least two users in an external directory service.

1. Define Storage Administrator

A Storage Administrator can manage, create and remove storage domains. This is useful in an enterprise where there are multiple storage domains, each of which require their own system administrators. A Storage Administrator has permissions for the assigned storage domain only, not for all storage domains in the enterprise.

To assign user permissions, log in to the Red Hat Enterprise Virtualization Manager administration portal as the SuperUser. In this example, SuperUser permissions have been assigned to **admin**.

To assign a system administrator role to a storage domain

1. Navigate to the **Tree** pane and click the **Expand All** button. Under **Default**, click **Storage**. The available storage domains displays in the **Storage** tab.
2. Select the storage domain that you want to assign users to and click the **Permissions** subtab on the details pane. This example uses the **local-iso-share** domain.
3. Click **Add** to add an existing user. The **Add Permission to User** dialog displays. Enter **rhevuser** in the **Search** textbox, and click **Go**.
4. Tick the checkbox of **rhevuser**. Select the **Assign role to user** drop-down list and select **StorageAdmin**.

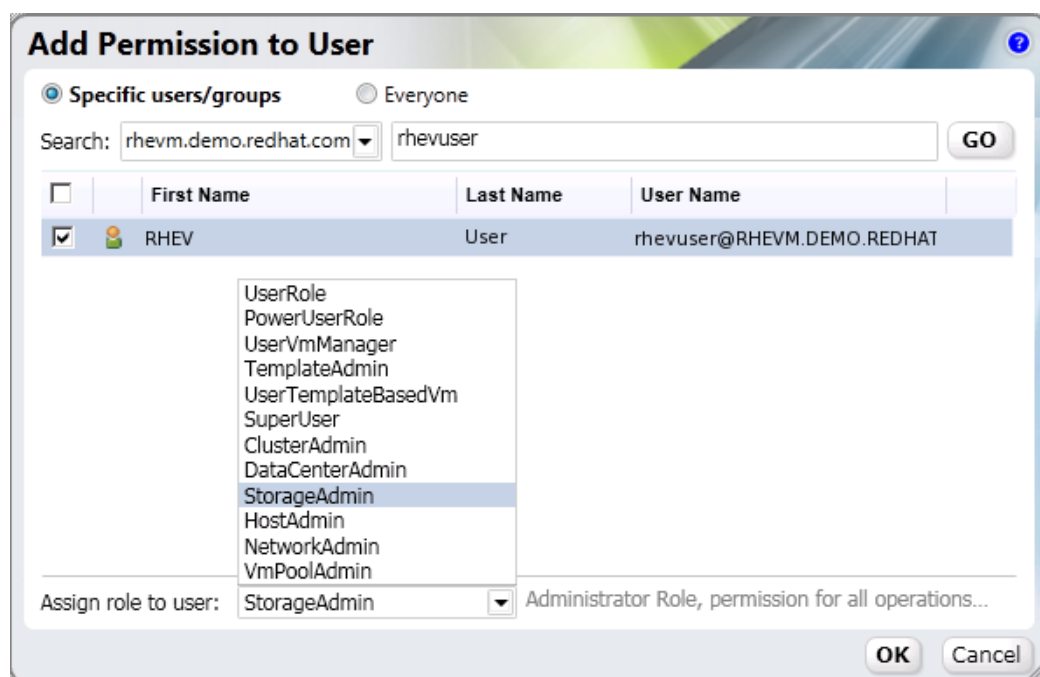


Figure 39. Add StorageAdmin permission

5. Click **OK**. The name of the user displays in the **Permissions** tab, with an icon and the assigned role.

You have now assigned administrative privileges for the **local-iso-domain** storage domain to the user named **rhevuser**. Next, you will assign PowerUserRole permissions for the same user.

2. Define Virtual Machine Administrator

As demonstrated in [Lab 4 - Power User Portal](#) a power user can create, manage and delete virtual machines, configure storage and networking, as well as migrate the virtual machine. These

administrative privileges only apply to the virtual machines on which the user has **PowerUserRole** permissions, not all virtual machines in the system.

You should still be logged in to the Red Hat Enterprise Virtualization Manager administration portal as **admin**. Repeat the same procedure as before to assign permissions.

To assign a system administrator role for a virtual machine

1. On the **Tree** pane, click **Expand All**. Under the **Default** data center and **Default** host cluster, click the **Virtual Machines** icon. The available virtual machines display in the **Virtual Machines** tab.
2. Select the virtual machine that you want to assign users to, and click the **Permissions** subtab on the details pane. This example uses the **RHEL6Thames** virtual machine.
3. Click **Add** to add an existing user. The **Add Permission to User** dialog displays. Enter **rhevuser** in the **Search** textbox, and click **Go**.
4. Tick the checkbox of **rhevuser**. Select the **Assign role to user** drop-down list and select **PowerUserRole**.

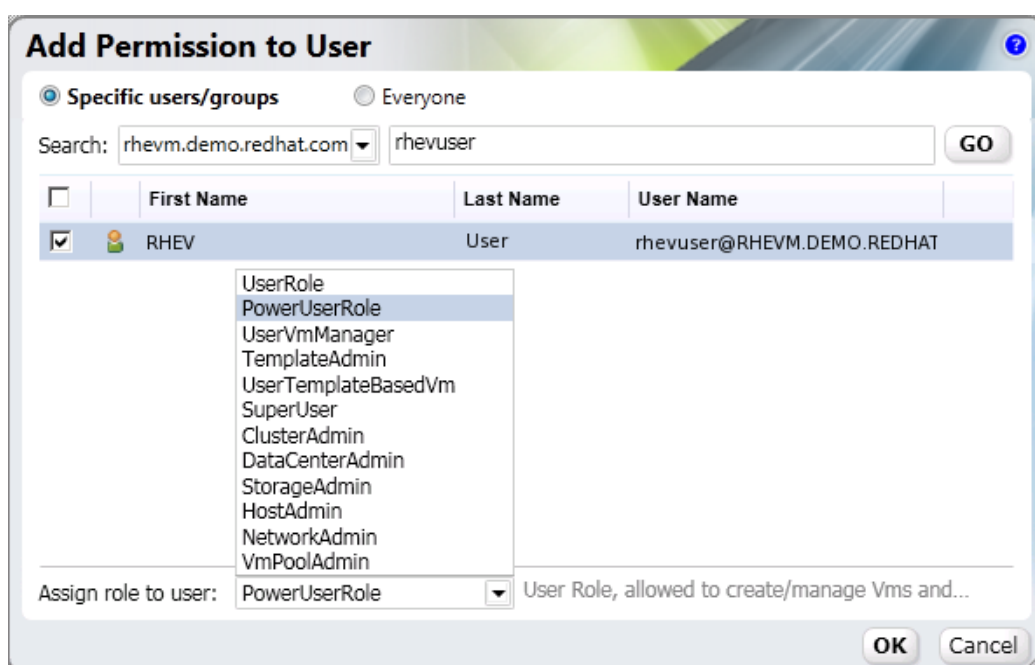


Figure 40. Add **PowerUserRole** permission

5. Click **OK**. The name of the user displays in the **Permissions** tab, with an icon and the assigned role.

You have now assigned administrative privileges for the **RHEL6Thames** virtual machine and also for the **local-iso-domain** storage to the user named **rhevuser**. The next step is to test if the permissions have been assigned as expected.

3. Verify User Permissions

To verify that the Storage Administrator role has been correctly assigned, sign out and log in to the Red Hat Enterprise Virtualization Manager administration portal as **rhevuser**, then perform a few storage configuration options.

To verify StorageAdmin permissions

1. Navigate to the **Tree** pane and click the **Expand All** button. Under **Default**, click **Storage**. The available storage domains displays in the **Storage** tab.
2. Select **local-iso-domain**. On the details pane, select the **Data Center** tab and click the **Maintenance** button. The ISO storage domain is deactivated, and appears as *Inactive* in the Storage pane.
3. Select the Data storage domain. On the details pane, select the **Data Center** tab and click the **Maintenance** button. This time you will get an error message stating "User is not authorized to perform this action". This happened because you gave administrative permissions only for the ISO domain, not the Data domain.
4. Select the ISO domain again and click the **Data Center** tab on the details pane. Click **Activate**. The domain is activated, and displays as Active in the Storage pane.

Next, verify that the PowerUserRole has been correctly assigned. You should still be logged in as **rhevuser**.

To verify PowerUserRole permissions

1. On the **Tree** pane, click **Expand All**. Under the **Default** data center and **Default** host cluster, click the **Virtual Machines** icon. The available virtual machines display in the **Virtual Machines** tab.
2. Select the **RHEL6Thames** virtual machine and try to stop it if it is running, or play it if it is not running. You should succeed.
3. Select a different virtual machine, and try to do the same. This time you should get the "User is not authorized to perform this action" message. This is because you only assigned power user permissions for **RHEL6Thames** and not the second virtual machine.

As you have seen in this lab, you can configure different levels of permissions for different users on multiple objects. This multi-level administration system is ideal for organizations with a diverse range of users who have different needs, and allows for enhanced security in that only specifically assigned users will be able to make system-wide changes.

4. Create Custom Roles

In addition to pre-defined roles, you can also create your own custom role with permission levels for various objects to suit your organization's needs. You can create administrator and user roles to permit access and management to different levels of resources in the data center. To perform the following procedure, log in to the administration portal as the **admin** user.

To create a new role

1. On the header bar, click **Configure**. The **Configure** dialog displays. Under the **Roles** tab, the dialog includes a list of default User and Administrator roles, and any custom roles.
2. Click **New**. The **New Role** dialog displays.

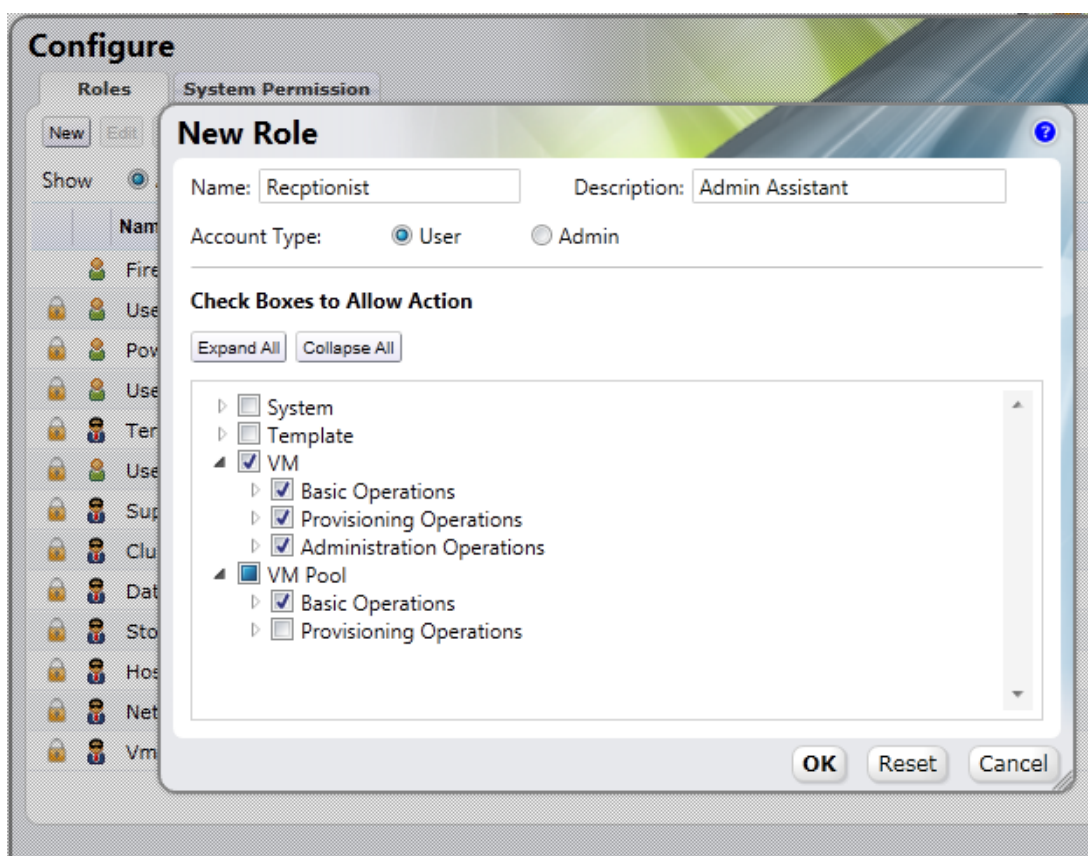


Figure 41. Create a new user role

- Enter a **Name** and **Description** for your new role.
 - Select either **User** or **Admin** as the **Account Type**.
 - Click the **Expand All** button to view more 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.
 - For each of the objects, select the actions you wish to permit for the role you are setting up.
3. Click **OK** to apply the changes you have made. The new role displays on the list of roles.


You have now created a new role, and can assign it to users as required. In addition to creating new roles from scratch, you can also clone default roles and modify the cloned roles as you wish. As a result, you have a wide range of possibilities to create a versatile, fine-grained model of permissions according to your organization's requirements.

5. Lab 5 - Summary

You have now completed [Lab 5 - Manage Multi-Level Administrators](#). In this lab, you have successfully assigned multiple levels of administrative permissions to users.

- If you are on [Section 1, "Track A: Standard Setup"](#), go to [Lab 6 - High Availability Scenarios](#). This lab teaches you how to configure power saving and resource management policies.
- If you are on [Section 2, "Track B: Minimal Setup"](#), go to [Lab 8 - Virtual Desktops](#). This lab shows you how to create and allocate desktop pools, and how to connect to virtual machines from the basic user portal.

Lab 5



Manage
Multi-Level
Administrators

Next

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Lab 6 - High Availability Scenarios



The Red Hat Enterprise Virtualization Manager offers various high availability features which can be applied in a granular manner, from the level of a single virtual machine up to protection against multiple host failure scenarios. In addition, you can protect your virtual machines against various failures by combining virtual machine high availability with out of band power management, Red Hat Enterprise Virtualization Manager's failure detection and failure recovery solutions.

This lab enables you to configure virtual machine high availability, and demonstrates its use in several common enterprise scenarios. It is assumed that you have successfully completed the basic labs of [Section 1, "Track A: Standard Setup"](#), meaning that you have correctly installed and configured Red Hat Enterprise Virtualization, and have several running virtual machines.

In addition, to successfully complete this lab you must have a power management card for each of your hosts. This lab uses the Intelligent Power Management Interface (IPMI) device as an example. If you have a different device see the *Red Hat Enterprise Virtualization Administration Guide*.

Lab 6 - Objectives

This lab takes you through the best practices of configuring and testing a reliable Red Hat Enterprise Virtualization environment where virtual machines running critical workloads are not easily interrupted. This lab should take you about 30 minutes.

[Section 1, "Configure Power Management"](#) shows you how to enable power management for your hosts. (3 minutes)

[Section 2, "Configure Virtual Machine High Availability"](#) shows you how to mark a virtual machine as highly available so that it automatically restarts after being unexpectedly terminated. (2 minutes)

[Section 3, "High Availability - Host Initiated Reboot"](#) demonstrates virtual machine high availability when a host is manually fenced and rebooted before the virtual machines running on it are properly shut down. (3 minutes)

[Section 4, "High Availability - Virtual Machine Interruption"](#) demonstrates how a highly available virtual machine will automatically restart on the same host if it experiences a crash. (6 minutes)

[Section 5, "High Availability - Non-Operational Host"](#) demonstrates virtual machine high availability when a host becomes non-operational due to a storage disconnection. (8 minutes)

[Section 6, "High Availability - Non-Responsive Host"](#) demonstrates virtual machine high availability when a host has lost communication with the Red Hat Enterprise Virtualization Manager. (8 minutes)

Lab 6 - Requirements

Before you attempt this lab, you must have a working Red Hat Enterprise Virtualization environment. The requirements for setting it up are stipulated in [Section 1.1, "Track A Requirements"](#). To successfully complete this lab, you must have:

- An out of band power management device for each host. This lab uses the Intelligent Power Management Interface (IPMI) device.
- Access to the administration portal and access to your hosts (for simulating failure scenarios). You will be instructed on how to enable remote login for your hypervisors later in this lab.

1. Configure Power Management

At this point, you should have two hosts and at least two virtual machines, however this lab uses six virtual machines. You can use as many virtual machines as you want, but for optimal demonstration of high availability features, it is recommended that you add four new virtual machines to your environment.

Highly available virtual machine settings will only be effective if power management is enabled on the hosts. However before configuring power management, recall that you have previously defined a power saving cluster policy in [Lab 3 - Live Migration Scenarios](#). Cluster policies and high availability can be used concurrently; however to best demonstrate Red Hat Enterprise Virtualization's high availability features for this lab, reset the cluster policy. This ensures that the virtual machines remain where they are staged before each demonstration, so the migration is triggered by high availability rather than the cluster's load balancing policies.

To disable cluster policy

1. On the administration portal, navigate to the **Tree** pane, click the **Expand All** button, and click the **Default** cluster. The **Cluster** tab displays, select the **Default** cluster to display its details pane.
2. On the **General** subtab, you can see that the policy is set to *Power Saving*. Click **Edit Policy**.

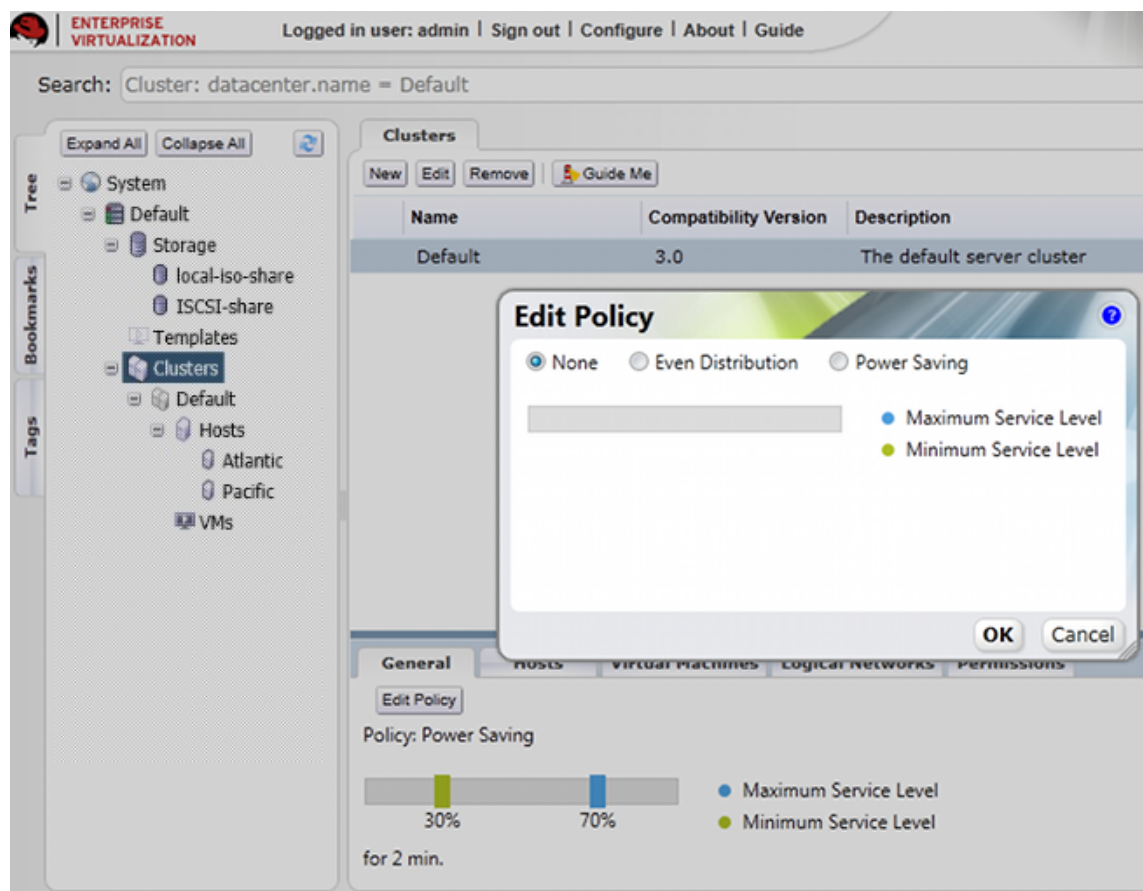


Figure 42. Edit cluster policy

3. The **Edit Policy** dialog displays. Select the **None** button to remove the previously configured policy. Click **OK**.

Now, you can configure power management on your hosts. Power management enables the system to fence a troublesome host using an additional interface such as an Intelligent Platform Management Interface (IPMI) device. Perform this procedure for each host.

To set up power management on a host

1. On the **Tree** pane, click the **Hosts** icon under the **Default** cluster. The **Hosts** tab displays a list of available hosts.
2. Select a host, in this example the **Atlantic** host is used. Notice that there is an exclamation mark next to the hostname which you were asked to ignore in previous labs. Click the **Edit** button to display the **Edit Host** dialog.
3. Select the **Power Management** tab. Tick the **Enable Power Management** checkbox and provide the required information in the following fields:
 - **Address:** The address of the power management card. This card does not have to be on any of the logical networks defined on the Red Hat Enterprise Virtualization Manager. However, all hosts in the cluster must have a valid route to the card's IP. This ensures that fencing is correctly configured, as fencing is done by any available host in the cluster.
 - **User Name:** The user allowed to log in to the power management device.
 - **Password:** The password of the user allowed to log in.
 - **Type:** The type of management device. For this lab, select **ipmilan**.
 - **Options:** These additional parameters depend on the specific implementation of each device. Detailed documentation of the options available is provided in the man page for each fence agent. For this lab, enter **power_wait=4,lanplus=yes** in the provided textbox.

Click the **Test** button to test the settings. If the power management options can be verified, the text *Test Succeeded, Host Status is: on* displays.

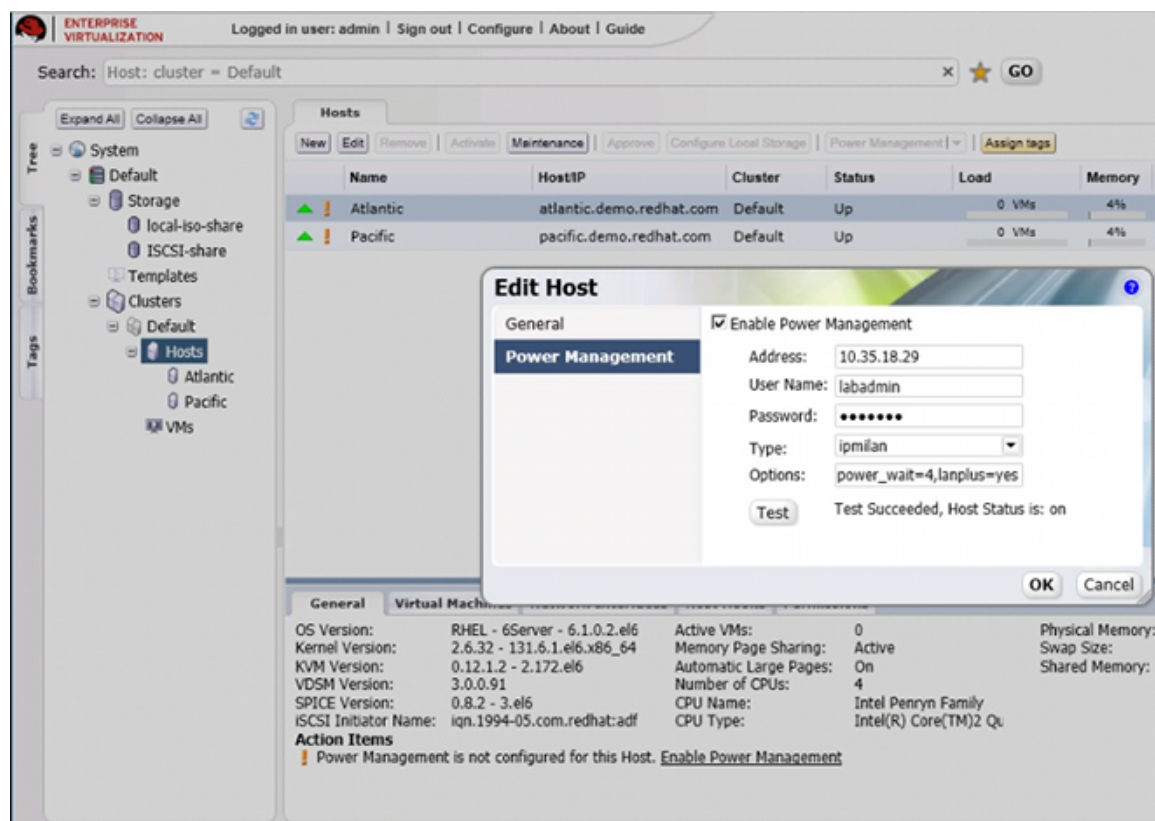


Figure 43. Edit cluster policy

- 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.

You have now configured power management for your hosts, meaning that your hosts' power status can be verified and controlled by the Red Hat Enterprise Virtualization Manager. Power management checks that a host is properly powered down, then restarts its virtual machines on another host in the same cluster. However, if the host's status cannot be verified, the virtual machines that were originally running on it will not be restarted.

Next, configure high availability for several virtual machines in the system.

2. Configure Virtual Machine High Availability

Now that you have configured power management on your hosts, they are ready to run highly available virtual machines. High availability means that a virtual machine will automatically be restarted if its process is interrupted. This interruption occurs when a virtual machine is terminated by methods other than shutting down within the guest or from the administration portal. When these events occur, the highly available virtual machine will be automatically restarted, either on its original host or another host in the cluster.

Note

High availability can only be configured for virtual servers, not virtual desktops.

This lab uses six virtual machines, and configures three of them to be highly available. You can use different names, or a different number of virtual machines - just be aware that this lab uses examples which consistently refer to these allocated names. The virtual machines used in this lab are:

- Highly Available Virtual Machines: RHEL6Nile, RHEL6RioGrande, RHEL6Thames
- Non-Highly Available Virtual Machines: RHEL6Congo, RHEL6Erie, RHEL6Ganges

To configure High Availability for a virtual machine

1. On the **Tree** pane, click the **VMs** icon. On the **Virtual Machines** tab, select the virtual machine you wish to mark as highly available. This example uses **RHEL6Thames**. Click **Edit**.
2. The **Edit Server Virtual Machine** dialog displays. Select the **High Availability** tab and tick the **Highly Available** checkbox. Change the **Priority for Run/ Migrate Queue** to **High**. This means that this virtual machine will take precedence in the queue of virtual machines to be migrated.

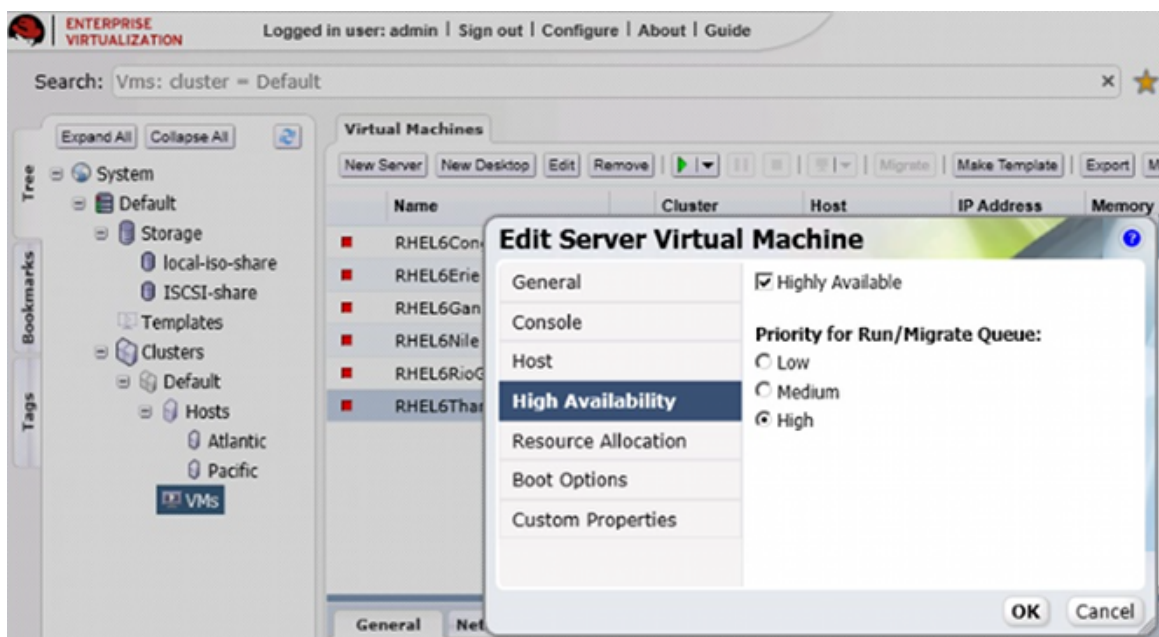


Figure 44. Set a server to be highly available

3. Click **OK** to save your settings. Repeat this procedure for other virtual machines you wish to mark as highly available, in this example they are **RHEL6Nile** and **RHEL6RioGrande**.

Now, you have three virtual machines which are highly available, and three which are not. Hold down the **Shift** key and click the virtual machines to select all of them, then click the **Run** icon to start them all. The virtual machines may not be evenly distributed across the hosts, because one of them is the allocated Storage Pool Manager (SPM) which manages access between hosts and storage. The SPM's CPU resources are utilized more heavily than that of other hosts. Therefore, when virtual machines are started, the host with a lighter workload is selected to run the machines.

On the **Tree** pane, click **Hosts** to display the available hosts and their workloads on the **Hosts** tab.

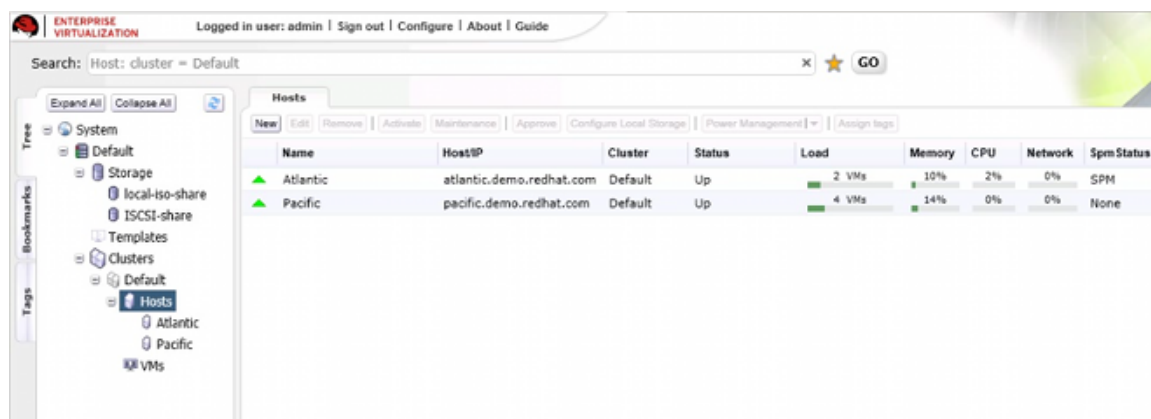


Figure 45. Virtual machines running on different hosts

You have now successfully configured power management for your hosts, and set several of your virtual machines to be highly available. You can now experiment with virtual machine high availability in four scenarios that may happen in an enterprise data center — host manual reboot (user error), virtual machine crash (unexpected fault), partial failure (non-operational) and host disconnection full failure (non-responsive).

3. High Availability - Host Initiated Reboot

At this stage you now have six running virtual machines, three of which are highly available. This section simulates an event in which a user error has caused a temporary host failure, after which the host recovers, but the virtual machines which were running on the host are terminated. In this case, the host is manually fenced before being placed into maintenance mode.

To demonstrate virtual machine high availability when host is incorrectly fenced

1. On the **Tree** pane, select **VMs**. The available virtual machines display on the **Virtual Machines** tab.

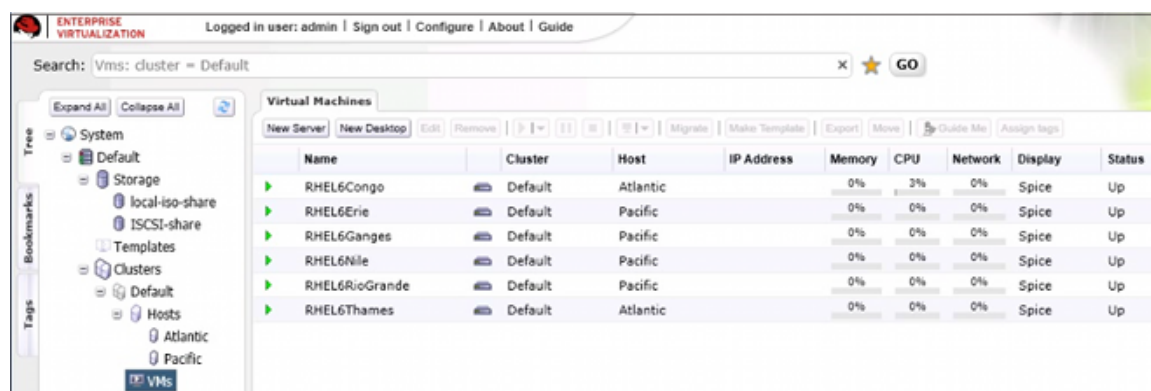


Figure 46. Virtual machines running on hosts

In this example, there are currently two virtual machines running on the **Atlantic** host; and another four on **Pacific**. You can check whether a virtual machine is highly available by selecting it looking at the **General** tab of the details pane. Here, on the **Atlantic** host **RHEL6Thames** is set to be highly available, while **RHEL6Congo** is not.

2. On the **Tree** pane, select **Hosts**. The available hosts display on the **Hosts** tab. Select the **Atlantic** host, click the **Power Management** drop-down menu and select **Restart**.

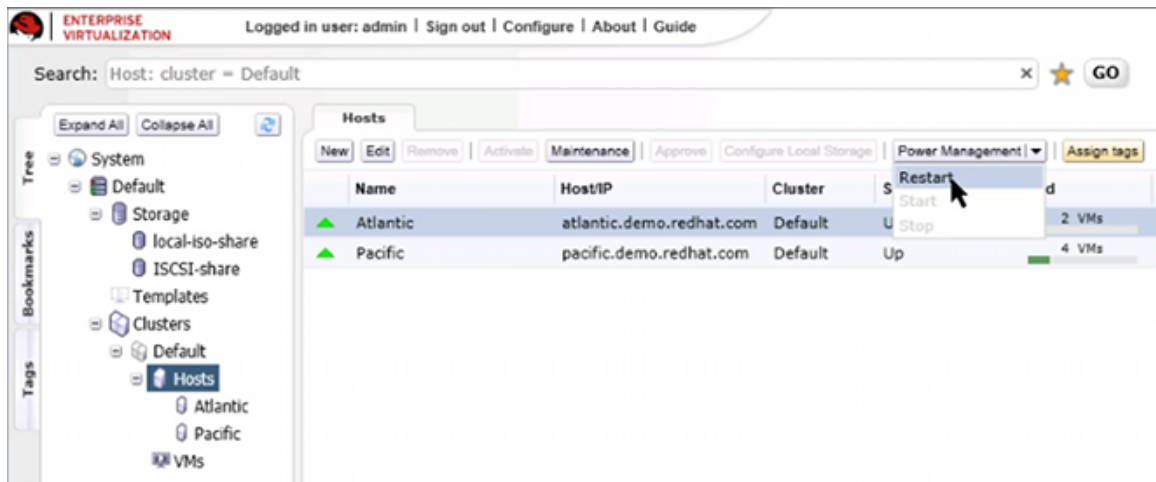


Figure 47. Restart host

The **Restart Host(s)** dialog displays, click **OK** to confirm and proceed. The host's status changes to *Reboot*, then *Non-Responsive*.

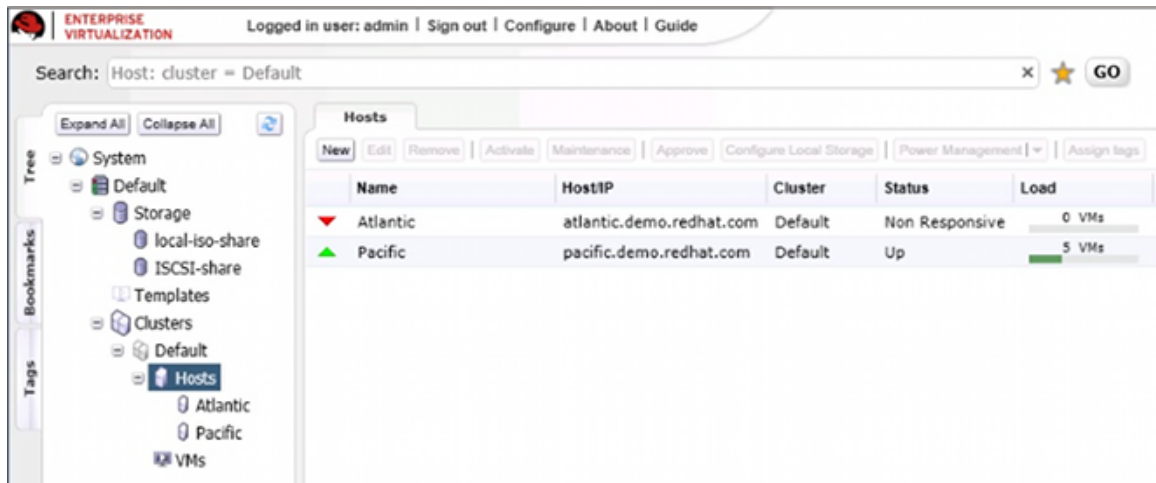


Figure 48. Non-responsive host

You have now simulated an environment where a host is manually fenced before it was placed into maintenance. Since power management has been configured for this host, it will automatically reboot after a short period.

- While the host is being restarted, observe what has happened to the virtual machines which were running on it. On the **Tree** pane, click **VMs** to display the **Virtual Machines** tab. Notice that both the virtual machines running on **Atlantic** were shut down as soon as the host was restarted.

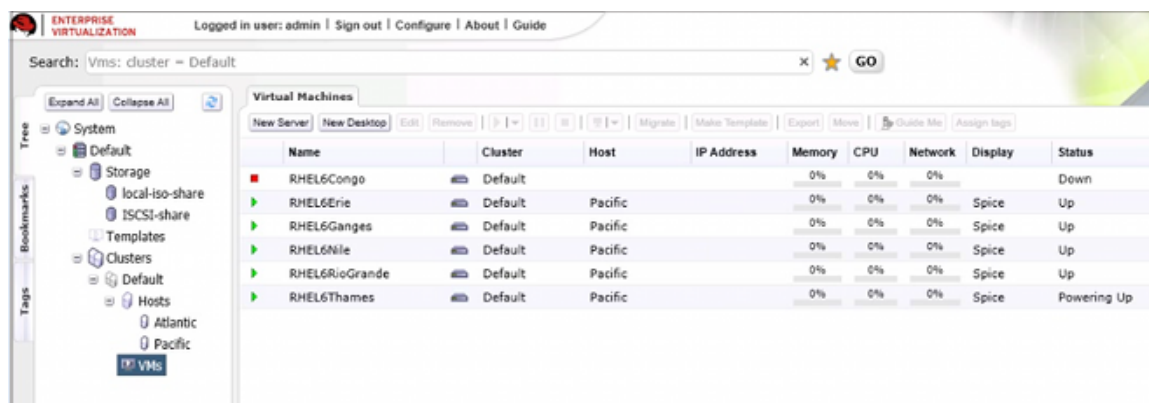


Figure 49. Virtual machines starting on another host

The highly available virtual machine, **RHEL6Thames**, is automatically restarted. Its status changes from *Down* to *Wait for Launch*, and then to *Powering Up*. It runs on the **Pacific** host in the interim period while the **Atlantic** host is still rebooting. In contrast, **RHEL6Congo** remains turned off, its status displays as *Down*.

You have just run a demonstration where a host was manually fenced before the virtual machines on it were properly shut down, causing the virtual machines to crash. When virtual machines are not properly stopped, only the highly available ones are restarted on another host in the cluster. In contrast, the non-highly available machines remain powered down until they are manually restarted.

4. High Availability - Virtual Machine Interruption

In the previous section, you demonstrated virtual machine high availability when a host becomes non-responsive and then rebooted. This section simulates a virtual machine crash. The expected outcome is for the highly available virtual machines to restart automatically, while the non-highly available ones will remain shut down until they are manually restarted.

In your current environment, the host that you restarted in the previous section (**Atlantic**) should be running again. The highly available virtual machine (**RHEL6Thames**) has been restarted on another host (**Pacific**), while the non-highly available virtual machine (**RHEL6Congo**) is still powered down.

For this demonstration, restart **RHEL6Congo**. The **Atlantic** host is automatically selected to run this virtual machine as its workload is currently lighter than **Pacific**'s. Next, live migrate two more virtual machines to the **Atlantic** host so the workload is equally balanced. Select **RHEL6RioGrande** and **RHEL6Thames**, and click **Migrate**. On the **Migrate Virtual Machine(s)** dialog, leave the option as **Select Host Automatically** and click **OK**.

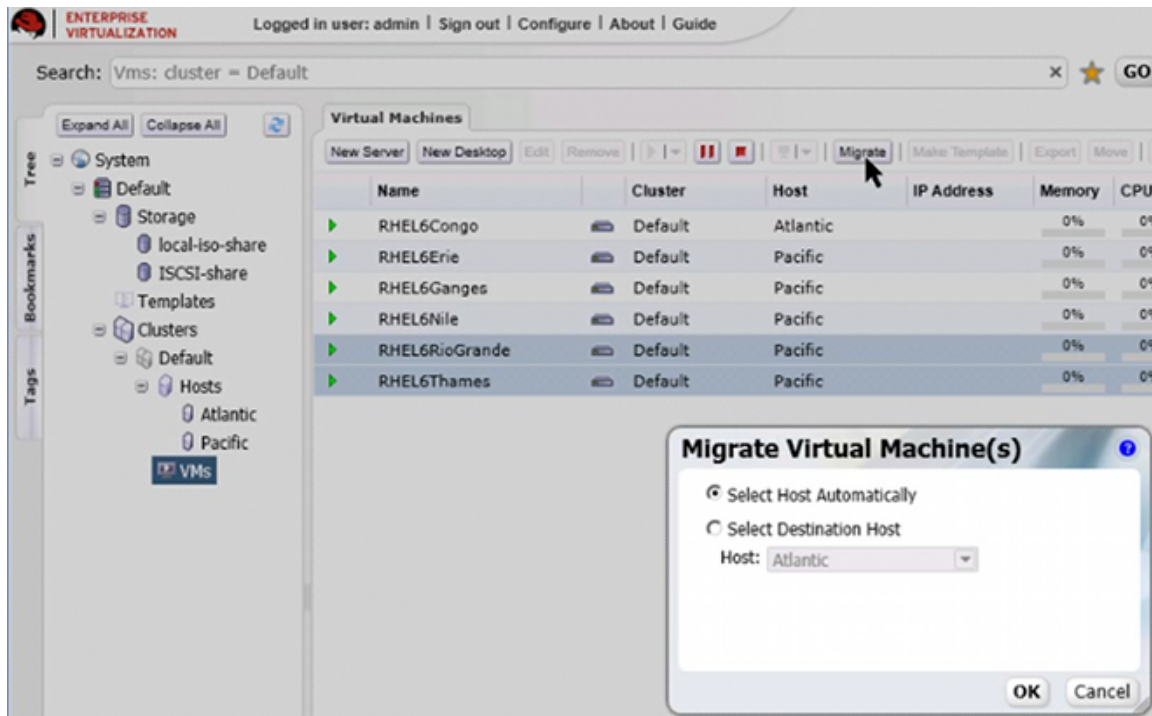


Figure 50. Migrate virtual machines to Atlantic

To recap, you now have three virtual machines running on each host. Click on the **Host** label to sort the virtual machines according to host in alphabetical order.

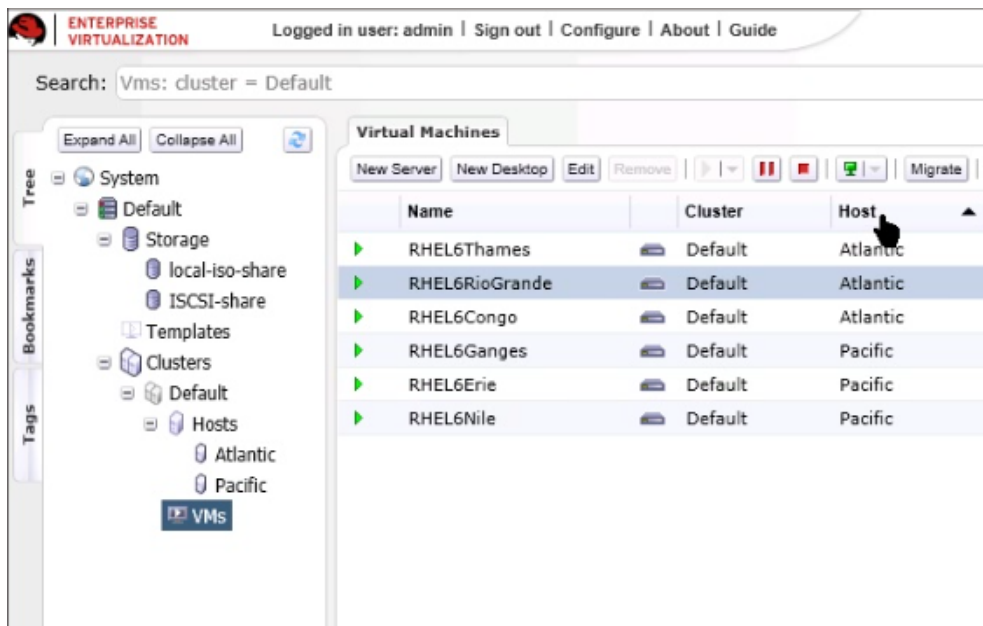


Figure 51. Sort virtual machines by host

To demonstrate virtual machine high availability when its process is killed

1. To simulate a virtual machine crash, you have to terminate the virtual machine's process from within its host. This example uses the **Atlantic** host, and provides instructions for remote access to both hypervisor and Linux hosts.
 - If you are using a Red Hat Enterprise Virtualization Hypervisor host, you must first enable remote login. On the hypervisor management console, navigate to the **Security** tab and tick the **Enable ssh password authentication** checkbox. Enter your password in the fields listed, then click **Apply**.

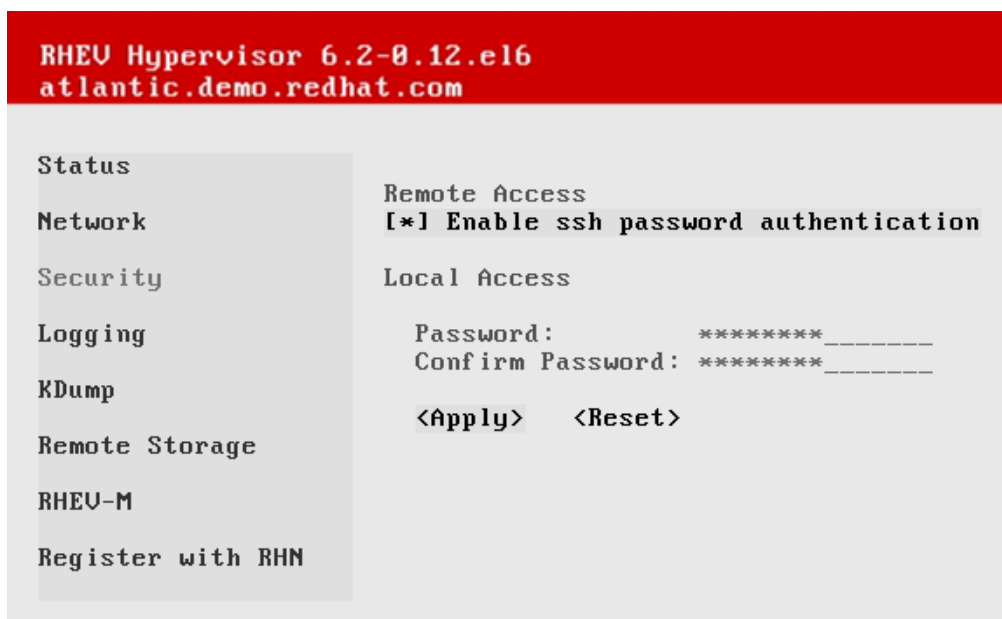


Figure 52. Enable SSH on hypervisor

Note that SSH login to the hypervisor is not recommended for security reasons, however to best demonstrate the procedures in this lab, enable remote login temporarily. Once you are done with this lab you can disable SSH login to the hypervisor.

To log in to the hypervisor via SSH, open a terminal and run:

```
# ssh admin@atlantic.demo.redhat.com
```

Accept the authentication key and enter the password for the hypervisor. When you are on the management console, press the **F2** key and select **Drop to Shell**. You can now perform commands as the root user.



Figure 53. Access hypervisor shell

- If you are using a Red Hat Enterprise Linux host, by default you can log in remotely to your host. Open a terminal and run:

```
# ssh root@atlantic.demo.redhat.com
```

Accept the authentication key and enter the password for the host.

- Once you have established a remote connection to your host, you can use the **vdsClient** utility which directly accesses the Red Hat Enterprise Virtualization Manager daemon that runs within the hosts. Run:

```
[root@atlantic ~]# vdsClient -s 0 list table
```

This lists the GUID, process id, name and status of each virtual machine on the host. For example:

6aba36aa-d0a9-4d51-bcf3-73544bc95964	2783	RHEL6Congo	Up
6f8bd3cc-3c54-413a-9a28-0bd2f65eeede	3341	RHEL6RioGrande	Up
4e1e0e4f-63e1-4a24-b1a6-76d7ae46e8c4	3015	RHEL6Thames	Up

- Send the termination signal to two virtual machines - one which is highly available, and one which is not. This example uses **RHEL6RioGrande** and **RHEL6Congo**.

```
[root@atlantic ~]# kill -9 3341
[root@atlantic ~]# kill -9 2783
```

You have now simulated an environment where a virtual machine has unexpectedly crashed, and is inaccessible to users.

- Back on the administration portal on the **Virtual Machines** tab, you can see that **RHEL6RioGrande**'s status is *Powering Up*. As it was marked as highly available, it instantly restarts when it experiences a crash.

In contrast, the status of **RHEL6Congo** remains at *Down* because it had not been marked as highly available. It remains turned off until it is manually restarted.

This demonstrates that if the virtual machine process is interrupted — whether due to user error, insufficient memory on hosts or other issues — highly available virtual machines will be restarted, while non-highly available ones require manual input. Therefore, if your environment has machines which must be accessible at all times, it is good practice to configure them as highly available, so they will automatically restart if they experience unexpected interruptions.

5. High Availability - Non-Operational Host

Now that you have tested high availability in cases of virtual machine failure, you can examine a scenario in which the failure occurs on the host's side.

When a host's status displays as *Non-Operational*, it means that the host is accessible from the Red Hat Enterprise Virtualization Manager, however it cannot serve as a member of a cluster. This can be due to a fault — for example if a logical network is down, or if storage is inaccessible to the host. It can also be due to configuration mismatch — for example if the host CPU type is incompatible with the cluster, or if the host is missing a logical network.

A non-operational host will not be able to run new virtual machines; and if there are virtual machines running on the host before it becomes non-operational, they will be migrated to other hosts in the cluster.

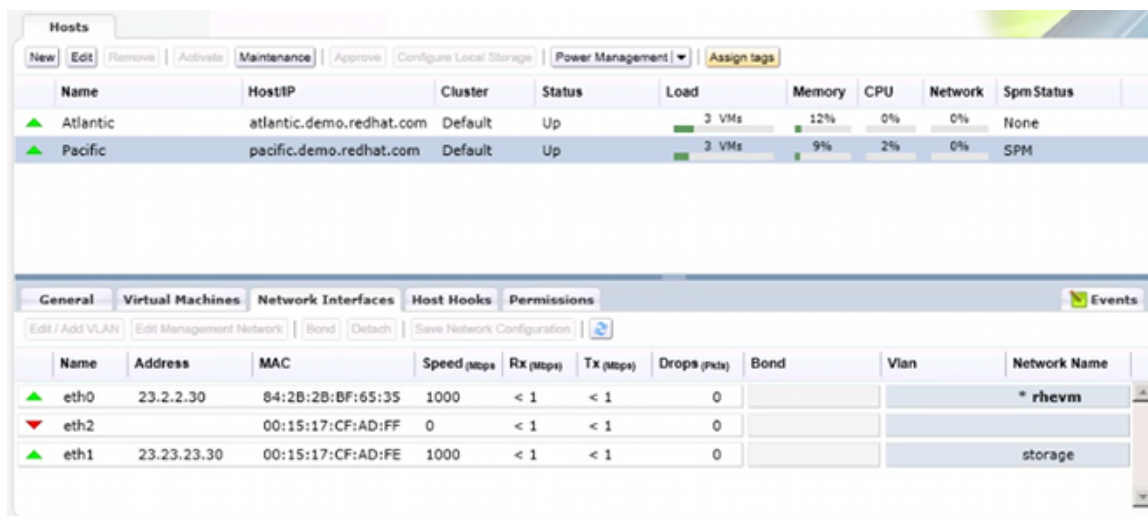
Lab 6 - High Availability Scenarios

This section demonstrates high availability when a host is non-operational because it is disconnected from the system's external storage resource. You can examine the outcomes of two different cases - when the host is acting as the Storage Pool Manager (SPM); and when it is not.

Before you begin these demonstrations, ensure that all your virtual machines are running. In addition, check which host has been configured as the SPM by clicking **Hosts** on the **Tree** pane. In this example, the **Pacific** host is the SPM.

To demonstrate virtual machine high availability when storage network is down (Host: SPM)

1. On the **Hosts** tab, select the **Pacific** host to display its details pane. Click the **Network Interfaces** subtab. You should have at least one rhevm network and one storage network, as configured in [Section 5, "Configure Logical Networks"](#). In this example, the storage network is allocated on **eth1**.



Name	HostIP	Cluster	Status	Load	Memory	CPU	Network	SpmStatus
Atlantic	atlantic.demo.redhat.com	Default	Up	3 VMs	12%	0%	0%	None
Pacific	pacific.demo.redhat.com	Default	Up	3 VMs	9%	2%	0%	SPM

Name	Address	MAC	Speed (Mbps)	Rx (Mbps)	Tx (Mbps)	Drops (pkts)	Bond	Vlan	Network Name
eth0	23.2.2.30	84:2B:2B:BF:65:35	1000	< 1	< 1	0			* rhevm
eth2		00:15:17:CF:AD:FF	0	< 1	< 1	0			
eth1	23.23.23.30	00:15:17:CF:AD:FE	1000	< 1	< 1	0			storage

Figure 54. Host network interfaces

Next, on the **Tree** pane click **ISCSI-share**. On the **Storage** tab, select the **ISCSI-share** domain and click **Edit**. On the **Edit Domain** dialog, click the **+** symbol to display the iSCSI target. Note that the storage target's submask address is the same as the storage network's, as seen under **Address**.

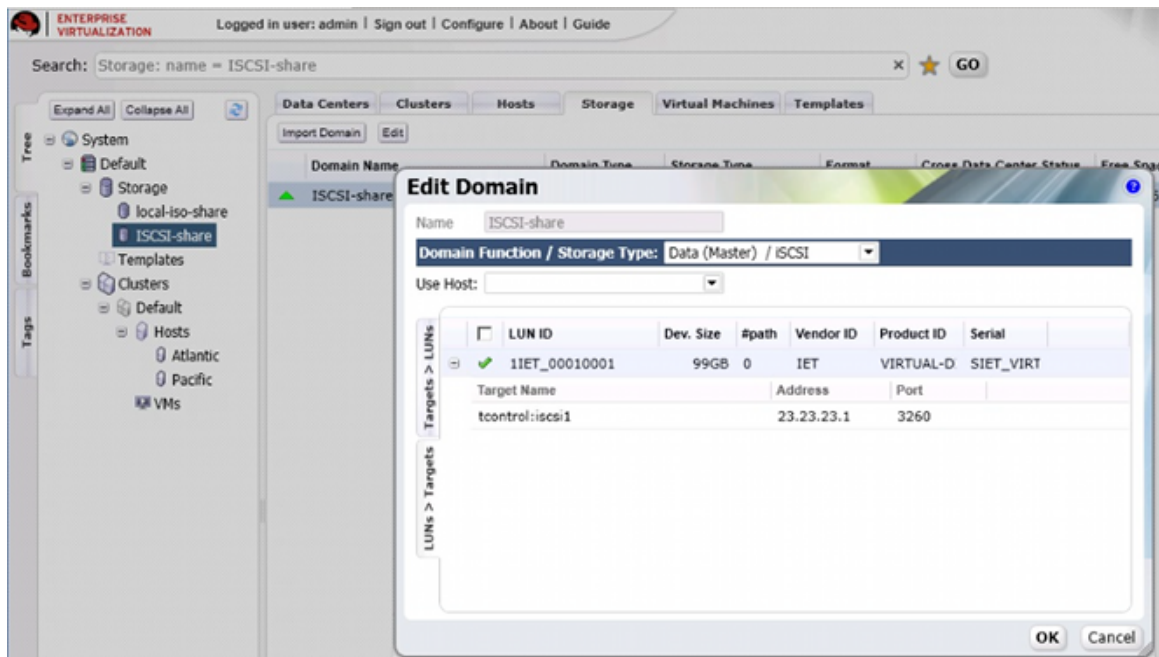


Figure 55. iSCSI target network

- Now that you have determined the name and physical interface of your storage network, connect to the **Pacific** host via SSH. Check your available networks by running the following command:

```
[root@pacific ~]# ifconfig
```

Once you have determined the name of your storage network, run:

```
[root@pacific ~]# ifdown storage
[root@pacific ~]# ifdown eth1
```

You have now shut down the network between the **Pacific** host and **ISCSI-share** storage. On the **Hosts** tab, the **Pacific** host changes to *Non Operational*, then to *Reboot*.

- Because the **Pacific** host was configured as the SPM, it is automatically rebooted. The highly available virtual machines are restarted on the other available host in the cluster - in this case it is **Atlantic** - while the non highly available ones are suspended. However, once the **Pacific** host is up and running again, the virtual machines which were originally running on it are migrated back to it in order to balance the workload between all hosts in the cluster.

You have now demonstrated high availability when the connection is disrupted between the storage and the host which is the SPM. However, storage disconnection can also occur with a host which is not acting as the SPM. In this case, the host moves into non-operational status, and its virtual machines migrate to other hosts in the cluster.

Previously, the Pacific host was running as the SPM. However, the role of SPM can be transferred, because it has to be filled by a running host. After Pacific had been rebooted, the Atlantic host gained the status of SPM. Therefore, in this example the **Pacific** host is used again, as it can now play the role of the host which is not the SPM. Before running the next procedure, migrate several virtual machines from Atlantic to Pacific.

To demonstrate virtual machine high availability when storage network is down (Host: non-SPM)

- As before, connect to the **Pacific** host via SSH. Check your available network by running the following command:

```
[root@pacific ~]# ifconfig
```

Once you have determined the name of your storage network, run:

```
[root@pacific ~]# ifdown storage
[root@pacific ~]# ifdown eth1
```

You have now shut down the network between the **Pacific** host and the **ISCSI-share** storage. If new data is being written onto the virtual machine's disk, the virtual machine detects that the storage connection has been lost, and pauses itself to prevent loss of data. When this happens, the **Hosts** tab shows that the status of the **Pacific** host has changed to *Non Operational*.

- Click the **VMs** icon on the **Tree** pane to examine the virtual machines. All the virtual machines which were originally running on the **Pacific** host are automatically migrated to the **Atlantic** host. The highly available machines, which were set as high priority, are migrated before the non-highly available ones.

When virtual machines are live migrated, they do not experience any downtime. In rare cases, they will be paused, and then continued on the host they have been migrated to.

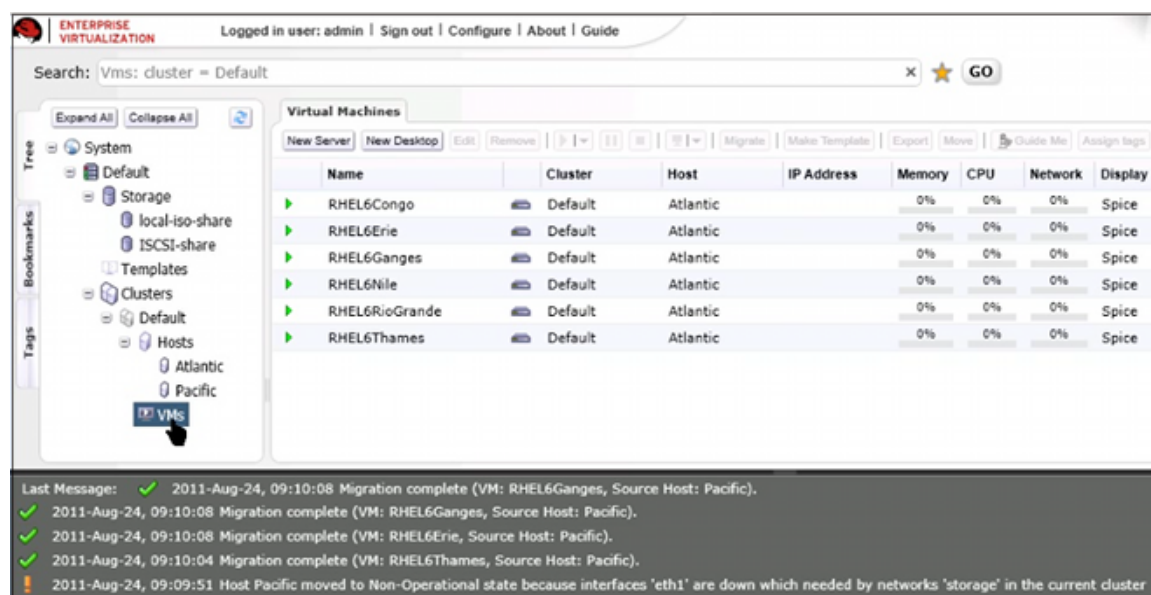


Figure 56. Virtual machines automatically migrated

The contrast between these two scenarios is that when the host is the SPM, the host will be fenced, causing termination of its virtual machines, therefore only the highly available machines will be restarted. However when the host is not the SPM, all virtual machines will be migrated in order of their assigned priority, and leave the host in non-operational mode.

6. High Availability - Non-Responsive Host

A host is deemed non-responsive when the Red Hat Enterprise Virtualization Manager cannot communicate with the Red Hat Enterprise Virtualization agent on the host. This can be either due to a networking issue, or failure on the host side (kernel panic, power failure and such) which stops all communication with the host.

When a host is non-responsive, it will be fenced to ensure that virtual machines are allowed to restart on other hosts in the cluster while avoiding "split brain" — a situation in which communication with

the host is lost while the virtual machines are still partially running. This scenario is simulated in the following section, where you will disconnect the host's management network while the storage connection remains functional.

At this stage, the **Pacific** host is non-operational as its storage connection was cut in the previous section.

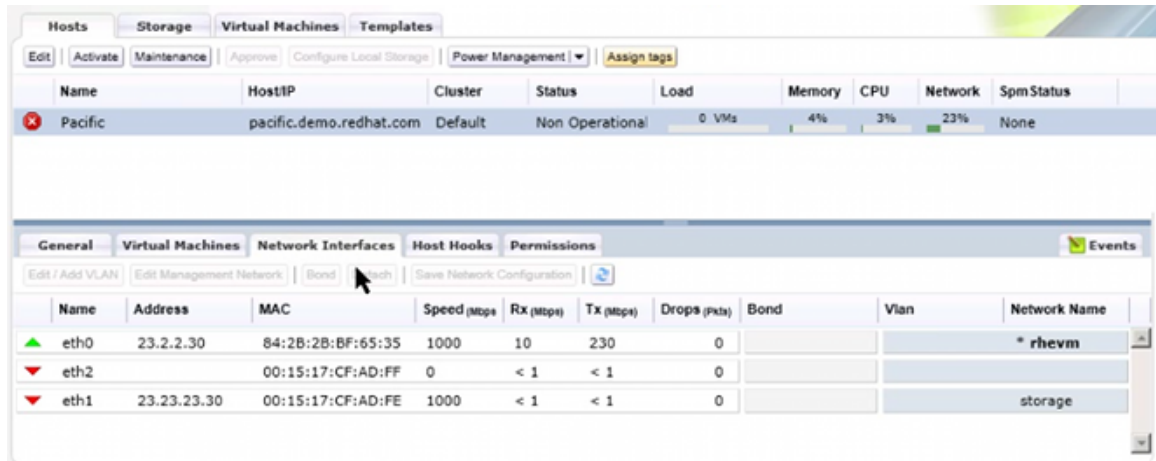


Figure 57. Non-operational Pacific host

Restart it for the next demonstration. On the **Tree** pane, select the **Pacific** host. Click the **Power Management** button and select **Restart**. Because you have fenced the host, it automatically brings the **storage** and **eth1** networks up again, and allows the host to run as normal.

When the host's status changes to *Up*, migrate several machines onto it. This example uses **RHEL6RioGrande**, **RHEL6Thames** (both highly available machines) and **RHEL6Erie**. As you have disabled cluster policy at the beginning of this lab, these virtual machines will not auto-migrate as soon as the host is back up. Therefore, they need to be manually migrated to the **Pacific** host.

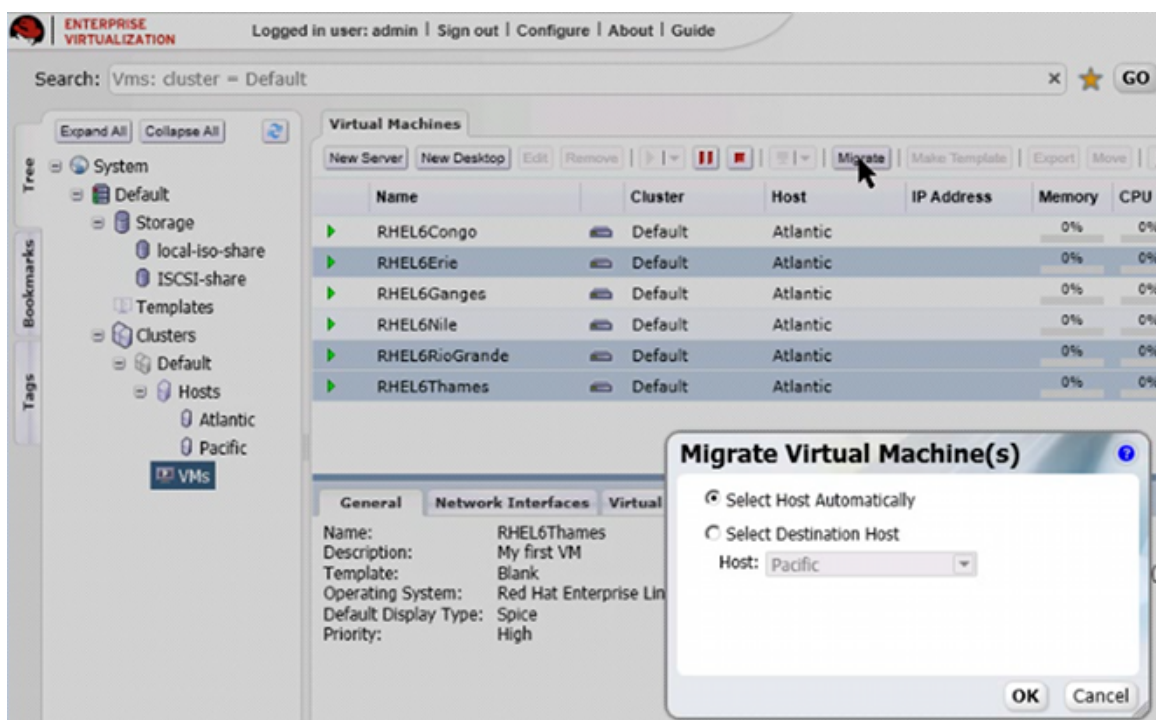


Figure 58. Migrate virtual machines to Pacific host

Lab 6 - High Availability Scenarios

To demonstrate high availability when host connection is disrupted

1. On the **Tree** pane, click **Hosts**. On the **Hosts** tab, select the **Pacific** host, and click the **Network Interfaces** subtab on the details pane. Check the physical interface name of the **rhev** network — in this example it is the **eth0** network.
2. As before, connect to the **Pacific** host via SSH. Disable the management network by running:

```
# ifdown rhevm
```

You have now shut down the network connecting the **Pacific** host to the Red Hat Enterprise Virtualization Manager. The next time that the Manager attempts to transmit signals to the host, it triggers the automatic fencing operation.

3. From the **Tree** pane, click **VMs** to display the **Virtual Machines** tab. The highly available virtual machines, **RHEL6RioGrande** and **RHEL6Thames**, have restarted on the **Atlantic** host. Conversely, **RHEL6Erie** did not restart because it was not configured to be highly available.

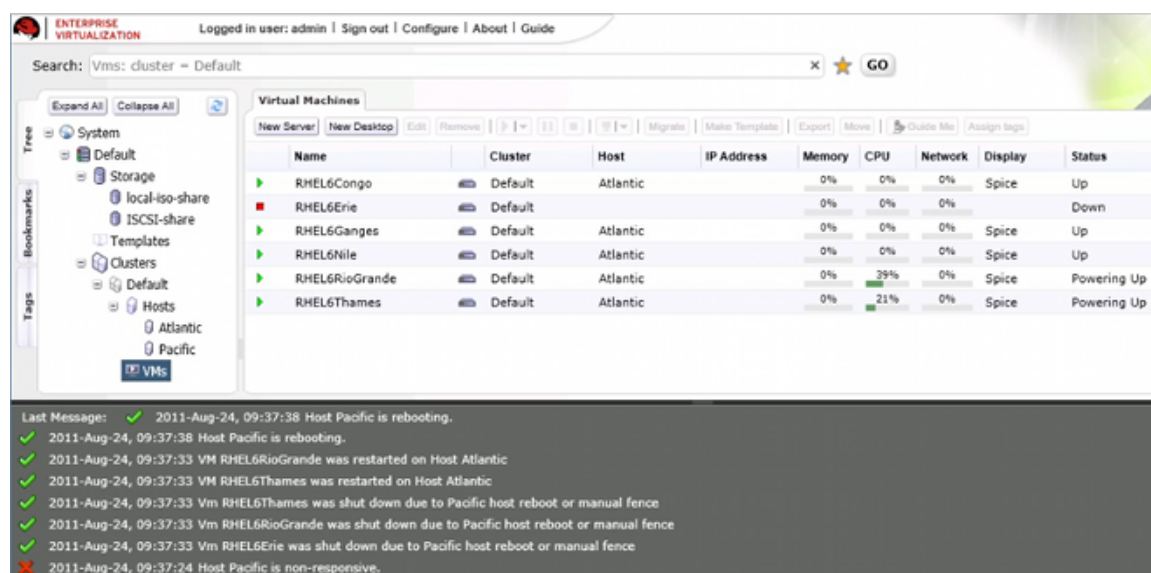


Figure 59. Highly Available virtual machines automatically migrated

4. Finally, go to the **Tree** pane and click **Hosts** to examine the status of the hosts. After a short period, the **Pacific** host will be rebooted, assuming that power management was successfully configured on this host.

You have just run a demonstration where a non-responsive host was automatically fenced and rebooted. As you had simulated a non-persistent network failure, the host will recover from the fault following its reboot. In the interim period while it is being restarted, the highly available virtual machines originally running on it are restarted on another available host in the cluster. Conversely, non-highly available virtual machines need to be manually restarted.

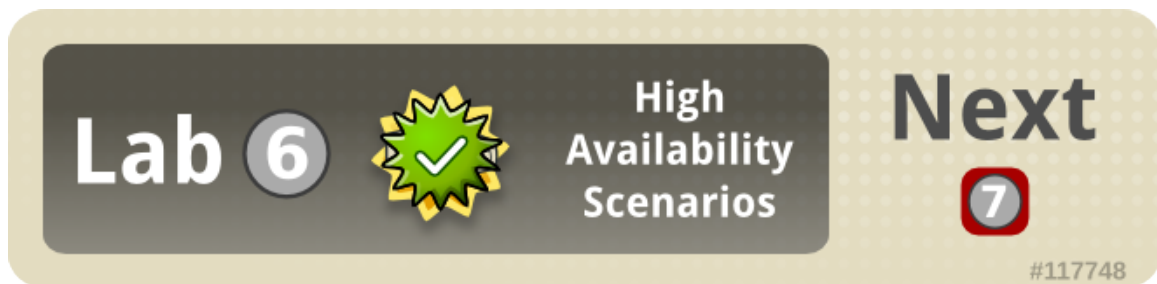
7. Lab 6 - Summary

You have now completed [Lab 6 - High Availability Scenarios](#). In this advanced lab, you have successfully enabled power management for your hosts and configured high availability for your virtual machines, and tested their effects in five typical enterprise use cases.

In conclusion, when a host malfunctions, but can still communicate with the Manager, it will try to migrate high priority virtual machines to other hosts in the cluster. If the host cannot connect to the Manager, it will trigger a fencing operation and reboot. In this case, highly available virtual machines

will restart in a different host in the same cluster; while non-highly available virtual machines will remain shut down unless manually restarted even when host has finished reboot and is back up.

The next lab in the Advanced Track for [Section 1, “Track A: Standard Setup”](#) is [Lab 7 - Add Additional Data Center](#). This lab teaches you how to create a new data center with Red Hat Enterprise Linux hosts.



Lab 7 - Add Additional Data Center



This lab shows you how to customize your standard Red Hat Enterprise Virtualization environment with an additional data center. This lab uses Red Hat Enterprise Linux hosts, however you can substitute them with Red Hat Enterprise Virtualization Hypervisor hosts. At the end of this lab you will be able to create virtual machines in your new data center.

This lab assumes that you have successfully completed all the sections in [Lab 1 - Install and Configure Basic Setup](#). You should have correctly installed and configured Red Hat Enterprise Virtualization, and have configured shared storage and logical networks.

Lab 7 - Objectives

This lab takes you through the tasks necessary to install and set up Red Hat Enterprise Virtualization with multiple hosts and shared storage. In addition, you will learn how to configure networks and add ISOs in order to create virtual machines. This lab should take you about 35 minutes.

[Section 1, "Install Red Hat Enterprise Linux Hosts"](#) shows you how to install and configure Red Hat Enterprise Linux hosts for use with Red Hat Enterprise Virtualization Manager. (10 minutes)

[Section 2, "Create a New Data Center"](#) shows you how to create a new Data Center for the Red Hat Enterprise Linux hosts. (1 minute)

[Section 3, "Create a New Cluster"](#) shows you how to create a new host cluster for your Red Hat Enterprise Linux hosts to it. (1 minute)

[Section 4, "Attach New Red Hat Enterprise Linux Hosts"](#) shows you how to manually attach the hosts to the Red Hat Enterprise Virtualization Manager. (4 minutes)

[Section 5, "Configure Logical Networks"](#) shows you how to define new networks for the storage devices and add them to the hosts. (5 minutes)

[Section 6, "Configure Storage"](#) shows you how to define NFS, iSCSI or FCP storage and attach the domains to the data center. (8 minutes)

[Section 7, "Configure ISO domain"](#) shows you how to create a new ISO domain or attach the existing ISO domain to your new data center. (6 minutes)

Lab 7 - Requirements

In addition to the requirements stipulated in [Section 1.1, "Track A Requirements"](#), ensure that you have the following:

Red Hat Enterprise Linux Hosts

- Minimum - Dual Core server, 10 GB RAM and 10 GB Storage, 1 Gbps network interface

Lab 7 - Add Additional Data Center

- Recommended - Dual socket server, 16 GB RAM and 50 GB storage, two 1 Gbps network interfaces.

The breakdown of the server requirements is:

- For each host: AMD-V or Intel VT enabled, AMD64 or Intel 64 extensions, minimum 1 GB RAM, 3 GB free storage and 1 Gbps network interface.
- For virtual machines running on each host: minimum 1 GB RAM per virtual machine.
- For each host, a valid Red Hat Network subscription to the **rhe1-x86_64-rhev-mgmt-agent-6** channel.

Storage and Networking

- One or more of the supported storage types (NFS, iSCSI and FCP).
- One static IP per host which is resolvable by the DNS server.
- An NFS mount point for an ISO directory if you choose to configure an ISO share external to the Red Hat Enterprise Virtualization Manager Server.

Lab 7 - Configuration

The following figure and table list the environment parameters and object names which will be used consistently throughout this lab. It is strongly recommended that you use these entities in your evaluation environment to ensure the names are resolvable. You may alter them if necessary, but make sure you have an equivalent name for each component.

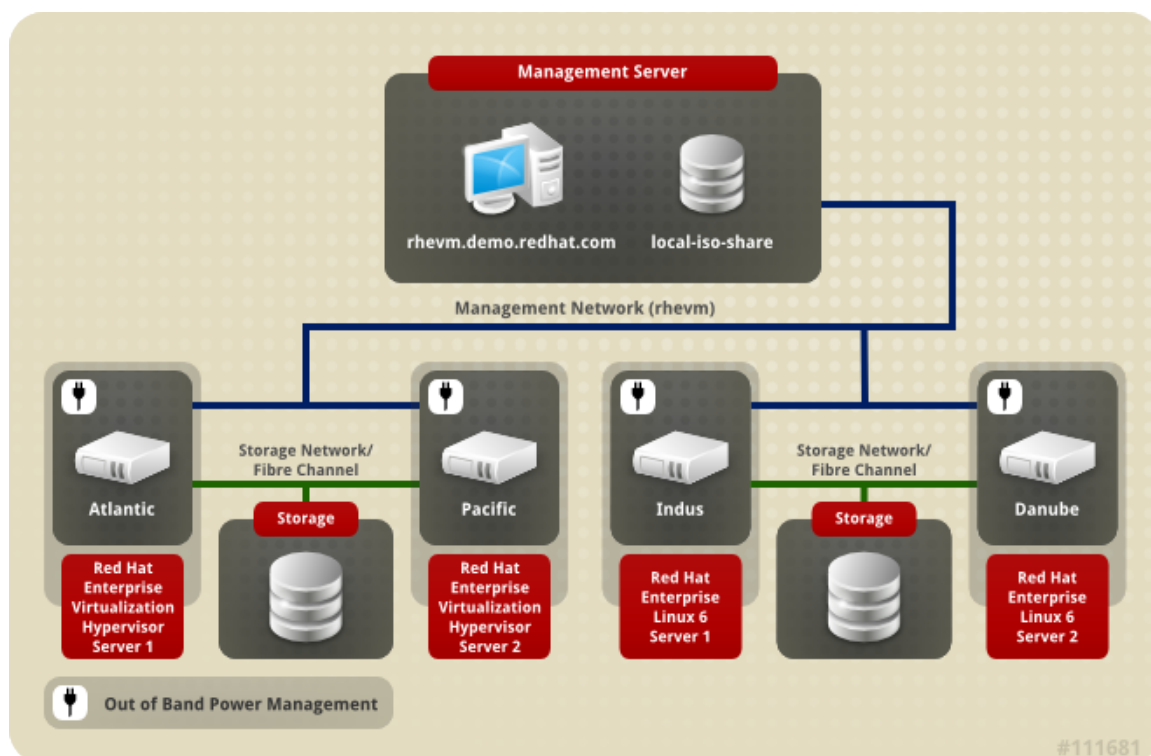


Table 2. Lab component names

Component	Name	IP (if applicable)	Fully Qualified Domain Name
Domain Services	-	-	demo.redhat.com

Component	Name	IP (if applicable)	Fully Qualified Domain Name
Red Hat Enterprise Virtualization Manager	-	-	rhevm.demo.redhat.com
Data Center	-	-	FinanceDataCenter
Cluster	-	-	FinanceCluster
Storage Network	storage	10.23.1.0/24	-
Management Network	rhevm	10.35.3.0/24	-
Red Hat Enterprise Virtualization Linux Host 1	Danube	-	danube.demo.redhat.com
Red Hat Enterprise Virtualization Linux Host 2	Indus	-	indus.demo.redhat.com
Red Hat Enterprise Virtualization Hypervisor 1	Atlantic	-	atlantic.demo.redhat.com
Red Hat Enterprise Virtualization Hypervisor 2	Pacific	-	pacific.demo.redhat.com
Administrator User Name	admin	-	-
NFS Storage Domain	NFS-share	-	-
iSCSI Storage Domain	iSCSI-share	-	-
FCP Storage Domain	FCP-share	-	-
ISO Storage Domain	local-iso-share	-	-

1. Install Red Hat Enterprise Linux Hosts

In your current environment, you should have Red Hat Enterprise Virtualization Manager and at least two hosts configured in the default data center. In this section, you will learn how to configure Red Hat Enterprise Linux servers as hosts to run virtual machines. You have to perform the installation on each physical server you wish to use as a host.

However, if you do not wish to use Red Hat Enterprise Linux hosts, you can still create an additional data center and add Red Hat Enterprise Virtualization Hypervisor hosts to it. See [Section 2, “Install Red Hat Enterprise Virtualization Hypervisor”](#) for instructions, then proceed to [Section 2, “Create a New Data Center”](#).

To install a Red Hat Enterprise Linux 6 host

- On the machine designated as your Red Hat Enterprise Linux host, install Red Hat Enterprise Linux 6.2. Select only the Base package group during installation. For more comprehensive instructions, refer to the *Red Hat Enterprise Linux Installation Guide*.
- Ensure the host is correctly subscribed to the appropriate Red Hat Network channels.
 - If your server has not been registered with the Red Hat Network, run the **rhn_register** command as **root** to register it. To complete registration successfully you will need to supply your Red Hat Network username and password. Follow the onscreen prompts to complete registration of the system.

Lab 7 - Add Additional Data Center

```
# rhn_register
```

- b. Run the **rhn-channel** command to subscribe the system to the **Red Hat Enterprise Virt Management Agent (v.6 for x86_64)** channel, also referred to as **rhel-x86_64-rhev-mgmt-agent-6**.

```
# rhn-channel -a -c rhel-x86_64-rhev-mgmt-agent-6
```

3. Make sure the kernel and all the packages are up to date. This may take some time. Run:

```
# yum -y update
```

4. Red Hat Enterprise Virtualization platform uses a number of network ports for management and other virtualization features. Adjust your Red Hat Enterprise Linux host's firewall settings to allow access to the required ports by configuring **iptables** rules. Modify the **/etc/sysconfig/iptables** file so it resembles the following example:

```
:INPUT ACCEPT [0:0]
:FORWARD ACCEPT [0:0]
:OUTPUT ACCEPT [10765:598664]
-A INPUT -m state --state RELATED,ESTABLISHED -j ACCEPT
-A INPUT -p icmp -j ACCEPT
-A INPUT -i lo -j ACCEPT
-A INPUT -p tcp --dport 22 -j ACCEPT
-A INPUT -p tcp --dport 16514 -j ACCEPT
-A INPUT -p tcp --dport 54321 -j ACCEPT
-A INPUT -p tcp -m multiport --dports 5634:6166 -j ACCEPT
-A INPUT -p tcp -m multiport --dports 49152:49216 -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m
-A INPUT -j REJECT --reject-with icmp-host-prohibited
-A FORWARD -m physdev ! --physdev-is-bridged -j REJECT --reject-with icmp-host-
prohibited
COMMIT
```

5. Ensure that the **iptables** service is configured to start on boot and has been restarted, or started for the first time if it was not already running. Run the following commands:

```
# chkconfig iptables on
# service iptables restart
```

You have now successfully installed your Red Hat Enterprise Virtualization Linux hosts. The following sections will provide instructions on how to attach the hosts to the Red Hat Enterprise Virtualization Manager.

2. Create a New Data Center

In the basic labs, you used the Default data center which was automatically created upon installation. However, in this lab you will create a new data center. A data center is a logical entity that defines the set of physical and logical resources used in a managed virtual environment. It is a container for clusters of virtual machines, storage and networks.



Note

While this lab provides the example of creating a new data center consisting only of Red Hat Enterprise Linux hosts, in reality you can actually add both types of hosts (Red Hat Enterprise Virtualization Hypervisor and Red Hat Enterprise Linux) to the same cluster.

From this point onwards, you should be logged in to the administration portal as the **admin** user.

To add a new Data Center

1. Navigate to the **Tree** pane and click **Expand All**. Click **System** and select the **Data Centers** tab.
2. Click the **New** button. The **New Data Center** dialog displays.

Figure 60. New Data Center

Fill in the **Name** and **Description** fields. Select the data center **Type** from the drop-down menu, this has to be compatible with your storage type.

3. Click **OK**. The **New Data Center - Guide Me** dialog displays. This dialog provides a context-sensitive reference for the components which have not been configured for your data center. Leave it open for now.

Figure 61. New Data Center - Guide Me

3. Create a New Cluster

Now that you have created a new data center, you can populate it with a new cluster. A cluster is a set of physical hosts that are treated as a resource pool for a set of virtual machines. A cluster constitutes a domain for virtual machines to migrate from one host to another, therefore all hosts in a cluster must share the same network infrastructure and the same storage. However, the hosts do not need to share the exact same CPU model, as long as the cluster's CPU name is set to the family that is the most common denominator.

To add a new host cluster

1. You should still be on the **New Data Center - Guide Me** dialog. If you are not, select your newly created data center and click **Guide Me**. On the dialog, click **Configure Cluster**.
2. The **New Cluster** dialog displays. Note that there are three tabs on the left side of this dialog box. Click on each tab to access them in turn.

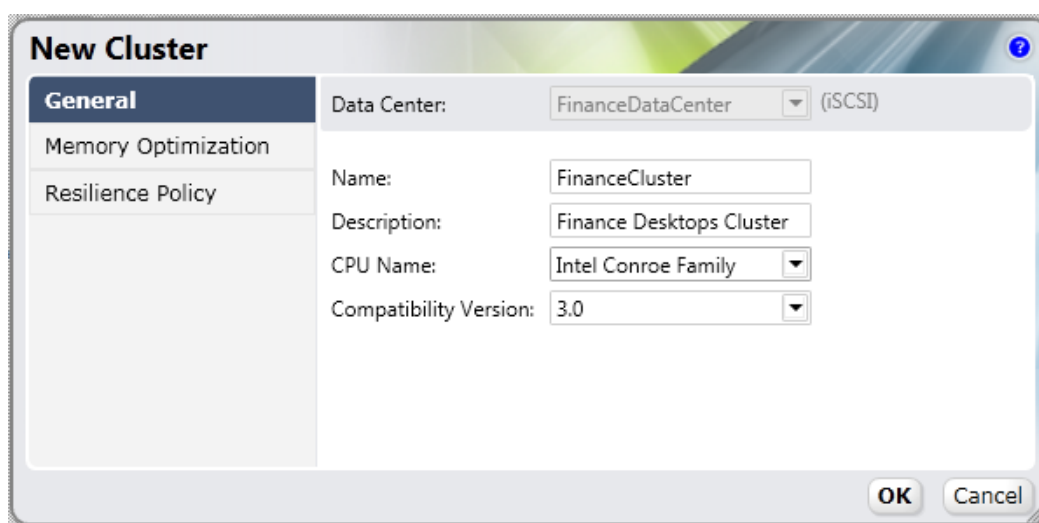


Figure 62. New Cluster

Configure the following options:

- On the **General** tab, enter a suitable **Name** and **Description**.

On the **CPU Name** field, select the family that best describes your host CPUs. Note that for the Default cluster, you did not need to perform this step because it had been automatically set according to the first host you added to the cluster.

- On the **Memory Optimization** tab, tick the checkbox for **Optimize for Density** and select **For Desktop Load**.
- On the **Resilience Policy** tab, select **Do Not Migrate Virtual Machines**.

3. Click **OK**. The **New Data Center - Guide Me** dialog displays again. Leave it open for now.

4. Attach New Red Hat Enterprise Linux Hosts

You have created a new data center and a new cluster within it, now you need to populate the cluster with the Red Hat Enterprise Linux hosts you installed in [Section 1, "Install Red Hat Enterprise Linux Hosts"](#). Before they can be used, they have to be manually attached to the Red Hat Enterprise Virtualization platform. Perform the following procedure for each host you have installed.

Note that this step is required for Red Hat Enterprise Linux hosts only, if you are using Red Hat Enterprise Virtualization Hypervisors for this lab you only have to approve the hosts with a click, as

you did in [Section 4, “Approve the Red Hat Enterprise Virtualization Hypervisor”](#). This time, attach the hosts to your newly created cluster.

To attach Red Hat Enterprise Linux hosts

1. You should still be on the **New Data Center - Guide Me** dialog. If you are not, select your newly created data center and click **Guide Me**. On the dialog, click **Configure Host**.
2. The **New Host** dialog displays.

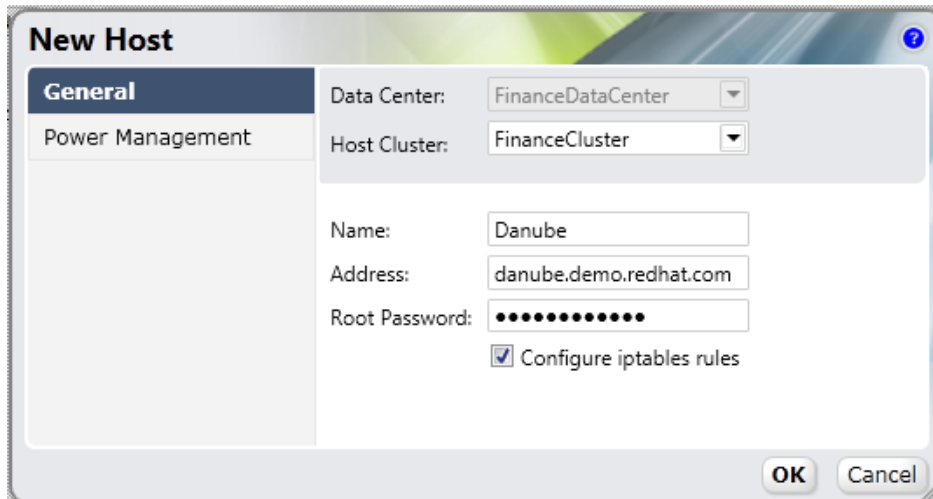


Figure 63. Attach a Red Hat Enterprise Linux Host

Configure the following options:

- The **Data Center** and **Host Cluster** are already pre-selected.
 - Enter the **Name** and the IP **Address** or resolvable hostname of the host. Enter the **Root Password** used to log in to the host.
 - If you wish to configure Out of Band (OOB) power management for this host, see [Section 1, “Configure Power Management”](#).
3. Click **OK**. On the **Tree** pane, click **Expand All** and select the **Danube** host. It displays on the **Hosts** tab with a status of "Installing". The installation may take a few minutes as the required packages are being downloaded. Once installation is complete, the status will update to *Reboot* and then *Awaiting*.
 4. When the host is ready for use, its status changes to **Up**.

5. Configure Logical Networks

Now that you have a data center with hosts grouped in a cluster, you need to define and apply the networking layer. By default, the Management network is already defined for the new data center you created. You can define new logical networks, for example data, storage or display networks.

You have already defined a storage network for the Default data center in [Lab 1 - Install and Configure Basic Setup](#), and added it to the hosts in the Default cluster. Now, you will repeat the same procedure for the FinanceCluster in the FinanceDataCenter.

To define logical networks in a cluster

1. Navigate to the **Tree** pane and click the **Expand All** button. Click **FinanceDataCenter**. On the results list, the **FinanceDataCenter** data center displays. Click on it to display the details pane.

Lab 7 - Add Additional Data Center

- On the details pane, select the **Logical Networks** tab and click **New**. The **New Logical Network** dialog displays.

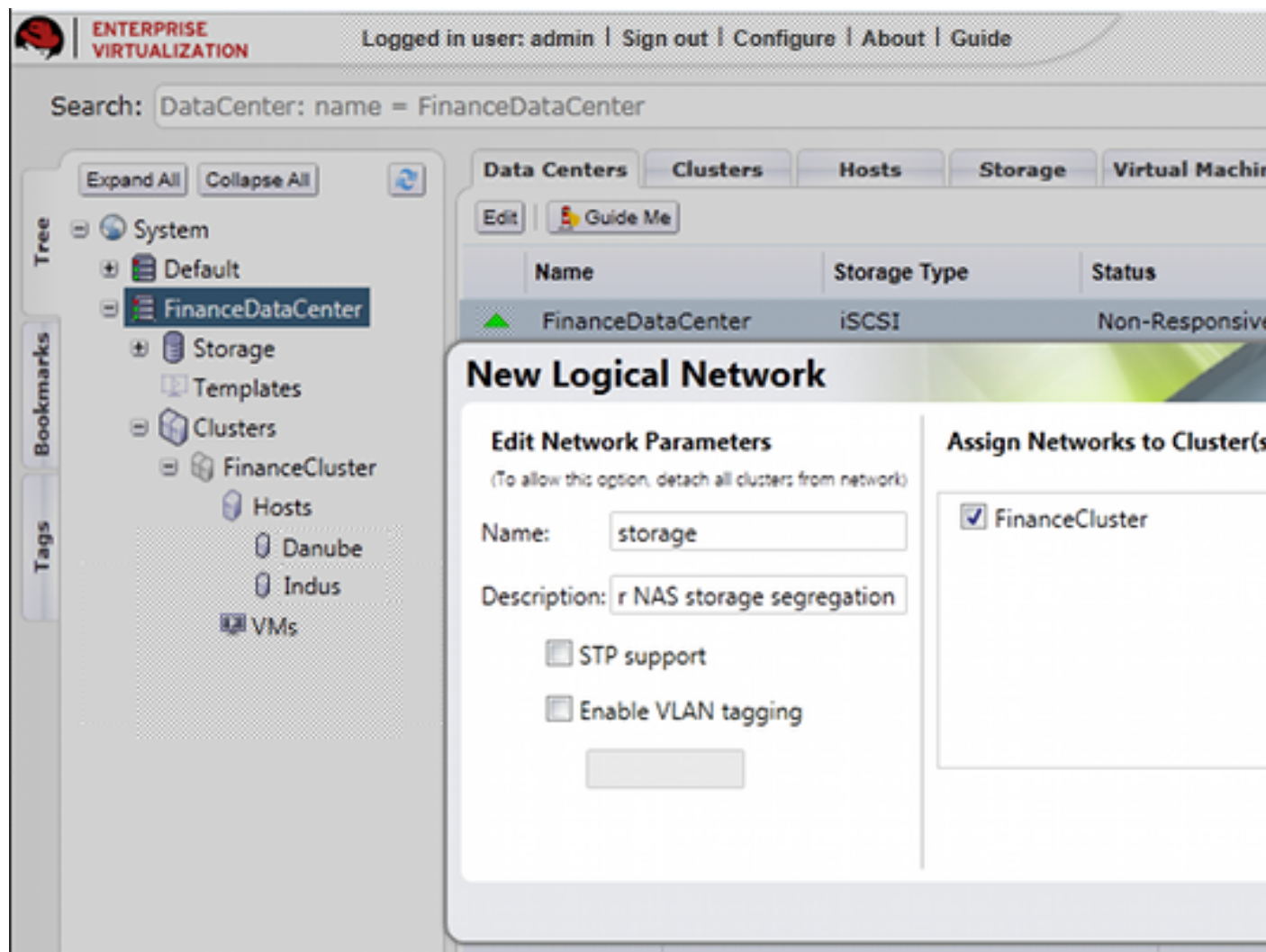


Figure 64. New Logical Network

Fill in the **Name** and **Description** fields, and tick the **Assign Networks to Cluster(s) - FinanceCluster** checkbox to automatically add the Storage network to the FinanceCluster.

- Click **OK** to create the new logical network.

Now that you have defined this network as a resource required by the FinanceCluster in the data center, it is time to add this resource to the hosts in the cluster.

To add network to hosts

- Back on the **Tree** pane, click **FinanceDataCenter** → **Clusters** → **FinanceCluster** → **Hosts**. The **Hosts** tab displays a list of available hosts.
- For each of your installed hosts, perform the following tasks:
 - Click on the host. On the details pane, select the **Network Interfaces** tab.
 - A list of network interfaces available for this host displays. One of them will already have the management network (rhev) configured.

Hosts									
Name	HostIP	Cluster	Status	Load	Memory	CPU	Network	SpmStatus	
Danube	danube.demo.redhat.com	FinanceDataCenter	Up	0 VMs	4%	0%	0%	None	
Indus	indus.demo.redhat.com	FinanceDataCenter	Up	0 VMs	3%	0%	0%	None	

Network Interfaces									
Name	Address	MAC	Speed (Mbps)	Rx (Mbps)	Tx (Mbps)	Drops (pkts)	Bond	Vlan	Network Name
eth0	23.2.2.30	84:2B:2B:BF:65:35	1000	< 1	< 1	0			* rhevm
eth2		00:15:17:CF:AD:FF	0	< 1	< 1	0			
eth1		00:15:17:CF:AD:FE	0	< 1	< 1	0			

Figure 65. Available network interfaces

- c. Select the interface on which to configure the Storage network and click the **Edit/ Add** button. The **Edit Network Interface** dialog displays.

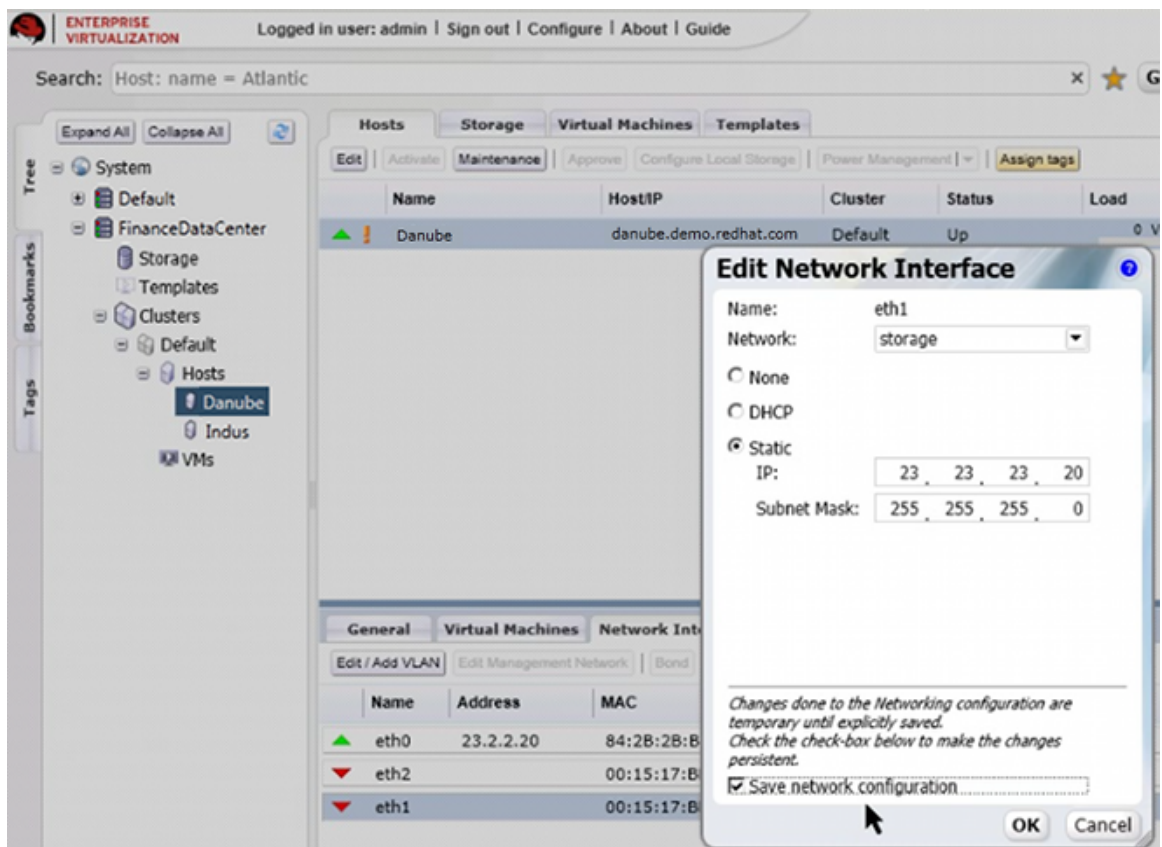


Figure 66. Edit network interface

Configure the following options:

- Under **Network**, select **storage**.
- Select the **Static** radio button. Enter the **IP** and **Subnet Mask** you have prepared as part of the prerequisites to this lab.
- Tick the **Save network configuration** checkbox.

- d. Click **OK**.

You have now added a new storage network to your data center, and attached the network to your hosts. On the **Logical Networks** tab of **FinanceDataCenter**, you should have at least two networks - **rhevm** and **storage**. Now, you can add storage to the system.

6. Configure Storage

After configuring your logical networks, you need to add storage to your data center. This storage resource does not have to be of the same type as the first one you configured during [Lab 1 - Install and Configure Basic Setup](#). It just needs to match the data center type that you specified in [Section 2, "Create a New Data Center"](#).

As before, you will attach two types of storage domains to your data center - an ISO domain for installation media images, and a data domain for virtual machine disk images. When you created your new data center, you have already set the default storage type. Ensure that you use the same type when creating your data domain.

Select your next step by checking the storage type you should use:

1. Navigate to the **Tree** pane and click the **Expand All** button. Click **FinanceDataCenter**. On the results list, **FinanceDataCenter** displays.
2. On the data center entry, the **Storage Type** column displays the type you should add.
3. Now that you have verified the storage type, create the storage domain:
 - For NFS storage, refer to [Section 6.1, "Create an NFS Data Domain"](#).
 - For iSCSI storage, refer to [Section 6.2, "Create an iSCSI Data Domain"](#).
 - For FCP storage, refer to [Section 6.3, "Create an FCP Data Domain"](#).

6.1. Create an NFS Data Domain

Because you have selected NFS as your default storage when you created a data center, you will now create an NFS storage domain.



Important

If you are using NFS storage, you must first create and export the directories to be used as storage domains from the NFS server. These directories must have their numerical user and group ownership set to 36:36 on the NFS server, to correspond to the **vds** user and **kvm** group respectively on the Red Hat Enterprise Virtualization Manager server. In addition, these directories must be exported with the read write options (**rw**). For more information see the *Red Hat Enterprise Virtualization Installation Guide*.

To add NFS storage:

1. On the side pane, select the **Tree** tab. On **System**, click the **+** icon to display the available data centers.
2. Double click on the **FinanceDataCenter** data center and click on **Storage**. The available storage domains display on the results list. Click **New Domain**.

3. The **New Storage** dialog box displays.

Figure 67. Add NFS Storage

Configure the following options:

- Name:** Enter **NFS-share**.
 - Data Center:** The **FinanceDataCenter** data center is already pre-selected.
 - Domain Function / Storage Type:** The **Data/ NFS** option is already pre-selected because during installation you set NFS as your data center's default storage type. The storage domain types which are not compatible with the Data Center will not be available.
 - Use Host:** Select any of the hosts from the drop down menu. Only hosts which belong in this data center will display in this list.
 - Export Path:** Enter the IP address or a resolvable hostname of the chosen host. The export path should be in the format of **192.168.0.10:/Images/NFS-Share** or **domain.example.com:/Images/NFS-Share**.
4. Click **OK**. The new **NFS-share** 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.

You have created an NFS storage domain. Now, you need to attach an ISO domain to the data center and upload installation images so you can use them to create virtual machines. Proceed to [Section 7, "Configure ISO domain"](#).

6.2. Create an iSCSI Data Domain

Because you have selected iSCSI as your default storage type when you created a data center, you will now create an iSCSI storage domain.

To add iSCSI storage:

1. On the side pane, select the **Tree** tab. On **System**, click the **+** icon to display the available data centers.

Lab 7 - Add Additional Data Center

2. Double click on the **FinanceDataCenter** data center and click on **Storage**. The available storage domains display on the results list. Click **New Domain**.
3. The **New Domain** dialog box displays.

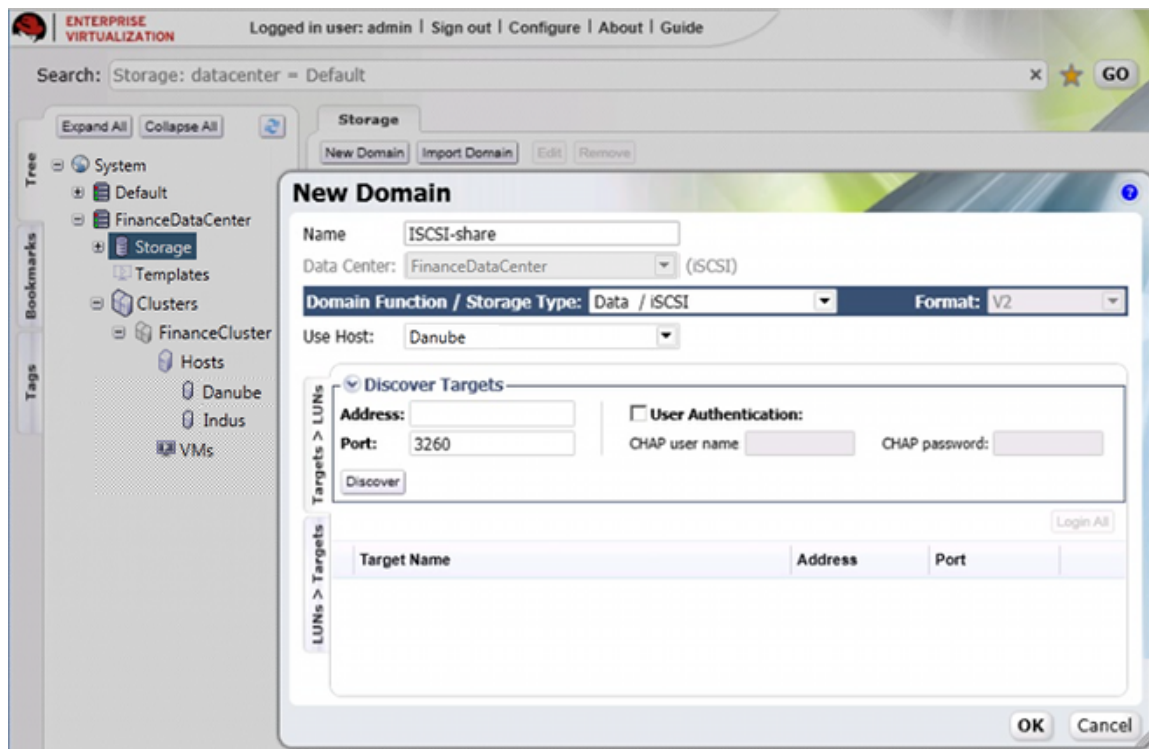


Figure 68. Add iSCSI Storage

Configure the following options:

- a. **Name:** Enter **ISCSI - share**.
 - b. **Data Center:** The **FinanceDataCenter** data center is already pre-selected.
 - c. **Domain Function / Storage Type:** The **Data/ iSCSI** option is already pre-selected because during installation you set iSCSI as your data center's default storage type. The storage domain types which are not compatible with the Data Center will not be available.
 - d. **Use Host:** Select any of the hosts from the drop down menu. Only hosts which belong in this data center will display in this list.
4. To connect to the iSCSI target, enter the required information under the **Discover Targets** bar.

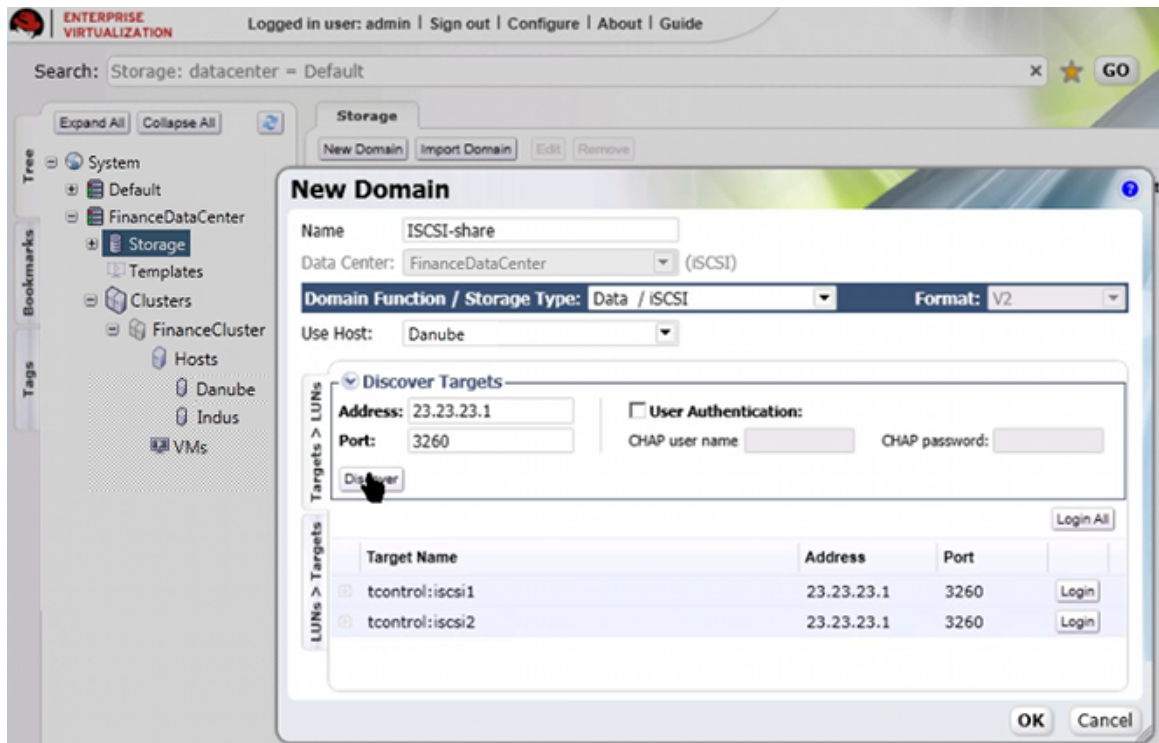


Figure 69. Discover iSCSI target

Enter the required information:

- a. **Address:** Enter the address of the iSCSI target.
 - b. **Port:** Select the port to connect to. The default is 3260.
 - c. **User Authentication:** If required, enter the username and password.
5. Click the **Discover** button to find the targets. The iSCSI targets display in the results list with a **Login** button for each target.
 6. Click **Login** on the first target to display the list of existing LUNs. Click the + icon under the Target Name to expand the LUN list. Tick the **Add LUN** checkbox to use the selected LUN as the iSCSI data domain.

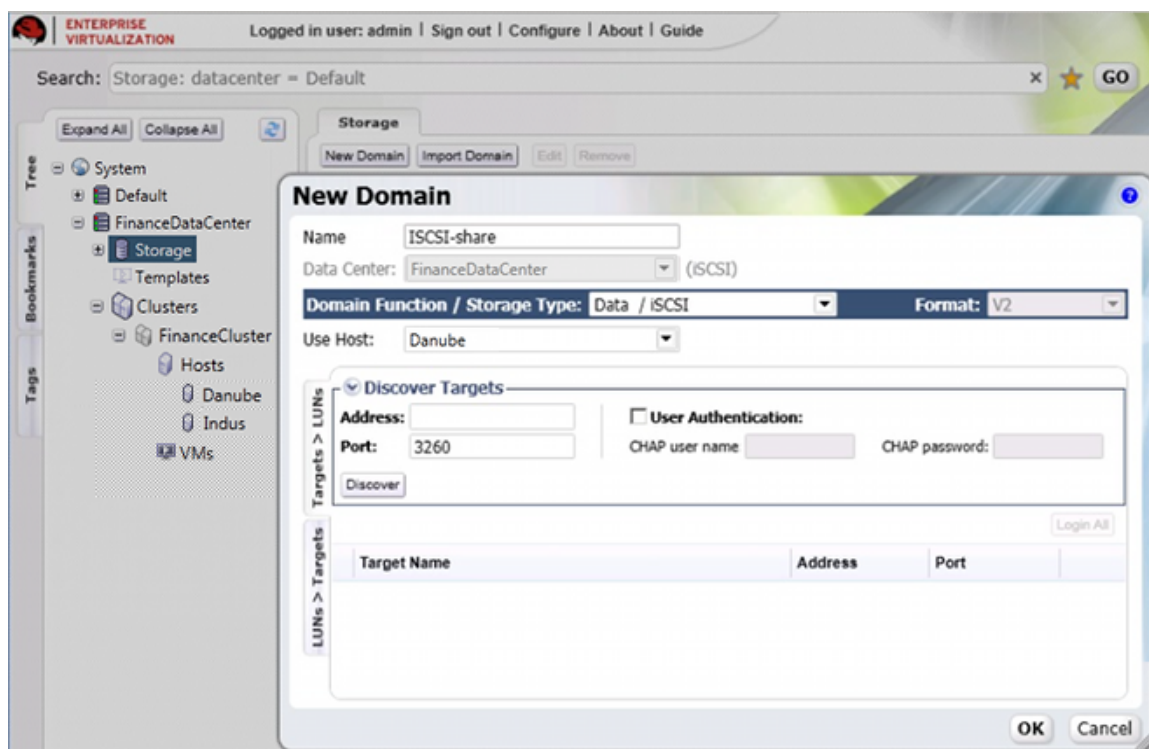


Figure 70. Attach LUNs to iSCSI domain

7. Click **OK**. The new **ISCSI-share** 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.

You have created an iSCSI storage domain. Now, you need to attach an ISO domain to the data center and upload installation images so you can use them to create virtual machines. Proceed to [Section 7, "Configure ISO domain"](#).

6.3. Create an FCP Data Domain

Because you have selected FCP as your default storage type when you created a data center, you will now create an FCP storage domain.

To add FCP storage:

1. On the side pane, select the **Tree** tab. On **System**, click the **+** icon to display the available data centers.
2. Double click on the **FinanceDataCenter** data center and click on **Storage**. The available storage domains display on the results list. Click **New Domain**.
3. The **New Domain** dialog box displays.

New Domain

Name:

Data Center: (Fibre Channel)

Domain Function / Storage Type: Format:

Use Host:

LUN ID	Dev. Size	#path	Vendor ID	Product ID	Serial
--------	-----------	-------	-----------	------------	--------

OK Cancel

Figure 71. Add FCP Storage

Configure the following options:

- a. **Name:** Enter **FCP-share**.
 - b. **Data Center:** The **FinanceDataCenter** data center is already pre-selected.
 - c. **Domain Function / Storage Type:** The **Data/ Fibre Channel** option is already pre-selected because during installation you set FC as your data center's default storage type. The storage domain types which are not compatible with the Data Center will not be available.
 - d. **Use Host:** Select any of the hosts from the drop down menu. Only hosts which belong in this data center will display in this list. Ensure that the LUN you intend to use is available on the host you select.
 - e. The list of existing LUNs display. On the selected LUN, tick the **Add LUN** checkbox to use it as the FCP data domain.
4. Click **OK**. The new **FCP-share** 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.

You have created an FCP storage domain. Now, you need to attach an ISO domain to the data center and upload installation images so you can use them to create virtual machines. Proceed to [Section 7, "Configure ISO domain"](#).

7. Configure ISO domain

Now that you have configured your data storage domains, the next step is to define an ISO domain for your new data center. If you have an additional NFS mount point, you can choose to create a new ISO domain and attach it to your new data center. Alternatively, you can also use the local ISO domain created during the Manager installation. An ISO domain can be shared across data centers, even if the data center storage types are different.

Option 1: To create a new ISO domain

1. On the side pane, select the **Tree** tab and click **Expand All**. Under the **FinanceDataCenter** data center, select **Storage**. On the results list, click **New Domain**.
2. The **New Storage** dialog box displays.

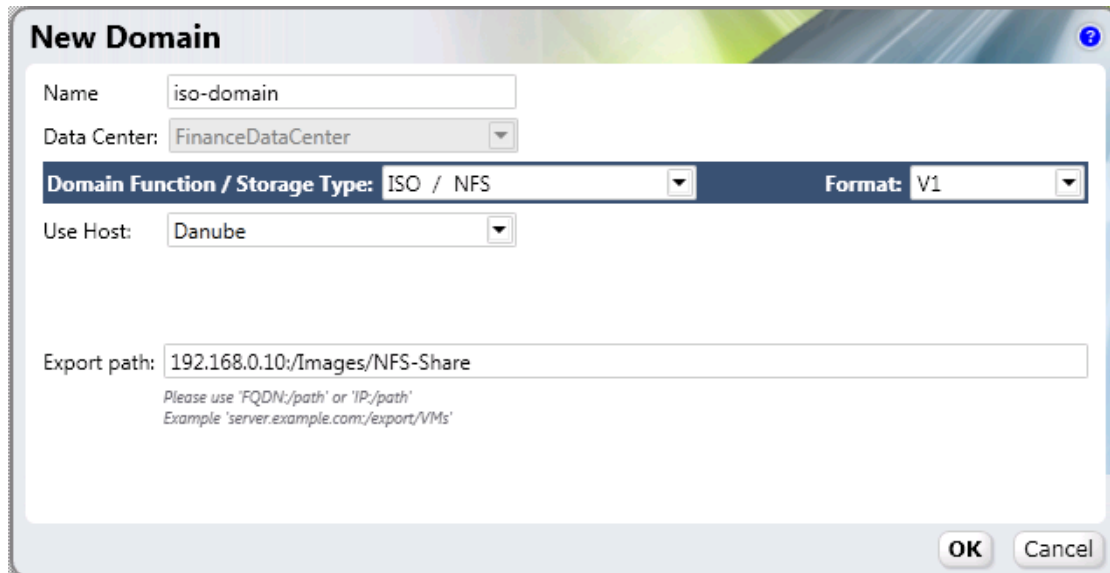


Figure 72. New ISO domain

Configure the following options:

- a. **Name:** Enter **iso-domain**.
 - b. **Data Center:** The **FinanceDataCenter** data center is already pre-selected.
 - c. **Domain Function / Storage Type:** In the drop down menu, select **Data** → **NFS**. The storage domain types which are not compatible with the Default data center are grayed out. After you select your domain type, the **Export Path** field appears.
 - d. **Use Host:** Select any of the hosts from the drop down menu. Only hosts which belong in this data center will display in this list.
 - e. **Export Path:** Enter the IP address or a resolvable hostname of the chosen host. The export path should be in the format of **192.168.0.10:/Images/NFS-Share** or **domain.example.com:/Images/NFS-Share**.
3. Click **OK**. The new **iso-domain** displays on the Storage tab. It displays with a *Locked* status as the domain is being validated, then transits to *Inactive*.
 4. Select the ISO domain and click the **Activate** button. The status changes to *Locked* and then to *Active*.

You have now successfully defined an ISO domain for your new data center, and can now upload ISO images to it. Refer to [To upload ISO images](#) for instructions. Once you have populated your ISO domain, you can create virtual machines as instructed in [Lab 2 - Create Virtual Machines](#).

Alternatively, if you do not have an NFS mount point for a new ISO domain, use the **local-iso-share** domain which was created on the Manager server.

Option 2: To attach the existing ISO domain to a new data center

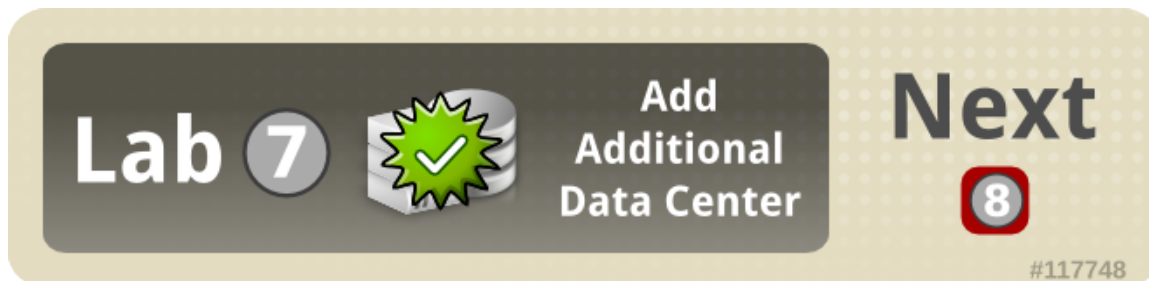
1. On the side pane, select the **Tree** tab and click **Expand All**. Click **FinanceDataCenter**. On the results list, the **FinanceDataCenter** data center displays. Click on it to display the details pane.
2. On the details pane, select the **Storage** tab and click the **Attach ISO** button. Select the **local-iso-share** domain and click **OK**.
3. The ISO domain appears in the results list of the **Storage** tab. It displays with the *Locked* status as the domain is being validated, then transits to *Inactive*.
4. Select the ISO domain and click the **Activate** button. The status changes to *Locked* and then to *Active*.

You have now successfully attached the ISO domain from the Manager server to your new data center. All the installation images which were available in the Default data center can now be used for the **FinanceDataCenter** data center. You can create more virtual machines on your new hosts, using the instructions in [Lab 2 - Create Virtual Machines](#). Just remember to substitute the default cluster for **FinanceCluster** and the default data center for **FinanceDataCenter**.

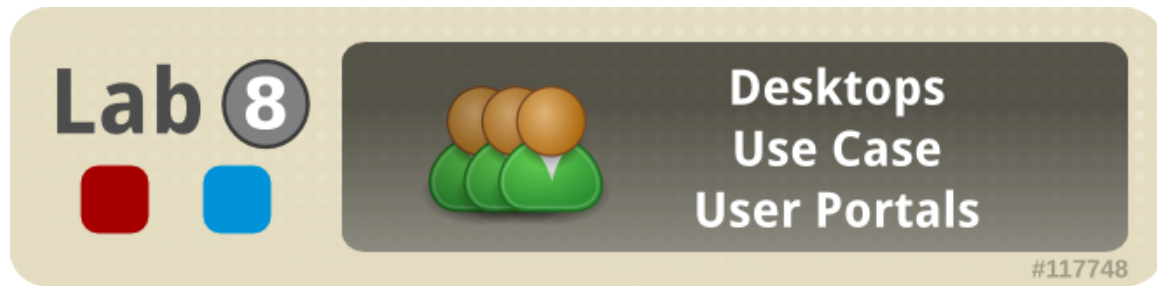
8. Lab 7 - Summary

You have now completed [Lab 7 - Add Additional Data Center](#). In this lab, you have successfully installed Red Hat Enterprise Linux hosts, attached them to an additional data center, and configured additional resources for your new data center.

- The next lab in the Advanced Track for [Section 1, "Track A: Standard Setup"](#) is [Lab 8 - Virtual Desktops](#). This lab shows you how to create and allocate desktop pools, and how to connect to virtual desktops from the basic user portal.



Lab 8 - Virtual Desktops



In [Lab 4 - Power User Portal](#), you learned how to provision virtual machines in the user portal when you have power user privileges. In this lab however, you will log in to the user portal using the same web address but with a different domain. In particular, this lab pertains to the use of Windows virtual desktops and pools, which require users to be configured in Active Directory.

For desktop users, the Red Hat Enterprise Virtualization user portal is simply a one-stop platform to access one or more virtual machines. This portal is suitable for desktop end users who have little need to make configuration changes to their virtual machines. At the end of this lab you will have created Windows virtual machines and pools, and be able to connect to virtual machines from the basic user portal.

This lab assumes that you have successfully completed the basic labs of [Section 1, "Track A: Standard Setup"](#) or [Section 2, "Track B: Minimal Setup"](#). You should have correctly installed and configured Red Hat Enterprise Virtualization, and be able to create virtual machines.

Lab 8 - Objectives

This lab takes you through the tasks necessary to create and then connect to a Windows virtual machine or desktop pool with UserRole privileges. This lab should take you about 50 minutes.

[Section 1, "Add Active Directory Domain"](#) shows you how to add an Active Directory domain to the Red Hat Enterprise Virtualization Manager in order to use Windows virtual desktop pools. (5 minutes)

[Section 2, "Create a Windows Virtual Machine"](#) shows you how to create a new Windows virtual machine, configure storage and networking, and install the operating system. (15 minutes)

[Section 3, "Create a Windows Template"](#) shows you how to seal the Windows virtual machine with sysprep and use it as a basis to create a template. (10 minutes)

[Section 4, "Create a Windows Virtual Machine from a Template"](#) shows you how to create a thin provisioned virtual machine from the Windows template and apply the sysprep configuration settings. (5 minutes)

[Section 5, "Assign Virtual Machine User Permissions"](#) shows you how to assign UserRole permissions for a virtual machine to a user. (2 minutes)

[Section 6, "Connect to a Virtual Machine"](#) shows you how to log in to the User Portal and connect to a virtual machine. (3 minutes)

[Section 7, "Use Virtual Desktop Pools"](#) shows you how to create a Windows desktop pool, assign UserRole permission for the desktop pool and how to connect to a virtual machine in a pool. (10 minutes)

Lab 8 - Requirements

In addition to the requirements stipulated in [Section 1.1, “Track A Requirements”](#) (for Track A) or [Section 2.1, “Track B Requirements”](#) (for Track B), to complete this lab you need the following requirements:

- Active Directory domain. The name used in this lab is **addomain.demo.redhat.com**.
- An Active Directory user with permissions to query and add machines to the domain. The name used in this lab is **desktopsadmin**.
- A regular Active Directory user. The name used in this lab is **desktopuser**.
- A Windows installation image and a volume license key.

1. Add Active Directory Domain

Previously, you have used the **internal** domain, and learned how to add an IPA domain to the Red Hat Enterprise Virtualization Manager. In addition to IPA, Active Directory is also supported. This lab teaches you how to use Active Directory to authenticate users.

To add an Active Directory domain

1. Log in to the Red Hat Enterprise Virtualization Manager server console.
2. Run the following command, and provide the domain administrator password when prompted:

```
# rhvm-manage-domains -action=add -domain=addomain.demo.redhat.com -user=desktopsadmin -interactive
```

3. Restart the service for the changes to be applied across the system.

```
# service jbossas restart
```

Restarting the JBoss service disconnects you from the administration portal. After a few minutes, the restart completes, and you can log back in to the administration portal.

4. Refresh the administration portal login screen. On the drop-down menu, you now have three domains — the internal domain, the IPA domain, and the new Active Directory domain. Log in to the portal as the **admin** user with the **internal** domain.

2. Create a Windows Virtual Machine

You already know how to create a Red Hat Enterprise Linux virtual machine from scratch. The procedure for creating a Windows virtual machine is similar, except that it requires additional virtio drivers. This example uses Windows 7, but you can also use other Windows operating systems. You will perform a normal attended installation using a virtual DVD.

To create a Windows server

1. Navigate to the **Tree** pane and click **Expand All**. Click the **VMs** icon in the **Default** cluster under the **Default** data center. On the **Virtual Machines** tab, click **New Desktop**.

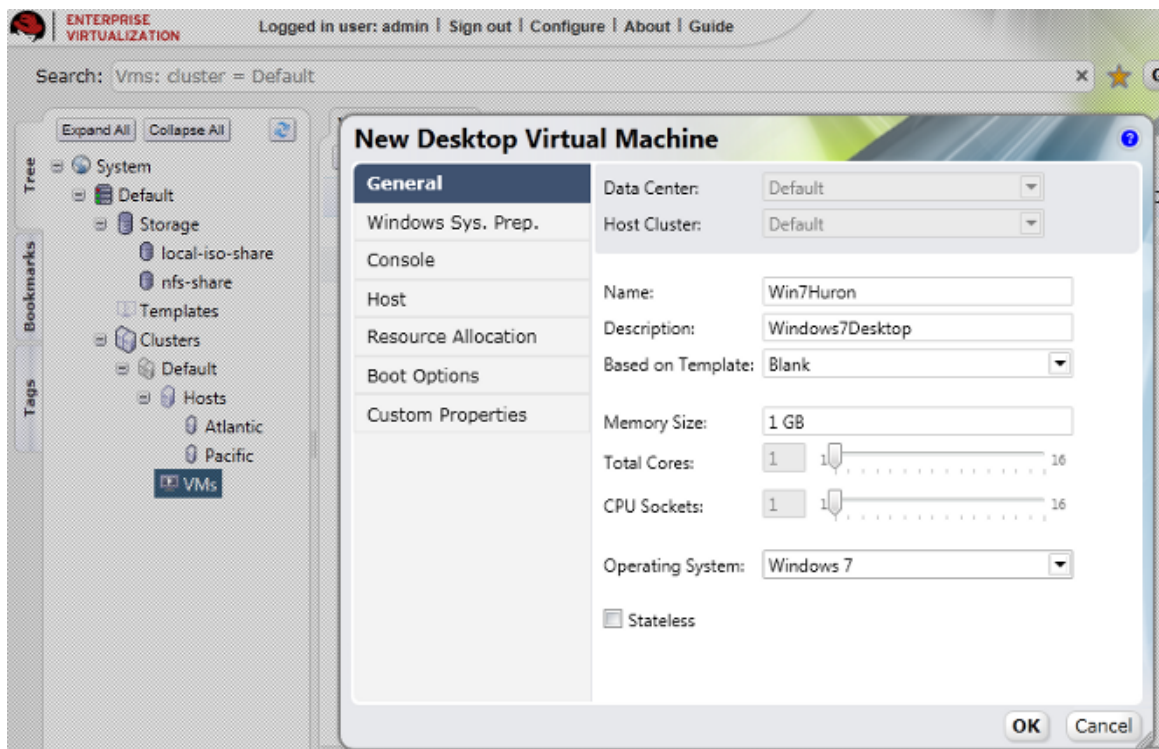


Figure 73. Create new Windows desktop

You only need to fill in the **Name** field and select **Windows 7** as your **Operating System**. You may alter other settings, but this example retains the defaults. Click **OK** to create the virtual machine.

2. A **New Virtual Machine - Guide Me** window opens. This allows you to define networks for the virtual machine. Click **Configure Network Interfaces**.

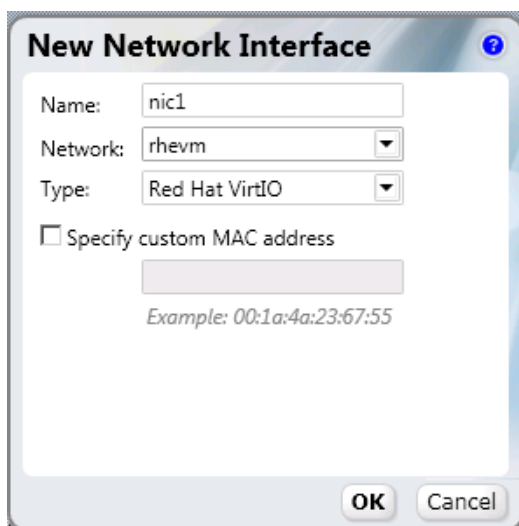


Figure 74. New Network Interface configurations

Retain all the default settings and click **OK**.

3. You are returned to the **Guide Me** window. This time, click **Configure Virtual Disks** to add storage to the virtual machine.



Figure 75. New Virtual Disk configurations

In the **Size (GB)** field, enter 15. Retain all other default settings and click **OK**.

4. Close the Guide Me window. Your new Windows 7 virtual machine displays in the **Virtual Machines** tab.


You have now created your first Windows desktop virtual machine. Before you can use your virtual machine, install an operating system on it.

To install the Windows guest operating system

1. Right click the virtual machine and select **Run Once**. Configure the following options:

- **Attach Floppy:** virtio-win
- **Attach CD:** Your Windows installation media
- **Boot sequence:** CD-ROM
- **Display protocol:** SPICE

Retain the default settings for the other options and click **OK** to start the virtual machine.

2. Select the virtual machine and click the **Console** () icon. If this is your first time connecting to the virtual machine, allow the installation of SPICE ActiveX and the SPICE client.
3. After the SPICE plugins have been installed, select the virtual machine and click **Console** again. This displays a window to the virtual machine, where you will be prompted to begin the installation process.
4. Accept the default settings and enter the required information as necessary. The only change you must make is to manually install the VirtIO drivers from the virtual floppy disk (vfd) image. To do so, select the **Custom (advanced)** installation option and click **Load Driver**. Press Ctrl and select:

- **Red Hat VirtIO Ethernet Adapter**
- **Red Hat VirtIO SCSI Controller**

5. The installation process commences, and the system will reboot itself several times.

When the virtual machine has finished installing, it is time to install **RHEV-tools** which provide some required features including optimizing SPICE display resolution. Press **F12** to release the mouse and click on the SPICE symbol on the upper left hand corner of the SPICE window. In the menu, select **Change CD** → **RHEV-toolsSetup** to attach the Guest Tools ISO to the virtual machine.

6. On the virtual machine, locate the CD drive (usually D drive) and install the Red Hat Enterprise Virtualization Application provisioning tool. This tool checks for RHEV-tools updates on every reboot.
7. After the installation of the tool, wait for a few minutes. During this time, you will not see any apparent activity because the tool runs as a service. The guest will automatically reboot to apply changes.

You have completed the installation of your Windows virtual machine. You can now log in and start using it. In the next lab you will convert this machine into a template from which you will be able to provision multiple similar machines.

3. Create a Windows Template

Now that you have created a Windows virtual machine, you can save its settings into a template. This template will retain the original virtual machine's configurations, including virtual disk and network interface settings, operating systems and applications. You can use this template to rapidly create replicas of the original virtual machine. For this lab, name your template **FinanWinDesk**.

Before your virtual machine can be used to create a template, it has to be sealed with **sysprep**. This ensures that machine-specific settings are not propagated through the template.

Note that the procedure below is applicable for creating Windows 7 and Windows 2008 R2 templates. If you wish to seal a Windows XP template, refer to the *Red Hat Enterprise Virtualization Administration Guide*.

To seal a Windows virtual machine with sysprep

1. In the Windows virtual machine to be used as a template, open a command line terminal and type **regedit**.
2. The **Registry Editor** window displays. On the left pane, expand **HKEY_LOCAL_MACHINE** → **SYSTEM** → **SETUP**.
3. On the main window, right click to add a new string value using **New** → **String Value**. Right click on the string value file and select **Modify**. When the **Edit String** dialog box displays, fill in the provided text boxes:
 - Value name: **UnattendFile**
 - Value data: **a:\sysprep.inf**
4. Launch sysprep from **C:\Windows\System32\sysprep\sysprep.exe**
 - Under **System Cleanup Action**, select **Enter System Out-of-Box-Experience (OOBE)**.
 - Tick the **Generalize** checkbox if you need to change the computer's system identification number (SID).
 - Under **Shutdown Options**, select **Shutdown**.

Click **OK**. The virtual machine will now go through the sealing process and shut down automatically.

To create a template from an existing Windows machine

1. In the administration portal, click the **Virtual Machines** tab. Select the sealed Windows 7 virtual machine. Ensure that it has a status of **Down** and click **Make Template**.
2. The **New Virtual Machine Template** displays. Enter information into the following fields:
 - **Name**: Name of the new template.

Name your new template **FinanWinDesk**.
 - **Description**: Description of the new template.
 - **Host Cluster**: The Host Cluster for the virtual machines using this template.
 - **Make Public**: Check this box to allow all users to access this template.
3. Click **OK**. In the **Templates** tab, the template displays the "Image Locked" status icon while it is being created. During this time, the action buttons for the template remain disabled. Once created, the action buttons are enabled and the template is ready for use.
4. Now that you have the template, you can further modify its properties. In this example you will set its time zone and enable it to join the Active Directory. These parameters will be passed to the sysprep answers file while creating a virtual machine using this template.

On the **Tree** pane navigate to the data center where you have created the template. Double-click the template and click the **sysprep** tab. Fill in the Active Directory domain that you have added previously, select your time zone, and click **OK**.

5. You have to activate the Windows operating system for each virtual machine created using this template. To automate the activation process, configure sysprep with the volume license key you have prepared for this track.

Log in to the Red Hat Enterprise Virtualization Manager's server console and run:

```
# rhevm-config -s ProductKeyWindow7x64="enter your key here"
# service jbossas restart
```

You can now create new Windows machines using this template.

4. Create a Windows Virtual Machine from a Template

In the previous section, you created a Windows template complete with pre-configured storage, networking and operating system settings. Now, you will use this template to deploy a pre-installed virtual machine.

To create a Windows virtual machine from a template

1. Navigate to the **Tree** pane and click **Expand All**. Click the **VMs** icon in the **Default** cluster under the **Default** data center. On the **Virtual Machines** tab, click **New Desktop**.

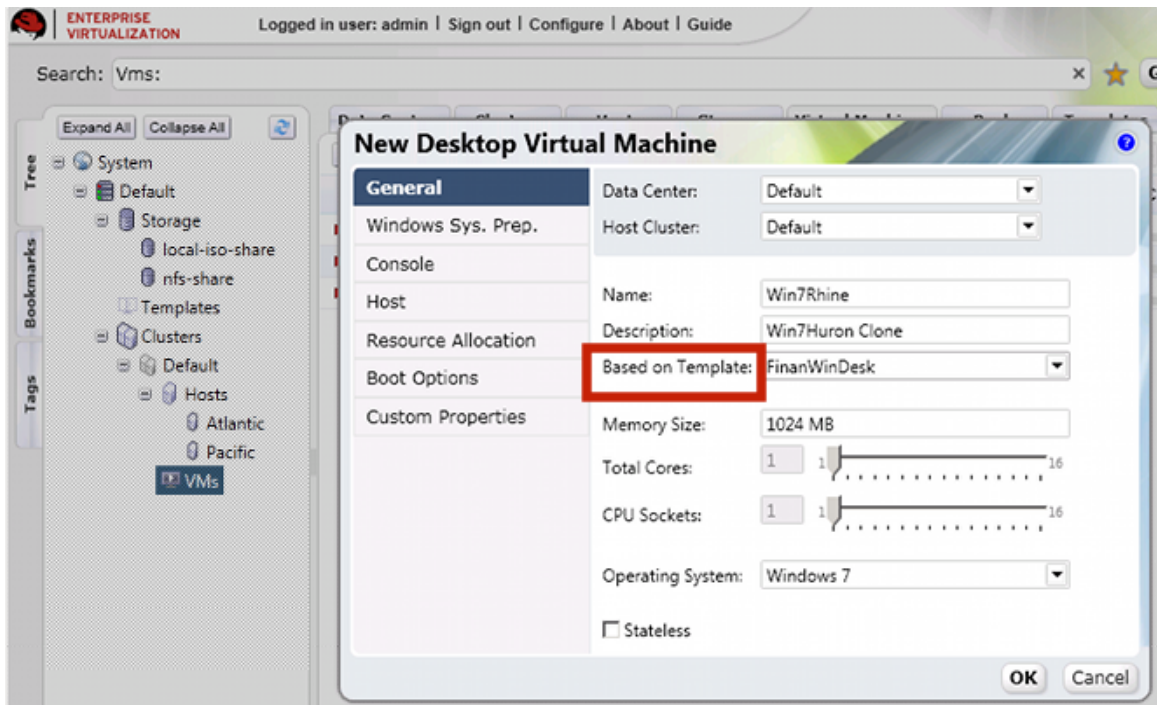



Figure 76. Clone a Windows desktop

- a. On the **General** tab, select your newly created Windows template called **FinanWinDesk** from the **Based on Template** list.
 - b. Enter a suitable **Name** and **Description**, and accept the default values inherited from the template in the rest of the fields. You can change them if needed.
2. Retain all other default setting and click **OK** to create the virtual machine. The virtual machine displays in the Virtual Machines list with a status of "Image Locked" until the virtual disk is created. The virtual disk and networking settings are inherited from the template, and do not have to be reconfigured.
 3. Click the **Run**  icon to turn it on. This time, the **Run Once** steps are not required as the operating system has already been installed onto the virtual machine hard drive. Click the green **Console** button to connect to the virtual machine.
 4. The Windows virtual machine goes through the unattended setup process to apply the customized settings set by sysprep using the answer file provided. When this process ends, log in to the machine. You can see that the virtual machine has joined the Active Directory domain.

You have now learned how to create Windows virtual machines with and without templates. Next, you will learn how to access these virtual machines from a user portal.

5. Assign Virtual Machine User Permissions

To access virtual machines from the Red Hat Enterprise Virtualization User Portal, users must have the relevant permissions. Permissions are added from the Manager administration portal or the Power User Portal. A basic user has permissions for the assigned virtual machine only, not for all virtual machines in the system.

To assign UserRole permissions on a virtual machine

1. From the administration portal, click the **Virtual Machines** tab. Select the virtual machine you created, **Win7Huron**.
2. On the **Details** pane, navigate to the **Permissions** tab. Click the **Add** button.
3. The **Add Permission to User** dialog displays. Enter **desktopuser** in the **Search** textbox, and click **Go**. Select the check box of the user to be assigned the permissions. Scroll through the **Assign role to user** list and select **UserRole**.

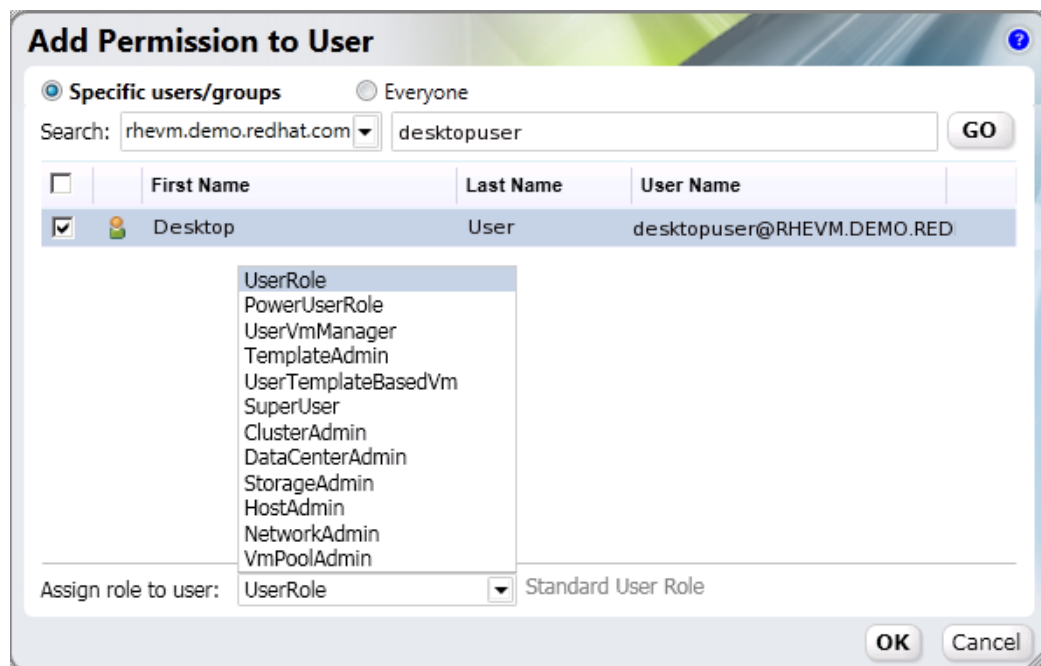


Figure 77. Add UserRole permission


4. Click **OK**. The user now has permissions to access the virtual desktop.

6. Connect to a Virtual Machine

Now that you have created a user who has basic permissions, log in as **desktopuser** to the User Portal. Ensure that you have the **addomain.demo.redhat.com** domain selected. For instructions refer to [To log in to the User Portal](#).

The Basic User Portal displays for users who have basic permissions. Note the difference between this portal and the one you accessed in a previous lab as a Power User. The Basic User Portal is designed for end users with little need for performing system administration changes to the virtual machines.

To connect to a virtual machine

1. Select the virtual machine you wish to connect to and click the Play  button.
2. The virtual machine powers up. When it is turned on, it will no longer be grayed out. The text **Machine is Ready** displays under the virtual machine logo. Double click the virtual machine to connect to console.

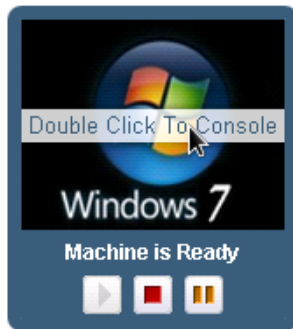


Figure 78. Add UserRole permission

3. A SPICE console window of the virtual machine displays.

A virtual desktop can be used the same way as a physical computer. Red Hat Enterprise Virtualization supports the use of USB devices and CD-ROMs on virtual machines. For more information on using virtual machines refer to the *Red Hat Enterprise Virtualization User Portal Guide*.

4. Once you have finished using the virtual machine, log out according to the instructions specific to the operating system. This returns you to the user portal.

7. Use Virtual Desktop Pools

A virtual desktop pool is a group of identical desktops that can be used on demand by each user who has permissions to use the desktops from the pool. However, a single desktop cannot be used concurrently by multiple users. The user does not always get the same desktop, but is allocated an available desktop of the required type, from the appropriate pool.

7.1. Create a Desktop Pool

Perform this procedure in the administration portal as the **admin** user.

To create a desktop pool

1. Log in to the administration portal. In the **Tree** pane, select **System** and click the **Pools** tab. Click the **New** button.

New Pool

General

Pool

Windows Sys. Prep.

Console

Host

Resource Allocation

Boot Options

*Data Center: Default

*Host Cluster: Default

Name: FinWinPool

Description: Finance Windows 7 Shared

Number of VMs: 5

*Based on Template: FinanWinDesk

*Memory Size: 1 GB

*Total Cores: 1

*CPU Sockets: 1

*Operating System: Windows 7 x64

* Changing this field will affect only newly created VM

OK Cancel

Figure 79. Create a new desktop pool

Enter *FinWinPool* in **Name** and 5 in **Number of VMs**. In the **Based On Template** field, select **FinanWinDesk**. You may alter other settings, but this example retains the defaults. Click **OK** to create the desktop pool.

- On the **Virtual Machines** tab, you can see that five new virtual desktops have been created. You have to run them to allow sysprep to set up the virtual desktops and add them to the domain as specified when you created the template. This will take a few minutes, you can either open consoles to all the virtual desktops to monitor the progress of this setup or wait until you see the virtual machine information (like IP addresses) display on the results list, which indicates the setup is complete.
- Power off all the pool desktops. Select them all and click the Stop button. The virtual desktops will move to a *Powering Down* state, and after a while change to *Down*.

7.2. Assign Pool User Permissions

To access virtual machines from the Red Hat Enterprise Virtualization User Portal, users must have the relevant permissions. Assigning UserRole permissions for a pool allows a user to access all of the virtual desktops in the pool, but not other virtual machines in the system.

To assign UserRole permissions

- On the **Tree** pane, select **System** and click **Pools**. Select the pool you created, **FinanWinPool1**.
- On the **Details** pane, navigate to the **Permissions** tab. Click the **Add** button.
- The **Add Permission to User** dialog displays as illustrated in [Figure 77, “Add UserRole permission”](#).

Select **addomain.demo.redhat.com** as the domain to search and enter **desktopuser** in the **Search** textbox, then click **Go**. Select the checkbox of the **desktopuser**. Scroll through the **Assign role to user** list and select **UserRole**.

- Click **OK**. The user now has permissions to access the desktop pool.

7.3. Allocate Virtual Desktop

Virtual desktops in a pool have the same operating system and installed applications. The pool will allocate identical virtual desktops as needed to each user permitted to access the pool.

Log in to the user portal as **desktopuser**. Ensure that you have the **addomain.demo.redhat.com** domain selected.

To allocate a virtual desktop

- Select the pool you created. Turn it on by clicking on the Play button which in this case allocates a virtual desktop from the pool.



Figure 80. Take virtual desktop from pool

- The virtual desktop assigned to you powers up. Its name reflects the pool it was taken from.



Figure 81. Take virtual desktop from pool

- When the virtual desktop displays the text **Machine is Ready**, double-click the virtual desktop logo to access its console window.

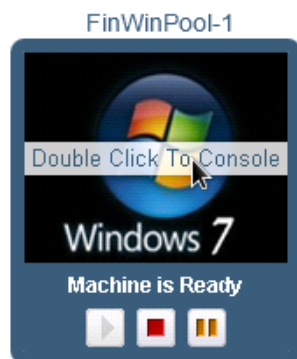




Figure 82. Connect to virtual desktop

4. A virtual desktop in a pool should be stateless, meaning any changes made to it will be deleted upon shutdown. In the next section, you will test whether this virtual desktop is stateless by seeing changes that you make to it get removed when the virtual desktop is returned to the pool. First, make a change to the default virtual desktop. For example, create a file on the Desktop called **test.txt** or add a new user account.

7.4. Deallocate Virtual Desktop

Now, you will shut down the virtual desktop and return it to the pool. As the virtual desktop you used is part of a shared resource, the changes you have made will not be persistent.

To deallocate a virtual desktop

1. Make a note of the name of the virtual desktop, then shut it down by clicking the  button. It is now deallocated and returned to the pool.
2. Now, select the desktop pool and click  to allocate a virtual desktop again.
3. You might get a different virtual desktop from the pool or the same one; check its name.

If it is the same desktop, you can check that the desktop has indeed been rebuilt, and thus retains only the settings specified in the template from which it was created. To do so, log in to the virtual desktop and verify that the changes you have made previously are lost, as expected.

8. Lab 8 - Summary

You have now completed [Lab 8 - Virtual Desktops](#). In this lab, you have successfully created and used Windows virtual machines and desktop pools.

You have now completed the Advanced Labs of [Section 2, "Track B: Minimal Setup"](#). If you wish to attempt the Standard Setup evaluation track, go to [Section 1, "Track A: Standard Setup"](#). If you wish to unlock the full version of Red Hat Enterprise Virtualization, or to contact our sales representatives for more information, please proceed to the last chapter.

You have now completed the Advanced Labs of [Section 1, "Track A: Standard Setup"](#). If you wish to attempt the Minimal Setup evaluation track, go to [Section 2, "Track B: Minimal Setup"](#). If you wish to unlock the full version of Red Hat Enterprise Virtualization, or to contact our sales representatives for more information, please proceed to the last chapter.

Lab **8**



Desktops
Use Case
User Portals

Next



#117748

Lab 9 - Install and Configure Minimal Setup

This lab demonstrates basic installation and configuration of Red Hat Enterprise Virtualization using minimal hardware. At the end of this lab the you will be able to create virtual machines up to the limit of a single host system, provision the virtual machines, and experience the management interface.

Note that this lab is designed for users with minimum resources for evaluation. If you have multiple servers for use as virtual machine hosts, or wish to use shared storage, please refer to [Lab 1 - Install and Configure Basic Setup](#).

Lab 9 - Objectives

This lab takes you through the tasks necessary to install and set up Red Hat Enterprise Virtualization on a single host and using local storage. In addition, you will learn how to add ISOs in order to create virtual machines. This lab should take you about 60 minutes.

Section 1, "Install Red Hat Enterprise Virtualization Manager" shows you how to install the Red Hat Enterprise Virtualization Manager on a server running Red Hat Enterprise Linux. (12 minutes*)

Section 2, "Install Red Hat Enterprise Virtualization Hypervisor" shows you how to install and configure a Red Hat Enterprise Virtualization Hypervisor for use with Red Hat Enterprise Virtualization Manager. (13 minutes*)

Section 3, "Connect to Red Hat Enterprise Virtualization Manager" shows you how to configure a client machine to connect to the Red Hat Enterprise Virtualization Manager administration portal. (8 minutes)

Section 4, "Approve the Red Hat Enterprise Virtualization Hypervisor" shows you how to approve the host for use from the Red Hat Enterprise Virtualization Manager. (7 minutes)

Section 5, "Create Local Storage" shows you how to define NFS, iSCSI or FCP storage and attach the domains to the data center. (10 minutes)

Section 6, "Attach and Populate ISO Domain" shows you how to attach the predefined ISO domain to the data center and upload ISO images to the repository. (10 minutes)

* The time required to download packages from the Red Hat Network depends on the bandwidth of your connection to RHN, therefore it has not been included in the estimated time.

Lab 9 - Configuration

The following figure and table list the environment parameters and object names which will be used consistently throughout this lab. It is strongly recommended that you use these entities in your evaluation environment to ensure the names are resolvable. You may alter them if necessary, but make sure you have an equivalent name for each component.

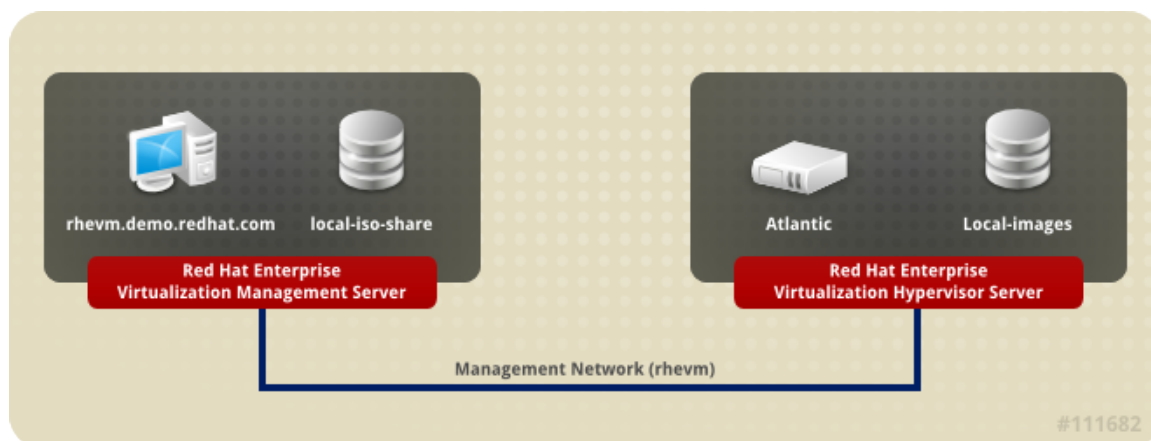


Table 3. Lab component names

Component	Name in the Red Hat Enterprise Virtualization Manager Setup	IP (if applicable)	Fully Qualified Domain Name
Domain Services	-	-	demo.redhat.com
Red Hat Enterprise Virtualization Manager	-	-	rhev.demo.redhat.com
Domain Name System	-	23.23.2.1	-
Management Network	rhev	10.35.3.0/24	-
Red Hat Enterprise Virtualization Hypervisor	Atlantic	-	atlantic.demo.redhat.com
Administrator User Name	admin	-	-
Local Storage Domain	Local-images	-	-
ISO Storage Domain	local-iso-share	-	-

1. Install Red Hat Enterprise Virtualization Manager

The Red Hat Enterprise Virtualization Manager is the control center of the Red Hat Enterprise Virtualization environment. It allows you to define hosts, configure data centers, add storage, define networks, create virtual machines, manage user permissions and use templates from one central location.

The Red Hat Enterprise Virtualization Manager must be installed on a server running Red Hat Enterprise Linux 6, with minimum 4 GB RAM, 25 GB free disk space and 1 Gbps network interface (see [Section 2.1, “Track B Requirements”](#)).

To install Red Hat Enterprise Virtualization Manager

1. Install Red Hat Enterprise Linux 6 on a server. When prompted for the software packages to install, select the default **Basic Server** option. See the *Red Hat Enterprise Linux Installation Guide* for more details.

**Important**

During installation, set the fully qualified domain name (FQDN) for the server as **rhevmdemo.redhat.com**.

2. If the *classpathx-jaf* package has been installed, it must be removed because it conflicts with some of the components required to support JBoss in Red Hat Enterprise Virtualization Manager. Run:

```
# yum remove classpathx-jaf
```

3. If your server has not been registered with the Red Hat Network, run:

```
# rhn_register
```

To complete registration successfully you need to supply your Red Hat Network username and password. Follow the onscreen prompts to complete registration of the system.

After you have registered your server, update all the packages on it. Run:

```
# yum -y update
```

Reboot your server for the updates to be applied.

4. Subscribe the server to the required channels for Red Hat Enterprise Virtualization Manager:
 - The **Red Hat Enterprise Virtualization Manager (v.3 x86_64)** channel, also referred to as **rhel-x86_64-server-6-rhevmd-3**, provides Red Hat Enterprise Virtualization Manager.
 - The **JBoss Application Platform (v 5 in rpm)** channel, also referred to as **jbappplatform-5-x86_64-server-6-rpm**, provides the supported release of the application platform on which the manager runs.
 - The **RHEL Server Supplementary (v. 6 64-bit x86_64)** channel, also referred to as **rhel-x86_64-server-supplementary-6**, provides the supported version of the Java Runtime Environment (JRE).

To do so, run the following command:

```
# rhn-channel -v -u YOUR-RHN-USERNAME -a -c rhel-x86_64-server-6-rhevmd-3 -c  
jbappplatform-5-x86_64-server-6-rpm -c rhel-x86_64-server-supplementary-6
```

5. You are now ready to install the Red Hat Enterprise Virtualization Manager. Run the following command:

```
# yum -y install rhvmd
```

Lab 9 - Install and Configure Minimal Setup

This command will download the Red Hat Enterprise Virtualization Manager installation software and resolve all dependencies.

- When the packages have finished downloading, run the installer:

```
# rhvm-setup
```



Important — Supported Locales

rhvm-setup supports the **en_US.UTF-8**, **en_US.utf8**, and **en_US.utf-8** locales. You will not be able to run this installer on a system where the locale in use is not one of these supported values.

- The installer will take you through a series of interactive questions as listed in the following example. If you do not enter a value when prompted, the installer uses the default settings which are stated in [] brackets.

Example 4. Red Hat Enterprise Virtualization Manager installation

```
Welcome to RHEV Manager setup utility
HTTP Port [8080] :
HTTPS Port [8443] :
Host fully qualified domain name, note that this name should be fully resolvable
[rhvm.demo.redhat.com] :
Password for Administrator (admin@internal) :
Database password (required for secure authentication with the locally created
database) :
Confirm password :
Organization Name for the Certificate: Red Hat
The default storage type you will be using ['NFS'| 'FC'| 'ISCSI'] [NFS] : ISCSI
Should the installer configure NFS share on this server to be used as an ISO Domain?
['yes'| 'no'] [no] : yes
Mount point path: /data/iso
Display name for the ISO Domain: local-iso-share
Firewall ports need to be opened.
You can let the installer configure iptables automatically overriding the current
configuration. The old configuration will be backed up.
Alternately you can configure the firewall later using an example iptables file found
under /usr/share/rhvm/conf/iptables.example
Configure iptables ? ['yes'| 'no']: yes
```

Important points to note:

- The default ports **8080** and **8443** must be available to access the manager on HTTP and HTTPS respectively.
- If you elect to configure an NFS share it will be exported from the machine on which the manager is being installed.
- The storage type that you select will be used to create a data center and cluster. However, at this stage it does not matter which one you choose, because you will be creating local storage on your host later.

8. You are then presented with a summary of the configurations you have selected. Type yes to accept them.

Example 5. Confirm Manager installation settings

```
RHEV Manager will be installed using the following configuration:
=====
http-port:                8080
https-port:               8443
host-fqdn:                rhevm.demo.redhat.com
auth-pass:                *****
db-pass:                  *****
org-name:                 Red Hat
default-dc-type:          ISCSI
nfs-mp:                   /data/iso
iso-domain-name:          local-iso-share
override-iptables:       yes
Proceed with the configuration listed above? (yes|no): yes
```

9. The installation commences. It may take a few minutes. When complete, the following message displays, indicating that the installation was successful.

Example 6. Successful installation

```
Installing:
Creating JBoss Profile...          [ DONE ]
Creating CA...                    [ DONE ]
Setting Database Security...      [ DONE ]
Creating Database...              [ DONE ]
Updating the Default Data Center Storage Type... [ DONE ]
Editing JBoss Configuration...    [ DONE ]
Editing RHEV Manager Configuration... [ DONE ]
Configuring the Default ISO Domain... [ DONE ]
Starting JBoss Service...         [ DONE ]
Configuring Firewall (iptables)... [ DONE ]

**** Installation completed successfully ****
```

Your Red Hat Enterprise Virtualization Manager is now up and running. You can log in to the Red Hat Enterprise Virtualization Manager's web administration portal with the username **admin** (the administrative user configured during installation) in the **internal** domain.



Important

The **internal** domain is automatically created upon installation, however no new users can be added to this domain. To authenticate new users, you need an external directory service. Red Hat Enterprise Virtualization supports IPA and Active Directory, and provides a utility called **rhevmanage-domains** to attach new directories to the system. You will use this tool in subsequent labs.

2. Install Red Hat Enterprise Virtualization Hypervisor

You have now successfully installed Red Hat Enterprise Virtualization Manager. The next step is to install your Red Hat Enterprise Virtualization Hypervisor hosts, which will be used to run your virtual machines. Note that you have to perform this installation once on each physical server used as a host.

While this lab describes the use of Red Hat Enterprise Virtualization Hypervisor hosts, you can also use Red Hat Enterprise Linux servers as virtual machine hosts. See [To install a Red Hat Enterprise Linux 6 host](#) for details. In addition, if you wish to use installation methods other than ISO images (including network or PXE boot), see the *Red Hat Enterprise Linux — Hypervisor Deployment Guide*.

Before installing the Red Hat Enterprise Virtualization Hypervisor, you need to download the hypervisor image from the Red Hat Network and create a bootable CD with the image. This procedure can be performed on any machine running Red Hat Enterprise Linux.

To prepare a Red Hat Enterprise Virtualization Hypervisor installation CD

1. Download the latest version of the *rhev-hypervisor** package from Red Hat Network. The list of hypervisor packages is located at the **Red Hat Enterprise Virtualization Hypervisor (v.6 x86-64)** channel.
2. Install the RPM on a Red Hat Enterprise Linux system. You must log in as the **root** user and navigate to the location of the downloaded file to perform this step.

```
# yum localinstall rhev-hypervisor*.rpm
```

3. Insert a blank CD into your CD writer. Use the *cdrecord* utility to burn the hypervisor ISO image onto your disc. Run:

```
# cdrecord dev=/dev/cdrw /usr/share/rhev-hypervisor/rhev-hypervisor.iso
```

You have created a Red Hat Enterprise Virtualization Hypervisor installation CD, now you can use it to boot the machine designated as your hypervisor host. This lab describes the interactive installation where you are prompted to configure your settings in a graphical interface. Use the following keys to navigate around the installation screen:

Menu Navigation Keys

- Use the **Up** and **Down** arrow keys to navigate between selections. Your selections are highlighted in white.
- The **Tab** key allows you to move between fields.
- Use the **Spacebar** to tick checkboxes, which are represented by [] brackets. A marked checkbox displays with an asterisk (*).
- To proceed with the selected configurations, press the **Enter** key.

To boot the Red Hat Enterprise Virtualization Hypervisor from a CD

1. Insert the Red Hat Enterprise Virtualization Hypervisor installation CD into the CD-ROM drive of the machine designated as a host. Reboot the machine. When the boot splash screen displays, press the **Tab** key and select **Boot** to boot from the hypervisor installation media. Press **Enter**.
2. On the installation confirmation screen, select **Install RHEV Hypervisor** and press **Enter**.
3. The installer automatically detects the drives attached to the system. The selected disk for booting the hypervisor is highlighted in white. Ensure that the local disk is highlighted, otherwise use the arrow keys to select the correct disk. Select **Continue** and press **Enter**.

4. You are prompted to select the drive on which the hypervisor is to be installed. Ensure that the local disk is highlighted, otherwise use the arrow keys to select the correct disk. While multiple installation drives can be used, select only one for this evaluation. Select **Continue** and press **Enter**.
5. Enter a password for local console access and confirm it. Select **Install** and press **Enter**. The Red Hat Enterprise Virtualization Hypervisor partitions the local drive, then commences installation.
6. Once installation is complete, a dialog prompts you to **Reboot** the hypervisor. Press **Enter** to confirm. Remove the installation disc.
7. After the hypervisor has rebooted, you will be taken to a login shell. Log in as the **admin** user with the password you provided during installation to enter the Red Hat Enterprise Virtualization Hypervisor management console.
8. On the hypervisor management console, there are eight tabs on the left. Press the **Up** and **Down** keys to navigate between them and **Enter** to access them.
 - a. Select the **Network** tab. Fill in the required fields as shown in the following example. Substitute the **DNS Server** address according to your environment.

```

RHEV Hypervisor 6.2-0.12.el6
atlantic.demo.redhat.com

Status
Network
Security
Logging
Kernel Dump
Remote Storage
RHEV-M
Red Hat Network

System Identification
Hostname: atlantic.demo.redhat.com

DNS Server 1: 23.2.2.1
DNS Server 2: 23.2.2.11

NTP Server 1: 0.rhel.pool.ntp.org
NTP Server 2: 1.rhel.pool.ntp.org

Device  Status  Model  MAC Address
eth0    Unconfigured  unknown  52:54:00:a4:14:0b

<Flash Lights to Identify>  <Apply>  <Reset>
  
```

Figure 83. Configure Hypervisor network settings

After you have filled in the fields, select **Apply** and press **Enter**. This saves your network settings.

- b. For this document, the **eth0** device will be used to set up the management network. Select it and press **Enter** to access the interface configuration menu. Fill in the required fields as shown in the following example.

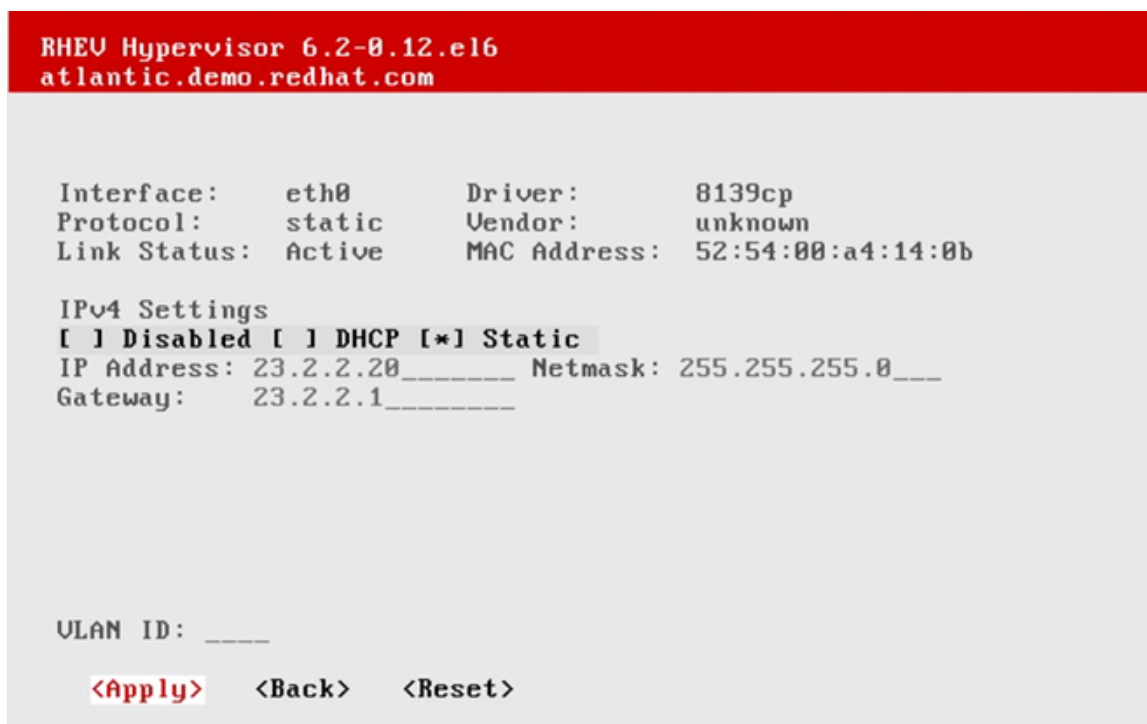


Figure 84. Configure management network interface

Under **IPv4 Settings**, select **DHCP** or **Static** IP addressing and press **Spacebar** to mark the option as enabled. If using static IP addressing you must also provide the **IP Address**, **Netmask**, and **Gateway**. Select **Apply** and press **Enter**.

A dialog prompts you to confirm your network settings, select **OK** and press **Enter**.

- c. Select the **RHEV-M** tab. Configure the following options:
 - In the **Management Server** field, enter **rhev.m.demo.redhat.com**.
 - In the **Management Server Port** field, enter **8443**.
 - Tick the **Connect to the RHEV Manager and Validate Certificate** checkbox.
 - The **Set RHEV-M Admin Password** field allows you to specify the root password for the hypervisor, and enable SSH password authentication from the Red Hat Enterprise Virtualization Manager. You do not have to fill in this field for this document.

Select **Apply** and press **Enter**. A dialog displays, asking you to connect the hypervisor to the Red Hat Enterprise Virtualization Manager and validate its certificate. Select **Approve** and press **Enter**. A message will display notifying you that the Manager configuration has been successfully updated.

- d. Under the **Red Hat Network** tab, you can register the host with the Red Hat Network. This enables the host to run Red Hat Enterprise Linux virtual machines with proper RHN entitlements. However, for the purposes of this document, the evaluation subscriptions will be used for the guests. To confirm your RHN settings, select **Apply** and press **Enter**.
- e. Accept all other default settings. For information on configuring logging, kdump and remote storage, refer to the *Red Hat Enterprise Linux 6 Hypervisor Deployment Guide*.
- f. Finally, select the **Status** tab. Select **Restart** and press **Enter** to reboot the host and apply all changes.

You have now successfully installed the Red Hat Enterprise Virtualization Hypervisor. The following sections will provide instructions on how to approve the hypervisor for use with the Red Hat Enterprise Virtualization Manager.

3. Connect to Red Hat Enterprise Virtualization Manager

Now that you have installed the Red Hat Enterprise Virtualization Manager and Hypervisors, you can log in to the Manager administration portal to start using the Hypervisors and configure your virtualization environment.

Before logging in to the administration portal, you have to install .NET Framework 4 and modify the default security settings on the machine used to access the web administration portal. These steps enable your client to connect to the Red Hat Enterprise Virtualization Manager. The example below is applicable for Windows 2008, but you can also use Windows XP and Windows 7.

To configure Windows client to access the administration portal

1. To install .NET Framework 4, download it from <http://www.microsoft.com/download/en/details.aspx?id=17718>. Run this executable as a user with administration access to the system.
2. Next, disable Internet Explorer Enhanced Security Configuration. Click **Start** → **Administrative Tools** → **Server Manager**. On the **Security Information** pane in the **Server Manager** window, click **Configure IE ESC**. Select **Off** for Administrators and Users to disable the security configuration. Click **OK**.
3. To add the administration portal to the browser's list of trusted sites, open a browser and click on **Tools** → **Internet Options**. Click on the **Security** tab.
 - a. Select **Trusted Sites**. Click **Sites** to display the **Trusted Sites** dialog. Enter the URL for your administration portal in the **Add this website to the zone** textbox. Click **Add**, then **Close**.
 - b. Click the **Custom Level...** button. Locate the **XAML browser applications** item in the list, ensure that it is set to **Enable**, then click **OK**.
4. Restart Internet Explorer to access the administration portal.

You can use Internet Explorer 7 and above to connect to the administration portal. The following example is applicable to Internet Explorer 9.

To connect to Red Hat Enterprise Virtualization Manager administration portal

1. Open a web browser and navigate to `https://demo.redhat.com:8443/RHEVManager`.
2. If this is your first time connecting to the administration portal, Red Hat Enterprise Virtualization Manager will issue security certificates for your browser. Click the link labeled **this certificate** to trust the **ca.cer** certificate. A bar displays at the bottom of the browser, click **Open** to launch the **Certificate** dialog. Click **Install Certificate** and select to place the certificate in **Trusted Root Certification Authorities** store.
3. Back on the browser screen, click the link labeled **here** and follow the prompts to install the **RHEV-GUI-CertificateInstaller** executable. A bar displays at the bottom of the browser again, this time click **Run**. Note that the actual certificate installation is preceded by an ActiveX installation.

When complete, a new link labeled **here** appears. Click on it to reload the administration portal.

4. The portal login screen displays. Enter the administrator's **User Name** and **Password** that you provided during installation, and ensure that your domain is set to **Internal**. Click **Login**.

Lab 9 - Install and Configure Minimal Setup

You have now successfully logged in to the Red Hat Enterprise Virtualization web administration portal. Here, you can manage and monitor all your virtual resources through a graphical user interface.

3.1. The Administration Portal Graphical User Interface

The administration portal graphical interface has two modes: Tree mode and flat mode. Tree mode allows you to browse the object hierarchy of a data center, and is the recommended manner of operation. On the other hand, flat mode is used for objects which are not in the data centers hierarchy, for example the Users tab which does not appear in tree mode.

The functions of the administration portal GUI are described in the following figure and list:

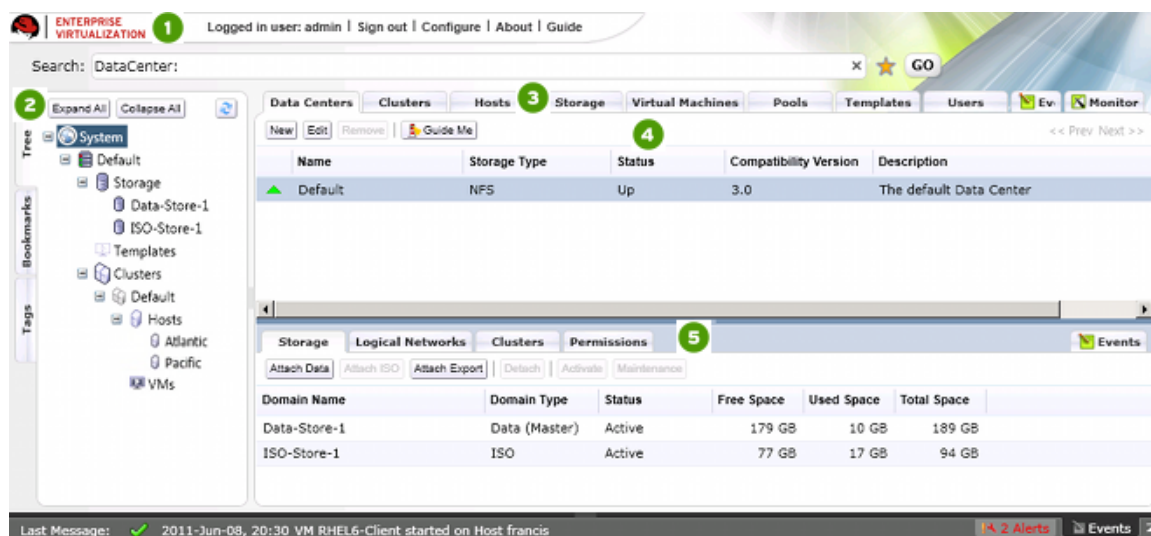


Figure 85. Administration Portal Features

1. **Header:** This bar contains the name of the logged in user, the sign out button, the option to configure user roles.
2. **Navigation Pane:** This pane allows you to navigate between the Tree, Bookmarks and Tags tabs. In the Tree tab, tree mode allows you to see the entire system tree and provides a visual representation your virtualization environment's architecture.
3. **Resources Tabs:** These tabs allow you to access the resources of Red Hat Enterprise Virtualization. You should already have a Default Data Center, a Default Cluster, a Host waiting to be approved, and available Storage waiting to be attached to the data center.
4. **Results List:** When you select a tab, this list displays the available resources. You can perform a task on an individual item or multiple items by selecting the item(s) and then clicking the relevant action button. If an action is not possible, the button is disabled.
5. **Details Pane:** When you select a resource, this pane displays its details in several subtabs. These subtabs also contain action buttons which you can use to make changes to the selected resource.

Once you are familiar with the layout of the administration portal, you can start configuring your virtual environment. Begin by approving your Hypervisor hosts for use, as detailed in the next section.

4. Approve the Red Hat Enterprise Virtualization Hypervisor

At this point you should already have a Default data center and a Default cluster, which have been automatically created during the Manager installation. In addition, the Red Hat Enterprise Virtualization

Hypervisor you installed in [Section 2, “Install Red Hat Enterprise Virtualization Hypervisor”](#) should have been automatically detected by the Red Hat Enterprise Virtualization Manager, and attached to the Default cluster of the Default data center. However, before it can be used, it requires a click of approval from the administration portal.

To approve the Red Hat Enterprise Virtualization Hypervisor host

1. Navigate to the **Tree** pane and click the **Expand All** button. Under the **Default** cluster, click the **Hosts** icon. The **Hosts** tab displays a list of available hypervisors.

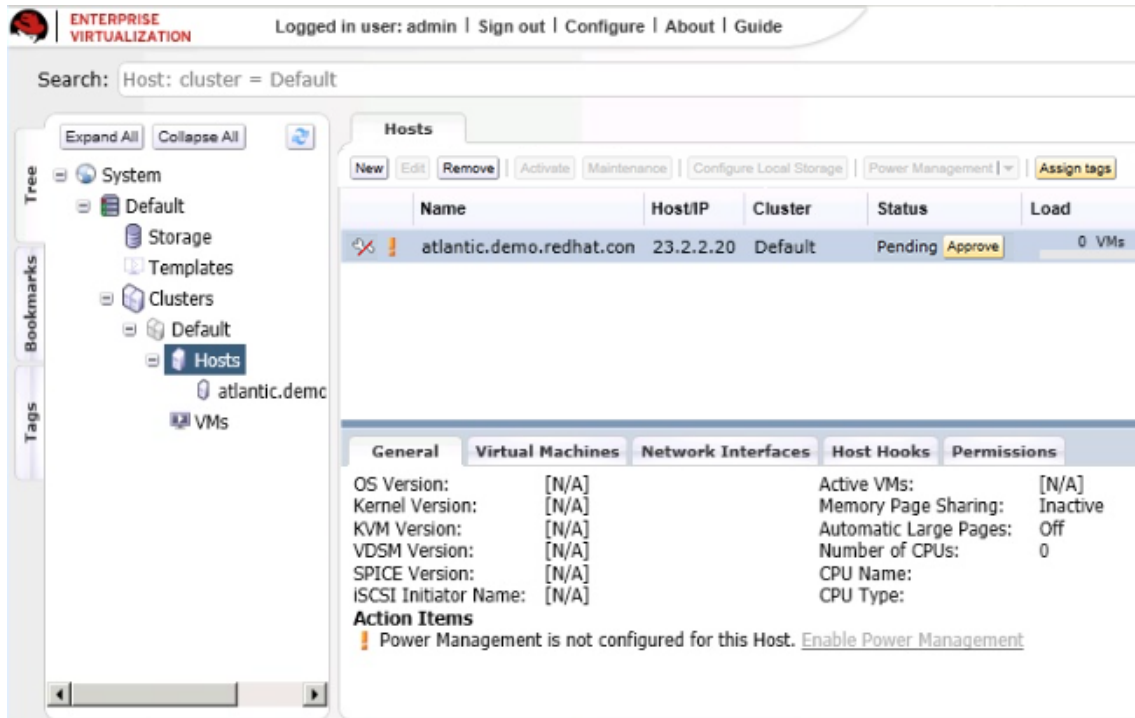


Figure 86. Red Hat Enterprise Virtualization Hypervisor pending approval

2. Select your hypervisor and click the **Approve** button. The **Edit and Approve Host** dialog displays. Accept the defaults or make changes as necessary, then click **OK**.

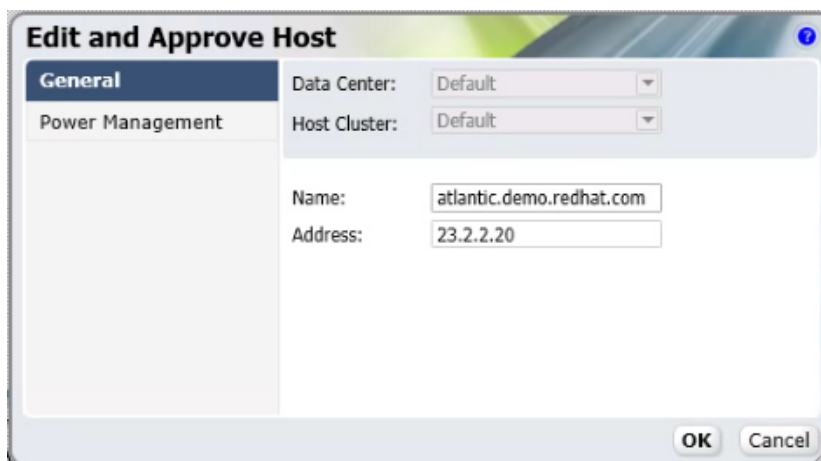


Figure 87. Approve Red Hat Enterprise Virtualization Hypervisor

3. A dialog appears, indicating that you have not configured Power Management for this host. For the purpose of this lab, click **OK** to continue. The host goes through a brief installation cycle. When complete, the host status changes from **Non Operational** to **Up**.

Now that you have finished configuring your physical servers for use as the Manager, Hypervisor and administration portal client respectively, you are ready to customize and deploy virtual resources including storage domains and virtual machines.

5. Create Local Storage

At this point, you have installed your Red Hat Enterprise Virtualization Hypervisor and approved it for use with the Red Hat Enterprise Virtualization Manager. Now, you have to set up the host to provide local storage for the virtual machine disk images. Note that setting up local storage is suitable for a small environment, such as this evaluation setup. If you were deploying Red Hat Enterprise Virtualization across a large organization, it is recommended that you use shared storage as described in [Section 6, “Configure Storage”](#). However, for this lab, use the following procedure to add storage to your system.

To create a local storage domain

1. Navigate to the **Tree** pane and click the **Expand All** button. Under the **Default** cluster, click the **Hosts** icon. The **Hosts** tab displays a list of available hypervisors.
2. Place the host into maintenance mode by clicking the **Maintenance** button. The **Status** field of the host changes to *Preparing for Maintenance*, followed by *Maintenance*. The icon changes to indicate that the host is in maintenance.
3. Click **Configure Local Storage**. The **Configure Local Storage** dialog displays.

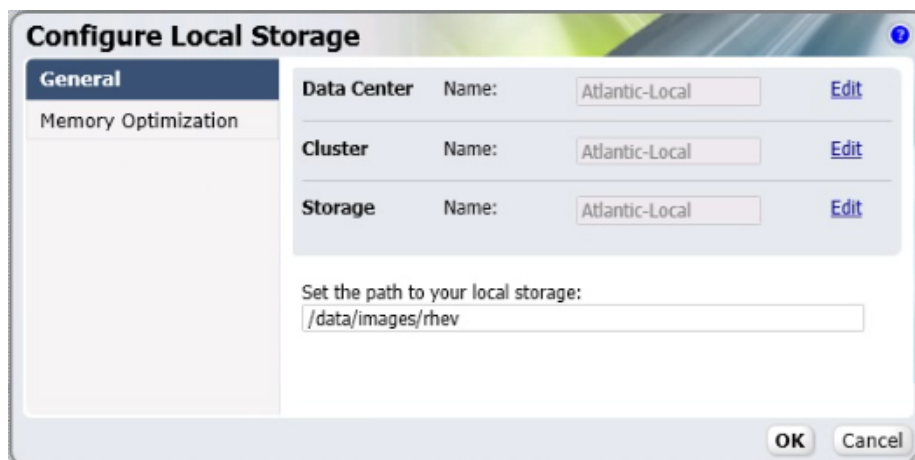


Figure 88. Configure Local Storage

On the **General** tab, specify the path to your local storage domain. For this lab, enter **/data/images/rhev**. Retain all the other default settings, and click **OK**.

4. Your local storage domain is created, and attached to the automatically created **Atlantic-Local** data center and **Atlantic-Local** cluster.

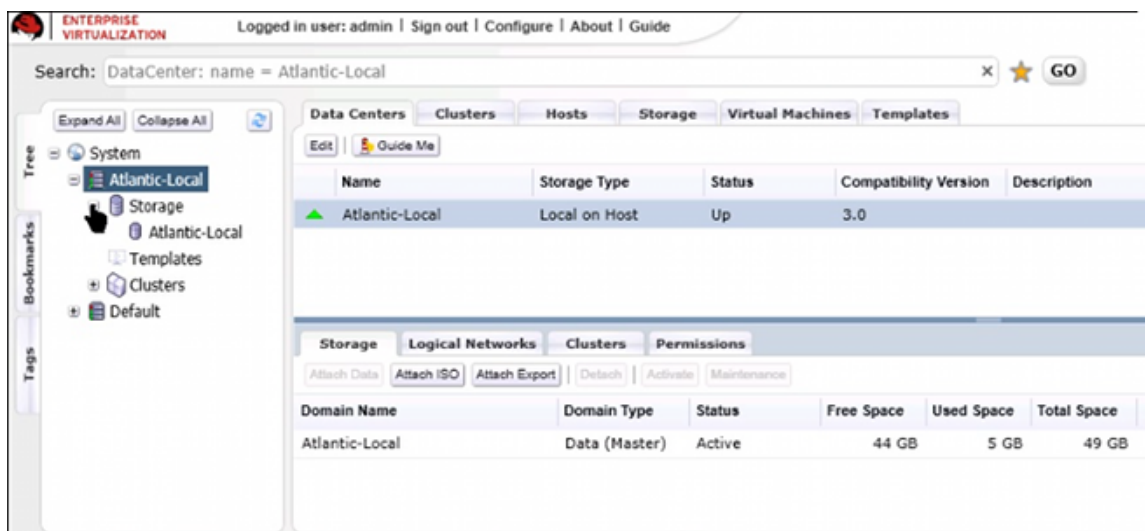


Figure 89. Automatically created data center and cluster

You have created a data storage domain. Now, you need to attach an ISO domain to the data center and upload installation images so you can use them to create virtual machines.

6. Attach and Populate ISO Domain

You have defined your first storage domain to store virtual guest data, now it is time to configure your second storage domain, which will be used to store installation images for creating virtual machines. You have already created an ISO domain during the installation of the Red Hat Enterprise Virtualization Manager. To use this ISO domain, attach it to the same data center which contains the local storage domain.

To attach the ISO domain

1. Navigate to the **Tree** pane and click the **Expand All** button. Click the **Atlantic-Local** data center. On the results list, the **Atlantic-Local** data center displays.
2. On the details pane, select the **Storage** tab and click the **Attach ISO** button.
3. The **Attach ISO Library** dialog appears with the available ISO domain. Select the **local-iso-share** domain and click **OK**.

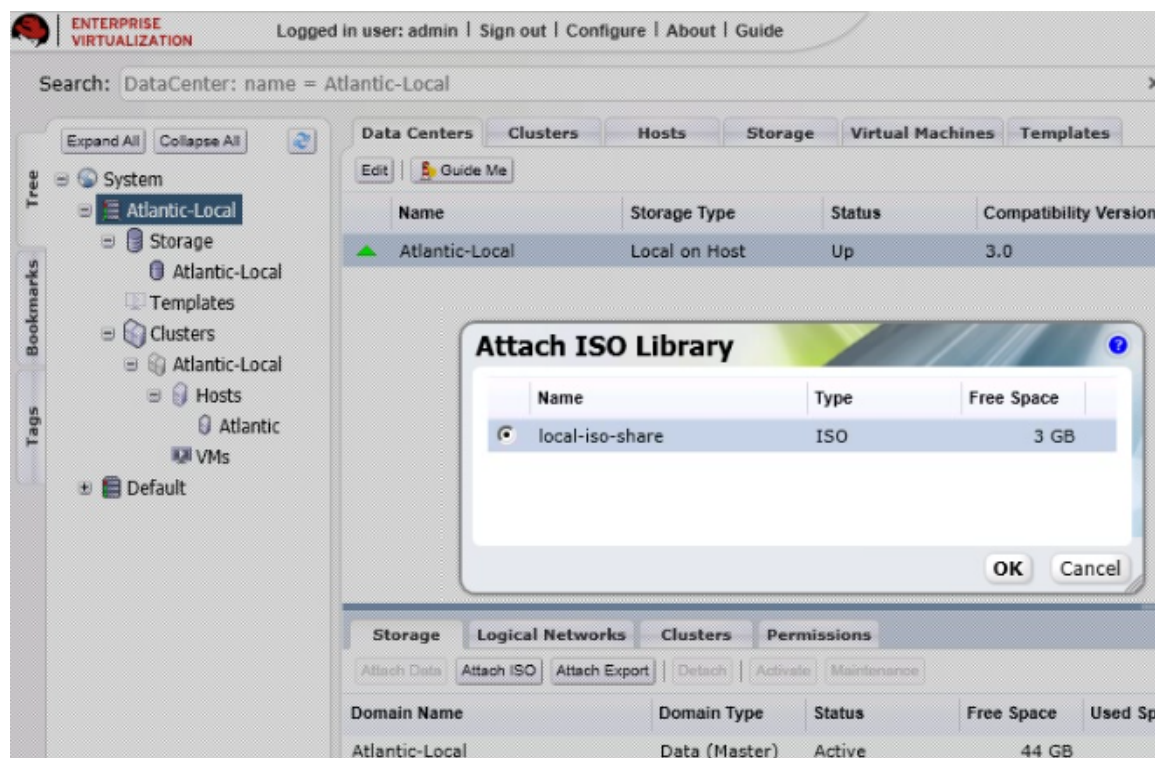


Figure 90. Attach ISO Library

- The ISO domain appears in the results list of the **Storage** tab. It displays with the *Locked* status as the domain is being validated, then transits to *Inactive*.
- Select the ISO domain and click the **Activate** button. The status changes to *Locked* and then to *Active*.

Media images (CD-ROM or DVD-ROM in the form of ISO images) must be available in the ISO repository for the virtual machines to use. To do so, Red Hat Enterprise Virtualization provides a utility that copies the images and sets the appropriate permissions on the file. For this lab, both the file provided to the utility and the ISO share have to be accessible from the Red Hat Enterprise Virtualization Manager.

Log in to the Red Hat Enterprise Virtualization Manager server console to upload images to the ISO domain.

To upload ISO images

- Create or acquire the appropriate ISO images from boot media. Ensure the path to these images is accessible from the Red Hat Enterprise Virtualization Manager server.
- The next step is to upload these files. First, determine the available ISO domains by running:

```
# rhvm-iso-uploader list
```

You will be prompted to provide the admin user password which you are using to connect to the administration portal. The tool lists the name of the ISO domain that you have already attached in the previous lab:

```
ISO Storage Domain List:
local-iso-share
```

Now you have all the information required to upload the required files. To copy your installation images to the ISO domain, run:

```
# rhvm-iso-uploader upload -i local-iso-share [file1] [file2] .... [fileN]
```

3. After the images have been loaded, check that they are available for use in the Manager administration portal.
 - a. Navigate to the **Tree** and click the **Expand All** button.
 - b. Under **Storage**, click on the name of the ISO domain. It displays in the results list. Click on it to display its details pane.
 - c. On the details pane, select the **Images** tab. The list of available images should be populated with the files which you have uploaded. In addition, the **RHEV-toolsSetup.iso** and **virtio-win.vfd** images should have been automatically uploaded during installation.

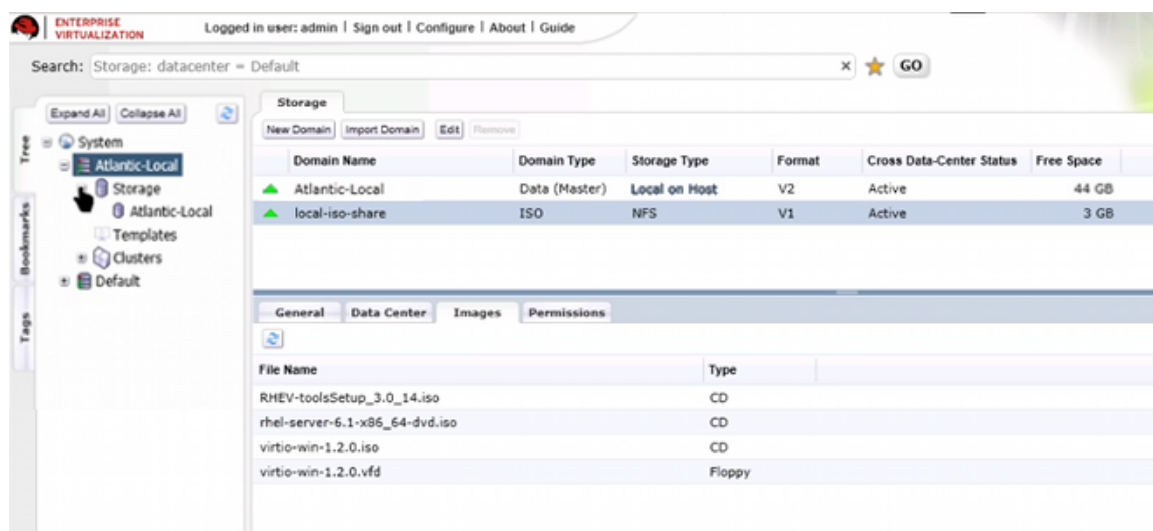


Figure 91. Uploaded ISO images

Now that you have successfully prepared the ISO domain for use, you have completed this lab and are ready to start creating virtual machines.

7. Lab 9 - Summary

Congratulations, you have achieved the first goal of Track B! You now have an infrastructure ready to create and run virtual machines. To recap, you have successfully installed the Red Hat Enterprise Virtualization Manager and Red Hat Enterprise Virtualization Hypervisor, attached storage domains to the data center, and prepared ISO images.

The next lab on Track B teaches you how to create Red Hat Enterprise Linux virtual machines and templates. To proceed, go to [Lab 2 - Create Virtual Machines](#).

The subsequent labs for this track are also used for **Track A: Standard Setup**. Therefore, most examples, instructions and screenshots are specific to Track A. When you use the instructions in the following labs, substitute the instances of default data center and default cluster with Atlantic-Local data center and Atlantic-Local cluster respectively.

Conclusion

The Evaluation license offers a preview of how you can deploy Red Hat Enterprise Virtualization within your enterprise. As demonstrated, Red Hat Enterprise Virtualization delivers high performing and versatile features which can be applied across many different types of enterprises with different configurations and requirements.

To fully unlock the value of Red Hat Enterprise Virtualization, it is recommended that you purchase a subscription for the full version. With this subscription, you receive full access to Red Hat's Customer Portal, where you can access our Knowledgebase which contains reference architecture whitepapers, troubleshooting tips, security and technical support. You can also connect with other Red Hat users, and contribute suggestions on how we can further improve our offerings.

To access the Red Hat Customer Portal, visit <https://access.redhat.com/home>

Appendix A. Revision History

Revision 1-5 **Friday December 2 2011** Cheryn Tan cheryntan@redhat.com
Red Hat Enterprise Virtualization General Availability

Revision 1-4 **Monday October 3 2011** Cheryn Tan cheryntan@redhat.com
Red Hat Enterprise Virtualization External Beta 3

Revision 1-3 **Monday September 19 2011** Cheryn Tan cheryntan@redhat.com
Red Hat Enterprise Virtualization External Beta 2

Revision 1-2 **Tuesday August 30 2011** Cheryn Tan cheryntan@redhat.com
Added content for Lab 7 - High Availability Scenarios

Revision 1-1 **Wednesday August 3 2011** Cheryn Tan cheryntan@redhat.com
Red Hat Enterprise Virtualization External Beta 1

Revision 1-0 **Thursday June 30 2011** Cheryn Tan cheryntan@redhat.com
Initial creation of book by publican
