Update and upgrade tasks for Red Hat Virtualization

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Abstract

A comprehensive guide to upgrading and updating components in a Red Hat Virtualization environment.
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CHAPTER 1. RED HAT VIRTUALIZATION UPGRADE OVERVIEW

This guide explains how to upgrade the following environments to Red Hat Virtualization 4.3:

- **Standalone manager, local database**: Both the Data Warehouse database and the Manager database are installed on the Manager.

- **Standalone manager, remote database**: Either the Data Warehouse database or the Manager database, or both, are on a separate machine.

- **Self-hosted engine, local database**: Both the Data Warehouse database and the Manager database are installed on the Manager.

To save time when upgrading a Manager with local databases, use the `ovirt-fast-forward-upgrade` tool.

**NOTE**

`ovirt-fast-forward-upgrade` supports local database environments only.

Alternatively, you can manually upgrade the Manager. For remote database environments, this path is required.

**IMPORTANT**

Plan any necessary downtime in advance. After you update the clusters’ compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended VMs as soon as possible to apply the configuration changes.

Select the appropriate instructions for your environment from the following table. If your Manager and host versions differ (if you have previously upgraded the Manager but not the hosts), follow the instructions that match the Manager’s version.

**Table 1.1. Supported Upgrade Paths**

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<th>Current Manager version</th>
<th>Target Manager version</th>
<th>Relevant section</th>
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<table>
<thead>
<tr>
<th>Current Manager version</th>
<th>Target Manager version</th>
<th>Relevant section</th>
</tr>
</thead>
</table>
| 4.0                     | 4.3                    | **Local database environment:**  
|                         |                        | ● Fast-forward upgrade: Chapter 3, *Fast-forwarding Red Hat Virtualization from 4.0 to 4.3*  
|                         |                        | ● Manual upgrade: Chapter 6, *Upgrading from 4.0 to Red Hat Virtualization 4.3*  
|                         |                        | **Remote database environment:** Chapter 9, *Upgrading a Remote Database Environment from 4.0 to Red Hat Virtualization 4.3*  
|                         |                        | **Self-hosted engine, local database environment:**  
|                         |                        | ● Fast-forward upgrade: Chapter 3, *Fast-forwarding Red Hat Virtualization from 4.0 to 4.3*  
|                         |                        | ● Manual upgrade: Chapter 12, *Upgrading a Self-Hosted Engine from 4.0 to Red Hat Virtualization 4.3*  

| 4.1                     | 4.3                    | **Local database environment:**  
|                         |                        | ● Fast-forward upgrade: Chapter 4, *Fast-forwarding Red Hat Virtualization from 4.1 to 4.3*  
|                         |                        | ● Manual upgrade: Chapter 7, *Upgrading from 4.1 to Red Hat Virtualization 4.3*  
|                         |                        | **Remote database environment:** Chapter 10, *Upgrading a Remote Database Environment from 4.1 to Red Hat Virtualization 4.3*  
|                         |                        | **Self-hosted engine, local database environment:**  
|                         |                        | ● Fast-forward upgrade: Chapter 4, *Fast-forwarding Red Hat Virtualization from 4.1 to 4.3*  
|                         |                        | ● Manual upgrade: Chapter 13, *Upgrading a Self-Hosted Engine from 4.1 to Red Hat Virtualization 4.3*  

Current Manager version: 4.0  
Target Manager version: 4.3  
Relevant section: **Local database environment:**  
- Fast-forward upgrade: Chapter 3, *Fast-forwarding Red Hat Virtualization from 4.0 to 4.3*  
- Manual upgrade: Chapter 6, *Upgrading from 4.0 to Red Hat Virtualization 4.3*  
**Remote database environment:** Chapter 9, *Upgrading a Remote Database Environment from 4.0 to Red Hat Virtualization 4.3*  
**Self-hosted engine, local database environment:**  
- Fast-forward upgrade: Chapter 3, *Fast-forwarding Red Hat Virtualization from 4.0 to 4.3*  
- Manual upgrade: Chapter 12, *Upgrading a Self-Hosted Engine from 4.0 to Red Hat Virtualization 4.3*  

Current Manager version: 4.1  
Target Manager version: 4.3  
Relevant section: **Local database environment:**  
- Fast-forward upgrade: Chapter 4, *Fast-forwarding Red Hat Virtualization from 4.1 to 4.3*  
- Manual upgrade: Chapter 7, *Upgrading from 4.1 to Red Hat Virtualization 4.3*  
**Remote database environment:** Chapter 10, *Upgrading a Remote Database Environment from 4.1 to Red Hat Virtualization 4.3*  
**Self-hosted engine, local database environment:**  
- Fast-forward upgrade: Chapter 4, *Fast-forwarding Red Hat Virtualization from 4.1 to 4.3*  
- Manual upgrade: Chapter 13, *Upgrading a Self-Hosted Engine from 4.1 to Red Hat Virtualization 4.3*
## Red Hat Virtualization 4.3 Upgrade Guide

### Current Manager version | Target Manager version | Relevant section
---|---|---
4.2 | 4.3 | Local database environment:
  - Fast-forward upgrade: Chapter 5, Fast-forwarding Red Hat Virtualization from 4.2 to 4.3
  - Manual upgrade: Chapter 8, Upgrading from 4.2 to Red Hat Virtualization 4.3

Remote database environment: Chapter 11, Upgrading a Remote Database Environment from 4.2 to Red Hat Virtualization 4.3

Self-hosted engine, local database environment:
  - Fast-forward upgrade: Chapter 5, Fast-forwarding Red Hat Virtualization from 4.2 to 4.3
  - Manual upgrade: Chapter 14, Upgrading a Self-Hosted Engine from 4.2 to Red Hat Virtualization 4.3

4.3.x | 4.3.y | Appendix A, Updates between Minor Releases

For interactive upgrade instructions, you can also use the RHV Upgrade Helper available at [https://access.redhat.com/labs/rhvupgradehelper/](https://access.redhat.com/labs/rhvupgradehelper/). This application asks you to provide information about your upgrade path and your current environment, and presents the relevant steps for upgrade as well as steps to prevent known issues specific to your upgrade scenario.
PART I. FAST-FORWARD UPGRADING A LOCAL DATABASE ENVIRONMENT

This section applies to both self-hosted engine and standalone Manager environments.
CHAPTER 2. OVIRT-FAST-FORWARD-UPGRADE EXPLAINED

You can upgrade the Manager to the latest version with the `ovirt-fast-forward-upgrade` tool. `ovirt-fast-forward-upgrade` detects the current version of the Manager and checks for available upgrades. If an upgrade is available, the tool upgrades the Manager to the next major version, and continues to upgrade the Manager until the latest version is installed.

During the upgrade process, the tool might pause and prompt you to manually complete some upgrade tasks, such as upgrading hosts or the cluster compatibility version. You can leave `ovirt-fast-forward-upgrade` paused while you complete these tasks.

`ovirt-fast-forward-upgrade` supports the following upgrade paths:

- Upgrading a standalone Manager with local databases
- Upgrading a self-hosted engine environment using local databases

**NOTE**

`ovirt-fast-forward-upgrade` upgrades the Manager. You need to manually upgrade the hosts, and compatibility versions of clusters and data centers, and you need to reboot any running virtual machines. See Section A.4, “Updating All Hosts in a Cluster” to upgrade the hosts.

**NOTE**

`ovirt-fast-forward-upgrade` does not support Red Hat Virtualization environments deployed and managed with Satellite.
CHAPTER 3. FAST-FORWARDING RED HAT VIRTUALIZATION FROM 4.0 TO 4.3

Red Hat Virtualization 4.3 and later does not support 4.0 cluster compatibility version or data center compatibility version. So when you upgrade from Red Hat Virtualization 4.0, you must update the cluster and data center compatibility versions to at least 4.1 before you upgrade the Manager from 4.2 to 4.3. Then, if you want to use the 4.3 compatibility version, update the compatibility versions again after completing the Manager upgrades.

You must also update the hosts before updating the compatibility versions, but only need to do so once. The host repositories stay the same across Red Hat Virtualization versions, so the hosts will already be upgraded to the latest version after a single update.

Upgrading your environment from 4.0 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites.
2. Run `ovirt-fast-forward-upgrade`.
3. Update the compatibility version of the clusters to 4.2.
4. Reboot any running or suspended virtual machines to update their configuration to 4.2.
5. Update the compatibility version of the data centers to 4.2.
6. Return to `ovirt-fast-forward-upgrade` and continue the upgrade. The tool upgrades the Manager to 4.3.
7. Update the compatibility version of the cluster to the latest version.
8. Reboot any running or suspended virtual machines to update their configuration to the latest version.
9. Update the compatibility version of the data centers to the latest version.
10. Update the hosts.
11. Replace SHA-1 certificates with SHA-256 certificates.

3.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters' compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.

- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.

3.2. UPGRADING TO RED HAT VIRTUALIZATION MANAGER 4.3 WITH OVIRT-FAST-FORWARD-UPGRADE
Procedure

1. Log in to the Manager machine and install the `ovirt-fast-forward-upgrade` tool:
   
   ```
   # yum install ovirt-fast-forward-upgrade
   ```

2. Run the following command to upgrade the Manager, while creating a backup of the current version:
   
   ```
   # ovirt-fast-forward-upgrade --backup --backup-dir=/backup
   ```

   **NOTE**

   Red Hat recommends using the `--backup` and `--backup-dir` options to create a backup of the current Manager. If a backup directory is not specified, the backup is saved in `/tmp`.

   The `--backup` option is a wrapper for the `engine-backup` tool and is equivalent to running the following command:

   ```
   # engine-backup --scope=all --mode=backup --file=file_name --log=log_file_name
   ```

   To restore your backup, run `engine-backup` in `restore` mode:

   ```
   # engine-backup --mode=restore
   ```

   See Backing Up and Restoring the Red Hat Virtualization Manager in the Administration Guide for details.

   Alternatively, to upgrade without creating a backup, run the following command:

   ```
   # ovirt-fast-forward-upgrade
   ```

3. If there are errors, check the log: `/var/log/ovirt-engine/ovirt-fast-forward-upgrade.log`.

   The tool enables the proper repositories and upgrades the Manager to 4.2.

   If the tool detects that the cluster compatibility version is set to 3.6 or 4.0, the tool pauses and prompts you to manually upgrade the cluster compatibility version to at least 4.1.

   **WARNING**

   If you try to continue without upgrading the cluster compatibility version to at least 4.1, `ovirt-fast-forward-upgrade` aborts.
You must now update the hosts before you can update the cluster and data center compatibility versions.

3.3. UPDATING INDIVIDUAL HOSTS

Use the host upgrade manager to update individual hosts directly from the Administration Portal.

NOTE

The upgrade manager only checks hosts with a status of Up or Non-operational, but not Maintenance.

Limitations

- On RHVH, the update only preserves modified content in the /etc and /var directories. Modified data in other paths is overwritten during an update.
- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster. Update a host when its usage is relatively low.
- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.
- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.
- Do not update all hosts at the same time, as one host must remain available to perform Storage Pool Manager (SPM) tasks.
- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines must be shut down before updating the host.

Procedure

1. Ensure that the correct repositories are enabled. To view a list of currently enabled repositories, run `yum repolist`.

   - For Red Hat Virtualization Hosts:
     ```bash
     # subscription-manager repos --enable=rhel-7-server-rhvh-4-rpms
     ```
   - For Red Hat Enterprise Linux hosts:
     ```bash
     # subscription-manager repos \
     --enable=rhel-7-server-rpms \
     --enable=rhel-7-server-rhv-4-mgmt-agent-rpms \
     --enable=rhel-7-server-ansible-2.9-rpms
     ```

2. In the Administration Portal, click Compute → Hosts and select the host to be updated.

3. Click Installation → Check for Upgrade and click OK.

Open the Notification Drawer (📢) and expand the Events section to see the result.
4. If an update is available, click Installation → Upgrade.

5. Click OK to update the host. Running virtual machines are migrated according to their migration policy. If migration is disabled for any virtual machines, you are prompted to shut them down. The details of the host are updated in Compute → Hosts and the status transitions through these stages:

   Maintenance > Installing > Reboot > Up

   **NOTE**
   
   If the update fails, the host’s status changes to Install Failed. From Install Failed you can click Installation → Upgrade again.

Repeat this procedure for each host in the Red Hat Virtualization environment.

You can now change the cluster compatibility version to 4.2.

### 3.4. Changing the Cluster Compatibility Version

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click Compute → Clusters.
2. Select the cluster to change and click Edit.
3. On the General tab, change the Compatibility Version to the desired value.
5. Click OK to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

### 3.5. Changing Virtual Machine Cluster Compatibility

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all
running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (⚠️).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure

1. In the Administration Portal, click Compute → Virtual Machines.

2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:

   next_run_config_exists=True

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click Reboot.

   When the virtual machine starts, the new compatibility version is automatically applied.

   **NOTE**

   You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

You can now change the data center compatibility version to 4.2.

### 3.6. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click Compute → Data Centers.

2. Select the data center to change and click Edit.

3. Change the Compatibility Version to the desired value.

4. Click OK. The Change Data Center Compatibility Version confirmation dialog opens.

5. Click OK to confirm.
3.7. CONTINUE UPGRADING THE MANAGER TO 4.3

Return to ovirt-fast-forward-upgrade and continue the process. The tool upgrades the Manager to 4.3.

You can now change the cluster compatibility version to 4.3.

3.8. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click Compute → Clusters.
2. Select the cluster to change and click Edit.
3. On the General tab, change the Compatibility Version to the desired value.
5. Click OK to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

3.9. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (⚠️).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

**Procedure**

1. In the Administration Portal, click Compute → Virtual Machines.
2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:

\[\text{next\_run\_config\_exists=True}\]

The search results show all virtual machines with pending changes.

3. Select each virtual machine and click Reboot.

When the virtual machine starts, the new compatibility version is automatically applied.

**NOTE**

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

You can now change the data center compatibility version to 4.3.

### 3.10. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

**Procedure**

1. In the Administration Portal, click **Compute → Data Centers**.
2. Select the data center to change and click **Edit**.
3. Change the **Compatibility Version** to the desired value.
4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.
5. Click **OK** to confirm.

### 3.11. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- Prevent warning messages from appearing in your browser when connecting to the Administration Portal. These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.
- Replace the SHA-1 certificates throughout the system with SHA-256 certificates.

Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

```bash
# cat /etc/pki/ovirt-engine/openssl.conf
```

If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

```bash
# cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
# sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
```

3. Define the certificate that should be re-signed:

```bash
# names="apache"
```

4. On the Manager, re-sign the Apache certificate:

```bash
for name in $names; do
  subject="$(
    openssl x509 -in /etc/pki/ovirt-engine/certs/"${name}".cer -noout -subject | sed 's;subject= \(.*\);1;"
  )"
  /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
  --name="${name}" \
  --password=mypass \
  --subject="${subject}" \
  --san=DNS:"${ENGINE_FQDN}" \
  --keep-key
done
```

5. Restart the `httpd` service:

```bash
# systemctl restart httpd
```

6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to [http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA](http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA), replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).
Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

   ```
   # cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +"%Y%m%d%H%M%S")"
   # openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
   ```

4. Replace the existing certificate with the new certificate:

   ```
   # mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
   ```

5. Define the certificates that should be re-signed:

   ```
   # names="engine apache websocket-proxy jboss imageio-proxy"
   ```

   If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

   ```
   # names="engine websocket-proxy jboss imageio-proxy"
   ```

   For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. On the Manager, re-sign the certificates:

   ```
   for name in $names; do
     subject="$(
       openssl
       x509
       -in /etc/pki/ovirt-engine/certs/"${name}".cer
       -noout
       -subject
       | sed
       's;subject= \(*\);1;"
     
     /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh
     --name="${name}" \\ 
     --password=mypass \\ 
     --subject="${subject}" \\ 
   ```
--san=DNS:"${ENGINE_FQDN}" \
--keep-key
done

7. Restart the following services:

```
# systemctl restart httpd
# systemctl restart ovirt-engine
# systemctl restart ovirt-websocket-proxy
# systemctl restart ovirt-imageio-proxy
```

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to `http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.
   
   a. In the Administration Portal, click **Compute → Hosts**.
   
   b. Select the host and click **Management → Maintenance**.
   
   c. Once the host is in maintenance mode, click **Installation → Enroll Certificate**.
   
   d. Click **Management → Activate**.
CHAPTER 4. FAST-FORWARDING RED HAT VIRTUALIZATION FROM 4.1 TO 4.3

Upgrading your environment from 4.1 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites.
2. Run `ovirt-fast-forward-upgrade`.
3. Update the hosts.
4. Update the compatibility version of the clusters.
5. Reboot any running or suspended virtual machines to update their configuration.
6. Update the compatibility version of the data centers.
7. Replace SHA-1 certificates with SHA-256 certificates.
8. If you installed the technology preview version of Open Virtual Network (OVN) in 4.1, update the OVN provider’s networking plugin.

### 4.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters’ compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the [Planning and Prerequisites Guide](#).

- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see [Enabling the Red Hat Virtualization Host Repository](#) for RHVH, or [Enabling the Red Hat Enterprise Linux host Repositories](#) for RHEL host.

### 4.2. UPGRADING TO RED HAT VIRTUALIZATION MANAGER 4.3 WITH OVIRT-FAST-FORWARD-UPGRADE

**Procedure**

1. Log in to the Manager machine and install the `ovirt-fast-forward-upgrade` tool:

   ```bash
   # yum install ovirt-fast-forward-upgrade
   ```

2. Run the following command to upgrade the Manager, while creating a backup of the current version:

   ```bash
   # ovirt-fast-forward-upgrade --backup --backup-dir=/backup
   ```
NOTE

Red Hat recommends using the `--backup` and `--backup-dir` options to create a backup of the current Manager. If a backup directory is not specified, the backup is saved in `/tmp`.

The `--backup` option is a wrapper for the `engine-backup` tool and is equivalent to running the following command:

```
# engine-backup --scope=all --mode=backup --file=file_name --log=log_file_name
```

To restore your backup, run `engine-backup` in `restore` mode:

```
# engine-backup --mode=restore
```

See Backing Up and Restoring the Red Hat Virtualization Manager in the Administration Guide for details.

Alternatively, to upgrade without creating a backup, run the following command:

```
# ovirt-fast-forward-upgrade
```

3. If there are errors, check the log: `/var/log/ovirt-engine/ovirt-fast-forward-upgrade.log`.

You can now update the hosts.

### 4.3. UPDATING ALL HOSTS IN A CLUSTER

You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful during upgrades to new versions of Red Hat Virtualization. See https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

**Limitations**

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.

- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.

- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.

- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.

- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.
Procedure

1. In the Administration Portal, click **Compute → Clusters** and select the cluster.

2. Click **Upgrade**.

3. Select the hosts to update, then click **Next**.

4. Configure the options:
   - **Stop Pinned VMs** shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.
   - **Upgrade Timeout (Minutes)** sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is **60**. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where the hosts update quickly.
   - **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.
   - **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.
   - **Use Maintenance Policy** sets the cluster’s scheduling policy to **cluster_maintenance** during the update. It is selected by default, so activity is limited and virtual machines cannot start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click **Next**.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click **Upgrade**.

You can track the progress of host updates in the **Compute → Hosts** view, and in the **Events** section of the **Notification Drawer** ( 🚨 ).

You can track the progress of individual virtual machine migrations in the **Status** column of the **Compute → Virtual Machines** view. In large environments, you may need to filter the results to show a particular group of virtual machines.

**4.4. CHANGING THE CLUSTER COMPATIBILITY VERSION**

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

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

Procedure

1. In the Administration Portal, click Compute → Clusters.

2. Select the cluster to change and click Edit.

3. On the General tab, change the Compatibility Version to the desired value.


5. Click OK to confirm.

IMPORTANT

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

4.5. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (.Yellow).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure

1. In the Administration Portal, click Compute → Virtual Machines.

2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:

   next_run_config_exists=True

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click Reboot.

When the virtual machine starts, the new compatibility version is automatically applied.
NOTE
You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

4.6. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

IMPORTANT
To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click Compute → Data Centers.
2. Select the data center to change and click Edit.
3. Change the Compatibility Version to the desired value.
4. Click OK. The Change Data Center Compatibility Version confirmation dialog opens.
5. Click OK to confirm.

4.7. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- Prevent warning messages from appearing in your browser when connecting to the Administration Portal. These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

- Replace the SHA-1 certificates throughout the system with SHA-256 certificates.

Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.
2. Check whether /etc/pki/ovirt-engine/openssl.conf includes the line default_md = sha256:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes default_md = sha1, back up the existing configuration and change the default to sha256:
# cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
# sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf

3. Define the certificate that should be re-signed:

   # names="apache"

4. On the Manager, re-sign the Apache certificate:

   for name in $names; do
       subject="$(
           openssl \ 
           x509 \ 
           -in /etc/pki/ovirt-engine/certs/"${name}".cer \ 
           -noout \ 
           -subject \ 
           | sed \ 
           's;subject= \(.\)\1;" \ 
           )" \\
           /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \ 
           --name="${name}" \ 
           --password=mypass \ 
           --subject="${subject}" \ 
           --san=DNS:"${ENGINE_FQDN}" \ 
           --keep-key
       done

5. Restart the httpd service:

   # systemctl restart httpd

6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority's certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

**Replacing All Signed Certificates with SHA-256**

1. Log in to the Manager machine as the root user.

2. Check whether /etc/pki/ovirt-engine/openssl.conf includes the line default_md = sha256:

   # cat /etc/pki/ovirt-engine/openssl.conf

   If it still includes default_md = sha1, back up the existing configuration and change the default to sha256:
3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

   ```
   # cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +%Y%m%d%H%M%S)"
   # openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
   ```

4. Replace the existing certificate with the new certificate:

   ```
   # mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
   ```

5. Define the certificates that should be re-signed:

   ```
   # names="engine apache websocket-proxy jboss imageio-proxy"
   ```

   If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

   ```
   # names="engine websocket-proxy jboss imageio-proxy"
   ```

   For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. On the Manager, re-sign the certificates:

   ```
   for name in $names; do
   subject="$(
     openssl \x509 -in /etc/pki/ovirt-engine/certs/"${name}".cer -noout -subject | sed 's;subject= \(.*\);\1;'
   )"
   /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh --name="${name}" --password=mypass --subject="${subject}" --san=DNS:"${ENGINE_FQDN}" --keep-key
   done
   ```

7. Restart the following services:

   ```
   # systemctl restart httpd
   # systemctl restart ovirt-engine
   # systemctl restart ovirt-websocket-proxy
   # systemctl restart ovirt-imageio-proxy
   ```
8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to \texttt{http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA}, replacing \texttt{your-manager-fqdn} with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.
   a. In the Administration Portal, click \texttt{Compute} \rightarrow \texttt{Hosts}.
   b. Select the host and click \texttt{Management} \rightarrow \texttt{Maintenance}.
   c. Once the host is in maintenance mode, click \texttt{Installation} \rightarrow \texttt{Enroll Certificate}.
   d. Click \texttt{Management} \rightarrow \texttt{Activate}.

4.8. UPDATING OVN PROVIDERS INSTALLED IN RED HAT VIRTUALIZATION 4.1

If you installed an Open Virtual Network (OVN) provider in Red Hat Virtualization 4.1, you must manually edit its configuration for Red Hat Virtualization 4.2.

Procedure

1. Click \texttt{Administration} \rightarrow \texttt{Providers} and select the OVN provider.

2. Click \texttt{Edit}.

3. Click the \texttt{Networking Plugin} text field and select \texttt{oVirt Network Provider for OVN} from the drop-down list.

4. Click \texttt{OK}.
CHAPTER 5. FAST-FORWARDING RED HAT VIRTUALIZATION FROM 4.2 TO 4.3

Upgrading your environment from 4.2 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites.
2. Use the Log Collection Analysis tool to check for issues that might prevent a successful upgrade.
3. Run `ovirt-fast-forward-upgrade`.
4. Update the hosts.
5. Update the compatibility version of the clusters.
6. Reboot any running or suspended virtual machines to update their configuration.
7. Update the compatibility version of the data centers.
8. If you previously upgraded to 4.2 without replacing SHA-1 certificates with SHA-256 certificates, you must replace the certificates now.

5.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters’ compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.
- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.
- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.
- Ensure the Manager has the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Manager Repositories for Red Hat Virtualization 4.2.

5.2. ANALYZING THE ENVIRONMENT

Red Hat recommends running the Log Collection Analysis tool prior to performing updates and for troubleshooting. The tool analyzes your environment for known issues that might prevent you from performing an update, and provides recommendations to resolve them.

The tool gathers detailed information about your system and presents it as an HTML file.

**NOTE**

The Log Collection Analysis tool is available from Red Hat Virtualization 4.2.5.
1. Install the Log Collection Analysis tool on the Manager:
   
   ```bash
   # yum install rhv-log-collector-analyzer
   ```

2. Run the tool:
   
   ```bash
   # rhv-log-collector-analyzer --live
   ```

   A detailed report is displayed.

   By default, the report is saved to a file called `analyzer_report.html`.

   To save the file to a specific location, use the `--html` flag and specify the location:

   ```bash
   # rhv-log-collector-analyzer --live --html=/directory/filename.html
   ```

3. Use the ELinks text mode web browser to read the analyzer reports. To install the ELinks browser:
   
   ```bash
   # yum install -y elinks
   ```

4. Launch ELinks and open `analyzer_report.html`.

   ```bash
   # elinks /home/user1/analyzer_report.html
   ```

   To navigate the report, use the following commands in ELinks:

   - **Insert** to scroll up
   - **Delete** to scroll down
   - **PageUp** to page up
   - **PageDown** to page down
   - **Left Bracket** to scroll left
   - **Right Bracket** to scroll right

### 5.3. UPGRAADING TO RED HAT VIRTUALIZATION MANAGER 4.3 WITH OVIRT-FAST-FORWARD-UPGRADE

**Procedure**

1. Log in to the Manager machine and install the `ovirt-fast-forward-upgrade` tool:

   ```bash
   # yum install ovirt-fast-forward-upgrade
   ```

2. Run the following command to upgrade the Manager, while creating a backup of the current version:

   ```bash
   # ovirt-fast-forward-upgrade --backup --backup-dir=/backup
   ```
Red Hat recommends using the `--backup` and `--backup-dir` options to create a backup of the current Manager. If a backup directory is not specified, the backup is saved in `/tmp`.

The `--backup` option is a wrapper for the `engine-backup` tool and is equivalent to running the following command:

```
# engine-backup --scope=all --mode=backup --file=file_name --log=log_file_name
```

To restore your backup, run `engine-backup` in `restore` mode:

```
# engine-backup --mode=restore
```

See `Backing Up and Restoring the Red Hat Virtualization Manager` in the `Administration Guide` for details.

Alternatively, to upgrade without creating a backup, run the following command:

```
# ovirt-fast-forward-upgrade
```

3. If there are errors, check the log: `/var/log/ovirt-engine/ovirt-fast-forward-upgrade.log`.

You can now update the hosts.

5.4. UPDATING ALL HOSTS IN A CLUSTER

You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful during upgrades to new versions of Red Hat Virtualization. See [https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md](https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md) for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

Limitations

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.

- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.

- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.

- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.

- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.
Procedure

1. In the Administration Portal, click Compute → Clusters and select the cluster.

2. Click Upgrade.

3. Select the hosts to update, then click Next.

4. Configure the options:
   - **Stop Pinned VMs** shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.
   - **Upgrade Timeout (Minutes)** sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is 60. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where the hosts update quickly.
   - **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.
   - **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.
   - **Use Maintenance Policy** sets the cluster’s scheduling policy to cluster_maintenance during the update. It is selected by default, so activity is limited and virtual machines cannot start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click Next.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click Upgrade.

You can track the progress of host updates in the Compute → Hosts view, and in the Events section of the Notification Drawer (-speaker-).

You can track the progress of individual virtual machine migrations in the Status column of the Compute → Virtual Machines view. In large environments, you may need to filter the results to show a particular group of virtual machines.

### 5.5. Changing the Cluster Compatibility Version

Red Hat Virtualization clusters have a compatibility version. The cluster compatibility version indicates the features of Red Hat Virtualization supported by all of the hosts in the cluster. The cluster compatibility is set according to the version of the least capable host operating system in the cluster.
IMPORTANT
To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

Procedure
1. In the Administration Portal, click **Compute → Clusters**.
2. Select the cluster to change and click **Edit**.
3. On the **General** tab, change the **Compatibility Version** to the desired value.
4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.
5. Click **OK** to confirm.

IMPORTANT
An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The **Edit Virtual Machine** window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

5.6. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (💰).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure
1. In the Administration Portal, click **Compute → Virtual Machines**.
2. Check which virtual machines require a reboot. In the **Vms** search bar, enter the following query:

   |next_run_config_exists=True|

   The search results show all virtual machines with pending changes.
3. Select each virtual machine and click **Reboot**.

When the virtual machine starts, the new compatibility version is automatically applied.
NOTE
You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

5.7. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

IMPORTANT
To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click Compute → Data Centers.
2. Select the data center to change and click Edit.
3. Change the Compatibility Version to the desired value.
4. Click OK. The Change Data Center Compatibility Version confirmation dialog opens.
5. Click OK to confirm.

If you previously upgraded to 4.2 without replacing SHA-1 certificates with SHA-256 certificates, you must do so now.

5.8. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- Prevent warning messages from appearing in your browser when connecting to the Administration Portal. These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

- Replace the SHA-1 certificates throughout the system with SHA-256 certificates.

Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.
2. Check whether /etc/pki/ovirt-engine/openssl.conf includes the line default_md = sha256:

```bash
# cat /etc/pki/ovirt-engine/openssl.conf
```
If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

```bash
# cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
# sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
```

3. Define the certificate that should be re-signed:

   ```bash
   # names="apache"
   ```

4. On the Manager, re-sign the Apache certificate:

   ```bash
   for name in $names; do
     subject="$(
       openssl \x509 \-in /etc/pki/ovirt-engine/certs/"${name}".cer \-noout \-subject | sed \"s;subject= \(.*\);1;\"
     )"
     /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \--name="${name}" \--password=mypass \--subject="${subject}" \--san=DNS:"${ENGINE_FQDN}" \--keep-key
   done
   ```

5. Restart the `httpd` service:

   ```bash
   # systemctl restart httpd
   ```

6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority's certificate, navigate to `http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

**Replacing All Signed Certificates with SHA-256**

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```bash
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:
# cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +%Y%m%d%H%M%S)"
# sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf

3. Re-sign the CA certificate by backing it up and creating a new certificate in ca.pem.new:

```bash
# cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +%Y%m%d%H%M%S)"
# openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
```

4. Replace the existing certificate with the new certificate:

```bash
# mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
```

5. Define the certificates that should be re-signed:

```bash
# names="engine apache websocket-proxy jboss imageio-proxy"
```

If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

```bash
# names="engine websocket-proxy jboss imageio-proxy"
```

For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. On the Manager, re-sign the certificates:

```bash
for name in $names; do
  subject="$(openssl \
    x509 \
    -in /etc/pki/ovirt-engine/certs//"${name}".cer \
    -noout \
    -subject \
    | sed \
    "s;subject= \(.*\);\1;"
  )" \
  /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
    --name="${name}" \
    --password=mypass \
    --subject="${subject}" \
    --san=DNS::${ENGINE_FQDN}" \
    --keep-key
done
```

7. Restart the following services:

```bash
# systemctl restart httpd
# systemctl restart ovirt-engine
# systemctl restart ovirt-websocket-proxy
# systemctl restart ovirt-imageio-proxy
```
8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.
    a. In the Administration Portal, click Compute → Hosts.
    b. Select the host and click Management → Maintenance.
    c. Once the host is in maintenance mode, click Installation → Enroll Certificate.
    d. Click Management → Activate.
PART II. UPGRADING A LOCAL DATABASE ENVIRONMENT MANUALLY
CHAPTER 6. UPGRADING FROM 4.0 TO RED HAT VIRTUALIZATION 4.3

The 4.0 compatibility version is not supported after Red Hat Virtualization 4.2. Therefore, when upgrading from Red Hat Virtualization 4.0 you must update the cluster and data center compatibility versions to at least 4.1 before upgrading the Manager from 4.2 to 4.3, then update the compatibility versions again after completing the Manager upgrades.

You must also update the hosts before updating the compatibility versions, but only need to do so once. The host repositories stay the same across Red Hat Virtualization versions, so the hosts will already be upgraded to the latest version after a single update.

Upgrading your environment from 4.0 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories
2. Update the 4.0 Manager to the latest version of 4.0
3. Upgrade the Manager from 4.0 to 4.1
4. Upgrade the Manager from 4.1 to 4.2
5. Update the hosts
6. Update the compatibility version of the clusters to 4.2
7. Reboot any running or suspended virtual machines to update their configuration to 4.2
8. Update the compatibility version of the data centers to 4.2
9. Upgrade the Manager from 4.2 to 4.3
10. Update the compatibility version of the cluster to the latest version
11. Reboot any running or suspended virtual machines to update their configuration to the latest version
12. Update the compatibility version of the data centers to the latest version
13. Replace SHA-1 certificates with SHA-256 certificates

6.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters’ compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.

- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.
6.2. UPDATING THE RED HAT VIRTUALIZATION MANAGER

**WARNING**

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

**Procedure**

1. Log in to the Manager machine.

2. Check if updated packages are available:

   ```
   # engine-upgrade-check
   ```

3. Update the setup packages:

   ```
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```

4. Update the Red Hat Virtualization Manager with the `engine-setup` script. The `engine-setup` script prompts you with some configuration questions, then stops the `ovirt-engine` service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the `ovirt-engine` service.

   ```
   # engine-setup
   ```

When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```

**NOTE**

The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.
5. Update the base operating system and any optional packages installed on the Manager:

   # yum update

5. IMPORTANT

   If any kernel packages were updated, reboot the machine to complete the update.

6.3. UPGRADING THE MANAGER FROM 4.0 TO 4.1

Upgrade the Red Hat Virtualization Manager from 4.0 to 4.1.

5. IMPORTANT

   If the upgrade fails, the engine-setup command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version’s repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

Procedure

1. Log in to the Manager machine.

2. Enable the Red Hat Virtualization 4.1 repositories:

   # subscription-manager repos \  
   --enable=rhel-7-server-rhv-4.1-rpms \  
   --enable=rhel-7-server-rhv-4-tools-rpms \  
   --enable=jb-eap-7.1-for-rhel-7-server-rpms

   All other repositories remain the same across Red Hat Virtualization releases.

3. Update the setup packages:

   # yum update ovirt\"setup\" rh\"vm-setup-plugins

4. Run engine-setup and follow the prompts to upgrade the Red Hat Virtualization Manager:

   # engine-setup

5. Disable the Red Hat Virtualization 4.0 repositories to ensure the system does not use any 4.0 packages:

   # subscription-manager repos \  
   --disable=rhel-7-server-rhv-4.0-rpms \  
   --disable=jb-eap-7.0-for-rhel-7-server-rpms
6. Update the base operating system:

```bash
# yum update
```

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

6.4. UPGRADING THE MANAGER FROM 4.1 TO 4.2

Upgrade the Red Hat Virtualization Manager from 4.1 to 4.2.

**IMPORTANT**

If the upgrade fails, the `engine-setup` command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version’s repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

**Procedure**

1. Log in to the Manager machine.

2. Enable the Red Hat Virtualization 4.2 repositories:

```bash
# subscription-manager repos \
   --enable=rhel-7-server-rhv-4.2-manager-rpms \
   --enable=rhel-7-server-rhv-4.2-manager-tools-rpms \
   --enable=jb-eap-7-for-rhel-7-server-rpms \
   --enable=rhel-7-server-ansible-2.9-rpms
```

All other repositories remain the same across Red Hat Virtualization releases.

3. Update the setup packages:

```bash
# yum update ovirt\"setup\" rh\"vm-setup-plugins
```

4. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

```bash
# engine-setup
```

**NOTE**

If you changed the default trust keystore password, you might get a keystore certificate error. If so, update the configuration to reflect the correct password. For more information, see *RHV 4.2 - Failed to import provider certificate into the external provider keystore*

5. Disable the Red Hat Virtualization 4.1 repositories to ensure the system does not use any 4.1 packages:
6. Update the base operating system:

```bash
# subscription-manager repos 
--disable=rhel-7-server-rhv-4.1-rpms 
--disable=rhel-7-server-rhv-4.1-manager-rpms 
--disable=rhel-7-server-rhv-4-tools-rpms 
--disable=jb-eap-7.0-for-rhel-7-server-rpms 
--disable=jb-eap-7.1-for-rhel-7-server-rpms
```

# yum update

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

You must now update the hosts before you can update the cluster and data center compatibility versions.

### 6.5. UPDATING INDIVIDUAL HOSTS

Use the host upgrade manager to update individual hosts directly from the Administration Portal.

**NOTE**

The upgrade manager only checks hosts with a status of **Up** or **Non-operational**, but not **Maintenance**.

**Limitations**

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.
- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster. Update a host when its usage is relatively low.
- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.
- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.
- Do not update all hosts at the same time, as one host must remain available to perform Storage Pool Manager (SPM) tasks.
- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines must be shut down before updating the host.

**Procedure**

1. Ensure that the correct repositories are enabled. To view a list of currently enabled repositories, run `yum repolist`. 
• For Red Hat Virtualization Hosts:

```
# subscription-manager repos --enable=rhel-7-server-rvh-4-rpms
```

• For Red Hat Enterprise Linux hosts:

```
# subscription-manager repos \
 --enable=rhel-7-server-rpms \
 --enable=rhel-7-server-rhv-4-mgmt-agent-rpms \
 --enable=rhel-7-server-ansible-2.9-rpms
```

2. In the Administration Portal, click **Compute → Hosts** and select the host to be updated.

3. Click **Installation → Check for Upgrade** and click **OK**.

   Open the **Notification Drawer** and expand the **Events** section to see the result.

4. If an update is available, click **Installation → Upgrade**.

5. Click **OK** to update the host. Running virtual machines are migrated according to their migration policy. If migration is disabled for any virtual machines, you are prompted to shut them down.

   The details of the host are updated in **Compute → Hosts** and the status transitions through these stages:

   Maintenance > Installing > Reboot > Up

   **NOTE**

   If the update fails, the host’s status changes to **Install Failed**. From **Install Failed**

   you can click **Installation → Upgrade** again.

Repeat this procedure for each host in the Red Hat Virtualization environment.

You can now change the cluster compatibility version to 4.2.

### 6.6. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.

2. Select the cluster to change and click **Edit**.

3. On the **General** tab, change the **Compatibility Version** to the desired value.

5. Click OK to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

### 6.7. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (⚠️).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

**Procedure**

1. In the Administration Portal, click Compute → Virtual Machines.

2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:
   
   next_run_config_exists=True

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click Reboot.

When the virtual machine starts, the new compatibility version is automatically applied.

**NOTE**

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

You can now change the data center compatibility version to 4.2.

### 6.8. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click **Compute → Data Centers**.

2. Select the data center to change and click **Edit**.

3. Change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.

6.9. UPGRADING THE MANAGER FROM 4.2 TO 4.3

You need to be logged into the machine that you are upgrading.

IMPORTANT

If the upgrade fails, the `engine-setup` command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the `engine-setup` script explains how to restore your installation.

Procedure

1. Enable the Red Hat Virtualization 4.3 repositories:

```bash
# subscription-manager repos \
--enable=rhel-7-server-rhv-4.3-manager-rpms \
--enable=jb-eap-7.2-for-rhel-7-server-rpms
```

All other repositories remain the same across Red Hat Virtualization releases.

2. Update the setup packages:

```bash
# yum update ovirt*setup[^]* rh[^]*vm-setup-plugins
```

3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

```bash
# engine-setup
```

When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:
5. Update the base operating system:

# yum update

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

The Manager is now upgraded to version 4.3.

You can now change the cluster compatibility version to 4.3.

### 6.10. Changing the Cluster Compatibility Version

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.
2. Select the cluster to change and click **Edit**.
3. On the **General** tab, change the **Compatibility Version** to the desired value.
4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.
5. Click **OK** to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The **Edit Virtual Machine** window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

### 6.11. Changing Virtual Machine Cluster Compatibility
After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (⚠️).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

**Procedure**

1. In the Administration Portal, click **Compute → Virtual Machines**.

2. Check which virtual machines require a reboot. In the **Vms**: search bar, enter the following query:

   ```
   next_run_config_exists=True
   ```

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click **Reboot**.

When the virtual machine starts, the new compatibility version is automatically applied.

   **NOTE**

   You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

You can now change the data center compatibility version to 4.3.

**6.12. CHANGING THE DATA CENTER COMPATIBILITY VERSION**

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

   **IMPORTANT**

   To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

**Procedure**

1. In the Administration Portal, click **Compute → Data Centers**.

2. Select the data center to change and click **Edit**.

3. Change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.
6.13. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- **Prevent warning messages from appearing in your browser when connecting to the Administration Portal.** These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see [Replacing the Red Hat Virtualization Manager CA Certificate](Administration Guide) in the Administration Guide.

- **Replace the SHA-1 certificates throughout the system with SHA-256 certificates.**

### Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Define the certificate that should be re-signed:

   ```
   # names="apache"
   ```

4. On the Manager, re-sign the Apache certificate:

   ```
   for name in $names; do
     subject="$(
       openssl \
       x509 \
       -in /etc/pki/ovirt-engine/certs/"${name}").cer \
       -noout \
       -subject \
       | sed \
       s;subject= \(^.*\);1;" \n     )"
     /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
     --name="${name}" \
     --password=mypass \
     --subject="$\{subject\}" \
     --san=DNS:"${ENGINE_FQDN}" \
     --keep-key
   done
   ```
5. Restart the `httpd` service:

```
# systemctl restart httpd
```

6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to `http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

### Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

```
# cat /etc/pki/ovirt-engine/openssl.conf
```

If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

```
# cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date 
+"%Y%m%d%H%M%S")"
# sed -i 's/^default_md = sha1/default_md = sha256/" /etc/pki/ovirt-engine/openssl.conf
```

3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

```
# cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date 
+"%Y%m%d%H%M%S")"
# openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
```

4. Replace the existing certificate with the new certificate:

```
# mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
```

5. Define the certificates that should be re-signed:

```
# names="engine apache websocket-proxy jboss imageio-proxy"
```

If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

```
# names="engine websocket-proxy jboss imageio-proxy"
```

For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. On the Manager, re-sign the certificates:

```
for name in $names; do
```
subject="$(openssl x509 -in /etc/pki/ovirt-engine/certs/${name}.cer -noout -subject | sed 's;subject= \(.*\);\1;')"
/usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh
   --name="${name}" \
   --password=mypass \
   --subject="${subject}" \
   --san=DNS:"${ENGINE_FQDN}" \
   --keep-key
done

7. Restart the following services:

   # systemctl restart httpd
   # systemctl restart ovirt-engine
   # systemctl restart ovirt-websocket-proxy
   # systemctl restart ovirt-imageio-proxy

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.
   a. In the Administration Portal, click Compute → Hosts.
   b. Select the host and click Management → Maintenance.
   c. Once the host is in maintenance mode, click Installation → Enroll Certificate.
   d. Click Management → Activate.
CHAPTER 7. UPGRAADING FROM 4.1 TO RED HAT VIRTUALIZATION 4.3

Upgrading your environment from 4.1 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories
2. Update the 4.1 Manager to the latest version of 4.1
3. Upgrade the Manager from 4.1 to 4.2
4. Upgrade the Manager from 4.2 to 4.3
5. Update the hosts
6. Update the compatibility version of the clusters
7. Reboot any running or suspended virtual machines to update their configuration
8. Update the compatibility version of the data centers
9. Replace SHA-1 certificates with SHA-256 certificates
10. If you installed the technology preview version of Open Virtual Network (OVN) in 4.1, update the OVN provider’s networking plugin

7.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters' compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.

- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.

- Ensure the Manager has the correct repositories enabled. For the list of required repositories, see Subscribing to the Required Entitlements for Red Hat Virtualization 4.1.

7.2. UPDATING THE RED HAT VIRTUALIZATION MANAGER

WARNING
Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.
Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

**Procedure**

1. Log in to the Manager machine.

2. Check if updated packages are available:
   ```
   # engine-upgrade-check
   ```

3. Update the setup packages:
   ```
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```

4. Update the Red Hat Virtualization Manager with the `engine-setup` script. The `engine-setup` script prompts you with some configuration questions, then stops the `ovirt-engine` service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the `ovirt-engine` service.
   ```
   # engine-setup
   ```

   When the script completes successfully, the following message appears:

   ```
   Execution of setup completed successfully
   ```

   **NOTE**
   
   The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.

   **IMPORTANT**
   
   The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:
   ```
   # yum update
   ```

   **IMPORTANT**
   
   If any kernel packages were updated, reboot the machine to complete the update.

### 7.3. UPGRADING THE MANAGER FROM 4.1 TO 4.2
Upgrade the Red Hat Virtualization Manager from 4.1 to 4.2.

**IMPORTANT**

If the upgrade fails, the `engine-setup` command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version's repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

**Procedure**

1. Log in to the Manager machine.
2. Enable the Red Hat Virtualization 4.2 repositories:
   ```bash
   # subscription-manager repos
      --enable=rhel-7-server-rhv-4.2-manager-rpms
      --enable=rhel-7-server-rhv-4-manager-tools-rpms
      --enable=jb-eap-7-for-rhel-7-server-rpms
      --enable=rhel-7-server-ansible-2.9-rpms
   ```

   All other repositories remain the same across Red Hat Virtualization releases.
3. Update the setup packages:
   ```bash
   # yum update ovirt\*
   ```
4. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:
   ```bash
   # engine-setup
   ```

   **NOTE**

   If you changed the default trust keystore password, you might get a keystore certificate error. If so, update the configuration to reflect the correct password.
   
   For more information, see [RHV 4.2 - Failed to import provider certificate into the external provider keystore](#).
5. Disable the Red Hat Virtualization 4.1 repositories to ensure the system does not use any 4.1 packages:
   ```bash
   # subscription-manager repos
      --disable=rhel-7-server-rhv-4.1-rpms
      --disable=rhel-7-server-rhv-4.1-manager-rpms
      --disable=rhel-7-server-rhv-4-tools-rpms
      --disable=jb-eap-7.0-for-rhel-7-server-rpms
      --disable=jb-eap-7.1-for-rhel-7-server-rpms
   ```
6. Update the base operating system:
   ```bash
   # yum update
   ```
If any kernel packages were updated, reboot the machine to complete the upgrade.

## 7.4. UPGRADING THE MANAGER FROM 4.2 TO 4.3

You need to be logged into the machine that you are upgrading.

### IMPORTANT

If the upgrade fails, the `engine-setup` command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the `engine-setup` script explains how to restore your installation.

### Procedure

1. Enable the Red Hat Virtualization 4.3 repositories:

   ```bash
   # subscription-manager repos \
   --enable=rhel-7-server-rhv-4.3-manager-rpms \
   --enable=jb-eap-7.2-for-rhel-7-server-rpms
   ```

   All other repositories remain the same across Red Hat Virtualization releases.

2. Update the setup packages:

   ```bash
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```

3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

   ```bash
   # engine-setup
   ```

   When the script completes successfully, the following message appears:

   ```
   Execution of setup completed successfully
   ```

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:

   ```bash
   # subscription-manager repos \
   --disable=rhel-7-server-rhv-4.2-manager-rpms \
   --disable=jb-eap-7-for-rhel-7-server-rpms
   ```

5. Update the base operating system:

   ```bash
   # yum update
   ```
IMPORTANT

If any kernel packages were updated, reboot the machine to complete the upgrade.

The Manager is now upgraded to version 4.3.

You can now update the hosts.

7.5. UPDATING ALL HOSTS IN A CLUSTER

You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful during upgrades to new versions of Red Hat Virtualization. See https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

Limitations

- On RHVH, the update only preserves modified content in the /etc and /var directories. Modified data in other paths is overwritten during an update.

- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.

- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.

- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.

- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.

Procedure

1. In the Administration Portal, click Compute → Clusters and select the cluster.

2. Click Upgrade.

3. Select the hosts to update, then click Next.

4. Configure the options:

   - Stop Pinned VMs shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.

   - Upgrade Timeout (Minutes) sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is 60. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where
the hosts update quickly.

- **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.

- **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.

- **Use Maintenance Policy** sets the cluster’s scheduling policy to `cluster_maintenance` during the update. It is selected by default, so activity is limited and virtual machines cannot start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click Next.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click Upgrade.

You can track the progress of host updates in the **Compute → Hosts** view, and in the **Events** section of the **Notification Drawer**.

You can track the progress of individual virtual machine migrations in the **Status** column of the **Compute → Virtual Machines** view. In large environments, you may need to filter the results to show a particular group of virtual machines.

### 7.6. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.

2. Select the cluster to change and click **Edit**.

3. On the **General** tab, change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.
IMPORTANT

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

7.7. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (△).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure

1. In the Administration Portal, click Compute → Virtual Machines.
2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:

   next_run_config_exists=True

   The search results show all virtual machines with pending changes.
3. Select each virtual machine and click Reboot.

When the virtual machine starts, the new compatibility version is automatically applied.

NOTE

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

7.8. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

IMPORTANT

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click Compute → Data Centers.
2. Select the data center to change and click **Edit**.

3. Change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.

### 7.9. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- **Prevent warning messages from appearing in your browser when connecting to the Administration Portal.** These warnings may either appear as pop-up windows or in the browser’s **Web Console** window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see [Replacing the Red Hat Virtualization Manager CA Certificate](#) in the Administration Guide.

- **Replace the SHA-1 certificates throughout the system with SHA-256 certificates.**

#### Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```bash
   # cat /etc/pki/ovirt-engine/openssl.conf
   ``

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```bash
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ``

3. Define the certificate that should be re-signed:

   ```bash
   # names="apache"
   ```

4. On the Manager, re-sign the Apache certificate:

   ```bash
   for name in $names; do
     subject="$(
       openssl \
       x509 \
       -in /etc/pki/ovirt-engine/certs/"$name".cer \
       -noout \
       -subject \
       | sed \n       's;subject= \((.*)\);1;"
     )"
   ```

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5. Restart the **httpd** service:

```bash
# systemctl restart httpd
```

6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to `http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

### Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

```bash
# cat /etc/pki/ovirt-engine/openssl.conf
```

If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

```bash
# cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
# sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
```

3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

```bash
# cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +"%Y%m%d%H%M%S")"
# openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
```

4. Replace the existing certificate with the new certificate:

```bash
# mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
```

5. Define the certificates that should be re-signed:

```bash
# names="engine apache websocket-proxy jboss imageio-proxy"
```

If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:
# names="engine websocket-proxy jboss imageio-proxy"

For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. On the Manager, re-sign the certificates:

```bash
for name in $names; do
    subject="$(
picksub=$(openssl \n    x509 \n    -in /etc/pki/ovirt-engine/certs/"${name}".cer \n    -noout \n    -subject \n    | sed \n    's;subject= \(.*\);1;\'")" \n    /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \n    --name="${name}" \n    --password=mypass \n    --subject="${subject}" \n    --san=DNS:"${ENGINE_FQDN}" \n    --keep-key
done
```

7. Restart the following services:

```bash
# systemctl restart httpd
# systemctl restart ovirt-engine
# systemctl restart ovirt-websocket-proxy
# systemctl restart ovirt-imageio-proxy
```

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.

   a. In the Administration Portal, click Compute → Hosts.

   b. Select the host and click Management → Maintenance.

   c. Once the host is in maintenance mode, click Installation → Enroll Certificate.

   d. Click Management → Activate.

**7.10. UPDATING OVN PROVIDERS INSTALLED IN RED HAT VIRTUALIZATION 4.1**
If you installed an Open Virtual Network (OVN) provider in Red Hat Virtualization 4.1, you must manually edit its configuration for Red Hat Virtualization 4.2.

**Procedure**

1. Click **Administration → Providers** and select the OVN provider.

2. Click **Edit**.

3. Click the **Networking Plugin** text field and select **oVirt Network Provider for OVN** from the drop-down list.

4. Click **OK**.
CHAPTER 8. UPGRADING FROM 4.2 TO RED HAT VIRTUALIZATION 4.3

Upgrading your environment from 4.2 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories
2. Use the Log Collection Analysis tool to check for issues that might prevent a successful upgrade
3. Update the 4.2 Manager to the latest version of 4.2
4. Upgrade the Manager from 4.2 to 4.3
5. Update the hosts
6. Update the compatibility version of the clusters
7. Reboot any running or suspended virtual machines to update their configuration
8. Update the compatibility version of the data centers
9. If you previously upgraded to 4.2 without replacing SHA-1 certificates with SHA-256 certificates, you must replace the certificates now.

8.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters' compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.

- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.

- Ensure the Manager has the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Manager Repositories for Red Hat Virtualization 4.2.

8.2. ANALYZING THE ENVIRONMENT

Red Hat recommends running the Log Collection Analysis tool prior to performing updates and for troubleshooting. The tool analyzes your environment for known issues that might prevent you from performing an update, and provides recommendations to resolve them.

The tool gathers detailed information about your system and presents it as an HTML file.

NOTE
The Log Collection Analysis tool is available from Red Hat Virtualization 4.2.5.
**Procedure**

1. Install the Log Collection Analysis tool on the Manager:
   ```bash
   # yum install rhv-log-collector-analyzer
   ```

2. Run the tool:
   ```bash
   # rhv-log-collector-analyzer --live
   ```
   A detailed report is displayed.

   By default, the report is saved to a file called `analyzer_report.html`.

   To save the file to a specific location, use the `--html` flag and specify the location:
   ```bash
   # rhv-log-collector-analyzer --live --html=/directory/filename.html
   ```

3. Use the ELinks text mode web browser to read the analyzer reports. To install the ELinks browser:
   ```bash
   # yum install -y elinks
   ```

4. Launch ELinks and open `analyzer_report.html`.
   ```bash
   # elinks /home/user1/analyzer_report.html
   ```
   To navigate the report, use the following commands in ELinks:
   - **Insert** to scroll up
   - **Delete** to scroll down
   - **PageUp** to page up
   - **PageDown** to page down
   - **Left Bracket** to scroll left
   - **Right Bracket** to scroll right

**8.3. UPDATING THE RED HAT VIRTUALIZATION MANAGER**

**WARNING**

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.
Procedure

1. Log in to the Manager machine.

2. Check if updated packages are available:
   
   ```bash
   # engine-upgrade-check
   ```

3. Update the setup packages:
   
   ```bash
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```

4. Update the Red Hat Virtualization Manager with the `engine-setup` script. The `engine-setup` script prompts you with some configuration questions, then stops the `ovirt-engine` service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the `ovirt-engine` service.
   
   ```bash
   # engine-setup
   ```

   When the script completes successfully, the following message appears:
   
   Execution of setup completed successfully

   **NOTE**

   The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.

   **IMPORTANT**

   The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:
   
   ```bash
   # yum update
   ```

   **IMPORTANT**

   If any kernel packages were updated, reboot the machine to complete the update.

8.4. UPGRAADING THE MANAGER FROM 4.2 TO 4.3

You need to be logged into the machine that you are upgrading.
If the upgrade fails, the `engine-setup` command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the `engine-setup` script explains how to restore your installation.

**Procedure**

1. Enable the Red Hat Virtualization 4.3 repositories:
   ```bash
   # subscription-manager repos \
   --enable=rhel-7-server-rhv-4.3-manager-rpms \
   --enable=jb-eap-7.2-for-rhel-7-server-rpms
   ```
   All other repositories remain the same across Red Hat Virtualization releases.

2. Update the setup packages:
   ```bash
   # yum update ovirt-*setup-* rhvvm-setup-plugins
   ```

3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:
   ```bash
   # engine-setup
   ```
   When the script completes successfully, the following message appears:
   ```plaintext
   Execution of setup completed successfully
   ```

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:
   ```bash
   # subscription-manager repos \
   --disable=rhel-7-server-rhv-4.2-manager-rpms \
   --disable=jb-eap-7-for-rhel-7-server-rpms
   ```

5. Update the base operating system:
   ```bash
   # yum update
   ```

   **IMPORTANT**
   If any kernel packages were updated, reboot the machine to complete the upgrade.

The Manager is now upgraded to version 4.3.

You can now update the hosts.

**8.5. UPDATING ALL HOSTS IN A CLUSTER**

You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful
during upgrades to new versions of Red Hat Virtualization. See https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

Limitations

- On RHVH, the update only preserves modified content in the /etc and /var directories. Modified data in other paths is overwritten during an update.
- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.
- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.
- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.
- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.

Procedure

1. In the Administration Portal, click Compute → Clusters and select the cluster.
2. Click Upgrade.
3. Select the hosts to update, then click Next.
4. Configure the options:
   - **Stop Pinned VMs** shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.
   - **Upgrade Timeout (Minutes)** sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is 60. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where the hosts update quickly.
   - **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.
   - **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.
   - **Use Maintenance Policy** sets the cluster’s scheduling policy to cluster_maintenance during the update. It is selected by default, so activity is limited and virtual machines cannot
start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click Next.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click Upgrade.

You can track the progress of host updates in the Compute → Hosts view, and in the Events section of the Notification Drawer ( ).

You can track the progress of individual virtual machine migrations in the Status column of the Compute → Virtual Machines view. In large environments, you may need to filter the results to show a particular group of virtual machines.

8.6. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

IMPORTANT

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

Procedure

1. In the Administration Portal, click Compute → Clusters.

2. Select the cluster to change and click Edit.

3. On the General tab, change the Compatibility Version to the desired value.


5. Click OK to confirm.

IMPORTANT

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

8.7. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all
running or suspended virtual machines by rebooting them from the Administration Portal, or using the
REST API, instead of from within the guest operating system. Virtual machines that require a reboot are
marked with the pending changes icon (⚠️).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is
highly recommended so that the virtual machines use the latest configuration. Any virtual machine that
has not been rebooted runs with the previous configuration, and subsequent configuration changes
made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure

1. In the Administration Portal, click **Compute → Virtual Machines**.

2. Check which virtual machines require a reboot. In the **Vms**: search bar, enter the following query:

   next_run_config_exists=True

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click **Reboot**.

When the virtual machine starts, the new compatibility version is automatically applied.

**NOTE**

You cannot change the cluster compatibility version of a virtual machine snapshot that is
in preview. You must first commit or undo the preview.

### 8.8. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the data center compatibility version, you must have first updated the
compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click **Compute → Data Centers**.

2. Select the data center to change and click **Edit**.

3. Change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.

If you previously upgraded to 4.2 without replacing SHA-1 certificates with SHA-256 certificates, you
must do so now.
8.9. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- Prevent warning messages from appearing in your browser when connecting to the Administration Portal. These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

- Replace the SHA-1 certificates throughout the system with SHA-256 certificates.

Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.

2. Check whether /etc/pki/ovirt-engine/openssl.conf includes the line default_md = sha256:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes default_md = sha1, back up the existing configuration and change the default to sha256:

   ```
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Define the certificate that should be re-signed:

   ```
   # names="apache"
   ```

4. On the Manager, re-sign the Apache certificate:

   ```
   for name in $names; do
     subject="$(
       openssl \
       x509 \
       -in /etc/pki/ovirt-engine/certs/${name}.cer \
       -noout \
       -subject \
       | sed \n       's;subject= \
       
       "\n       )"
     /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
     --name="${name}" \
     --password=mypass \
     --subject="${subject}" \
     --san=DNS:"${ENGINE_FQDN}" \
     --keep-key
   done
   ```
5. Restart the **httpd** service:

   ```
   # systemctl restart httpd
   ```

6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority's certificate, navigate to `http://your-manager-fqdn.ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

### Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

   ```
   # cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +"%Y%m%d%H%M%S")"
   # openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
   ```

4. Replace the existing certificate with the new certificate:

   ```
   # mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
   ```

5. Define the certificates that should be re-signed:

   ```
   # names="engine apache websocket-proxy jboss imageio-proxy"
   ```

   If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

   ```
   # names="engine websocket-proxy jboss imageio-proxy"
   ```

   For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. On the Manager, re-sign the certificates:

   ```
   for name in $names; do
   ```
subject="$(
    openssl \
    x509 \
    -in /etc/pki/ovirt-engine/certs/"${name}".cer \
    -noout \
    -subject \
    | sed \n      's;subject= \(.*\);1;" \n    )"

/usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
   --name="${name}" \
   --password=mypass \
   --subject="${subject}" \
   --san=DNS:"${ENGINE_FQDN}" \
   --keep-key

done

7. Restart the following services:

# systemctl restart httpd
# systemctl restart ovirt-engine
# systemctl restart ovirt-websocket-proxy
# systemctl restart ovirt-imageio-proxy

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.

   a. In the Administration Portal, click Compute → Hosts.
   
   b. Select the host and click Management → Maintenance.
   
   c. Once the host is in maintenance mode, click Installation → Enroll Certificate.
   
   d. Click Management → Activate.
PART III. UPGRADING A REMOTE DATABASE ENVIRONMENT MANUALLY
CHAPTER 9. UPGRADING A REMOTE DATABASE ENVIRONMENT FROM 4.0 TO RED HAT VIRTUALIZATION 4.3

The 4.0 compatibility version is not supported after Red Hat Virtualization 4.2. Therefore, when upgrading from Red Hat Virtualization 4.0 you must update the cluster and data center compatibility versions to at least 4.1 before upgrading the Manager from 4.2 to 4.3, then update the compatibility versions again after completing the Manager upgrades.

You must also update the hosts before updating the compatibility versions, but only need to do so once. The host repositories stay the same across Red Hat Virtualization versions, so the hosts will already be upgraded to the latest version after a single update.

Upgrading your environment from 4.0 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories
2. Update the 4.0 Manager to the latest version of 4.0
3. Upgrade the Manager from 4.0 to 4.1
4. Upgrade the database from PostgreSQL 9.2 to 9.5
5. Upgrade the Manager from 4.1 to 4.2
6. Update the hosts
7. Update the compatibility version of the clusters to 4.2
8. Reboot any running or suspended virtual machines to update their configuration to 4.2
9. Update the compatibility version of the data centers to 4.2
10. Upgrade the database from PostgreSQL 9.5 to 10.0
11. Upgrade the Manager from 4.2 to 4.3
12. Update the compatibility version of the clusters to the latest version
13. Reboot any running or suspended virtual machines to update their configuration to the latest version
14. Update the compatibility version of the data centers to the latest version
15. Replace SHA-1 certificates with SHA-256 certificates

9.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters' compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.
Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.

Ensure the Manager has the correct repositories enabled. For the list of required repositories, see Subscribing to the Required Entitlements for Red Hat Virtualization 4.0.

9.2. UPDATING THE RED HAT VIRTUALIZATION MANAGER

WARNING
Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

Procedure

1. Log in to the Manager machine.

2. Check if updated packages are available:

   # engine-upgrade-check

3. Update the setup packages:

   # yum update ovirt\"setup\" rh\"vm-setup-plugins

4. Update the Red Hat Virtualization Manager with the engine-setup script. The engine-setup script prompts you with some configuration questions, then stops the ovirt-engine service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the ovirt-engine service.

   # engine-setup

When the script completes successfully, the following message appears:

Execution of setup completed successfully
NOTE

The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.

IMPORTANT

The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:

```
# yum update
```

IMPORTANT

If any kernel packages were updated, reboot the machine to complete the update.

9.3. UPGRADING THE MANAGER FROM 4.0 TO 4.1

Upgrade the Red Hat Virtualization Manager from 4.0 to 4.1.

IMPORTANT

If the upgrade fails, the `engine-setup` command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version's repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

Procedure

1. Log in to the Manager machine.

2. Enable the Red Hat Virtualization 4.1 repositories:

```
# subscription-manager repos \
  --enable=rhel-7-server-rhv-4.1-rpms \
  --enable=rhel-7-server-rhv-4-tools-rpms \
  --enable=jb-eap-7.1-for-rhel-7-server-rpms
```

All other repositories remain the same across Red Hat Virtualization releases.

3. Update the setup packages:

```
# yum update ovirt*setup* rhv*vm-setup-plugins
```
4. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

```
# engine-setup
```

5. Disable the Red Hat Virtualization 4.0 repositories to ensure the system does not use any 4.0 packages:

```
# subscription-manager repos \
--disable=rhel-7-server-rhv-4.0-rpms \
--disable=jb-eap-7-for-rhel-7-server-rpms \
--disable=jb-eap-7.0-for-rhel-7-server-rpms
```

6. Update the base operating system:

```
# yum update
```

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

### 9.4. UPGRADING REMOTE DATABASES FROM POSTGRESQL 9.2 TO 9.5

Red Hat Virtualization 4.2 uses PostgreSQL 9.5 instead of PostgreSQL 9.2. If your databases are installed locally, the upgrade script will automatically upgrade them from version 9.2 to 9.5. However, if either of your databases (Manager or Data Warehouse) is installed on a separate machine, you must perform the following procedure on each remote database before upgrading the Manager.

1. Stop the service running on the machine:
   - When upgrading the Manager database, stop the `ovirt-engine` service on the Manager machine:
     ```
     # systemctl stop ovirt-engine
     ```
   - When upgrading the Data Warehouse database, stop the `ovirt-engine-dwhd` service on the Data Warehouse machine:
     ```
     # systemctl stop ovirt-engine-dwhd
     ```

2. Enable the required repository to receive the PostgreSQL 9.5 package:
   - Enable either the Red Hat Virtualization Manager repository:
     ```
     # subscription-manager repos --enable=rhel-7-server-rhv-4.2-manager-rpms
     ```
   - or the SCL repository:
     ```
     # subscription-manager repos --enable rhel-server-rhscl-7-rpms
     ```

3. Install the PostgreSQL 9.5 packages:
# yum install rh-postgresql95 rh-postgresql95-postgresql-contrib

4. Stop and disable the PostgreSQL 9.2 service:

   # systemctl stop postgresql
   # systemctl disable postgresql

5. Upgrade the PostgreSQL 9.2 database to PostgreSQL 9.5:

   # scl enable rh-postgresql95 -- postgresql-setup upgrade

6. Start and enable the **rh-postgresql95-postgresql.service** and check that it is running:

   # systemctl start rh-postgresql95-postgresql.service
   # systemctl enable rh-postgresql95-postgresql.service
   # systemctl status rh-postgresql95-postgresql.service

   Ensure that you see an output similar to the following:

   rh-postgresql95-postgresql.service - PostgreSQL database server
      Loaded: loaded (/usr/lib/systemd/system/rh-postgresql95-postgresql.service; enabled; vendor preset: disabled)
      Active: active (running) since Mon 2018-05-07 08:48:27 CEST; 1h 59min ago

7. Log in to the database and enable the **uuid-ossp** extension:

   # su - postgres -c "scl enable rh-postgresql95 -- psql -d database-name"

8. Execute the following SQL commands:

   # database-name=# DROP FUNCTION IF EXISTS uuid_generate_v1();
   # database-name=# CREATE EXTENSION "uuid-ossp";

9. Copy the **pg_hba.conf** client configuration file from the 9.2 environment to your 9.5 environment:

   # cp -p /var/lib/pgsql/data/pg_hba.conf /var/opt/rh/rh-postgresql95/lib/pgsql/data/pg_hba.conf

10. Update the following parameters in **/var/opt/rh/rh-postgresql95/lib/pgsql/data/postgresql.conf**:

   listen_addresses="*"
   autovacuum_vacuum_scale_factor = 0.01
   autovacuum_analyze_scale_factor = 0.075
   autovacuum_max_workers = 6
   maintenance_work_mem = 65536
   max_connections = 150
   work_mem = 8192

11. Restart the PostgreSQL 9.5 service to apply the configuration changes:

    # systemctl restart rh-postgresql95-postgresql.service
12. Start the `ovirt-engine-dwhd` service:

```
# systemctl start ovirt-engine-dwhd
```

You can now upgrade the Manager to 4.2.

## 9.5. UPGRADING THE MANAGER FROM 4.1 TO 4.2

Upgrade the Red Hat Virtualization Manager from 4.1 to 4.2.

### IMPORTANT

If the upgrade fails, the `engine-setup` command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version’s repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

### Procedure

1. Log in to the Manager machine.

2. Enable the Red Hat Virtualization 4.2 repositories:

```
# subscription-manager repos \
--enable=rhel-7-server-rhv-4.2-manager-rpms \
--enable=rhel-7-server-rhv-4.2-manager-tools-rpms \
--enable=jb-eap-7-for-rhel-7-server-rpms \
--enable=rhel-7-server-ansible-2.9-rpms
```

All other repositories remain the same across Red Hat Virtualization releases.

3. Update the setup packages:

```
# yum update ovirt*setup\* rh\*vm-setup-plugins
```

4. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

```
# engine-setup
```

### NOTE

If you changed the default trust keystore password, you might get a keystore certificate error. If so, update the configuration to reflect the correct password. For more information, see `RHV 4.2 - Failed to import provider certificate into the external provider keystore`

5. Disable the Red Hat Virtualization 4.1 repositories to ensure the system does not use any 4.1 packages:

```
# subscription-manager repos \n--disable=rhel-7-server-rhv-4.1-rpms \n--disable=rhel-7-server-rhv-4.1-manager-rpms
```
6. Update the base operating system:

# yum update

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

You must now update the hosts before you can update the cluster and data center compatibility versions.

**9.6. UPDATING INDIVIDUAL HOSTS**

Use the host upgrade manager to update individual hosts directly from the Administration Portal.

**NOTE**

The upgrade manager only checks hosts with a status of **Up** or **Non-operational**, but not **Maintenance**.

**Limitations**

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.

- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster. Update a host when its usage is relatively low.

- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.

- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.

- Do not update all hosts at the same time, as one host must remain available to perform Storage Pool Manager (SPM) tasks.

- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines must be shut down before updating the host.

**Procedure**

1. Ensure that the correct repositories are enabled. To view a list of currently enabled repositories, run `yum repolist`.

   - For Red Hat Virtualization Hosts:

   ```bash
   # subscription-manager repos --enable=rhel-7-server-rvh-4-rpms
   ```
For Red Hat Enterprise Linux hosts:

```bash
# subscription-manager repos \
--enable=rhel-7-server-rpms \
--enable=rhel-7-server-rhv-4-mgmt-agent-rpms \
--enable=rhel-7-server-ansible-2.9-rpms
```

1. In the Administration Portal, click **Compute → Hosts** and select the host to be updated.

2. Click **Installation → Check for Upgrade** and click **OK**.

3. Open the **Notification Drawer** and expand the **Events** section to see the result.

4. If an update is available, click **Installation → Upgrade**.

5. Click **OK** to update the host. Running virtual machines are migrated according to their migration policy. If migration is disabled for any virtual machines, you are prompted to shut them down.

   The details of the host are updated in **Compute → Hosts** and the status transitions through these stages:

   Maintenance > Installing > Reboot > Up

   **NOTE**
   
   If the update fails, the host’s status changes to **Install Failed**. From **Install Failed** you can click **Installation → Upgrade** again.

Repeat this procedure for each host in the Red Hat Virtualization environment.

You can now change the cluster compatibility version to 4.2.

### 9.7. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.

2. Select the cluster to change and click **Edit**.

3. On the **General** tab, change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.
IMPORTANT

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

9.8. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (⚠️).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure

1. In the Administration Portal, click Compute → Virtual Machines.

2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:

   ```
   next_run_config_exists=True
   ```

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click Reboot.

When the virtual machine starts, the new compatibility version is automatically applied.

NOTE

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

You can now change the data center compatibility version to 4.2.

9.9. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

IMPORTANT

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.
Procedure

1. In the Administration Portal, click Compute → Data Centers.

2. Select the data center to change and click Edit.

3. Change the Compatibility Version to the desired value.

4. Click OK. The Change Data Center Compatibility Version confirmation dialog opens.

5. Click OK to confirm.

9.10. UPGRADING REMOTE DATABASES FROM POSTGRESQL 9.5 TO 10

Red Hat Virtualization 4.3 uses PostgreSQL 10 instead of PostgreSQL 9.5. If your databases are installed locally, the upgrade script automatically upgrades them from version 9.5 to 10. However, if either of your databases (Manager or Data Warehouse) is installed on a separate machine, you must perform the following procedure on each remote database before upgrading the Manager.

1. Stop the service running on the machine:
   - When upgrading the Manager database, stop the ovirt-engine service on the Manager machine:
     
     ```
     # systemctl stop ovirt-engine
     ```
   - When upgrading the Data Warehouse database, stop the ovirt-engine-dwhd service on the Data Warehouse machine:
     
     ```
     # systemctl stop ovirt-engine-dwhd
     ```

2. Enable the required repository to receive the PostgreSQL 10 package:
   - Enable either the Red Hat Virtualization Manager repository:
     
     ```
     # subscription-manager repos --enable=rhel-7-server-rhv-4.3-manager-rpms
     ```
   - or the SCL repository:
     
     ```
     # subscription-manager repos --enable rhel-server-rhscl-7-rpms
     ```

3. Install the PostgreSQL 10 packages:

   ```
   # yum install rh-postgresql10 rh-postgresql10-postgresql-contrib
   ```

4. Stop and disable the PostgreSQL 9.5 service:

   ```
   # systemctl stop rh-postgresql95-postgresql
   # systemctl disable rh-postgresql95-postgresql
   ```

5. Upgrade the PostgreSQL 9.5 database to PostgreSQL 10:
6. Start and enable the `rh-postgresql10-postgresql.service` and check that it is running:

```bash
# systemctl start rh-postgresql10-postgresql.service
# systemctl enable rh-postgresql10-postgresql.service
# systemctl status rh-postgresql10-postgresql.service
```

Ensure that you see output similar to the following:

```
rh-postgresql10-postgresql.service - PostgreSQL database server
   Loaded: loaded (/usr/lib/systemd/system/rh-postgresql10-postgresql.service; enabled; vendor preset: disabled)
   Active: active (running) since ...
```

7. Copy the `pg_hba.conf` client configuration file from the PostgreSQL 9.5 environment to the PostgreSQL 10 environment:

```bash
```

8. Update the following parameters in `/var/opt/rh/rh-postgresql10/lib/pgsql/data/postgresql.conf`:

```
listen_addresses='*'
autovacuum_vacuum_scale_factor=0.01
autovacuum_analyze_scale_factor=0.075
autovacuum_max_workers=6
maintenance_work_mem=65536
max_connections=150
work_mem = 8192
```

9. Restart the PostgreSQL 10 service to apply the configuration changes:

```bash
# systemctl restart rh-postgresql10-postgresql.service
```

You can now upgrade the Manager to 4.3.

### 9.11. UPGRADING THE MANAGER FROM 4.2 TO 4.3

Follow these same steps when upgrading any of the following:

- the Red Hat Virtualization Manager
- a remote machine with the Data Warehouse service

You need to be logged into the machine that you are upgrading.
IMPORTANT

If the upgrade fails, the `engine-setup` command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the `engine-setup` script explains how to restore your installation.

Procedure

1. Enable the Red Hat Virtualization 4.3 repositories:
   
   ```bash
   # subscription-manager repos \
   --enable=rhel-7-server-rhv-4.3-manager-rpms \
   --enable=jb-eap-7.2-for-rhel-7-server-rpms
   ```
   
   All other repositories remain the same across Red Hat Virtualization releases.

2. Update the setup packages:
   
   ```bash
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```

3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager, the remote database or remote service:
   
   ```bash
   # engine-setup
   ```

   NOTE
   
   During the upgrade process for the Manager, the `engine-setup` script might prompt you to disconnect the remote Data Warehouse database. You must disconnect it to continue the setup.

   When the script completes successfully, the following message appears:

   ```bash
   Execution of setup completed successfully
   ```

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:
   
   ```bash
   # subscription-manager repos \
   --disable=rhel-7-server-rhv-4.2-manager-rpms \
   --disable=jb-eap-7-for-rhel-7-server-rpms
   ```

5. Update the base operating system:
   
   ```bash
   # yum update
   ```

   IMPORTANT
   
   If any kernel packages were updated, reboot the machine to complete the upgrade.
The Manager is now upgraded to version 4.3.

9.11.1. Completing the remote Data Warehouse database upgrade

Complete these additional steps when upgrading a remote Data Warehouse database from PostgreSQL 9.5 to 10.

Procedure

1. The ovirt-engine-dwhd service is now running on the Manager machine. If the ovirt-engine-dwhd service is on a remote machine, stop and disable the ovirt-engine-dwhd service on the Manager machine, and remove the configuration files that engine-setup created:

   ```bash
   # systemctl stop ovirt-engine-dwhd
   # systemctl disable ovirt-engine-dwhd
   # rm -f /etc/ovirt-engine-dwh/ovirt-engine-dwhd.conf.d/*
   ```

2. Repeat the steps in Section 9.11, “Upgrading the Manager from 4.2 to 4.3” on the machine hosting the ovirt-engine-dwhd service.

You can now change the cluster compatibility version to 4.3.

9.12. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

Procedure

1. In the Administration Portal, click Compute → Clusters.

2. Select the cluster to change and click Edit.

3. On the General tab, change the Compatibility Version to the desired value.


5. Click OK to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.
9.13. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (⚠️).

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure

1. In the Administration Portal, click **Compute → Virtual Machines**.

2. Check which virtual machines require a reboot. In the **Vms**: search bar, enter the following query:

   ```
   next_run_config_exists=True
   ```

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click **Reboot**.

When the virtual machine starts, the new compatibility version is automatically applied.

**NOTE**

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

You can now change the data center compatibility version to 4.3.

9.14. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click **Compute → Data Centers**.

2. Select the data center to change and click **Edit**.

3. Change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.
9.15. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- Prevent warning messages from appearing in your browser when connecting to the Administration Portal. These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

- Replace the SHA-1 certificates throughout the system with SHA-256 certificates.

Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.

2. Check whether /etc/pki/ovirt-engine/openssl.conf includes the line default_md = sha256:

   ```bash
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes default_md = sha1, back up the existing configuration and change the default to sha256:

   ```bash
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf.$(date +"%Y%m%d%H%M%S")
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Define the certificate that should be re-signed:

   ```bash
   # names="apache"
   ```

4. On the Manager, re-sign the Apache certificate:

   ```bash
   for name in $names; do
       subject="$(
             openssl \ 
             x509 \ 
             -in /etc/pki/ovirt-engine/certs/${name}.cer \ 
             -noout \ 
             -subject \ 
             | sed \ 
             's;subject= \(.*\);1;'
           )"
       /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \ 
       --name="${name}" \ 
       --password=mypass \ 
       --subject="${subject}" 
   ```
5. Restart the httpd service:

```bash
# systemctl restart httpd
```

6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority's certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

```bash
# cat /etc/pki/ovirt-engine/openssl.conf
```

If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

```bash
# cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +%Y%m%d%H%M%S")"
# sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
```

3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

```bash
# cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +%Y%m%d%H%M%S")"
# openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
```

4. Replace the existing certificate with the new certificate:

```bash
# mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
```

5. Define the certificates that should be re-signed:

```bash
# names="engine apache websocket-proxy jboss imageio-proxy"
```

If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

```bash
# names="engine websocket-proxy jboss imageio-proxy"
```
6. On the Manager, re-sign the certificates:

   for name in $names; do
     subject="${name}"
     openssl x509 -in /etc/pki/ovirt-engine/certs/"${name}".cer
     -noout -subject | sed 's;subject= \([^;]*\);1;'
     /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh
       --name="${name}" \
       --password=mypass \
       --subject="${subject}" \
       --san=DNS:"${ENGINE_FQDN}" \
       --keep-key
   done

7. Restart the following services:

   # systemctl restart httpd
   # systemctl restart ovirt-engine
   # systemctl restart ovirt-websocket-proxy
   # systemctl restart ovirt-imageio-proxy

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.

    a. In the Administration Portal, click **Compute → Hosts**.
    
    b. Select the host and click **Management → Maintenance**.
    
    c. Once the host is in maintenance mode, click **Installation → Enroll Certificate**.
    
    d. Click **Management → Activate**.
CHAPTER 10. UPGRADING A REMOTE DATABASE ENVIRONMENT FROM 4.1 TO RED HAT VIRTUALIZATION 4.3

Upgrading your environment from 4.1 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories
2. Upgrade the database from PostgreSQL 9.2 to 9.5
3. Update the 4.1 Manager to the latest version of 4.1
4. Upgrade the Manager from 4.1 to 4.2
5. Upgrade the database from PostgreSQL 9.5 to 10.0
6. Upgrade the Manager from 4.2 to 4.3
7. Update the hosts
8. Update the compatibility version of the clusters
9. Reboot any running or suspended virtual machines to update their configuration
10. Update the compatibility version of the data centers
11. Replace SHA-1 certificates with SHA-256 certificates

10.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters' compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.

- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.

- Ensure the Manager has the correct repositories enabled. For the list of required repositories, see Subscribing to the Required Entitlements for Red Hat Virtualization 4.1.

10.2. UPGRADING REMOTE DATABASES FROM POSTGRESQL 9.2 TO 9.5

Red Hat Virtualization 4.2 uses PostgreSQL 9.5 instead of PostgreSQL 9.2. If your databases are installed locally, the upgrade script will automatically upgrade them from version 9.2 to 9.5. However, if either of your databases (Manager or Data Warehouse) is installed on a separate machine, you must perform the following procedure on each remote database before upgrading the Manager.

1. Stop the service running on the machine:
   - When upgrading the Manager database, stop the ovirt-engine service on the Manager machine.
macrine:

- When upgrading the Data Warehouse database, stop the `ovirt-engine-dwhd` service on the Data Warehouse machine:

```
# systemctl stop ovirt-engine-dwhd
```

2. Enable the required repository to receive the PostgreSQL 9.5 package:

   Enable either the Red Hat Virtualization Manager repository:

```
# subscription-manager repos --enable=rhel-7-server-rhv-4.2-manager-rpms
```

   or the SCL repository:

```
# subscription-manager repos --enable rhel-server-rhscl-7-rpms
```

3. Install the PostgreSQL 9.5 packages:

```
# yum install rh-postgresql95 rh-postgresql95-postgresql-contrib
```

4. Stop and disable the PostgreSQL 9.2 service:

```
# systemctl stop postgresql
# systemctl disable postgresql
```

5. Upgrade the PostgreSQL 9.2 database to PostgreSQL 9.5:

```
# scl enable rh-postgresql95 -- postgresql-setup upgrade
```

6. Start and enable the `rh-postgresql95-postgresql.service` and check that it is running:

```
# systemctl start rh-postgresql95-postgresql.service
# systemctl enable rh-postgresql95-postgresql.service
# systemctl status rh-postgresql95-postgresql.service
```

   Ensure that you see an output similar to the following:

```
rh-postgresql95-postgresql.service - PostgreSQL database server
Loaded: loaded (/usr/lib/systemd/system/rh-postgresql95-postgresql.service; enabled; vendor preset: disabled)
Active: active (running) since Mon 2018-05-07 08:48:27 CEST; 1h 59min ago
```

7. Log in to the database and enable the `uuid-ossp` extension:

```
# su - postgres -c "scl enable rh-postgresql95 -- psql -d database-name"
```

8. Execute the following SQL commands:

```
# database-name=# DROP FUNCTION IF EXISTS uuid_generate_v1();
# database-name=# CREATE EXTENSION "uuid-ossp";
```
9. Copy the `pg_hba.conf` client configuration file from the 9.2 environment to your 9.5 environment:

   ```bash
   # cp -p /var/lib/pgsql/data/pg_hba.conf /var/opt/rh/rh-postgresql95/lib/pgsql/data/pg_hba.conf
   ```

10. Update the following parameters in `/var/opt/rh/rh-postgresql95/lib/pgsql/data/postgresql.conf`:

   ```bash
   listen_addresses='***
   autovacuum_vacuum_scale_factor = 0.01
   autovacuum_analyze_scale_factor = 0.075
   autovacuum_max_workers = 6
   maintenance_work_mem = 65536
   max_connections = 150
   work_mem = 8192
   ```

11. Restart the PostgreSQL 9.5 service to apply the configuration changes:

   ```bash
   # systemctl restart rh-postgresql95-postgresql.service
   ```

12. Start the `ovirt-engine-dwhd` service:

   ```bash
   # systemctl start ovirt-engine-dwhd
   ```

   You can now update the Manager to the latest version of 4.1.

### 10.3. UPDATING THE RED HAT VIRTUALIZATION MANAGER

**WARNING**

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

**Procedure**

1. Log in to the Manager machine.

2. Check if updated packages are available:

   ```bash
   # engine-upgrade-check
   ```

3. Update the setup packages:

   ```bash
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```
4. Update the Red Hat Virtualization Manager with the `engine-setup` script. The `engine-setup` script prompts you with some configuration questions, then stops the `ovirt-engine` service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the `ovirt-engine` service.

   ```
   # engine-setup
   ```

   When the script completes successfully, the following message appears:

   Execution of setup completed successfully

   **NOTE**
   The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.

   **IMPORTANT**
   The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:

   ```
   # yum update
   ```

   **IMPORTANT**
   If any kernel packages were updated, reboot the machine to complete the update.

You can now upgrade the Manager to 4.2.

### 10.4. UPGRADING THE MANAGER FROM 4.1 TO 4.2

Upgrade the Red Hat Virtualization Manager from 4.1 to 4.2.

**IMPORTANT**
If the upgrade fails, the `engine-setup` command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version’s repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

**Procedure**

1. Log in to the Manager machine.
2. Enable the Red Hat Virtualization 4.2 repositories:

```
# subscription-manager repos \
--enable=rhel-7-server-rhv-4.2-manager-rpms \
--enable=rhel-7-server-rhv-4.2-manager-tools-rpms \
--enable=jb-eap-7-for-rhel-7-server-rpms \
--enable=rhel-7-server-ansible-2.9-rpms
```

All other repositories remain the same across Red Hat Virtualization releases.

3. Update the setup packages:

```
# yum update ovirt\*setup\* rh\*vm-setup-plugins
```

4. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

```
# engine-setup
```

**NOTE**

If you changed the default trust keystore password, you might get a keystore certificate error. If so, update the configuration to reflect the correct password. For more information, see *RHV 4.2 - Failed to import provider certificate into the external provider keystore*

5. Disable the Red Hat Virtualization 4.1 repositories to ensure the system does not use any 4.1 packages:

```
# subscription-manager repos \
--disable=rhel-7-server-rhv-4.1-rpms \
--disable=rhel-7-server-rhv-4.1-manager-rpms \
--disable=rhel-7-server-rhv-4-tools-rpms \
--disable=jb-eap-7.0-for-rhel-7-server-rpms \
--disable=jb-eap-7.1-for-rhel-7-server-rpms
```

6. Update the base operating system:

```
# yum update
```

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

### 10.5. UPGRADING REMOTE DATABASES FROM POSTGRESQL 9.5 TO 10

Red Hat Virtualization 4.3 uses PostgreSQL 10 instead of PostgreSQL 9.5. If your databases are installed locally, the upgrade script automatically upgrades them from version 9.5 to 10. However, if either of your databases (Manager or Data Warehouse) is installed on a separate machine, you must perform the following procedure on each remote database before upgrading the Manager.
1. Stop the service running on the machine:
   - When upgrading the Manager database, stop the `ovirt-engine` service on the Manager machine:
     
     ```bash
     # systemctl stop ovirt-engine
     ```
   - When upgrading the Data Warehouse database, stop the `ovirt-engine-dwhd` service on the Data Warehouse machine:
     
     ```bash
     # systemctl stop ovirt-engine-dwhd
     ```

2. Enable the required repository to receive the PostgreSQL 10 package:
   Enable either the Red Hat Virtualization Manager repository:
     
     ```bash
     # subscription-manager repos --enable=rhel-7-server-rhv-4.3-manager-rpms
     ```
   or the SCL repository:
     
     ```bash
     # subscription-manager repos --enable rhel-server-rhscl-7-rpms
     ```

3. Install the PostgreSQL 10 packages:

   ```bash
   # yum install rh-postgresql10 rh-postgresql10-postgresql-contrib
   ```

4. Stop and disable the PostgreSQL 9.5 service:

   ```bash
   # systemctl stop rh-postgresql95-postgresql
   # systemctl disable rh-postgresql95-postgresql
   ```

5. Upgrade the PostgreSQL 9.5 database to PostgreSQL 10:

   ```bash
   # scl enable rh-postgresql10 -- postgresql-setup --upgrade-from=rh-postgresql95-postgresql --upgrade
   ```

6. Start and enable the `rh-postgresql10-postgresql.service` and check that it is running:

   ```bash
   # systemctl start rh-postgresql10-postgresql.service
   # systemctl enable rh-postgresql10-postgresql.service
   # systemctl status rh-postgresql10-postgresql.service
   ```

   Ensure that you see output similar to the following:

   ```text
   rh-postgresql10-postgresql.service - PostgreSQL database server
   Loaded: loaded (/usr/lib/systemd/system/rh-postgresql10-postgresql.service;
   enabled; vendor preset: disabled)
   Active: active (running) since ...
   ```

7. Copy the `pg_hba.conf` client configuration file from the PostgreSQL 9.5 environment to the PostgreSQL 10 environment:
8. Update the following parameters in `/var/opt/rh/rh-postgresql10/lib/pgsql/data/postgresql.conf`:

```bash
listen_addresses='**'
autovacuum_vacuum_scale_factor=0.01
autovacuum_analyze_scale_factor=0.075
autovacuum_max_workers=6
maintenance_work_mem=65536
max_connections=150
work_mem = 8192
```

9. Restart the PostgreSQL 10 service to apply the configuration changes:

```
# systemctl restart rh-postgresql10-postgresql.service
```

You can now upgrade the Manager to 4.3.

### 10.6. UPGRADING THE MANAGER FROM 4.2 TO 4.3

Follow these same steps when upgrading any of the following:

- the Red Hat Virtualization Manager
- a remote machine with the Data Warehouse service

You need to be logged into the machine that you are upgrading.

**IMPORTANT**

If the upgrade fails, the `engine-setup` command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the `engine-setup` script explains how to restore your installation.

**Procedure**

1. Enable the Red Hat Virtualization 4.3 repositories:

```
# subscription-manager repos \
   --enable=rhel-7-server-rhv-4.3-manager-rpms \
   --enable=jb-eap-7.2-for-rhel-7-server-rpms
```

   All other repositories remain the same across Red Hat Virtualization releases.

2. Update the setup packages:

```
# yum update ovirt*setup rhvm-setup-plugins
```

3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager, the remote database or remote service:
NOTE

During the upgrade process for the Manager, the `engine-setup` script might prompt you to disconnect the remote Data Warehouse database. You must disconnect it to continue the setup.

When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:

```
# subscription-manager repos \
   --disable=rhel-7-server-rhv-4.2-manager-rpms \
   --disable=jb-eap-7-for-rhel-7-server-rpms
```

5. Update the base operating system:

```
# yum update
```

IMPORTANT

If any kernel packages were updated, reboot the machine to complete the upgrade.

The Manager is now upgraded to version 4.3.

### 10.6.1. Completing the remote Data Warehouse database upgrade

Complete these additional steps when upgrading a remote Data Warehouse database from PostgreSQL 9.5 to 10.

**Procedure**

1. The `ovirt-engine-dwhd` service is now running on the Manager machine. If the `ovirt-engine-dwhd` service is on a remote machine, stop and disable the `ovirt-engine-dwhd` service on the Manager machine, and remove the configuration files that `engine-setup` created:

```
# systemctl stop ovirt-engine-dwhd
# systemctl disable ovirt-engine-dwhd
# rm -f /etc/ovirt-engine-dwh/ovirt-engine-dwhd.conf.d/*
```

2. Repeat the steps in Section 10.6, “Upgrading the Manager from 4.2 to 4.3” on the machine hosting the `ovirt-engine-dwhd` service.

You can now update the hosts.

### 10.7. UPDATING ALL HOSTS IN A CLUSTER
You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful during upgrades to new versions of Red Hat Virtualization. See https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

**Limitations**

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.
- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.
- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.
- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.
- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters** and select the cluster.
2. Click **Upgrade**.
3. Select the hosts to update, then click **Next**.
4. Configure the options:
   - **Stop Pinned VMs** shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.
   - **Upgrade Timeout (Minutes)** sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is **60**. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where the hosts update quickly.
   - **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.
   - **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.
   - **Use Maintenance Policy** sets the cluster’s scheduling policy to `cluster_maintenance`. 
during the update. It is selected by default, so activity is limited and virtual machines cannot start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click **Next**.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click **Upgrade**.

You can track the progress of host updates in the **Compute → Hosts** view, and in the **Events** section of the **Notification Drawer** ( ).

You can track the progress of individual virtual machine migrations in the **Status** column of the **Compute → Virtual Machines** view. In large environments, you may need to filter the results to show a particular group of virtual machines.

### 10.8. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.

2. Select the cluster to change and click **Edit**.

3. On the **General** tab, change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The **Edit Virtual Machine** window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

### 10.9. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY
After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (⚠️). Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure

1. In the Administration Portal, click **Compute → Virtual Machines**.
2. Check which virtual machines require a reboot. In the **Vms** search bar, enter the following query:

   ```
   next_run_config_exists=True
   ```

   The search results show all virtual machines with pending changes.
3. Select each virtual machine and click **Reboot**.

When the virtual machine starts, the new compatibility version is automatically applied.

NOTE

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

10.10. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

IMPORTANT

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click **Compute → Data Centers**.
2. Select the data center to change and click **Edit**.
3. Change the **Compatibility Version** to the desired value.
4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.
5. Click **OK** to confirm.

10.11. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES
Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- **Prevent warning messages from appearing in your browser when connecting to the Administration Portal.** These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

- **Replace the SHA-1 certificates throughout the system with SHA-256 certificates.**

**Preventing Warning Messages from Appearing in the Browser**

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Define the certificate that should be re-signed:

   ```
   # names="apache"
   ```

4. On the Manager, re-sign the Apache certificate:

   ```
   for name in $names; do
   subject="$(
   openssl \n   x509 \n   -in /etc/pki/ovirt-engine/certs/"${name}".cer \n   -noout \n   -subject \n   | sed \n   's;subject= (.*)\1;1;"
   )"
   /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \n   --name="${name}" \n   --password=mypass \n   --subject="${subject}" \n   --san=DNS:"${ENGINE_FQDN}" \n   --keep-key
   done
   ```

5. Restart the `httpd` service:
6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether /etc/pki/ovirt-engine/openssl.conf includes the line default_md = sha256:

   ```bash
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes default_md = sha1, back up the existing configuration and change the default to sha256:

   ```bash
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +%Y%m%d%H%M%S)"
   # sed -i '/^default_md = sha1/ s/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Re-sign the CA certificate by backing it up and creating a new certificate in ca.pem.new:

   ```bash
   # cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +%Y%m%d%H%M%S)"
   # openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
   ```

4. Replace the existing certificate with the new certificate:

   ```bash
   # mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
   ```

5. Define the certificates that should be re-signed:

   ```bash
   # names="engine apache websocket-proxy jboss imageio-proxy"
   ```

   If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

   ```bash
   # names="engine websocket-proxy jboss imageio-proxy"
   ```

   For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. On the Manager, re-sign the certificates:

   ```bash
   for name in $names; do
     subject="$name"
     ```
openssl \
  x509 \
  -in /etc/pki/ovirt-engine/certs/"${name}".cer \
  -noout \
  -subject \
  | sed \
  's;subject= \(.*\);1;1;'
)"
/usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
  --name="${name}" \
  --password=mypass \
  --subject="${subject}" \
  --san=DNS::"$ENGINE_FQDN" \
  --keep-key
done

7. Restart the following services:

# systemctl restart httpd
# systemctl restart ovirt-engine
# systemctl restart ovirt-websocket-proxy
# systemctl restart ovirt-imageio-proxy

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.

   a. In the Administration Portal, click Compute → Hosts.

   b. Select the host and click Management → Maintenance.

   c. Once the host is in maintenance mode, click Installation → Enroll Certificate.

   d. Click Management → Activate.

10.12. UPDATING OVN PROVIDERS INSTALLED IN RED HAT VIRTUALIZATION 4.1

If you installed an Open Virtual Network (OVN) provider in Red Hat Virtualization 4.1, you must manually edit its configuration for Red Hat Virtualization 4.2.

Procedure

1. Click Administration → Providers and select the OVN provider.

2. Click Edit.
3. Click the Networking Plugin text field and select oVirt Network Provider for OVN from the drop-down list.

4. Click OK.
CHAPTER 11. UPGRAADING A REMOTE DATABASE ENVIRONMENT FROM 4.2 TO RED HAT VIRTUALIZATION 4.3

Upgrading your environment from 4.2 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories.
2. Use the Log Collection Analysis tool to check for issues that might prevent a successful upgrade.
3. Update the 4.2 Manager to the latest version of 4.2.
4. Upgrade the database from PostgreSQL 9.5 to 10.0.
5. Upgrade the Manager from 4.2 to 4.3.
6. Update the hosts.
7. Update the compatibility version of the clusters.
8. Reboot any running or suspended virtual machines to update their configuration.
9. Update the compatibility version of the data centers.
10. If you previously upgraded to 4.2 without replacing SHA-1 certificates with SHA-256 certificates, you must replace the certificates now.

11.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters’ compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.

- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.

- Ensure the Manager has the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Manager Repositories for Red Hat Virtualization 4.2.

11.2. ANALYZING THE ENVIRONMENT

Red Hat recommends running the Log Collection Analysis tool prior to performing updates and for troubleshooting. The tool analyzes your environment for known issues that might prevent you from performing an update, and provides recommendations to resolve them.

The tool gathers detailed information about your system and presents it as an HTML file.

NOTE

The Log Collection Analysis tool is available from Red Hat Virtualization 4.2.5.
Procedure

1. Install the Log Collection Analysis tool on the Manager:

   ```
   # yum install rhv-log-collector-analyzer
   ```

2. Run the tool:

   ```
   # rhv-log-collector-analyzer --live
   ```

   A detailed report is displayed.

   By default, the report is saved to a file called `analyzer_report.html`.

   To save the file to a specific location, use the `--html` flag and specify the location:

   ```
   # rhv-log-collector-analyzer --live --html=/directory/filename.html
   ```

3. Use the ELinks text mode web browser to read the analyzer reports. To install the ELinks browser:

   ```
   # yum install -y elinks
   ```

4. Launch ELinks and open `analyzer_report.html`.

   ```
   # elinks /home/user1/analyzer_report.html
   ```

   To navigate the report, use the following commands in ELinks:
   - **Insert** to scroll up
   - **Delete** to scroll down
   - **PageUp** to page up
   - **PageDown** to page down
   - **Left Bracket** to scroll left
   - **Right Bracket** to scroll right

You can now update the Manager to the latest version of 4.2.

### 11.3. UPDATING THE RED HAT VIRTUALIZATION MANAGER

**WARNING**

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.
Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

**Procedure**

1. Log in to the Manager machine.

2. Check if updated packages are available:
   
   ```
   # engine-upgrade-check
   ```

3. Update the setup packages:
   
   ```
   # yum update ovirt*setup* rh*vm-setup-plugins
   ```

4. Update the Red Hat Virtualization Manager with the `engine-setup` script. The `engine-setup` script prompts you with some configuration questions, then stops the `ovirt-engine` service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the `ovirt-engine` service.

   ```
   # engine-setup
   ```

   When the script completes successfully, the following message appears:

   Execution of setup completed successfully

   **NOTE**

   The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.

   **IMPORTANT**

   The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:

   ```
   # yum update
   ```

   **IMPORTANT**

   If any kernel packages were updated, reboot the machine to complete the update.
11.4. UPGRADING REMOTE DATABASES FROM POSTGRESQL 9.5 TO 10

Red Hat Virtualization 4.3 uses PostgreSQL 10 instead of PostgreSQL 9.5. If your databases are installed locally, the upgrade script automatically upgrades them from version 9.5 to 10. However, if either of your databases (Manager or Data Warehouse) is installed on a separate machine, you must perform the following procedure on each remote database before upgrading the Manager.

1. Stop the service running on the machine:
   - When upgrading the Manager database, stop the `ovirt-engine` service on the Manager machine:
     ```
     # systemctl stop ovirt-engine
     ```
   - When upgrading the Data Warehouse database, stop the `ovirt-engine-dwhd` service on the Data Warehouse machine:
     ```
     # systemctl stop ovirt-engine-dwhd
     ```

2. Enable the required repository to receive the PostgreSQL 10 package:
   - Enable either the Red Hat Virtualization Manager repository:
     ```
     # subscription-manager repos --enable=rhel-7-server-rhv-4.3-manager-rpms
     ```
   - or the SCL repository:
     ```
     # subscription-manager repos --enable rhel-server-rhscl-7-rpms
     ```

3. Install the PostgreSQL 10 packages:
   ```
   # yum install rh-postgresql10 rh-postgresql10-postgresql-contrib
   ```

4. Stop and disable the PostgreSQL 9.5 service:
   ```
   # systemctl stop rh-postgresql95-postgresql
   # systemctl disable rh-postgresql95-postgresql
   ```

5. Upgrade the PostgreSQL 9.5 database to PostgreSQL 10:
   ```
   # scl enable rh-postgresql10 -- postgresql-setup --upgrade-from=rh-postgresql95-postgresql --upgrade
   ```

6. Start and enable the `rh-postgresql10-postgresql.service` and check that it is running:
   ```
   # systemctl start rh-postgresql10-postgresql.service
   # systemctl enable rh-postgresql10-postgresql.service
   # systemctl status rh-postgresql10-postgresql.service
   ```
   Ensure that you see output similar to the following:
   ```
   rh-postgresql10-postgresql.service - PostgreSQL database server
   ```
7. Copy the `pg_hba.conf` client configuration file from the PostgreSQL 9.5 environment to the PostgreSQL 10 environment:

```bash
```

8. Update the following parameters in `/var/opt/rh/rh-postgresql10/lib/pgsql/data/postgresql.conf`:

```plaintext
listen_addresses='*'  
autovacuum_vacuum_scale_factor=0.01  
autovacuum_analyze_scale_factor=0.075  
autovacuum_max_workers=6  
maintenance_work_mem=65536  
max_connections=150  
work_mem = 8192
```

9. Restart the PostgreSQL 10 service to apply the configuration changes:

```bash
# systemctl restart rh-postgresql10-postgresql.service
```

You can now upgrade the Manager to 4.3.

### 11.5. UPGRADING THE MANAGER FROM 4.2 TO 4.3

Follow these same steps when upgrading any of the following:

- the Red Hat Virtualization Manager
- a remote machine with the Data Warehouse service

You need to be logged into the machine that you are upgrading.

**IMPORTANT**

If the upgrade fails, the `engine-setup` command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the `engine-setup` script explains how to restore your installation.

**Procedure**

1. Enable the Red Hat Virtualization 4.3 repositories:

```bash
# subscription-manager repos \
--enable=rhel-7-server-rhv-4.3-manager-rpms \ 
--enable=jb-eap-7.2-for-rhel-7-server-rpms
```

All other repositories remain the same across Red Hat Virtualization releases.
2. Update the setup packages:

```bash
# yum update ovirt\*setup\* rh\*vm-setup-plugins
```

3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager, the remote database or remote service:

```bash
# engine-setup
```

**NOTE**

During the upgrade process for the Manager, the `engine-setup` script might prompt you to disconnect the remote Data Warehouse database. You must disconnect it to continue the setup.

When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:

```bash
# subscription-manager repos \
--disable=rhel-7-server-rhv-4.2-manager-rpms \
--disable=jb-eap-7-for-rhel-7-server-rpms
```

5. Update the base operating system:

```bash
# yum update
```

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

The Manager is now upgraded to version 4.3.

### 11.5.1. Completing the remote Data Warehouse database upgrade

Complete these additional steps when upgrading a remote Data Warehouse database from PostgreSQL 9.5 to 10.

**Procedure**

1. The `ovirt-engine-dwhd` service is now running on the Manager machine. If the `ovirt-engine-dwhd` service is on a remote machine, stop and disable the `ovirt-engine-dwhd` service on the Manager machine, and remove the configuration files that `engine-setup` created:

```bash
# systemctl stop ovirt-engine-dwhd
# systemctl disable ovirt-engine-dwhd
# rm -f /etc/ovirt-engine-dwh/ovirt-engine-dwhd.conf.d/*
```
2. Repeat the steps in Section 11.5, “Upgrading the Manager from 4.2 to 4.3” on the machine hosting the `ovirt-engine-dwhd` service.

You can now update the hosts.

11.6. UPDATING ALL HOSTS IN A CLUSTER

You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful during upgrades to new versions of Red Hat Virtualization. See https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

Limitations

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.
- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.
- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.
- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.
- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.

Procedure

1. In the Administration Portal, click **Compute → Clusters** and select the cluster.
2. Click **Upgrade**.
3. Select the hosts to update, then click **Next**.
4. Configure the options:
   - **Stop Pinned VMs** shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.
   - **Upgrade Timeout (Minutes)** sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is **60**. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where the hosts update quickly.
   - **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent
updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.

- **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.

- **Use Maintenance Policy** sets the cluster’s scheduling policy to `cluster_maintenance` during the update. It is selected by default, so activity is limited and virtual machines cannot start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click **Next**.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click **Upgrade**.

You can track the progress of host updates in the **Compute → Hosts** view, and in the **Events** section of the **Notification Drawer** (🔔).

You can track the progress of individual virtual machine migrations in the **Status** column of the **Compute → Virtual Machines** view. In large environments, you may need to filter the results to show a particular group of virtual machines.

### 11.7. Changing the Cluster Compatibility Version

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.

2. Select the cluster to change and click **Edit**.

3. On the **General** tab, change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.
IMPORTANT

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

11.8. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (Longrightarrow). Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure

1. In the Administration Portal, click Compute → Virtual Machines.
2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:
   ```
   next_run_config_exists=True
   ```
   The search results show all virtual machines with pending changes.
3. Select each virtual machine and click Reboot.

When the virtual machine starts, the new compatibility version is automatically applied.

NOTE

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

11.9. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

IMPORTANT

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click Compute → Data Centers.
Select the data center to change and click **Edit**.

Change the **Compatibility Version** to the desired value.

Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.

Click **OK** to confirm.

If you previously upgraded to 4.2 without replacing SHA-1 certificates with SHA-256 certificates, you must do so now.

### 11.10. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- *Prevent warning messages from appearing in your browser when connecting to the Administration Portal.* These warnings may either appear as pop-up windows or in the browser’s **Web Console** window. This option is not required if you already replaced the Red Hat Virtualization Manager's Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see **Replacing the Red Hat Virtualization Manager CA Certificate** in the **Administration Guide**.

- **Replace the SHA-1 certificates throughout the system with SHA-256 certificates.**

**Preventing Warning Messages from Appearing in the Browser**

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```bash
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```bash
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf.$(date +"%Y%m%d%H%M%S")
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Define the certificate that should be re-signed:

   ```bash
   # names="apache"
   ```

4. On the Manager, re-sign the Apache certificate:

   ```bash
   for name in $names; do
       subject="$(
           openssl \
           x509 \
           -in /etc/pki/ovirt-engine/certs"$\{name\}".cer \
           -noout \
           -subject \
           openssl \
           x509 \
           -in /etc/pki/ovirt-engine/certs"$\{name\}".cer \
           -noout \
           -subject \
       )
       openssl x509 -set_serial -new_serial -out /etc/pki/ovirt-engine/certs"$\{name\}".cer \
   done
   ```
5. Restart the **httpd** service:

```
# systemctl restart httpd
```

6. Connect to the Administration Portal to confirm that the warning no longer appears.

7. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to `http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

### Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

```
# cat /etc/pki/ovirt-engine/openssl.conf
```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to **sha256**:

   ```
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Re-sign the CA certificate by backing it up and creating a new certificate in **ca.pem.new**:

   ```
   # cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +"%Y%m%d%H%M%S")"
   # openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
   ```

4. Replace the existing certificate with the new certificate:

   ```
   # mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
   ```

5. Define the certificates that should be re-signed:

   ```
   # names="engine apache websocket-proxy jboss imageio-proxy"
   ```
If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

```
# names="engine websocket-proxy jboss imageio-proxy"
```

For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. On the Manager, re-sign the certificates:

```
for name in $names; do
  subject="$(
    openssl \
      x509 \
      -in /etc/pki/ovirt-engine/certs"${name}".cer \
      -noout \
      -subject \
      | sed \
      's;subject= (.*);1;"
    )"
  /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
    --name="${name}" \
    --password=mypass \
    --subject="${subject}" \
    --san=DNS:"${ENGINE_FQDN}" \
    --keep-key
done
```

7. Restart the following services:

```
# systemctl restart httpd
# systemctl restart ovirt-engine
# systemctl restart ovirt-websocket-proxy
# systemctl restart ovirt-imageio-proxy
```

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority's certificate, navigate to `http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

10. Enroll the certificates on the hosts. Repeat the following procedure for each host.

   a. In the Administration Portal, click Compute → Hosts.
   
   b. Select the host and click Management → Maintenance.
   
   c. Once the host is in maintenance mode, click Installation → Enroll Certificate.
   
   d. Click Management → Activate.
PART IV. UPGRADING A SELF-HOSTED ENGINE ENVIRONMENT MANUALLY
CHAPTER 12. UPGRADING A SELF-HOSTED ENGINE FROM 4.0 TO RED HAT VIRTUALIZATION 4.3

The 4.0 compatibility version is not supported after Red Hat Virtualization 4.2. Therefore, when upgrading from Red Hat Virtualization 4.0 you must update the cluster and data center compatibility versions to at least 4.1 before upgrading the Manager from 4.2 to 4.3, then update the compatibility versions again after completing the Manager upgrades.

You must also update the hosts before updating the compatibility versions, but only need to do so once. The host repositories stay the same across Red Hat Virtualization versions, so the hosts will already be upgraded to the latest version after a single update.

Upgrading your environment from 4.0 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories
2. Place the environment in global maintenance mode
3. Update the 4.0 Manager to the latest version of 4.0
4. Upgrade the Manager from 4.0 to 4.1
5. Upgrade the Manager from 4.1 to 4.2
6. Disable global maintenance mode
7. Update the hosts
8. Update the compatibility version of the clusters to 4.2
9. Reboot any running or suspended virtual machines to update their configuration to 4.2
10. Update the compatibility version of the data centers to 4.2
11. Place the environment in global maintenance mode
12. Upgrade the Manager from 4.2 to 4.3
13. Disable global maintenance mode
14. Update the compatibility version of the clusters
15. Reboot any running or suspended virtual machines to update their configuration to the latest version
16. Update the compatibility version of the data centers
17. Replace SHA-1 certificates with SHA-256 certificates

12.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters’ compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.
12.2. ENABLING GLOBAL MAINTENANCE MODE

You must place the self-hosted engine environment in global maintenance mode before performing any setup or upgrade tasks on the Manager virtual machine.

Procedure

1. Log in to one of the self-hosted engine nodes and enable global maintenance mode:

```bash
# hosted-engine --set-maintenance --mode=global
```

2. Confirm that the environment is in maintenance mode before proceeding:

```bash
# hosted-engine --vm-status
```

You should see a message indicating that the cluster is in maintenance mode.

12.3. UPDATING THE RED HAT VIRTUALIZATION MANAGER

WARNING

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

Procedure

1. Log in to the Manager virtual machine.

2. Check if updated packages are available:

```bash
# engine-upgrade-check
```

3. Update the setup packages:

```bash
# yum update ovirt\*setup\* rh\*vm-setup-plugins
```
4. Update the Red Hat Virtualization Manager with the `engine-setup` script. The `engine-setup` script prompts you with some configuration questions, then stops the `ovirt-engine` service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the `ovirt-engine` service.

```
# engine-setup
```

When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```

**NOTE**

The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.

**IMPORTANT**

The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:

```
# yum update
```

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the update.

### 12.4. UPGRADING THE MANAGER FROM 4.0 TO 4.1

Upgrade the Red Hat Virtualization Manager from 4.0 to 4.1.

**IMPORTANT**

If the upgrade fails, the `engine-setup` command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version’s repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

**Procedure**

1. Log in to the Manager virtual machine.

2. Enable the Red Hat Virtualization 4.1 repositories:
# subscription-manager repos 
   --enable=rhel-7-server-rhv-4.1-rpms 
   --enable=rhel-7-server-rhv-4-tools-rpms 
   --enable=jb-eap-7.1-for-rhel-7-server-rpms

All other repositories remain the same across Red Hat Virtualization releases.

3. Update the setup packages:

   # yum update ovirt*setup* rh*vm-setup-plugins

4. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

   # engine-setup

5. Disable the Red Hat Virtualization 4.0 repositories to ensure the system does not use any 4.0 packages:

   # subscription-manager repos 
   --disable=rhel-7-server-rhv-4.0-rpms 
   --disable=jb-eap-7-for-rhel-7-server-rpms 
   --disable=jb-eap-7.0-for-rhel-7-server-rpms

6. Update the base operating system:

   # yum update

   **IMPORTANT**
   If any kernel packages were updated, reboot the machine to complete the upgrade.

### 12.5. UPGRADING THE MANAGER FROM 4.1 TO 4.2

Upgrade the Red Hat Virtualization Manager from 4.1 to 4.2.

**IMPORTANT**
If the upgrade fails, the `engine-setup` command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version’s repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

**Procedure**

1. Log in to the Manager virtual machine.

2. Enable the Red Hat Virtualization 4.2 repositories:

   # subscription-manager repos 
   --enable=rhel-7-server-rhv-4.2-manager-rpms 
   --enable=rhel-7-server-rhv-4-manager-tools-rpms 

3. Update the setup packages:

   ```
   # yum update ovirt"setup" rh\vm-setup-plugins
   ```

4. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

   ```
   # engine-setup
   ```

   **NOTE**

   If you changed the default trust keystore password, you might get a keystore certificate error. If so, update the configuration to reflect the correct password. For more information, see `RHV 4.2 - Failed to import provider certificate into the external provider keystore`.

5. Disable the Red Hat Virtualization 4.1 repositories to ensure the system does not use any 4.1 packages:

   ```
   # subscription-manager repos
   --disable=rhel-7-server-rhv-4.1-rpms
   --disable=rhel-7-server-rhv-4.1-manager-rpms
   --disable=rhel-7-server-rhv-4-tools-rpms
   --disable=jb-eap-7.0-for-rhel-7-server-rpms
   --disable=jb-eap-7.1-for-rhel-7-server-rpms
   ```

6. Update the base operating system:

   ```
   # yum update
   ```

   **IMPORTANT**

   If any kernel packages were updated, reboot the machine to complete the upgrade.

### 12.6. Disabling Global Maintenance Mode

#### Procedure

1. Log in to the Manager virtual machine and shut it down.

2. Log in to one of the self-hosted engine nodes and disable global maintenance mode:

   ```
   # hosted-engine --set-maintenance --mode=none
   ```

   When you exit global maintenance mode, ovirt-ha-agent starts the Manager virtual machine, and then the Manager automatically starts. It can take up to ten minutes for the Manager to start.
3. Confirm that the environment is running:

```
# hosted-engine --vm-status
```

The listed information includes **Engine Status**. The value for **Engine status** should be:

```
{"health": "good", "vm": "up", "detail": "Up"}
```

**NOTE**

When the virtual machine is still booting and the Manager hasn’t started yet, the **Engine status** is:

```
{"reason": "bad vm status", "health": "bad", "vm": "up", "detail": "Powering up"}
```

If this happens, wait a few minutes and try again.

You must now update the hosts before you can update the cluster and data center compatibility versions. Update the self-hosted engine nodes first, and then any standard hosts. The procedure is the same for both host types.

### 12.7. UPDATING INDIVIDUAL HOSTS

Use the host upgrade manager to update individual hosts directly from the Administration Portal.

**NOTE**

The upgrade manager only checks hosts with a status of **Up** or **Non-operational**, but not **Maintenance**.

**Limitations**

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.

- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster. Update a host when its usage is relatively low.

- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.

- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.

- Do not update all hosts at the same time, as one host must remain available to perform Storage Pool Manager (SPM) tasks.

- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines must be shut down before updating the host.

**Procedure**
1. Ensure that the correct repositories are enabled. To view a list of currently enabled repositories, run `yum repolist`.
   - For Red Hat Virtualization Hosts:
     ```
     # subscription-manager repos --enable=rhel-7-server-rvh-4-rpms
     ```
   - For Red Hat Enterprise Linux hosts:
     ```
     # subscription-manager repos \ 
     --enable=rhel-7-server-rpms \ 
     --enable=rhel-7-server-rhv-4-mgmt-agent-rpms \ 
     --enable=rhel-7-server-ansible-2.9-rpms
     ```

2. In the Administration Portal, click **Compute → Hosts** and select the host to be updated.

3. Click **Installation → Check for Upgrade** and click **OK**.
   Open the **Notification Drawer** and expand the **Events** section to see the result.

4. If an update is available, click **Installation → Upgrade**.

5. Click **OK** to update the host. Running virtual machines are migrated according to their migration policy. If migration is disabled for any virtual machines, you are prompted to shut them down. The details of the host are updated in **Compute → Hosts** and the status transitions through these stages:

   Maintenance > Installing > Reboot > Up

   **NOTE**
   If the update fails, the host’s status changes to **Install Failed**. From **Install Failed** you can click **Installation → Upgrade** again.

Repeat this procedure for each host in the Red Hat Virtualization environment.

You can now change the cluster compatibility version to 4.2.

### 12.8. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

#### IMPORTANT

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.
2. Select the cluster to change and click Edit.

3. On the General tab, change the Compatibility Version to the desired value.


5. Click OK to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

### 12.9. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (△).

The Manager virtual machine does not need to be rebooted.

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

**Procedure**

1. In the Administration Portal, click Compute → Virtual Machines.

2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:

   ```
   next_run_config_exists=True
   ```

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click Reboot.

When the virtual machine starts, the new compatibility version is automatically applied.

**NOTE**

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

You can now change the data center compatibility version to 4.2.

### 12.10. CHANGING THE DATA CENTER COMPATIBILITY VERSION
Red Hat Virtualization data centers have a compatibility version. The compatibility version indicates the version of Red Hat Virtualization with which the data center is intended to be compatible. All clusters in the data center must support the desired compatibility level.

**IMPORTANT**

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

**Procedure**

1. In the Administration Portal, click **Compute → Data Centers**.
2. Select the data center to change and click **Edit**.
3. Change the **Compatibility Version** to the desired value.
4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.
5. Click **OK** to confirm.

### 12.11. ENABLING GLOBAL MAINTENANCE MODE

You must place the self-hosted engine environment in global maintenance mode before performing any setup or upgrade tasks on the Manager virtual machine.

**Procedure**

1. Log in to one of the self-hosted engine nodes and enable global maintenance mode:
   
   ```bash
   # hosted-engine --set-maintenance --mode=global
   ```

2. Confirm that the environment is in maintenance mode before proceeding:
   
   ```bash
   # hosted-engine --vm-status
   ```
   
   You should see a message indicating that the cluster is in maintenance mode.

### 12.12. UPGRADING THE MANAGER FROM 4.2 TO 4.3

You need to be logged into the machine that you are upgrading.

**IMPORTANT**

If the upgrade fails, the **engine-setup** command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the **engine-setup** script explains how to restore your installation.

**Procedure**

1. Enable the Red Hat Virtualization 4.3 repositories:
# subscription-manager repos \
   --enable=rhel-7-server-rhv-4.3-manager-rpms \ 
   --enable=jb-eap-7.2-for-rhel-7-server-rpms

All other repositories remain the same across Red Hat Virtualization releases.

2. Update the setup packages:

   # yum update ovirt\*setup\*\ rh\*vm-setup-plugins

3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

   # engine-setup

   When the script completes successfully, the following message appears:

   Execution of setup completed successfully

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:

   # subscription-manager repos \ 
   --disable=rhel-7-server-rhv-4.2-manager-rpms \ 
   --disable=jb-eap-7-for-rhel-7-server-rpms

5. Update the base operating system:

   # yum update

   **IMPORTANT**

   If any kernel packages were updated, reboot the machine to complete the upgrade.

The Manager is now upgraded to version 4.3.

12.13. DISABLING GLOBAL MAINTENANCE MODE

**Procedure**

1. Log in to the Manager virtual machine and shut it down.

2. Log in to one of the self-hosted engine nodes and disable global maintenance mode:

   # hosted-engine --set-maintenance --mode=none

   When you exit global maintenance mode, ovirt-ha-agent starts the Manager virtual machine, and then the Manager automatically starts. It can take up to ten minutes for the Manager to start.

3. Confirm that the environment is running:
# hosted-engine --vm-status

The listed information includes **Engine Status**. The value for **Engine status** should be:

```
{"health": "good", "vm": "up", "detail": "Up"}
```

**NOTE**

When the virtual machine is still booting and the Manager hasn’t started yet, the **Engine status** is:

```
{"reason": "bad vm status", "health": "bad", "vm": "up", "detail": "Powering up"}
```

If this happens, wait a few minutes and try again.

### 12.14. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.
2. Select the cluster to change and click **Edit**.
3. On the **General** tab, change the **Compatibility Version** to the desired value.
4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.
5. Click **OK** to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The **Edit Virtual Machine** window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

### 12.15. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are
The Manager virtual machine does not need to be rebooted.

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

Procedure
1. In the Administration Portal, click **Compute → Virtual Machines**.
2. Check which virtual machines require a reboot. In the **Vms** search bar, enter the following query:

   ```
   next_run_config_exists=True
   ```

   The search results show all virtual machines with pending changes.
3. Select each virtual machine and click **Reboot**.

   When the virtual machine starts, the new compatibility version is automatically applied.

   **NOTE**

   You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

12.16. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure
1. In the Administration Portal, click **Compute → Data Centers**.
2. Select the data center to change and click **Edit**.
3. Change the **Compatibility Version** to the desired value.
4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.
5. Click **OK** to confirm.

12.17. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL
certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- Prevent warning messages from appearing in your browser when connecting to the Administration Portal. These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

- Replace the SHA-1 certificates throughout the system with SHA-256 certificates.

Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.

2. Check whether /etc/pki/ovirt-engine/openssl.conf includes the line `default_md = sha256`:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Define the certificate that should be re-signed:

   ```
   # names="apache"
   ```

4. Log in to one of the self-hosted engine nodes and enable global maintenance:

   ```
   # hosted-engine --set-maintenance --mode=global
   ```

5. On the Manager, re-sign the Apache certificate:

   ```
   for name in $names; do
   subject="$(
     openssl \
     x509 \
     -in /etc/pki/ovirt-engine/certs/"${name}".cer \
     -noout \
     -subject \
     | sed \
     's;subject= \(.\)*;1;''
   )"
   /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
     --name="${name}" \
     --password=mypass \
     --subject="${subject}" \
     --san=DNS:"${ENGINE_FQDN}" \
     --keep-key
   done
   ```
6. Restart the `httpd` service:

   ```
   # systemctl restart httpd
   ```

7. Log in to one of the self-hosted engine nodes and disable global maintenance:

   ```
   # hosted-engine --set-maintenance --mode=none
   ```

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority's certificate, navigate to `http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).

### Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   ```

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

   ```
   # cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +"%Y%m%d%H%M%S")"
   # openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
   ```

4. Replace the existing certificate with the new certificate:

   ```
   # mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
   ```

5. Define the certificates that should be re-signed:

   ```
   # names="engine apache websocket-proxy jboss imageio-proxy"
   ```

   If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

   ```
   # names="engine websocket-proxy jboss imageio-proxy"
   ```
For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. Log in to one of the self-hosted engine nodes and enable global maintenance:

```
# hosted-engine --set-maintenance --mode=global
```

7. On the Manager, re-sign the certificates:

```
for name in $names; do
  subject="$(
    openssl \
      x509 \
      -in /etc/pki/ovirt-engine/certs/"${name}".cer \
      -noout \
      -subject \
      | sed \
      's;subject=.*;\1;'
  )" \
  /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
    --name="${name}" \
    --password=mypass \
    --subject="${subject}" \
    --san=DNS:"${ENGINE_FQDN}" \
    --keep-key
done
```

8. Restart the following services:

```
# systemctl restart httpd
# systemctl restart ovirt-engine
# systemctl restart ovirt-websocket-proxy
# systemctl restart ovirt-imageio-proxy
```

9. Log in to one of the self-hosted engine nodes and disable global maintenance:

```
# hosted-engine --set-maintenance --mode=none
```

10. Connect to the Administration Portal to confirm that the warning no longer appears.

11. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

12. Enroll the certificates on the hosts. Repeat the following procedure for each host.

   a. In the Administration Portal, click Compute → Hosts.

   b. Select the host and click Management → Maintenance.

   c. Once the host is in maintenance mode, click Installation → Enroll Certificate.
d. Click Management → Activate.
CHAPTER 13. UPGRADING A SELF-HOSTED ENGINE FROM 4.1 TO RED HAT VIRTUALIZATION 4.3

Upgrading a self-hosted engine environment from version 4.1 to 4.2 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories
2. Place the environment in global maintenance mode
3. Update the 4.1 Manager to the latest version of 4.1
4. Upgrade the Manager from 4.1 to 4.2
5. Upgrade the Manager from 4.2 to 4.3
6. Disable global maintenance mode
7. Update the self-hosted engine nodes, and any standard hosts
8. Update the compatibility version of the clusters
9. Reboot any running or suspended virtual machines to update their configuration
10. Update the compatibility version of the data centers
11. If you installed the technology preview version of Open Virtual Network (OVN) in 4.1, update the OVN provider’s networking plugin
12. Replace SHA-1 certificates with SHA-256 certificates

13.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters’ compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.
- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.
- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.
- Ensure the Manager has the correct repositories enabled. For the list of required repositories, see Subscribing to the Required Entitlements for Red Hat Virtualization 4.1.

13.2. ENABLING GLOBAL MAINTENANCE MODE

You must place the self-hosted engine environment in global maintenance mode before performing any setup or upgrade tasks on the Manager virtual machine.

Procedure

1. Log in to one of the self-hosted engine nodes and enable global maintenance mode:
## 13.3. UPDATING THE RED HAT VIRTUALIZATION MANAGER

### WARNING

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

**Procedure**

1. Log in to the Manager virtual machine.

2. Check if updated packages are available:

   ```shell
   # engine-upgrade-check
   ```

3. Update the setup packages:

   ```shell
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```

4. Update the Red Hat Virtualization Manager with the `engine-setup` script. The `engine-setup` script prompts you with some configuration questions, then stops the `ovirt-engine` service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the `ovirt-engine` service.

   ```shell
   # engine-setup
   ```

When the script completes successfully, the following message appears:

```shell
Execution of setup completed successfully
```
NOTE

The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.

IMPORTANT

The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:

   ```
   # yum update
   ```

   IMPORTANT

   If any kernel packages were updated, reboot the machine to complete the update.

13.4. UPGRADING THE MANAGER FROM 4.1 TO 4.2

Upgrade the Red Hat Virtualization Manager from 4.1 to 4.2.

IMPORTANT

If the upgrade fails, the `engine-setup` command attempts to roll your Red Hat Virtualization Manager installation back to its previous state. For this reason, the previous version’s repositories must not be removed until after the upgrade is complete. If the upgrade fails, detailed instructions display that explain how to restore your installation.

Procedure

1. Log in to the Manager virtual machine.

2. Enable the Red Hat Virtualization 4.2 repositories:

   ```
   # subscription-manager repos \
   --enable=rhel-7-server-rhv-4.2-manager-rpms \
   --enable=rhel-7-server-rhv-4-manager-tools-rpms \
   --enable=jb-eap-7-for-rhel-7-server-rpms \
   --enable=rhel-7-server-ansible-2.9-rpms
   ```

   All other repositories remain the same across Red Hat Virtualization releases.

3. Update the setup packages:

   ```
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```
4. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

```
# engine-setup
```

**NOTE**

If you changed the default trust keystore password, you might get a keystore certificate error. If so, update the configuration to reflect the correct password. For more information, see [RHV 4.2 – Failed to import provider certificate into the external provider keystore](#).

5. Disable the Red Hat Virtualization 4.1 repositories to ensure the system does not use any 4.1 packages:

```
# subscription-manager repos
 --disable=rhel-7-server-rhv-4.1-rpms
 --disable=rhel-7-server-rhv-4.1-manager-rpms
 --disable=rhel-7-server-rhv-4.tools-rpms
 --disable=jb-eap-7.0-for-rhel-7-server-rpms
 --disable=jb-eap-7.1-for-rhel-7-server-rpms
```

6. Update the base operating system:

```
# yum update
```

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

### 13.5. UPGRADING THE MANAGER FROM 4.2 TO 4.3

You need to be logged into the machine that you are upgrading.

**IMPORTANT**

If the upgrade fails, the `engine-setup` command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the `engine-setup` script explains how to restore your installation.

**Procedure**

1. Enable the Red Hat Virtualization 4.3 repositories:

```
# subscription-manager repos
 --enable=rhel-7-server-rhv-4.3-manager-rpms
 --enable=jb-eap-7.2-for-rhel-7-server-rpms
```

   All other repositories remain the same across Red Hat Virtualization releases.

2. Update the setup packages:
3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

```bash
# engine-setup
```

When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:

```bash
# subscription-manager repos --disable=rhel-7-server-rhv-4.2-manager-rpms --disable=jb-eap-7-for-rhel-7-server-rpms
```

5. Update the base operating system:

```bash
# yum update
```

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

The Manager is now upgraded to version 4.3.

### 13.6. DISABLING GLOBAL MAINTENANCE MODE

**Procedure**

1. Log in to the Manager virtual machine and shut it down.

2. Log in to one of the self-hosted engine nodes and disable global maintenance mode:

```bash
# hosted-engine --set-maintenance --mode=none
```

When you exit global maintenance mode, ovirt-ha-agent starts the Manager virtual machine, and then the Manager automatically starts. It can take up to ten minutes for the Manager to start.

3. Confirm that the environment is running:

```bash
# hosted-engine --vm-status
```

The listed information includes **Engine Status**. The value for **Engine status** should be:

```json
{"health": "good", "vm": "up", "detail": "Up"}
```
NOTE

When the virtual machine is still booting and the Manager hasn’t started yet, the Engine status is:

```json
{
  "reason": "bad vm status",
  "health": "bad",
  "vm": "up",
  "detail": "Powering up"
}
```

If this happens, wait a few minutes and try again.

You can now update the self-hosted engine nodes, and then any standard hosts. The procedure is the same for both host types.

### 13.7. UPDATING ALL HOSTS IN A CLUSTER

You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful during upgrades to new versions of Red Hat Virtualization. See https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

**Limitations**

- On RHVH, the update only preserves modified content in the `/etc` and `var` directories. Modified data in other paths is overwritten during an update.
- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.
- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.
- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.
- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters** and select the cluster.
2. Click **Upgrade**.
3. Select the hosts to update, then click **Next**.
4. Configure the options:
   - **Stop Pinned VMs** shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.
- **Upgrade Timeout (Minutes)** sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is 60. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where the hosts update quickly.

- **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.

- **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.

- **Use Maintenance Policy** sets the cluster’s scheduling policy to `cluster_maintenance` during the update. It is selected by default, so activity is limited and virtual machines cannot start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click **Next**.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click **Upgrade**.

You can track the progress of host updates in the **Compute → Hosts** view, and in the **Events** section of the **Notification Drawer**.

You can track the progress of individual virtual machine migrations in the **Status** column of the **Compute → Virtual Machines** view. In large environments, you may need to filter the results to show a particular group of virtual machines.

### 13.8. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.
2. Select the cluster to change and click **Edit**.
3. On the **General** tab, change the **Compatibility Version** to the desired value.
4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.
5. Click OK to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The Edit Virtual Machine window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

### 13.9. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (/graphql).

The Manager virtual machine does not need to be rebooted.

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

**Procedure**

1. In the Administration Portal, click Compute → Virtual Machines.

2. Check which virtual machines require a reboot. In the Vms: search bar, enter the following query:

   ```sql
   next_run_config_exists=True
   ```

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click Reboot.

When the virtual machine starts, the new compatibility version is automatically applied.

**NOTE**

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

### 13.10. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

Procedure

1. In the Administration Portal, click Compute → Data Centers.
2. Select the data center to change and click Edit.
3. Change the Compatibility Version to the desired value.
4. Click OK. The Change Data Center Compatibility Version confirmation dialog opens.
5. Click OK to confirm.

13.11. UPDATING OVN PROVIDERS INSTALLED IN RED HAT VIRTUALIZATION 4.1

If you installed an Open Virtual Network (OVN) provider in Red Hat Virtualization 4.1, you must manually edit its configuration for Red Hat Virtualization 4.2.

Procedure

1. Click Administration → Providers and select the OVN provider.
2. Click Edit.
3. Click the Networking Plugin text field and select oVirt Network Provider for OVN from the drop-down list.
4. Click OK.

13.12. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- Prevent warning messages from appearing in your browser when connecting to the Administration Portal. These warnings may either appear as pop-up windows or in the browser’s Web Console window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

- Replace the SHA-1 certificates throughout the system with SHA-256 certificates.

Preventing Warning Messages from Appearing in the Browser

1. Log in to the Manager machine as the root user.
2. Check whether /etc/pki.ovirt-engine/openssl.conf includes the line default_md = sha256:
If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

```bash
# cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
# sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
```

3. Define the certificate that should be re-signed:

```bash
# names="apache"
```

4. Log in to one of the self-hosted engine nodes and enable global maintenance:

```bash
# hosted-engine --set-maintenance --mode=global
```

5. On the Manager, re-sign the Apache certificate:

```bash
for name in $names; do
    subject="$(
        openssl \
        x509 \
        -in /etc/pki/ovirt-engine/certs/$name.cer \
        -noout \
        -subject \
        | sed \
        's;subject= \([^;]*\);\1;'
    )"
    /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
        --name="$name" \
        --password=mypass \
        --subject="$subject" \
        --san=DNS:"$ENGINE_FQDN" \
        --keep-key
done
```

6. Restart the `httpd` service:

```bash
# systemctl restart httpd
```

7. Log in to one of the self-hosted engine nodes and disable global maintenance:

```bash
# hosted-engine --set-maintenance --mode=none
```

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to `http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA`, replacing `your-manager-fqdn` with the fully qualified domain name (FQDN).
Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```
   # cat /etc/pki/ovirt-engine/openssl.conf
   #
   # If it still includes default_md = sha1, back up the existing configuration and change the default to sha256:
   #
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +%Y%m%d%H%M%S)"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ```

3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

   ```
   # cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +%Y%m%d%H%M%S)"
   # openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
   ```

4. Replace the existing certificate with the new certificate:

   ```
   # mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
   ```

5. Define the certificates that should be re-signed:

   ```
   # names="engine apache websocket-proxy jboss imageio-proxy"
   #
   # If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:
   #
   # names="engine websocket-proxy jboss imageio-proxy"
   #
   # For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.
   ```

6. Log in to one of the self-hosted engine nodes and enable global maintenance:

   ```
   # hosted-engine --set-maintenance --mode=global
   ```

7. On the Manager, re-sign the certificates:

   ```
   for name in $names; do
   subject="$(
       openssl \
       x509 \n       -in /etc/pki/ovirt-engine/certs/"${name}".cer \n       -noout \n       -subject \n       | sed \n       's;subject= \\([^;]*);\1;'
   ```
")
/usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
   --name="${name}" \
   --password=mypass \
   --subject="${subject}" \
   --san=DNS: "$ENGINE_FQDN" \
   --keep-key
done

8. Restart the following services:

   # systemctl restart httpd
   # systemctl restart ovirt-engine
   # systemctl restart ovirt-websocket-proxy
   # systemctl restart ovirt-imageio-proxy

9. Log in to one of the self-hosted engine nodes and disable global maintenance:

   # hosted-engine --set-maintenance --mode=none

10. Connect to the Administration Portal to confirm that the warning no longer appears.

11. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

12. Enroll the certificates on the hosts. Repeat the following procedure for each host.

   a. In the Administration Portal, click **Compute → Hosts**.

   b. Select the host and click **Management → Maintenance**.

   c. Once the host is in maintenance mode, click **Installation → Enroll Certificate**.

   d. Click **Management → Activate**.
CHAPTER 14. UPGRADING A SELF-HOSTED ENGINE FROM 4.2 TO RED HAT VIRTUALIZATION 4.3

Upgrading a self-hosted engine environment from version 4.2 to 4.3 involves the following steps:

1. Make sure you meet the prerequisites, including enabling the correct repositories
2. Use the Log Collection Analysis tool to check for issues that might prevent a successful upgrade
3. Place the environment in global maintenance mode
4. Update the 4.2 Manager to the latest version of 4.2
5. Upgrade the Manager from 4.2 to 4.3
6. Disable global maintenance mode
7. Upgrade the self-hosted engine nodes, and any standard hosts
8. Update the compatibility version of the clusters
9. Reboot any running or suspended virtual machines to update their configuration
10. Update the compatibility version of the data centers
11. If you previously upgraded to 4.2 without replacing SHA-1 certificates with SHA-256 certificates, you must replace the certificates now.

14.1. PREREQUISITES

- Plan for any necessary virtual machine downtime. After you update the clusters’ compatibility versions during the upgrade, a new hardware configuration is automatically applied to each virtual machine once it reboots. You must reboot any running or suspended virtual machines as soon as possible to apply the configuration changes.

- Ensure your environment meets the requirements for Red Hat Virtualization 4.3. For a complete list of prerequisites, see the Planning and Prerequisites Guide.

- Ensure the hosts have the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Host Repository for RHVH, or Enabling the Red Hat Enterprise Linux host Repositories for RHEL host.

- Ensure the Manager has the correct repositories enabled. For the list of required repositories, see Enabling the Red Hat Virtualization Manager Repositories for Red Hat Virtualization 4.2.

14.2. ANALYZING THE ENVIRONMENT

Red Hat recommends running the Log Collection Analysis tool prior to performing updates and for troubleshooting. The tool analyzes your environment for known issues that might prevent you from performing an update, and provides recommendations to resolve them.

The tool gathers detailed information about your system and presents it as an HTML file.
NOTE

The Log Collection Analysis tool is available from Red Hat Virtualization 4.2.5.

Procedure

1. Install the Log Collection Analysis tool on the Manager:
   
   ```bash
   # yum install rhv-log-collector-analyzer
   ```

2. Run the tool:

   ```bash
   # rhv-log-collector-analyzer --live
   ```

   A detailed report is displayed.

   By default, the report is saved to a file called `analyzer_report.html`.

   To save the file to a specific location, use the `--html` flag and specify the location:

   ```bash
   # rhv-log-collector-analyzer --live --html=/directory/ilename.html
   ```

3. Use the ELinks text mode web browser to read the analyzer reports. To install the ELinks browser:

   ```bash
   # yum install -y elinks
   ```

4. Launch ELinks and open `analyzer_report.html`.

   ```bash
   # elinks /home/user1/analyzer_report.html
   ```

   To navigate the report, use the following commands in ELinks:

   - Open `Insert` to scroll up
   - Open `Delete` to scroll down
   - Open `PageUp` to page up
   - Open `PageDown` to page down
   - Open `Left Bracket` to scroll left
   - Open `Right Bracket` to scroll right

14.3. ENABLING GLOBAL MAINTENANCE MODE

You must place the self-hosted engine environment in global maintenance mode before performing any setup or upgrade tasks on the Manager virtual machine.

Procedure

1. Log in to one of the self-hosted engine nodes and enable global maintenance mode:
# hosted-engine --set-maintenance --mode=global

2. Confirm that the environment is in maintenance mode before proceeding:

```
# hosted-engine --vm-status
```

You should see a message indicating that the cluster is in maintenance mode.

## 14.4. UPDATING THE RED HAT VIRTUALIZATION MANAGER

### WARNING

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

### Procedure

1. Log in to the Manager virtual machine.

2. Check if updated packages are available:

```
# engine-upgrade-check
```

3. Update the setup packages:

```
# yum update ovirt\*setup\* rh\*vm-setup-plugins
```

4. Update the Red Hat Virtualization Manager with the `engine-setup` script. The `engine-setup` script prompts you with some configuration questions, then stops the `ovirt-engine` service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the `ovirt-engine` service.

```
# engine-setup
```

When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```
NOTE

The `engine-setup` script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if `engine-config` was used to update configuration after installation. For example, if `engine-config` was used to update `SANWipeAfterDelete` to `true` after installation, `engine-setup` will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by `engine-setup`.

IMPORTANT

The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:

```
# yum update
```

IMPORTANT

If any kernel packages were updated, reboot the machine to complete the update.

14.5. UPGRADING THE MANAGER FROM 4.2 TO 4.3

You need to be logged into the machine that you are upgrading.

IMPORTANT

If the upgrade fails, the `engine-setup` command attempts to restore your Red Hat Virtualization Manager installation to its previous state. For this reason, do not remove the previous version’s repositories until after the upgrade is complete. If the upgrade fails, the `engine-setup` script explains how to restore your installation.

Procedure

1. Enable the Red Hat Virtualization 4.3 repositories:

```
# subscription-manager repos \
   --enable=rhel-7-server-rhv-4.3-manager-rpms \
   --enable=jb-eap-7.2-for-rhel-7-server-rpms
```

All other repositories remain the same across Red Hat Virtualization releases.

2. Update the setup packages:

```
# yum update ovirt*setup\* rh\*vm-setup-plugins
```

3. Run `engine-setup` and follow the prompts to upgrade the Red Hat Virtualization Manager:

```
# engine-setup
```
When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```

4. Disable the Red Hat Virtualization 4.2 repositories to ensure the system does not use any 4.2 packages:

```
# subscription-manager repos \
   --disable=rhel-7-server-rhv-4.2-manager-rpms \
   --disable=jb-eap-7-for-rhel-7-server-rpms
```

5. Update the base operating system:

```
# yum update
```

**IMPORTANT**

If any kernel packages were updated, reboot the machine to complete the upgrade.

The Manager is now upgraded to version 4.3.

### 14.6. DISABLING GLOBAL MAINTENANCE MODE

**Procedure**

1. Log in to the Manager virtual machine and shut it down.

2. Log in to one of the self-hosted engine nodes and disable global maintenance mode:

```
# hosted-engine --set-maintenance --mode=none
```

When you exit global maintenance mode, ovirt-ha-agent starts the Manager virtual machine, and then the Manager automatically starts. It can take up to ten minutes for the Manager to start.

3. Confirm that the environment is running:

```
# hosted-engine --vm-status
```

The listed information includes **Engine Status**. The value for **Engine status** should be:

```
{"health": "good", "vm": "up", "detail": "Up"}
```
NOTE

When the virtual machine is still booting and the Manager hasn’t started yet, the Engine status is:

{"reason": "bad vm status", "health": "bad", "vm": "up", "detail": "Powering up"}

If this happens, wait a few minutes and try again.

You can now update the self-hosted engine nodes, and then any standard hosts. The procedure is the same for both host types.

14.7. UPDATING ALL HOSTS IN A CLUSTER

You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful during upgrades to new versions of Red Hat Virtualization. See https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

Limitations

- On RHVH, the update only preserves modified content in the /etc and /var directories. Modified data in other paths is overwritten during an update.
- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.
- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.
- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.
- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.

Procedure

1. In the Administration Portal, click Compute → Clusters and select the cluster.
2. Click Upgrade.
3. Select the hosts to update, then click Next.
4. Configure the options:

   - Stop Pinned VMs shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.
• **Upgrade Timeout (Minutes)** sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is 60. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where the hosts update quickly.

• **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.

• **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.

• **Use Maintenance Policy** sets the cluster’s scheduling policy to `cluster_maintenance` during the update. It is selected by default, so activity is limited and virtual machines cannot start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click **Next**.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click **Upgrade**.

You can track the progress of host updates in the **Compute → Hosts** view, and in the **Events** section of the **Notification Drawer**.

You can track the progress of individual virtual machine migrations in the **Status** column of the **Compute → Virtual Machines** view. In large environments, you may need to filter the results to show a particular group of virtual machines.

### 14.8. CHANGING THE CLUSTER COMPATIBILITY VERSION

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

**IMPORTANT**

To change the cluster compatibility version, you must have first updated all the hosts in your cluster to a level that supports your desired compatibility level. Check if there is an icon next to the host indicating an update is available.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters**.

2. Select the cluster to change and click **Edit**.

3. On the **General** tab, change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Cluster Compatibility Version** confirmation dialog opens.
5. Click **OK** to confirm.

**IMPORTANT**

An error message might warn that some virtual machines and templates are incorrectly configured. To fix this error, edit each virtual machine manually. The **Edit Virtual Machine** window provides additional validations and warnings that show what to correct. Sometimes the issue is automatically corrected and the virtual machine’s configuration just needs to be saved again. After editing each virtual machine, you will be able to change the cluster compatibility version.

### 14.9. CHANGING VIRTUAL MACHINE CLUSTER COMPATIBILITY

After updating a cluster’s compatibility version, you must update the cluster compatibility version of all running or suspended virtual machines by rebooting them from the Administration Portal, or using the REST API, instead of from within the guest operating system. Virtual machines that require a reboot are marked with the pending changes icon (⚠️).

The Manager virtual machine does not need to be rebooted.

Although you can wait to reboot the virtual machines at a convenient time, rebooting immediately is highly recommended so that the virtual machines use the latest configuration. Any virtual machine that has not been rebooted runs with the previous configuration, and subsequent configuration changes made to the virtual machine might overwrite its pending cluster compatibility changes.

**Procedure**

1. In the Administration Portal, click **Compute → Virtual Machines**.

2. Check which virtual machines require a reboot. In the **Vms**: search bar, enter the following query:

   ```
   next_run_config_exists=True
   ```

   The search results show all virtual machines with pending changes.

3. Select each virtual machine and click **Reboot**.

   When the virtual machine starts, the new compatibility version is automatically applied.

**NOTE**

You cannot change the cluster compatibility version of a virtual machine snapshot that is in preview. You must first commit or undo the preview.

### 14.10. CHANGING THE DATA CENTER COMPATIBILITY VERSION

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

To change the data center compatibility version, you must have first updated the compatibility version of all clusters and virtual machines in the data center.

**Procedure**

1. In the Administration Portal, click **Compute → Data Centers**.

2. Select the data center to change and click **Edit**.

3. Change the **Compatibility Version** to the desired value.

4. Click **OK**. The **Change Data Center Compatibility Version** confirmation dialog opens.

5. Click **OK** to confirm.

If you previously upgraded to 4.2 without replacing SHA-1 certificates with SHA-256 certificates, you must do so now.

**14.11. REPLACING SHA-1 CERTIFICATES WITH SHA-256 CERTIFICATES**

Red Hat Virtualization 4.3 uses SHA-256 signatures, which provide a more secure way to sign SSL certificates than SHA-1. Newly installed systems do not require any special steps to enable Red Hat Virtualization’s public key infrastructure (PKI) to use SHA-256 signatures. However, for systems upgraded from 4.1 or earlier, one of the following is required:

- Prevent warning messages from appearing in your browser when connecting to the Administration Portal. These warnings may either appear as pop-up windows or in the browser’s **Web Console** window. This option is not required if you already replaced the Red Hat Virtualization Manager’s Apache SSL certificate after the upgrade. However, if the certificate was signed with SHA-1, you should replace it with an SHA-256 certificate. For more details see **Replacing the Red Hat Virtualization Manager CA Certificate** in the **Administration Guide**.

- Replace the SHA-1 certificates throughout the system with SHA-256 certificates.

**Preventing Warning Messages from Appearing in the Browser**

1. Log in to the Manager machine as the root user.

2. Check whether `/etc/pki/ovirt-engine/openssl.conf` includes the line `default_md = sha256`:

   ```bash
   # cat /etc/pki/ovirt-engine/openssl.conf
   ``

   If it still includes `default_md = sha1`, back up the existing configuration and change the default to `sha256`:

   ```bash
   # cp -p /etc/pki/ovirt-engine/openssl.conf /etc/pki/ovirt-engine/openssl.conf."$(date +"%Y%m%d%H%M%S")"
   # sed -i 's/^default_md = sha1/default_md = sha256/' /etc/pki/ovirt-engine/openssl.conf
   ``

3. Define the certificate that should be re-signed:

   ```bash
   # names="apache"
   ```
4. Log in to one of the self-hosted engine nodes and enable global maintenance:

   # hosted-engine --set-maintenance --mode=global

5. On the Manager, re-sign the Apache certificate:

   for name in $names; do
     subject="$(
       openssl \
       x509 \
       -in /etc/pki/ovirt-engine/certs/"${name}".cer \
       -noout \
       -subject \n       | sed \n         's;subject=.*;\1;'
     )"
     /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \
       --name="${name}" \
       --password=mypass \
       --subject="${subject}" \
       --san=DNS:"${ENGINE_FQDN}" \
       --keep-key
   done

6. Restart the httpd service:

   # systemctl restart httpd

7. Log in to one of the self-hosted engine nodes and disable global maintenance:

   # hosted-engine --set-maintenance --mode=none

8. Connect to the Administration Portal to confirm that the warning no longer appears.

9. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

Replacing All Signed Certificates with SHA-256

1. Log in to the Manager machine as the root user.

2. Check whether /etc/pki/ovirt-engine/openssl.conf includes the line default_md = sha256:

   # cat /etc/pki/ovirt-engine/openssl.conf

   If it still includes default_md = sha1, back up the existing configuration and change the default to sha256:
3. Re-sign the CA certificate by backing it up and creating a new certificate in `ca.pem.new`:

```bash
# cp -p /etc/pki/ovirt-engine/private/ca.pem /etc/pki/ovirt-engine/private/ca.pem."$(date +"%Y%m%d%H%M%S")"
# openssl x509 -signkey /etc/pki/ovirt-engine/private/ca.pem -in /etc/pki/ovirt-engine/ca.pem -out /etc/pki/ovirt-engine/ca.pem.new -days 3650 -sha256
```

4. Replace the existing certificate with the new certificate:

```bash
# mv /etc/pki/ovirt-engine/ca.pem.new /etc/pki/ovirt-engine/ca.pem
```

5. Define the certificates that should be re-signed:

```bash
# names="engine apache websocket-proxy jboss imageio-proxy"
```

   If you replaced the Red Hat Virtualization Manager SSL Certificate after the upgrade, run the following instead:

```bash
# names="engine websocket-proxy jboss imageio-proxy"
```

   For more details see Replacing the Red Hat Virtualization Manager CA Certificate in the Administration Guide.

6. Log in to one of the self-hosted engine nodes and enable global maintenance:

```bash
# hosted-engine --set-maintenance --mode=global
```

7. On the Manager, re-sign the certificates:

```bash
for name in $names; do
  subject="$\n  openssl \n  x509 \n  -in /etc/pki/ovirt-engine/certs/"${name}".cer \n  -noout \n  -subject \n  | sed \n  \"s;subject= \'(.*);1;" \n\" /usr/share/ovirt-engine/bin/pki-enroll-pkcs12.sh \n  --name="${name}" \n  --password=mypass \n  --subject="${subject}" \n  --san=DNS:"${ENGINE_FQDN}" \n  --keep-key\n done
```

8. Restart the following services:
# systemctl restart httpd
# systemctl restart ovirt-engine
# systemctl restart ovirt-websocket-proxy
# systemctl restart ovirt-imageio-proxy

9. Log in to one of the self-hosted engine nodes and disable global maintenance:

   # hosted-engine --set-maintenance --mode=none

10. Connect to the Administration Portal to confirm that the warning no longer appears.

11. If you previously imported a CA or https certificate into the browser, find the certificate(s), remove them from the browser, and reimport the new CA certificate. Install the certificate authority according to the instructions provided by your browser. To get the certificate authority’s certificate, navigate to http://your-manager-fqdn/ovirt-engine/services/pki-resource?resource=ca-certificate&format=X509-PEM-CA, replacing your-manager-fqdn with the fully qualified domain name (FQDN).

12. Enroll the certificates on the hosts. Repeat the following procedure for each host.
   
a. In the Administration Portal, click **Compute → Hosts**.

b. Select the host and click **Management → Maintenance**.

c. Once the host is in maintenance mode, click **Installation → Enroll Certificate**.

d. Click **Management → Activate**.
APPENDIX A. UPDATES BETWEEN MINOR RELEASES

To update from your current version of 4.3 to the latest version of 4.3, update the Manager and then update the hosts.

A.1. ANALYZING THE ENVIRONMENT

Red Hat recommends running the Log Collection Analysis tool prior to performing updates and for troubleshooting. The tool analyzes your environment for known issues that might prevent you from performing an update, and provides recommendations to resolve them.

The tool gathers detailed information about your system and presents it as an HTML file.

NOTE

The Log Collection Analysis tool is available from Red Hat Virtualization 4.2.5.

Procedure

1. Install the Log Collection Analysis tool on the Manager:
   
   ```
   # yum install rhv-log-collector-analyzer
   ```

2. Run the tool:
   
   ```
   # rhv-log-collector-analyzer --live
   ```

   A detailed report is displayed.

   By default, the report is saved to a file called `analyzer_report.html`.

   To save the file to a specific location, use the `--html` flag and specify the location:

   ```
   # rhv-log-collector-analyzer --live --html=/directory/filename.html
   ```

3. Use the ELInks text mode web browser to read the analyzer reports. To install the ELInks browser:
   
   ```
   # yum install -y elinks
   ```

4. Launch ELInks and open `analyzer_report.html`.
   
   ```
   # elinks /home/user1/analyzer_report.html
   ```

   To navigate the report, use the following commands in ELInks:

   - **Insert** to scroll up
   - **Delete** to scroll down
   - **PageUp** to page up
   - **PageDown** to page down
To update a standalone Manager, follow the standard procedure for minor updates:

A.2. UPDATING THE RED HAT VIRTUALIZATION MANAGER

WARNING

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

Procedure

1. Log in to the Manager machine.

2. Check if updated packages are available:

   # engine-upgrade-check

3. Update the setup packages:

   # yum update ovirt\*setup\* rh\*vm-setup-plugins

4. Update the Red Hat Virtualization Manager with the engine-setup script. The engine-setup script prompts you with some configuration questions, then stops the ovirt-engine service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the ovirt-engine service.

   # engine-setup

When the script completes successfully, the following message appears:

Execution of setup completed successfully

NOTE

The engine-setup script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if engine-config was used to update configuration after installation. For example, if engine-config was used to update SANWipeAfterDelete to true after installation, engine-setup will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by engine-setup.
IMPORTANT

The update process might take some time. Do not stop the process before it completes.

5. Update the base operating system and any optional packages installed on the Manager:

```
# yum update
```

IMPORTANT

If any kernel packages were updated, reboot the machine to complete the update.

NOTE

If the update from RHV 4.2.7 to RHV 4.2.8 fails with a message indicating a dependency error with an eap7-jboss-server-migration-wildfly package:

1. Check if all the required repositories are enabled.
2. Update the eap7-jboss-server-migration-wildfly packages installed on the Manager:

```
# yum update eap7-jboss-server-migration-wildfly*
```
3. Run engine-setup again.

A.3. UPDATING A SELF-HOSTED ENGINE

To update a self-hosted engine from your current version of 4.3 to the latest version of 4.3, you must place the environment in global maintenance mode and then follow the standard procedure for updating between minor versions.

Enabling Global Maintenance Mode

You must place the self-hosted engine environment in global maintenance mode before performing any setup or upgrade tasks on the Manager virtual machine.

Procedure

1. Log in to one of the self-hosted engine nodes and enable global maintenance mode:

```
# hosted-engine --set-maintenance --mode=global
```
2. Confirm that the environment is in maintenance mode before proceeding:

```
# hosted-engine --vm-status
```

You should see a message indicating that the cluster is in maintenance mode.

Updating the Red Hat Virtualization Manager
WARNING

Be sure to enable the correct repositories as detailed in Prerequisites. Otherwise, the upgrade might fail.

Updates to the Red Hat Virtualization Manager are released through the Content Delivery Network.

Procedure

1. Log in to the Manager virtual machine.
2. Log in to the Manager machine.
3. Check if updated packages are available:
   ```bash
   # engine-upgrade-check
   ```
4. Update the setup packages:
   ```bash
   # yum update ovirt\*setup\* rh\*vm-setup-plugins
   ```
5. Update the Red Hat Virtualization Manager with the engine-setup script. The engine-setup script prompts you with some configuration questions, then stops the ovirt-engine service, downloads and installs the updated packages, backs up and updates the database, performs post-installation configuration, and starts the ovirt-engine service.
   ```bash
   # engine-setup
   ```

When the script completes successfully, the following message appears:

```
Execution of setup completed successfully
```

NOTE

The engine-setup script is also used during the Red Hat Virtualization Manager installation process, and it stores the configuration values supplied. During an update, the stored values are displayed when previewing the configuration, and might not be up to date if engine-config was used to update configuration after installation. For example, if engine-config was used to update SANWipeAfterDelete to true after installation, engine-setup will output "Default SAN wipe after delete: False" in the configuration preview. However, the updated values will not be overwritten by engine-setup.

IMPORTANT

The update process might take some time. Do not stop the process before it completes.
6. Update the base operating system and any optional packages installed on the Manager:

```
# yum update
```

**IMPORTANT**

If any kernel packages were updated:

1. Disable global maintenance mode
2. Reboot the machine to complete the update.

**NOTE**

If the update from RHV 4.2.7 to RHV 4.2.8 fails with a message indicating a dependency error with an `eap7-jboss-server-migration-wildfly` package:

1. Check if all the required repositories are enabled.
2. Update the `eap7-jboss-server-migration-wildfly` packages installed on the Manager:

```
# yum update eap7-jboss-server-migration-wildfly*
```
3. Run `engine-setup` again.

**Related Information**

Disabling Global Maintenance Mode

**Disabling Global Maintenance Mode**

**Procedure**

1. Log in to the Manager virtual machine and shut it down.
2. Log in to one of the self-hosted engine nodes and disable global maintenance mode:

```
# hosted-engine --set-maintenance --mode=none
```

When you exit global maintenance mode, ovirt-ha-agent starts the Manager virtual machine, and then the Manager automatically starts. It can take up to ten minutes for the Manager to start.
3. Confirm that the environment is running:

```
# hosted-engine --vm-status
```

The listed information includes **Engine Status**. The value for **Engine status** should be:

```
{"health": "good", "vm": "up", "detail": "Up"}
```
NOTE

When the virtual machine is still booting and the Manager hasn’t started yet, the **Engine status** is:

```json
{"reason": "bad vm status", "health": "bad", "vm": "up", "detail": "Powering up"}
```

If this happens, wait a few minutes and try again.

A.4. UPDATING ALL HOSTS IN A CLUSTER

You can update all hosts in a cluster instead of updating hosts individually. This is particularly useful during upgrades to new versions of Red Hat Virtualization. See [https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md](https://github.com/oVirt/ovirt-ansible-cluster-upgrade/blob/master/README.md) for more information about the Ansible role used to automate the updates.

Red Hat recommends updating one cluster at a time.

**Limitations**

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.

- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster.

- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.

- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.

- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines are shut down during the update, unless you choose to skip that host instead.

**Procedure**

1. In the Administration Portal, click **Compute → Clusters** and select the cluster.

2. Click **Upgrade**.

3. Select the hosts to update, then click **Next**.

4. Configure the options:

   - **Stop Pinned VMs** shuts down any virtual machines that are pinned to hosts in the cluster, and is selected by default. You can clear this check box to skip updating those hosts so that the pinned virtual machines stay running, such as when a pinned virtual machine is running important services or processes and you do not want it to shut down at an unknown time during the update.

   - **Upgrade Timeout (Minutes)** sets the time to wait for an individual host to be updated before the cluster upgrade fails with a timeout. The default is **60**. You can increase it for large clusters where 60 minutes might not be enough, or reduce it for small clusters where
the hosts update quickly.

- **Check Upgrade** checks each host for available updates before running the upgrade process. It is not selected by default, but you can select it if you need to ensure that recent updates are included, such as when you have configured the Manager to check for host updates less frequently than the default.

- **Reboot After Upgrade** reboots each host after it is updated, and is selected by default. You can clear this check box to speed up the process if you are sure that there are no pending updates that require a host reboot.

- **Use Maintenance Policy** sets the cluster’s scheduling policy to `cluster_maintenance` during the update. It is selected by default, so activity is limited and virtual machines cannot start unless they are highly available. You can clear this check box if you have a custom scheduling policy that you want to keep using during the update, but this could have unknown consequences. Ensure your custom policy is compatible with cluster upgrade activity before disabling this option.

5. Click **Next**.

6. Review the summary of the hosts and virtual machines that will be affected.

7. Click **Upgrade**.

You can track the progress of host updates in the **Compute → Hosts** view, and in the **Events** section of the **Notification Drawer** ( ).

You can track the progress of individual virtual machine migrations in the **Status** column of the **Compute → Virtual Machines** view. In large environments, you may need to filter the results to show a particular group of virtual machines.

You can also update hosts individually:

### A.5. UPDATING INDIVIDUAL HOSTS

Use the host upgrade manager to update individual hosts directly from the Administration Portal.

> **NOTE**

The upgrade manager only checks hosts with a status of **Up** or **Non-operational**, but not **Maintenance**.

**Limitations**

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.

- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster. Update a host when its usage is relatively low.

- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.
The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.

Do not update all hosts at the same time, as one host must remain available to perform Storage Pool Manager (SPM) tasks.

You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines must be shut down before updating the host.

**Procedure**

1. Ensure that the correct repositories are enabled. To view a list of currently enabled repositories, run `yum repolist`.
   - For Red Hat Virtualization Hosts:
     
     ```
     # subscription-manager repos --enable=rhel-7-server-rvh-4-rpms
     ```
   - For Red Hat Enterprise Linux hosts:
     
     ```
     # subscription-manager repos \
     --enable=rhel-7-server-rpms \
     --enable=rhel-7-server-rhv-4-mgmt-agent-rpms \
     --enable=rhel-7-server-ansible-2.9-rpms
     ```

2. In the Administration Portal, click **Compute** → **Hosts** and select the host to be updated.

3. Click **Installation** → **Check for Upgrade** and click **OK**.
   Open the **Notification Drawer** (>Lorem) and expand the **Events** section to see the result.

4. If an update is available, click **Installation** → **Upgrade**.

5. Click **OK** to update the host. Running virtual machines are migrated according to their migration policy. If migration is disabled for any virtual machines, you are prompted to shut them down. The details of the host are updated in **Compute** → **Hosts** and the status transitions through these stages:

   **Maintenance** > **Installing** > **Reboot** > **Up**

   **NOTE**

   If the update fails, the host’s status changes to **Install Failed**. From **Install Failed** you can click **Installation** → **Upgrade** again.

Repeat this procedure for each host in the Red Hat Virtualization environment.

Red Hat recommends updating the hosts from the Administration Portal. However, you can update the hosts using `yum update` instead:

**A.6. MANUALLY UPDATING HOSTS**

You can use the `yum` command to update your hosts. Update your systems regularly, to ensure timely application of security and bug fixes.
Limitations

- On RHVH, the update only preserves modified content in the `/etc` and `/var` directories. Modified data in other paths is overwritten during an update.

- If migration is enabled at the cluster level, virtual machines are automatically migrated to another host in the cluster. Update a host when its usage is relatively low.

- In a self-hosted engine environment, the Manager virtual machine can only migrate between self-hosted engine nodes in the same cluster. It cannot migrate to standard hosts.

- The cluster must have sufficient memory reserved for its hosts to perform maintenance. Otherwise, virtual machine migrations will hang and fail. You can reduce the memory usage of host updates by shutting down some or all virtual machines before updating hosts.

- Do not update all hosts at the same time, as one host must remain available to perform Storage Pool Manager (SPM) tasks.

- You cannot migrate a pinned virtual machine (such as a virtual machine using a vGPU) to another host. Pinned virtual machines must be shut down before updating the host.

Procedure

1. Ensure the correct repositories are enabled. You can check which repositories are currently enabled by running `yum repolist`.
   - For Red Hat Virtualization Hosts:
     
     ```
     # subscription-manager repos --enable=rhel-7-server-rhvh-4-rpms
     ```
   - For Red Hat Enterprise Linux hosts:
     
     ```
     # subscription-manager repos \
     --enable=rhel-7-server-rpms \
     --enable=rhel-7-server-rhv-4-mgmt-agent-rpms \
     --enable=rhel-7-server-ansible-2.9-rpms
     ```

2. In the Administration Portal, click **Compute → Hosts** and select the host to be updated.

3. Click **Management → Maintenance**.

4. Update the host:

   ```
   # yum update
   ```

5. Reboot the host to ensure all updates are correctly applied.

   **NOTE**

   Check the imgbased logs to see if any additional package updates have failed for a Red Hat Virtualization Host. If some packages were not successfully reinstalled after the update, check that the packages are listed in `/var/imgbased/persisted-rpms`. Add any missing packages then run `rpm -Uvh /
/var/imgbased/persisted-rpms/*`. 
Repeat this process for each host in the Red Hat Virtualization environment.
APPENDIX B. UPDATING THE LOCAL REPOSITORY FOR AN OFFLINE RED HAT VIRTUALIZATION MANAGER INSTALLATION

If your Red Hat Virtualization Manager is hosted on a machine that receives packages via FTP from a local repository, you must regularly synchronize the repository to download package updates from the Content Delivery Network, then update or upgrade that machine. Updated packages address security issues, fix bugs, and add enhancements.

1. On the system hosting the repository, synchronize the repository to download the most recent version of each available package:

   ```bash
   # reposync -l --newest-only /var/ftp/pub/rhevrepo
   ```

   This command might download a large number of packages, and take a long time to complete.

2. Ensure that the repository is available on the Manager machine, and then update or upgrade the machine. See Updating the Red Hat Virtualization Manager for information on updating the Manager between minor versions. See Red Hat Virtualization Upgrade Overview for information on upgrading between major versions.