Red Hat Satellite 6.2

Content Management Guide

An end-to-end guide on managing content from Red Hat and custom sources

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Abstract

This guide provides an end-to-end scenario on managing content in Red Hat Satellite 6. Examples of such content include RPM files, ISO images, Puppet modules, and container images. Red Hat Satellite 6 manages this content using a set of Content Views promoted across the application lifecycle. This guide demonstrates how to create an application lifecycle that suits your organization and content views that fulfils host states within lifecycle environments. These content views eventually form the basis for provisioning and updating hosts in your Red Hat Satellite 6 environment.

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CHAPTER 1. INTRODUCTION

In the context of system management, we define **content** as the software installed on systems. This includes, but is not limited to, the base operating system, middleware services, and end user applications. Red Hat Satellite 6 provides tools to manage the various types of content for Red Hat Enterprise Linux systems. This provides system administrators with an easy way to collect a range of content, keep it up to date, and use it to provision new systems and update existing systems.

This guide aims to provide an end-to-end scenario to demonstrate how to manage your content. This guide is targeted at system administrators with a newly installed Satellite Server.

1.1. OVERVIEW OF RED HAT SATELLITE 6 CONTENT MANAGEMENT

Content management in the context of Red Hat Satellite 6 means a work flow that provides a sustainable repository for multiple content types. For Red Hat content, Red Hat Satellite 6 also uses subscription information so that it knows what content is available to a user. This means Red Hat Satellite 6 uses components to manage the following:

- **Subscription management**, which includes tools to manage Red Hat software subscriptions, and associated content, over a secure connection. This provides a means for organizations to manage their Red Hat subscription information.
- **Content management**, which includes applications to download and store content in custom repositories. This provides organizations with a method to store Red Hat content and organize it in various ways.

1.2. DEFINING THE APPLICATION LIFE CYCLE

The **application life cycle** is a concept central to Red Hat Satellite 6's content management functions. The application life cycle defines how a particular system and its software look at a particular stage. For example, an application life cycle might be simple; you might only have a development stage and production stage. In this case the application life cycle might look like this:

- Development
- Production

However, a more complex application life cycle might have further stages, such as a phase for testing or a beta release. This adds extra stages to the application life cycle:

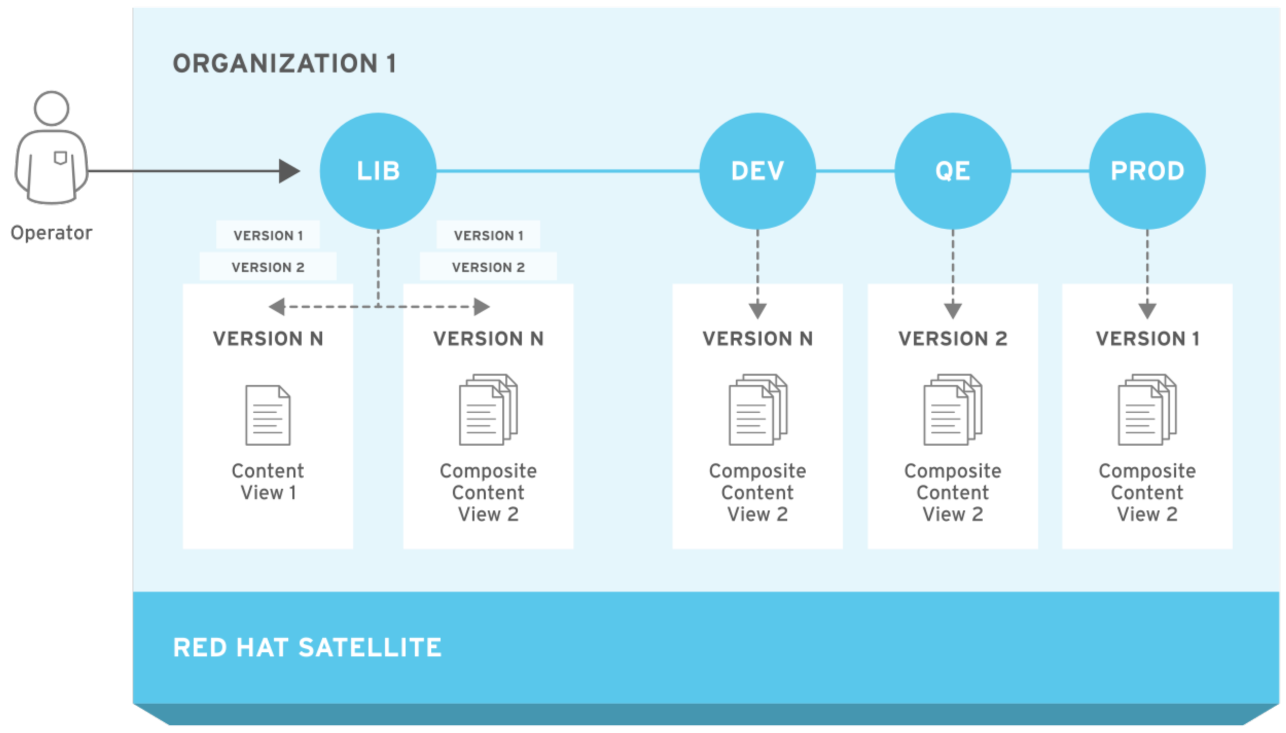
- Development
- Testing
- Beta Release
- Production

Ultimately, the stages in an application life cycle depend on your organization and its software development methods. However, Red Hat Satellite 6 provides methods to customize each application life cycle stage so that it suits your specifications.

Each stage in the application life cycle is called an **environment** in Red Hat Satellite 6. Each environment uses a specific collection of content. Red Hat Satellite 6 defines these content collections as a **content view**. Each **content view** acts as a filter where we can define what repositories, packages, and Puppet modules to include in a particular environment. This provides a method for you to define specific sets of content to designate to each environment.

The concept of the application life cycle depends on a certain level of progression. For example, environments in the early stages of an application life cycle might use newer and pre-release packages for development and testing of new features. Likewise, environments in the later stages might use only stable packages to suit production-level software. If the packages in development pass testing, you can promote the development content view across the application life cycle so that it becomes the content view for the production environment. This ensures that your application life cycle progresses with the development of your application.

Figure 1.1. The Red Hat Satellite 6 Application Life Cycle



1.3. DEFINING CONTENT MANAGEMENT TYPES

Red Hat Satellite 6 manages different content types. This includes:

RPM Packages

Red Hat Satellite 6 provides a method to import RPM files from repositories related to your Red Hat subscriptions. This means the Satellite Server downloads the RPM files from Red Hat's Content Delivery Network and stores them locally. You can use these repositories and their RPM files in content views.

Kickstart Trees

Red Hat Satellite 6 obtains the kickstart trees for creating a new system. New systems access these kickstart trees over a network to use as base content for their installation. Red Hat Satellite 6 also contains some predefined kickstart templates (and the ability to create your own), which are used to provision new systems and customize the installation.

ISO and KVM Images

Red Hat Satellite 6 downloads and manages media for installation and provisioning. For example, Satellite downloads, stores and manages ISO images and KVM guest images for specific Red Hat Enterprise Linux versions.

Puppet Modules

Red Hat Satellite 6 offers the ability to upload Puppet modules alongside RPM content so that it can configure the system's state after provisioning. Users can also manage Puppet classes and parameters as part of the provisioning process.

Container Images

Red Hat Satellite 6 can act as a registry for container images. This provides a method to create containers using Red Hat Enterprise Linux Atomic Host.

OSTree

Red Hat Satellite 6 can import OSTree branches and publish this content to a HTTP location.

1.4. DEFINING OUR SCENARIO

This guide uses an example scenario to demonstrate Red Hat Satellite 6's features. In this scenario, a software development company called **ACME** recently installed Red Hat Satellite 6 and its system administrators want to start importing and managing Red Hat content. The end goal for ACME is to:

- Have a set of content sources imported for their organization. This includes content from their Red Hat subscription and their own custom content.
- Have an application life cycle defined based on their software development process.
- Have their Satellite Server ready so they can provision new Red Hat Enterprise Linux hosts and register existing Red Hat Enterprise Linux hosts.

This guide only focuses on content management. Further features, such as host provisioning, environment architecture, and Satellite Server management, are covered in other guides in the Red Hat Satellite 6 series.

This guide provides both steps for using either the Red Hat Satellite 6 Web UI or its CLI tool (**`hammer`**). Use either depending on your preferred method of interacting with Red Hat Satellite 6. If using the CLI and do not want to include authentication details each time you run the **`hammer`** command, create a CLI configuration file for the local user:

```
# mkdir ~/.hammer
# cat > .hammer/cli_config.yml <<EOF
:foreman:
    :host: 'https://satellite.example.com/'
    :username: 'admin'
    :password: 'p@55w0rd!'

EOF
```

IMPORTANT

All uses of the **`hammer`** command in this guide use the configuration file and omit the authentication details.

Some CLI commands can use the **`--async`** option to perform certain tasks asynchronously. For example, you can synchronize content and publish content views as a asynchronous task rather than monitoring it. This guide omits the **`--async`** so that users can monitor progress of tasks to completion. If including the **`--async`** option for certain tasks, make sure the task completes before moving on to the next task.

1.5. DEFINING CONTENT MANAGEMENT STORAGE

Red Hat Satellite 6 hosts repositories for RPM and Puppet content, including content synchronized with Red Hat's Content Delivery Network and your own custom repositories. Such repositories grow in size over time. This means you must estimate adequate size requirements to suit your environment and scale future requirements accordingly.

Red Hat Satellite 6 stores and manages repository content in **`/var/lib/pulp`**. It is recommended to mount this directory onto a large local partition that you can scale. For example, use Logical Volume Manager (LVM) to create this partition.

IMPORTANT

Do not mount **`/var/lib/pulp`** on an NFS share. Parts of Red Hat Satellite 6 use transient SQLite databases, which have issues over NFS. If you aim to use an NFS share, only mount the **`/var/lib/pulp/content`** directory, which contains the main source content units. Red Hat recommends the use of high-bandwidth, low-latency storage for the **`/var/lib/pulp`** file system. Red Hat Satellite has many operations that are I/O-intensive so usage of high-latency, low-bandwidth storage could result in performance degradation.

Red Hat Satellite 6 synchronize and stores packages from Red Hat's Content Delivery Network. This includes repositories for Red Hat Enterprise Linux and other Red Hat software. The recommended storage requirements for Red Hat content are as follows:

During Production Phase 1 of a major Red Hat Enterprise Linux version:

- At least 40GB for each binary package repository
- At least 80GB for each debug-info repository

After Production Phase 1 of a major Red Hat Enterprise Linux version:

- The estimated annual growth rates of these repositories are 10GB per binary package repository and 20GB per debug-info repository

For more information about Red Hat Production Phases, see "Red Hat Enterprise Linux Life Cycle".

NOTE

All repositories vary in size. These specifications are recommendations only, and should be adjusted according to the repositories you choose to synchronize.

Red Hat Satellite 6 provides users with the ability to create content views. Content views act as a snapshot of a user-defined content collection at a particular point in time. This provides a means to create customized content collections from preexisting repositories.

Each unit of content in a content view uses a symbolic link to the Definitive Media Library stored in the **`/var/lib/pulp/content`** directory. In addition, each repository in a content view contains metadata about the content belonging to the content view. This means a content view using a minimal number of packages uses a small amount of storage. However, the storage size adds up once you use multiple content views and a large number of packages per view.

For example, a content view using the Red Hat Enterprise Linux 7 RPMs repository might contain over 7000 packages. In terms of disk space, this might only result in less than 100MB of symbolic links. However, take into account the following:

- The number content views containing this repository
- The number of versions per content view
- The number of life cycle environments using the promoted view
- Any additional content, such as kickstart trees or Live CD content

To help reduce the amount of storage that content views consume, use the following recommendations:

- Remove unused versions of content views. If you are not using a content view in a life cycle environment and you have no intention of reusing it, delete it to reclaim the storage used.
- Use filters in content views. Filters limit the content that appears in a content view. This helps you define only the necessary content required for your view and excludes redundant content. This reduces the size of each content view significantly.
- Monitor the **`/var/lib/pulp/nodes`** directory. Red Hat Satellite 6 uses this directory to construct content views.
- Monitor the **`/var/lib/pulp/published`** directory. Red Hat Satellite 6 uses this directory to publish content views.

Red Hat Satellite 6 also uses the following databases for its content management components:

- **Main database** - PostgreSQL database stored in **`/var/lib/pgsql`**. The storage requirements depend on a number of factors including organizations, environments, registered systems, and content views.
- **Content database** - MongoDB database stored in **`/var/lib/mongodb`**. The storage requirements depend on the number of packages and content views for your Red Hat Satellite 6 environment. This usually takes a large amount of storage. Reserve at minimum 10GB for the Content database and plan for an estimated 5GB per repository. It is recommended to mount this directory onto a large local partition that you can scale. For example, use Logical Volume Manager (LVM) to create this partition.

IMPORTANT

Do not mount **`/var/lib/mongodb`** on an NFS share. Red Hat recommends the usage of high-bandwidth, low-latency storage for the **`/var/lib/mongodb`** file system. Red Hat Satellite has many operations that are I/O-intensive so usage of high-latency, low-bandwidth storage could result in performance degradation.

1.6. CHAPTER SUMMARY

In this chapter, we explored the base concept of content management in the context of Red Hat Satellite 6. This includes defining phases of the Red Hat Satellite 6 application life cycle and the different types of content that Red Hat Satellite 6 manages. This chapter also defined the scope of our example scenario and provided storage requirements to suit your content management needs.

The next chapter looks at creating organizations to store content.

CHAPTER 2. CREATING ORGANIZATIONS

Organizations divide Red Hat Satellite 6 resources into logical groups based on ownership, purpose, content, security level, or other divisions. You can create and manage multiple organizations through Red Hat Satellite 6, then divide and assign your Red Hat subscriptions to each individual organization. This provides a method of managing the content of several individual organizations under one management system. Here are some examples of organization management:

Single Organization

A small business with a simple system administration chain. In this case, we create a single organization for the business and assign content to it.

Multiple Organizations

A large company that owns several smaller business units. For example, a company with separate system administration and software development groups. In this case, we create organizations for the company and each of the business units it owns. This keeps the system infrastructure for each separate. We then assign content to each organization based on their needs.

External Organizations

A company that manages external systems for other organizations. For example, a company offering cloud computing and web hosting resources to customers. In this case, we might create an organization for the company's own system infrastructure and then an organization for each external business. We then assign content to each organization where necessary.

For our scenario, ACME acts as a single entity organization so the aim is to create and manage the organization for it. A default installation of Red Hat Satellite 6 provides a default organization called **Default_Organization**. However, this scenario steps through the creation and configuration of a custom organization for ACME.

IMPORTANT

If a new user is not assigned a default organization their access will be limited. To grant systems rights to users, assign them to a default organization and have them log out and log back in again.

2.1. CREATING AN ORGANIZATION

For Web UI Users

Navigate to **Administer > Organizations**. This displays the list of organizations that your Satellite Server currently manages.

Click **New Organization**.

A creation wizard appears with three sections:

Create Organization

Provide the base details for the organization. This includes:

- **Name** - A plain text name for the organization. For our scenario, use `ACME`.
- **Label** - A unique identifier for the organization. This is used for creating and mapping certain assets, such as directories for content storage. Use letters, numbers, underscores, and dashes, but no spaces. For our scenario, use `ACME` too.

- **Description** - An optional plain text description for our organization. For our scenario, use **`Our example organization`**.

Select Hosts

All hosts should have an organization. However, in some circumstances, hosts might become orphaned. For example, deleting an old organization might orphan its hosts. In these situations, you can assign orphaned hosts to your newly created organization if necessary. Choose **Assign All** to assign all orphaned hosts or **Manually Assign** to select which orphaned hosts to assign. In our scenario for ACME, no orphaned hosts should exist yet, so click **Proceed to Edit** to move to the **Edit Properties** section.

Edit Properties

This section allows us to assign certain infrastructure resources to our organization. This includes networking resources, installation media, kickstart templates, and other parameters. You can return to this screen at any time by navigating to **Administer > Organization** and then selecting an organization to edit. In terms of our scenario, no further configuration is required. However, we will return to this section later in this guide after we synchronize a kickstart tree.

After completing your organization creation, click **Submit**.

For CLI Users

```
# hammer organization create \
--name "ACME" \
--label "ACME" \
--description "Our example organization for managing content."
```

This creates your first organization.

2.2. SETTING THE CONTEXT

Before managing content in Red Hat Satellite 6, we must set the context. A context defines which organization to use for our content.

For Web UI Users

The **Context** menu is in the top-left corner of the screen. If you have not selected a context, the menu will say "Any Context". Hover over this menu, then select **ACME** for the **Organization** selector. This changes the context to our ACME organization.

For CLI Users

If using the CLI, ensure to include either **`--organization "ACME"`** or **`--organization-label "ACME"`** as an option at the end of your command. For example:

```
# hammer subscription list --organization "ACME"
```

This sets the context for each interaction through the CLI.

2.3. CHAPTER SUMMARY

This chapter showed how to create new organizations and set one as our context for content management.

The next chapter explores how Red Hat Satellite 6 imports your subscriptions into your organization. After the subscriptions are imported, so you can start managing Red Hat content.

CHAPTER 3. MANAGING SUBSCRIPTIONS

Red Hat Satellite 6 imports content from Red Hat's Content Delivery Network (CDN). To do this, the Satellite Server needs to know what product subscriptions are available so that it can find, access, and download from corresponding repositories. All subscription information is available in your Red Hat Customer Portal account. To import this information into Satellite, you create a **Subscription Manifest**.

A Subscription Manifest is a set of encrypted files that contains your subscription information. You import this manifest into your Satellite Server. The Satellite Server then uses this information to access the CDN and find what repositories are available.

For this chapter, we examine how to create a Subscription Manifest containing a subset of your subscriptions.

3.1. MANAGING MULTIPLE ORGANIZATIONS USING MULTIPLE MANIFESTS

You can have more than one manifest in a Satellite Server if you want to manage more than one organization. Satellite 6 requires a single manifest for each organization configured on the Satellite. The advantage of this is that since each organization maintains completely separate subscriptions, you can support multiple organizations each with their own Red Hat Network accounts.

3.2. ADDING A SATELLITE SERVER TO THE CUSTOMER PORTAL

The Red Hat Customer Portal provides access to your subscription information. The Customer Portal can also add Satellite Servers as subscription management applications. This is necessary so that the Customer Portal can assign subscriptions to the Satellite.

For this scenario, we aim to add our Satellite Server as a content distributor in the Customer Portal. Follow these steps:

1. Open https://access.redhat.com/ in your browser and log into your Customer Portal account.
2. Navigate to **Subscriptions**, which is in the top-left corner of the Customer Portal.
3. This page displays your subscription information. Scroll to the **Manage** section, which shows all systems registered to the Customer Portal. This section also displays **Subscription Management Applications**. Click **Satellite**.
4. This page lists our Satellite Servers. This includes any previously added Red Hat Satellite 5 or 6 Servers. For our scenario, this list should be empty. Click **Register a Satellite**.
5. The Customer Portal provides a form to enter basic details about your Satellite, including a **Name** and the **Version** of your Satellite Server. After entering these details, click **Register**.

The Customer Portal now has an entry for our Satellite Server. Now we can assign subscriptions on this page and create our Subscription Manifest.

3.3. CREATING A SUBSCRIPTION MANIFEST

The Customer Portal page for the Satellite Server provides the ability to collect a group of subscriptions and attach them to the server for distribution to managed systems. As mentioned, we create a Subscription Manifest for our Satellite Server. To attach subscriptions and create the manifest for ACME, follow these steps:

1. On the Customer Portal page for our Satellite, click **Attach a subscription**.

2. A list of your Red Hat product subscriptions appears. Select the products to assign to the Satellite's Subscription Manifest and also enter the **Quantity** for each selected product. For our scenario, select a subscription for Red Hat Enterprise Linux 7 and enter 10 for the quantity. Click **Attach Selected** to complete the assignment.

3. The Customer Portal encodes the chosen subscription certificates and creates a `.zip` archive, which is our ACME Subscription Manifest. Click **Download manifest** to obtain the manifest.

Now we have a Subscription Manifest, which we upload into our Satellite Server.

3.4. IMPORTING A SUBSCRIPTION MANIFEST INTO THE SATELLITE SERVER

Both the Red Hat Satellite 6 Web UI and CLI provide methods for importing the manifest.

For Web UI Users

Make sure the context is set to the ACME organization and navigate to **Content > Red Hat Subscriptions**. In our scenario, this displays an empty page. Click **Manage Manifest** to display the manifest page for our organization. Click **Choose file**, select our Subscription Manifest, then click **Upload**. The Satellite Server uploads the manifest and, after a few minutes, reports a successful import in the **Manifest History** section.

For CLI Users

The Red Hat Satellite 6 CLI requires the manifest to be on the Satellite Server. On your local client system, copy the manifest to the Satellite Server:

```
[user@client ~]$ scp ~/<manifest_file>.zip root@satellite.example.com:~/.
```

Then import it using the following command:

```
[root@satellite ~]# hammer subscription upload \
--file ~/<manifest_file>.zip \
--organization "ACME"
```

After a few minutes, the CLI reports a successful manifest import.

3.5. UPDATING AND REFRESHING A MANIFEST

NOTE

Manifests should not be deleted. If you delete the manifest from the Red Hat Customer Portal or in the Satellite Web UI it will unregister all of your content hosts.

You can add and remove subscription to a manifest in the customer portal and then add the updated manifest to your Satellite in one of three ways:

- By using the refresh button in the Satellite web UI as follows: In the web UI, navigate to **Content** > **Red Hat Subscriptions** > **Manage Manifests** and select the **Refresh Manifest** button.

- By downloading it from the customer portal and uploading it in the Satellite web UI as follows: In the web UI, navigate to **Content** > **Red Hat Subscriptions** > **Manage Manifests** and click **Choose file**. Select the Subscription Manifest, and then click **Upload**.

- By downloading it from the customer portal and uploading it to Satellite Server using the CLI as follows:

```
# hammer subscription upload --file ~/<manifest_file>.zip
```

3.6. CHAPTER SUMMARY

This chapter showed how to use a Subscription Manifest to take subscription information from the Red Hat Customer Portal and import it into our Satellite Server.

The next chapter looks at how to start importing content, specifically Red Hat’s RPM repositories.

CHAPTER 4. IMPORTING RED HAT CONTENT

Our Satellite Server now has the necessary subscription information imported. We are ready to add content to our system. For this chapter, we explore the concept of a Definitive Media Library (DML) and how to synchronize content to create our DML.

4.1. CREATING A DEFINITIVE MEDIA LIBRARY

A DML is a repository that stores and protects the definitive, authorized versions of software and configurations. In other words, the DML acts as a master version of any content imported into the Satellite. This includes Red Hat content, such as RPM files, kickstart trees, and ISO images. As mentioned in Section 1.1, "Overview of Red Hat Satellite 6 Content Management", Red Hat Satellite 6 stores and manages content in a DML.

4.2. USING PRODUCTS AND REPOSITORIES IN SATELLITE

In Satellite, we use the concept of a **Product** as an organizational unit to group multiple repositories together. Such repository collections are analogous to the concept of real life products. For example, if we view Red Hat Enterprise Linux Server as a Product in Satellite, the repositories for that product might consist of different versions (6.0, 6.1, 7.0), different architectures (i386, x86_64, s390x, arm), and different add-ons (Optional repositories, Supplementary repositories, Virt V2V tools). This unifies all related repositories within the DML. Using Products ensures repositories that depend on each other are synchronized together. For Red Hat repositories, products are created automatically after enabling the repository.

In this chapter, our aim is to start creating our DML using Red Hat content. To do this, we synchronize our DML with Red Hat's Products and their repositories.

4.3. SYNCHRONIZING CONTENT

Once we choose which repositories form our DML, the Satellite Server synchronizes its own repositories with the repositories on the Red Hat CDN. This ensures that the Satellite Server retains an exact copy of Red Hat's repositories as a part of its DML. The Satellite Server fetches this repository information and stores it on the Satellite Server's file system. After an initial synchronization, you can create a synchronization plan that checks to make sure the repositories in the DML is up to date with the CDN's repositories.

It is possible to perform an initial synchronization using ISO images. See Appendix C, *Importing Content ISOs into a Connected Satellite* for more information on using Content ISOs. For locations with bandwidth limitations, using an **On Demand** or **Background** download policy as described below might be quicker than downloading and importing Content ISOs.

4.4. USING DOWNLOAD POLICIES

The Satellite Server provides multiple download policies for synchronizing RPM content. For example, you might aim to save time and only download the content metadata while deferring the actual content download for later. The Satellite Server offers the following policies:

- **Immediate** - Satellite Server downloads all metadata and packages during synchronization.
- **On Demand** - Satellite Server only downloads the metadata during synchronization. The server only fetches and stores packages on the file system when clients request them.

- **Background** - Satellite Server creates a background task to download all packages after the initial synchronization.

The latter two policies act as a *Lazy Synchronization* feature because they save time synchronizing content. The lazy sync feature must only be used for **yum** repositories.

All repositories stored in the Satellite Server use a download policy and you can change the download policy to suit your needs.

4.5. SELECTING RED HAT REPOSITORIES TO SYNCHRONIZE

The first step in selecting the repositories to synchronize is to identify the product that contains the repository, then enable that repository based on release version and base architecture.

IMPORTANT

If using a Disconnected Satellite, you need to import the Content ISOs for Red Hat Satellite and change the CDN URL on the Satellite Server before synchronizing content. For more information, see Appendix B, *Importing Content ISOs into a Disconnected Satellite*.

For Web UI Users

Navigate to **Content** > **Red Hat Repositories**. This displays a set of tabs for different content types. Each tab contains a list of products. The **RPMs** should be the default tab upon loading this page. This tab contains list of all subscribed products that provide RPM content.

The relationship between products and specific repositories is connected through a cascading hierarchy. Select a product and this opens a list of repository sets for that product. Select a repository set and this opens a list of repositories that you can enable. For our scenario, select **Red Hat Enterprise Linux Server**, then **Red Hat Enterprise Linux 7 Server (RPMs)**, then enable **Red Hat Enterprise Linux 7 Server RPMs x86_64 7Server**. This enables the latest RPM files for Red Hat Enterprise Linux 7.

NOTE

The difference between associating Red Hat Enterprise Linux Operating System with either 7 Server repositories or 7.X repositories is that 7 Server repositories contain all the latest updates while Red Hat Enterprise Linux 7.X repositories stop getting updates after the next minor version release. Note that Kickstart repositories only have minor versions.

For CLI Users

The relationship between products and repositories is the same. Search for your product with the following command:

```
# hammer product list --organization "ACME"
```

List the repository set for the product:

```
# hammer repository-set list \
--product "Red Hat Enterprise Linux Server" \
--organization "ACME"
```

This displays the repositories in the product’s repository set, including their name and ID number. Enable the repository using either the name or ID number. Also include the release version (**`7Server`**) and base architecture (**`x86_64`**). For example:

```
# hammer repository-set enable \
--name "Red Hat Enterprise Linux 7 Server (RPMs)" \
--releasever "7Server" \
--basearch "x86_64" \
--product "Red Hat Enterprise Linux Server" \
--organization "ACME"
```

For this scenario, use either the Web UI or the CLI to enable the following repositories for ACME:

Repository	Type	Description
Red Hat Enterprise Linux 7 Server RPMs x86_64 7Server	RPM	Repositories for the latest version of Red Hat Enterprise Linux 7. Use the **`7 Server`** repository instead of the **`7.2`** repository so that you receive continuous package updates.
Red Hat Satellite Tools 6.2 for RHEL 7 Server RPMs x86_64	RPM	The Satellite Tools repository, which contains system management agents and tools for client systems. After provisioning a new system, Satellite installs tools such as **`katello-agent`** and Puppet to the client. Use the **`7 Server`** repository instead of the **`7.2`** repository so that you receive continuous package updates.
Red Hat Enterprise Linux 7.2 Kickstart x86_64 7Server	Kickstart	The kickstart tree for Red Hat Enterprise Linux 7.2. Use this as installation media for provisioning new systems over PXE.

These repositories will provide some initial content for our scenario’s DML. You can select more repositories based upon your needs.

NOTE

For this scenario, all repositories use **`x86_64`** as the base architecture.

4.6. SYNCHRONIZING RED HAT REPOSITORIES

We have enabled specific repositories to form our initial DML. Now we synchronize the repositories with the Red Hat CDN’s repositories.

For Web UI Users

Navigate to **Content > Products** and select **Red Hat Enterprise Linux Server**. This displays all enabled repositories in our product. Select all repositories and click **Sync Now**. You can also view the progress of the synchronization in the Web UI. Navigate to **Content > Sync Status** and expanding the Product/Repository tree (or click **Expand All**).

For CLI Users

Synchronize the enabled repositories in the Red Hat Enterprise Linux Server product:

```
# hammer product synchronize \
--name "Red Hat Enterprise Linux Server" \
--organization "ACME"
```

You can also synchronize each repository individually. List all repositories in the product, then synchronize using the ID number for the corresponding repositories. For example:

```
# hammer repository list \
--product "Red Hat Enterprise Linux Server" \
--organization "ACME"
# hammer repository synchronize \
--name "Red Hat Enterprise Linux 7 Server RPMs x86_64 7Server" \
--product "Red Hat Enterprise Linux Server" \
--organization "ACME"
```

The synchronization duration depends on the size of each repository and the speed of your network connection. The following table provides estimates of how long it would take to synchronize content, depending on the available Internet bandwidth:

	Single Package (10Mb)	Minor Release (750Mb)	Major Release (6Gb)
256 Kbps	5 Mins 27 Secs	6 Hrs 49 Mins 36 Secs	2 Days 7 Hrs 55 Mins
512 Kbps	2 Mins 43.84 Secs	3 Hrs 24 Mins 48 Secs	1 Day 3 Hrs 57 Mins
T1 (1.5 Mbps)	54.33 Secs	1 Hr 7 Mins 54.78 Secs	9 Hrs 16 Mins 20.57 Secs
10 Mbps	8.39 Secs	10 Mins 29.15 Secs	1 Hr 25 Mins 53.96 Secs
100 Mbps	0.84 Secs	1 Min 2.91 Secs	8 Mins 35.4 Secs
1000 Mbps	0.08 Secs	6.29 Secs	51.54 Secs

A manual synchronization is often required for the initial content import into the DML. However, it is recommended create a synchronization plan to ensure that our DML is kept up to date on a regular basis.

NOTE

Once the synchronization completes, the kickstart repository appears in Red Hat Satellite 6’s list of installation media and is assigned to your organization. To view this, navigate to **Hosts > Installation Media**.

NOTE

You can change the download policy for a Red Hat repository. Select a repository in the **Red Hat Enterprise Linux Server** product and scroll to the **Download Policy** field. If using the CLI, use the **hammer repository update** command with the **--download-policy** option.

4.6.1. Limiting Synchronization Speed

You can control the speed of synchronization to avoid exhaustion of available bandwidth and prevent other performance issues. This is done by configuring **PULP_CONCURRENCY** and **max_speed** parameters. Note that these settings are overwritten on an upgrade. It is recommended to backup changed files prior to an upgrade to be able to restore the configuration.

1. To control the number of synchronization jobs that run in parallel, configure the **PULP_CONCURRENCY** parameter in the **/etc/default/pulp_workers** file. For example, to set the number of jobs that run in parallel to 1, change **PULP_CONCURRENCY** to 1:

   ```
   PULP_CONCURRENCY=1
   ```

   Default value for the **PULP_CONCURRENCY** parameter is **2**.

2. To set the maximum network speed for synchronizing in bytes per second, configure the **max_speed** parameter. This parameter must be configured separately for each importer in the **/etc/pulp/server/plugins.conf.d/** directory.

   a. For example, to set the maximum speed for synchronizing RPM content to 10 bytes per second, set the **"max_speed"** parameter in the **/etc/pulp/server/plugins.conf.d/yum_importer.json** file to 10:

   ```
   # cat /etc/pulp/server/plugins.conf.d/yum_importer.json
   {
       "proxy_host": null,
       "proxy_port": null,
       "proxy_username": null,
       "proxy_password": null,
       "max_speed": 10
   }
   ```

   b. Verify the syntax of the file after editing:

   ```
   # json_verify < /etc/pulp/server/plugins.conf.d/yum_importer.json
   JSON is valid
   ```

3. Restart Satellite services to apply the changes:

   ```
   # katello-service restart
   ```

4.7. CREATING A SYNCHRONIZATION PLAN

A synchronization plan checks and updates the content in your DML at a regularly scheduled date and time. Red Hat Satellite 6 provides users with the ability to create a synchronization plan and assign products to it.

For Web UI Users

Navigate to **Content > Sync Plans** and click **New Sync Plan**. The UI provides a set of fields where you can input details about your synchronization plan:

- **Name** - A plain text name for the plan. Enter **`Example Plan`**.
- **Description** - A plain text description of the plan. Enter **`Example Plan for ACME's repositories`**.
- **Interval** - Defines when to run the synchronization. Select **`daily`**.
- **Start Date** and **Start Time** - Defines when to run the synchronization. We already completed a synchronization today, so set the synchronization for tomorrow at 1:00 (1AM).

Click **Save** to create a plan. The plan details page displays along with two tabs for **Details** and **Products**.

Now add your products. Click the **Products** tab, then click **Add**. Select the **Red Hat Enterprise Linux Server** product and click **Add Selected**.

For CLI Users

Create the synchronization plan with the following command:

```
# hammer sync-plan create \
--name "Red Hat Products 2" \
--description "Example Plan for ACME's Red Hat Products" \
--interval daily \
--sync-date "2016-02-01 01:00:00" \
--enabled true \
--organization "ACME"
```

Then assign the Red Hat Enterprise Linux Server product to it:

```
# hammer product set-sync-plan \
--name "Red Hat Enterprise Linux Server" \
--sync-plan "Red Hat Products" \
--organization "ACME"
```

Now the Satellite Server checks its DML content against the Red Hat CDN on a daily basis and keeps its Red Hat repositories up to date.

4.8. CHAPTER SUMMARY

This chapter showed how to import Red Hat content into ACME’s Satellite Server and keep it up to date through synchronization plans.

The next chapter explores a importing custom content into the Satellite Server’s DML. This process is a little similar to importing Red Hat content except we create and manage custom products.

CHAPTER 5. IMPORTING CUSTOM CONTENT

The previous chapter examined how to import Red Hat content into the Definitive Media Library (DML). This chapter focuses on custom content, which differs slightly from Red Hat content. We create our own product beforehand, customize it, and add our own repositories. In addition, you can add Puppet modules to a custom repository.

5.1. USING CUSTOM PRODUCTS IN SATELLITE

In Section 4.2, “Using Products and Repositories in Satellite”, we explored the concept of a Product in Red Hat Satellite 6 and how it is used to group repositories together. Red Hat Satellite 6 also provides the ability to create custom Products so you can add multiple related repositories. Both Red Hat content and custom content in Red Hat Satellite 6 share some similarities:

- The relationship between a product and its repositories is the same and the repositories still require synchronization.
- Custom Products require a subscription for clients to access, similar to subscriptions to Red Hat Products. Red Hat Satellite 6 creates a new subscription for each custom Product you create.

In this chapter, we aim to create a product that contains two related repositories: an RPM repository containing RPM content and a Puppet repository for modules to configure the RPM content.

5.2. CREATING A CUSTOM PRODUCT

In our scenario, ACME is aiming to develop a product called *Exampleware*, which is a web-based application that requires a PostgreSQL database. ACME might aim to use production-level Exampleware in the field using PostgreSQL from the Red Hat Enterprise Linux repositories but test Exampleware with newer versions of PostgreSQL. For this situation, let’s create a custom product for PostgreSQL so that we can synchronize the newer versions.

For Web UI Users

Navigate to **Content** > **Products** and click **New Product**. A form for a new Product appears. Enter the following details:

- **Name** - The plain text name for the product. Enter **`PostgreSQL`**.
- **Label** - An internal ID for the product. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **GPG Key** - The GPG Key for the entire product. Leave this blank as we will import a GPG for a specific version of PostgreSQL and attach it to the repository instead of the product.
- **Sync Plan** - A synchronization plan for the product. We can attach this to the **`Example Plan`** we created in the previous chapter.
- **Description** - A plain text description of the product. Enter **`Content from PostgreSQL repositories`**.

When you have entered this information, click **Save**.

For CLI Users

Create the product with one command:

```
# hammer product create \
--name "PostgreSQL" \
--sync-plan "Example Plan" \
--description "Content from PostgreSQL repositories" \
--organization "ACME"
```

This creates a new product where we can create our own custom repositories and synchronize their content.

5.3. IMPORTING A CUSTOM GPG KEY

Before we create a custom product, we might need to create a custom GPG key. This is used to provide a certain level of security for RPM transactions with the PostgreSQL repository.

First download a copy of the version specific repository package to your client system. In our case, we download **`pgdg-redhat95`**:

```
[user@client ~]$ wget http://yum.postgresql.org/9.5/redhat/rhel-7-
x86_64/pgdg-redhat95-9.5-2.noarch.rpm
```

Extract the RPM file without installing it:

```
[user@client ~]$ rpm2cpio pgdg-redhat95-9.5-2.noarch.rpm | cpio -idmv
```

The GPG key is located relative to the extraction at **`etc/pki/rpm-gpg/RPM-GPG-KEY-PGDG-95`**.

For Web UI Users

Navigate to **Content > GPG keys**. Click **New Gpg Key**. Provide the GPG key with a name (**`PostgreSQL 9.5`**) and select **Upload GPG Key**. Click **Browse** and select the GPG key you extracted. Click **Save**.

For CLI Users

Copy the GPG key to your Satellite Server:

```
[user@client ~]$ scp ~/etc/pki/rpm-gpg/RPM-GPG-KEY-PGDG-95
root@satellite.example.com:~/.
```

Upload the GPG key to Satellite:

```
[root@satellite ~]# hammer gpg create \
--key ~/RPM-GPG-KEY-PGDG-95 \
--name "PostgreSQL 9.5" \
--organization "ACME"
```

Now we have a GPG key we can associate with our repository.

5.4. CREATING A CUSTOM RPM REPOSITORY

Normally, a production-level server would use the version of PostgreSQL included with Red Hat Enterprise Linux for stability purposes. However, ACME’s developers might aim to test Exampleware with a more recent version of PostgreSQL. In this instance, they can create a custom repository for a newer version of PostgreSQL.

For Web UI Users

We follow on from creating our custom PostgreSQL product. After creating our custom product, the repositories screen appears. Click **Create Repository**, which displays a form for a new repository. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`PostgreSQL 9.5`**.
- **Label** - An internal ID for the repository. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Type** - The type of repository. You can choose either a repository for RPM files (**`yum`**), Puppet modules (**`puppet`**), or Docker images (**`docker`**). For our scenario, select **`yum`**. A new set of fields appear.
- **URL** - The URL of the external repository to use as a source. Enter **`http://yum.postgresql.org/9.5/redhat/rhel-7-x86_64/`**.
- **Download Policy** - Determines the type of synchronization the Satellite Server performs. Select **`Immediate`**. See Section 4.4, “Using Download Policies” for more information.
- **Mirror on Sync** - Ensures the content that is no longer part of the upstream repository is removed during synchronization. Leave this checked, which is the default.
- **Checksum** - The checksum for the repository. For this example, leave this as the **`Default`**, which defaults to SHA256. This is the checksum required for Red Hat Enterprise Linux 7. For Red Hat Enterprise Linux 5 or previous versions, select SHA1 for the checksum.
- **Publish via HTTP** - Enables this repository for publication through HTTP. This option is automatically selected.
- **GPG Key** - The GPG Key for this repository. Select the PostgreSQL 9.5 GPG key we created previously.

Click **Save** to save this repository entry.

The repository uses the synchronization plan to periodically keep it up to date. However, let’s perform an initial synchronization. Select the PostgreSQL 9.5 repository and click **Sync Now**. This starts a task to synchronize our repository with the external PostgreSQL repository.

NOTE

Monitor the progress of this synchronization on the **Content** > **Sync Status** page.

For CLI Users

Run the following command to create the repository:

```
# hammer repository create \
--name "PostgreSQL 9.5" \
--content-type "yum" \
--publish-via-http true \
--url http://yum.postgresql.org/9.5/redhat/rhel-7-x86_64/ \
--gpg-key "PostgreSQL 9.5" \
--product "PostgreSQL" \
--organization "ACME"
```

Then synchronize the repository:

```
# hammer repository synchronize \
--name "PostgreSQL 9.5" \
--product "PostgreSQL" \
--organization "ACME"
```

Now we have a synchronized copy of PostgreSQL 9.5. Let’s take this a step further and include a Puppet module to configure a PostgreSQL server.

NOTE

The Products page in the Web UI also provides a **Repo Discovery** function that finds all repositories from a URL and allows you to select which ones to add to your custom Product. For example, you can use the **Repo Discovery** to search **`http://yum.postgresql.org/9.5/redhat/`** and list all PostgreSQL 9.5 repositories for different Red Hat Enterprise Linux versions and architectures. This helps users save time importing multiple repositories from a single source.

IMPORTANT

Red Hat does not support the upstream RPMs directly from the PostgreSQL site. These RPMs are used to demonstrate the synchronization process. For any issues with these RPMs, contact the developers for PostgreSQL.

5.5. CREATING A CUSTOM PUPPET REPOSITORY

Custom products can also include repositories for Puppet modules. This provides a method to incorporate state configuration of hosts.

First, let’s create a repository for our PostgreSQL product.

For Web UI Users

Make sure you are on the Product page (**Content > Products**). Click on the PostgreSQL product, which displays our repository listing. Click **Create Repository**, which displays a form for a new repository. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`PostgreSQL Puppet Modules`**.
- **Label** - An internal ID for the repository. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Type** - The type of repository. Select **`puppet`** and a URL field appears.
- **URL** - The URL of the external repository to use as a source. We will manually import our Puppet module, but you can use a repository source to synchronize your own Puppet modules.

Click **Save** to save this repository entry.

For CLI Users

Use the following command to create our Puppet module repository:

```
# hammer repository create \
--name "PostgreSQL Puppet Modules" \
--content-type "puppet" \
--product "PostgreSQL" \
--organization "ACME"
```

Now we have a custom repository for our Puppet modules. Let’s add one now.

5.6. MANAGING INDIVIDUAL PUPPET MODULES

For this scenario, we manually import a Puppet module for configuring PostgreSQL.

Download this module from the Puppet Forge site (https://forge.puppetlabs.com/puppetlabs/postgresql). Open the page in your browser and click **download latest tar.gz** to save to your local file system.

For Web UI Users

Make sure you are on the repository listing page for the PostgreSQL product. Click on the PostgreSQL Puppet Modules repository, which displays the details page for that repository.

Scroll to the **Upload Puppet Module** section, click **Browse**, select the PostgreSQL Puppet Module we downloaded previously, and click Upload. After a few seconds, the Satellite Server reports **`Content successfully uploaded`**.

NOTE

Click on the **Manage Puppet Modules** page to manage and remove Puppet modules from a product.

For CLI Users

Copy the Puppet module to your Satellite Server’s file system:

```
[user@client ~]$ scp ~/<puppet_module>.tar.gz
root@satellite.example.com:~/.
```

Import the Puppet module to the PostgreSQL Puppet Modules repository:

```
[root@satellite ~]# hammer repository upload-content \
--path ~/<puppet_module>.tar.gz \
--name "PostgreSQL Puppet Modules" \
--product "PostgreSQL" \
--organization "ACME"
```

Now we have a custom repository that contains both RPM content and a Puppet module to install and configure a server using the RPM content.

IMPORTANT

Red Hat does not support the modules from Puppet Forge. The PostgreSQL module is used to demonstrate the module management process. For any issues with these modules, contact the module developer.

5.7. SYNCHRONIZING PUPPET REPOSITORIES

In addition to creating a repository of uploaded Puppet modules, the Satellite Server can synchronize a complete Puppet module repository. In this example, the Satellite Server synchronizes the entire Puppet Forge repository.

For Web UI Users

Navigate to **Content > Products** and click **New Product**. A form for a new Product appears. Enter the following details:

- **Name** - The plain text name for the product. Enter **`Puppet Forge`**.
- **Label** - An internal ID for the product. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **GPG Key** - The GPG Key for the entire product. Leave this blank.
- **Sync Plan** - A synchronization plan for the product. We can attach this to the **`Example Plan`** we created in the previous chapter.
- **Description** - A plain text description of the product. Enter **`All modules from Puppet Forge`**.

When you have entered this information, click **Save**.

After creating our custom product, the repositories screen appears. Click **Create Repository**, which displays a form for a new repository. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`Puppet Forge Modules`**.
- **Label** - An internal ID for the repository. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Type** - The type of repository. Select **`puppet`** and a URL field appears.
- **URL** - The URL of the external repository to use as a source. Enter **`http://forge.puppetlabs.com/`**.

Click **Save** to save this repository entry.

Select the **`Puppet Forge Modules`** repository and click **Sync Now**. This imports all modules from Puppet Forge into the Satellite Server.

For CLI Users

Create the product:

```
# hammer product create \
--name "Puppet Forge" \
--sync-plan "Example Plan" \
--description "All modules from Puppet Forge" \
--organization "ACME"
```

Create the Puppet Forge repository:

```
# hammer repository create \
--name "Puppet Forge Modules" \
--content-type "puppet" \
--product "Puppet Forge" \
--organization "ACME" \
--url http://forge.puppetlabs.com/
```

Synchronize the repository:

```
# hammer repository synchronize \
--name "Puppet Forge Modules" \
--product "Puppet Forge" \
--organization "ACME"
```

NOTE

The Puppet Forge repository contains several thousand modules and can take a long time to synchronize.

IMPORTANT

Red Hat does not support the modules from Puppet Forge. The modules are used to demonstrate the synchronization process. For any issues with these modules, contact the module developer.

5.8. SYNCHRONIZING PUPPET MODULES FROM A GIT REPOSITORY

Red Hat Satellite 6 includes a utility called **`pulp-puppet-module-builder`**, which you can install on other systems from the **`pulp-puppet-tools`** RPM. This tool checks out a Git repository, builds all the modules, and publishes them in a structure that Satellite 6 can synchronize. One common method is to run the utility on the Satellite Server itself, publish to a local directory, and synchronize against that directory. For example:

```
# mkdir /modules
# chmod 755 /modules
# pulp-puppet-module-builder \
--output-dir=/modules \
--url=git@mygitserver.com:mymodules.git \
--branch=develop
```

This checks out the **`develop`** branch of the Git repository from **`git@mygitserver.com:mymodules.git`** and publishes it to **`/modules`**. Add this directory as the URL (**`file:///modules`**) for a new repository on the Satellite Server. For example:

For Web UI Users

Open a custom product (in this case, we will use **`MyProduct`** as an example) and click **Create Repository**. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`Modules from Git`**.
- **Label** - An internal ID for the repository. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Type** - The type of repository. Select **`puppet`** and a URL field appears.
- **URL** - The URL of the external repository to use as a source. Enter **`file:///modules`**.

For CLI Users

Create the Puppet Forge repository:

```
# hammer repository create \
--name "Modules from Git" \
--content-type "puppet" \
--product "MyProduct" \
--organization "ACME" \
--url file:///modules
```

NOTE

The same process also applies to publishing modules on a remote HTTP server. For example, if you use **`webserver.example.com`** as a standard web host to publish the Puppet modules, log into the host and run the following commands:

```
# mkdir /var/www/html/modules/
# chmod 755 /var/www/html/modules/
# pulp-puppet-module-builder \
--output-dir=/var/www/html/modules/ \
--url=git@mygitserver.com:mymodules.git \
--branch=develop
```

On the Satellite Server, set the repository's URL to **`http://webserver.example.com/modules/`**.

5.9. CHAPTER SUMMARY

This chapter demonstrated how to create custom repositories for non-Red Hat content. This includes RPM files and Puppet modules.

At this point we have all our base content imported into our Satellite Server's DML. This means we can start using it in our application life cycle.

The next chapter looks at developing an application life cycle to match the development and production process of ACME.

CHAPTER 6. CREATING AN APPLICATION LIFE CYCLE

In Section 1.2, "Defining the Application Life Cycle", we defined what an application life cycle is and why it is important to Red Hat Satellite 6. In this chapter, we take a closer look at planning the application life cycle and implementing it in Red Hat Satellite 6.

6.1. REVISITING THE APPLICATION LIFE CYCLE

As we discussed, the application life cycle defines how systems appear at a certain stage. However, the actual application life cycle depends on your organization and how it structures a particular production chain.

For example, an email server might only require a simple application life cycle where you have a production-level server for real world use and a test server for trying out the latest mail server packages. Once the test server passes the initial phase, we can set the production-level server to use the new packages.

Another example might be an development life cycle for a software product. You might aim to develop a new piece of software in a development environment, have it tested in a quality assurance environment, pre-release it as a beta, then release it as a production-level application.

Each application life cycle uses a set of stages called **environments**. Each environment act as a particular state for our systems. Each environment also follows on from a previous environment, creating a chain of environments that becomes our application life cycle. Each application life cycle starts with an initial **Library**, which acts as a central source in our Definitive Media Library (DML). The Library environment contains all of the content we previously synchronized in our previous chapters. From this point, we create additional environments that link starting from the Library environment.

6.2. CREATING A NEW APPLICATION LIFE CYCLE

For our scenario, we aim to create simple application life cycle for developing and releasing ACME's Exampleware. We use the Library environment as our initial environment, then chain an additional three environments in this order: **Development**, **Testing**, and **Production**.

For Web UI Users

Navigate to **Content > Lifecycle Environments**. This screen displays the current environments in your application life cycle. At the moment, only the Library environment exists.

Click **New Environment Path** to start a new application life cycle. A form appears for adding a new environment to Library. Enter **`Development`** for the **Name** and the **Label** automatically completes. Enter **`Environment for ACME's Development Team`** for the **Description**. Click **Save**.

We return to the environments listing. A new table appears with our Development environment. This new table represents our new application life cycle. Now we add the rest of the environments to the application life cycle.

Click **Add New Environment** just above the new table. This time, enter **`Testing`** for **Name** and **`Environment for ACME's Quality Engineering Team`** for the **Description**. Click **Save**.

Finally, click **Add New Environment** again. Enter **`Production`** for **Name** and **`Environment for ACME's Product Releases`** for the **Description**. Click **Save**.

The final application life cycle appears as a table with our three environments: **Development**, **Testing**, and **Production**.

For CLI Users

Run the **`hammer lifecycle-environment create`** for each environment. Use the **`--prior`** option to specify the previous environment. For example:

```
# hammer lifecycle-environment create \
--name "Development" \
--description "Environment for ACME's Development Team" \
--prior "Library" \
--organization "ACME"
# hammer lifecycle-environment create \
--name "Testing" \
--description "Environment for ACME's Quality Engineering Team" \
--prior "Development" \
--organization "ACME"
# hammer lifecycle-environment create \
--name "Production" \
--description "Environment for ACME's Product Releases" \
--prior "Testing" \
--organization "ACME"
```

View your chain with the **`hammer lifecycle-environment paths`** command:

```
# hammer lifecycle-environment paths --organization "ACME"
------------------------------------------------
LIFECYCLE PATH
------------------------------------------------
Library >> Development >> Testing >> Production
------------------------------------------------
```

6.3. PROMOTING CONTENT ACROSS THE APPLICATION LIFE CYCLE

Content moves from one environment to the next in an application life cycle chain. This is a process called **promotion**. Promotion is an important concept to understand because it is the basis for managing content across an application life cycle.

For our scenario, let’s say that ACME’s Exampleware is in full development and production. ACME packages their Exampleware content into a RPM file, which becomes part of a separate product. In this situation, ACME might have version 1.0 of Exampleware released, which means **`exampleware-1.0-0.noarch.rpm`** is in the Production environment.

ACME wants to release a patch for Exampleware, so they start development on version 1.1 of Exampleware. In this instance, the environments in the application life cycle would contain the following version of Exampleware:

Development	Testing	Production
exampleware-1.1-0.noarch.rpm	exampleware-1.0-0.noarch.rpm	exampleware-1.0-0.noarch.rpm

After completing development on the patch, ACME promotes the RPM to the Testing environment so ACME’s Quality Engineering team can review the patch. The application life cycle then contains the following package versions in each environment:

Development	Testing	Production
exampleware-1.1-0.noarch.rpm	**exampleware-1.1-0.noarch.rpm**	exampleware-1.0-0.noarch.rpm

While the Quality Engineering team reviews the patch, the Development team starts work on Exampleware 2.0. This results in the following application life cycle:

Development	Testing	Production
exampleware-2.0-0.noarch.rpm	exampleware-1.1-0.noarch.rpm	exampleware-1.0-0.noarch.rpm

The Quality Engineering team completes their review of the patch. Now Exampleware 1.1 is ready for release. ACME promotes 1.1 to the Production environment:

Development	Testing	Production
exampleware-2.0-0.noarch.rpm	exampleware-1.1-0.noarch.rpm	**exampleware-1.1-0.noarch.rpm**

The Development team completes their work on Exampleware 2.0 and promotes it to the Testing environment:

Development	Testing	Production
exampleware-2.0-0.noarch.rpm	**exampleware-2.0-0.noarch.rpm**	exampleware-1.1-0.noarch.rpm

Finally, the Quality Engineering team reviews the package. After a successful review, we promote the package to the Production environment:

Development	Testing	Production
exampleware-2.0-0.noarch.rpm	exampleware-2.0-0.noarch.rpm	**exampleware-2.0-0.noarch.rpm**

This example demonstrates the mapping of ACME’s development process into a Red Hat Satellite 6 application life cycle. Each environment contains a set of systems registered to Red Hat Satellite 6. These systems only have access to repositories relevant to their environment. When we promote packages from one environment to the next, the target environment’s repositories receive new package versions. As a result, each system in the target environment can update to the new package versions.

Another concept we will explore in the next chapter is **content views**. A content view is essentially a collection of content gathered and filtered from the Library and published in its own repository. The Red Hat and custom repositories we synchronized previously act as source content, while the content views customize exactly how the end repositories appear. Content views contain packages and the Satellite Server promotes content views across environments in the application life cycle. An environment might use one content view (Version 1.0) but then might receive a new version of the content view (Version 1.1). The repositories from Version 1.0 are replaced with the repositories for Version 1.1, which might include a new version of the Exampleware RPMs.

6.4. CHAPTER SUMMARY

This chapter returned to the concept of the application life cycle and how it applied to Red Hat Satellite 6's content management. This chapter also explored how Red Hat Satellite 6 promoted content across the environments in the application life cycle.

The next chapter discusses content views and how they are used to create custom filtered repositories from our existing DML.

CHAPTER 7. CREATING CONTENT VIEWS

Red Hat Satellite 6 uses content views to create customized repositories from the core repositories in your Definitive Media Library (DML). It achieves this through defining which repositories to use and then applying certain filters to the content. These filters include both package filters, package group filters, and errata filters. We use content views as a method to define which software versions a particular environment uses. As mentioned in the previous chapter, a Production environment might use a content view containing older package versions, while a Development environment might use a content view containing newer package versions.

Each content view creates a set of repositories across each environment, which the Satellite Server stores and manages. When we promote a content view from one environment to the next environment in the application life cycle, the respective repository on the Satellite Server updates and publishes the packages. For example, let’s say the we use a content view that contains our Exampleware package:

	Development	Testing	Production
Content View Version and Contents	Version 2 - exampleware-1.1-0.noarch.rpm	Version 1 - exampleware-1.0-0.noarch.rpm	Version 1 - exampleware-1.0-0.noarch.rpm

The repositories for Testing and Production contain the **`exampleware-1.0-0.noarch.rpm`** package. If we promote Version 2 of the content view from Development to Testing, the repository for Testing will regenerate and then contain the **`exampleware-1.1-0.noarch.rpm`** package:

	Development	Testing	Production
Content View Version and Contents	Version 2 - exampleware-1.1-0.noarch.rpm	**Version 2 - exampleware-1.1-0.noarch.rpm**	Version 1 - exampleware-1.0-0.noarch.rpm

This ensures systems are designated to a specific environment but receive updates when that environment uses a new version of the content view.

This chapter shows how to create different types of content views and apply various filters to them.

7.1. CREATING A SIMPLE CONTENT VIEW

For this example, we’ll create a simple content view using just two repositories and no filters. The repositories to include are the Red Hat Enterprise Linux repository and the Satellite Tools repository. Note that this content view contains all RPMs for Red Hat Enterprise Linux and takes several minutes to publish.

For Web UI Users

Navigate to **Content** > **Content Views** and click **Create New View**. This displays a form for **View Details**. Enter the following information:

- **Name** - The plain text name for the view. Enter **`Base`**.
- **Label** - An internal ID for the view. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.

- **Description** - A plain text description of the view. Enter **`Base operating system`**.
- **Composite View?** - Defines whether to use a Composite Content View. Leave this option deselected.

Click **Save** to complete.

This creates a new content view entry and now you can add repositories to it. Select the repositories for Red Hat Enterprise Linux 7 Server RPMs (not the Kickstart RPMs) and Red Hat Satellite Tools. Click **Add Repository**. This adds all packages from these repositories to the content view.

Our content view is ready to publish. Navigate to **Versions** and click **Publish New Version**. The Satellite Server provides some details about the new version (Version 1) and allows you to enter a **Description** for the version, which is useful to logging changes for new content versions. Enter **`Initial content view for our operating system`** and click **Save**.

The Satellite Server creates the new version of the view and publishes it to the Library environment.

For CLI Users

Obtain a list of repository IDs:

```
# hammer repository list --organization "ACME"
```

For our example, the two repositories we require are using 1 and 2 for their IDs:

ID	Name
1	Red Hat Enterprise Linux 7 Server RPMs x86_64 7Server
2	Red Hat Satellite Tools 6.2 for RHEL 7 Server RPMs x86_64

Create the content view and add repositories:

```
# hammer content-view create \
--name "Base" \
--description "Base operating system" \
--repository-ids 1,2 \
--organization "ACME"
```

Now publish the view:

```
# hammer content-view publish \
--name "Base" \
--description "Initial content view for our operating system" \
--organization "ACME"
```

The Satellite Server creates the new version of the view and publishes it to the Library environment.

7.2. CREATING A CONTENT VIEW WITH A PUPPET MODULE

For this example, we'll create another content view using one repository and no filters. The repository to include is the PostgreSQL repository.

For Web UI Users

Navigate to **Content > Content Views** and click **Create New View**. This displays a form for **View Details**. Enter the following information:

- **Name** - The plain text name for the view. Enter `Database`.
- **Label** - An internal ID for the view. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Description** - A plain text description of the view. Enter `PostgreSQL Database`.
- **Composite View?** - Defines whether to use a Composite Content View. Leave this option deselected.

Click **Save** to complete.

This creates a new content view entry. Select the repositories for PostgreSQL and click **Add Repository**. This adds all packages from the PostgreSQL repository to the content view.

Navigate to **Puppet Modules**. Click **Add New Module**. This shows all our imported Puppet modules. Scroll to the `postgresql` module and click **Select a Version**.

Scroll to the entry for **Use Latest** and click **Select Version** in the **Actions** column.

The Puppet module is now added to the content view. Let's publish a new version.

Navigate to **Versions** and click **Publish New Version**. Enter `Initial RPMs and Puppet module for database` in the **Description** and click **Save**.

The Satellite Server creates the new version of the view and publishes it to the Library environment.

For CLI Users

Obtain a list of repository IDs:

```
# hammer repository list --organization "ACME"
```

We only require the PostgreSQL RPM repository, not the Puppet module repository. In our example, we use the 4 for the ID of the PostgreSQL RPMs:

ID	Name
4	PostgreSQL 9.5

Create the content view and add repositories:

```
# hammer content-view create \
--name "Database" --description "PostgreSQL Database" \
--repository-ids 4 \
--organization "ACME"
```

Now publish the view:

```
# hammer content-view publish \
--name "Database" \
--description "Initial RPMs and Puppet module for database" \
--organization "ACME"
```

The Satellite Server creates the new version of the view and publishes it to the Library environment.

7.3. PROMOTING A CONTENT VIEW

The Satellite Server has published two content views and the repositories are now available to the Library environment. Let's promote one of these content views so the repository appears available to the other environments.

NOTE

Non-administrator users require two permissions to promote a content view to an environment:

1. **`promote_or_remove_content_views`**
2. **`promote_or_remove_content_views_to_environment`**.

The **`promote_or_remove_content_views`** permission restricts which content views a user is allowed to promote.

The **`promote_or_remove_content_views_to_environment`** permission restricts the environments to which a user is allowed to promote content views.

These permissions make it possible to designate that certain users are permitted to promote certain content views to certain environments, but not to other environments. For example, these permissions can be used to limit a user so that they are permitted to promote to test environments, but not to production environments. This provides a kind of multi-level authentication.

Both permissions must be assigned to a user to allow them to promote content views.

For Web UI Users

Make sure you're still on the **Versions** screen for the Database content view. In the versions table, scroll to **Version 1.0** of our view and click **Promote** in the Actions column. A new screen appears where you can select the target environment. Select the **Development** environment and click **Promote Version**. After a few minutes, the promotion completes.

Click on the **Promote** button again. This time select the **Testing** environment and click **Promote Version**.

Finally click on the **Promote** button once more. Select the **Production** environment and click **Promote Version**.

Now the repository for the content view appears in all environments.

For CLI Users

Promote the content view using the **`hammer content-view version promote`** each time:

```
# hammer content-view version promote \
--content-view "Database" \
--version 1 \
--to-lifecycle-environment "Development" \
--organization "ACME"
# hammer content-view version promote \
--content-view "Database" \
--version 1 \
--to-lifecycle-environment "Testing" \
--organization "ACME"
# hammer content-view version promote \
--content-view "Database" \
--version 1 \
--to-lifecycle-environment "Production" \
--organization "ACME"
```

Now the database content is available in all environments.

7.4. DEFINING CONTENT FILTERS

Content views also use filters to include or restrict certain RPM content. Without these filters, a content view includes everything from selected repositories.

Content filters are either one of the following types:

- **Include** - Defines the content to include in the view. This filter's behavior follows a pattern where you start with no content, then choose which content to add from the selected repositories. Use this filter to combine multiple content items.

- **Exclude** - Defines the content to exclude in the view. This filter's behavior follows a pattern where you start with all content from selected repositories, then choose which content to remove. Use this filter when you want to use most of a particular content repository but exclude certain packages, such as blacklisted packages. The filter uses all content in the repository except for the content you select.

NOTE

If using a combination of Include and Exclude filters, publishing a content view triggers the Include filters first, then the exclude filters. In this situation, select which content to include, then which content to exclude from the inclusive subset.

There are also four types of content to filter:

- **Package** - Filter packages based on their name and version number.

- **Package Group** - Select which package groups to add to the filter. The list of package groups is based on the repositories added to the content view.

- **Erratum (by ID)** - Select which specific errata to add to the filter. The list of Errata is based on the repositories added to the content view.

- **Erratum (by Date and Type)** - Select a issued or updated date range and errata type (Bugfix, Enhancement, or Security) to add to the filter.

IMPORTANT

Filters do not resolve any dependencies of the packages listed in the filters. Ensure to add package dependencies to the filter. This might require some level of testing to determine what dependencies are required.

Let’s look at some examples of using content filters.

Example 1

Create a repository with the base Red Hat Enterprise Linux packages. This filter requires a Red Hat Enterprise Linux repository added to the content view.

Filter:

- **Inclusion Type:** Include
- **Content Type:** Package Group
- **Filter:** Select only the **Base** package group

Example 2

Create a repository that excludes all errata, except for security updates, after a certain date. This is useful if your aim to perform system updates on a regularly scheduled basis with the exception of critical security updates, which should be applied immediately. This filter requires a Red Hat Enterprise Linux repository added to the content view.

Filter:

- **Inclusion Type:** Exclude
- **Content Type:** Erratum (by Date and Type)
- **Filter:** Select only the **Bugfix** and **Enhancement** errata types, and deselect the **Security** errata type. Set the **Date Type** to **Updated On**. Set the **Start Date** to the date you want to restrict errata. Leave the **End Date** blank to make sure any new non-security errata is filtered.

Example 3

A combination of Example 1 and Example 2 where we only require the Base OS packages but want to filter out recent bug fix and enhancement errata. This requires two filters attached to the same content view. The content view processes the Include filter first, then the Exclude filter.

Filter 1:

- **Inclusion Type:** Include
- **Content Type:** Package Group
- **Filter:** Select only the **Base** package group

Filter 2:

- **Inclusion Type:** Exclude
- **Content Type:** Erratum (by Date and Type)

- **Filter:** Select only the **Bugfix** and **Enhancement** errata types, and deselect the **Security** errata type. Set the **Date Type** to **Updated On**. Set the **Start Date** to the date you want to restrict errata. Leave the **End Date** blank to make sure any new non-security errata is filtered.

For another example of how content filters work, see the following article: "How do content filters work in Satellite 6"

7.5. CREATING A CONTENT FILTER

For our scenario, we aim to create a content filter that restricts errata items after a certain date for ACME's base operating system.

For Web UI Users

Navigate to **Content > Content Views** and select the **`Base`** content view. Navigate to **Yum Content > Filters** and click **New Filter**. Enter the following details for your filter:

- **Name** - **`Errata Filter`**
- **Content Type** - Erratum - Date and Type
- **Inclusion Type** - Exclude
- **Description** - **`Exclude errata items from the last year, with the exception of security updates`**

Click **Save**.

The **Erratum Date Range** screen appears, which allows you to select the errata type to filter and the date range. Select only **Enhancement** and **Bugfix**:

```
[ ] Security
[X] Enhancement
[X] Bugfix
```

For the **Date Type**, select either **Issued On** (the issued date of the erratum) or **Updated On** (the date of the erratum's last update). If the erratum has not been updated after the creation date, then the **Issued On** and **Updated On** date will be the same for that erratum. Note that **Issued On** just means that the errata items are filtered based on the issued date. The filter does not exclude any updates that have been made to that erratum.

For the **Start Date**, select today's date from one year ago.

For the **End Date**, leave this field blank.

Click **Save**.

NOTE

You can also choose which specific repositories use this filter. Select the **Affected repositories** tab to select these repositories. For this example, there is only one repository to use in our filter.

Our filter is complete. Click **Publish New Version** to publish the resulting repository. For the **Version Details** enter **`Adding errata filter`** in the **Description**. Click **Save**.

When the content view completes publication, notice the **Content** column reports a reduced number of packages and errata (except Security errata) from the initial repository. This means the filter successfully excluded the all non-security errata from the last year.

Promote this content view across all environments: **Development**, **Testing**, **Production**.

For CLI Users

Add a filter to the content view. Use the **`--inclusion false`** option to set the filter to an Exclude filter:

```
# hammer content-view filter create \
--name "Errata Filter" \
--type erratum --content-view "Base" \
--description "Exclude errata items from the last year, with the exception
of security updates" \
--inclusion false  \
--organization "ACME"
```

Add a rule to the filter:

```
# hammer content-view filter rule create \
--content-view "Base" \
--content-view-filter "Errata Filter" \
--start-date "2015-01-01" \
--types enhancement,bugfix \
--date-type updated \
--organization "ACME"
```

Publish the content view:

```
# hammer content-view publish \
--name "Base" \
--description "Adding errata filter" \
--organization "ACME"
```

Promote the view across all environments:

```
# hammer content-view version promote \
--content-view "Base" \
--version 1 \
--to-lifecycle-environment "Development" \
--organization "ACME"
# hammer content-view version promote \
--content-view "Base" \
--version 1 \
--to-lifecycle-environment "Testing" \
--organization "ACME"
# hammer content-view version promote \
--content-view "Base" \
--version 1 \
--to-lifecycle-environment "Production" \
--organization "ACME"
```

7.6. DEFINING COMPOSITE CONTENT VIEWS

A Composite Content View combines the content from several content views. For example, you might have separate content views to manage a base OS and an application individually. A Composite Content View allows you to merge the contents of both content views into a new repository. The repositories for the original content views still exist but a new repository now exists for the combined content.

As a use case scenario, a company might aim to develop an application that supports different database servers. The general application stack appears as:

Exampleware Stack
Application
Database
Operating System

The company might develop four individual content views:

- Red Hat Enterprise Linux (Operating System)
- PostgreSQL (Database)
- MariaDB (Database)
- Exampleware (Application)

The company can then create two Composite Content Views. One with a PostgreSQL database:

Composite Content View 1 - Exampleware on PostgreSQL
Exampleware (Application)
PostgreSQL (Database)
Red Hat Enterprise Linux (Operating System)

And one with MariaDB:

Composite Content View 2 - Exampleware on MariaDB
Exampleware (Application)
MariaDB (Database)
Red Hat Enterprise Linux (Operating System)

Each individual content view is then managed and published separately. When we create a new version of the application stack, we publish a new version of the Composite Content Views.

IMPORTANT

Composite Content Views do not allow more than one of each repository. For example, if you attempt to include two content views using the same repository in a Composite Content View, the Satellite Server reports an error.

7.7. CREATING A COMPOSITE CONTENT VIEW

Let's create a content view for ACME that combines our two existing content views.

For Web UI Users

Navigate to **Content > Content Views** and click **Create New View**. Provide the following details for the view:

- **Name** - `Stack`
- **Description** - `A stack that includes a base operating system and a database`
- **Composite View?** - Selected

The content view listing for the Composite Content View appears. Select both the Base and Database content views. Also, the Base content view contains two versions, which means we need to select a version. Select Version 2, which contains the errata filter. After selecting the content views and their versions, click **Add Content Views**.

Click **Publish New Version** to publish the Composite Content View. Enter `Initial version of Stack` for **Description** and click **Save**.

When the publication completes, notice that the **Content** column reports the total package, errata, and Puppet module count for all included content views.

Now **Promote** the Composite Content View across all environments: **Development**, **Testing**, **Production**.

As you can see, Composite Content Views are published and promoted across application life cycle environments similar to regular content views.

For CLI Users

Before we create the Composite Content Views, we need the version IDs for our existing content views:

```
# hammer content-view version list \
--full-results true \
--organization "ACME"
```

For our scenario, the Database v1.0 version ID is 5 and the Base v2.0 version ID is 6. Create a new Composite Content View called `Stack` and include the version IDs with the `--component-ids` option:

```
# hammer content-view create \
--composite \
--name "Stack" \
--description "A stack that includes a base operating system and a
database" \
--component-ids 4,14 \
--organization "ACME"
```

Publish the Composite Content View:

```
# hammer content-view publish \
--name "Stack" \
--description "Initial version of Stack" \
--organization "ACME"
```

Promote the Composite Content View across all environments:

```
# hammer content-view version promote \
--content-view "Stack" \
--version 1 \
--to-lifecycle-environment "Development" \
--organization "ACME"
# hammer content-view version promote \
--content-view "Stack" \
--version 1 \
--to-lifecycle-environment "Testing" \
--organization "ACME"
# hammer content-view version promote \
--content-view "Stack" \
--version 1 \
--to-lifecycle-environment "Production" \
--organization "ACME"
```

7.8. REGISTERING SYSTEMS TO ENVIRONMENTS AND THEIR CONTENT VIEWS

With content views in place, we can register systems to these environments and views.

7.8.1. Registering a RHEL System with Subscription Manager

First, log into a test Red Hat Enterprise Linux 7 client system as the **`root`** user and download the consumer RPM for your Satellite Server. This is located in the **`pub`** directory on the host. For example, for a Satellite Server with the host name **`satellite6.example.com`**, run the following command on the client to register:

```
[root@client ~]# rpm -Uvh http://satellite6.example.com/pub/katello-ca-
consumer-latest.noarch.rpm
```

Run the following command to view a list of environments and their content views on the Satellite Server:

```
[root@client ~]# subscription-manager environments --org "acme"
```

Register the client system to an environment and content view on the Satellite Server:

```
[root@client ~]# subscription-manager register --org "acme" --environment
"Development/Stack"
```

NOTE

The client system asks for the user name and password for a Satellite Server user that belongs to the ACME organization. As an alternative, you can use an activation key to register a system, which is discussed in Chapter 8, *Managing Activation Keys*.

The client system now uses the published repositories from the Stack content view in the Development environment.

7.8.2. Registering an Atomic Host with Subscription Manager

The following procedure explains how to register an Atomic Host with Subscription Manager.

Retrieve **`katello-rhsm-consumer`** from the Satellite server:

```
[root@atomic_client ~]# wget http://satellite.example.com/pub/katello-
rhsm-consumer
```

Change the mode of **`katello-rhsm-consumer`** in order to make it executable:

```
[root@atomic_client ~]# chmod +x katello-rhsm-consumer
```

Run **`katello-rhsm-consumer`**:

```
[root@atomic_client ~]# ./katello-rhsm-consumer
```

Register with **`Red Hat Subscription Manager`**:

```
[root@atomic_client ~]# subscription-manager register
```

NOTE

Because Atomic is functionally an appliance, we do not recommend that you try to install **`katello-agent`** on it.

7.9. CHAPTER SUMMARY

This chapter explain how to use content views to customize your own repositories from existing content in the DML. This includes:

- Creating basic content views with RPMs
- Creating content views with RPMs and Puppet modules
- Using content filters to include and exclude RPM content
- Combining several content views into a Composite Content View
- Registering systems to the Satellite Server and consuming content from a specific content views

The next chapter discusses activation keys and how systems use them to register and access content from application life cycle environments.

CHAPTER 8. MANAGING ACTIVATION KEYS

At this point, we have published some content views, which resulted in the Satellite Server publishing repositories. Systems now can register to the Satellite Server and consume content from these repositories. Systems register in a similar way to how they register to the Red Hat Customer Portal. For example, users can use Red Hat Subscription Manager (**`subscription-manager`**) with the **`--baseurl`** pointing to the Satellite Server instead of the Red Hat Content Delivery Network.

There are two methods to register a system. The first is to authenticate with a Satellite Server user name and password, which we explored in the previous chapter. An alternative and preferred method is to use an activation key, which acts as an authentication token. Activation keys provide a method for easy system registration and subscription attachment. Users can create multiple keys and associate them with different environments and content views. For example, you might create a basic activation key with a subscription for Red Hat Enterprise Linux workstations and associate it with content views from a particular environment.

For more information about activation keys and more use case examples outside of this guide, see "Activation Key Enhancements with Red Hat Satellite 6.1" on the Red Hat Customer Portal.

8.1. CREATING AN ACTIVATION KEY

For Web UI Users

Navigate to **Content** > **Activation keys** and click **Create Activation Key**. Provide the activation key with the following information:

- **Name** - The name of the activation key. We use this name during the system registration process. Enter **`development-stack`**.
- **Content Host Limit** - Defines how many systems the Satellite Server allows to register for this activation key. Select **`Unlimited Content Hosts`**.
- **Description** - A plain text description for the activation key. Enter **`Exampleware Stack in the Development Environment`**
- **Environment** - The environment to use. Select **`Development`**.
- **Content View** - The Content View (and, by extension, the repository) in the environment to use. Select **`Stack`**.

Click **Save**. The activation key details screen displays.

Now we must define which products to attach and repositories to enable upon registration. Navigate to the **Subscriptions** tab. An empty product/subscription listing appears. Click **Add**, select both the Red Hat Enterprise Linux subscription and the PostgreSQL product, and click **Add Selected**.

NOTE

The **Auto-Attach** option is enabled. This automatically attaches these products to the system upon registration and enables the required repositories. If **Auto-Attach** is disabled for the activation key, the system only registers to the Satellite Server without attaching any subscriptions or content.

Navigate to the **Product Content** page. This displays all the repositories associated with the activation key's products. As default, the Satellite Server only enables:

- The repository that best matches the system requirements. In this case, it is only the Red Hat Enterprise Linux 7 Server RPMs.
- Any custom content.

Our scenario should have the following defaults set:

PostgreSQL:

- PostgreSQL 9.5 - Enabled: **`Yes (Default)`**
- PostgreSQL Puppet Modules - Enabled: **`Yes (Default)`**

Red Hat Enterprise Linux Server:

- Red Hat Enterprise Linux 7 Server (Kickstart) - Enabled: **`No (Default)`**
- Red Hat Satellite Tools 6.2 (for RHEL 7 Server) (RPMs) - Enabled: **`No (Default)`**
- Red Hat Enterprise Linux 7 Server (RPMs) - Enabled: **`Yes (Default)`**

However, we want to enable the Red Hat Satellite Tools repository because that contains our configuration tools (such as **`katello-agent`** and **`puppet`**). Change it to the following:

- Red Hat Satellite Tools 6.2 (for RHEL 7 Server) (RPMs) - Enabled: **`Override to Yes`**

Click **Save**

Now we have an activation key ready for system registration.

For CLI Users

Create the activation key:

```
# hammer activation-key create \
--name "development-stack" \
--unlimited-content-hosts true \
--description "Exampleware Stack in the Development Environment" \
--lifecycle-environment "Development" \
--content-view "Stack"  \
--organization "ACME"
```

Obtain a list of your subscription IDs:

```
# hammer subscription list --organization "ACME"
```

Attach the Red Hat Enterprise Linux subscription UUID to the activation key:

```
# hammer activation-key add-subscription \
--name "development-stack" \
--subscription-id ff808181533518d50152354246e901aa \
--organization "ACME"
```

Attach the PostgreSQL product to the activation key:

```
#hammer activation-key add-subscription \
--name "development-stack" \
--subscription-id ff8081815239acdc015238fefaa10002 \
--organization "ACME"
```

List the product content associated with the activation key:

```
# hammer activation-key product-content \
--name "development-stack" \
--organization "ACME"
```

Override the default auto-enable status for the Red Hat Satellite Tools 6.2 repository. The default status is set to disabled. This command enables it:

```
# hammer activation-key content-override \
--name "stack-development" \
--content-label rhel-7-server-satellite-tools-6.1-rpms \
--value 1 \
--organization "ACME"
```

8.2. USING ACTIVATION KEYS

The activation keys are used for registration. This includes:

- Registering new systems during provisioning through Red Hat Satellite 6. The kickstart provisioning templates in Red Hat Satellite 6 contain commands to register the system using an activation key defined when creating a new host.

- Registering existing Red Hat Enterprise Linux systems. Configure Red Hat Subscription Manager to use the Satellite Server for registration and specify the activation key when running the **`subscription-manager register`** command.

You can test the activation key we created. Register an existing Red Hat Enterprise Linux 7 system to the Satellite.

First, download the consumer RPM for your Satellite Server. This is usually located in the **`pub`** directory on the host’s web server. For example, for a Satellite Server with the host name **`satellite6.example.com`**, run the following command on the client to register:

```
# rpm -Uvh http://satellite6.example.com/pub/katello-ca-consumer-
latest.noarch.rpm
```

This RPM installs the necessary certificates for accessing repositories on the Satellite Server and configures Red Hat Subscription Manager to use the server’s URL.

Next, run Red Hat Subscription Manager on the client:

```
# subscription-manager register --activationkey="stack-development" --
org="acme"
The system has been registered with id: 744fb31c-c983-00f5-ca14-
bddd0f711353
```

Check the Satellite Server to confirm the registration.

For Web UI Users

Navigate to **Hosts** > **Content Hosts** and the system appears in the list.

For CLI Users

Run the following command:

```
# hammer content-host list --organization "ACME"
```

IMPORTANT

After registering a client system to the Satellite Server, install the **`katello-agent`** package on the system so that it can report back to the Satellite Server:

```
# yum install katello-agent
```

The Red Hat Satellite 6 Tools repository provides this package.

8.3. CHAPTER SUMMARY

This chapter discussed activation keys, demonstrated how to create them, and how systems register to a Satellite Server with them.

The next chapter explores errata management, including how to apply errata to a system.

CHAPTER 9. MANAGING ERRATA

As a part of Red Hat’s quality control and release process, we provide customers with updates for each release of official Red Hat RPMs. Red Hat compiles groups of related package into an **erratum** along with an advisory that provides a description of the update. There are three types of advisories (in order of importance):

Security Advisory

Describes fixed security issues found in the package. The security impact of the issue can be Low, Moderate, Important, or Critical.

Bug Fix Advisory

Describes bug fixes for the package.

Product Enhancement Advisory

Describes enhancements and new features added to the package.

Red Hat Satellite 6 imports this errata information when synchronizing repositories with Red Hat’s Content Delivery Network (CDN). Red Hat Satellite 6 also provides tools to inspect and filter errata, allowing for precise update management. This way, you can select relevant updates and propagate them through content views to selected content hosts.

In Red Hat Satellite, there are two keywords that describe an erratum’s relationship to the available content hosts:

Applicable

Erratum applies to one or more content hosts, which means it updates packages present on the content host. Applicable errata are not yet accessible by the content host.

Installable

Erratum applies to one or more content hosts and it has been made available to the content host. Installable errata are present in the content host’s life cycle environment and content view, but are not yet installed. This way, errata can be installed by users who have permissions to manage content hosts, but are not entitled for errata management at higher levels.

This chapter shows how to manage errata and apply them to either a single system or multiple systems.

IMPORTANT

Install the `katello-agent` package on hosts registered to the Satellite. This package provides the necessary services for errata management.

9.1. MANAGING ERRATA WITH CONTENT VIEWS

Red Hat Satellite 6 provides various methods to manage and apply errata. As discussed in Section 7.4, “Defining Content Filters”, we can use content views and content filters to limit errata. Such filters include:

- **ID** - We can create a filter to choose specific erratum to allow into our resulting repositories.
- **Date Range** - We can define a date range and include a set of errata released during that date range.
- **Type** - We can select the type of errata to include such as bug fixes, enhancements, and security updates.

As an example, we can create a content filter to exclude errata after a certain date. This ensures our production systems in the application life cycle are kept up to date to a certain point. Then we can modify the filter's start date to introduce new errata into our testing environment. This is so we can test the compatibility of new packages into our application life cycle.

For instructions on creating a content filter, see Section 7.5, “Creating a Content Filter”.

Once a content view contains errata, we can apply it to our systems. Each system registered to your Red Hat Satellite 6 includes an errata management screen where you can apply multiple errata to the system. In addition, Red Hat Satellite 6 contains an errata management feature where you can search, review, and apply errata to multiple systems.

9.2. APPLYING ERRATA TO INDIVIDUAL SYSTEMS

For this procedure, we aim to apply some errata to a system. This procedure follows on from Section 8.2, “Using Activation Keys” and assumes you registered a test Red Hat Enterprise Linux 7 system to your Satellite Server. In this example, we aim to apply the following erratum:

```
Errata ID:   RHSA-2016:0008
Title:       Moderate: openssl security update
Type:        security
Severity:    Moderate
Issued:      2016-01-07
Updated:     2016-01-07
Description: OpenSSL is a toolkit that implements the Secure Sockets Layer
(SSL v2/v3) and Transport Layer Security (TLS v1) protocols, as well as a
full-strength, general purpose cryptography library.
```

For Web UI Users

Navigate to **Hosts** > **Content Hosts** and click on your test system. Navigate to the **Errata** tab. Due to the filter set up in Section 7.5, “Creating a Content Filter”, a list of security errata appears.

Let's apply errata for OpenSSL. Navigate to the search bar and enter **`title ~ openssl`**. This searches for any errata with **`openssl`** in the title. Select the **`RHSA-2016:0008`** errata and click **Apply Selected**. A confirmation message appears. Click **Apply**.

The Satellite Server starts a task to update all packages associated with the selected errata. When the task completes, the Satellite Server lists the packages updated and their new versions in the **Details** section. For example:

```
1:openssl-1.0.1e-51.el7_2.2.x86_64
1:openssl-libs-1.0.1e-51.el7_2.2.x86_64
```

Log in to the client system and confirm the errata updates:

```
[root@client ~]# yum list openssl openssl-libs
```

For CLI Users

List the OpenSSL errata for the client system:

```
# hammer host errata list \
--host client.example.com \
--search "title ~ openssl" \
--organization "ACME"
```

Apply the most recent erratum to the client system. Identify the erratum to apply using the Errata ID:

```
# hammer host errata apply \
--host client.danssat.net \
--errata-ids RHSA-2016:0008 \
--organization "ACME"
```

Log in to the client system and confirm the errata updates:

```
[root@client ~]# yum list openssl openssl-libs
```

9.3. APPLYING ERRATA TO MULTIPLE SYSTEMS

The Red Hat Satellite 6 Web UI provides an errata management tool to help review and apply errata to multiple systems. For this example, we use the same erratum (**`RHSA-2016:0008`**) from Section 9.2, "Applying Errata to Individual Systems".

For Web UI Users

Navigate to **Content** > **Errata**. This displays all errata from synchronized repositories. In addition, the **Content Host Counts** shows the number of registered hosts that can apply and install each erratum.

Let's apply a single OpenSSL errata to our systems through this tool. Navigate to the search field and enter **`title ~ openssl`**. This shows all errata relating to OpenSSL. Although this includes bug fixes and enhancements, note that the Satellite Server cannot install these errata to our test system due to the filter we created in Section 7.5, "Creating a Content Filter".

Click on the most recent OpenSSL errata. In our example, this is **`RHSA-2016:0008`**.

The **Details** screen for this erratum appears and provides a description of what the erratum resolves.

Navigate to the **Content Hosts** subtab. This displays a list of all applicable systems for this errata. We select **Only show content hosts where the errata is currently installable in the host's Lifecycle Environment** to limit this list to systems that can actually install the errata.

Select our test system and click **Apply to Hosts**. A confirmation screen appears regarding the errata installation. Click **Confirm**.

The Satellite Server starts a task to update the erratum's packages for each selected system. When the task completes, log in to the client system and confirm the errata updates:

```
[root@client ~]# yum list openssl openssl-libs
```

For CLI Users

Although the CLI does not have the same tools as the Web UI, you can replicate a similar procedure with CLI commands.

List all OpenSSL errata:

```
# hammer erratum list --search "title ~ openssl" --organization "ACME"
```

Search again, restricting the list to installable errata:

```
# hammer erratum list \
--errata-restrict-installable true \
--search "title ~ openssl" --organization "ACME"
```

Find out details about this errata:

```
# hammer erratum info --id RHSA-2016:0008
```

List the systems that this erratum is applicable:

```
# hammer host list \
--search "applicable_errata = RHSA-2016:0008" \
--organization "ACME"
```

Apply the errata to a single system:

```
# hammer host errata apply \
--host client.example.com \
--errata-ids RHSA-2016:0008
```

You need to run this command for each client system and replace **`--host`** with the name of the system for each execution. You can accomplish this using the following command:

```
# for HOST in `hammer \
--csv --csv-separator "|" host list \
--search "applicable_errata = RHSA-2016:0008" \
--organization "ACME" | tail -n+2 | awk \
-F "|" '{ print $2 }'` ; do echo \
"== Applying to $HOST ==" ; hammer host errata apply \
--host $HOST --errata-ids RHSA-2016:0008 ; done
```

This command identifies all hosts with RHSA-2016:0008 as an applicable erratum and then applies the erratum to each host.

Log in to the client system and confirm the errata updates:

```
[root@client ~]# yum list openssl openssl-libs
```

9.4. CHAPTER SUMMARY

This chapter provided some guidelines on how Red Hat Satellite 6 manage errata and applies them to systems.

The next chapter explores container management in Red Hat Satellite 6.

CHAPTER 10. MANAGING CONTAINER IMAGES

Containerization is an operating system-level virtualization method. While standard virtual machines consume resources that a hypervisor allocates to each system, containers act as individual systems that directly use a host’s kernel. This means that processes in containers share resources alongside the host and other containers. This provides an efficient method to run multiple systems from a single host. Linux containers also provide rapid application deployment, simpler testing, maintenance, and troubleshooting while improving security.

For more information about containers, see the Getting Started with Containers guide for *Red Hat Enterprise Linux Atomic Host 7*.

Docker is an open source project that automates the deployment Linux containers and their applications. It provides the capability to package an application with its runtime dependencies into a container.

A container in the Docker format is composed of the following parts:

Container

An application sandbox. Each container is based on an image that holds necessary configuration data. When you launch a container from an image, a writable layer is added on top of this image. Every time you commit a container a new image layer is added to store your changes.

Image

A static snapshot of the container’s configuration that is never modified. Any changes made to the container can be saved only by creating a new image layer. Each image depends on one or more parent images.

Platform image

An image that has no parent. Platform images define the runtime environment, packages and utilities necessary for containerized applications to run. The platform image is not writable, so any changes are reflected in the copied images stacked on top of it.

Registry

A public or private archive that contains images available for download. Some registries allow users to upload images to make them available to others. Red Hat Satellite allows you to import images from local and external registries. Satellite itself can act as an image registry for hosts. However, hosts cannot push changes back to the registry.

Tag

A mark used to differentiate images in a repository, typically by the version of the application stored in the image. Repositories are used to group similar images in a container registry. Images only have unique alphanumeric identifiers, so naming them in the form **`repository:tag`** provides a human-readable way of identifying images.

With Red Hat Satellite 6, you can create an on-premise registry, import images from various sources and distribute them to containers using content views. The Satellite Server supports creating one or more Docker compute resources that act as servers for running containers. This way, you can import an image, start a container based on this image, monitor the container’s activity, and commit its state to a new image layer that can be further propagated.

Importing content and managing the life cycle of container images is similar to managing other content types, such as RPMs and Puppet modules. You configure repositories bundled with Products and include those repositories in content views.

10.1. IMPORTING CONTAINER IMAGES FROM THE RED HAT CONTAINER CATALOG

The Red Hat Container Catalog provides a set of container images that you can import into your Satellite Server. The process for importing this content differs to how we enable repositories for Red Hat content. The process is:

1. Create a custom product for Red Hat Container Catalog.
2. Add a repository that links to the Red Hat Container Catalog registry (http://registry.access.redhat.com/).
3. Synchronize with the registry's repository.

For Web UI Users

Navigate to **Content** > **Products** and click **New Product**. A form for a new Product appears. Enter the following details:

- **Name** - The plain text name for the product. Enter **`Red Hat Container Catalog`**.
- **Label** - An internal ID for the repository. Enter **`rhcc`**.
- **GPG Key** - The GPG Key for the entire product. Leave this blank.
- **Sync Plan** - A synchronization plan for the product. We can attach this to our **`Example Plan`**.
- **Description** - A plain text description of the product. Enter **`Red Hat Container Catalog content`**.

Click **Save**.

After creating the custom product, the product's repositories screen appears. Click **Create Repository**, which displays a form for a new repository. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`RHEL7`**.
- **Label** - An internal ID for the repository. Enter **`RHEL7`**.
- **Type** - The type of repository. Select **`docker`**. A new set of fields appear.
- **URL** - The URL of the registry to use as a source. Enter **`http://registry.access.redhat.com/`**.
- **Upstream Repository Name** - The name of the repository on the registry. For our example, enter **`rhel7`**.

NOTE

You can search and view other repositories at https://access.redhat.com/containers/ .

Click **Save**. We return to the product's repository screen with our new repository listed. Select it and click **Sync Now** to start the synchronization process. After a few minutes, the Satellite Server completes the synchronization. Click **Manage Docker Manifests** to list the available manifests. From the list, you can optionally remove any manifests that are not required.

NOTE

You can also view the progress of the synchronization in the Web UI. Navigate to **Content > Sync Status** and expanding the Product/Repository tree (or click **Expand All**).

For CLI Users

Create the custom **`Red Hat Container Catalog`** product:

```
# hammer product create \
--name "Red Hat Container Catalog" \
--sync-plan "Example Plan" \
--description "Red Hat Container Catalog content" \
--organization "ACME"
```

Create the repository for the container images:

```
# hammer repository create \
--name "RHEL7" \
--content-type "docker" \
--url "http://registry.access.redhat.com/" \
--docker-upstream-name "rhel7" \
--product "Red Hat Container Catalog" \
--organization "ACME"
```

Then synchronize the repository:

```
# hammer repository synchronize \
--name "RHEL7" \
--product "Red Hat Container Catalog" \
--organization "ACME"
```

Now we have a synchronized set of container images.

10.2. IMPORTING CONTAINER IMAGES FROM OTHER IMAGE REGISTRIES

In addition to importing container images from Red Hat Container Catalog, Red Hat Satellite 6 can also import content from other image registries, such as community-based or internal registries. The process for importing from third-party registries is the similar to importing images from the Red Hat Container Catalog:

1. Create a custom product.
2. Add a repository for container images to the product and link it to a repository on an external registry.
3. Synchronize with the registry’s repository.

The following procedure demonstrates how to accomplish this using the official Fedora images from the DockerHub registry (**`https://registry.hub.docker.com`**).

For Web UI Users

Navigate to **Content** > **Products** and click **New Product**. A form for a new Product appears. Enter the following details:

- **Name** - The plain text name for the product. Enter **`Fedora`**.
- **Label** - An internal ID for the product. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **GPG Key** - The GPG Key for the entire product. Leave this blank.
- **Sync Plan** - A synchronization plan for the product. We can attach this to our **`Example Plan`**.
- **Description** - A plain text description of the product. Enter **`Fedora content`**.

Click **Save**.

After creating the custom product for Fedora, the product's repositories screen appears. Click **Create Repository**, which displays a form for a new repository. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`Fedora Docker Images`**.
- **Label** - An internal ID for the repository. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Type** - The type of repository. Select **`docker`**. A new set of fields appear.
- **URL** - The URL of the registry to use as a source. Enter **`https://registry.hub.docker.com`**.
- **Upstream Repository Name** - The name of the repository on the registry. For our example, enter **`fedora/ssh`**

NOTE

You can search and view other repositories at https://hub.docker.com/explore/ .

Click **Save**. We return to the product's repository screen with our new repository listed. Select it and click **Sync Now** to start the synchronization process. After a few minutes, the Satellite Server completes the synchronization. Click **Manage Docker Manifests** to list the available manifests. From the list, you can optionally remove any manifests that are not required.

NOTE

You can also view the progress of the synchronization in the Web UI. Navigate to **Content** > **Sync Status** and expanding the Product/Repository tree (or click **Expand All**).

For CLI Users

Create the custom **`fedora`** product:

```
# hammer product create \
--name "Fedora" \
--sync-plan "Example Plan" \
--description "Fedora content" \
--organization "ACME"
```

Create the repository for the container images:

```
# hammer repository create \
--name "Fedora/SSH" \
--content-type "docker" \
--url "https://registry.hub.docker.com" \
--docker-upstream-name "fedora/ssh" \
--product "Fedora" \
--organization "ACME"
```

Then synchronize the repository:

```
# hammer repository synchronize \
--name "Fedora/SSH" \
--product "Fedora" \
--organization "ACME"
```

Now we have a synchronized set of container images.

10.3. MANAGING CONTAINER IMAGES WITH CONTENT VIEWS

Use content views to manage container images across the application life cycle. This process uses the same publication and promotion method that RPMs and Puppet modules use.

For Web UI Users

Navigate to **Content > Content Views** and click **Create New View**. This displays a form for **View Details**. Enter the following information:

- **Name** - The plain text name for the view. Enter **`Containers`**.
- **Label** - An internal ID for the view. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Description** - A plain text description of the view. Enter **`Container image for Red Hat Enterprise Linux 7`**.
- **Composite View?** - Defines whether to use a Composite Content View. Leave this option deselected.

Click **Save** to complete.

This creates a new content view entry. Navigate to the **Docker Content** subtab, then click **Add**. Select the container repository for our Red Hat Enterprise Linux 7 Server image. Click **Add Repository**. This adds the container images from this repository to the content view.

Our content view is ready to publish. Navigate to **Versions** and click **Publish New Version**. The Satellite Server provides some details about the new version (Version 1) and allows you to enter a **Description** for the version, which is useful to logging changes for new content versions. Enter **`Initial content view for our container image`** and click **Save**.

The Satellite Server creates the new version of the view and publishes it to the Library environment.

You can also click **Promote** to promote this content view across environments in the application life cycle.

For CLI Users

Obtain a list of repository IDs:

```
# hammer repository list --organization "ACME"
```

For our example, the container **`rhel7`** repository uses 8 for its IDs. Create the content view and add the repository:

```
# hammer content-view create \
--name "Containers" \
--description "Container image for Red Hat Enterprise Linux 7" \
--repository-ids 8 \
--organization "ACME"
```

Now publish the view:

```
# hammer content-view publish \
--name "Containers" \
--description "Initial content view for our container image" \
--organization "ACME"
```

The Satellite Server creates the new version of the view and publishes it to the Library environment.

10.4. MANAGING CONTAINER IMAGES WITH DOCKER TAGS

Some of the container images use Docker tags to identify version numbers and basic information about each version.

For Web UI Users

Navigate to **Content** > **Docker Tags** to view a list of tags for container-based products. Click on a tag to view information about a specific image.

For CLI Users

View a list of Docker tags and their IDs:

```
# hammer docker tag info --id 218 --organization "ACME"
```

View a Docker tag using the tag ID:

```
# hammer docker tag info --id 218
```

10.5. CHAPTER SUMMARY

This chapter provided a basic overview of managing container image content in Red Hat Satellite 6, including how to create your own registry and how to manage container images across the application life cycle.

The next chapter examines how to manage OSTree content.

CHAPTER 11. MANAGING OSTREE CONTENT

OSTree is a tool to manage bootable, immutable, versioned file system trees. You can use any build system you like to place content into it on a build server then export an OSTree repository to a static HTTP. Red Hat Enterprise Linux Atomic Server uses OSTree content composed from RPM files as a method to keep the operating system up to date.

The Red Hat Satellite 6 offers tools to synchronize and manage OSTree branches from an OSTree repository.

11.1. CONFIGURING OSTREE MANAGEMENT ON THE SATELLITE SERVER

In Satellite Server 6.2, OSTree management tools are not installed and enabled by default. You need to run **`satellite-installer`** to install the required packages and to configure the tools.

Prerequisites

- Ensure you are on the latest minor version to prevent package version conflicts.

To Enable OSTree Tools:

As the **`root`** user, enter the following command:

```
# satellite-installer --katello-enable-ostree=true
```

The installer downloads the required packages (**`ostree`**, **`pulp-ostree-plugins`**, and **`tfm-rubygem-katello_ostree`**) and configures your Satellite Server to use OSTree management tools.

11.2. SELECTING RED HAT OSTREE CONTENT TO SYNCHRONIZE

Red Hat’s CDN provides OSTree Content for you to select and synchronize.

For Web UI Users

Navigate to **Content** > **Red Hat Repositories**. This displays a set of tabs for different content types. Select the **OSTree** tab. Scroll down to the OSTree set you aim to use. For our example, we will import the **Red Hat Enterprise Linux Atomic Host Trees** set from the **Red Hat Enterprise Linux Atomic Host** product group. Ensure you have a repository enabled.

Navigate to **Content** > **Products** and click on the **Red Hat Enterprise Linux Atomic Host**. This product now includes a repository for our **Red Hat Enterprise Linux Atomic Host Trees** branch set. Select this repository and click **Sync Now**.

NOTE

You can also view the progress of the synchronization in the Web UI. Navigate to **Content** > **Sync Status** and expanding the Product/Repository tree (or click **Expand All**).

After a few minutes, the Satellite Server completes the import of all images relating to the **`rhel7`** repository.

For CLI Users

Search the Red Hat Enterprise Linux Server product for **`ostree`** repositories:

```
# hammer repository-set list \
--product "Red Hat Enterprise Linux Atomic Host" \
--organization "ACME" | grep "ostree"
```

Enable the **`ostree`** repository for Red Hat Enterprise Linux Atomic Host. In our example, the ID for this repository is 3822:

```
# hammer repository-set enable \
--product "Red Hat Enterprise Linux Atomic Host" \
--name "Red Hat Enterprise Linux Atomic Host (Trees)" \
--organization "ACME"
```

Find and synchronize the repository in our product. In our example, the ID for our version of the repository is 5:

```
# hammer repository list \
--product "Red Hat Enterprise Linux Atomic Host" \
--organization "ACME"
# hammer repository synchronize \
--name "Red Hat Enterprise Linux Atomic Host Trees" \
--product "Red Hat Enterprise Linux Atomic Host" \
--organization "ACME"
```

11.3. IMPORTING CUSTOM OSTREE CONTENT

In addition to importing OSTree content from Red Hat's CDN, Red Hat Satellite 6 also imports content from other sources. This requires a published HTTP location for the OSTree to import.

For Web UI Users

Navigate to **Content** > **Products** and click **New Product**. A form for a new Product appears. Enter the following details:

- **Name** - The plain text name for the product. Enter **`OSTree Content`**.
- **Label** - An internal ID for the product. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **GPG Key** - The GPG Key for the entire product. Leave this blank.
- **Sync Plan** - A synchronization plan for the product. We can attach this to our **`Example Plan`**.
- **Description** - A plain text description of the product. Enter **`OSTree Content`**.

Click **Save**.

After creating the custom product for Fedora, the product's repositories screen appears. Click **Create Repository**, which displays a form for a new repository. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`Custom OSTree`**.
- **Label** - An internal ID for the repository. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.

- **Type** - The type of repository. Select **`ostree`**. A new field appears for the URL.
- **URL** - The URL of the registry to use as a source. For example **`http://www.example.com/rpm-ostree/`**.

Click **Save**. We return to the product's repository screen with our new repository listed. Select it and click **Sync Now** to start the synchronization process. After the a few minutes, the Satellite Server completes the synchronization.

NOTE

You can also view the progress of the synchronization in the Web UI. Navigate to **Content > Sync Status** and expanding the Product/Repository tree (or click **Expand All**).

For CLI Users

Create the custom **`OSTree Content`** product:

```
# hammer product create \
--name "OSTree Content" \
--sync-plan "Example Plan" \
--description "OSTree Content" \
--organization "ACME"
```

Create the repository for the OSTree:

```
# hammer repository create \
--name "Custom OSTree" \
--content-type "ostree" \
--url "http://www.example.com/rpm-ostree/" \
--product "OSTree Content" \
--organization "ACME"
```

Then synchronize the repository:

```
# hammer repository synchronize \
--name "Custom OStree" \
--product "OSTree Content" \
--organization "ACME"
```

Now we have a synchronized set of OSTree branches.

11.4. MANAGING OSTREE CONTENT WITH CONTENT VIEWS

Use content views to manage OSTree branches across the application life cycle. This process uses the same publication and promotion method that RPMs and Puppet modules use.

For Web UI Users

Navigate to **Content > Content Views** and click **Create New View**. This displays a form for **View Details**. Enter the following information:

- **Name** - The plain text name for the view. Enter **`OSTree`**.

- **Label** - An internal ID for the view. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Description** - A plain text description of the view. Enter **`OSTree branches for Red Hat Enterprise Atomic Host`**.
- **Composite View?** - Defines whether to use a Composite Content View. Leave this option deselected.

Click **Save** to complete.

This creates a new content view entry. Navigate to the **OSTree Content** subtab, then click **Add**. Select the OSTree repository for our **Red Hat Enterprise Linux Atomic Host Trees**. Click **Add Repository**. This adds the OSTree content from this repository to the content view.

Our content view is ready to publish. Navigate to **Versions** and click **Publish New Version**. The Satellite Server provides some details about the new version (Version 1) and allows you to enter a **Description** for the version, which is useful to logging changes for new content versions. Enter **`Initial content view for our OSTree`** and click **Save**.

The Satellite Server creates the new version of the view and publishes it to the Library environment.

You can also click **Promote** to promote this content view across environments in the application life cycle.

For CLI Users

Obtain a list of repository IDs:

```
# hammer repository list --organization "ACME"
```

For our example, the OSTree repository uses 5 for its IDs. Create the content view and add the repository:

```
# hammer content-view create \
--name "OSTree" \
--description "OSTree for Red Hat Enterprise Linux Atomic Host" \
--repository-ids 5 \
--organization "ACME"
```

Now publish the view:

```
# hammer content-view publish \
--name "OSTree" \
--description "Initial content view for our OSTree" \
--organization "ACME"
```

The Satellite Server creates the new version of the view and publishes it to the Library environment.

11.5. CHAPTER SUMMARY

This chapter provided a basic overview of managing OSTree content in Red Hat Satellite 6, including how to import and synchronize your OSTree content from Red Hat and custom sources. This chapter also showed how to manage this content across the application life cycle.

The next chapter examines how to manage ISO files.

CHAPTER 12. MANAGING ISO IMAGES AND FILES

Red Hat Satellite 6 has the ability to store ISO images, either from Red Hat's Content Delivery Network or other sources. In addition, the Satellite Server provides a means to upload other files, such as virtual machine images, and publish them in repositories. This chapter provides some basic procedures to import ISOs images and other files.

12.1. IMPORTING ISO IMAGES FROM RED HAT

The Red Hat Content Delivery Network provides ISO images for certain products. The process for importing this content is similar to how we enable repositories for RPM content.

For Web UI Users

Navigate to **Content** > **Red Hat Repositories**. This displays a set of tabs for different content types. Select the **ISOs** tab. Scroll down to the image set you aim to use. For our example, select **Red Hat Enterprise Linux Server** > **Red Hat Enterprise Linux 7 Server (ISOs)** and select the image for **Red Hat Enterprise Linux 7 Server ISOs x86_64 7.2**.

Navigate to **Content** > **Products** and click on **Red Hat Enterprise Linux Server**. The repository screen for this product appears. This product now includes a repository for our ISO image set. Select this repository and click **Sync Now**.

NOTE

You can also view the progress of the synchronization in the Web UI. Navigate to **Content** > **Sync Status** and expanding the Product/Repository tree (or click **Expand All**).

After a few minutes, the Satellite Server completes the import of all chosen images.

For CLI Users

Search the Red Hat Enterprise Linux Server product for **`file`** repositories:

```
# hammer repository-set list \
--product "Red Hat Enterprise Linux Server" \
--organization "ACME" | grep "file"
```

Enable the **`file`** repository for Red Hat Enterprise Linux 7.2 Server ISO:

```
# hammer repository-set enable \
--product "Red Hat Enterprise Linux Server" \
--name "Red Hat Enterprise Linux 7 Server (ISOs)" \
--releasever 7.2 \
--basearch x86_64 \
--organization "ACME"
```

Find and synchronize the repository in our product. In our example, the ID for our version of the repository is 40:

```
# hammer repository list \
--product "Red Hat Enterprise Linux Server" \
--organization "ACME"
# hammer repository synchronize \
--name "Red Hat Enterprise Linux 7 Server ISOs x86_64 7.2" \
--product "Red Hat Enterprise Linux Server" \
--organization "ACME"
```

12.2. IMPORTING INDIVIDUAL ISO IMAGES AND FILES

This section provides a method to manually import ISO content and other files to the Satellite Server. For this example, we upload a file called **`bootdisk.iso`** to the Satellite Server. The process is similar to uploading custom Puppet modules:

1. Create a custom product.
2. Add a repository for files to the product.
3. Select a file to upload to the repository.

For Web UI Users

Navigate to **Content > Products** and click **New Product**. A form for a new Product appears. Enter the following details:

- **Name** - The plain text name for the product. Enter **`Custom ISOs`**.
- **Label** - An internal ID for the product. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **GPG Key** - The GPG Key for the entire product. Leave this blank.
- **Sync Plan** - A synchronization plan for the product. We can attach this to our **`Example Plan`**.
- **Description** - A plain text description of the product. Enter **`Custom ISO collection`**.

Click **Save**.

After creating the custom product for our ISOs, the product's repositories screen appears. Click **Create Repository**, which displays a form for a new repository. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`Bootdisk`**.
- **Label** - An internal ID for the repository. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
- **Type** - The type of repository. Select **`file`**. A new set of fields appear.
- **URL** - The URL of the registry to use as a source. This is to synchronize other Satellite-generated repositories, which contain a **`PULP_MANIFEST`** file. For our example, leave this field blank.

Click **Save**. We return to the product's repository screen with our new **`Bootdisk`** repository listed. Click on the **`Bootdisk`** repository.

Scroll to the **Upload File** section and click **Browse**. Select the ISO file (**`bootdisk.iso`** in our example) and click **Upload**. After a few seconds, the Satellite Server reports **`Content successfully uploaded`**.

NOTE

Click on the **Manage Puppet Modules** page to manage and remove Puppet modules from a product.

For CLI Users

Create the custom product:

```
# hammer product create \
--name "Custom ISOs" \
--sync-plan "Example Plan" \
--description "Custom ISO collection" \
--organization "ACME"
```

Create the repository:

```
# hammer repository create \
--name "Bootdisk" \
--content-type "file" \
--product "Custom ISOs" \
--organization "ACME"
```

Upload the ISO file to the repository:

```
# hammer repository upload-content \
--path ~/bootdisk.iso \
--name "Bootdisk" \
--product "Custom ISOs" \
--organization "ACME"
```

Now we have a custom repository that contains an ISO image.

12.3. IMPORTING THE RED HAT OVAL REPOSITORY

Open Vulnerability and Assessment Language (OVAL) files contain information about public security content. Red Hat Satellite 6 uses OVAL files as part of its SCAP auditing process. Red Hat also provides a repository (https://www.redhat.com/security/data/oval/) that contains multiple OVAL files. The Satellite Server can synchronize this repository so that you have local access to files for SCAP auditing.

For Web UI Users

Navigate to **Content** > **Products**, and click **New Product**. A form for a new product appears. Enter the following details:

- **Name** - The plain text name for the product. Enter **`OVAL Files`**.
- **Label** - An internal ID for the product. Red Hat Satellite 6 automatically completes this field based on the value you entered for **Name**.
- **GPG Key** - The GPG Key for the entire product. Leave this blank.
- **Sync Plan** - A synchronization plan for the product. We can attach this to our **`Example Plan`**.
- **Description** - A plain text description of the product. Enter **`OVAL file collections`**.

Click **Save**.

After creating the custom product for our OVAL files, the product’s repositories screen appears. Click **Create Repository**, which displays a form for a new repository. Enter the following details:

- **Name** - A plain text name for the repository. Enter **`Red Hat OVAL Files`**.
- **Label** - An internal ID for the repository. Red Hat Satellite 6 automatically completes this field based on the value you entered for **Name**.
- **Type** - The type of repository. Select **`file`**. A new set of fields appear.
- **URL** - The URL of the registry to use as a source. Enter **`https://www.redhat.com/security/data/oval/`**. This repository contains a **`PULP_MANIFEST`** file that the Satellite Server uses for synchronization.

Click **Save**. We return to the product’s repository screen with our new repository listed. Select this repository and click **Sync Now**.

For CLI Users

Create the custom OVAL product:

```
# hammer product create \
--name "OVAL Files" \
--sync-plan "Example Plan" \
--description "OVAL file collections" \
--organization "ACME"
```

Create the OVAL repository:

```
# hammer repository create \
--name "Red Hat OVAL Files" \
--content-type "file" \
--product "OVAL Files" \
--publish-via-http true \
--url https://www.redhat.com/security/data/oval/ \
--organization "ACME"
```

Then synchronize the OVAL repository:

```
# hammer repository synchronize \
--name "Red Hat OVAL Files" \
--product "OVAL Files" \
--organization "ACME"
```

Testing the Local Red Hat OVAL Repository

Once the OVAL content completes synchronization, you can perform a test evaluation with an OVAL file from the repository.

On a test Red Hat Enterprise Linux 7 system, install the **`openscap-scanner`** package, which contains the **`oscap`** tool:

```
# yum install openscap-scanner
```

Download a copy of the Red Hat Enterprise Linux 7 OVAL file from the Satellite Server.

```
# cd /tmp
# wget http://satellite.example.com/pulp/isos/ACME-OVAL_Files-
Red_Hat_OVAL_Files/Red_Hat_Enterprise_Linux_7.xml
```

Scan the test Red Hat Enterprise Linux 7 machine for vulnerabilities with the **oscap** tool:

```
# oscap oval eval \
--results results.xml \
--report report.html ./Red_Hat_Enterprise_Linux_7.xml
```

This performs the evaluation and generates an OVAL report with information on whether each definition is compliant or not.

12.4. CHAPTER SUMMARY

This chapter provided a basic overview of managing ISOs and file content in Red Hat Satellite 6.

The next chapter examines completing the content management process.

CHAPTER 13. FINALIZING CONTENT MANAGEMENT

Content management is only part of Red Hat Satellite 6's functionality. Red Hat Satellite 6 also provides features for system provisioning, system management, capsule control, monitoring, and reporting. However, content management acts as the initial stage of the Red Hat Satellite 6 ecosystem. In this chapter, we recap on what we have learned about content management through the course of this guide and how it impacts other Red Hat Satellite 6 features.

13.1. COMPLETING SCENARIO OBJECTIVES

This guide presented an end-to-end scenario involving a fictional company called ACME. Through this scenario, this guide has demonstrated how to achieve the following:

Managing Red Hat Subscriptions

Access your Red Hat content in Red Hat Satellite 6 with a Subscription Manifest. Generate the Subscription Manifest, download it from the Customer Portal, and import it into your organization on your Satellite Server. This provides your Satellite environment with access to RPMs, kickstart content, ISOs, and container images from Red Hat's Content Delivery Network.

Creating a Definitive Media Library (DML)

The foundation for content management involves the creation of a DML. A DML acts as a central library for all master copies of content. Synchronize content from external sources into Red Hat Satellite 6 to form a DML. Such external sources include both Red Hat and custom sources. In addition, use synchronization plans to keep the DML up to date.

Managing Different Content Types

This guide provided examples to manage different content types, such as RPM files, Puppet modules, and container images.

Creating an Application Life Cycle

The application life cycle is a central concept in content management. Create environments in the application life cycle based on the production cycle of your organization. Then, define content views to filter content, publish resulting repositories, and promote them across the environments in the application life cycle. Use activation keys to register systems to a particular environment.

Managing Errata

Use Red Hat Satellite 6's tools to review and apply errata to registered systems. Each errata contains a set of associated packages, which you can remotely install on applicable systems.

Managing Container Images

Enable your Satellite Server to act as a registry for container images. Synchronize container images from Red Hat and other sources, then use content views to manage and publish them.

13.2. PROVISIONING SYSTEMS

The Satellite Server in our scenario now contains content managed across an application life cycle. Now we can provision systems in specific environments. Let's look at how this happens when provisioning bare metal systems.

Using Installation Media

The first thing to note is during the Red Hat content import, we synchronized a kickstart tree containing Red Hat Enterprise Linux 7. Red Hat Satellite 6 automatically adds this kickstart tree as an installation medium for your organization. Web UI users can navigate to **Hosts > Installation Media** and CLI users can view this kickstart tree using the following command:

```
# hammer medium list --organization "ACME"
```

■

The Satellite Server also contains a set of kickstart templates that include the installation medium you select during the provisioning process.

Registering to an Environment

As a part of the kickstart process, the Satellite Server creates a kickstart file using a set of provisioning templates and snippets. One snippet in particular (**`subscription_manager_registration`**) controls the registration process. Web UI users can navigate to **Hosts > Provisioning Templates** and click on the **`subscription_manager_registration`** snippet to view it. CLI users can achieve a similar function with the following command:

```
# hammer template dump --name subscription_manager_registration
```

The snippet appears as follows:

```
<% if @host.params['kt_activation_keys'] %>
# add subscription manager
yum -t -y -e 0 install subscription-manager
rpm -ivh <%= subscription_manager_configuration_url(@host) %>

echo "Registering the System"
subscription-manager register --org="<%= @host.rhsm_organization_label
%>" --name="<%= @host.name %>" --activationkey="<%=
@host.params['kt_activation_keys'] %>"

<% if @host.operatingsystem.name == "RedHat" %>
  # add the rhel rpms to install katello agent
  subscription-manager repos --enable=rhel-*-satellite-tools-*-rpms
<% end %>

echo "Installing Katello Agent"
yum -t -y -e 0 install katello-agent
chkconfig goferd on
<% end %>
```

This snippet does two main function. First, it registers your provisioned system to the Satellite Server using an activation key that you select during provisioning. Second, it installs **`katello-agent`**, which the Satellite Server uses to communicate with the system. Most of the default kickstart provisioning templates include this snippet to register systems. If creating your own kickstart template, make sure to reference this snippet using the following line in your template:

```
<%= snippet "subscription_manager_registration" %>
```

Provisioning a New System

When creating a new system, users choose certain aspects from their content management configuration:

- The application life cycle environment
- The content view in that environment
- Puppet classes from the selected environment

- The desired installation medium

  These aspects of the new host have an affect on packages installed during provisioning, the activation key used for registration, the repositories used for updates, the Puppet modules and their classes to apply to the system during configuration. In addition, you must also specify additional aspects of the host, such as networking information, partitioning tables, capsules, and system-specific parameters used as variables in provisioning templates.

  Web UI users navigate to **Hosts** > **New Host** to create a new system. Navigate to each subtab in order (**Host**, **Puppet Classes**, **Network**, **Operating System**, **Parameters**, **Additional Information**) and fill in the required information for your system. When complete, click **Submit** and the provisioning process begins.

  CLI users use `hammer host create` to provision a new host.

13.3. REFERRING TO OTHER DOCUMENTATION

The following guides provide information on related aspects of Red Hat Satellite 6 and provide example of next steps:

Red Hat Satellite 6 Host Configuration Guide

A guide to using the main Red Hat Satellite 6 features, including infrastructure management and provisioning.
https://access.redhat.com/documentation/en/red-hat-satellite/6.2/paged/host-configuration-guide/

Red Hat Satellite 6 Provisioning Guide

A guide to provisioning physical and virtual hosts from Red Hat Satellite Servers.
https://access.redhat.com/documentation/en/red-hat-satellite/6.2/paged/provisioning-guide/

Red Hat Satellite 6 Puppet Guide

A guide to building your own Puppet module and importing it into Red Hat Satellite 6.
https://access.redhat.com/documentation/en/red-hat-satellite/6.2/paged/puppet-guide/

APPENDIX A. USING AN NFS SHARE FOR CONTENT STORAGE

Your environment requires adequate hard disk space to fulfill content storage. In some situations, it is useful to use an NFS share to store this content. This appendix shows how to mount the NFS share on your Satellite Server's content management component.

IMPORTANT

Do not mount the full **/var/lib/pulp** on an NFS share. Parts of the Satellite Server use transient SQLite databases, which have issues over NFS. Red Hat recommends the use of high-bandwidth, low-latency storage for the **/var/lib/pulp** file system. Red Hat Satellite has many operations that are IO-intensive so usage of high-latency, low-bandwidth storage could potentially have issues with performance degradation. Only use the NFS share for the **/var/lib/pulp/content** directory.

1. Create the NFS share. This example uses a share at **nfs.example.com:/satellite/content**. Make sure this share provides the appropriate permissions to the Satellite Server and its **apache** user.

2. Shutdown the Satellite services on the Satellite host:

   ```
   # katello-service stop
   ```

3. Make sure the Satellite Server has the **nfs-utils** package installed:

   ```
   # yum install nfs-utils
   ```

4. You need to copy the existing contents of **/var/lib/pulp/content** to the NFS share. First, mount the NFS share to a temporary location:

   ```
   # mkdir /mnt/temp
   # mount -o rw nfs.example.com:/satellite/content /mnt/temp
   ```

   Copy the existing contents of **/var/lib/pulp/content** to the temporary location:

   ```
   # cp -r /var/lib/pulp/content/* /mnt/temp/.
   ```

5. Set the permissions for all files on the share to use the **apache** user. This ID of this user is usually 48.

6. Unmount the temporary storage location:

   ```
   # umount /mnt/temp
   ```

7. Remove the existing contents of **/var/lib/pulp/content**:

   ```
   # rm -rf /var/lib/pulp/content/*
   ```

8. Edit the **/etc/fstab** file and add the following line:

```
nfs.example.com:/satellite/content    /var/lib/pulp/content   nfs
rw,hard,intr,context="system_u:object_r:httpd_sys_rw_content_t:s0"
```

This makes the mount persistent across system reboots. Make sure to include the SELinux context.

9. Enable the mount:

```
# mount -a
```

10. Confirm the NFS share mounts to **var/lib/pulp/content**:

```
# df
Filesystem                         1K-blocks     Used Available
Use% Mounted on
...
nfs.example.com:/satellite/content 309506048 58632800 235128224  20%
/var/lib/pulp/content
...
```

Also confirm that the existing content exists at the mount on **var/lib/pulp/content**:

```
# ls /var/lib/pulp/content
```

11. Start the Satellite services on the Satellite host:

```
# katello-service start
```

The Satellite Server now uses the NFS share to store content. Run a content synchronization (see Section 4.3, “Synchronizing Content”) to make sure the NFS share works as expected.

APPENDIX B. IMPORTING CONTENT ISOS INTO A DISCONNECTED SATELLITE

In high security environments where hosts are required to function in a closed network disconnected from the Internet, the Satellite Server can provision systems with the latest security updates, errata, and packages. To accomplish this, download the Content ISOs for Red Hat Satellite from the Red Hat Customer Portal and import them into the Satellite Server.

IMPORTANT

This section is not required if your Satellite Server is connected to the Internet.

Download the product ISO from the Red Hat Customer Portal, as follows:

1. Go to Downloads (at the very top of the window) and select Red Hat Satellite.
2. Open the Content ISOs tab. All products in your subscription are listed here.
3. Click the link for the product name, such as Red Hat Enterprise Linux 6 Server (x86_64) to download the ISO.
4. Copy all of the Satellite Content ISOs to a directory the Satellite can access. This example uses **`/root/isos`**.
5. Create a local directory that will be shared through httpd on the Satellite. This example uses **`/var/www/html/pub/sat-import/`**.

   ```
   # mkdir -p /var/www/html/pub/sat-import/
   ```

6. Mount and recursively copy the contents of the first ISO to the local directory:

   ```
   # mkdir /mnt/iso
   # mount -o loop /root/isos/first_iso /mnt/iso
   # cp -ruv /mnt/iso/* /var/www/html/pub/sat-import/
   # umount /mnt/iso
   # rmdir /mnt/iso
   ```

7. Repeat the above step for each ISO until you have copied all the data from the Content ISOs into **`/var/www/html/pub/sat-import/`**.
8. Ensure the SELinux contexts for the directory are correct:

   ```
   # restorecon -rv /var/www/html/pub/sat-import/
   ```

9. The Satellite Server now contains the content from the Content ISOs. However, the Satellite Server needs to point to this location as the CDN URL. In the Satellite Web UI, navigate to **Content > Red Hat Subscriptions**. .
10. Click **Manage Manifest**.
11. On the Subscription Manifest information screen, select the **Actions** tab.
12. Scroll to Red Hat Provider Details. Click the edit icon on the **Red Hat CDN URL** and change the URL to the Satellite host name with the newly created directory, for example:

`http://server.example.com/pub/sat-import/`

13. Click **Save** and then upload your manifest using Section 3.4, “Importing a Subscription Manifest into the Satellite Server”.

The Satellite is now acting as its own CDN with the files located in `http://server.example.com/pub/sat-import/`. This is not a requirement. The CDN can be hosted on a different machine inside the same disconnected network as long as it is accessible to the Satellite Server using HTTP.

If your environment changes from disconnected to connected, you can reconfigure a disconnected Satellite to pull content directly from Red Hat Customer Portal:

1. In the Satellite Web UI, navigate to **Content** > **Red Hat Subscriptions**.
2. Click **Manage Manifest**.
3. On the Subscription Manifest information screen, select the **Actions** tab.
4. Scroll to Red Hat Provider Details. Click the edit icon on the **Red Hat CDN URL** and change the URL to the Red Hat CDN URL:
   `https://cdn.redhat.com`
5. Click **Save**

The Satellite Server pulls content directly from Red Hat Customer Portal on the next synchronization.

APPENDIX C. IMPORTING CONTENT ISOS INTO A CONNECTED SATELLITE

Even if the Satellite Server can connect directly to the Red Hat Customer Portal, you can perform the initial synchronization from locally mounted content ISOs. Once the initial synchronization is completed from the content ISOs, you can switch back to downloading content through the network connection. To accomplish this, download the Content ISOs for Red Hat Satellite from the Red Hat Customer Portal and import them into the Satellite Server. For locations with bandwidth limitations, using an **On Demand** or **Background** download policy might be more efficient than downloading and importing Content ISOs.

IMPORTANT

This section is not required if your Satellite Server is connected to the Internet.

This example shows how to perform the first synchronization of the Red Hat Enterprise Linux 6 repository from content ISOs. At the time of writing there are 21 DVD size ISO files.

Downloading the content ISOs from the Red Hat Customer Portal

1. In your browser, go to Red Hat Customer Portal and log in.
2. Click **DOWNLOADS**.
3. Select **Red Hat Satellite**.
4. Select the **Content ISOs** tab. All products in your subscription are listed there.
5. Search for the section required, in this example **Red Hat Enterprise Linux 6**.
6. Click the link for the product name, such as **`RHEL 6 Server (x86_64)(2017-04-14T01:27:00)`** to reveal the ISO files.
7. Using your browser, download the required ISOs to a location accessible by your browser. For example, to your workstation's **`Downloads`** directory.

Importing the Content ISOs

1. In a terminal connected to the Satellite Server, create a directory to act as a temporary store for all of the required Satellite Content ISOs. This example uses **`/tmp/isos/rhel6`**:

```
# mkdir -p /tmp/isos/rhel6
```

2. On your workstation, copy the ISO files to the Satellite Server:

```
$ scp ~/Downloads/<iso_file>
root@satellite.example.com:/tmp/isos/rhel6
```

3. On the Satellite Server, create a directory to serve as a mount point for the ISOs:

```
# mkdir /mnt/iso
```

4. Create a working directory to hold the contents of all the ISOs:

```
# mkdir /mnt/rhel6
```

5. Mount and recursively copy the contents of the first ISO to the working directory:

```
# mount -o loop /tmp/isos/<iso_file> /mnt/iso
# cp -ruv /mnt/iso/* /mnt/rhel6/
# umount /mnt/iso
```

6. Repeat the above step for each ISO until you have copied all the data from the Content ISOs into **`/mnt/rhel6`**.

7. If required, remove the empty directory used as the mount point:

```
# rmdir /mnt/iso
```

8. If required, remove the temporary working directory and its contents to regain the space:

```
# rm -rf /tmp/isos/
```

Performing the Initial Synchronization

1. Set the owner and the SELinux context for the directory and its contents to be the same as **`/var/lib/pulp`**:

```
# chcon -R --reference /var/lib/pulp  /mnt/rhel6/
# chown -R apache:apache /mnt/rhel6/
```

2. Create or edit the **`/etc/pulp/content/sources/conf.d/local.conf`** file. Insert the following text into the file:

```
[rhel-6-server]
enabled: 1
priority: 0
expires: 3d
name: Red Hat Enterprise Linux 6 Server
type: yum
base_url:
file:///mnt/rhel6/content/dist/rhel/server/6/6Server/x86_64/os/
```

The **`base_url`** path might differ in your content ISO. The directory specified in **`base_url`** must contain the **`repodata`** directory, otherwise the synchronization will fail. To synchronize multiple repositories, create a separate entry for each of them in the configuration file **`/etc/pulp/content/sources/conf.d/local.conf`**.

3. In the Satellite web UI, navigate to **Content** > **Red Hat Repositories** and select the repository to be enabled, in this example Red Hat Enterprise Linux 6 Server RPMs x86_64 6Server.

4. Under **Content** > **Sync Status** select the repository to be synchronized and click **Synchronize Now**.

Note that there is no indication in the Satellite web UI of which source is being used. In case of problems with a local source, Satellite pulls content through the network. To monitor the process, enter the following command in a terminal (limited to Red Hat Enterprise Linux 7 base systems):

```
# journalctl -f -l SYSLOG_IDENTIFIER=pulp | grep -v worker[\-,\.]heartbeat
```

The above command displays interactive logs. First, Satellite Server connects to the Red Hat Customer Portal to download and process repository metadata. Then, the local repository is loaded. In case of any errors, cancel the synchronization in the Satellite web UI and verify your configuration.

After successful synchronization you can detach the local source by removing its entry from **`/etc/pulp/content/sources/conf.d/local.conf`**.

APPENDIX D. SYNCHRONIZING CONTENT BETWEEN SATELLITE SERVERS

Red Hat Satellite 6.2 uses Inter-Satellite Synchronization (ISS) to synchronize content between upstream and downstream servers. In the context of ISS, upstream refers to the server from which content is exported; downstream refers to the server into which content is imported.

ISS is designed to address two scenarios:

- If you have both connected and disconnected Satellite Servers, and want to propagate content from the connected servers to the disconnected servers.
- If you have a primary Satellite Server and want to propagate some, but not all, content to other Satellite Servers. For example, you might have Content Views (CVs) that are validated by the IT department, and you want to propagate the `yum` content from those CVs to a downstream Satellite.

NOTE

Be aware that you cannot use ISS to synchronize content from a Satellite Server to a Capsule Server. Capsule Server supports synchronization natively. See the Red Hat Architecture Guide for more details.

Satellite 6.2 supports exports as a set of directories (default) or as ISO files. You can then import the resulting export to another Satellite Server. This replaces the `katello-disconnected` script in earlier Satellite versions, which exported repositories into a directory structure that could be later imported into another Satellite Server. In Satellite 6.2, all export and import functions are performed on the command line.

NOTE

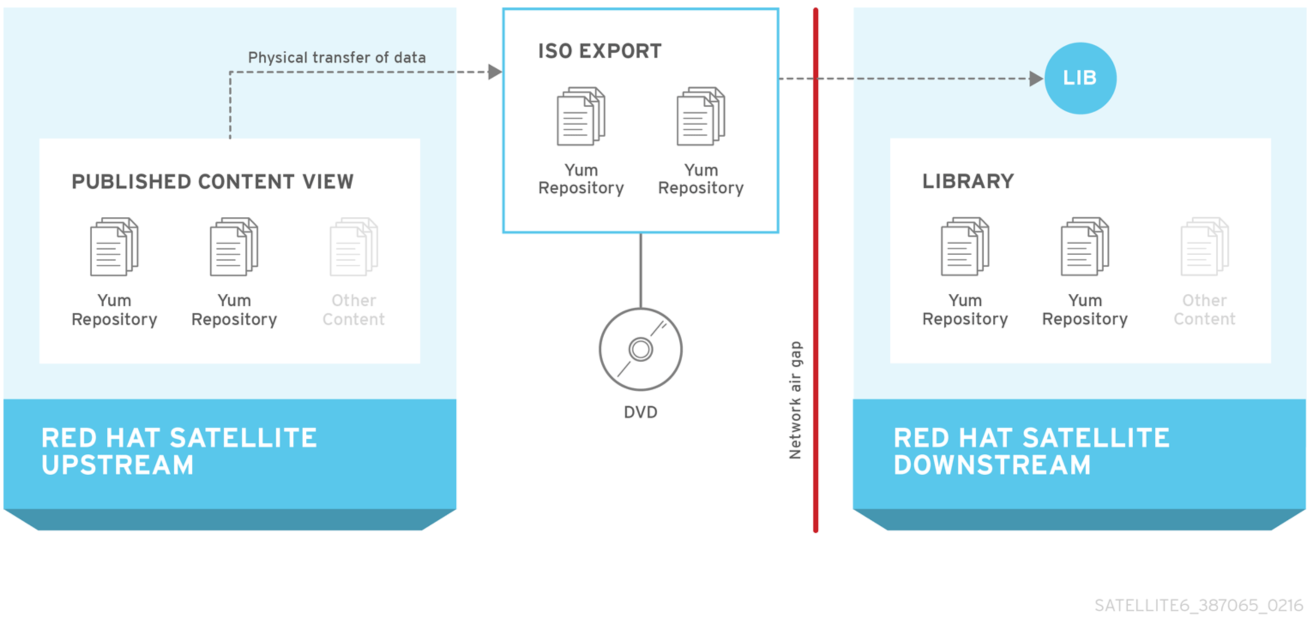
Only RPM, kickstart, and ISO files are exported. Content View metadata, such as package filters, is not transferred. Satellite 6.2 does not support the export of Puppet, Docker, or OSTree content. Imports occur as a normal repository synchronization, and consequently always arrive in the Library environment.

The disconnected use case is used extensively by customers who have air-gapped networks where a Satellite and its clients are on a network that is never connected to the Internet. The only way that these disconnected Satellites are populated with content is by exports from a connected Satellite.

IMPORTANT

Bidirectional synchronization is NOT used in a disconnected environment. Content never passes from the disconnected server to the connected server.

Figure D.1. Information Flow in ISS in an Air-gapped Network



D.1. SATELLITE SERVERS, CAPSULE SERVERS, AND ISS

ISS serves a distinct purpose in a Red Hat Satellite deployment. If you intend to include ISS as part of your deployment, it equates to keeping a separate Satellite Server that you need to maintain, back up, and so on. ISS does not provide a failover mechanism for clients, and neither is it designed as a backup and recovery system. It is a means of providing information sharing between Satellite Servers. The primary use case for implementing ISS is when you have a Satellite Server that is not connected to the Internet or to external content, and you need to synchronize content with a Satellite that **is** connected to the Internet. This can apply when you need complete isolation of management infrastructure for security or other purposes.

If you do not want to maintain another management web UI and platform, and you want to perform management and provisioning to local clients, you should consider setting up a Capsule Server.

D.2. PREREQUISITES

- In Red Hat Satellite 6, ISS is only available in Satellite 6.2 and later, which requires Red Hat Enterprise Linux 6.7, 7.2, or later.
- The export directory needs to be large enough to accommodate at least one Red Hat Enterprise Linux export. By default, the export directory is ***/var/lib/pulp/katello-export/***.
- The ***/var/lib/pulp/*** directory must have free storage space equivalent to the size of the repository being exported for temporary files created during the export process. This is in addition to the space required by the default export directory.
- The downstream Satellite Server must have the required manifests and entitlements for any content that you intend to enable. You cannot enable repositories on a downstream Satellite for which no entitlements exist.
- The repository download policy needs to be set to **immediate**. This policy specifies whether or not Satellite first downloads metadata and other repository information, and only downloads actual repositories when requested. ISS will not function correctly if this policy is not set to **immediate**.

Section D.5, “Configuring ISS” describes how to configure required options.

D.3. SUPPORTED SYNCHRONIZATION OPTIONS

Satellite 6.2 supports the following synchronization options:

- Exporting repositories to a directory or ISO file.
- Exporting all repositories in an Environment or CV version to a directory or ISO file. You can also recreate any custom products during the import process, but Red Hat products are not recreated because they must be created using a manifest.
- Date-based incremental exports of RPM files and errata.

These synchronization options include a range of history details about the export and import, depending on the type of content. For example:

- The repository synchronization history includes upstream source information, as well as the time the export occurred.
- The CV synchronization history includes the export time and version, as well as the import time, version, and upstream source.

D.4. USING CHUNKED ISO FILES

Satellite 6.2 supports exports to chunked ISO files. A chunked ISO is similar to a split ISO but with one significant difference. Satellite tracks the size of the ISO file, and if the total size of the files being added to the ISO exceeds that value, Satellite stops writing to the ISO and creates a new one in the series. The advantage of this is that you can specify the ISO file size (for example, 4.7 GB), and still export larger repositories. The result is multiple 4.7 GB ISO files that you can burn to DVDs.

The difference between this and splitting large files is that the **`split`** utility is not aware of the ISO file format, which means that it will not create a new burnable ISO file for the next file in the series. This method requires that you copy all of the files to one place, concatenate those files, and then mount that single large ISO via loopback.

You can use the **`--iso-mb-size`** parameter to specify the size of ISO export files. The default value is 4380 MB, the size of a single-sided, single-layer DVD.

D.5. CONFIGURING ISS

This section describes how to configure the required settings for ISS. It is important that these settings be configured correctly or your synchronization may fail.

D.5.1. Configuring an Export Destination

Inter-Satellite Synchronization by default uses the ***/var/lib/pulp/katello-export/*** directory, as indicated by the ***pulp_export_destination*** setting. To change this directory you must create the new directory and configure the Pulp export destination setting. Only Satellite Administrators can specify this directory, and SELinux and other permissions are also in place to prevent Satellite from writing to arbitrary file systems.

It can be helpful to create symbolic links to commonly used directories after they are exported. Exported repositories and CVs will have the organization name and environment name prepended to the repository directory structure, which might create paths of overlong length.

IMPORTANT

The directory used in this example is for demonstration purposes only. Confirm that the export directory has adequate space for the required export RPM and ISO files. Section 1.5, “Defining Content Management Storage” provides information on estimating storage requirements. A temporary file will be created during the export process in the ***/var/lib/pulp/*** directory. This means that storage space equal to twice the size of the repository being exported is required during the export process. The temporary file will be deleted when the export is completed.

Create the Export Directory

1. Create the export directory:

```
# mkdir /var/www/html/pub/export
```

2. Ensure the **`foreman`** user has read and write permissions on the export directory:

```
# chown foreman:foreman /var/www/html/pub/export
```

3. Configure the SELinux context:

```
# semanage fcontext -a -t httpd_sys_rw_content_t \
"/var/www/html/pub/export(/.*)?"
# restorecon -RvF /var/www/html/pub/export
# ls -Zd /var/www/html/pub/export \
drwxr-xr-x. foreman foreman \
system_u:object_r:httpd_sys_rw_content_t:s0 /var/www/html/pub/export
```

Configure the Export Destination

For CLI Users

To change the export destination using the command line, use a **`hammer`** command in the following format:

```
# hammer settings set \
--name pulp_export_destination \
--value your-export-directory
```

For example, to specify ***/var/www/html/pub/export/*** as the export destination, enter:

```
# hammer settings set \
--name pulp_export_destination \
--value /var/www/html/pub/export
```

For Web UI Users

1. In the web UI, navigate to **Administer > Settings**, and click the **Katello** tab.

2. Locate the ***pulp_export_destination*** variable in the **`Name`** column, and click the **`Value`** field.

3. Enter the export destination, for example **/var/www/html/pub/export**, in the **`Value`** field and click **Save**.

D.5.2. Configuring the Download Policy

ISS requires that the ***Download Policy*** be set to **immediate**. You can set this globally so that it applies to new repositories created in all Organizations, or you can set it individually for every repository. Changing the default value will not change existing settings.

For CLI Users

To change the global default Download Policy using the command line, use a command as follows:

```
# hammer settings set \
--name default_download_policy \
--value immediate
```

If required to change the policy for a specific repository, you can list the repositories for an organization as follows:

```
# hammer repository list \
--organization-label <organization-label>
```

To change the download policy for an existing repository, use a command as follows:

```
# hammer repository update \
--organization-label <organization-label>  \
--product "Red Hat Enterprise Linux Server" \
--name "Red Hat Enterprise Linux 7 Server Kickstart x86_64 7.2"  \
--download-policy immediate
```

For Web UI Users

To change the global default Download Policy using the web UI:

1. Go to **Administer > Settings**.
2. On the **Katello** tab, locate **`default_download_policy`**.
3. In the Value field, click the edit icon.
4. Set the value to **immediate**, and then click **`Save`**.

To change the Download Policy for an existing repository using the web UI:

1. In the web UI, navigate to **Content > Products**, and click the required product name.
2. On the **Repositories** tab, click the required repository, locate the ***Download Policy*** field, and click the edit icon.
3. From the drop-down list, select **Immediate**, and then click **`Save`**.

D.6. EXPORTING CONTENT

This section describes how to export different types of content from your upstream server and import it to one or more downstream servers. Synchronization between upstream and downstream servers is currently supported in disconnected deployments, for example in an air-gapped environment, where complete isolation is required.

D.6.1. Exporting Repositories

Use the **`hammer repository export`** command to export content from your upstream server. This command exports content to the directory specified in ***pulp_export_destination***. ISS exports to a directory by default; you can use the ***--export-to-iso 1*** parameter to export to an ISO file instead. For example:

```
# hammer repository export --id 1 [--export-to-iso 1]
```

NOTE

If you use the ***--export-to-iso*** parameter, you need to specify either 1 (ISO) or 0 (directory). This parameter does not have a default value.

D.6.2. Exporting Content View Version to a Directory

You can export a specific version of a Content View to a directory. That means that you can label a particular version of a CV to suit your requirements. This way you will be able to curate and track your exports and facilitate updates.

To Create a Content View for Exporting

- Ensure all repositories within the CV have their download policy set to **Immediate**. You cannot export repositories with policies other than **Immediate**.
- Ensure Products are synchronized to the required date.

For Web UI Users

1. Ensure Products are synchronized to the required date.
2. Go to **Content** → **Content Views**. Click **Create New View**. Enter following details to create a CV:
   a. **Name** — A plain text name for the CV. Enter ***Export_CV***.
   b. **Label** — An internal ID for the CV. Red Hat Satellite 6 automatically completes this field based on what you have entered for **Name**.
   c. **Description** — An optional plain text description of the CV.
   d. **Composite View** — Defines whether or not to use a Composite Content View. Leave this option unselected.
3. Click **Save** to submit your changes.
4. On the **Repository Selection** screen, select the repositories to be added to the new CV from the **Repository Selection** table. Click **Add Repositories** to add selected packages to the CV.
5. Go to **Yum Content** → **Filters** and click **New Filter**. Enter following details to create a filter for including non-errata packages:
   a. **Name** — A plain text name for the filter. Enter **Non-errata Products**.

b. **Content type** — A drop-down menu listing types of content to be included into the filter. Choose **Package**.

c. **Inclusion type** — A drop-down menu defining whether the content will be included or excluded from the CV. Choose **Include**.

d. **Description** — An optional plain text description of the filter. Enter **Include all non-errata Products**.

e. Click **Save**.

f. On the **Include RPM** screen, select the **Include all RPMs with no errata** check box.

6. Go to **Yum Content** → **Filters** and click **New Filter**. Enter following details to create a filter for including errata packages in accordance with the required date range:

   a. **Name** — A plain text name for the filter. Enter **Erratas untill *YYYY-MM-DD***.

   b. **Content type** — A drop-down menu listing types of content to be included into the filter. Choose **Erratum - Date and Type**.

   c. **Inclusion type** — A drop-down menu defining whether the content will be included or excluded from the CV. Choose **Include**.

   d. **Description** — An optional plain text description of the filter. Enter **Include errata products untill *YYYY-MM-DD***.

   e. Click **Save**.

   f. On the **Erratum Date Range** screen, select all **Security**, **Enhancement** and **Bugfix** errata types.

   g. Select the **Updated On** check box in **Data type**.

   h. Fill in the **Start Date** and **End Date** menus to configure the date range of Products for the filter.

   i. Click **Save**.

7. Click **Publish New Version**, fill in a short description of a version into the **Description** field. Ensure the **Force Yum Metadata Regeneration** check box is not selected.

8. Click **Save** to publish the CV version ready for exporting.

For CLI Users

1. Use the **`hammer content-view create`** command to create a new CV:

```
# hammer content-view create \
--name "Export_CV" \
--organization "Default Organization"
```

2. Use the **`hammer content-view add-repository`** command to add repositories to the CV:

```
# hammer content-view add-repository \
--name "Export_CV" \
--product "Red Hat Satellite" \
--repository "Red Hat Satellite Tools 6.3 for RHEL 7 Server RPMs
x86_64" \
--organization "Default Organization"
# hammer content-view add-repository \
--name "Export_CV" \
--product "Red Hat Satellite Capsule" \
--repository "Red Hat Satellite Capsule Tools 6.2 for RHEL 7 Server
RPMs x86_64" \
--organization "Default Organization"
```

3. Create filters for the new CV:

   a. Use the **`hammer content-view filter create`** command to create a filter for including non-errata packages:

      ```
      # hammer content-view filter create \
      --content-view "Export_CV" \
      --inclusion true \
      --name "Non-errata_Products" \
      --type rpm \
      --original-packages true \
      --organization "Default Organization"
      ```

   b. Use the **`hammer content-view filter create`** command to create a filter for including errata packages:

      ```
      # hammer content-view filter create \
      --content-view "Export_CV" \
      --inclusion true \
      --name "Erratas until YYYY-MM-DD" \
      --type erratum \
      --organization "Default Organization"
      ```

   c. Use the **`hammer content-view filter rule create`** command to create a rule defining the date range:

      ```
      # hammer content-view filter rule create \
      --content-view "Export_CV" \
      --content-view-filter "Erratas until YYYY-MM-DD" \
      --end-date YYYY-MM-DD \
      --types security,enhancement,bugfix \
      --organization "Default Organization"
      ```

4. Use the **`hammer content-view publish`** command to publish the CV version ready for exporting. It is recommended to fill in the date ranges of repositories under the **`--description`** option.

   ```
   # hammer content-view publish \
   --name "Export_CV" \
   --description "Repositories until YYYY-MM-DD" \
   --force-yum-metadata-regeneration true \
   --async \
   --organization "Default Organization"
   ```

To Determine Which Content View Version to Export:

1. Use the **`hammer content-view version list`** command to determine which version of a Content View to export. For example:

```
$ hammer content-view version list \
--organization "Default Organization"
---|-------------------------------|---------|-------------------
----
ID | NAME                          | VERSION | LIFECYCLE
ENVIRONMENTS
---|-------------------------------|---------|-------------------
----
3  | Export_CV 2.0                 | 2.0     | Library
2  | Export_CV 1.0                 | 1.0     | Library
1  | Default Organization View 1.0 | 1.0     | Library
---|-------------------------------|---------|-------------------
----
```

To Export a Content View Version:

1. Use the **`hammer content-view version export`** command to export a version of a Content View:

```
# hammer content-view version export --id 3
```

2. On a downstream server, use the **`hammer organization update`** command to add new repositories to an organization. Set the address to the directory corresponding to the version you want within the exported Content View as shown:

```
$ hammer organization update \
--name "Default Organization" \
--redhat-repository-url \
http://satellite.example.com/var/www/html/pub/export/Default_Organiz
ation-Export_CV-
v2.0/Default_Organization/content_views/Export_CV/2.0

Organization updated
```

D.6.3. Incremental Updates

To avoid exporting large repositories from a Satellite Server in order to get recent updates you can make make use of incremental updates. Incremental updates are made by exporting changes made to a local repository, by one or more synchronization events, since a particular date and time.

To make an incremental-update repository, use the **`hammer repository export`** command with the **`--since`** option. For example:

```
# hammer repository export \
--id 1 [--export-to-iso 1]  \
--since [ <ISO_Date> ]
```

Where *ISO_Date* is in ISO 8601 format. For example, **`2010-01-01T12:00:00Z`**.

The time stamp used for the calculations is the time that the RPMs were synchronized on the Satellite Server. For example, if Red Hat adds RPMs to a repository on a Monday and then again on a Wednesday, you cannot synchronize your local repository on Thursday and then use a date of Tuesday to get only the Wednesday update.

In addition to exporting changes to a repository, this feature is useful with the Default Organization View content view, but is not as useful for published CVs.

Ensure you use the **`--incremental`** option to the **`hammer repository synchronize`** command when synchronizing from an incremental export. If you do not use this option and also have "Mirror on Sync" enabled for the repository, Satellite Server will treat the import as if it is a full import and will erase all data that was not in the incremental export. Recovering from such a scenario requires the time consuming process of doing a full export and then synchronizing from that.

D.7. IMPORTING CONTENT

Red Hat Satellite 6.2 currently supports importing content that has been exported from an upstream Satellite Server in a disconnected environment. This method is used for disconnected Satellite Servers that have no Internet access, and requires the physical transfer of content between the servers, for example using a DVD.

D.7.1. Importing a Repository

Prerequisites

- Export the repository from the upstream Satellite Server. For more details, see Section D.6.1, “Exporting Repositories”.

To Import a Repository:

1. Make the data available for a repository over HTTP, not HTTPS. For example, copy the exported directory to the **`/var/www/html/pub/export/`** directory on the downstream server, which is available over HTTP by default.

2. In the web UI, navigate to **Content** → **Red Hat Subscriptions**.

3. Select **Manage Manifests**.

4. On the **Import**/**Remove Manifest** tab, set the **Red Hat CDN URL** address field to match the location of a **`content`** directory and a **`listing`** file within the exported repository.
   For example, if the exported repository is located in **`/var/www/html/pub/export/7f6a4f46-c77b-4781-bbd9-871764f8c8b8`**, set the URL to be **`http://satellite.example.com/pub/export/7f6a4f46-c77b-4781-bbd9-871764f8c8b8/Default_Organization/Library/`**.

5. Click **Save**.

6. Navigate to **Content** → **Red Hat Repositories** and select the check box of the repository you have exported.

D.7.2. Importing a Content View as a Red Hat Repository

Prerequisites

- You have a Content View with Red Hat repositories on the upstream Satellite Server.
- Export the Content View from the upstream Satellite Server. For more details, see Section D.6.2, “Exporting Content View Version to a Directory”.

NOTE

A custom repository can also be imported to a custom product, for example a disconnected Satellite. For more information about Red Hat Content Delivery Network (CDN) see Content Delivery Network (CDN) Structure in the *Architecture Guide*.

To Import a Content View:

1. Make the data available for a repository over HTTP, not HTTPS. For example, copy it to the **`/var/www/html/pub/export/`** directory on the downstream server.
2. In the web UI, navigate to **Content** → **Red Hat Subscriptions**.
3. Select **Manage Manifests**.
4. On the **Import**/**Remove Manifest** tab, set the **Red Hat CDN URL** address field to match the location of a **`content`** directory and a **`listing`** file within the exported Content View.
   For example, if the exported CV is located in **`/var/www/html/pub/export/Default_Organization-Export_CV-v1.0`**, set the URL to be **`http://satellite.example.com/pub/export/Default_Organization-Export_CV-v1.0/Default_Organization/content_views/Export_CV/1.0/`**
5. Click **Save**.
6. Navigate to **Content** → **Red Hat Repositories** and check the repository you have exported.
7. On a downstream server, use the **`hammer organization update`** command to add new repositories to an organization. Set the address to the directory corresponding to the version you want within the exported Content View as shown:

```
$ hammer organization update \
--name "Default Organization" \
--redhat-repository-url \
http://satellite.example.com/pub/export/Default_Organization-Export_
CV-v1.0/Default_Organization/content_views/Export_CV/1.0/

Organization updated
```