Administration Guide

Uyuni 2020.06

June 15, 2020

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Introduction

Publication Date: 2020-06-15

This book provides guidance on performing common administrative tasks on Uyuni.

Image Building and Management

Image Building Overview

Uyuni enables system administrators to build containers and OS Images and push the result in image stores. The workflow looks like this:

1. Define an image store

2. Define an image profile and associate it with a source (either a git repository or a directory)

3. Build the image

4. Push the image to the image store

Uyuni supports two distinct build types: dockerfile, and the Kiwi image system.

The Kiwi build type is used to build system, virtual, and other images. The image store for the Kiwi build type is pre-defined as a file system directory at `/srv/www/os-images` on the server. Uyuni serves the image store over HTTPS from `https://example.com/os-images/`. The image store location is unique and is not customizable.

Images are always stored in `/srv/www/os-image/<organization id>`.

Container Images
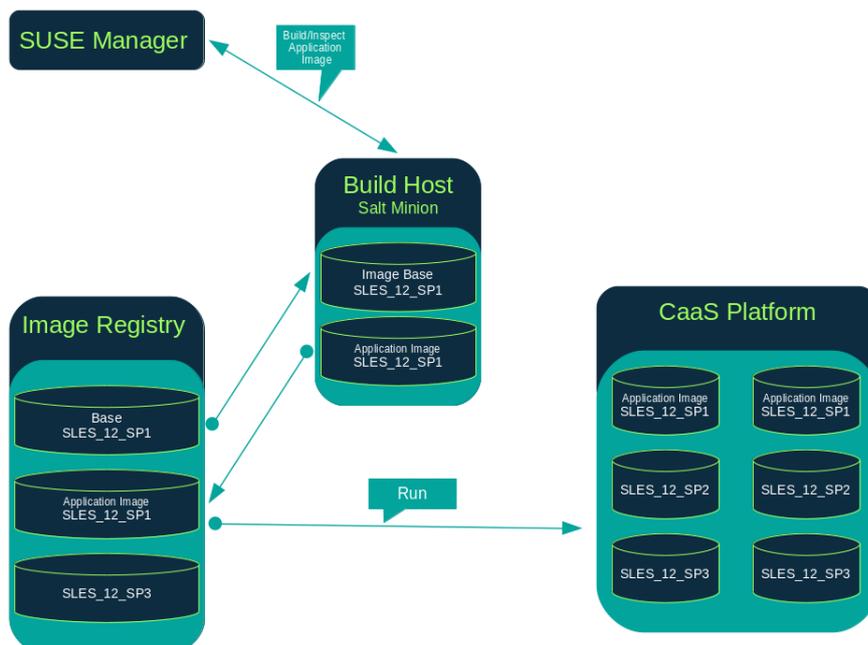
Requirements

The containers feature is available for Salt clients running SUSE Linux Enterprise Server 12 or later. Before you begin, ensure your environment meets these requirements:

- A published git repository containing a dockerfile and configuration scripts. The repository can be public or private, and should be hosted on GitHub, GitLab, or BitBucket.

- A properly configured image store, such as a Docker registry.

> **i** If you require a private image registry you can use an open source solution such as `Portus`. For additional information on setting up Portus as a registry provider, see the Portus Documentation.

For more information on Containers or SUSE CaaS Platform, see:

- https://documentation.suse.com/sles/15-SP1/html/SLES-all/book-sles-docker.html
- https://documentation.suse.com/suse-caasp/4/

Create a Build Host

To build images with Uyuni, you will need to create and configure a build host. Container build hosts are Salt clients running SUSE Linux Enterprise 12 or later. This section guides you through the initial configuration for a build host.

From the Uyuni Web UI, perform these steps to configure a build host:

1. Select a Salt client to be designated as a build host from the **Systems › Overview** page.

2. From the `System Details` page of the selected client assign the containers modules. Go to **Software › Software Channels** and enable the containers module (for example, `SLE-Module-Containers15-Pool` and `SLE-Module-Containers15-Updates`). Confirm by clicking **[Change Subscriptions]**.

3. From the **System Details › Properties** page, enable `Container Build Host` from the `Add-on System Types` list and confirm by clicking **[Update Properties]**.

4. Install all required packages by applying `Highstate`. From the system details page select **States › Highstate** and click `Apply Highstate`. Alternatively, apply Highstate from the Uyuni Server command line:

```
salt '$your_client' state.highstate
```

Create an Activation Key for Containers

The containers built using Uyuni will use channel(s) associated to the activation key as repositories when building the image. This section will guide you into creating an ad-hoc activation key for this purpose.

> To build a container, you will need an activation key that is associated with a channel other than `SUSE Manager Default`.

1. Select **Systems › Activation Keys**.

2. Click **[Create Key]**.

3. Enter a `Description` and a `Key` name. Use the drop-down menu to select the `Base Channel` to associate with this key.

4. Confirm with **[Create Activation Key]**.

For more information, see [bp.key.managment].

Create an Image Store

All built images are pushed to an image store. This section contains information about creating an image store.

1. Select **Images › Stores**.

2. Click `Create` to create a new store.
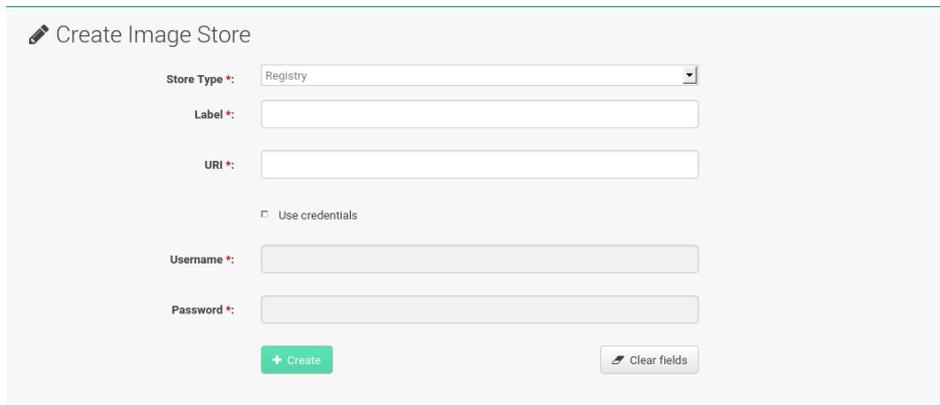
3. Define a name for the image store in the `Label` field.

4. Provide the path to your image registry by filling in the `URI` field, as a fully qualified domain name (FQDN) for the container registry host (whether internal or external).

```
registry.example.com
```

The Registry URI can also be used to specify an image store on a registry that is already in use.

```
registry.example.com:5000/myregistry/myproject
```

5. Click **[Create]** to add the new image store.

Create an Image Profile

All container images are built using an image profile, which contains the building instructions. This section contains information about creating an image profile with the Uyuni Web UI.
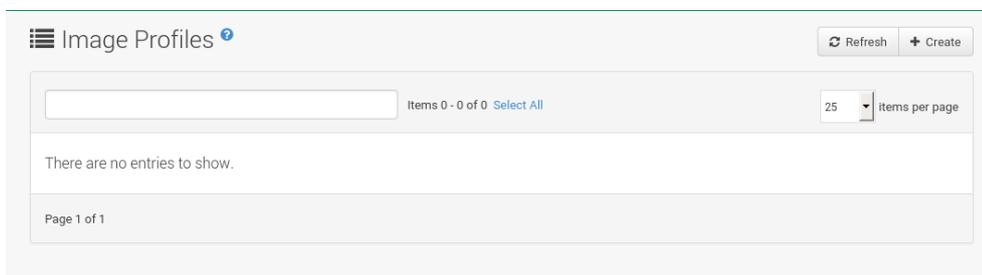
Procedure: Create an Image Profile

1. To create an image profile select **Images › Profiles** and click **[Create]**.

2. Provide a name for the image profile by filling in the `Label` field.

> **ℹ** If your container image tag is in a format such as `myproject/myimage`, make sure your image store registry URI contains the `/myproject` suffix.

3. Use a dockerfile as the `Image Type`.

4. Use the drop-down menu to select your registry from the `Target Image Store` field.

5. In the `Path` field, type a GitHub, GitLab or BitBucket repository URL. The URL should be be http, https, or a token authentication URL. Use one of these formats:

GitHub Path Options

- GitHub single user project repository

```
https://github.com/USER/project.git#branchname:folder
```

- GitHub organization project repository

```
https://github.com/ORG/project.git#branchname:folder
```

- GitHub token authentication

If your git repository is private, modify the profile's URL to include authentication. Use this URL format to authenticate with a GitHub token:

```
https://USER:<AUTHENTICATION_TOKEN>@github.com/USER/project.git#master:/container/
```

GitLab Path Options

- GitLab single user project repository

```
https://gitlab.example.com/USER/project.git#master:/container/
```

- GitLab groups project repository

```
https://gitlab.example.com/GROUP/project.git#master:/container/
```

- GitLab token authentication

If your git repository is private and not publicly accessible, you need to modify the profile's git URL to include authentication. Use this URL format to authenticate with a GitLab token:

```
https://gitlab-ci-
token:<AUTHENTICATION_TOKEN>@gitlab.example.com/USER/project.git#master:/container/
```

> **!** If you do not specify a git branch, the `master` branch will be used by default. If a `folder` is not specified, the image sources (dockerfile sources) are expected to be in the root directory of the GitHub or GitLab checkout.

1. Select an `Activation Key`. Activation keys ensure that images using a profile are assigned to the correct channel and packages.

> **i** When you associate an activation key with an image profile you are ensuring any image using the profile will use the correct software channel and any packages in the channel.

2. Click the **[Create]** button.

Example Dockerfile Sources

An Image Profile that can be reused is published at https://github.com/SUSE/manager-build-profiles

> **i** The `ARG` parameters ensure that the built image is associated with the desired repository served by Uyuni. The `ARG` parameters also allow you to build image versions of SUSE Linux Enterprise Server which may differ from the version of SUSE Linux Enterprise Server used by the build host itself.
>
> For example: The `ARG repo` parameter and the `echo` command pointing to the repository file, creates and then injects the correct path into the repository file for the desired channel version.
>
> The repository is determined by the activation key that you assigned to your image profile.

The python and python-xml packages must be installed in the container. They are required for inspecting images, and for providing the package and product list of a container to the Uyuni Web UI. If you do not install them, images will still build but the package and product list will not available in the Web UI.

```
FROM registry.example.com/sles12sp2
MAINTAINER Tux Administrator "tux@example.com"

### Begin: These lines Required for use with {productname}

ARG repo
ARG cert

# Add the correct certificate
RUN echo "$cert" > /etc/pki/trust/anchors/RHN-ORG-TRUSTED-SSL-CERT.pem

# Update certificate trust store
RUN update-ca-certificates

# Add the repository path to the image
RUN echo "$repo" > /etc/zypp/repos.d/susemanager:dockerbuild.repo

### End: These lines required for use with {productname}

# Add the package script
ADD add_packages.sh /root/add_packages.sh

# Run the package script
RUN /root/add_packages.sh

# After building remove the repository path from image
RUN rm -f /etc/zypp/repos.d/susemanager:dockerbuild.repo
```

Using Custom Info Key-value Pairs as Docker Buildargs

You can assign custom info key-value pairs to attach information to the image profiles. Additionally, these key-value pairs are passed to the Docker build command as `buildargs`.

For more information about the available custom info keys and creating additional ones, see **[Reference › Systems ›]**.

Build an Image

There are two ways to build an image. You can select **Images › Build** from the left navigation bar, or click the build icon in the **Images › Profiles** list.

Procedure: Building an Image

1. Select **Images › Build**.

2. Add a different tag name if you want a version other than the default `latest` (only relevant to containers).

3. Select `Build Profile` and `Build Host`.

> **i** Notice the `Profile Summary` to the right of the build fields. When you have selected a build profile, detailed information about the selected profile will be displayed in this area.

4. To schedule a build click the **[Build]** button.

Import an Image

You can import and inspect arbitrary images. Select **Images › Image List** from the left navigation bar. Complete the text boxes of the `Import` dialog. When it has processed, the imported image will be listed on the `Image List` page.

Procedure: Importing an Image

1. From **Images › Image list** click **[Import]** to open the `Import Image` dialog.

2. In the `Import Image` dialog complete these fields:

   Image store

   The registry from where the image will be pulled for inspection.

   Image name

   The name of the image in the registry.

   Image version

   The version of the image in the registry.

   Build host

   The build host that will pull and inspect the image.

   Activation key

   The activation key that provides the path to the software channel that the image will be inspected with.

3. For confirmation, click **[Import]**.

The entry for the image is created in the database, and an `Inspect Image` action on Uyuni is scheduled.

When it has been processed, you can find the imported image in the `Image List`. It has a different icon

in the `Build` column, to indicate that the image is imported. The status icon for the imported image can also be seen on the `Overview` tab for the image.

Troubleshooting

These are some known problems when working with images:

- HTTPS certificates to access the registry or the git repositories should be deployed to the client by a custom state file.

- SSH git access using Docker is currently unsupported.

- If the python and python-xml packages are not installed in your images during the build process, reporting of installed packages or products will fail. This will result in an `unknown` update status.

OS Images

OS Images are built by the Kiwi image system. The output image is customizable and can be PXE, QCOW2, LiveCD, or other types of images.

For more information about the Kiwi build system, see the Kiwi documentation.

Requirements

The Kiwi image building feature is available for Salt clients running SUSE Linux Enterprise Server 12 and SUSE Linux Enterprise Server 11.

Kiwi image configuration files and configuration scripts must be accessible in one of these locations:

- Git repository

- HTTP hosted tarball

- Local build host directory

For an example of a complete Kiwi repository served by git, see https://github.com/SUSE/manager-build-profiles/tree/master/OSImage

> You will need at least 1 GB of RAM available for Hosts running OS Images built with Kiwi. Disk space depends on the actual size of the image. For more information, see the documentation of the underlying system.

> The build host must be a Salt client. Do not install the build host as a traditional client.

Create a Build Host

To build all kinds of images with Uyuni, create and configure a build host. OS Image build hosts are Salt clients running on SUSE Linux Enterprise Server 12 (SP3 or later) or SUSE Linux Enterprise Server 11 SP4.

This procedure will guide you through the initial configuration for a build host.

> **!**
> The operating system on the build host must match the operating system on the targeted image.
>
> For example, build SUSE Linux Enterprise Server 12 based images on a build host running SUSE Linux Enterprise Server 12 OS version. Build SUSE Linux Enterprise Server 11 based images on a build host running SUSE Linux Enterprise Server 11 OS version.

Configure the build host in the Uyuni Web UI:

1. Select a client that will be designated as a build host from the **Systems › Overview** page.

2. Navigate to the **System Details › Properties** tab, enable the `Add-on System Type OS Image Build Host`. Confirm with **[Update Properties]**.

3. Navigate to the **System Details › Software › Software Channels** tab, enable Uyuni Client tools (for example: `SLE-Manager-Tools12-Pool` and `SLE-Manager-Tools12-Updates`). Schedule and click **[Confirm]**.

4. Install Kiwi and all required packages by applying `Highstate`. From the system details page select **States › Highstate** and click **[Apply Highstate]**. Alternatively, apply Highstate from the Uyuni Server command line:

```
salt '$your_client' state.highstate
```

Uyuni Web Server Public Certificate RPM

Build host provisioning copies the Uyuni certificate RPM to the build host. This certificate is used for accessing repositories provided by Uyuni.

The certificate is packaged in RPM by the `mgr-package-rpm-certificate-osimage` package script. The package script is called automatically during a new Uyuni installation.

When you upgrade the `spacewalk-certs-tools` package, the upgrade scenario will call the package script using the default values. However if the certificate path was changed or unavailable, you will need to call the package script manually using `--ca-cert-full-path <path_to_certificate>` after the upgrade procedure has finished.

Listing 1. Package script call example

```
/usr/sbin/mgr-package-rpm-certificate-osimage --ca-cert-full-path /root/ssl-build/RHN-ORG-
TRUSTED-SSL-CERT
```

The RPM package with the certificate is stored in a salt-accessible directory such as:

```
/usr/share/susemanager/salt/images/rhn-org-trusted-ssl-cert-osimage-1.0-1.noarch.rpm
```

The RPM package with the certificate is provided in the local build host repository:

```
/var/lib/Kiwi/repo
```

> Specify the RPM package with the Uyuni SSL certificate in the build source, and make sure your Kiwi configuration contains `rhn-org-trusted-ssl-cert-osimage` as a required package in the `bootstrap` section.
>
> *Listing 2. config.xml*
>
> ```
> ...
>   <packages type="bootstrap">
>     ...
>     <package name="rhn-org-trusted-ssl-cert-osimage"
> bootinclude="true"/>
>   </packages>
> ...
> ```

Create an Activation Key for OS Images

Create an activation key associated with the channel that your OS Images will use as repositories when building the image.

Activation keys are mandatory for OS Image building.

> To build OS Images, you will need an activation key that is associated with a channel other than `SUSE Manager Default`.

1. In the Web UI, select **Systems › Activation Keys**.

2. Click `Create Key`.

3. Enter a `Description`, a `Key` name, and use the drop-down box to select a `Base Channel` to associate with the key.

4. Confirm with **[Create Activation Key]**.

For more information, see [bp.key.managment].

Create an Image Store

OS Images can require a significant amount of storage space. Therefore, we recommended that the OS Image store is located on a partition of its own or on a Btrfs subvolume, separate from the root partition. By default, the image store will be located at `/srv/www/os-images`.

Image stores for Kiwi build type, used to build system, virtual, and other images, are not supported yet.

Images are always stored in `/srv/www/os-images/<organization id>` and are accessible via HTTP/HTTPS `https://<susemanager_host>/os-images/<organization id>`.

Create an Image Profile

Manage image profiles using the Web UI.
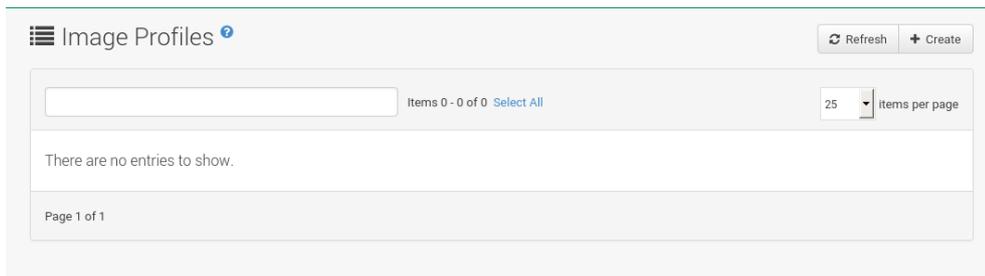
Procedure: Create an Image Profile

1. To create an image profile select from **Images › Profiles** and click **[Create]**.

2. In the `Label` field, provide a name for the `Image Profile`.

3. Use `Kiwi` as the `Image Type`.

4. Image store is automatically selected.

5. Enter a `Config URL` to the directory containing the Kiwi configuration files:

   a. git URI

   b. HTTPS tarball

   c. Path to build host local directory

6. Select an `Activation Key`. Activation keys ensure that images using a profile are assigned to the correct channel and packages.

Associate an activation key with an image profile to ensure the image profile uses the correct software channel, and any packages.

7. Confirm with the **[Create]** button.

Source format options

- git/HTTP(S) URL to the repository

  URL to the git repository containing the sources of the image to be built. Depending on the layout of the repository the URL can be:

  ```
  https://github.com/SUSE/manager-build-profiles
  ```

  You can specify a branch after the `#` character in the URL. In this example, we use the `master` branch:

  ```
  https://github.com/SUSE/manager-build-profiles#master
  ```

  You can specify a directory that contains the image sources after the `:` character. In this example, we use `OSImage/POS_Image-JeOS6`:

  ```
  https://github.com/SUSE/manager-build-profiles#master:OSImage/POS_Image-JeOS6
  ```

- HTTP(S) URL to the tarball

  URL to the tar archive, compressed or uncompressed, hosted on the webserver.

  ```
  https://myimagesourceserver.example.org/MyKiwiImage.tar.gz
  ```

- Path to the directory on the build host

  Enter the path to the directory with the Kiwi build system sources. This directory must be present on the selected build host.

  ```
  /var/lib/Kiwi/MyKiwiImage
  ```

Example of Kiwi Sources

Kiwi sources consist at least of `config.xml`. Usually, `config.sh` and `images.sh` are present as well. Sources can also contain files to be installed in the final image under the `root` subdirectory.

For information about the Kiwi build system, see the Kiwi documentation.

SUSE provides examples of fully functional image sources at the SUSE/manager-build-profiles public GitHub repository.

Listing 3. Example of JeOS config.xml

```xml
<?xml version="1.0" encoding="utf-8"?>

<image schemaversion="6.1" name="POS_Image_JeOS6">
    <description type="system">
        <author>Admin User</author>
        <contact>noemail@example.com</contact>
        <specification>SUSE Linux Enterprise 12 SP3 JeOS</specification>
    </description>
    <preferences>
        <version>6.0.0</version>
        <packagemanager>zypper</packagemanager>
        <bootsplash-theme>SLE</bootsplash-theme>
        <bootloader-theme>SLE</bootloader-theme>

        <locale>en_US</locale>
        <keytable>us.map.gz</keytable>
        <timezone>Europe/Berlin</timezone>
        <hwclock>utc</hwclock>

        <rpm-excludedocs>true</rpm-excludedocs>
        <type boot="saltboot/suse-SLES12" bootloader="grub2" checkprebuilt="true"
compressed="false" filesystem="ext3" fsmountoptions="acl" fsnocheck="true" image="pxe"
kernelcmdline="quiet"></type>
    </preferences>
    <!--    CUSTOM REPOSITORY
    <repository type="rpm-dir">
      <source path="this://repo"/>
    </repository>
    -->
    <packages type="image">
        <package name="patterns-sles-Minimal"/>
        <package name="aaa_base-extras"/> <!-- wouldn't be SUSE without that ;-) -->
        <package name="kernel-default"/>
        <package name="salt-minion"/>
        ...
    </packages>
    <packages type="bootstrap">
        ...
        <package name="sles-release"/>
        <!-- this certificate package is required to access {productname} repositories
            and is provided by {productname} automatically -->
        <package name="rhn-org-trusted-ssl-cert-osimage" bootinclude="true"/>

    </packages>
    <packages type="delete">
        <package name="mtools"/>
        <package name="initviocons"/>
        ...
    </packages>
</image>
```

Build an Image

There are two ways to build an image using the Web UI. Either select **Images › Build**, or click the build icon in the **Images › Profiles** list.
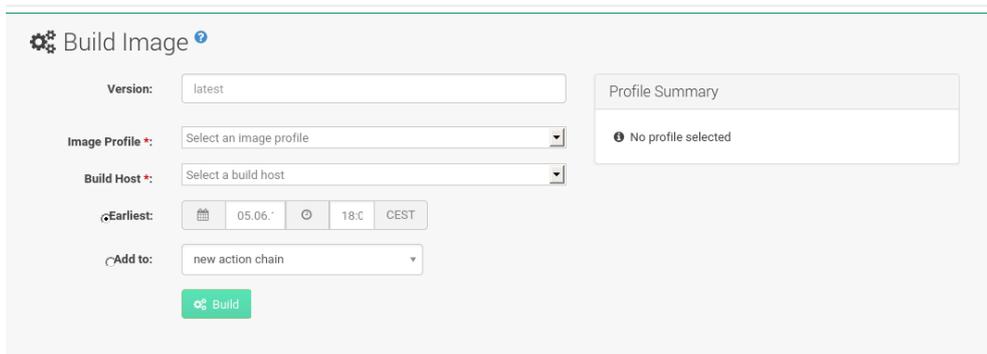
Procedure: Building an Image

1. Select **Images › Build**.

2. Add a different tag name if you want a version other than the default `latest` (applies only to containers).

3. Select the `Image Profile` and a `Build Host`.

> **ℹ** A `Profile Summary` is displayed to the right of the build fields. When you have selected a build profile, detailed information about the selected profile will show up in this area.

4. To schedule a build, click the **[Build]** button.

After the image is successfully built, the inspection phase begins. During the inspection phase SUSE Manager collects information about the image:

- List of packages installed in the image

- Checksum of the image

- Image type and other image details

> **ℹ** If the built image type is `PXE`, a Salt pillar will also be generated. Image pillars are stored in the `/srv/susemanager/pillar_data/images/` directory and the Salt subsystem can access details about the generated image. Details include where the pillar is located and provided, image checksums, information needed for network boot, and more.
>
> The generated pillar is available to all connected clients.

Troubleshooting

Building an image requires several dependent steps. When the build fails, investigating Salt states results can help identify the source of the failure. You can carry out these checks when the build fails:

- The build host can access the build sources

- There is enough disk space for the image on both the build host and the Uyuni server

- The activation key has the correct channels associated with it

- The build sources used are valid

- The RPM package with the Uyuni public certificate is up to date and available at `/usr/share/susemanager/salt/images/rhn-org-trusted-ssl-cert-osimage-1.0-1.noarch.rpm`. For more on how to refresh a public certificate RPM, see Create a Build Host.

Limitations

The section contains some known issues when working with images.

- HTTPS certificates used to access the HTTP sources or git repositories should be deployed to the client by a custom state file, or configured manually.

- Importing Kiwi-based images is not supported.

List Image Profiles Available for Building

To list images available for building select **Images › Image List**. A list of all images will be displayed.
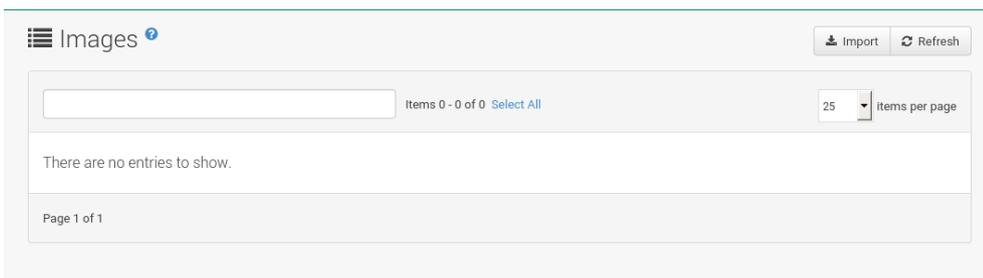
Displayed data about images includes an image `Name`, its `Version` and the build `Status`. You will also see the image update status with a listing of possible patch and package updates that are available for the image.

Clicking the **[Details]** button on an image will provide a detailed view. The detailed view includes an exact list of relevant patches and a list of all packages installed within the image.

> The patch and the package list is only available if the inspect state after a build was successful.

Channel Management

Channels are a method of grouping software packages.

In Uyuni, channels are grouped into base and child channels, with base channels grouped by operating system type, version, and architecture, and child channels being compatible with their related base channel. When a client has been assigned to a base channel, it is only possible for that system to install the related child channels. Organizing channels in this way ensures that only compatible packages are installed on each system.

Software channels use repositories to provide packages. The channels mirror the repositories in Uyuni, and the package names and other data are stored in the Uyuni database. You can have any number of repositories associated with a channel. The software from those repositories can then be installed on clients by subscribing the client to the appropriate channel.

Clients can only be assigned to one base channel. The client can then install or update packages from the repositories associated with that base channel and any of its child channels.

Uyuni provides a number of vendor channels, which provide you everything you need to run Uyuni. Uyuni Administrators and Channel Administrators have channel management authority, which gives them the ability to create and manage their own custom channels. If you want to use your own packages in your environment, you can create custom channels. Custom channels can be used as a base channel, or you can associate them with a vendor base channel.

For more on creating custom channels, see [**Administration › Custom-channels ›**].

Channel Administration

By default, any user can subscribe channels to a system. You can implement restrictions on the channel using the Web UI.

Procedure: Restricting Subscriber Access to a Channel

1. In the Uyuni Web UI, navigate to **Software › Channel List**, and select the channel to edit.

2. Locate the `Per-User Subscription Restrictions` section and check `Only selected users within your organization may subscribe to this channel`. Click [**Update**] to save the changes.

3. Navigate to the `Subscribers` tab and select or deselect users as required.

Custom Channels

Custom channels give you the ability to create your own software packages and repositories, which you can use to update your clients. They also allow you to use software provided by third party vendors in your environment.

You must have administrator privileges to be able to create and manage custom channels.

Before you create a custom channel, determine which base channel you want to associate it with, and which repositories you want to use for content.

This section gives more detail on how to create, administer, and delete custom channels.

Creating Custom Channels and Repositories

If you have custom software packages that you need to install on your Uyuni systems, you can create a custom child channel to manage them. You will need to create the channel in the Uyuni Web UI and create a repository for the packages, before assigning the channel to your systems.

You can select a vendor channel as the base channel if you want to use packages provided by a vendor. Alternatively, select `none` to make your custom channel a base channel.

Custom channels will sometimes require additional security settings. Many third party vendors secure packages with GPG. If you want to use GPG-protected packages in your custom channel, you will need to trust the GPG key which has been used to sign the metadata. You can then check the `Has Signed Metadata?` check box to match the package metadata against the trusted GPG keys. For more information on importing GPG keys, see **[Reference › Systems ›]**.

> ⚠ Do not create child channels containing packages that are not compatible with the client system.

Procedure: Creating a Custom Channel

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, and click **[Create Channel]**.

2. On the `Create Software Channel` page, give your channel a name (for example, `My Tools SLES 15 SP1 x86_64`) and a label (for example, `my-tools-sles15sp1-x86_64`). Labels must not contain spaces or uppercase letters.

3. In the `Parent Channel` drop down, choose the relevant base channel (for example, `SLE-Product-SLES15-SP1-Pool for x86_64`). Ensure that you choose the compatible parent channel for your packages.

4. In the `Architecture` drop down, choose the appropriate hardware architecture (for example, `x86_64`).

5. Provide any additional information in the contact details, channel access control, and GPG fields, as required for your environment.

6. Click **[Create Channel]**.

> ⚠ By default, the `Enable GPG Check` field is checked when you create a new channel. If you would like to add custom packages and applications to your channel, make sure you uncheck this field to be able to install unsigned packages. Disabling the GPG check is a security risk if packages are from an untrusted source.

Procedure: Creating a Software Repository

1. In the Uyuni Web UI, navigate to **Software › Manage › Repositories**, and click **[Create Repository]**.

2. On the `Create Repository` page, give your repository a label (for example, `my-tools-sles15sp1-x86_64-repo`).

3. In the `Repository URL` field, provide the path to the directory that contains the `repodata` file (for example, `file:///opt/mytools/`). You can use any valid addressing protocol in this field.

4. Uncheck the `Has Signed Metadata?` check box.

5. OPTIONAL: Complete the SSL fields if your repository requires client certificate authentication.

6. Click **[Create Repository]**.

Procedure: Assigning the Repository to a Channel

1. Assign your new repository to your custom channel by navigating to **Software › Manage › Channels**, clicking the name of your newly created custom channel, and navigating to the `Repositories` tab.

2. Ensure the repository you want to assign to the channel is checked, and click **[Update Repositories]**.

3. Navigate to the `Sync` tab and click **[Sync Now]** to synchronize immediately. You can also set an automated synchronization schedule on this tab.

There are several ways to check if a channel has finished synchronizing:

- In the Uyuni Web UI, navigate to **Admin › Setup Wizard** and select the `Products` tab. This dialog displays a completion bar for each product when they are being synchronized.

- In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository. Navigate to the menu:[Repositories > Sync] tab. The `Sync Status` is shown next to the repository name..

- Check the synchronization log file at the command prompt:

```
tail -f /var/log/rhn/reposync/<channel-label>.log
```

Each child channel will generate its own log during the synchronization progress. You will need to check all the base and child channel log files to be sure that the synchronization is complete.

Procedure: Adding Custom Channels to an Activation Key

1. In the Uyuni Web UI, navigate to **Systems › Activation Keys**, and select the key you want to add the custom channel to.

2. On the `Details` tab, in the `Child Channels` listing, select the channel to associate. You can select multiple channels, if you need to.

3. Click **[Update Activation Key]**.

Add Packages and Patches to Custom Channels

When you create a new custom channel without cloning it from an existing channel, it will not contain any packages or patches. You can add the packages and patches you require using the {productnmae} Web UI.

Custom channels can only include packages or patches that are cloned or custom, and they must match the base architecture of the channel. Patches added to custom channels must apply to a package that exists in the channel.

Procedure: Adding Packages to Custom Channels

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, and go to the `Packages` tab.

2. OPTIONAL: See all packages currently in the channel by navigating to the `List/Remove` tab.

3. Add new packages to the channel by navigating to the `Add` tab.

4. Select the parent channel to provide packages, and click **[View Packages]** to populate the list.

5. Check the packages to add to the custom channel, and click **[Add Packages]**.

6. When you are satisfied with the selection, click **[Confirm Addition]** to add the packages to the channel.

7. OPTIONAL: You can compare the packages in the current channel with those in a different channel by navigating to **Software › Manage › Channels**, and going to the **Packages › Compare** tab. To make the two channels the same, click the **[Merge Differences]** button, and resolve any conflicts.

Procedure: Adding Patches to a Custom Channel

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, and go to the `Patches` tab.

2. OPTIONAL: See all patches currently in the channel by navigating to the `List/Remove` tab.

3. Add new patches to the channel by navigating to the `Add` tab, and selecting what kind of patches you want to add.

4. Select the parent channel to provide patches, and click **[View Associated Patches]** to populate the list.

5. Check the patches to add to the custom channel, and click **[Confirm]**.

6. When you are satisfied with the selection, click **[Confirm]** to add the patches to the channel.

Manage Custom Channels

Uyuni administrators and channel administrators can alter or delete any channel.

To grant other users rights to alter or delete a channel, navigate to **Software › Manage › Channels** and select the channel you want to edit. Navigate to the `Managers` tab, and check the user to grant permissions. Click **[Update]** to save the changes.

> ⚠️ If you delete a channel that has been assigned to a set of clients, it will trigger an immediate update of the channel state for any clients associated with the deleted channel. This is to ensure that the changes are reflected accurately in the repository file.

You cannot delete Uyuni channels with the Web UI. Only custom channels can be deleted.

Procedure: Deleting Custom Channels

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, and select the channel you want to delete.

2. Click **[Delete software channel]**.

3. On the `Delete Channel` page, check the details of the channel you are deleting, and check the `Unsubscribe Systems` checkbox to remove the custom channel from any systems that might still be subscribed.

4. Click **[Delete Channel]**.

When channels are deleted, the packages that are part of the deleted channel are not automatically removed. You will not be able to update packages that have had their channel deleted.

You can delete packages that are not associated with a channel in the Uyuni Web UI. Navigate to **Software › Manage › Packages**, check the packages to remove, and click **[Delete Packages]**.

Subscription Matching

Your SUSE products require subscriptions, which are managed by the SUSE Customer Center (SCC). Uyuni runs a nightly report checking the subscription status of all your registered clients against your SCC account. The report gives you information about which clients consume which subscriptions, how many subscriptions you have remaining and available to use, and which clients do not have a current subscription.

Navigate to **Audit › Subscription Matching** to see the report.

The `Subscriptions Report` tab gives information about current and expiring subscriptions.

The `Unmatched Products Report` tab gives a list of clients that do not have a current subscription. This includes clients that could not be matched, or that are not currently registered with Uyuni. The report includes product names and the number of systems that remain unmatched.

The `Pins` tab allows you to associate individual clients to the relevant subscription. This is especially useful if the subscription manager is not automatically associating clients to subscriptions successfully.

The `Messages` tab shows any errors that occurred during the matching process.

You can also download the reports in .csv format, or access them from that command prompt in the `/var/lib/spacewalk/subscription-matcher/` directory.

By default, the subscription matcher runs daily, at midnight. To change this, navigate to **Admin › Task Schedules** and click `gatherer-matcher-default`. Change the schedule as required, and click **[Update Schedule]**.

Because the report can only match current clients with current subscriptions, you might find that the matches change over time. The same client will not always match the same subscription. This can be due to new clients being registered or unregistered, or because of the addition or expiration of subscriptions.

The subscription matcher will automatically attempt to reduce the number of unmatched products, limited by the terms and conditions of the subscriptions in your account. However, if you have incomplete hardware information, unknown virtual machine host assignments, or clients running in unknown public clouds, the matcher might show that you do not have enough subscriptions available. Always ensure you have complete data about your clients included in Uyuni, to help ensure accuracy.

> **!** The subscription matcher will not always match clients and subscriptions accurately. It is not intended to be a replacement for auditing.

Pin Clients to Subscriptions

If the subscription matcher is not automatically matching a particular client with the correct subscription, you can manually pin them. When you have created a pin, the subscription matcher favors matching a specific subscription with a given system or group of systems.

However, the matcher will not always respect a pin. It depends on the subscription being available, and whether or not the subscription can be applied to the client. Additionally, pins will be ignored if they result in a match that violates the terms and conditions of the subscription, or if the matcher detects a more accurate match if the pin is ignored.

To add a new pin, click **[Add a Pin]**, and select the client to pin.

> We do not recommend using pinning regularly, or for a large number of clients. The subscription matcher tool is generally accurate enough for most installations.

Live Patching with SUSE Manager

Performing a kernel update usually requires a system reboot. Common vulnerability and exposure (CVE) patches should be applied as soon as possible, but if you cannot afford the downtime, you can use Live Patching to inject these important updates and skip the need to reboot.

The procedure for setting up Live Patching is slightly different for SLES 12 and SLES 15. Both procedures are documented in this section.

Set up Channels for Live Patching

A reboot is required every time you update the full kernel package. Therefore, it is important that clients using Live Patching do not have newer kernels available in the channels they are assigned to. Clients using live patching have updates for the running kernel in the live patching channels.

There are two ways to manage channels for live patching:

- Use content lifecycle management to clone the product tree and remove kernel versions newer than the running one. This procedure is explained in the Content Livecycle Management Examples. This is the recommended solution.

- Use the `spacewalk-manage-channel-lifecycle` tool. This procedure is more manual and requires command line tools as well as the Web UI. This procedure is explained in this section for SLES 15 SP1, but it also works for SLE 12 SP4 or later.

Use spacewalk-manage-channel-lifecycle for Live Patching

Cloned vendor channels should be prefixed by `dev` for development, `testing`, or `prod` for production. In this procedure, you will create a `dev` cloned channel and then promote the channel to `testing`.

Procedure: Cloning Live Patching Channels

1. At the command prompt on the client, as root, obtain the current package channel tree:

```
# spacewalk-manage-channel-lifecycle --list-channels
Spacewalk Username: admin
Spacewalk Password:
Channel tree:

 1. sles15-{sp-vert}-pool-x86_64
      \__ sle-live-patching15-pool-x86_64-{sp-vert}
      \__ sle-live-patching15-updates-x86_64-{sp-vert}
      \__ sle-manager-tools15-pool-x86_64-{sp-vert}
      \__ sle-manager-tools15-updates-x86_64-{sp-vert}
      \__ sles15-{sp-vert}-updates-x86_64
```

2. Use the `spacewalk-manage-channel` command with the `init` argument to automatically create a new development clone of the original vendor channel:

```
spacewalk-manage-channel-lifecycle --init -c sles15-{sp-vert}-pool-x86_64
```

3. Check that `dev-sles15-{sp-vert}-updates-x86_64` is available in your channel list.

Check the `dev` cloned channel you created, and remove any kernel updates that require a reboot.

Procedure: Removing Non-Live Kernel Patches from Cloned Channels

1. Check the current kernel version by selecting the client from **Systems › System List**, and taking note of the version displayed in the `Kernel` field.

2. In the Uyuni Web UI, select the client from **Systems › Overview**, navigate to the **Software › Manage › Channels** tab, and select `dev-sles15-sp{sp-vert}-updates-x86_64`. Navigate to the `Patches` tab, and click **[List/Remove Patches]**.

3. In the search bar, type `kernel` and identify the kernel version that matches the kernel currently used by your client.

4. Remove all kernel versions that are newer than the currently installed kernel.

Your channel is now set up for live patching, and can be promoted to `testing`. In this procedure, you will also add the live patching child channels to your client, ready to be applied.

Procedure: Promoting Live Patching Channels

1. At the command prompt on the client, as `root`, promote and clone the `dev-sles15-{sp-vert}-pool-x86_64` channel to a new `testing` channel:

```
# spacewalk-manage-channel-lifecycle --promote -c dev-sles15-{sp-vert}-pool-x86_64
```

2. In the Uyuni Web UI, select the client from **Systems › Overview**, and navigate to the **Software › Software Channels** tab.

3. Check the new `test-sles15-sp{sp-vert}-pool-x86_64` custom channel to change the base channel, and check both corresponding live patching child channels.

4. Click **[Next]**, confirm that the details are correct, and click **[Confirm]** to save the changes.

You can now select and view available CVE patches, and apply these important kernel updates with Live Patching.

Live Patching on SLES 15

On SLES 15 systems and newer, live patching is managed by the `klp livepatch` tool.

Before you begin, ensure:

- Uyuni is fully updated.

- You have one or more Salt clients running SLES 15 (SP1 or later).

- Your SLES 15 Salt clients are registered with Uyuni.

- You have access to the SLES 15 channels appropriate for your architecture, including the live patching child channel (or channels).

- The clients are fully synchronized.

- Assign the clients to the cloned channels prepared for live patching. For more information on preparation, see [**Administration › Live-patching-channel-setup** ›].

Procedure: Setting up for Live Patching

1. Select the client you want to manage with Live Patching from **Systems › Overview**, and navigate to the **Software › Packages › Install** tab. Search for the `kernel-livepatch` package, and install it.
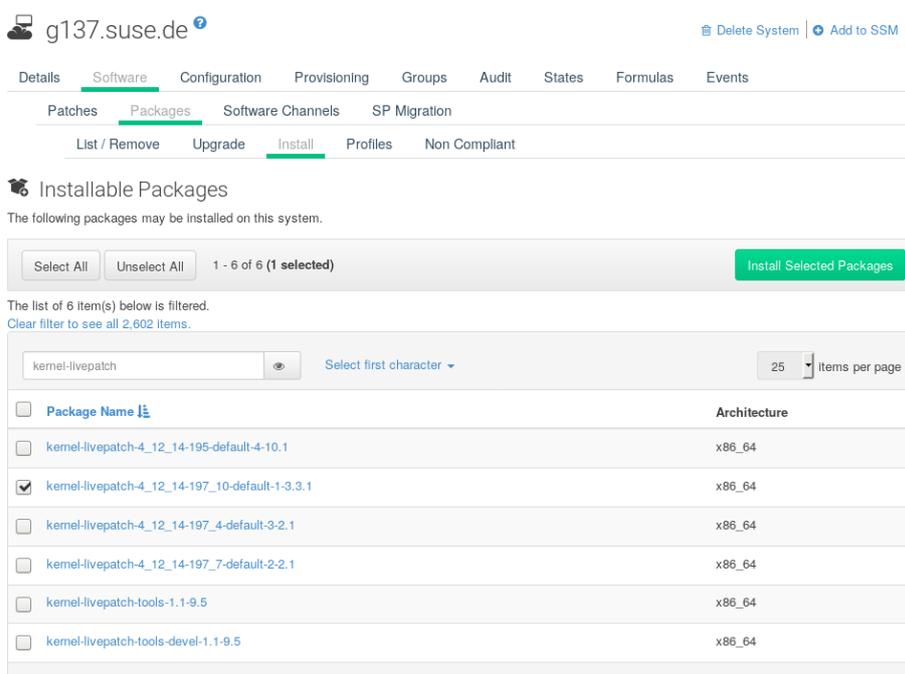
2. Apply the highstate to enable Live Patching, and reboot the client.

3. Repeat for each client that you want to manage with Live Patching.

4. To check that live patching has been enabled correctly, select the client from **Systems › System List**, and ensure that `Live Patch` appears in the `Kernel` field.

Procedure: Applying Live Patches to a Kernel

1. In the Uyuni Web UI, select the client from **Systems › Overview**. You will see a banner at the top of the screen showing the number of critical and non-critical packages available for the client:

2. Click **[Critical]** to see a list of the available critical patches.

3. Select any patch with a synopsis reading `Important: Security update for the Linux kernel`. Security bugs will also include their CVE number, where applicable.

4. OPTIONAL: If you know the CVE number of a patch you want to apply, you can search for it in **Audit › CVE Audit**, and apply the patch to any clients that require it.

> **!** Not all kernel patches are Live Patches! Non-Live kernel patches are represented by a `Reboot Required` icon located next to the `Security` shield icon. These patches will always require a reboot.

> **!** Not all security issues can be fixed by applying a live patch. Some security issues can only be fixed by applying a full kernel update and will require a reboot. The assigned CVE numbers for these issues are not included in live patches. A CVE audit will display this requirement.

Live Patching on SLES 12

On SLES 12 systems, live patching is managed by kGraft. For in depth information covering kGraft use, see https://documentation.suse.com/sles/12-SP4/html/SLES-all/cha-kgraft.html.

Before you begin, ensure:

- Uyuni is fully updated.

- You have one or more Salt clients running SLES 12 (SP1 or later).

- Your SLES 12 Salt clients are registered with Uyuni.

- You have access to the SLES 12 channels appropriate for your architecture, including the live patching child channel (or channels).

- The clients are fully synchronized.

- Assign the clients to the cloned channels prepared for live patching. For more information on preparation, see **[Administration › Live-patching-channel-setup ›]**.

Procedure: Setting up for Live Patching

1. Select the client you want to manage with Live Patching from **Systems › Overview**, and on the system details page navigate to the **Software › Packages › Install** tab. Search for the `kgraft` package, and install it.
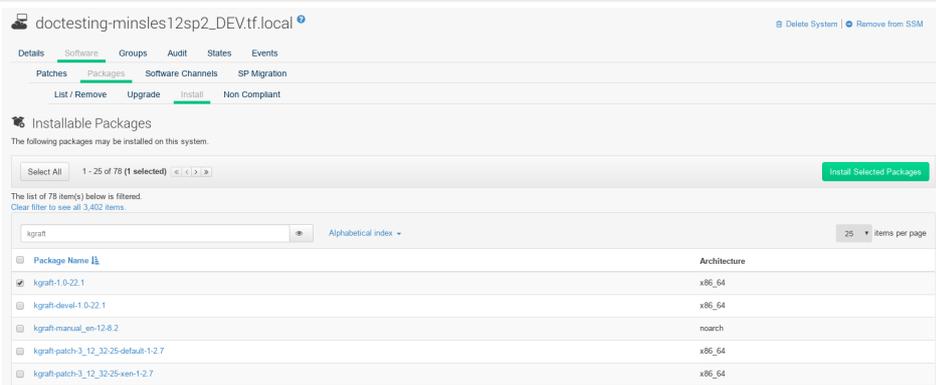
2. Apply the highstate to enable Live Patching, and reboot the client.

3. Repeat for each client that you want to manage with Live Patching.

4. To check that live patching has been enabled correctly, select the client from **Systems › System List**, and ensure that `Live Patching` appears in the `Kernel` field.

Procedure: Applying Live Patches to a Kernel

1. In the Uyuni Web UI, select the client from **Systems › Overview**. You will see a banner at the top of the screen showing the number of critical and non-critical packages available for the client:

2. Click **[Critical]** to see a list of the available critical patches.

3. Select any patch with a synopsis reading `Important: Security update for the Linux kernel`. Security bugs will also include their CVE number, where applicable.

4. OPTIONAL: If you know the CVE number of a patch you want to apply, you can search for it in **Audit › CVE Audit**, and apply the patch to any clients that require it.

> Not all kernel patches are Live Patches! Non-Live kernel patches are represented by a `Reboot Required` icon located next to the `Security` shield icon. These patches will always require a reboot.

> Not all security issues can be fixed by applying a live patch. Some security issues can only be fixed by applying a full kernel update and will require a reboot. The assigned CVE numbers for these issues are not included in live patches. A CVE audit will display this requirement.

Monitoring with Prometheus and Grafana

You can monitor your Uyuni environment using Prometheus and Grafana. Uyuni Server and Proxy are able to provide self-health metrics. You can also install and manage a number of Prometheus exporters on Salt clients.

Prometheus and Grafana packages are included in the Uyuni Client Tools for SUSE Linux Enterprise 12, SUSE Linux Enterprise 15, Red Hat Enterprise Linux 6, Red Hat Enterprise Linux 7, Red Hat Enterprise Linux 8 and openSUSE 15.x.

You need to install Prometheus and Grafana on a machine separate from the Uyuni Server. We recommend you use a managed Salt client as your monitoring server.

> Prometheus fetches metrics using a pull mechanism, so the server must be able to establish TCP connections to monitored clients. Clients must have corresponding open ports and be reachable over the network.

> You must have a monitoring add-on subscription for each client you want to monitor. Visit the SUSE Customer Center to manage your Uyuni subscriptions.

Prometheus and Grafana

Prometheus

Prometheus is an open-source monitoring tool that is used to record real-time metrics in a time-series database. Metrics are pulled via HTTP, enabling high performance and scalability.

Prometheus metrics are time series data, or timestamped values belonging to the same group or dimension. A metric is uniquely identified by its name and set of labels.

```
    metric name              labels              timestamp    value

http_requests_total{status="200", method="GET"}  @1557331801.111  42236
```

Each application or system being monitored must expose metrics in the format above, either through code instrumentation or Prometheus exporters.

Prometheus Exporters

Exporters are libraries that help with exporting metrics from third-party systems as Prometheus metrics. Exporters are useful whenever it is not feasible to instrument a given application or system with Prometheus metrics directly. Multiple exporters can run on a monitored host to export local metrics.

The Prometheus community provides a list of official exporters, and more can be found as community contributions. For more information and an extensive list of exporters, see https://prometheus.io/docs/instrumenting/exporters/.

Grafana is a tool for data visualization, monitoring, and analysis. It is used to create dashboards with panels representing specific metrics over a set period of time. Grafana is commonly used together with Prometheus, but also supports other data sources such as ElasticSearch, MySQL, PostgreSQL, and Influx DB. For more information about Grafana, see https://grafana.com/docs/.

Set up the Monitoring Server

To set up your monitoring server, you need to install Prometheus and Grafana, and configure them.

Install Prometheus

If your monitoring server is a Uyuni Salt client, you can install the Prometheus package using the Uyuni Web UI. Otherwise you can download and install the package on your monitoring server manually.

Procedure: Installing Prometheus Using the Web UI

1. In the Uyuni Web UI, open the details page of the system where Prometheus is to be installed, and navigate to the `Formulas` tab.

2. Check the `Prometheus` checkbox to enable monitoring formulas, and click **[Save]**.

3. Navigate to the `Prometheus` tab in the top menu.

4. In the `Uyuni Server` section, enter valid Uyuni API credentials. Make sure that the credentials you have entered allow access to the set of systems you want to monitor.

5. Customize any other configuration options according to your needs.

6. Click **[Save Formula]**.

7. Apply the highstate and confirm that it completes successfully.

8. Check that the Prometheus interface loads correctly. In your browser, navigate to the URL of the server where Prometheus is installed, on port 9090 (for example, `http://example.com:9090`).

Procedure: Manually Installing and Configuring Prometheus

1. On the monitoring server, install the `golang-github-prometheus-prometheus` package:

   ```
   zypper in golang-github-prometheus-prometheus
   ```

2. Enable the Prometheus service:

   ```
   systemctl enable --now prometheus
   ```

3. Check that the Prometheus interface loads correctly. In your browser, navigate to the URL of the server where Prometheus is installed, on port 9090 (for example, `http://example.com:9090`).

4. Open the configuration file at `/etc/prometheus/prometheus.yml` and add this configuration

information. Replace `server.url` with your Uyuni server URL and adjust `username` and `password` fields to match your Uyuni credentials.

```
# {productname} self-health metrics
scrape_configs:
- job_name: 'mgr-server'
  static_configs:
    - targets:
      - 'server.url:9100'  # Node exporter
      - 'server.url:9187'  # PostgreSQL exporter
      - 'server.url:5556'  # JMX exporter (Tomcat)
      - 'server.url:5557'  # JMX exporter (Taskomatic)
      - 'server.url:9800'  # Taskomatic
    - targets:
      - 'server.url:80'    # Message queue
      labels:
        __metrics_path__: /rhn/metrics

# Managed systems metrics:
- job_name: 'mgr-clients'
  uyuni_sd_configs:
    - host: "http://server.url"
      username: "admin"
      password: "admin"
```

5. Save the configuration file.

6. Restart the Prometheus service:

```
systemctl restart prometheus
```

For more information about the Prometheus configuration options, see the official Prometheus documentation at https://prometheus.io/docs/prometheus/latest/configuration/configuration/

Install Grafana

If your monitoring server is a Uyuni Salt client, you can install the Grafana package using the Uyuni Web UI. Otherwise you can download and install the package on your monitoring server manually.

Procedure: Installing Grafana Using the Web UI

1. In the Uyuni Web UI, open the details page of the system where Grafana is to be installed, and navigate to the `Formulas` tab.

2. Check the `Grafana` checkbox to enable monitoring formulas, and click **[Save]**.

3. Navigate to the `Grafana` tab in the top menu.

4. In the `Enable and configure Grafana` section, enter the admin credentials you want to use to log in Grafana.

5. On the `Datasources` section, make sure that the Prometheus URL field points to the system where Prometheus is running.

6. Customize any other configuration options according to your needs.

7. Click **[Save Formula]**.

8. Apply the highstate and confirm that it completes successfully.

9. Check that the Grafana interface is loading correctly. In your browser, navigate to the URL of the server where Grafana is installed, on port 3000 (for example, `http://example.com:3000`).

> ℹ️ Uyuni provides pre-built dashboards for server self-health, basic client monitoring, and more. You can choose which dashboards to provision in the formula configuration page.

Procedure: Manually Installing Grafana

1. Install the `grafana` package:

```
zypper in grafana
```

2. Enable the Grafana service:

```
systemctl enable --now grafana-server
```

3. Check that the Grafana interface is loading correctly. In your browser, navigate to the URL of the server where Grafana is installed, on port 3000 (for example, `http://example.com:3000`).
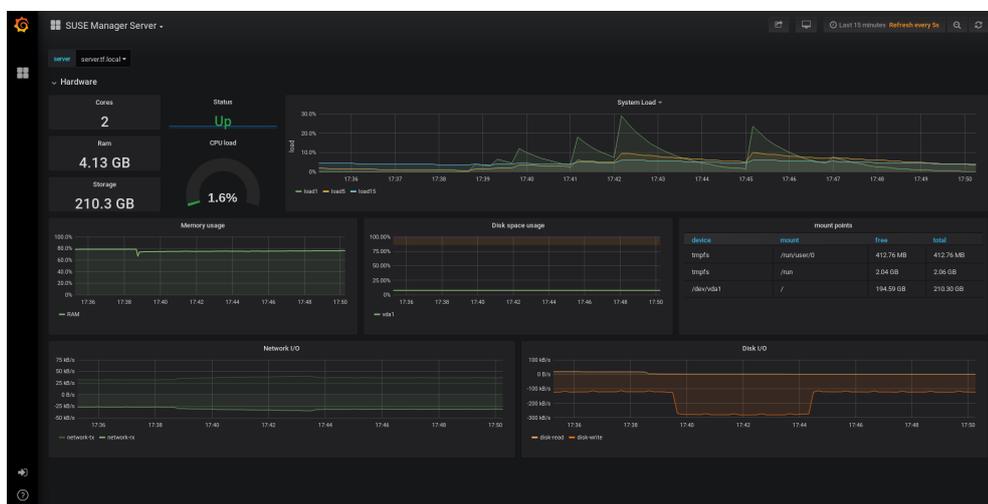
For more information on how to manually install and configure Grafana, see https://grafana.com/docs.

For more information about the monitoring formulas with forms, see **[Salt › Formula-monitoring ›]**.

Configure Uyuni Monitoring

With Uyuni 4, you can enable the server to expose Prometheus self-health metrics, and also install and configure exporters on client systems.

Server Self Monitoring

The Server self-health metrics cover hardware, operating system and Uyuni internals. These metrics are made available by instrumentation of the Java application, combined with Prometheus exporters.

These exporter packages are shipped with Uyuni Server:

- Node exporter: `golang-github-prometheus-node_exporter`. See https://github.com/prometheus/node_exporter.

- PostgreSQL exporter: `golang-github-wrouesnel-postgres_exporter`. See https://github.com/wrouesnel/postgres_exporter.

- JMX exporter: `prometheus-jmx_exporter`. See https://github.com/prometheus/jmx_exporter.

- Apache exporter: `golang-github-lusitaniae-apache_exporter`. See https://github.com/Lusitaniae/apache_exporter.

These exporter packages are shipped with Uyuni Proxy:

- Node exporter: `golang-github-prometheus-node_exporter`. See https://github.com/prometheus/node_exporter.

- Squid exporter: `golang-github-boynux-squid_exporter`. See https://github.com/boynux/squid-exporter.

The exporter packages are pre-installed in Uyuni Server and Proxy, but their respective systemd daemons are disabled by default.

Procedure: Enabling Self Monitoring

1. In the Uyuni Web UI, navigate to **Admin › Manager Configuration › Monitoring**.

2. Click **[Enable services]**.

3. Restart Tomcat and Taskomatic.

4. Navigate to the URL of your Prometheus server, on port 9090 (for example, `http://example.com:9090`)

5. In the Prometheus UI, navigate to menu:[Status > Targets] and confirm that all the endpoints on the `mgr-server` group are up.

6. If you have also installed Grafana with the Web UI, the server insights will be visible on the Uyuni Server dashboard.
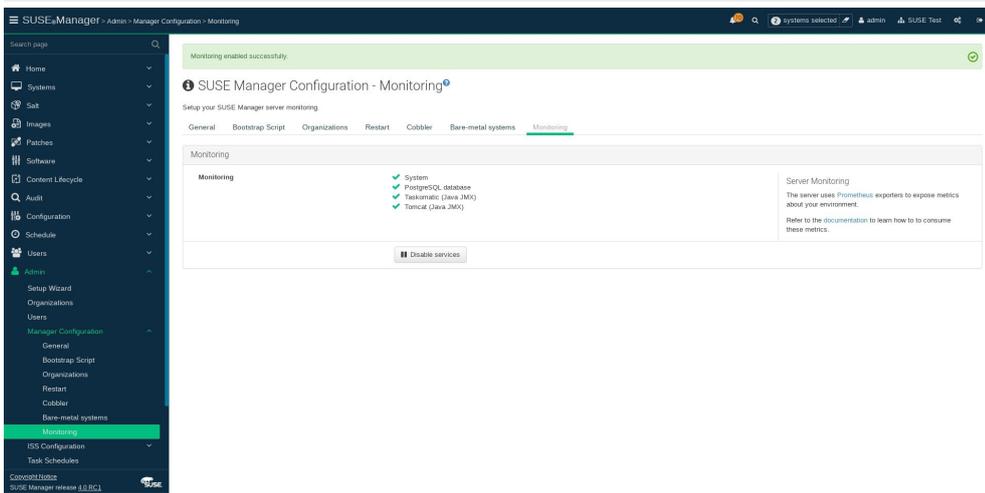
Only server self-health monitoring can be enabled using the Web UI. Metrics for a proxy are not automatically collected by Prometheus. To enable self-health monitoring on a proxy, you will need to manually install exporters and enable them.

Monitoring Managed Systems

Prometheus metrics exporters can be installed and configured on Salt clients using formulas. The packages are available from the Uyuni client tools channels, and can be enabled and configured directly in the Uyuni Web UI.

These exporters can be installed on managed systems:

- Node exporter: `golang-github-prometheus-node_exporter`. See https://github.com/prometheus/node_exporter.

- PostgreSQL exporter: `golang-github-wrouesnel-postgres_exporter`. See https://github.com/wrouesnel/postgres_exporter.

- Apache exporter: `golang-github-lusitaniae-apache_exporter`. See https://github.com/Lusitaniae/apache_exporter.

When you have the exporters installed and configured, you can start using Prometheus to collect metrics from monitored systems. If you have configured your monitoring server with the Web UI, metrics collection will happen automatically.

Procedure: Configuring Prometheus Exporters on a Client

1. In the Uyuni Web UI, open the details page of the client to be monitored, and navigate to the menu:Formulas tab.

2. Check the `Enabled` checkbox on the `Prometheus Exporters` formula.

3. Click [**Save**].

4. Navigate to the **Formulas › Prometheus Exporters** tab.

5. Select the exporters you want to enable and customize arguments according to your needs.

6. Click **[Save Formula]**.

7. Apply the highstate.
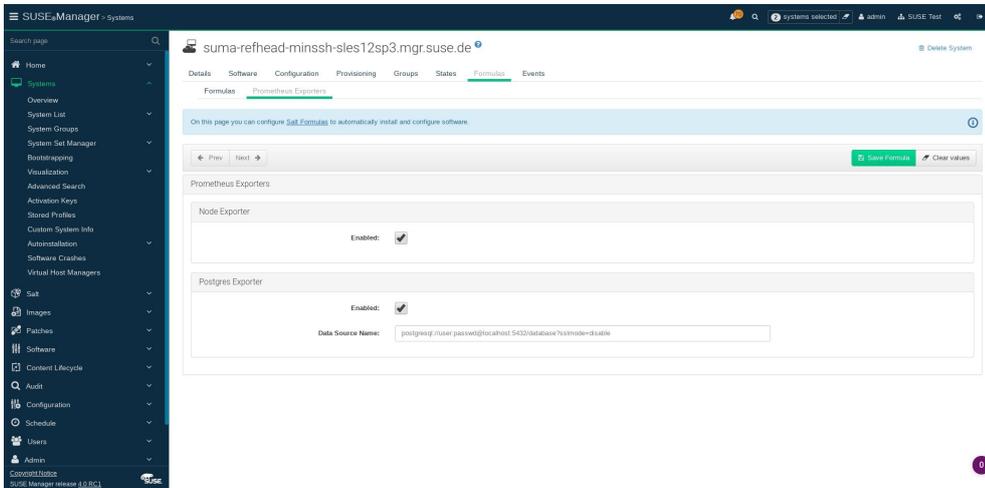
 Monitoring formulas can also be configured for System Groups, by applying the same configuration used for individual systems inside the corresponding group.

Network Boundaries

Prometheus fetches metrics using a pull mechanism, so the server must be able to establish TCP connections to monitored clients. By default, Prometheus uses these ports:

- Node exporter: 9100

- PostgreSQL exporter: 9187

- Apache exporter: 9117

Additionally, if you are running the alert manager on a different host than where you run Prometheus, you will also need to open port 9093.

For clients installed on cloud instances, you can add the required ports to a security group that has access to the monitoring server.

Alternatively, you can deploy a Prometheus instance in the exporters' local network, and configure federation. This allows the main monitoring server to scrape the time series from the local Prometheus instance. If you use this method, you only need to open the Prometheus API port, which is 9090.

For more information on Prometheus federation, see https://prometheus.io/docs/prometheus/latest/federation/.

You can also proxy requests through the network boundary. Tools like PushProx deploy a proxy and a client on both sides of the network barrier and allow Prometheus to work across network topologies such as NAT.

For more information on PushProx, see https://github.com/RobustPerception/PushProx.

Organizations

Organizations are used to manage user access and permissions within Uyuni.

For most environments, a single organization is enough. However, more complicated environments might need several organizations. You might like to have an organization for each physical location within your business, or for different business functions.

When you have created your organizations, you can create and assign users to your organizations. You can then assign permissions on an organization level, which applies by default to every user assigned to the organization.

You can also configure authentication methods for your new organization, including PAM and single sign-on. For more information about authentication, see [**Administration** › **Auth-methods** ›].

> You must be logged in as a Uyuni administrator to create and manage organizations.

Procedure: Creating a New Organization

1. In the Uyuni Web UI, navigate to **Admin** › **Organizations**, and click [**Create Organization**].

2. In the `Create Organization` dialog, complete these fields:

   ◦ In the `Organization Name` field, type a name for your new organization. The name should be between 3 and 128 characters long.

   ◦ In the `Desired Login` field, type the login name you want to use for the organization's administrator. This must be a new administrator account, you will not be able to use an existing administrator account to sign in to the new organization, including the one you are currently signed in with.

   ◦ In the `Desired Password` field, type a password for the new organization's administrator. Confirm the password by typing it again in the `Confirm Password` field. Password strength is indicated by the colored bar beneath the password fields.

   ◦ In the `Email` field, type an email address for the new organization's administrator.

   ◦ In the `First Name` field, select a salutation, and type a given name for the new organization's administrator.

   ◦ In the `Last Name` field, type a surname for the new organization's administrator.

3. Click [**Create Organization**].

Manage Organizations

In the Uyuni Web UI, navigate to **Admin** › **Organizations** to see a list of available organizations. Click the name of an organization to manage it.

From the **Admin** › **Organizations** section, you can access tabs to manage users, trusts, configuration, and

states for your organization.

> ℹ️ Organizations can only be managed by their administrators. To manage an organization, ensure you are signed in as the correct administrator for the organization you want to change.

Organization Users

Navigate to the `Users` tab to view the list of all users associated with the organization, and their role. Clicking a username takes you to the `Users` menu to add, change, or delete users.

Trusted Organizations

Navigate to the `Trusts` tab to add or remove trusted organizations. Establishing trust between organizations allow them to share content between them, and gives you the ability to migrate clients from one organization to another.

Configure Organizations

Navigate to the `Configuration` tab to manage the configuration of your organization. This includes the use of staged contents, setting up crash reporting, and the use of SCAP files.

For more information about content staging, see **[Administration › Content-staging ›]**.

For more information about OpenSCAP, see **[Reference › Audit ›]**.

Manage States

Navigate to the `States` tab to manage Salt states for all clients in your organization. States allow you to define global security policies, or add a common admin user to all clients.

For more information about Salt States, see **[Salt › Salt-states ›]**.

Manage Configuration Channels

You can select which configuration channels should be applied across your organization. Configuration channels can be created in the Uyuni Web UI by navigating to **Configuration › Channels**. Apply configuration channels to your organization using the Uyuni Web UI.

Procedure: Applying Configuration Channels to an Organization

1. In the Uyuni Web UI, navigate to **Home › My Organization › Configuration Channels**.

2. Use the search feature to locate a channel by name.

3. Check the channel to be applied and click **[Save Changes]**. This saves to the database, but does not apply the changes to the channel.

4. Apply the changes by clicking **[Apply]**. This schedules the task to apply the changes to all clients within the organization.

Content Staging

Staging is used by clients to download packages in advance, before they are installed. This allows package installation to begin as soon as it is scheduled, which can reduce the amount of time required for a maintenance window.

Enable Content Staging

You can manage content staging across your entire organization. In the Uyuni Web UI, navigate to **Admin › Organizations** to see a list of available organizations. Click the name of an organization, and check the `Enable Staging Contents` box to allow clients in this organization to stage package data.

> You must be logged in as a Uyuni administrator to create and manage organizations.

You can also enable staging at the command prompt by editing `/etc/sysconfig/rhn/up2date`, and adding or editing these lines:

```
stagingContent=1
stagingContentWindow=24
```

The `stagingContentWindow` parameter is a time value expressed in hours and determines when downloading will start. It is the number of hours before the scheduled installation or update time. In this example, content will be downloaded 24 hours before the installation time. The start time for download depends on the selected contact method for a system. The assigned contact method sets the time for when the next `mgr_check` will be executed.

Next time an action is scheduled, packages are automatically downloaded, but not installed. At the scheduled time, the staged packages are installed.

Configure Content Staging

There are two parameters used to configure content staging:

- `salt_content_staging_advance` is the advance time for the content staging window to open, in hours. This is the number of hours before installation starts, that package downloads can begin.

- `salt_content_staging_window` is the duration of the content staging window, in hours. This is the amount of time clients have to stage packages before installation begins.

For example, if `salt_content_staging_advance` is set to six hours, and `salt_content_staging_window` is set to two hours, the staging window will open six hours before the installation time, and remain open for two hours. No packages will be downloaded in the four remaining hours until installation starts.

If you set the same value for both `salt_content_staging_advance` and `salt_content_staging_window` packages will be able to be downloaded until installation begins.

Configure the content staging parameters in `/usr/share/rhn/config-defaults/rhn_java.conf`.

Default values:

- `salt_content_staging_advance: 8 hours`

- `salt_content_staging_window: 8 hours`

> Content staging must be enabled for these parameters to work correctly.

Disconnected Setup

When it is not possible to connect Uyuni to the internet, you can use it within a disconnected environment.

The repository mirroring tool (RMT) is available on SUSE Linux Enterprise 15 and later. RMT replaces the subscription management tool (SMT), which can be used on older SUSE Linux Enterprise installations.

In a disconnected Uyuni setup, RMT or SMT uses an external network to connect to SUSE Customer Center. All software channels and repositories are synchronized to a removable storage device. The storage device can then be used to update the disconnected Uyuni installation.

This setup allows your Uyuni installation to remain in an offline, disconnected environment.

> Your RMT or SMT instance must be used to managed a Uyuni Server directly. It cannot be used to manage a second RMT or SMT instance, in a cascade.

For more information on RMT, see https://documentation.suse.com/sles/15-SP1/html/SLES-all/book-rmt.html.

Synchronize RMT

You can use RMT on SUSE Linux Enterprise 15 installations to manage clients running SUSE Linux Enterprise 12 or later.

We recommend you set up a dedicated RMT instance for each Uyuni installation.

Procedure: Setting up RMT

1. On the RMT instance, install the RMT package:

   ```
   zypper in rmt-server
   ```

2. Configure RMT using YaST:

   ```
   yast2 rmt
   ```

3. Follow the prompts to complete installation. For more information on setting up RMT, see https://documentation.suse.com/sles/15-SP1/html/SLES-all/book-rmt.html.

Procedure: Synchronizing RMT with SCC

1. On the RMT instance, list all available products and repositories for your organization:

```
rmt-cli products list --all
rmt-cli repos list --all
```

2. Synchronize all available updates for your organization:

```
rmt-cli sync
```

You can also configure RMT to synchronize regularly using systemd.

3. Enable the products you require. For example, to enable SLES 15:

```
rmt-cli product enable sles/15/x86_64
```

4. Export the synchronized data to your removable storage. In this example, the storage medium is mounted at `/mnt/usb`:

```
rmt-cli export data /mnt/usb
```

5. Export the enabled repositories to your removable storage:

```
rmt-cli export settings /mnt/usb
```

> **!** Ensure that the external storage is mounted to a directory that is writeable by the RMT user. You can change RMT user settings in the `cli` section of `/etc/rmt.conf`.

Synchronize SMT

SMT is included with SUSE Linux Enterprise 12, and can be used to manage clients running SUSE Linux Enterprise 10 or later.

SMT requires you to create a local mirror directory on the SMT instance in order to synchronize repositories and packages.

For more details on installing and configuring SMT, see https://documentation.suse.com/sles/12-SP4/html/SLES-all/book-smt.html.

Procedure: Synchronizing SMT with SCC

1. On the SMT instance, create a database replacement file:

```
smt-sync --createdbreplacementfile /tmp/dbrepl.xml
```

2. Export the synchronized data to your removable storage. In this example, the storage medium is mounted at `/mnt/usb`:

```
smt-sync --todir /mnt/usb
smt-mirror --dbreplfile /tmp/dbrepl.xml --directory /mnt/usb \
           --fromlocalsmt -L /var/log/smt/smt-mirror-export.log
```

3. Export the enabled repositories to your removable storage:

```
rmt-cli export settings /mnt/usb
```

> ⚠ Ensure that the external storage is mounted to a directory that is writeable by the RMT user. You can change SMT user settings in `/etc/smt.conf`.

Synchronize a Disconnected Server

When you have removable media loaded with your SUSE Customer Center data, you can use it to synchronize your disconnected server.

Procedure: Synchronizing a Disconnected Server

1. Mount your removable media device to the Uyuni server. In this example, the mount point is `/media/disk`.

2. Open `/etc/rhn/rhn.conf` and define the mount point by adding or editing this line:

```
server.susemanager.fromdir = /media/disk
```

3. Restart the Tomcat service:

```
systemctl restart tomcat
```

4. Refresh the local data:

```
mgr-sync refresh
```

5. Perform a synchronization:

```
mgr-sync list channels
mgr-sync add channel channel-label
```

The removable disk that you use for synchronization must always be available at the same mount point. Do not trigger a synchronization, if the storage medium is not mounted. This will result in data corruption.

Inter-Server Synchronization

If you have more than one Uyuni installation, you need to ensure that they stay aligned on content and permissions. Inter-Server Synchronization (ISS) allows you to connect two or more Uyuni Servers and keep them up-to-date.

To set up ISS, you need to define one Uyuni Server as a master, with the other as a slave. If conflicting configurations exist, the system will prioritize the master configuration.

> ℹ️ ISS Masters are masters only because they have slaves attached to them. This means that you need to set up the ISS Master first, by defining its slaves. You can then set up the ISS Slaves, by attaching them to a master.

Procedure: Setting up an ISS Master

1. In the Uyuni Web UI, navigate to **Admin › ISS Configuration › Master Setup**, and click **[Add new slave]**.

2. In the `Edit Slave Details` dialog, provide these details for the ISS Master's first slave:

   - In the `Slave Fully-Qualified Domain Name` field, enter the FQDN of the ISS Slave. For example: `server2.example.com`.

   - Check the `Allow Slave to Sync?` checkbox to enable the slave to synchronize with the master.

   - Check the `Sync All Orgs to Slave?` checkbox to synchronize all organizations to this slave.

3. Click **[Create]** to add the ISS slave.

4. In the `Allow Export of the Selected Organizations` section, check the organizations you want to allow this slave to export to the master, and click **[Allow Orgs]**.

Before you set up the ISS Slave, you will need to ensure you have the appropriate CA certificate.

Procedure: Copying the Master CA Certificate to an ISS Slave

1. On the ISS Master, locate the CA Certificate at `/srv/www/htdocs/pub/RHN-ORG-TRUSTED-SSL-CERT` and create a copy that can be transferred to the ISS Slave.

2. On the ISS Slave, save the CA certificate file to the `/etc/pki/trust/anchors/` directory.

When you have copied the certificate, you can set up the ISS Slave.

Procedure: Setting up an ISS Slave

1. In the Uyuni Web UI, navigate to **Admin › ISS Configuration › Slave Setup**, and click **[Add new master]**.

2. In the `Details for new Master` dialog, provide these details for the server to use as the ISS master:

- In the `Master Fully-Qualified Domain Name` field, enter the FQDN of the ISS Master for this slave. For example: `server1.example.com`.

- In the `Filename of this Master's CA Certificate` field, enter the absolute path to the CA certificate on the ISS master. This should be `/etc/pki/trust/anchors/RHN-ORG-TRUSTED-SSL-CERT`.

3. Click **[Add new master]** to add the ISS Slave to this master.

Procedure: Completing ISS Setup

1. At the command prompt on the ISS Slave, synchronize with the ISS Master:

```
mgr-inter-sync
```

2. OPTIONAL: To synchronize a single channel, use this command:

```
mgr-inter-sync -c <channel-name>
```

3. In the Uyuni Web UI, navigate to **Admin › ISS Configuration › Configure Master-to-Slave Mappings** and select the organizations you want to synchronize.

Task Schedules

Under **Admin › Task Schedules** all predefined task bunches are listed.

Click a **SUSE Manager Schedules › Schedule name** to open its **Schedule Name › Basic Schedule Details** where you can disable it or change the frequency. Click **[Edit Schedule]** to update the schedule with your settings. To delete a schedule, click **[Delete Schedule]** in the upper right-hand corner.

> ⚠️ Only disable or delete a schedule if you are absolutely certain this is necessary as they are essential for Uyuni to work properly.

If you click a bunch name, a list of runs of that bunch type and their status will be displayed. Clicking the start time links takes you back to the **Schedule Name › Basic Schedule Details**.

For example, the following predefined task bunches are scheduled by default and can be configured:

channel-repodata-default:
> (Re)generates repository metadata files.

cleanup-data-default:

Cleans up stale package change log and monitoring time series data from the database.

clear-taskologs-default:

Clears task engine (taskomatic) history data older than a specified number of days, depending on the job type, from the database.

cobbler-sync-default:

Synchronizes distribution and profile data from Uyuni to Cobbler. For more information, see **[Client-configuration › Cobbler ›]**.

compare-configs-default:

Compares configuration files as stored in configuration channels with the files stored on all configuration-enabled servers. To review comparisons, click **Systems** tab and select the system of interest. Go to **Configuration › Compare Files**. For more information, see reference:systems/system-details/sd-configuration.pdf.

cve-server-channels-default:

Updates internal pre-computed CVE data that is used to display results on the **Audit › CVE Audit** page. Search results in the **Audit › CVE Audit** page are updated to the last run of this schedule). For more information, see **[Reference › Audit ›]**.

daily-status-default:

Sends daily report e-mails to relevant addresses. To learn more about how to configure notifications for specific users, see **[Reference › Users ›]**.

errata-cache-default:

Updates internal patch cache database tables, which are used to look up packages that need updates for each server. Also, this sends notification emails to users that might be interested in certain patches. For more information about patches, see **[Reference › Patches ›]**.

errata-queue-default:

Queues automatic updates (patches) for servers that are configured to receive them.

kickstart-cleanup-default:

Cleans up stale kickstart session data.

kickstartfile-sync-default:

Generates Cobbler files corresponding to Kickstart profiles created by the configuration wizard.

mgr-register-default:

Calls the `mgr-register` command, which synchronizes client registration data with NCC (new, changed or deleted clients' data are forwarded).

mgr-sync-refresh-default:

The default time at which the start of synchronization with SUSE Customer Center (SCC) takes place (`mgr-sync-refresh`).

minion-action-cleanup-default:

Deletes stale client action data from the file system. First it tries to complete any possibly unfinished actions by looking up the corresponding results; these results are stored in the Salt job cache. An unfinished action can occur if the server has missed the results of the action. For successfully completed actions it removes artifacts such as executed script files.

package-cleanup-default:

Deletes stale package files from the file system.

reboot-action-cleanup-default:

Any reboot actions pending for more than six hours are marked as failed and associated data is cleaned up in the database. For more information on scheduling reboot actions, see reference:systems/system-details/sd-provisioning.pdf.

sandbox-cleanup-default:

Cleans up Sandbox configuration files and channels that are older than the *sandbox_lifetime* configuration parameter (3 days by default). Sandbox files are those imported from systems or files under development. For more information, see reference:systems/system-details/sd-configuration.pdf.

session-cleanup-default:

Cleans up stale Web interface sessions, typically data that is temporarily stored when a user logs in and then closes the browser before logging out.

ssh-push-default:

Prompts clients to check in with Uyuni via SSH if they are configured with a `SSH Push` contact method.

token-cleanup-default:

Deletes expired repository tokens that are used by Salt clients to download packages and metadata.

Actions

You can manage actions on your clients in a number of different ways.

For Salt clients, you can schedule automated recurring actions to apply the highstate to clients on a specified schedule. You can apply recurring actions to individual clients, to all clients in a system group, or to an entire organization.

On both Salt and traditional clients, you can set actions to be performed in a particular order by creating action chains. Action chains can be created and edited ahead of time, and scheduled to run at a time that suits you.

You can also perform remote commands on one or more of your Salt clients. Remote commands allows you to issue commands to individual Salt clients, or to all clients that match a search term.

Recurring Actions

You can apply recurring actions on individual Salt clients, or to all clients in an organization.

Procedure: Creating a New Recurring Action

1. To apply a recurring action to an individual client, navigate to `Systems`, click the client to configure schedules for, and navigate to the **States › Recurring States** tab.

2. To apply a recurring action to a system group, navigate to **Systems › System Groups**, select the group to configure schedules for, and navigate to **States › Recurring States** tab.

3. Click **[Create]**.

4. Type a name for the new schedule.

5. Choose the frequency of the recurring action:

   ◦ `Hourly:` Type the minute of each hour. For example, `15` will run the action at fifteen minutes past every hour.

   ◦ `Daily:` Select the time of each day. For example, `01:00` will run the action at 0100 every day, in the timezone of the Uyuni Server.

   ◦ `Weekly:` Select the day of the week and the time of the day, to execute the action every week at the specified time.

   ◦ `Monthly:` Select the day of the month and the time of the day, to execute the action every month at the specified time.

   ◦ `Custom Quartz format:` For more detailed options, enter a custom quartz string. For example, to run a recurring action at 0215 every Saturday of every month, enter:

   ```
   0 15 2 ? * 7
   ```

6. OPTIONAL: Toggle the `Test mode` switch on to run the schedule in test mode.

7. Click **[Create Schedule]** to save, and see the complete list of existing schedules.

Organization Administrators can set and edit recurring actions for all clients in the organization. Navigate to **Home › My Organization › Recurring States** to see all recurring actions that apply to the entire organization.

Uyuni Administrators can set and edit recurring actions for all clients in all organizations. Navigate to **Admin › Organizations**, select the organization to manage, and navigate to the **States › Recurring States** tab.

> Recurring actions can only be used with Salt clients. Traditional clients in your group or organization are ignored.

Action Chains

If you need to perform a number of sequential actions on your clients, you can create an action chain to ensure the order is respected.

By default, most clients will execute an action as soon as the command is issued. In some case, actions will take a long time, which could mean that actions issued afterwards fail. For example, if you instruct a client to reboot, then issue a second command, the second action could fail because the reboot is still occurring. To ensure that actions occur in the correct order, use action chains.

You can use action chains on both traditional and Salt clients. Action chains can include any number of these actions, in any order:

- **System Details › Remote Command**
- **System Details › Schedule System Reboot**
- **System Details › States › Highstate**
- **System Details › Software › Packages › List/Remove**
- **System Details › Software › Packages › Install**
- **System Details › Software › Packages › Upgrade**
- **System Details › Software › Patches**
- **System Details › Software › Software Channels**
- **System Details › Configuration**
- **Images › Build**

Procedure: Creating a New Action Chain

1. In the Uyuni Web UI, navigate to the first action you want to perform in the action chain. For example, navigate to `System Details` for a client, and click **[Schedule System Reboot]**.

2. Check the `Add to` field and select `new action chain`.

3. Confirm the action. This will not perform the action immediately, it will instead create the new action chain, and a blue bar confirming this appears at the top of the screen.

4. Continue adding actions to your action chain by checking the `Add to` field and selecting the name of the action chain to add them to.

5. When you have finished adding actions, navigate to **Schedule › Action Chains** and selecting the action chain from the list.

6. Re-order actions by dragging them and dropping them into the correct position. Click the blue plus sign to see the clients an action will be performed on. Click **[Save]** to save your changes.

7. Schedule a time for your action chain to run, and click **[Save and Schedule]**. If you leave the page without clicking either **[Save]** or **[Save and Schedule]** all unsaved changes will be discarded.

> If one action in an action chain fails, the action chain stops, and no further actions are executed.

You can see scheduled actions from action chains by navigating to **Schedule › Pending Actions**.

Remote Commands

Salt runs remote commands from the `/tmp/` directory on the client. To ensure that remote commands work accurately, do not mount `/tmp` with the `noexec` option.

> All commands run from the `Remote Commands` page are executed as root on clients. Wildcards can be used to run commands across any number of systems. Always take extra care to check your commands before issuing them.

Procedure: Creating Remote Commands

1. Navigate to **Salt › Remote Commands**.

2. In the first field, before the `@` symbol, type the command you want to issue.

3. In the second field, after the `@` symbol, type the client you want to issue the command on. You can type the `minion-id` of an individual client, or you can use wildcards to target a range of clients.

4. Click **[Find targets]** to check which clients you have targeted, and confirm that you have used the correct details.

5. Click **[Run command]** to issue the command to the target clients.

Security

Set up a Client to Master Validation Fingerprint

In highly secure network configurations you may wish to ensure your Salt clients are connecting a specific master. To set up validation from client to master enter the master's fingerprint within the `/etc/salt/minion` configuration file.

See the following procedure:

1. On the master, at the command prompt, as root, use this command to find the `master.pub` fingerprint:

   ```
   salt-key -F master
   ```

   On your client, open the `/etc/salt/minion` configuration file. Uncomment the following line and enter the master's fingerprint replacing the example fingerprint:

   ```
   master_finger: 'ba:30:65:2a:d6:9e:20:4f:d8:b2:f3:a7:d4:65:11:13'
   ```

2. Restart the salt-minion service:

   ```
   # systemctl restart salt-minion
   ```

For information on configuring security from a client, see https://docs.saltstack.com/en/latest/ref/configuration/minion.html.

Signing Repository Metadata

You will require a custom GPG key to be able to sign repository metadata.

Procedure: Generating a Custom GPG Key

1. As the root user, use the `gpg` command to generate a new key:

   ```
   gpg --gen-key
   ```

2. At the prompts, select `RSA` as the key type, with a size of 2048 bits, and select an appropriate expiry date for your key. Check the details for your new key, and type `y` to confirm.

3. At the prompts, enter a name and email address to be associated with your key. You can also add a comment to help you identify the key, if desired. When you are happy with the user identity, type `O` to confirm.

4. At the prompt, enter a passphrase to protect your key.

5. The key should be automatically added to your keyring. You can check by listing the keys in your keyring:

```
gpg --list-keys
```

6. Add the password for your keyring to the `/etc/rhn/signing.conf` configuration file, by opening the file in your text editor and adding this line:

```
GPGPASS="password"
```

You can manage metadata signing on the command line using the `mgr-sign-metadata-ctl` command.

Procedure: Enabling Metadata Signing

1. You will need to know the short identifier for the key to use. You can list your available public keys in short format:

```
gpg --keyid-format short --list-keys
...
pub   rsa2048/3E7BFE0A 2019-04-02 [SC] [expires: 2021-04-01]
      A43F9EC645ED838ED3014B035CFA51BF3E7BFE0A
uid         [ultimate] SUSE Manager
sub   rsa2048/118DE7FF 2019-04-02 [E] [expires: 2021-04-01]
```

2. Enable metadata signing with the `mgr-sign-metadata-ctl` command:

```
mgr-sign-metadata-ctl enable 3E7BFE0A
OK. Found key 3E7BFE0A in keyring.
DONE. Set key 3E7BFE0A in /etc/rhn/signing.conf.
DONE. Enabled metadata signing in /etc/rhn/rhn.conf.
DONE. Exported key 4E2C3DD8 to /srv/susemanager/salt/gpg/mgr-keyring.gpg.
DONE. Exported key 4E2C3DD8 to /srv/www/htdocs/pub/mgr-gpg-pub.key.
NOTE. For the changes to become effective run:
    mgr-sign-metadata-ctl regen-metadata
```

3. You can check that your configuration is correct with this command:

```
mgr-sign-metadata-ctl check-config
```

4. Restart the services and schedule metadata regeneration to pick up the changes:

```
mgr-sign-metadata-ctl regen-metadata
```

You can also use the `mgr-sign-metadata-ctl` command to perform other tasks. Use `mgr-sign-metadata-ctl --help` to see the complete list.

Repository metadata signing is a global option. When it is enabled, it is enabled on all software channels on the server. This means that all clients connected to the server will need to trust the new GPG key to be able to install or update packages.

Procedure: Importing GPG keys on Clients

1. For RPM-based client systems, use these remote commands:

```
rpm --import http://server.example.com/pub/mgr-gpg-pub.key
```

2. For Ubuntu clients, you will need to reassign the channels, which will automatically pick up the new GPG key. You can do this through the Uyuni Web UI, or from the command line on the server with this command:

```
salt <ubuntu-client> state.apply channels
```

3. OPTIONAL: For Salt clients, you might prefer to use a state to manage your GPG keys.

Mirror Source Packages

If you build your own packages locally, or if you require the source code for your packages for legal reasons, it is possible to mirror the source packages on Uyuni Server.

> Mirroring source packages can consume a significant amount of disk space.

Procedure: Mirroring Source Packages

1. Open the `/etc/rhn/rhn.conf` configuration file, and add this line:

```
server.sync_source_packages = 1
```

2. Restart the Spacewalk service to pick up the changes:

```
spacewalk-service restart
```

Currently, this feature can only be enabled globally for all repositories. It is not possible to select individual repositories for mirroring.

When this feature has been activated, the source packages will become available in the Uyuni Web UI after the next repository synchronization. They will be shown as sources for the binary package, and can be downloaded directly from the Web UI. Source packages cannot be installed on clients using the Web UI.

System Security via OpenSCAP

Uyuni uses OpenSCAP to audit clients. It allows you to schedule and view compliance scans for any client.

> OpenSCAP auditing is available for use with traditional clients only. It is not available on Salt clients.

To use openSCAP, you will need the `spacewalk-oscap` package installed on the clients you want to audit.

About SCAP

The Security Certification and Authorization Package (SCAP) is a standardized compliance checking solution for enterprise-level Linux infrastructures. It is a line of specifications maintained by the National Institute of Standards and Technology (NIST) for maintaining system security for enterprise systems.

SCAP was created to provide a standardized approach to maintaining system security, and the standards that are used will therefore continually change to meet the needs of the community and enterprise businesses. New specifications are governed by NIST's SCAP Release cycle to provide a consistent and repeatable revision work flow. For more information, see http://scap.nist.gov/timeline.html.

Uyuni uses OpenSCAP to implement the SCAP specifications. OpenSCAP is an auditing tool that utilizes the Extensible Configuration Checklist Description Format (XCCDF). XCCDF is a standard way of expressing checklist content and defines security checklists. It also combines with other specifications such as Common Platform Enumeration (CPE), Common Configuration Enumeration (CCE), and Open Vulnerability and Assessment Language (OVAL), to create a SCAP-expressed checklist that can be processed by SCAP-validated products.

OpenSCAP verifies the presence of patches by using content produced by the SUSE Security Team. OpenSCAP checks system security configuration settings and examines systems for signs of compromise by using rules based on standards and specifications. For more information about the SUSE Security Team, see https://www.suse.com/support/security.

Prepare Clients for an SCAP Scan

Before you begin, you need to prepare your client systems for SCAP scanning. Ensure clients have the `openscap-content` and `openscap-utils` packages installed before you begin.

Use this command to determine the location of the appropriate SCAP files. Take a note of these paths for performing the scan:

+

```
rpm -ql openscap-content
```

+ The output should include these files:

+

```
/usr/share/openscap/scap-oval.xml
/usr/share/openscap/scap-xccdf.xml
/usr/share/openscap/scap-yast2sec-oval.xml
/usr/share/openscap/scap-yast2sec-xccdf.xml
```

OpenSCAP Content Files

OpenSCAP uses SCAP content files to define test rules. These content files are created based on the XCCDF or OVAL standards. You can download publicly available content files and customize it to your requirements. You can install the `openscap-content` package for default content file templates. Alternatively, if you are familiar with XCCDF or OVAL, you can create your own content files.

> ⚠️ We recommend you use templates to create your SCAP content files. If you create and use your own custom content files, you do so at your own risk. If your system becomes damaged through the use of custom content files, you might not be supported by SUSE.

When you have created your content files, you need to transfer the file to the client. You can do this in the same way as you move any other file, using physical storage media, or across a network with `ftp` or `scp`.

We recommend that you create a package to distribute content files to clients that you are managing with Uyuni. Packages can be signed and verified to ensure their integrity. For more information, see [**Administration › Custom-channels ›]**.

Perform an Audit Scan

When you have transferred your content files, you can perform audit scans. Audit scans can be triggered using the Uyuni Web UI. You can also use the Uyuni API to schedule regular scans.

Procedure: Running an Audit Scan from the Web UI

1. In the Uyuni Web UI, navigate to **Systems › Systems List** and select the client you want to scan.

2. Navigate to the `Audit` tab, and the `Schedule` subtab.

3. In the `Path to XCCDF Document` field, enter the path to the XCCDF content file on the client. For example: `/usr/share/openscap/scap-yast2sec-xccdf.xml`

4. The scan will run at the client's next scheduled synchronization.

> The XCCDF content file is validated before it is run on the remote system. If the content file includes invalid arguments, the test will fail.

1. Before you begin, ensure that the client to be scanned has Python and XML-RPC libraries installed.

2. Choose an existing script or create a script for scheduling a system scan through `system.scap.scheduleXccdfScan`. For example:

```
#!/usr/bin/python
client = xmlrpclib.Server('https://spacewalk.example.com/rpc/api')
key = client.auth.login('username', 'password')
client.system.scap.scheduleXccdfScan(key, <1000010001>,
    '<path_to_xccdf_file.xml>',
    '--profile <profile_name>')
```

In this example: * `<1000010001>` is the system ID (sid). * `<path_to_xccdf_file.xml>` is the path to the content file location on the client. For example, `/usr/local/share/scap/usgcb-sled15desktop-xccdf.xml`. * `<profile_name>` is an additional argument for the `oscap` command. For example, use `united_states_government_configuration_baseline` (USGCB).

3. Run the script on the client you want to scan, from the command prompt.

Scan Results

Information about the scans you have run is in the Uyuni Web UI. Navigate to to **Audit › OpenSCAP › All Scans** for a table of results. For more information about the data in this table, see **[Reference › Audit ›]**.

To ensure that detailed information about scans is available, you need to enable it on the client. In the Uyuni Web UI, navigate to **Admin › Organizations** and click on the organization the client is a part of. Navigate to the `Configuration` tab, and check the `Enable Upload of Detailed SCAP Files` option. When enabled, this generates an additional HTML file on every scan, which contains extra information. The results will show an extra line similar to this:

```
Detailed Results: xccdf-report.html xccdf-results.xml scap-yast2sec-oval.xml.result.xml
```

To retrieve scan information from the command line, use the `spacewalk-report` command:

```
spacewalk-report system-history-scap
spacewalk-report scap-scan
spacewalk-report scap-scan-results
```

You can also use the Uyuni API to view results, with the `system.scap` handler.

Auditing

In Uyuni, you can keep track of your clients through a series of auditing tasks. You can check that your

clients are up to date with all public security patches (CVEs), perform subscription matching, and use OpenSCAP to check for specification compliance.

In the Uyuni Web UI, navigate to `Audit` to perform auditing tasks.

CVE Audits

A CVE (common vulnerabilities and exposures) is a fix for a publicly known security vulnerability.

> ❗ You must apply CVEs to your clients as soon as they become available.

Each CVE contains an identification number, a description of the vulnerability, and links to further information. CVE identification numbers use the form `CVE-YEAR-XXXX`.

In the Uyuni Web UI, navigate to **Audit › CVE Audit** to see a list of all clients and their current patch status.

By default, the CVE data is updated at 2300 every day. We recommend that before you begin a CVE audit you refresh the data to ensure you have the latest patches.

Procedure: Updating CVE Data

1. In the Uyuni Web UI, navigate to **Admin › Task Schedules** and select the `cve-server-channels-default` schedule.

2. Click **[cve-server-channels-bunch]**.

3. Click **[Single Run Schedule]** to schedule the task. Allow the task to complete before continuing with the CVE audit.

Procedure: Verifying Patch Status

1. In the Uyuni Web UI, navigate to **Audit › CVE Audit**.

2. OPTIONAL: To check the patch status for a particular CVE, type the CVE identifier in the `CVE Number` field.

3. Select the patch statuses you want to look for, or leave all statuses checked to look for all.

4. Click **[Audit Servers]** to check all systems, or click **[Audit Images]** to check all images.

For more information about the patch status icons used on this page, see **[Reference › Audit ›]**.

For each system, the `Next Action` column provides information about what you need to do to address vulnerabilities. If applicable, a list of candidate channels or patches is also given. You can also assign systems to a `System Set` for further batch processing.

You can use the Uyuni API to verify the patch status of your clients. Use the `audit.listSystemsByPatchStatus` API method. For more information about this method, see the Uyuni API Guide.

CVE Status

The CVE status of clients is usually either `affected`, `not affected`, or `patched`. These statuses are based only on the information that is available to Uyuni.

Within Uyuni, these definitions apply:

System affected by a certain vulnerability

A system which has an installed package with version lower than the version of the same package in a relevant patch marked for the vulnerability.

System not affected by a certain vulnerability

A system which has no installed package that is also in a relevant patch marked for the vulnerability.

System patched for a certain vulnerability

A system which has an installed package with version equal to or greater than the version of the same package in a relevant patch marked for the vulnerability.

Relevant patch

A patch known by Uyuni in a relevant channel.

Relevant channel

A channel managed by Uyuni, which is either assigned to the system, the original of a cloned channel which is assigned to the system, a channel linked to a product which is installed on the system or a past or future service pack channel for the system.

> ⓘ Because of the definitions used within Uyuni, CVE audit results might be incorrect in some circumstances. For example, unmanaged channels, unmanaged packages, or non-compliant systems might report incorrectly.

Authentication Methods

Uyuni supports several different authentication methods. This section discusses pluggable authentication modules (PAM) and single sign-on (SSO).

Authentication With Single Sign-On (SSO)

Uyuni supports single sign-on (SSO) by implementing the Security Assertion Markup Language (SAML) 2 protocol.

Single sign-on is an authentication process that allows a user to access multiple applications with one set of credentials. SAML is an XML-based standard for exchanging authentication and authorization data. A SAML identity service provider (IdP) provides authentication and authorization services to service providers (SP), such as Uyuni. Uyuni exposes three endpoints which must be enabled for single sign-on.

SSO in Uyuni supports:

- Log in with SSO.

- Log out with service provider-initiated single logout (SLO), and Identity service provider single logout service (SLS).

- Assertion and nameId encryption.

- Assertion signatures.

- Message signatures with AuthNRequest, LogoutRequest, and LogoutResponses.

- Enable an Assertion consumer service endpoint.

- Enable a single logout service endpoint.

- Publish the SP metadata (which can be signed).

SSO in Uyuni does not support:

- Product choosing and implementation for the identity service provider (IdP).

- SAML support for other products (check with the respective product documentation).

For an example implementation of SSO, see **[Administration › Auth-methods-sso-example ›]**.

> If you change from the default authentication method to single sign-on, the new SSO credentials apply only to the Web UI. Client tools such as `mgr-sync` or `spacecmd` will continue to work with the default authentication method only.

Prerequisites

Before you begin, you need to have configured an external identity service provider with these parameters. Check your IdP documentation for instructions.

> **!** Your IdP must have a SAML:Attribute containing the username of the IdP user domain, called `uid`. The `uid` attribute passed in the SAML:Attribute must be created in the Uyuni user base before you activate single sign-on.

You will need these endpoints:

- Assertion consumer service (or ACS): an endpoint to accept SAML messages to establish a session into the Service Provider. The endpoint for ACS in Uyuni is: https://server.example.com/rhn/manager/sso/acs

- Single logout service (or SLS): an endpoint to initiate a logout request from the IdP. The endpoint for SLS in Uyuni is: https://server.example.com/rhn/manager/sso/sls

- Metadata: an endpoint to retrieve Uyuni metadata for SAML. The endpoint for metadata in Uyuni is: https://server.example.com/rhn/manager/sso/metadata

After the authentication with the IdP using the user `orgadmin` is successful, you will be logged in into Uyuni as the `orgadmin` user, provided that the `orgadmin` user exists in Uyuni.

Enable SSO

> **i** Using SSO is mutually exclusive with other types of authentication: it is either enabled or disabled. SSO is disabled by default.

Procedure: Enabling SSO

1. If your users do not yet exist in Uyuni, create them first.

2. Edit `/etc/rhn/rhn.conf` and add this line at the end of the file:

```
java.sso = true
```

3. Find the parameters you want to customize in `/usr/share/rhn/config-defaults/rhn_java_sso.conf`. Insert the parameters you want to customize into `/etc/rhn/rhn.conf` and prefix them with `java.sso`. For example, in `/usr/share/rhn/config-defaults/rhn_java_sso.conf` find:

```
onelogin.saml2.sp.assertion_consumer_service.url = https://YOUR-PRODUCT-HOSTNAME-OR-
IP/rhn/manager/sso/acs
```

To customize it, create the corresponding option in `/etc/rhn/rhn.conf` by prefixing the option name with `java.sso.`:

```
java.sso.onelogin.saml2.sp.assertion_consumer_service.url = https://YOUR-PRODUCT-
HOSTNAME-OR-IP/rhn/manager/sso/acs
```

To find all the occurrences you need to change, search in the file for the placeholders YOUR-PRODUCT and YOUR-IDP-ENTITY. Every parameter comes with a brief explanation of what it is meant for.

4. Restart the spacewalk service to pick up the changes:

```
spacewalk-service restart
```

When you visit the Uyuni URL, you will be redirected to the IdP for SSO where you will be requested to authenticate. Upon successful authentication, you will be redirected to the Uyuni Web UI, logged in as the authenticated user. If you encounter problems with logging in using SSO, check the Uyuni logs for more information.

Authentication With PAM

Uyuni supports network-based authentication systems using pluggable authentication modules (PAM). PAM is a suite of libraries that allows you to integrate Uyuni with a centralized authentication mechanism, eliminating the need to remember multiple passwords. Uyuni supports LDAP, Kerberos, and other network-based authentication systems using PAM.

Procedure: Enabling PAM

1. Create a PAM service file at `/etc/pam.d/susemanager`. A standard `/etc/pam.d/susemanager` file should look like this. It configures Uyuni to use the system wide PAM configuration:

```
#%PAM-1.0
auth       include        common-auth
account    include        common-account
password   include        common-password
session    include        common-session
```

2. Enforce the use of the service file by adding this line to `/etc/rhn/rhn.conf`:

```
pam_auth_service = susemanager
```

In this example, the PAM service file is called `susemanager`.

3. Restart the Uyuni services after a configuration change.

4. In the Uyuni Web UI, navigate to **Users › Create User** and enable a new or existing user to authenticate with PAM.

5. Check the `Pluggable Authentication Modules (PAM)` checkbox. It is below the password and password confirmation fields.

Changing the password in the Uyuni Web UI changes only the local password on the Uyuni Server. If PAM is enabled for that user, the local password might not be used at all. In the above example, for instance, the Kerberos password will not be changed. Use the password change mechanism of your network service to change the password for these users.

To configure system-wide authentication you can use YaST. You will need to install the `yast2-ldap-client` and `yast2-kerberos-client` packages.

For more information about configuring PAM, the SUSE Linux Enterprise Server Security Guide contains a generic example that will also work for other network-based authentication methods. It also describes how to configure an active directory service. For more information, see https://documentation.suse.com/sles/15-SP1/html/SLES-all/part-auth.html.

SSL Certificates

Uyuni uses SSL certificates to ensure that clients are registered to the correct server.

When you create an SSL certificate for your server, the certificate includes the host name of the server it is associated with. The certificate is then deployed on the server, and when clients attempt to connect, they check the certificate details. If the certificate contains the name of the server they are attempting to connect to, the connection will be successful. The client will also check if the certificate has been signed by a trusted certificate authority.

All certificates must be signed by a certificate authority (CA), in order for them to be considered valid, and for clients to be able to successfully match against them. When an organization signs its own certificate, the certificate is considered self-signed. A self-signed certificate is straight-forward to set up, and does not cost any money, but they are considered less secure.

For additional security, you can arrange a third party CA to sign your certificates. Third party CAs perform checks to ensure that the information contained in the certificate is correct. They will usually charge an annual fee for this service. Using a third party CA makes certificates harder to spoof, and will provide additional protection for your installation.

By default, Uyuni uses a self-signed certificate. If you have certificates signed by a third party CA, you can import them to your Uyuni installation.

- For more on self-signed certificates, see **[Administration › Ssl-certs-selfsigned ›]**.
- For more on imported certificates, see **[Administration › Ssl-certs-imported ›]**.

Self-Signed SSL Certificates

By default, Uyuni uses a self-signed certificate. In this case, the certificate is created and signed by Uyuni. This method does not use an independent certificate authority to guarantee that the details of the certificate are correct. Third party CAs perform checks to ensure that the information contained in the certificate is correct. For more on third party CAs, see **[Administration › Ssl-certs-imported ›]**.

This section covers how to re-create your self-signed certificates on an existing installation. It also covers how to create new self-signed certificates and authenticate your existing clients to the new certificate, using an intermediate certificate. Intermediate certificates merge the intermediate and root CA certificates into one file. Ensure that the intermediate certificate comes first in the combined file.

The host name of the SSL keys and certificates must match the fully qualified host name of the machine you deploy them on.

Re-Create Existing Server Certificates

If your existing certificates have expired or stopped working for any reason, you can generate a new server certificate from the existing CA.

Procedure: Re-Creating an Existing Server Certificate

1. On the Uyuni Server, at the command prompt, regenerate the server certificate:

```
rhn-ssl-tool --gen-server --dir="/root/ssl-build" --set-country="COUNTRY" \
--set-state="STATE" --set-city="CITY" --set-org="ORGANIZATION" \
--set-org-unit="ORGANIZATION UNIT" --set-email="name@example.com" \
--set-hostname="susemanager.example.com" --set-cname="example.com"
```

Ensure that the `set-cname` parameter is the fully-qualified domain name of your Uyuni Server. You can use the the `set-cname` parameter multiple times if you require multiple aliases.

2. Install the RPM that contains the newly generated certificate. Check that you have the latest version of the RPM before running this command. The version number is incremented every time you re-create the certificates.

```
rpm -Uhv /root/ssl-build/lnx0259a/rhn-org-httpd-ssl-key-pair-lnx0259a-1.0-2.noarch.rpm
```

3. Restart services to pick up the changes:

```
spacewalk-service restart
```

Create and Replace CA and Server Certificates

If you need to create entirely new certificates for an existing installation, you need to create a combined certificate first. Clients will authenticate to the certificate with both the old and new details. Then you can go ahead and remove the old details. This maintains the chain of trust.

> ⚠️ Be careful with this procedure! It is possible to break the trust chain between the server and clients using this procedure. If that happens, you will need an administrative user to log in to every client and deploy the CA directly.

Procedure: Creating New Certificates

1. On the Uyuni Server, at the command prompt, move the old certificate directory to a new location:

```
mv /root/ssl-build /root/old-ssl-build
```

2. Generate a new CA certificate and create an RPM:

```
rhn-ssl-tool --gen-ca --dir="/root/ssl-build" --set-country="COUNTRY" \
--set-state="STATE" --set-city="CITY" --set-org="ORGANIZATION" \
--set-org-unit="ORGANIZATION UNIT" --set-common-name="SUSE Manager CA Certificate" \
--set-email="name@example.com"
```

3. Generate a new server certificate and create an RPM:

```
rhn-ssl-tool --gen-server --dir="/root/ssl-build" --set-country="COUNTRY" \
--set-state="STATE" --set-city="CITY" --set-org="ORGANIZATION" \
--set-org-unit="ORGANIZATION UNIT" --set-email="name@example.com" \
--set-hostname="susemanager.example.top" --set-cname="example.com"
```

Ensure that the `set-cname` parameter is the fully-qualified domain name of your Uyuni Server. You can use the the `set-cname` parameter multiple times if you require multiple aliases.

You will need to generate a server certificate RPM for each proxy, using their host names and cnames.

When you have new certificates, you can create the combined RPMs to authenticate the clients.

Procedure: Create Combined Certificate RPMs

1. Create a new CA file that combines the old and new certificate details, and generate a new RPM:

```
mkdir /root/combined-ssl-build
cp /root/old-ssl-build/RHN-ORG-TRUSTED-SSL-CERT /root/combined-ssl-build/
cat /root/ssl-build/RHN-ORG-TRUSTED-SSL-CERT >> /root/combined-ssl-build/RHN-ORG-
TRUSTED-SSL-CERT
cp /root/old-ssl-build/*.rpm /root/combined-ssl-build/
rhn-ssl-tool --gen-ca --rpm-only --dir="/root/combined-ssl-build"
```

2. Deploy the CA certificate on the server:

```
/usr/bin/rhn-deploy-ca-cert.pl --source-dir /root/combined-ssl-build \
--target-dir /srv/www/htdocs/pub/ --trust-dir=/etc/pki/trust/anchors/
```

When you have the combined RPMs, you can deploy the combined CA certificates to your clients.

Procedure: Deploying Combined Certificates on Traditional Clients

1. On the client, create a new custom channel using these details:

   ◦ Name: SSL-CA-Channel

   ◦ Label: ssl-ca-channel

   ◦ Parent Channel: <choose the parent channel of a client>

   ◦ Summary: SSL-CA-Channel

   For more on creating custom channels, see **[Administration › Channel-management ›]**.

2. Upload the CA certificate RPM to the channel:

```
rhnpush -c ssl-ca-channel --nosig \
--ca-chain=/srv/www/htdocs/pub/RHN-ORG-TRUSTED-SSL-CERT \
/root/combined-ssl-build/rhn-org-trusted-ssl-cert-1.0-2.noarch.rpm
```

3. Subscribe all clients to the new `SSL-CA-Channel` channel.

4. Install the CA certificate RPM on all clients by updating the channel.

Procedure: Deploying Combined Certificates on Salt Clients

1. In the Uyuni Web UI, navigate to **Systems › Overview**.

2. Check all your Salt Clients to add them to the System Set Manager (SSM).

3. Navigate to **Systems › System Set Manager › Overview**.

4. In the `States` field, click **[Apply]** to apply the system states.

5. In the `Highstate` page, click **[Apply Highstate]** to propagate the changes to the clients.

When you have every client trusting both the old and new certificates, you can go ahead and replace the server certificate on the Uyuni Server and Proxies.

Procedure: Replace Server Certificate on the Server

1. On the Uyuni Server, at the command prompt, install the RPM from the `ssl-build` directory:

```
rpm -Uhv ssl-build/susemanager/rhn-org-httpd-ssl-key-pair-susemanager-1.0-2.noarch.rpm
```

2. Restart services to pick the changes:

```
spacewalk-service restart
```

Procedure: Replace Server Certificate on the Proxy

1. On the Uyuni Proxy, at the command prompt, install the RPM from the `ssl-build` directory:

```
rpm -Uhv ssl-build/susemanager-proxy/rhn-org-httpd-ssl-key-pair-susemanager-proxy-1.0-
2.noarch.rpm
```

2. Restart services to pick up the changes:

```
rhn-proxy restart
```

3. Test that all clients still operate as expected and can use SSL to reach the Uyuni Server and any proxies.

When you have replaced the server certificates on your server and any proxies, you need to update the certificate with only the new details on all the clients. This is done by adding it to the client channels you set up previously.

Procedure: Adding the New Certificates to the Client Channel

1. Copy the combined certificate RPM into the `/root/ssl-build/` directory:

```
cp /root/combined-ssl-build/*.rpm /root/ssl-build/
```

2. Generate a new RPM with from the new certificates. Check the release number carefully to ensure you have the right certificate file:

```
rhn-ssl-tool --gen-ca --rpm-only --dir="/root/ssl-build"
```

3. Install the new local certificates on the Uyuni Server:

```
/usr/bin/rhn-deploy-ca-cert.pl --source-dir /root/ssl-build \
--target-dir /srv/www/htdocs/pub/ --trust-dir=/etc/pki/trust/anchors/
```

4. Restart services to pick up the changes:

```
spacewalk-service restart
```

5. Upload the new RPM into the channel:

```
rhnpush -c ssl-ca-channel --nosig \
--ca-chain=/srv/www/htdocs/pub/RHN-ORG-TRUSTED-SSL-CERT \
/root/ssl-build/rhn-org-trusted-ssl-cert-1.0-3.noarch.rpm
```

When you have the new certificate in the channel, you can use the Uyuni Web UI to update it on all clients and proxies, by synchronizing them with the channel. Alternatively, for Salt clients, you can use **Salt › Remote Commands**, or apply the highstate.

You will also need to update your proxies to remove the copy of the certificate and the associated RPM. Your proxies must have the same certificate content as the server. Check the `/srv/www/htdocs/pub/` directory and ensure it contains:

```
RHN-ORG-TRUSTED-SSL-CERT
rhn-org-trusted-ssl-cert-*.noarch.rpm
```

To complete the process, you need to update the database with this command:

```
/usr/bin/rhn-ssl-dbstore --ca-cert=/root/ssl-build/RHN-ORG-TRUSTED-SSL-CERT
```

If you use bootstrap, remember to also update your bootstrap scripts to reflect the new certificate information.

Import SSL Certificates

By default, Uyuni uses a self-signed certificate. For additional security, you can import a custom certificate, signed by a third party certificate authority (CA).

This section covers how to use an imported SSL certificate with a new Uyuni installation, and how to replace existing self-signed certificates with imported certificates.

Before you begin, ensure you have:

- A certificate authority (CA) SSL public certificate

- An SSL server key

- An SSL server certificate

Your key and certificate files must be in PEM format.

The host name of the SSL keys and certificates must match the fully qualified host name of the machine you deploy them on. You can set the host names in the `X509v3 Subject Alternative Name` section of the certificate. You can also list multiple host names if your environment requires it.

Import Certificates for New Installations

By default, Uyuni uses a self-signed certificate. After you have completed the initial setup, you can replace the default certificate with an imported certificate.

Procedure: Import Certificates on a New Uyuni Server

1. Install the Uyuni Server according to the instructions in **[Installation › Install-intro ›]**.

2. Complete the initial setup according to **[Installation › Server-setup ›]**.

3. At the command prompt, point the SSL environment variables to the certificate file locations:

```
export CA_CERT=<path_to_CA_certificate_file>
export SERVER_KEY=<path_to_web_server_key>
export SERVER_CERT=<path_to_web_server_certificate>
```

4. Complete Uyuni setup:

```
yast susemanager_setup
```

When you are prompted for certificate details during setup, fill in random values. The values will be overridden by the values you specified at the command prompt.

> Execute the `yast susemanager_setup` command from the same shell you exported the environment variables from.

Import Certificates for New Proxy Installations

By default, Uyuni Proxy uses a self-signed certificate. After you have completed the initial setup, you can replace the default certificate with an imported certificate.

Procedure: Import Certificates on a New Uyuni Proxy

1. Install the Uyuni Proxy according to the instructions in **[Installation › Install-intro ›]**.

2. Complete the initial setup according to **[Installation › Proxy-setup ›]**.

3. At the command prompt, run:

   ```
   configure-proxy.sh
   ```

4. At the `Do you want to import existing certificates?` prompt, type `y`.

5. Follow the prompts to complete setup.

> Use the same certificate authority to sign all server certificates for servers and proxies. Certificates signed with different CAs will not match.

Replace Certificates with a Third Party Certificate

You can replace active certificates on your Uyuni installation with a new third party certificate. To replace the certificates, you can replace the installed CA certificate RPM with a new RPM containing the third party certificate, and then update the database.

This procedure is similar to the one described in administration:ssl-certs-selfsigned.pdf. The difference is that we import the certificates generated by an external PKI.

Procedure: Replacing Existing Certificates

1. On the Uyuni Server, at the command prompt, move the old certificate directory to a backup location:

   ```
   mv /root/ssl-build /root/old-ssl-build
   ```

2. Generate a CA certificate RPM from the new certificate:

   ```
   rhn-ssl-tool --gen-ca --rpm-only --dir="/root/ssl-build" --from-ca
   -cert=<Path_to_CA_Certificate>
   ```

3. Generate a new server certificate RPM:

   ```
   rhn-ssl-tool --gen-server --rpm-only --dir="/root/ssl-build" --from-server
   -key=<Server_Key_File> --from-server-cert=<Server_Cert_File>
   ```

When you create the new server certificate RPM, you might get a warning that server certificate request file could not be found. This file is not required, and the procedure will complete correctly without it. However, if you want to avoid the error, you can copy the file into the server directory, and name it `server.csr`:

```
cp <Certificate_Request_File>.csr /root/ssl-build/<Server_Name>/server.csr
```

When you have created the new `ssl-build` directory, you can create combined certificate RPMs and deploy them on the clients. For the procedures to do this, see **[Administration › Ssl-certs-selfsigned ›]**.

If you are using a proxy, you will need to generate a server certificate RPM for each proxy, using their host names and cnames.

Backup and Restore

Back up your Uyuni installation regularly, in order to prevent data loss. Because Uyuni relies on a database as well as the installed program and configurations, it is important to back up all components of your installation. This chapter contains information on the files you need to back up, and introduces the `smdba` tool to manage database backups. It also contains information about restoring from your backups in the case of a system failure.

> ⚠️ **Backup Space Requirements**
>
> Regardless of the backup method you use, you must have available at least three times the amount of space your current installation uses. Running out of space can result in backups failing, so check this often.

Backing up Uyuni

The most comprehensive method for backing up your Uyuni installation is to back up the relevant files and directories. This can save you time in administering your backup, and can be faster to reinstall and re-synchronize in the case of failure. However, this method requires significant disk space and could take a long time to perform the backup.

> ℹ️ If you want to only back up the required files and directories, use the following list. To make this process simpler, and more comprehensive, we recommend backing up the entire `/etc` and `/root` directories, not just the ones specified here. Some files only exist if you are actually using the related SUSE Manager feature.

- `/etc/cobbler/`

- `/etc/dhcp.conf`

- `/etc/fstab` and any ISO mountpoints you require.

- `/etc/rhn/`

- `/etc/salt`

- `/etc/sudoers`

- `/etc/sysconfig/rhn/`

- `/root/.gnupg/`

- `/root/.ssh`

  This file exists if you are using an SSH tunnel or SSH `push`. You will also need to have saved a copy of the `id-susemanager` key.

- `/root/ssl-build/`

- `/srv/formula_metadata`

- `/srv/pillar`

- `/srv/salt`

- `/srv/susemanager`

- `/srv/tftpboot/`

- `/srv/www/cobbler`

- `/srv/www/htdocs/pub/`

- `/srv/www/os-images`

- `/var/cache/rhn`

- `/var/cache/salt`

- `/var/lib/cobbler/`

- `/var/lib/cobbler/templates/` (before version 4.0 it was `/var/lib/rhn/kickstarts/`)

- `/var/lib/Kiwi`

- `/var/lib/rhn/`

- `/var/spacewalk/`

- Plus any directories containing custom data such as scripts, Kickstart or AutoYaST profiles, and custom RPMs.

> You will also need to back up your database, which you can do with the `smdba` tool. For more information about the `smdba` tool, see **[Administration › Backup-restore ›]**.

Procedure: Restore from a Manual Backup

1. Re-install Uyuni. For more information about recovering from a backup, see **[Administration › Backup-restore ›]**.

2. Re-synchronize your Uyuni repositories with the `mgr-sync` tool. For more information about the `mgr-sync` tool, see [syncing.suse.mgr.repositories.scc].

3. You can choose to re-register your product, or skip the registration and SSL certificate generation sections.

4. Re-install the `/root/ssl-build/rhn-org-httpd-ssl-key-pair-MACHINE_NAME-VER-REL.noarch.rpm` package.

5. Schedule the re-creation of search indexes next time the `rhn-search` service is started:

```
rhn-search cleanindex
```

This command produces only debug messages. It does not produce error messages.

6. Check whether you need to restore `/var/spacewalk/packages/`. If `/var/spacewalk/packages/` was not in your backup, you will need to restore it. If the source repository is available, you can restore `/var/spacewalk/packages/` with a complete channel synchronization:

```
mgr-sync refresh --refresh-channels
```

Check the progress by running `tail -f /var/log/rhn/reposync/` <CHANNEL_NAME>`.log` as *root*.

Administering the Database with smdba

The `smdba` tool is used for managing a local PostgreSQL database. It allows you to back up and restore your database, and manage backups. It can also be used to check the status of your database, and perform administration tasks, such as restarting.

The `smdba` tool works with local PostgreSQL databases only, it will not work with remotely accessed databases, or Oracle databases.

> ⚠️ The `smdba` tool requires `sudo` access, in order to execute system changes. Ensure you have enabled `sudo` access for the `admin` user before you begin, by checking the `/etc/sudoers` file for this line:
>
> ```
> admin   ALL=(postgres) /usr/bin/smdba
> ```

Check the runtime status of your database with:

```
smdba db-status
```

This command will return either `online` or `offline`, for example:

```
Checking database core...        online
```

Starting and stopping the database can be performed with:

```
smdba db-start
```

And:

```
smdba db-stop
```

Database Backup with smdba

The `smdba` tool performs a continuous archiving backup. This backup method combines a log of every change made to the database during the current session, with a series of more traditional backup files. When a crash occurs, the database state is first restored from the most recent backup file on disk, then the log of the current session is replayed exactly, to bring the database back to a current state. A continuous archiving backup with `smdba` is performed with the database running, so there is no need for downtime.

This method of backing up is stable and generally creates consistent snapshots, however it can take up a lot of storage space. Ensure you have at least three times the current database size of space available for backups. You can check your current database size by navigating to `/var/lib/pgsql/` and running `df -h`.

The `smdba` tool also manages your archives, keeping only the most recent backup, and the current archive of logs. The log files can only be a maximum file size of 16 MB, so a new log file will be created when the files reach this size. Every time you create a new backup, previous backups will be purged to release disk space. We recommend you use `cron` to schedule your `smdba` backups to ensure that your storage is managed effectively, and you always have a backup ready in case of failure.

Performing a Manual Database Backup

The `smdba` tool can be run directly from the command line. We recommend you run a manual database backup immediately after installation, or if you have made any significant changes to your configuration.

> When `smdba` is run for the first time, or if you have changed the location of the backup, it will need to restart your database before performing the archive. This will result in a small amount of downtime. Regular database backups will not require any downtime.

Procedure: Performing a Manual Database Backup

1. Allocate permanent storage space for your backup. This example uses a directory located at `/var/spacewalk/`. This will become a permanent target for your backup, so ensure it will remain accessible by your server at all times.

2. In your backup location, create a directory for the backup:

```
sudo -u postgres mkdir /var/spacewalk/db-backup
```

Or, as root:

```
install -d -o postgres -g postgres -m 700 /var/spacewalk/db-backup
```

3. Ensure you have the correct permissions set on the backup location:

```
chown postgres:postgres /var/spacewalk/db-backup
```

4. To create a backup for the first time, run the `smdba backup-hot` command with the `enable` option set. This will create the backup in the specified directory, and, if necessary, restart the database:

```
smdba backup-hot --enable=on --backup-dir=/var/spacewalk/db-backup
```

This command produces debug messages and finishes sucessfully with the output:

```
INFO: Finished
```

5. Check that the backup files exist in the `/var/spacewalk/db-backup` directory, to ensure that your backup has been successful.

Scheduling Automatic Backups

You do not need to shut down your system in order to perform a database backup with `smdba`. However, because it is a large operation, database performance can slow down while the backup is running. We recommend you schedule regular database backups for a low-traffic period, to minimize disruption.

> ⚠ Ensure you have at least three times the current database size of space available for backups. You can check your current database size by navigating to `/var/lib/pgsql/` and running `df -h`.

Procedure: Scheduling Automatic Backups

1. Create a directory for the backup, and set the appropriate permissions (as root):

```
install -m 700 -o postgres -g postgres /var/spacewalk/db-backup
```

2. Open `/etc/cron.d/db-backup-mgr`, or create it if it does not exist, and add the following line to create the cron job:

```
0 2 * * * root /usr/bin/smdba backup-hot --enable=on --backup-dir=/var/spacewalk/db
-backup
```

3. Check the backup directory regularly to ensure the backups are working as expected.

Restoring from Backup

The `smdba` tool can be used to restore from backup in the case of failure.

Procedure: Restoring from Backup

1. Shut down the database:

   ```
   smdba db-stop
   ```

2. Start the restore process and wait for it to complete:

   ```
   smdba backup-restore start
   ```

3. Restart the database:

   ```
   smdba db-start
   ```

4. Check if there are differences between the RPMs and the database.

   ```
   spacewalk-data-fsck
   ```

Archive Log Settings

Archive logging allows the database management tool `smdba` to perform hot backups. In Uyuni with an embedded database, archive logging is enabled by default.

PostgreSQL maintains a limited number of archive logs. Using the default configuration, approximately 64 files with a size of 16 MiB are stored.

Creating a user and syncing the channels:

- SLES12-SP2-Pool-x86_64

- SLES12-SP2-Updates-x86_64

- SLE-Manager-Tools12-Pool-x86_64-SP2

- SLE-Manager-Tools12-Updates-x86_64-SP2

PostgreSQL will generate an additional roughly 1 GB of data. So it is important to think about a backup strategy and create a backups in a regular way.

Archive logs are stored at `/var/lib/pgsql/data/pg_xlog/` (postgresql).

Retrieving an Overview of Occupied Database Space

Database administrators may use the subcommand `space-overview` to get a report about occupied table spaces, for example:

```
smdba space-overview
```

outputs:

```
SUSE Manager Database Control. Version 1.5.2
Copyright (c) 2012 by SUSE Linux Products GmbH


Tablespace  | Size (Mb) | Avail (Mb) | Use %
------------+-----------+------------+------
postgres    | 7         | 49168      | 0.013
susemanager | 776       | 48399      | 1.602
```

The `smdba` command is available for PostgreSQL. For a more detailed report, use the `space-tables` subcommand. It lists the table and its size, for example:

```
smdba space-tables
```

outputs:

```
SUSE Manager Database Control. Version 1.5.2
Copyright (c) 2012 by SUSE Linux Products GmbH


Table                                | Size
-------------------------------------+-----------
public.all_primary_keys              | 0 bytes
public.all_tab_columns               | 0 bytes
public.allserverkeywordsincereboot   | 0 bytes
public.dblink_pkey_results           | 0 bytes
public.dual                          | 8192 bytes
public.evr_t                         | 0 bytes
public.log                           | 32 kB
...
```

Moving the Database

It is possible to move the database to another location. For example, move the database if the database storage space is running low. The following procedure will guide you through moving the database to a new location for use by Uyuni.

Procedure: Moving the Database

1. The default storage location for Uyuni is `/var/lib/pgsql/`. If you would like to move it, for example to `/storage/postgres/`, proceed as follows.

2. Stop the running database with (as root):

```
rcpostgresql stop
```

Shut down the running Spacewalk services with:

```
spacewalk-service stop
```

3. Copy the current working directory structure with `cp` using the `-a, --archive` option. For example:

```
cp --archive /var/lib/pgsql/ /storage/postgres/
```

This command will copy the contents of `/var/lib/pgsql/` to `/storage/postgres/pgsql/`.

> ❗ The contents of the `/var/lib/pgsql` directory needs to remain the same, otherwise the Uyuni database may malfunction. You also should ensure that there is enough available disk space.

4. Mount the new database directory with:

```
mount /storage/postgres/pgsql
```

5. Make sure ownership is `postgres:postgres` and not `root:root` by changing to the new directory and running the following commands:

```
cd /storage/postgres/pgsql/
ls -l
```

Outputs:

```
total 8
drwxr-x---  4 postgres postgres   47 Jun  2 14:35 ./
```

6. Add the new database mount location to your servers fstab by editing `etc/fstab`.

7. Start the database with:

```
rcpostgresql start
```

8. Start the Spacewalk services with:

```
spacewalk-service start
```

Recovering from a Crashed Root Partition

This section provides guidance on restoring your server after its root partition has crashed. This section assumes you have setup your server similar to the procedure explained in Installation guide with separate partitions for the database and for channels mounted at `/var/lib/pgsql` and `/var/spacewalk/`.

Procedure: Recovering from a Crashed Root Partition

1. Install Uyuni. Do not mount the `/var/spacewalk` and `/var/lib/pgsql` partitions. Wait for the installation to complete before going on to the next step.

2. Shut down the services with `spacewalk-service shutdown`.

3. Shut down the database with `rcpostgresql stop`.

4. Mount `/var/spacewalk` and `/var/lib/pgsql` partitions.

5. Restore the directories listed in Backing up Uyuni.

6. Start the Spacewalk services with `spacewalk-services start`.

7. Start the database with `rcpostgresql start`.

Uyuni should now operate normally without loss of your database or synced channels.

Database Connection Information

The information for connecting to the Uyuni database is located in `/etc/rhn/rhn.conf`:

```
db_backend = postgresql
db_user = susemanager
db_password = susemanager
db_name = susemanager
db_host = localhost
db_port = 5432
db_ssl_enabled =
```

Managing Disk Space

Running out of disk space can have a severe impact on the Uyuni database and file structure which, in some cases, is not recoverable.

Uyuni monitors some directories for free disk space. You can modify which directories are monitored, and the warnings that are created. All settings are configured in the `/etc/rhn/rhn.conf` configuration file.

Monitored Directories

By default, Uyuni monitors these directories:

- `/var/lib/pgsql`
- `/var/spacewalk`
- `/var/cache`
- `/srv`

You can change which directories are monitored with the `spacecheck_dirs` parameter. You can specify multiple directories by separating them with a space.

For example:

```
spacecheck_dirs = /var/lib/pgsql /var/spacewalk /var/cache /srv
```

Thresholds

By default, Uyuni will create a warning mail when a monitored directory has less than 10% of total space available. A critical alert is created when a monitored directory falls below 5% space available.

You can change these alert thresholds with the `spacecheck_free_alert` and `spacecheck_free_critical` parameters.

For example:

```
spacecheck_free_alert = 10
spacecheck_free_critical = 5
```

Shut Down Services

By default, Uyuni will shut down the spacewalk services when the critical alert threshold is reached.

You can change this behavior with the `spacecheck_shutdown` parameter. A value of `true` will enable

the shut down feature. Any other value will disable it.

For example:

```
spacecheck_shutdown = true
```

Disable Space Checking

The space checking tool is enabled by default. You can disable it entirely with these commands:

```
systemctl stop spacewalk-diskcheck.timer
systemctl disable spacewalk-diskcheck.timer
```

Content Lifecycle Management

Content lifecycle management allows you to customize and test packages before updating production clients. This is especially useful if you need to apply updates during a limited maintenance window.

Content lifecycle management allows you to select software channels as sources, adjust them as required for your environment, and thoroughly test them before installing onto your production clients.

While you cannot directly modify vendor channels, you can clone them and then modify the clones by adding or removing packages and custom patches. You can assign these cloned channels to test clients to ensure they work as expected. Then, when all tests pass, you can promote them to production servers.

This is achieved through a series of environments that your software channels can move through on their lifecycle. Most environment lifecycles include at least test and production environments, but you can have as many environments as you require.

This section covers the basic content lifecycle procedures, and the filters available. For more specific examples, see **[Administration › Content-lifecycle-examples ›]**.

Create a Content Lifecycle Project

To set up a content lifecycle, you need to begin with a project. The project defines the software channel sources, the filters used to find packages, and the build environments.

Procedure: Creating a Content Lifecycle Project

1. In the Uyuni Web UI, navigate to **Content Lifecycle › Projects**, and click **[Create Project]**.

2. In the `Label` field, enter a label for your project. The `Label` field only accepts lowercase letters, numbers, periods, hyphens, and underscores.

3. In the `Name` field, enter a descriptive name for your project.

4. Click the **[Create]** button to create your project and return to the project page.

5. Click **[Attach/Detach Sources]**.

6. In the `Sources` dialog, select the source type, and select a base channel for your project. The available child channels for the selected base channel are displayed, including information on whether the channel is mandatory or recommended.

7. Check the child channels you require, and click **[Save]** to return to the project page. The software channels you selected should now be showing.

8. Click **[Attach/Detach Filters]**.

9. In the `Filters` dialog, select the filters you want to attach to the project. To create a new filter, click **[Create new Filter]**.

10. Click **[Add Environment]**.

11. In the `Environment Lifecycle` dialog, give the first environment a name and a description, and click **[Save]**. The `Name` field only accepts lowercase letters, numbers, periods, hyphens, and

underscores.

12. Continue creating environments until you have all the environments for your lifecycle completed. You can select the order of the environments in the lifecycle by selecting an environment in the `Insert before` field when you create it.

Filter Types

Uyuni allows you to create various types of filters to control the content used for building the project. Filters allow you to select which packages will be included or excluded from the build. For example, you could exclude all kernel packages, or include only specific releases of some packages.

The supported filters are:

- package filtering

    ◦ by name

    ◦ by name, epoch, version, release, and architecture

- patch filtering

    ◦ by advisory name

    ◦ by advisory type

    ◦ by synopsis

    ◦ by keyword

    ◦ by date

    ◦ by affected package

- module

    ◦ by stream

> 🛈 Package dependencies are not resolved during content filtering.

There are multiple matchers you can use with the filter. Which ones are available will depend on the filter type you choose.

The available matchers are:

- contains

- matches (must take the form of a regular expression)

- equals

- greater

- greater or equal

- lower or equal

- lower

- later or equal

Filter `rule` Parameter

Each filter has a `rule` parameter that can be set to either `Allow` or `Deny`. The filters are processed like this:

- If a package or patch satisfies a `Deny` filter, it will be excluded from the result.

- If a package or patch satisfies an `Allow` filter, it will be included in the result (even if it was excluded by a `Deny` filter).

This behavior is useful when you want to exclude large number of packages or patches using a general `Deny` filter and "cherry-pick" specific packages or patches with specific `Allow` filters.

> Content filters are global in your organization and can be shared between projects.

> If your project already contains built sources, when you add an environment it will automatically populate with the existing content. Content will be drawn from the previous environment of the cycle if it had one. If there is no previous environment, it will be left empty until the project sources are built again.

Build a Content Lifecycle Project

When you have created your project, defined environments, and attached sources and filters, you can build the project for the first time.

Building applies filters to the attached sources and clones them to the first environment in the project.

Procedure: Building a Content Lifecycle Project

1. In the Uyuni Web UI, navigate to **Content Lifecycle › Projects**, and select the project you want to build.

2. Review the attached sources and filters, and click **[Build]**.

3. Provide a version message to describe the changes or updates in this build.

4. You can monitor build progress in the `Environment Lifecycle` section.

After the build is finished, the environment version is increased by one and the built sources, such as software channels, can be assigned to your clients.

Promote Environments

When the project has been built, the built sources can be sequentially promoted to the environments.

Procedure: Promoting Environments

1. In the Uyuni Web UI, navigate to **Content Lifecycle › Projects**, and select the project you want to work with.

2. In the `Environment Lifecycle` section, locate the environment to promote to its successor, and click **[Promote]**.

3. You can monitor build progress in the `Environment Lifecycle` section.

Assign Clients to Environments

When you build and promote content lifecycle projects, Uyuni creates a tree of software channels. To add clients to the environment, assign the base and child software channels to your client using **Software › Software Channels** in the `System Details` page for the client.

> Newly added cloned channels are not assigned to clients automatically. If you add or promote sources you will need to manually check and update your channel assignments.
>
> Automatic assignment is intended to be added to Uyuni in a future version.

Content Lifecycle Management Examples

This section contains some common examples of how you can use content lifecycle management. Use these examples to build your own personalized implementation.

Creating a Project for a Monthly Patch Cycle

An example project for a monthly patch cycle consists of:

- Creating a `By Date` filter
- Adding the filter to the project
- Applying the filter to a new project build
- Excluding a patch from the project
- Including a patch in the project

Creating a `By Date` filter

The `By Date` filter excludes all patches released after a specified date. This filter is useful for your content lifecycle projects that follow a monthly patch cycle.

Procedure: Creating the `By Date` *Filter*

1. In the Uyuni Web UI, navigate to **Content Lifecycle › Filters** and click **[Create Filter]**.

2. In the `Filter Name` field, type a name for your filter. For example, `Exclude patches by date`.

3. In the `Filter Type` field, select `Patch (Issue date)`.

4. In the `Matcher` field, `later or equal` is autoselected.

5. Select the date and time.

6. Click **[Save]**.

Adding the Filter to the Project

Procedure: Adding a Filter to a Project

1. In the Uyuni Web UI, navigate to **Content Lifecycle › Projects** and select a project from the list.

2. Click **[Attach/Detach Filters]** link to see all available filters

3. Select the new `Exclude patches by date` filter.

4. Click **[Save]**.

Applying the Filter to a new Project Build

The new filter is added to your filter list, but it still needs to be applied to the project. To apply the filter you need to build the first environment.

Procedure: Using the Filter

Click **[Build]** to build the first environment. . OPTIONAL: Add a message. You can use messages to help track the build history. . Check that the filter has worked correctly by using the new channels on a test server. . Click **[Promote]** to move the content to the next environment. The build will take longer if you have a large number of filters, or they are very complex.

Excluding a Patch from the Project

Tests may help you discover issues. When an issue is found, exclude the problem patch released before the `by date` filter.

Procedure: Excluding a Patch

1. In the Uyuni Web UI, navigate to **Content Lifecycle › Filters** and click **[Create Filter]**.

2. In the `Filter Name` field, enter a name for the filter. For example, `Exclude openjdk patch`.

3. In the `Filter Type` field, select `Patch (Advisory Name)`.

4. In the `Matcher` field, select `equals`.

5. In the `Advisory Name` field, type a name for the advisory. For example, `SUSE-15-2019-1807`.

6. Click **[Save]**.

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7. Navigate to **Content Lifecycle › Projects** and select your project.

8. Click **[Attach/Detach Filters]** link, select `Exclude openjdk patch`, and click **[Save]**.

When you rebuild the project with the **[Build]** button, the new filter is used together with the `by date` filter we added before.

Including a Patch in the Project

In this example, you have received a security alert. An important security patch was released several days after the first of the month you are currently working on. The name of the new patch is `SUSE-15-2019-2071`. You need to include this new patch into your environment.

> **!** The `Allow` filters rule overrides the exclude function of the `Deny` filter rule. For more information, see **[Administration › Content-lifecycle ›]**.

Procedure: Including a Patch in a Project

1. In the Uyuni Web UI, navigate to **Content Lifecycle › Filters** and click **[Create Filter]**.

2. In the `Filter Name` field, type a name for the filter. For example, `Include kernel security fix`.

3. In the `Filter Type` field, select `Patch (Advisory Name)`.

4. In the `Matcher` field, select `equals`.

5. In the `Advisory Name` field, type `SUSE-15-2019-2071`, and check `Allow`.

6. Click **[Save]** to store the filter.

7. Navigate to **Content Lifecycle › Projects** and select your project from the list.

8. Click **[Attach/Detach Filters]**, and select `Include kernel security patch`.

9. Click **[Save]**.

10. Click **[Build]** to rebuild the environment.

Update an Existing Monthly Patch Cycle

When a monthly patch cycle is complete, you can update the patch cycle for the next month.

Procedure: Updating a Monthly Patch Cycle

1. In the `by date` field, change the date of the filter to the next month. Alternatively, create a new filter and change the assignment to the project.

2. Check if the exclude filter for `SUSE-15-2019-1807` can be detached from the project. There may be a new patch available to fix this issue.

3. Detach the `allow` filter you added previously. The patch is included by default.

4. Rebuild the project to create a new environment with patches for the next month.

Enhance a Project with Live Patching

This section covers setting up filters to create environments for live patching.

> ❗ When you are preparing to use live patching, there are some important considerations
>
> - Only ever use one kernel version on your systems. The live patching packages are installed with a specific kernel.
>
> - Live patching updates are shipped as one patch.
>
> - Each kernel patch that begins a new series of live patching kernels will display the `required reboot` flag. These kernel patches come with live patching tools. When you have installed them, you will need to reboot the system at least once before the next year.
>
> - Only install live patch updates that match the installed kernel version.
>
> - Live patches are provided as stand-alone patches. You must exclude all regular kernel patches with higher kernel version than the currently installed one.

Exclude Packages with a Higher Kernel Version

In this example you update your systems with the `SUSE-15-2019-1244` patch. This patch contains `kernel-default-4.12.14-150.17.1-x86_64`.

You need to exclude all patches which contain a higher version of `kernel-default`.

Procedure: Excluding Packages with a Higher Kernel Version

1. In the Uyuni Web UI, navigate to **Content Lifecycle › Filters**, and click **[Create Filter]**.

2. In the `Filter Name` field, type a name for your filter. For example, `Exclude kernel greater than 4.12.14-150.17.1`.

3. In the `Filter Type` field, select `Patch (Contains Package)`.

4. In the `Matcher` field, select `version greater than`.

5. In the `Package Name` field, type `kernel-default`.

6. Leave the the `Epoch` field empty.

7. In the `Version` field, type `4.12.14`.

8. In the `Release` field, type `150.17.1`.

9. Click **[Save]** to store the filter.

10. Navigate to **Content Lifecycle › Projects** and select your project.

11. Click **[Attach/Detach Filters]**.

12. Select `Exclude kernel greater than 4.12.14-150.17.1`, and click **[Save]**.

When you click **[Build]**, a new environment is created. The new environment contains all the kernel patches up to the version you installed.

> All kernel patches with higher kernel versions are removed. Live patching kernels will stay available as long as they are not the first in a series.

Switch to a New Kernel Version for Live Patching

Live Patching for a specific kernel version is only available for one year. After one year you must update the kernel on your systems. Execute these environment changes:

Procedure: Switch to a New Kernel Version

1. Decide which kernel version you will upgrade to. For example: `4.12.14-150.32.1`

2. Create a new kernel version Filter.

3. Detach the previous filter **Exclude kernel greater than 4.12.14-150.17.1** and attach the new filter.

Click **[Build]** to rebuild the environment. The new environment contains all kernel patches up to the new kernel version you selected. Systems using these channels will have the kernel update available for installation. You will need to reboot systems after they have performed the upgrade. The new kernel will remain valid for one year. All packages installed during the year will match the current live patching kernel filter.

Appstream Filters

If you are using Red Hat Enterprise Linux 8 clients, you cannot perform package operations such as installing or upgrading directly from modular repositories like the Red Hat Enterprise Linux Appstream repository. You can use the Appstream filter to transform modular repositories into regular repositories. It does this by keeping the packages in the repository and stripping away the module metadata. The resulting repository can be used in Uyuni in the same way as a regular repository.

The AppStream filter selects a single module stream to be included in the target repository. You can add multiple filters to select multiple module streams.

If you do not use an AppStream filter in your CLM project, the module metadata in the modular sources remains intact, and the target repositories contain the same module metadata. As long as at least one AppStream filter is enabled in the CLM project, all target repositories are transformed into regular repositories.

To use the AppStream filter, you need a CLM project with a modular repository such as `Red Hat Enterprise Linux AppStream`. Ensure that you included the module you need as a source before you begin.

Procedure: Using Appstream Filters

1. In the Uyuni Web UI, navigate to your Red Hat Enterprise Linux 8 CLM project. Ensure that you have included the AppStream channels for your project.

2. Click btn:`Create Filter` and use these parameters:

   ○ In the `Filter Name` field, type a name for the new filter.

   ○ In the `Filter Type` field, select `Module (Stream)`.

   ○ In the `Module Name` field, type a module name. For example, `postgresql`.

   ○ In the `Stream` field, type the name of the desired stream. For example, `10`. If you leave this field blank, the default stream for the module is selected.

3. Click **[Save]** to create the new filter.

4. Navigate to **Content Lifecycle › Projects** and select your project.

5. Click btn:`Attach/Detach Filters`, select your new Appstream filter, and click **[Save]**.

You can use the browse function in the `Create/Edit Filter` form to select a module from a list of available module streams for a modular channel.

Procedure: Browsing Available Module Streams

1. In the Uyuni Web UI, navigate to your Red Hat Enterprise Linux 8 CLM project. Ensure that you have included the AppStream channels for your project.

2. Click btn:`Create Filter` and use these parameters:

   ○ In the `Filter Name` field, type a name for the new filter.

   ○ In the `Filter Type` field, select `Module (Stream)`.

3. Click `Browse available modules` to see all modular channels.

4. Select a channel to browse the modules and streams:

   ○ In the `Module Name` field, start typing a module name to search, or select from the list.

   ○ In the `Stream` field, start typing a stream name to search, or select from the list.

> Channel selection is only for browsing modules. The selected channel will not be saved with the filter, and will not affect the CLM process in any way.

You can create additional AppStream filters for any other module stream to be included in the target repository. Any module streams that the selected stream depends on will be automatically included.

> Be careful not to specify conflicting, incompatible, or missing module streams. For example, selecting two streams from the same module is invalid.

When you build your CLM project using the **[Build]** button in the Web UI, the target repository is a

regular repository without any modules, that contains packages from the selected module streams.

Using `mgr-sync`

The `mgr-sync` tool is used at the command prompt. It provides functions for using Uyuni that are not always available in the Web UI. The primary use of `mgr-sync` is to connect to the SUSE Customer Center, retrieve product and package information, and prepare channels for synchronization with the Uyuni Server.

This tool is designed for use with a SUSE support subscription. It is not required for open source distributions, including openSUSE, CentOS, and Ubuntu.

The available commands and arguments for `mgr-sync` are listed in this table. Use this syntax for `mgr-sync` commands:

```
mgr-sync [-h] [--version] [-v] [-s] [-d {1,2,3}] {list,add,refresh,delete}
```

Table 1. mgr-sync Commands

Command	Description	Example Use
list	List channels, organization credentials, or products	`mgr-sync list channels`
add	Add channels, organization credentials, or products	`mgr-sync add channel <channel_name>`
refresh	Refresh the local copy of products, channels, and subscriptions	`mgr-sync refresh`
delete	Delete existing SCC organization credentials from the local system	`mgr-sync delete credentials`
sync	Synchronize specified channel or ask for it when left blank	`mgr-sync sync channel <channel_name>`

To see the full list of options specific to a command, use this command:

```
mgr-sync <command> --help
```

Table 2. mgr-sync Optional Arguments

Option	Abbreviated option	Description	Example Use
help	h	Display the command usage and options	`mgr-sync --help`
version	N/A	Display the currently installed version of `mgr-sync`	`mgr-sync --version`

Option	Abbreviated option	Description	Example Use
verbose	`v`	Provide verbose output	`mgr-sync --verbose refresh`
store-credentials	`s`	Store credentials a local hidden file	`mgr-sync --store -credentials`
debug	`d`	Log additional debugging information. Requires a level of 1, 2, 3. 3 provides the highest amnount of debugging information	`mgr-sync -d 3 refresh`
no-sync	N/A	Use with the `add` command to add products or channels without beginning a synchronization	`mgr-sync --no-sync add <channel_name>`

Logs for `mgr-sync` are located in:

- `/var/log/rhn/mgr-sync.log`
- `/var/log/rhn/rhn_web_api.log`

Generate Reports

The `spacewalk-report` command is used to produce a variety of reports. These reports can be helpful for taking inventory of your subscribed systems, users, and organizations. Using reports is often simpler than gathering information manually from the SUSE Manager Web UI, especially if you have many systems under management.

To generate reports, you must have the `spacewalk-reports` package installed.

The `spacewalk-report` command allows you to organize and display reports about content, systems, and user resources across Uyuni.

You can generate reports on:

1. System Inventory: list all the systems registered to Uyuni.

2. Patches: list all the patches relevant to the registered systems. You can sort patches by severity, as well as the systems that apply to a particular patch.

3. Users: list all registered users and any systems associated with a particular user.

To get the report in CSV format, run this command at the command prompt on the server:

```
spacewalk-report <report_name>
```

This table lists the available reports:

Table 3. `spacewalk-report` *Reports*

Report	Invoked as	Description
Actions	`actions`	All actions.
Activation Keys	`activation-keys`	All activation keys, and the entitlements, channels, configuration channels, system groups, and packages associated with them.
Activation Keys: Channels	`activation-keys-channels`	All activation keys and the entities associated with each key.
Activation Keys: Configuration	`activation-keys-config`	All activation keys and the configuration channels associated with each key.
Activation Keys: Server Groups	`activation-keys-groups`	All activation keys and the system groups associated with each key.
Activation Keys: Packages	`activation-keys-packages`	All activation keys and the packages each key can deploy.

Report	Invoked as	Description
Channel Packages	`channel-packages`	All packages in a channel.
Channel Report	`channels`	Detailed report of a given channel.
Cloned Channel Report	`cloned-channels`	Detailed report of cloned channels.
Configuration Files	`config-files`	All configuration file revisions for all organizations, including file contents and file information.
Latest Configuration Files	`config-files-latest`	The most recent configuration file revisions for all organizations, including file contents and file information.
Custom Channels	`custom-channels`	Channel metadata for all channels owned by specific organizations.
Custom Info	`custom-info`	Client custom information.
Patches in Channels	`errata-channels`	All patches in channels.
Patches Details	`errata-list`	All patches that affect registered clients.
All patches	`errata-list-all`	All patches.
Patches for Clients	`errata-systems`	Applicable patches and any registered clients that are affected.
Host Guests	`host-guests`	Host and guests mapping.
Inactive Clients	`inactive-systems`	Inactive clients.
System Inventory	`inventory`	Clients registered to the server, together with hardware and software information.
Kickstart Scripts	`kickstart-scripts`	All kickstart scripts, with details.
Kickstart Trees	`kickstartable-trees`	Kickstartable trees.
All Upgradable Versions	`packages-updates-all`	All newer package versions that can be upgraded.
Newest Upgradable Version	`packages-updates-newest`	Newest package versions that can be upgraded.
Proxy Overview	`proxies-overview`	All proxies and the clients registered to each.
Repositories	`repositories`	All repositories, with their associated SSL details, and any filters.

Report	Invoked as	Description
Result of SCAP	`scap-scan`	Result of OpenSCAP `sccdf` evaluations.
Result of SCAP	`scap-scan-results`	Result of OpenSCAP `sccdf` evaluations, in a different format.
System Data	`splice-export`	Client data needed for splice integration.
System Crash: Count	`system-crash-count`	The total number of client crashes.
System Crash: Details	`system-crash-details`	Crash details for all clients.
System Currency	`system-currency`	Number of available patches for each registered client.
System Extra Packages	`system-extra-packages`	All packages installed on all clients that are not available from channels the client is subscribed to.
System Groups	`system-groups`	System groups.
Activation Keys for System Groups	`system-groups-keys`	Activation keys for system groups.
Systems in System Groups	`system-groups-systems`	Clients in system groups.
System Groups Users	`system-groups-users`	System groups and users that have permissions on them.
History: System	`system-history`	Event history for each client.
History: Channels	`system-history-channels`	Channel event history.
History: Configuration	`system-history-configuration`	Configuration event history.
History: Entitlements	`system-history-entitlements`	System entitlement event history.
History: Errata	`system-history-errata`	Errata event history.
History: Kickstart	`system-history-kickstart`	Kickstart event history.
History: Packages	`system-history-packages`	Package event history.
History: SCAP	`system-history-scap`	OpenSCAP event history.
MD5 Certificates	`system-md5-certificates`	All registered clients using certificates with an MD5 checksum.

Report	Invoked as	Description
Installed Packages	`system-packages-installed`	Packages installed on clients.
System Profiles	`system-profiles`	All clients registered to the server, with software and system group information.
Users	`users`	All users registered to Uyuni.
MD5 Users	`users-md5`	All users for all organizations using MD5 encrypted passwords, with their details and roles.
Systems administered	`users-systems`	Clients that individual users can administer.

For more information about an individual report, run `spacewalk-report` with the option `--info` or `--list-fields-info` and the report name. The description and list of possible fields in the report will be shown.

For further information on program invocation and options, see the `spacewalk-report(8)` man page as well as the `--help` parameter of the `spacewalk-report` command.

Tuning

Tuning Changelogs

Some packages have a long list of changelog entries. This data is downloaded by default, but it is not always useful information to keep. In order to limit the amount of changelog metadata which is downloaded and to save disk space, you can put a limit on how many entries to keep on disk.

This configuration option is in the `/etc/rhn/rhn.conf` configuration file. The parameter defaults to `0`, which means unlimited.

```
java.max_changelog_entries = 0
```

If you set this parameter, it will come into effect only for new packages when they are synchronized.

After changing this parameter, restart services with `spacewalk-service restart`.

You might like to delete and regenerate the cached data to remove older data.

> ⚠️ Deleting and regenerating cached data can take a long time. Depending on the number of channels you have and the amount of data to be deleted, it can potentially take several hours. The task is run in the background by Taskomatic, so you can continue to use Uyuni while the operation completes, however you should expect some performance loss.

You can delete and request a regeneration of cached data from the command line:

```
spacewalk-sql -i
```

Then on the SQL database prompt, enter:

```
DELETE FROM rhnPackageRepodata;
INSERT INTO rhnRepoRegenQueue (id, CHANNEL_LABEL, REASON, FORCE)
(SELECT sequence_nextval('rhn_repo_regen_queue_id_seq'),
        C.label,
        'cached data regeneration',
        'Y'
        FROM rhnChannel C);
\q
```

Maintenance Window

Maintenance Window

If you work with scheduled maintenance windows, you might find it difficult to remember all the things that you need to do before, during, and after that critical downtime of the Uyuni Server. Uyuni Server related systems such as Inter-Server Synchronization Slave Servers or Uyuni Proxies are also affected and have to be considered.

SUSE recommends you always keep your Uyuni infrastructure updated. That includes servers, proxies, and build hosts. If you do not keep the Uyuni Server updated, you might not be able to update some parts of your environment when you need to.

This section contains a checklist for your maintenance window, with links to further information on performing each of the steps.

Server

1. Apply the latest updates. See **[Upgrade › Server-intro ›]**.

2. Upgrade to the latest service pack, if required.

3. Run `spacewalk-service status` and check whether all required services are up and running.

For information about database schema upgrades and PostgreSQL migrations, see **[Upgrade › Db-intro ›]**.

You can install updates using your package manager. For information on using YaST, see https://documentation.suse.com/sles/15-SP1/html/SLES-all/cha-onlineupdate-you.html. For information on using zypper, see https://documentation.suse.com/sles/15-SP1/html/SLES-all/cha-sw-cl.html#sec-zypper.

By default, several update channels are configured and enabled for the Uyuni Server. New and updated packages will become available automatically.

To keep SUSE Manager up to date, either connect it directly to SUSE Customer Center or use Repository Management Tool (RMT). You can use RMT as a local installation source for disconnected environments.

You can check that the update channels are available on your system with this command:

```
zypper lr
```

The output will look similar to this:

```
Name                                             | Enabled | GPG Check  | Refresh
-------------------------------------------------+---------+------------+--------
SLE-Module-Basesystem15-SP1-Pool                 | Yes     | (r ) Yes   | No
SLE-Module-Basesystem15-SP1-Updates              | Yes     | (r ) Yes   | Yes
SLE-Module-Python2-15-SP1-Pool                   | Yes     | (r ) Yes   | No
SLE-Module-Python2-15-SP1-Updates                | Yes     | (r ) Yes   | Yes
SLE-Product-SUSE-Manager-Server-4.0-Pool         | Yes     | (r ) Yes   | No
SLE-Product-SUSE-Manager-Server-4.0-Updates      | Yes     | (r ) Yes   | Yes
SLE-Module-SUSE-Manager-Server-4.0-Pool          | Yes     | (r ) Yes   | No
SLE-Module-SUSE-Manager-Server-4.0-Updates       | Yes     | (r ) Yes   | Yes
SLE-Module-Server-Applications15-SP1-Pool        | Yes     | (r ) Yes   | No
SLE-Module-Server-Applications15-SP1-Updates     | Yes     | (r ) Yes   | Yes
SLE-Module-Web-Scripting15-SP1-Pool              | Yes     | (r ) Yes   | No
SLE-Module-Web-Scripting15-SP1-Updates           | Yes     | (r ) Yes   | Yes
```

Uyuni releases maintenance updates (MUs) to provide newer packages. Maintenance updates are indicated with a new version number. For example, the major release 4.0 will be incremented to 4.0.1 when an MU is released.

You can verify which version you are running by looking at the bottom of the navigation bar in the Web UI. You can also fetch the version number with the `api.getVersion()` XMLRPC API call.

Client Tools

When the server is updated consider to update some tools on the clients, too. Updating `salt-minion`, `zypper`, and other related management package on clients is not a strict requirement, but it is a best practice in general. For example, a maintenance update on the server might introduce a major new Salt version. Then minions will continue to work but might experience problems later on. To avoid this always update the salt-minion package when available. SUSE makes sure that `salt-minion` can always be updated safely.

Inter-Server Synchronization Slave Server

If you are using an inter-server synchronization slave server, update it after the Uyuni Server update is complete.

For more in inter-server synchronization, see [**Administration › Iss › **].

Monitoring Server

If you are using a monitoring server for Prometheus, update it after the Uyuni Server update is complete.

For more information on monitoring, see [**Administration › Monitoring › **].

Proxy

Proxies should be updated as soon as Uyuni Server updates are complete.

In general, running a proxy connected to a server on a different version is not supported. The only exception is for the duration of updates where it is expected that the server is updated first, so the proxy

could run the previous version temporarily.

Especially if you are migrating from version 3.2 to 4.0, upgrade the server first, then any proxy.

For more information, see **[Upgrade › Proxy-intro ›]**.

Rename Server

Rename Uyuni Server

It is possible to rename a Uyuni Server. Begin by changing the network settings of the server locally and remotely. Then use the `spacewalk-hostname-rename` script to update the settings in the PostgreSQL database and the internal structures of Uyuni.

The `spacewalk-hostname-rename` script is part of the `spacewalk-utils` package.

The only mandatory parameter for the script is the newly configured IP address of the Uyuni Server.

Procedure: Renaming Uyuni Server

1. Change the network settings of the server on the system level locally and remotely at the DNS server. Provide configuration settings for reverse name resolution, too. Changing network settings is done in the same way as with renaming any other system.

2. Reboot the Uyuni Server to use the new network configuration and to ensure the hostname has changed.

3. Run the script `spacewalk-hostname-rename` script with the public IP address of the server. If the server is not using the new hostname, the script will fail.

4. Some other actions are needed to make your environment aware of the new hostname and IP address. Re-configure your clients. For background information, see **[Client-configuration › Registration-cli ›]**.

   In the Salt minion configuration file `/etc/salt/minion`, you must make sure to specify the name of the new Salt master (Uyuni Server):

   ```
   master: <new_hostname>
   ```

   Traditional clients have the `/etc/sysconfig/rhn/up2date` configuration file that must be changed. With a re-activation key you can re-register traditional clients (if there are any).

5. OPTIONAL: If you use PXE boot through a Uyuni Proxy, you must check the configuration settings of the proxy. On the proxy, run the `configure-tftpsync.sh` setup script and enter the requested information. For more information, see **[Installation › Proxy-setup ›]**.

Troubleshooting

This section contains some common problems you might encounter with Uyuni, and solutions to resolving them.

Troubleshooting Corrupt Repositories

The information in the repository metadata files can become corrupt or out of date. This can create problems with updating clients. You can fix this by removing the files and regenerating it. With an new repository data file, updates should operate as expected.

Procedure: Resolving Corrupt Repository Data

1. Remove all files from `/var/cache/rhn/repodata/<channel-label>-updates-x86_64`. If you do not know the channel label, you can find it in the Uyuni Web UI, by navigating to **Software ›** **Channels › Channel Label**.

2. Regenerate the file from the command line:

   ```
   spacecmd softwarechannel_regenerateyumcache <channel-label>-updates-x86_64
   ```

Troubleshooting Disk Space

Running out of disk space can have a severe impact on the Uyuni database and file structure which, in most cases, is not recoverable.

Uyuni monitors free space in specific directories, and has configurable alerts. For more on space management, see **[Administration › Space-management ›]**.

You can recover disk space by removing unused custom channels and redundant database entries before you run out of space entirely.

For instructions on how to delete custom channels, see **[Administration › Channel-management ›]**.

Procedure: Resolving redundant database entries

1. Use the `spacewalk-data-fsck` command to list any redundant database entries.

2. Use the `spacewalk-data-fsck --remove` command to delete them.

Troubleshooting Local Issuer Certificates

Some older bootstrap scripts create a link to the local certificate in the wrong place. This results in zypper returning an `Unrecognized error` about the local issuer certificate. You can ensure that the link to the local issuer certificate has been created correctly by checking the `/etc/ssl/certs/` directory. If you come across this problem, you should consider updating your bootstrap scripts to ensure that zypper operates as expected.

Troubleshooting Login Timeouts

By default, the Uyuni Web UI will require users to log in again after 30 minutes. Depending on your environment, you might want to adjust the login timeout value.

To adjust the value, you will need to make the change in both `rhn.conf` and `web.xml`. Ensure you set the value in seconds in `/etc/rhn/rhn.conf`, and in minutes in `web.xml`. The two values must equal the same amount of time.

For example, to change the timeout value to one hour, set the value in `rhn.conf` to 3600 seconds, and the value in `web.xml` to 60 minutes.

Procedure: Adjusting the Web UI Login Timeout Value

1. Stop services:

   ```
   spacewalk-service stop
   ```

2. Open `/etc/rhn/rhn.conf` and add or edit this line to include the new timeout value in seconds:

   ```
   web.session_database_lifetime = <Timeout_Value_in_Seconds>
   ```

3. Save and close the file.

4. Open `/srv/tomcat/webapps/rhn/WEB-INF/web.xml` and add or edit this line to include the new timeout value in minutes:

   ```
   <session-timeout>Timeout_Value_in_Minutes</session-timeout>
   ```

5. Save and close the file.

6. Restart services:

   ```
   spacewalk-service start
   ```

Troubleshooting Notifications

The default lifetime of notification messages is 30 days, after which messages are deleted from the database, regardless of read status. To change this value, add or edit this line in `/etc/rhn/rhn.conf`:

```
java.notifications_lifetime = 30
```

All notification types are enabled by default. To disable a notification type, add or edit this line in `/etc/rhn/rhn.conf`:

```
java.notifications_type_disabled = OnboardingFailed,ChannelSyncFailed,ChannelSyncFinished
```

Troubleshooting OSAD and jabberd

Open File Count Exceeded

In some cases, the maximum number of files that jabber can open is lower than the number of connected OSAD clients.

If this occurs, OSAD clients cannot contact the SUSE Manager Server, and jabberd will take an excessive amount of time to respond on port 5222.

> This fix is only required if you have more than 8192 clients connected using OSAD. In this case, we recommend you consider using Salt clients instead. For more information about tuning large scale installations, see **[Salt › Large-scale ›]**.

You can increase the number of files available to jabber by editing the jabberd local configuration file. By default, the file is located at `/etc/systemd/system/jabberd.service.d/override.conf`.

Procedure: Adjusting the Maximum File Count

1. At the command prompt, as root, open the local configuration file for editing:

   ```
   systemctl edit jabberd
   ```

2. Add or edit this section:

   ```
   [Service]
   LimitNOFILE=<soft_limit>:<hard_limit>
   ```

   The value you choose will vary depending on your environment. For example, if you have 9500 clients, increase the soft value by 100 to 9600, and the hard value by 1000 to 10500:

   ```
   [Unit]
   LimitNOFILE=
   LimitNOFILE=9600:10500
   ```

3. Save the file and exit the editor.

   > (i) The default editor for systemctl files is vim. To save the file and exit, press `Esc` to enter `normal` mode, type `:wq` and press `Enter`.

Ensure you also update the `max_fds` parameter in `/etc/jabberd/c2s.xml`. For example:

```
<max_fds>10500</max_fds>
```

The soft file limit is the maximum number of open files for a single process. In Uyuni the highest consuming process is `c2s`, which opens a connection per client. 100 additional files are added, here, to accommodate for any non-connection file that `c2s` requires to work correctly. The hard limit applies to all processes belonging to jabber, and also accounts for open files from the router, `c2s` and `sm` processes.

Troubleshooting Package Inconsistencies

When packages on a client are locked, Uyuni Server may not be able to correctly determine the set of applicable patches. When this occurs, package updates will be available in the Web UI, but will not appear on the client, and attempts to update the client will fail. Check package locks and exclude lists to determine if packages are locked or excluded on the client.

On the client, check package locks and exclude lists to determine if packages are locked or excluded:

- On an Expanded Support Platform, check `/etc/yum.conf` and search for `exclude=`.

- On SUSE Linux Enterprise and openSUSE, use the `zypper locks` command.

Troubleshooting Registering Cloned Clients

If you are using Uyuni to manage virtual machines, you might find it useful to create clones of your VMs. A clone is a VM that uses a primary disk that is an exact copy of an existing disk.

While cloning VMs can save you a lot of time, the duplicated identifying information on the disk can sometimes cause problems.

If you have a client that is already registered, you create a clone of that client, and then try and register the clone, you probably want Uyuni to register them as two separate clients. However, if the machine ID in both the original client and the clone is the same, Uyuni will register both clients as one system, and the existing client data will be over-written with that of the clone.

This can be resolved by changing the machine ID of the clone, so that Uyuni recognizes them as two different clients.

> Each step of this procedure is performed on the cloned client. This procedure does not manipulate the original client, which will still be registered to Uyuni.

Procedure: Resolving Duplicate Machine IDs in Cloned Salt Clients

1. On the cloned machine, change the hostname and IP addresses. Make sure `/etc/hosts` contains the changes you made and the correct host entries.

2. For distributions that support systemd: If your machines have the same machine ID, delete the file on each duplicated client and re-create it:

```
# rm /etc/machine-id
# rm /var/lib/dbus/machine-id
# dbus-uuidgen --ensure
# systemd-machine-id-setup
```

3. For distributions that do not support systemd: Generate a machine ID from dbus:

```
# rm /var/lib/dbus/machine-id
# dbus-uuidgen --ensure
```

4. If your clients still have the same Salt client ID, delete the `minion_id` file on each client (FQDN will be used when it is regenerated on client restart):

```
# rm /etc/salt/minion_id
```

5. Delete accepted keys from the onboarding page and the system profile from Uyuni, and restart the client with:

```
# service salt-minion restart
```

6. Re-register the clients. Each client will now have a different `/etc/machine-id` and should be correctly displayed on the `System Overview` page.

Procedure: Resolving Duplicate Machine IDs in Cloned Traditional Clients

1. On the cloned machine, change the hostname and IP addresses. Make sure `/etc/hosts` contains the changes you made and the correct host entries.

2. Stop the `rhnsd` daemon, on Red Hat Enterprise Linux Server 6 and SUSE Linux Enterprise 11 with:

```
# /etc/init.d/rhnsd stop
```

or, on newer systemd-based systems, with:

```
# service rhnsd stop
```

3. Stop `osad` with:

```
# /etc/init.d/osad stop
```

or:

```
# service osad stop
```

or:

```
# rcosad stop
```

4. Remove the `osad` authentication configuration file and the system ID:

```
# rm -f /etc/sysconfig/rhn/{osad-auth.conf,systemid}
```

5. Delete the files containing the machine IDs:

   ◦ SLES 12:

```
# rm /etc/machine-id
# rm /var/lib/dbus/machine-id
# dbus-uuidgen --ensure
# systemd-machine-id-setup
```

   ◦ SLES 11:

```
# suse_register -E
```

6. Remove the credential files:

   ◦ SLES clients:

```
# rm -f /etc/zypp/credentials.d/{SCCcredentials,NCCcredentials}
```

   ◦ Red Hat Enterprise Linux clients:

```
# rm  -f /etc/NCCcredentials
```

7. Re-run the bootstrap script. You should now see the cloned system in Uyuni without overriding the
   system it was cloned from.

Troubleshooting RPC Connection Timeouts

RPC connections can sometimes time out due to slow networks or a network link going down. This
results in package downloads or batch jobs hanging or taking longer than expected. You can adjust the
maximum time that an RPC connection can take by editing the configuration file. While this will not
resolve networking problems, it will cause a process to fail rather than hang.

1. On the Uyuni Server, open the `/etc/rhn/rhn.conf` file and set a maximum timeout value (in seconds):

   ```
   server.timeout =`number`
   ```

2. On the Uyuni Proxy, open the `/etc/rhn/rhn.conf` file and set a maximum timeout value (in seconds):

   ```
   proxy.timeout =`number`
   ```

3. On a SUSE Linux Enterprise Server client that uses zypper, open the `/etc/zypp/zypp.conf` file and set a maximum timeout value (in seconds):

   ```
   ## Valid values:  [0,3600]
   ## Default value: 180
   download.transfer_timeout = 180
   ```

4. On a Red Hat Enterprise Linux client that uses yum, open the `/etc/yum.conf` file and set a maximum timeout value (in seconds):

   ```
   timeout =`number`
   ```

> If you limit RPC timeouts to less than 180 seconds, you risk aborting perfectly normal operations.

Troubleshooting the Saltboot Formula

Because of a problem in the computed partition size value, the saltboot formula can sometimes fail when it is created on SLE 11 SP3 clients, with an error like this:

```
        ID: disk1_partitioned
  Function: saltboot.partitioned
      Name: disk1
    Result: false
   Comment: An exception occurred in this state: Traceback (most recent call last):
File "/usr/lib/python2.6/site-packages/salt/state.py", line 1767, in call
  **cdata['kwargs'])
File "/usr/lib/python2.6/site-packages/salt/loader.py", line 1705, in wrapper
  return f(*args, **kwargs)
File "/var/cache/salt/minion/extmods/states/saltboot.py", line 393, in disk_partitioned
  existing = __salt__['partition.list'](device, unit='MiB')
File "/usr/lib/python2.6/site-packages/salt/modules/parted.py", line 177, in list_
  'Problem encountered while parsing output from parted')
CommandExecutionError: Problem encountered while parsing output from parted
```

This problem can be resolved by manually configuring the size of the partition containing the operating system. When the size is set correctly, formula creation will work as expected.

Procedure: Manually Configuring the Partition Size in the Saltboot Formula

1. In the Uyuni Web UI, navigate to **Systems › System Groups** and select the `Hardware Type Group` that contains the SLE 11 SP3 client that is causing the error. In the `Formulas` tab, navigate to the `Saltboot` subtab.

2. Locate the partition that contains the operating system, and in the `Partition Size` field, type the appropriate size (in MiB).

3. Click **[Save Formula]**, and apply the highstate to save your changes.

Troubleshooting Package Synchronization

Uyuni does not automatically trust third party GPG keys. If package synchronization fails, it could be because of an untrusted GPG key. You can find out if this is the case by opening `/var/log/rhn/reposync` and looking for an error like this:

```
['/usr/bin/spacewalk-repo-sync', '--channel', 'sle-12-sp1-ga-desktop-
nvidia-driver-x86_64', '--type', 'yum', '--non-interactive']
ChannelException: The GPG key for this repository is not part of the keyring.
Please run spacewalk-repo-sync in interactive mode to import it.
```

To resolve the problem, you need to import the GPG key to Uyuni. For more on importing GPG keys, see **[Administration › Repo-metadata ›]**.

Troubleshooting Taskomatic

If Taskomatic crashes, repository metadata regeneration can be prevented from happening regularly. Repository metadata regeneration is a relatively intensive process, so Taskomatic can normally take several minutes to complete it. When this occurs, package updates will be available in the Web UI, but will not appear on the client, and attempts to update the client will fail. To correct this, determine if Taskomatic is still in the process of generating repository metadata, or if a crash could have occurred. Wait for metadata regeneration to complete or restart Taskomatic after a crash in order for client updates to be carried out correctly.

Procedure: Resolving Taskomatic Problems

1. On the Uyuni Server, check the `/var/log/rhn/rhn_taskomatic_daemon.log` file to determine if any metadata regeneration processes are still running, or if a crash occurred.

2. Restart taskomatic:

```
service taskomatic restart
```

In the Taskomatic log files, you can identify the section related to metadata regeneration by looking for opening and closing lines that look like this:

```
<YYYY-DD-MM> <HH:MM:SS>,174 [Thread-584] INFO
com.redhat.rhn.taskomatic.task.repomd.RepositoryWriter - Generating new repository metadata
for channel 'cloned-2018-q1-sles12-sp3-updates-x86_64'(sha256) 550 packages, 140 errata

...

<YYYY-DD-MM> <HH:MM:SS>,704 [Thread-584] INFO
com.redhat.rhn.taskomatic.task.repomd.RepositoryWriter - Repository metadata generation for
'cloned-2018-q1-sles12-sp3-updates-x86_64' finished in 4 seconds
```