Uyuni 2026.03

Client Configuration Guide

UYUNI

Chapter 1. Preface

Client Configuration Guide
Uyuni 2026.03

After installing Uyuni, the first step is registering clients. Managing these clients will be a key part of your workflow.

Uyuni supports SUSE Linux Enterprise and other Linux distributions, offering compatibility across various hardware options.

For a complete list of supported clients and features, refer to **Client-configuration › Supported-features**.

This guide covers both manual and automated client registration and configuration.

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Chapter 2. Supported Clients and Features

Uyuni is compatible with a range of client technologies. You can install Salt clients running SUSE Linux Enterprise or another Linux operating system, with a range of hardware options.

This section contains summary of supported client systems. For a detailed list of features available on each client, see the following pages.

2.1. Supported Client Systems

Client operating system is supported by the organization that supplies the operating system. The versions and SP levels must be under general support (normal or LTSS) to be supported with Uyuni. For details on supported product versions, see https://www.suse.com/lifecycle.

Supported client operating systems are listed in this table. The icons in the table indicate:

- ✔ clients running this operating system are supported by SUSE
- ✖ clients running this operating system are not supported by SUSE
- ? clients are under consideration, and may or may not be supported at a later date.

The operating system running on a client is supported by the organization that supplies the operating system.

Table 1. Supported Client Systems and Architectures

Operating System	x86-64	ppc64le	IBM Z	aarch64	arm64 / armhf
SUSE Linux Enterprise 16, 15, 12	✔	✔	✔	✔	✖
SUSE Linux Enterprise Server for SAP 16, 15, 12	✔	✔	✖	✖	✖
SLE Micro	✔	✖	✖	✔	✖
SL Micro	✔	✖	✖	✔	✖
openSUSE Leap Micro	✔	✖	✖	✔	✖
openSUSE Tumbleweed	✔	✖	✖	✔	✖
openSUSE Leap 16	✔	✖	✖	✔	✖
openSUSE Leap 15	✔	✔	✔	✔	✖
Alibaba Cloud Linux 2	✔	✖	✖	✔	✖

Operating System	x86-64	ppc64le	IBM Z	aarch64	arm64 / armhf
AlmaLinux 9, 8	✓	✗	✗	✓	✗
Amazon Linux 2003, 2	✓	✗	✗	✓	✗
CentOS 7	✓	✓	✗	✓	✗
Debian 12, 13 (*)	✓	✗	✗	✗	✗
openEuler 22.03	✓	✗	✗	✗	✗
Open Enterprise Server 24.4, 23.4	✓	✗	✗	✗	✗
Oracle Linux 9, 8, 7	✓	✗	✗	✓	✗
Raspberry Pi OS 12, 13	✗	✗	✗	✗	✓
Red Hat Enterprise Linux 9, 8, 7	✓	✗	✗	✗	✗
Rocky Linux 9, 8	✓	✗	✗	✓	✗
Ubuntu 24.04, 22.04	✓	✗	✗	✗	✗

(*) Debian lists the x86-64 architecture as amd64.

When the distibution reaches end-of-life, it enters grace period of 3 months when the support is considered deprecated. After that period, the product is considered unsupported. Any support may only be available on the best-effort basis.

For more information about end-of-life dates, see https://endoflife.date/.

2.2. Additional Tools Packages

The spacewalk-utils and spacewalk-utils-extras packages can provide additional services and features. Users are advised to stop using the deprecated tools and switch to the alternatives recommended in the documentation.

Table 2. Spacewalk Utilities

Tool Name	Description	Deprecated?
spacewalk-common-channels	Add channels not provided by SUSE Customer Center	
spacewalk-hostname-rename	Change the hostname of the Uyuni Server	

Tool Name	Description	Deprecated?
spacewalk-clone-by-date	Clone channels by a specific date. This is deprecated tool and user should switch to CLM API.	✔
spacewalk-sync-setup	Set up ISS master and slave organization mappings	✔
spacewalk-manage-channel-lifecycle	Manage channel lifecycles. This is deprecated tool and user should switch to CLM API.	✔

2.3. Supported SLES and openSUSE Leap Features

This table lists the availability of various features on SUSE and openSUSE Leap clients. This table covers all variants of the SUSE Linux Enterprise operating system, including SLES, SLED, SUSE Linux Enterprise Server for SAP, and SUSE Linux Enterprise Server for HPC.

The operating system you run on a client is supported by the organization that supplies the operating system. SUSE Linux Enterprise is supported by SUSE. openSUSE Leap is supported by the openSUSE community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 3. Supported Features on SUSE and openSUSE Leap Operating Systems

Feature	SUSE Linux Enterprise 12	SUSE Linux Enterprise 15	SUSE Linux Enterprise 16	openSUSE Leap 15	openSUSE Leap 16
Client	✔	✔	✔	✔	✔
System packages	SUSE	SUSE	SUSE	openSUSE Community	openSUSE Community
Registration	✔	✔	✔	✔	✔
Install packages	✔	✔	✔	✔	✔
Apply patches	✔	✔	✔	✔	✔

Feature	SUSE Linux Enterprise 12	SUSE Linux Enterprise 15	SUSE Linux Enterprise 16	openSUSE Leap 15	openSUSE Leap 16
Remote commands	✓	✓	✓	✓	✓
System package states	✓	✓	✓	✓	✓
System custom states	✓	✓	✓	✓	✓
Group custom states	✓	✓	✓	✓	✓
Organization custom states	✓	✓	✓	✓	✓
System set manager (SSM)	✓	✓	✓	✓	✓
Product migration	✓	✓	✗	✓	✗
Basic Virtual Guest Management *	✓	✓	✓	✓	✓
Advanced Virtual Guest Management *	✓	✓	✓	✓	✓
Virtual Guest Installation (AutoYaST), as Host OS	✗	✗	✗	✗	✗
Virtual Guest Installation (image template), as Host OS	✓	✓	✓	✓	✓
Virtual Guest Management	✓	✓	✓	✓	✓

Feature	SUSE Linux Enterprise 12	SUSE Linux Enterprise 15	SUSE Linux Enterprise 16	openSUSE Leap 15	openSUSE Leap 16
System deployment (PXE/AutoYaST)	✔	✔	✔	✔	✔
System redeployment (AutoYaST)	✔	✔	✔	✔	✔
Contact methods	✔ ZeroMQ, Salt-SSH	✔ ZeroMQ, Salt-SSH	✔ ZeroMQ, Salt-SSH	✔ ZeroMQ, Salt-SSH	✔ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✔	✔	✔	✔	✔
Action chains	✔	✔	✔	✔	✔
Staging (pre-download of packages)	✔	✔	✔	✔	✔
Duplicate package reporting	✔	✔	✔	✔	✔
CVE auditing	✔	✔	✔	✔	✔
SCAP auditing	✔	✔	✖	✔	✖
Package verification	✖	✖	✖	✖	✖
Package locking	✔	✔	✔	✔	✔
System locking	✖	✖	✖	✖	✖
Maintenance Windows	✔	✔	✔	✔	✔
System snapshot	✖	✖	✖	✖	✖
Configuration file management	✔	✔	✔	✔	✔
Package profiles	✔ Profiles supported, Sync not supported	✔ Profiles supported, Sync not supported	✔ Profiles supported, Sync not supported	✔ Profiles supported, Sync not supported	✔ Profiles supported, Sync not supported

Feature	SUSE Linux Enterprise 12	SUSE Linux Enterprise 15	SUSE Linux Enterprise 16	openSUSE Leap 15	openSUSE Leap 16
Power management	✓	✓	✓	✓	✓
Monitoring server	✓	✓	✓	✓	✓
Monitored clients	✓	✓	✓	✓	✓
Docker buildhost	✓	✓	✓	?	?
Build Docker image with OS	✓	✓	✓	✓	✓
Kiwi buildhost	✓	?	?	?	?
Build Kiwi image with OS	✓	?	?	?	?
Recurring Actions	✓	✓	✓	✓	✓
AppStreams	N/A	N/A	N/A	N/A	N/A
Yomi	✗	✓	✗	✓	✗

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.4. Supported SLE Micro Features

The operating system you run on a client is supported by the organization that supplies the operating system. SLE Micro is supported by SUSE.

SLE Micro is only supported as regular minion (default contact method) for the time being. We are working on managing it as Salt SSH client (salt-ssh contact method), too.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 4. Supported Features on SLE Micro Operating Systems

Feature	SLE Micro
Client	✔
Operating system packages	✔
Registration	✔
Install packages	✔
Apply patches (requires CVE ID)	✔
Remote commands	✔
System package states	✔
System custom states	✔
Group custom states	✔
Organization custom states	✔
System set manager (SSM)	✔
Product migration	✔
Basic Virtual Guest Management ✱	✔
Advanced Virtual Guest Management ✱	✔
Virtual Guest Installation (Kickstart), as Host OS	✔
Virtual Guest Installation (image template), as Host OS	✔
System deployment (PXE/Kickstart)	✔
System redeployment (Kickstart)	✔
Contact methods	✔ ZeroMQ
Works with Uyuni Proxy	✔

Feature	SLE Micro
Action chains	✔
Staging (pre-download of packages)	?
Duplicate package reporting	✔
CVE auditing (requires CVE ID)	✔
SCAP auditing	?
Package verification	?
Package locking	✔
System locking	?
Maintenance Windows	?
System snapshot	✘
Configuration file management	✔
Snapshots and profiles	✔ Profiles supported, Sync not supported
Power management	✔
Monitoring server	✘
Monitored clients ✱✱	✔
Docker buildhost	✘
Build Docker image with OS	✘
Kiwi buildhost	✘
Build Kiwi image with OS	✔
Recurring Actions	✔
AppStreams	N/A
Yomi	?

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

✱✱ On SLE Micro, only the Node exporter and the Blackbox exporter are available.

2.5. Supported SL Micro Client Features

The operating system you run on a client is supported by the organization that supplies the operating system. SL Micro is supported by SUSE.

SL Micro is currently supported as a Salt client with the default contact method only.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 5. Supported Features on SL Micro Operating Systems

Feature	SL Micro
Client	Salt
Operating system packages	Salt
Registration	Salt
Install packages	Salt
Apply patches (requires CVE ID)	Salt
Remote commands	Salt
System package states	Salt
System custom states	Salt
Group custom states	Salt
Organization custom states	Salt
System set manager (SSM)	Salt
Product migration	Salt
Basic Virtual Guest Management ✱	?

Feature	SL Micro
Advanced Virtual Guest Management *	?
Virtual Guest Installation (Kickstart), as Host OS	✗
Virtual Guest Installation (image template), as Host OS	?
System deployment (PXE/Kickstart)	?
System redeployment (Kickstart)	✗
Contact methods	Salt: ZeroMQ
Works with Uyuni Proxy	Salt
Action chains	Salt
Staging (pre-download of packages)	?
Duplicate package reporting	Salt
CVE auditing (requires CVE ID)	Salt
SCAP auditing	?
Package verification	?
Package locking	Salt
System locking	?
Maintenance Windows	?
System snapshot	✗
Configuration file management	Salt
Snapshots and profiles	Salt: Profiles supported, Sync not supported
Power management	Salt
Monitoring server	✗
Monitored clients **	Salt
Docker buildhost	✗
Build Docker image with OS	✗
Kiwi buildhost	✗

Feature	SL Micro
Build Kiwi image with OS	Salt
Recurring Actions	Salt
AppStreams	N/A
Yomi	?

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

✱✱ On SL Micro, only the Node exporter and the Blackbox exporter are available.

2.6. openSUSE Tumbleweed Client Features

openSUSE Tumbleweed is supported by the SUSE community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 6. Supported Features on openSUSE Tumbleweed Operating Systems

Feature	openSUSE Tumbleweed
Client	✔
Operating system packages	✔
Registration	✔
Install packages	✔
Apply patches (requires CVE ID)	✔

Feature	openSUSE Tumbleweed
Remote commands	✔
System package states	✔
System custom states	✔
Group custom states	✔
Organization custom states	✔
System set manager (SSM)	✔
Product migration	✔
Basic Virtual Guest Management *	✔
Advanced Virtual Guest Management *	✔
Virtual Guest Installation (Kickstart), as Host OS	✔
Virtual Guest Installation (image template), as Host OS	✔
System deployment (PXE/Kickstart)	✔
System redeployment (Kickstart)	✔
Contact methods	✔ ZeroMQ
Works with Uyuni Proxy	✔
Action chains	✔
Staging (pre-download of packages)	?
Duplicate package reporting	✔
CVE auditing (requires CVE ID)	✔
SCAP auditing	?
Package verification	?
Package locking	✔
System locking	?
Maintenance Windows	?
System snapshot	✘

Feature	openSUSE Tumbleweed
Configuration file management	✔
Snapshots and profiles	✔ Profiles supported, Sync not supported
Power management	✔
Monitoring server	✖
Monitored clients	✔
Docker buildhost	✖
Build Docker image with OS	✖
Kiwi buildhost	✖
Build Kiwi image with OS	✔
Recurring Actions	✔
AppStreams	N/A
Yomi	?

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.7. openSUSE Leap Micro Client Features

openSUSE Leap Micro is supported by the SUSE community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 7. Supported Features on openSUSE Leap Micro Operating Systems

Feature	openSUSE Leap Micro
Client	✓
Operating system packages	✓
Registration	✓
Install packages	✓
Apply patches (requires CVE ID)	✓
Remote commands	✓
System package states	✓
System custom states	✓
Group custom states	✓
Organization custom states	✓
System set manager (SSM)	✓
Product migration	✓
Basic Virtual Guest Management ✱	✓
Advanced Virtual Guest Management ✱	✓
Virtual Guest Installation (Kickstart), as Host OS	✓
Virtual Guest Installation (image template), as Host OS	✓
System deployment (PXE/Kickstart)	✓
System redeployment (Kickstart)	✓
Contact methods	✓ ZeroMQ
Works with Uyuni Proxy	✓
Action chains	✓
Staging (pre-download of packages)	?
Duplicate package reporting	✓
CVE auditing (requires CVE ID)	✓

Feature	openSUSE Leap Micro
SCAP auditing	?
Package verification	?
Package locking	✔
System locking	?
Maintenance Windows	?
System snapshot	✖
Configuration file management	✔
Snapshots and profiles	✔ Profiles supported, Sync not supported
Power management	✔
Monitoring server	✖
Monitored clients	✔
Docker buildhost	✖
Build Docker image with OS	✖
Kiwi buildhost	✖
Build Kiwi image with OS	✔
Recurring Actions	✔
AppStreams	N/A
Yomi	?

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.8. Supported Alibaba Cloud Linux Features

This table lists the availability of various features on Alibaba Cloud Linux clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Alibaba Cloud Linux is supported by Alibaba Cloud.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 8. Supported Features on Alibaba Cloud Linux Operating Systems

Feature	Alibaba Cloud Linux 2
Client	✔
Operating system packages	✔
Registration	✔
Install packages	✔
Apply patches (requires CVE ID)	✔
Remote commands	✔
System package states	✔
System custom states	✔
Group custom states	✔
Organization custom states	✔
System set manager (SSM)	✔
Product migration	N/A
Basic Virtual Guest Management ✱	?
Advanced Virtual Guest Management ✱	?
Virtual Guest Installation (Kickstart), as Host OS	✖
Virtual Guest Installation (image template), as Host OS	?

Feature	Alibaba Cloud Linux 2
System deployment (PXE/Kickstart)	?
System redeployment (Kickstart)	?
Contact methods	✔ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✔
Action chains	✔
Staging (pre-download of packages)	✔
Duplicate package reporting	✔
CVE auditing (requires CVE ID)	✔
SCAP auditing	✔
Package verification	✘
Package locking	✘
System locking	✘
Maintenance Windows	✔
System snapshot	✘
Configuration file management	✔
Snapshots and profiles	✔ Profiles supported, Sync not supported
Power management	?
Monitoring server	✘
Monitored clients	✔
Docker buildhost	✔
Build Docker image with OS	✔
Kiwi buildhost	✔
Build Kiwi image with OS	✔
Recurring Actions	✔
AppStreams	N/A
Yomi	N/A

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.9. Supported AlmaLinux Features

This table lists the availability of various features on AlmaLinux clients.

The operating system you run on a client is supported by the organization that supplies the operating system. AlmaLinux is supported by the AlmaLinux community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 9. Supported Features on AlmaLinux Operating Systems

Feature	AlmaLinux 9	AlmaLinux 8
Client	✔ (plain AlmaLinux)	✔ (plain AlmaLinux)
System packages	AlmaLinux Community	AlmaLinux Community
Registration	✔	✔
Install packages	✔	✔
Apply patches	✔	✔
Remote commands	✔	✔
System package states	✔	✔
System custom states	✔	✔
Group custom states	✔	✔
Organization custom states	✔	✔

Feature	AlmaLinux 9	AlmaLinux 8
System set manager (SSM)	✔	✔
Product migration *	✔	✔
Basic Virtual Guest Management **	✔	✔
Advanced Virtual Guest Management **	✔	✔
Virtual Guest Installation (Kickstart), as Host OS	✘	✘
Virtual Guest Installation (image template), as Host OS	✔	✔
System deployment (PXE/Kickstart)	✔	✔
System redeployment (Kickstart)	✔	✔
Contact methods	✔ ZeroMQ, Salt-SSH	✔ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✔	✔
Action chains	✔	✔
Staging (pre-download of packages)	✔	✔
Duplicate package reporting	✔	✔
CVE auditing	✔	✔
SCAP auditing	✔	✔
Package verification	✘	✘
Package locking	✘	✘
System locking	✘	✘
Maintenance Windows	✔	✔
System snapshot	✘	✘
Configuration file management	✔	✔
Snapshots and profiles	✔ Profiles supported, Sync not supported	✔ Profiles supported, Sync not supported

Feature	AlmaLinux 9	AlmaLinux 8
Power management	✔	✔
Monitoring server	✘	✘
Monitored clients	✔	✔
Docker buildhost	✘	✘
Build Docker image with OS	✘	✘
Kiwi buildhost	✘	✘
Build Kiwi image with OS	✘	✘
Recurring Actions	✔	✔
AppStreams	✔	✔
Yomi	N/A	N/A

✱ to matching SUSE Liberty Linux

✱✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.10. Supported Amazon Linux Features

This table lists the availability of various features on Amazon Linux clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Amazon Linux is supported by Amazon.

The icons in this table indicate:

- ✔ the feature is available
- ✘ the feature is not available

- ? the feature is under consideration, and may or may not be made available at a later date

Table 10. Supported Features on Amazon Linux Operating Systems

Feature	Amazon Linux 2	Amazon Linux 2023
Client	✓	✓
Operating system packages	✓	✓
Registration	✓	✓
Install packages	✓	✓
Apply patches (requires CVE ID)	✓	✓
Remote commands	✓	✓
System package states	✓	✓
System custom states	✓	✓
Group custom states	✓	✓
Organization custom states	✓	✓
System set manager (SSM)	✓	✓
Product migration	N/A	N/A
Basic Virtual Guest Management ✱	?	?
Advanced Virtual Guest Management ✱	?	?
Virtual Guest Installation (Kickstart), as Host OS	✗	✗
Virtual Guest Installation (image template), as Host OS	?	?
System deployment (PXE/Kickstart)	?	?
System redeployment (Kickstart)	?	?
Contact methods	✓ ZeroMQ, Salt-SSH	✓ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✓	✓
Action chains	✓	✓

Feature	Amazon Linux 2	Amazon Linux 2023
Staging (pre-download of packages)	✔	✔
Duplicate package reporting	✔	✔
CVE auditing (requires CVE ID)	✔	✔
SCAP auditing	✔	✔
Package verification	✖	✖
Package locking	✖	✖
System locking	✖	✖
Maintenance Windows	✔	✔
System snapshot	✖	✖
Configuration file management	✔	✔
Snapshots and profiles	✔ Profiles supported, Sync not supported	✔ Profiles supported, Sync not supported
Power management	?	?
Monitoring server	✖	✖
Monitored clients	✔	✔
Docker buildhost	✔	✔
Build Docker image with OS	✔	✔
Kiwi buildhost	✔	✔
Build Kiwi image with OS	✔	✔
Recurring Actions	✔	✔
AppStreams	N/A	N/A
Yomi	N/A	N/A

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.11. Supported CentOS Features

This table lists the availability of various features on CentOS clients.

The operating system you run on a client is supported by the organization that supplies the operating system. CentOS is supported by the CentOS community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 11. Supported Features on CentOS Operating Systems

Feature	CentOS 7
Client	✔ (plain CentOS)
System packages	CentOS Community
Registration	✔
Install packages	✔
Apply patches (requires CVE ID)	✔ (third-party service required for errata)
Remote commands	✔
System package states	✔
System custom states	✔
Group custom states	✔
Organization custom states	✔
System set manager (SSM)	✔
Product migration *	✔
Basic Virtual Guest Management **	✔
Advanced Virtual Guest Management **	✔

Feature	CentOS 7
Virtual Guest Installation (Kickstart), as Host OS	✗
Virtual Guest Installation (image template), as Host OS	✓
System deployment (PXE/Kickstart)	✓
System redeployment (Kickstart)	✓
Contact methods	✓ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✓
Action chains	✓
Staging (pre-download of packages)	✓
Duplicate package reporting	✓
CVE auditing (requires CVE ID)	✓
SCAP auditing	✓
Package verification	✗
Package locking	✓
System locking	✗
Maintenance Windows	✓
System snapshot	✗
Configuration file management	✓
Snapshots and profiles	✓ Profiles supported, Sync not supported
Power management	✓
Monitoring server	✗
Monitored clients	✓
Docker buildhost	✗
Build Docker image with OS	✗
Kiwi buildhost	✗
Build Kiwi image with OS	✗

Feature	CentOS 7
Recurring Actions	✔
AppStreams	N/A
Yomi	N/A

✱ to matching SUSE Liberty Linux

✱✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.12. Supported Debian Features

This table lists the availability of various features on Debian clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Debian is supported by the Debian community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 12. Supported Features on Debian Operating Systems

Feature	Debian 12	Debian 13
Client	✔	✔
System packages	Debian Community	Debian Community
Registration	✔	✔
Install packages	✔	✔

Feature	Debian 12	Debian 13
Apply patches	?	?
Remote commands	✓	✓
System package states	✓	✓
System custom states	✓	✓
Group custom states	✓	✓
Organization custom states	✓	✓
System set manager (SSM)	✓	✓
Product migration	N/A	N/A
Basic Virtual Guest Management *	✓	✓
Advanced Virtual Guest Management *	✓	✓
Virtual Guest Installation (Kickstart), as Host OS	✓	✓
Virtual Guest Installation (image template), as Host OS	✓	✓
System deployment (PXE/Kickstart)	✓	✓
System redeployment (Kickstart)	✗	✗
Contact methods	✓ ZeroMQ, Salt-SSH	✓ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✓	✓
Action chains	✓	✓
Staging (pre-download of packages)	✓	✓
Duplicate package reporting	✓	✓
CVE auditing	?	?
SCAP auditing	?	?
Package verification	✗	✗
Package locking	✓	✓

Feature	Debian 12	Debian 13
System locking	✗	✗
Maintenance Windows	✓	✓
System snapshot	✗	✗
Configuration file management	✓	✓
Package profiles	✓ Profiles supported, Sync not supported	✓ Profiles supported, Sync not supported
Power management	✓	✓
Monitoring server	✗	✗
Monitoring clients	✓	✓
Docker buildhost	?	?
Build Docker image with OS	Salt	Salt
Kiwi buildhost	✗	✗
Build Kiwi image with OS	✗	✗
Recurring Actions	✓	✓
AppStreams	N/A	N/A
Yomi	N/A	N/A

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.13. Supported openEuler Features

This table lists the availability of various features on openEuler clients.

The operating system you run on a client is supported by the organization that supplies the

operating system. openEuler is supported by the openEuler community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 13. Supported Features on openEuler Operating Systems

Feature	openEuler 22.03
Client	✔ (plain openEuler)
System packages	openEuler Community
Registration	✔
Install packages	✔
Apply patches	✔
Remote commands	✔
System package states	✔
System custom states	✔
Group custom states	✔
Organization custom states	✔
System set manager (SSM)	✔
Product migration	N/A
Basic Virtual Guest Management ✱	✔
Advanced Virtual Guest Management ✱	✔
Virtual Guest Installation (Kickstart), as Host OS	✖
Virtual Guest Installation (image template), as Host OS	✔
System deployment (PXE/Kickstart)	✔
System redeployment (Kickstart)	✔
Contact methods	✔ ZeroMQ, Salt-SSH

Feature	openEuler 22.03
Works with Uyuni Proxy	✔
Action chains	✔
Staging (pre-download of packages)	✔
Duplicate package reporting	✔
CVE auditing	✔
SCAP auditing	✔
Package verification	✘
Package locking	✘
System locking	✘
Maintenance Windows	✔
System snapshot	✘
Configuration file management	✔
Snapshots and profiles	✔ Profiles supported, Sync not supported
Power management	✔
Monitoring	✔
Docker buildhost	✘
Build Docker image with OS	✘
Kiwi buildhost	✘
Build Kiwi image with OS	✘
Recurring Actions	✔
Yomi	N/A

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh,

VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.14. Supported Open Enterprise Server Features

This table lists the availability of various features on Open Enterprise Server clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Open Enterprise Server is supported by Micro Focus or OpenText.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 14. Supported Features on Open Enterprise Server Operating Systems

Feature	Open Enterprise Server 24.4	Open Enterprise Server 23.4
Client	✔	✔
System packages	SUSE	SUSE
Registration	✔	✔
Install packages	✔	✔
Apply patches	✔	✔
Remote commands	✔	✔
System package states	✔	✔
System custom states	✔	✔
Group custom states	✔	✔
Organization custom states	✔	✔
System set manager (SSM)	✔	✔
Product migration	✔	✔
Basic Virtual Guest Management ✱	✔	✔
Advanced Virtual Guest Management ✱	✔	✔

Feature	Open Enterprise Server 24.4	Open Enterprise Server 23.4
Virtual Guest Installation (AutoYaST), as Host OS	✗	✗
Virtual Guest Installation (image template), as Host OS	✓	✓
Virtual Guest Management	✓	✓
System deployment (PXE/AutoYaST)	✓	✓
System redeployment (AutoYaST)	✓	✓
Contact methods	✗	✗
Works with Uyuni Proxy	✓	✓
Action chains	✓	✓
Staging (pre-download of packages)	✓	✓
Duplicate package reporting	✓	✓
CVE auditing	✓	✓
SCAP auditing	✓	✓
Package verification	✗	✗
Package locking	✓	✓
System locking	✗	✗
Maintenance Windows	✓	✓
System snapshot	✗	✗
Configuration file management	✓	✓
Package profiles	✓ Profiles supported, Sync not supported	✓ Profiles supported, Sync not supported
Power management	✓	✓
Monitoring server	✓	✓
Monitored clients	✓	✓
Docker buildhost	✓	✓

Feature	Open Enterprise Server 24.4	Open Enterprise Server 23.4
Build Docker image with OS	✔	✔
Kiwi buildhost	?	?
Build Kiwi image with OS	?	?
Recurring Actions	✔	✔
AppStreams	N/A	N/A
Yomi	✔	✔

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.15. Supported Oracle Features

This table lists the availability of various features on Oracle Linux clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Oracle Linux is supported by Oracle.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 15. Supported Features on Oracle Linux Operating Systems

Feature	Oracle Linux 7	Oracle Linux 8	Oracle Linux 9
Client	✔	✔	✔

Feature	Oracle Linux 7	Oracle Linux 8	Oracle Linux 9
Operating system packages	✓	✓	✓
Registration	✓	✓	✓
Install packages	✓	✓	✓
Apply patches (requires CVE ID)	✓	✓	✓
Remote commands	✓	✓	✓
System package states	✓	✓	✓
System custom states	✓	✓	✓
Group custom states	✓	✓	✓
Organization custom states	✓	✓	✓
System set manager (SSM)	✓	✓	✓
Product migration *	✓	✓	✓
Basic Virtual Guest Management **	✓	✓	✓
Advanced Virtual Guest Management **	✓	✓	✓
Virtual Guest Installation (Kickstart), as Host OS	✗	✓	✓
Virtual Guest Installation (image template), as Host OS	✓	✓	✓
System deployment (PXE/Kickstart)	✓	✓	✓
System redeployment (Kickstart)	✓	✓	✓
Contact methods	✓ ZeroMQ, Salt-SSH	✓ ZeroMQ, Salt-SSH	✓ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✓	✓	✓
Action chains	✓	✓	✓

Feature	Oracle Linux 7	Oracle Linux 8	Oracle Linux 9
Staging (pre-download of packages)	✓	✓	✓
Duplicate package reporting	✓	✓	✓
CVE auditing (requires CVE ID)	✓	✓	✓
SCAP auditing	✓	✓	✓
Package verification	✗	✗	✗
Package locking	✓	✓	✓
System locking	✗	✗	✗
Maintenance Windows	✓	✓	✓
System snapshot	✗	✗	✗
Configuration file management	✓	✓	✓
Snapshots and profiles	✓ Profiles supported, Sync not supported	✓ Profiles supported, Sync not supported	✓ Profiles supported, Sync not supported
Power management	✓	✓	✓
Monitoring server	✗	✗	✗
Monitored clients	✓	✓	✓
Docker buildhost	✗	✗	✗
Build Docker image with OS	✗	✗	✗
Kiwi buildhost	✗	✗	✗
Build Kiwi image with OS	✗	✗	✗
Recurring Actions	✓	✓	✓
AppStreams	N/A	✓	✓
Yomi	N/A	N/A	N/A

✱ to matching SUSE Liberty Linux

** Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.16. Supported Raspberry Pi OS Features

This table lists the availability of various features on Raspberry Pi OS clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Raspberry Pi OS is supported by the Raspberry Pi OS community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 16. Supported Features on Raspberry Pi OS Operating Systems

Feature	Raspberry Pi OS 12	Raspberry Pi OS 13
Client	✔	✔
System packages	Raspberry Pi OS Community	Raspberry Pi OS Community
Registration	✔	✔
Install packages	✔	✔
Apply patches	?	?
Remote commands	✔	✔
System package states	✔	✔
System custom states	✔	✔
Group custom states	✔	✔
Organization custom states	✔	✔

Feature	Raspberry Pi OS 12	Raspberry Pi OS 13
System set manager (SSM)	✓	✓
Product migration	N/A	N/A
Basic Virtual Guest Management ✱	✓	✓
Advanced Virtual Guest Management ✱	✓	✓
Virtual Guest Installation (Kickstart), as Host OS	✗	✗
Virtual Guest Installation (image template), as Host OS	✓	✓
System deployment (PXE/Kickstart)	✗	✗
System redeployment (Kickstart)	✗	✗
Contact methods	✓ ZeroMQ, Salt-SSH	✓ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✓	✓
Action chains	✓	✓
Staging (pre-download of packages)	✓	✓
Duplicate package reporting	✓	✓
CVE auditing	?	?
SCAP auditing	?	?
Package verification	✗	✗
Package locking	✓	✓
System locking	✗	✗
Maintenance Windows	✓	✓
System snapshot	✗	✗
Configuration file management	✓	✓
Package profiles	✓ Profiles supported, Sync not supported	✓ Profiles supported, Sync not supported
Power management	✓	✓

Feature	Raspberry Pi OS 12	Raspberry Pi OS 13
Monitoring server	✗	✗
Monitoring clients	✓	✓
Docker buildhost	?	?
Build Docker image with OS	✓	✓
Kiwi buildhost	✗	✗
Build Kiwi image with OS	✗	✗
Recurring Actions	✓	✓
AppStreams	N/A	N/A
Yomi	N/A	N/A

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.17. Supported Red Hat Enterprise Linux Features

This table lists the availability of various features on native Red Hat Enterprise Linux clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Red Hat Enterprise Linux is supported by Red Hat.

The icons in this table indicate:

- ✓ the feature is available
- ✗ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 17. Supported Features on Red Hat Enterprise Linux Operating Systems

Feature	RHEL 7	RHEL 8	RHEL 9
Client	✔	✔	✔
System packages	Red Hat	Red Hat	Red Hat
Registration	✔	✔	✔
Install packages	✔	✔	✔
Apply patches	✔	✔	✔
Remote commands	✔	✔	✔
System package states	✔	✔	✔
System custom states	✔	✔	✔
Group custom states	✔	✔	✔
Organization custom states	✔	✔	✔
System set manager (SSM)	✔	✔	✔
Product migration	N/A	N/A	N/A
Basic Virtual Guest Management ✱	✔	✔	✔
Advanced Virtual Guest Management ✱	✔	✔	✔
Virtual Guest Installation (Kickstart), as Host OS	✘	✘	✘
Virtual Guest Installation (image template), as Host OS	✔	✔	✔
System deployment (PXE/Kickstart)	✔	✔	✔
System redeployment (Kickstart)	✔	✔	✔
Contact methods	✔ ZeroMQ, Salt-SSH	✔ ZeroMQ, Salt-SSH	✔ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✔	✔	✔
Action chains	✔	✔	✔

Feature	RHEL 7	RHEL 8	RHEL 9
Staging (pre-download of packages)	✓	✓	✓
Duplicate package reporting	✓	✓	✓
CVE auditing	✓	✓	✓
SCAP auditing	✓	✓	✓
Package verification	✗	✗	✗
Package locking	✓	✓	✓
System locking	✗	✗	✗
Maintenance Windows	✓	✓	✓
System snapshot	✗	✗	✗
Configuration file management	✓	✓	✓
Snapshots and profiles	✓ Profiles supported, Sync not supported	✓ Profiles supported, Sync not supported	✓ Profiles supported, Sync not supported
Power management	✓	✓	✓
Monitoring server	✗	✗	✗
Monitored clients	✓	✓	✓
Docker buildhost	✓	✓	✓
Build Docker image with OS	?	?	?
Kiwi buildhost	✗	✗	✗
Build Kiwi image with OS	✗	✗	✗
Recurring Actions	✓	✓	✓
AppStreams	N/A	✓	✓
Yomi	N/A	N/A	N/A

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.18. Supported Rocky Linux Features

This table lists the availability of various features on Rocky Linux clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Rocky Linux is supported by the Rocky Linux community.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 18. Supported Features on Rocky Linux Operating Systems

Feature	Rocky Linux 8	Rocky Linux 9
Client	✔ (plain Rocky Linux)	✔ (plain Rocky Linux)
System packages	Rocky Linux Community	Rocky Linux Community
Registration	✔	✔
Install packages	✔	✔
Apply patches	✔	✔
Remote commands	✔	✔
System package states	✔	✔
System custom states	✔	✔
Group custom states	✔	✔
Organization custom states	✔	✔
System set manager (SSM)	✔	✔
Product migration *	✔	✔

Feature	Rocky Linux 8	Rocky Linux 9
Basic Virtual Guest Management **	✔	✔
Advanced Virtual Guest Management **	✔	✔
Virtual Guest Installation (Kickstart), as Host OS	✘	✘
Virtual Guest Installation (image template), as Host OS	✔	✔
System deployment (PXE/Kickstart)	✔	✔
System redeployment (Kickstart)	✔	✔
Contact methods	✔ ZeroMQ, Salt-SSH	✔ ZeroMQ, Salt-SSH
Works with Uyuni Proxy	✔	✔
Action chains	✔	✔
Staging (pre-download of packages)	✔	✔
Duplicate package reporting	✔	✔
CVE auditing	✔	✔
SCAP auditing	✔	✔
Package verification	✘	✘
Package locking	✔	✔
System locking	✘	✘
Maintenance Windows	✔	✔
System snapshot	✘	✘
Configuration file management	✔	✔
Snapshots and profiles	✔ Profiles supported, Sync not supported	✔ Profiles supported, Sync not supported
Power management	✔	✔
Monitoring server	✘	✘

Feature	Rocky Linux 8	Rocky Linux 9
Monitored clients	✔	✔
Docker buildhost	✖	✖
Build Docker image with OS	✖	✖
Kiwi buildhost	✖	✖
Build Kiwi image with OS	✖	✖
Recurring Actions	✔	✔
AppStreams	✔	✔
Yomi	N/A	N/A

✱ to matching SUSE Liberty Linux

✱✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

2.19. Supported Ubuntu Features

This table lists the availability of various features on Ubuntu clients.

The operating system you run on a client is supported by the organization that supplies the operating system. Ubuntu is supported by Canonical.

The icons in this table indicate:

- ✔ the feature is available
- ✖ the feature is not available
- ? the feature is under consideration, and may or may not be made available at a later date

Table 19. Supported Features on Ubuntu Operating Systems

Feature	Ubuntu 22.04	Ubuntu 24.04	Client
✔	✔	System packages	Canonical
Canonical	Registration	✔	✔
Install packages	✔	✔	Apply patches
✔	✔	Remote commands	✔
✔	System package states	✔	✔
System custom states	✔	✔	Group custom states
✔	✔	Organization custom states	✔
✔	System set manager (SSM)	✔	✔
Product migration	N/A	N/A	N/A
Basic Virtual Guest Management ✱	✔	✔	Advanced Virtual Guest Management ✱
✔	✔	Virtual Guest Installation (Kickstart), as Host OS	✘
✘	Virtual Guest Installation (image template), as Host OS	✔	✔
System deployment (PXE/Kickstart)	✘	✘	System redeployment (Kickstart)
✘	✘	Contact methods	✔ ZeroMQ, Salt-SSH
✔ ZeroMQ, Salt-SSH	Works with Uyuni Proxy	✔	✔
Action chains	✔	✔	Staging (pre-download of packages)
✔	✔	Duplicate package reporting	✔
✔	CVE auditing	?	?
SCAP auditing	?	?	Package verification
✘	✘	Package locking	✔
✔	System locking	✘	✘

Feature	Ubuntu 22.04	Ubuntu 24.04	Client
System snapshot	✗	✗	Configuration file management
✓	✓	Package profiles	✓ Profiles supported, Sync not supported
✓ Profiles supported, Sync not supported	Power management	✓	✓
Monitoring	✓	✓	Docker buildhost
?	?	Build Docker image with OS	✓
✓	Kiwi buildhost	✗	✗
Build Kiwi image with OS	✗	✗	Recurring Actions
✓	✓	AppStreams	N/A
N/A	Yomi	N/A	N/A

✱ Virtual Guest Management:

In this table, virtual guest management is split into basic and advanced.

Basic virtual guest management includes listing VMs, slow refresh, VM lifecycle actions (start, stop, resume, pause), and modifying VM vCPU and Memory.

Advanced virtual guest management includes all features of Basic virtual guest management plus fast refresh, VM lifecycle actions (delete, reset, power off), modifying VM disk, network, graphical display, and graphical display configuration.

Chapter 3. Configuration Basics

Uyuni requires a number of steps to prepare the environment for clients registration before a wide range of its operations can be utilized.

This section contains summary of the initial configuration steps that are necessary to support environment operations following successful Uyuni installation and setting up.

- For more information about installing and setting up Uyuni, see **Installation-and-upgrade › Uyuni-installation-and-upgrade-overview**.

3.1. Software Channels

Channels are a method of grouping software packages. Software packages are provided by repositories, and repositories are associated with channels. Subscribing a client to a software channel allows the client to install and update any of the software associated with it.

In Uyuni, channels are divided into base channels and child channels. Organizing channels in this way ensures that only compatible packages are installed on each system. A client must be subscribed to only one base channel, assigned during registration based on the client operating system and architecture. For paid channels provided by a vendor, you must have an associated subscription.

A base channel consists of packages built for a specific operating system type, version, and architecture. For example, the SUSE Linux Enterprise Server 15 x86-64 base channel contains only software compatible with that operating system and architecture.

A child channel is associated with a base channel and provides only packages that are compatible with the base channel. A system can be subscribed to multiple child channels of its base channel. When a system has been assigned to a base channel, it is only possible for that system to install the related child channels. For example, if a system has been assigned to the SUSE Linux Enterprise Server 15 x86_64 base channel, they can only install or update packages made available through the compatible base channel, or any of its associated child channels.

In the Uyuni Web UI you can browse your available channels by navigating to **Software › Channel List › All**. You can modify or create new channels by navigating to **Software › Manage › Channels**.

For more on using channels, including custom channels, see **Administration › Channel-management**.

Handling the Installer Updates Channel after Bootstrapping

Once a client system has been bootstrapped, the **Installer Updates** channel should be removed. The standard update channel already includes the necessary updates, making this channel redundant.

Additionally, during migrations, this channel is unnecessary and should not be used.

3.1.1. Packages Provided by SUSE Package Hub

SUSE Package Hub is an extension to SUSE Linux Enterprise products that provides additional open source software provided by the openSUSE community.

The packages in SUSE Package Hub are provided by the openSUSE community. They are not supported by SUSE.

If you are using SUSE Linux Enterprise operating systems on your clients, you can enable the SUSE Package Hub extension to access these additional packages. This provides the SUSE Package Hub channels, which you can subscribe your clients to.

SUSE Package Hub provides a large number of packages, which can take a long time to synchronize and consume a large amount of disk space. Do not enable SUSE Package Hub unless you require the packages it provides.

To avoid unintentionally installing or updating unsupported packages, we recommend that you implement a content lifecycle management strategy that initially denies all SUSE Package Hub packages. You can then explicitly enable the specific packages you require. For more information about content lifecycle management, see **Administration › Content-lifecycle**.

3.1.2. Packages Provided by AppStream

For Red Hat based clients, additional packages are available through AppStream. In most cases, the AppStream packages are required to ensure that you have all the software you need.

3.1.3. Packages Provided by EPEL

For Red Hat based clients, additional packages are available through EPEL (extra packages for enterprise Linux). EPEL is an optional package repository that provides additional software.

The packages in EPEL are provided by the Fedora community. They are not supported by SUSE.

If you are using Red Hat operating systems on your clients, you can enable the EPEL extension to access these additional packages. This provides the EPEL channels, which you can subscribe your clients to.

EPEL provides a large number of packages, which can take a long time to synchronize and consume a large amount of disk space. Do not enable the EPEL repositories unless you require the packages it provides.

To avoid unintentionally installing or updating unsupported packages, we recommended that you implement a

content lifecycle management (CLM) strategy that initially denies all EPEL packages. You can then explicitly enable the specific packages you require. For more information about content lifecycle management, see **Administration › Content-lifecycle**.

3.1.4. Unified Installer Updates Channels on SUSE Linux Enterprise Clients

This channel is used by the Unified Installer to ensure it is up to date before it installs the operating system. All SUSE Linux Enterprise products should have access to the installer updates channel during installation.

For SUSE Linux Enterprise Server clients the installer updates channel is synchronized by default when you add a product that contains them, and are enabled when you create an autoinstallable distribution with these product channels.

For all other SUSE Linux Enterprise variants, including SUSE Linux Enterprise for SAP, you must add the installer updates channel manually. To do this, clone the appropriate SUSE Linux Enterprise Server installer updates channel below the base channel of these SUSE Linux Enterprise variants. When creating an autoinstallable distribution for these SUSE Linux Enterprise variants after the channel was cloned, it is used automatically.

3.1.5. Software Repositories

Repositories are used to collect software packages. When you have access to a software repository, you can install any of the software that the repository provides. You must have at least one repository associated with your software channels in Uyuni to assign clients to the channel and install and update packages on the client.

Most default channels in Uyuni are already associated with the correct repositories. If you are creating custom channels, you need to associate a repository that you have access to, or that you have created yourself.

For more information about custom repositories and channels, see **Administration › Custom-channels**.

3.1.5.1. Local Repository Locations

You can configure local repositories on clients, to provide packages that are not supplied by Uyuni channels.

In most cases, client systems do not require local repositories. Local repositories can lead to problems knowing which packages are available on the client. This can lead to installing unexpected packages.

Local repositories are disabled during onboarding.

Local repositories will be disabled each time a channel state is executed. For example, when applying the

highstate or performing a package action.

If local repositories should stay enabled after onboarding, the following pillar must be set for the affected client:

Edit the /srv/pillar/top.sls file:

```
base:
  'minionid':
    - localrepos
```

Edit the /srv/pillar/localrepos.sls file:

```
mgr_disable_local_repos: False
```

After a client has completed onboarding, you can add local repositories to these locations:

Table 20. Local Repository Locations

Client Operating System	Local Repository Directory
SUSE Linux Enterprise Server	/etc/zypp/repos.d
openSUSE	/etc/zypp/repos.d
Red Hat Enterprise Linux and similar derivatives	/etc/yum.repos.d/
Ubuntu	/etc/apt/sources.list.d/
Debian	/etc/apt/sources.list.d/

3.1.6. Software Products

In Uyuni, software is made available in products. Your SUSE subscription allows you to access a range of different products, which you can browse and select in the Uyuni Web UI by navigating to **Admin › Setup Wizard › Products**.

Products contain any number of software channels. Click the Show product's channels icon to see the channels included in the product. When you have added a product and synchronized successfully, you have access to the channels provided by the product, and can use the packages in the product on your Uyuni Server and clients.

Procedure: Adding software channels

1. In the Uyuni Web UI, navigate to **Admin › Setup Wizard › Products**.

2. Locate the appropriate products for your client operating system and architecture using the search bar, and check the appropriate product. This will automatically check all mandatory channels. Also all recommended channels are checked as long as the include recommended toggle is turned on. Click the arrow to see the complete list of related products, and ensure that any extra products you require are checked.
3. Click **[Add Products]** and wait until the products have finished synchronizing.

3.1.7. AppStream Modules

If you are managing a client that is subscribed to an AppStream channel, Uyuni will filter packages available to the client depending on its currently enabled set of AppStream modules.

Procedure: Managing Enabled AppStream Modules

1. In the Uyuni Web UI, navigate to **Systems › Software › AppStreams**.
2. From the table of module streams, select the streams to be enabled on the client.
3. Click **[Apply Changes]**.
4. On the next page, check the list of changes to be made, and choose a time for the action to occur.
5. Click **[Confirm]** to schedule the changes to be applied.

3.2. Bootstrap repository

A bootstrap repository contains required packages for registering clients during bootstrapping. When products are synchronized, bootstrap repositories are automatically created and regenerated on the Uyuni Server.

3.2.1. Prepare to create a bootstrap repository

When you select a product for synchronization, the bootstrap repository is automatically created as soon as all mandatory channels are fully mirrored.

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

3.2.2. Options for automatic mode

You can change how the automated bootstrap repository creation works. This section details the various settings.

Flush mode

By default, existing repositories are updated only with the latest packages. You can configure it to always start with an empty repository instead. To enable this behavior, add or edit this value in /etc/rhn/rhn.conf:

```
server.susemanager.bootstrap_repo_flush = 1
```

Automatic mode

By default, automated regeneration of the bootstrap repositories is enabled. To disable it, add or edit this value in /etc/rhn/rhn.conf:

```
server.susemanager.auto_generate_bootstrap_repo = 0
```

3.2.2.1. Configure bootstrap data file

The tool uses a data file with information about which packages are required for each distribution. The data file is stored at /usr/share/susemanager/mgr_bootstrap_data.py. SUSE updates this file regularly. If you want to makes changes to this file, do not edit it directly. Instead, create a copy in persistent directory and edit your copy:

```
cp /usr/share/susemanager/mgr_bootstrap_data.py /srv/susemanager/my_data.py
```

When you have made your changes, configure Uyuni to use the new file. Add or edit this value in /etc/rhn/rhn.conf:

```
server.susemanager.bootstrap_repo_datamodule = my_data
```

On the next update, the new data from SUSE overwrites the original data file, not the new one. You need to keep the new file up to date with changes provided by SUSE.

3.2.3. Manually generate a bootstrap repository

By default, bootstrap repositories are regenerated daily. You can manually create the bootstrap repository from the command prompt.

Procedure: Generating the bootstrap repository for SUSE Linux Enterprise

1. At the command prompt on the Uyuni Server, as root, list the available distributions to create bootstrap repositories for:

   ```
   mgr-create-bootstrap-repo -l
   ```

2. Create the bootstrap repository, using the appropriate repository name as the product label:

   ```
   mgr-create-bootstrap-repo -c SLE-version-x86_64
   ```

3. Alternatively, use the number shown next to the distribution name in the list of available distributions.

The client repository is located in /srv/www/htdocs/pub/repositories/.

If you have mirrored more than one product (for example, SLES and SLES for SAP), or if you use custom channels, you might need to specify the parent channel to use when creating the bootstrap repository. This is not required in every situation. For example, some SLES 15 versions have common code bases, so there is no need to specify a parent channel. Use this procedure only if your environment requires it.

OPTIONAL Procedure: Specifying a parent channel for a bootstrap repository

1. Check which parent channels you have available:

```
mgr-create-bootstrap-repo -c SLE-15-x86_64
Multiple options for parent channel found. Please use option
--with-parent-channel <label> and choose one of:
- sle-product-sles15-pool-x86_64
- sle-product-sles_sap15-pool-x86_64
- sle-product-sled15-pool-x86_64
```

2. Specify the appropriate parent channel:

```
mgr-create-bootstrap-repo -c SLE-15-x86_64 --with-parent-channel sle-product-
sled15-pool-x86_64
```

3.2.3.1. Repositories with multiple architectures

If you are creating bootstrap repositories that include multiple different architectures, you need to be careful that all architectures are updated correctly. For example, the x86-64 and IBM Z architectures for SLE use the same bootstrap repository URL at /srv/www/htdocs/pub/repositories/sle/15/2/bootstrap/.

When the flush option is enabled, and you attempt to generate the bootstrap repository for multiple architectures, only one architecture is generated. To avoid this, use the --no-flush option at the command prompt when creating additional architectures. For example:

```
mgr-create-bootstrap-repo -c SLE-15-SP2-x86_64
mgr-create-bootstrap-repo --no-flush -c SLE-15-SP2-s390x
```

3.2.4. Bootstrap and custom channels

If you are using custom channels, you can use the --with-custom-channels option with the mgr-create-bootstrap-repo command. In this case, you also need to specify the parent channel to use.

Automatic creation of a bootstrap repository might fail if you are using custom channels. In this case, you need to create the repository manually.

For more information about custom channels, see **Administration › Custom-channels**.

3.3. Activation Keys

Activation keys are used to ensure that your clients have the correct software entitlements, are connecting to the appropriate channels, and are subscribed to the relevant groups. Each activation key is bound to an organization, which you can set when you create the key.

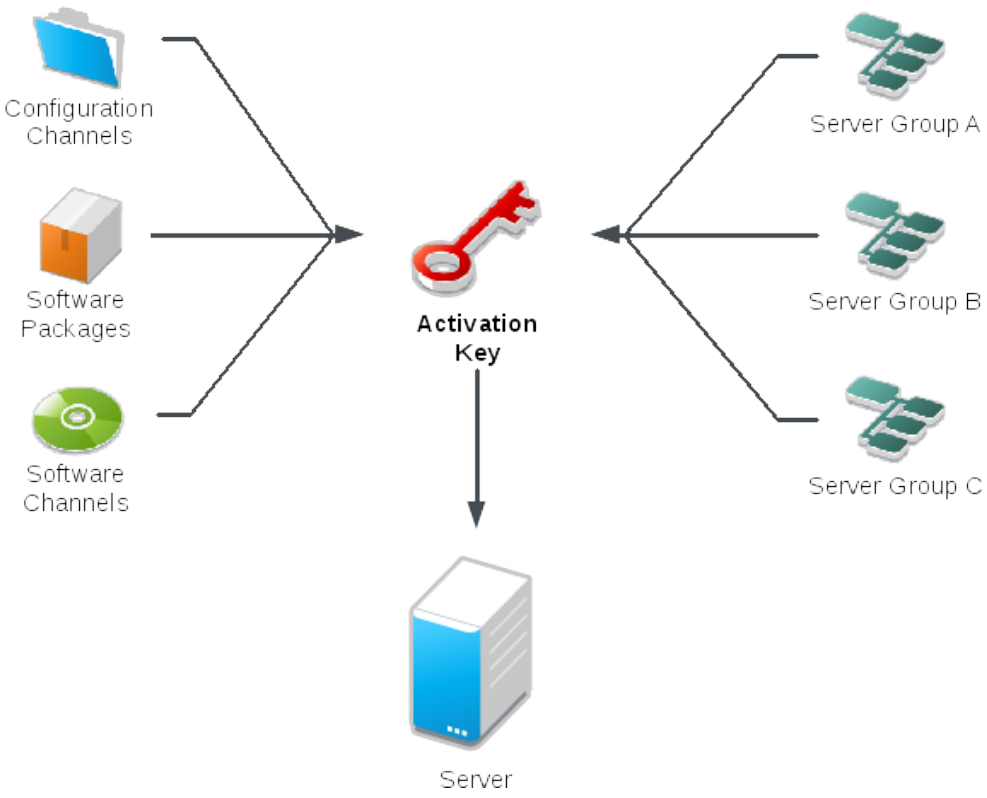
In Uyuni, an activation key is a group of configuration settings with a label. You can apply all configuration settings associated with an activation key by adding its label as a parameter to a bootstrap script. We recommend you use an activation key label in combination with a bootstrap script. When the bootstrap script

is executed all configuration settings associated with the label are applied to the system the script is run on.

An activation key can specify:

- Channel assignment
- System types or add-on entitlements
- Contact method
- Configuration files
- Packages to be installed
- AppStreams to be enabled
- System group assignment

Activation keys are used at the time a client is registered, and not used again. After the client has been registered, the client can be changed in any way, regardless of what the activation key specifies. The association between the activation key and the client is recorded only for historical purposes.



Procedure: Creating an Activation Key

1. In the Uyuni Web UI, as an administrator, navigate to **Systems › Activation Keys**.
2. Click the **[Create Key]** button.

3. On the Activation Key Details page, in the Description field, enter a description of the activation key.
4. In the Key field, enter a name for the activation key. For example, SLES15-SP7 for SUSE Linux Enterprise Server 15 SP7.

- Do not use commas or double quotes in the Key field for any SUSE products. However, you **must** use commas for Red Hat Products.
- All other characters are allowed, but <> (){} (this includes the space) are removed automatically.
- If the field is left empty, a random string is generated.

5. In the Usage add number of times the key can be used, or leave it blank for unlimited usage.
6. In the Base Channels drop-down box, select the appropriate base software channel, and allow the relevant child channels to populate. For more information, see **Reference › Admin** and **Administration › Custom-channels**.
7. Select the Child Channels you need (for example, the mandatory SUSE Multi-Linux Manager tools and updates channels).
8. Check the Add-On System Types checkbox if you need to enable any of the options. For more information about system types, see **Client-configuration › System-types**.
9. We recommend you leave the Contact Method set to Default. For more information about contact methds, see **Client-configuration › Contact-methods-intro**.
10. We recommend you leave the Universal Default setting unchecked.
11. Click **[Create Activation Key]** to create the activation key.
12. After the activation key is created, the page shows additional checkbox Configuration File Deployment below the list of Add-On System Types. To enable deploying configuration files to systems on registration, select this checkbox.
13. Click **[Update Activation Key]** to save the change.

When the activation key creation is completed, additional tabs appear at the top of the page. Use them to check and set additional features. These tabs are:

- Packages
- Configuration
- Groups
- Activated Systems
- AppStreams (available whenever a modular channel is associated with the activation key)

3.3.1. Reactivation Keys

Reactivation keys can be used once only to re-register a client and regain all Uyuni settings. Reactivation keys are client-specific, and include the system ID, history, groups, and channels.

To create a reactivation key, navigate to Systems, click the client to create a reactivation key for, and navigate to the **Details › Reactivation** tab. Click **[Generate New Key]** to create the reactivation key. Record the details of the key for later use. Unlike typical activation keys, which are not associated with a specific system ID, keys created here do not show up on the **Systems › Activation Keys** page.

After you have created a reactivation key, you can use it as the management_key grain in /etc/salt/minion.d/susemanager.conf. For example:

```
grains:
    susemanager:
        management_key: "re-1-daf44db90c0853edbb5db03f2b37986e"
```

Restart the venv-salt-minion or salt-minion process to apply the reactivation key.

You can use a reactivation key with a bootstrap script. For more information about bootstrap scripts, see **Client-configuration › Registration-bootstrap**.

If you autoinstall a client with its existing Uyuni profile, the profile uses the reactivation key to re-register the system and restore its settings. Do not regenerate, delete, or use this key while a profile-based autoinstallation is in progress. Doing so causes the autoinstallation to fail.

3.3.2. Activation Key Best Practices

Default Parent Channel

Avoid using the Uyuni Default parent channel. This setting forces Uyuni to choose a parent channel that best corresponds to the installed operating system, which can sometimes lead to unexpected behavior. Instead, we recommend you create activation keys specific to each distribution and architecture.

Bootstrapping With Activation Keys

If you are using bootstrap scripts, consider creating an activation key for each script. This helps you align channel assignments, package installation, system group memberships, and configuration channel assignments. You also need less manual interaction with your system after registration.

Bootstrapping LTSS Clients

If you are boostrapping clients with LTSS subscription, include the LTSS channels during activation key creation.

Bandwidth Requirements

Using activation keys might result in automatic downloading of software at registration time, which might not be desirable in environments where bandwidth is constrained.

These options create bandwidth usage:

- Assigning a SUSE Product Pool channel results in the automatic installation of the corresponding product descriptor package.
- Any package in the Packages section is installed.
- Any Salt state from the Configuration section might trigger downloads depending on its contents.

Key Label Naming

If you do not enter a human-readable name for your activation keys, the system automatically generates a number string, which can make it difficult to manage your keys.

Consider a naming scheme for your activation keys to help you keep track of them. Creating names which are associated with your organization's infrastructure makes it easier for you when performing more complex operations.

When creating key labels, consider these tips:

- OS naming (mandatory): Keys should always refer to the OS they provide settings for
- Architecture naming (recommended): Unless your company is running on one architecture only, for example x86_64, then providing labels with an architecture type is a good idea.
- Server type naming: What is this server being used for?
- Location naming: Where is the server located? Room, building, or department?
- Date naming: Maintenance windows, quarter, etc.
- Custom naming: What naming scheme suits your organizations needs?

  Example activation key label names:

  ```
  sles15-sp4-web_server-room_129-x86_64
  ```

  ```
  sles15-sp4-test_packages-blg_502-room_21-ppc64le
  ```

Included Channels

When creating activation keys you also need to keep in mind which software channels are associated with it. Keys should have a specific base channel assigned to them. Using the default base channel is not recommended. For more information, see the client operating system you are installing at **Client-configuration › Registration-overview**.

3.4. GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

In most cases, you do not need to adjust the GPG settings to be able to install software on your clients.

RPM packages can be signed directly, while Debian based systems sign only the metadata and use a chain of checksums to secure the packages. Most RPM based systems use signed metadata in addition to signed packages.

Operating systems either trust their own GPG keys directly or at least ship them installed with the minimal system. But third party packages signed by a different GPG key need manual handling. The clients can be successfully bootstrapped without the GPG key being trusted. However, you cannot install new client tool packages or update them until the keys are trusted.

Clients now use GPG key information entered for a software channel to manage the trusted keys. When a software channel with GPG key information is assigned to a client, the key is trusted when the channel is refreshed or the first package is installed from this channel.

The GPG key URL parameter in the software channel page can contain multiple key URLs separated by "whitespace". In case it is a file URL, the GPG key file must be deployed on the client before the software channel is used.

The GPG keys for the Client Tools Channels of Red Hat based clients are deployed on the client into /etc/pki/rpm-gpg/ and can be referenced with file URLs.

Only in case a software channel is assigned to the client they will be imported and trusted by the system.

Because Debian based systems sign only metadata, there is no need to specify extra keys for single channels. If a user configures an own GPG key to sign the metadata as described in "Use Your Own GPG Key" in **Administration › Repo-metadata** the deployment and trust of that key is executed automatically.

3.4.1. User Defined GPG Keys

Users can define custom GPG keys to be deployed to a client.

By providing some pillar data and providing the GPG key files in the Salt filesystem, they are automatically deployed to the client.

These keys are deployed into /etc/pki/rpm-gpg/ on RPM based operating systems and to /usr/share/keyrings/ on Debian systems:

Define the pillar key [literalcustom_gpgkeys for the client you want to deploy the key to and list the names of the key file.

```
cat /srv/pillar/mypillar.sls
custom_gpgkeys:
  - my_first_gpg.key
  - my_second_gpgkey.gpg
```

Additionally in the Salt filesystem create a directory named gpg and store there the GPG key files with the name specified in the custom_gpgkeys pillar data.

```
ls -la /srv/salt/gpg/
/srv/salt/gpg/my_first_gpg.key
/srv/salt/gpg/my_second_gpgkey.gpg
```

The keys are deployed to the client at /etc/pki/rpm-gpg/my_first_gpg.key and /etc/pki/rpm-gpg/my_second_gpgkey.gpg.

The last step is to add the URL to the GPG key URL field of the software channel. Navigate to **Software › Manage › Channels** and select the channel you want to modify. Add to GPG key URL the value file:///etc/pki/rpm-gpg/my_first_gpg.key.

3.4.2. GPG Keys in Bootstrap Scripts

Procedure: Trusting GPG Keys on Clients Using a Bootstrap Script

1. On the Uyuni Server, at the command prompt, check the contents of the /srv/www/htdocs/pub/ directory. This directory contains all available public keys. Take a note of the key that applies to the channel assigned to the client you are registering.
2. Open the relevant bootstrap script, locate the ORG_GPG_KEY= parameter and add the required key. For example:

   ```
   uyuni-gpg-pubkey-0d20833e.key
   ```

   You do not need to delete any previously stored keys.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. A software channel cannot be assigned to a client when the GPG key is not trusted.

Chapter 4. Client Contact Methods

There are three contact methods how the Uyuni Server can communicate with clients. They are based on Salt protocols.

Which Salt contact method you use depends on the type of client and your network architecture:

Default

is recommended unless there are specific user needs. By default, the Salt Bundle implementation will be deployed. For more information, see **Client-configuration › Contact-methods-default**.

SSH Push

is useful only if network restrictions make it impossible for clients to establish contact to the server. It is supported with the Salt Bundle only. This contact method has serious limitations. For more information, see **Client-configuration › Contact-methods-saltssh**.

SSH Push (with tunnel)

is the same as SSH Push, but with using a secured communication tunnel. For more information, see **Client-configuration › Contact-methods-saltssh-tunnel**.

Implementation of Salt communication software options:

Salt Bundle (venv-salt-minion)

is a single binary package containing Salt Minion, Python 3, required Python modules, and libraries. Thus the Salt contact method is independent from software installed on the client.

For more information, see **Client-configuration › Contact-methods-saltbundle**.

Salt Minion (salt-minion)

is Salt software installed on the client system and it is no longer supported with Uyuni in general. If needed, you can install it on SUSE Linux Enterprise 15 clients and derivatives (like SLE Micro) for bootstrapping only. Then, during bootstrapping it will be replaced with venv-salt-minion.

The so-called traditional contact protocol is no longer supported with Uyuni 5.0 and later. Before upgrading from Uyuni 4 to 5, any existing traditional clients including the traditional proxies must be migrated to Salt or replaced with Salt proxies.

For more information about migrating traditional Uyuni 4 clients to Salt clients, see https://documentation.suse.com/suma/4.3/en/suse-manager/client-configuration/contact-methods-migrate-traditional.html

4.1. Default Contact Method

The default contact method using the Salt protocol is recommended unless there are specific needs. By default, the Salt Bundle implementation (venv-salt-minion) will be deployed. For more information about Salt in general, see **Specialized-guides › Salt**.

Software updates are generally pushed from the server to the client. Connections are initiated from the client. This means you must open ports on the server, not on clients. The Salt clients are also known as Salt minions. Uyuni Server installs a daemon on every client.

If you need to use Salt clients in a disconnected setup you can configure SSH Push as a contact method. With this contact method, clients can be located in a firewall-protected zone called a DMZ. For more information about SSH Push, see **Client-configuration › Contact-methods-saltssh**.

4.1.1. Onboarding Details

Salt has its own database to keep the keys for the minions. This needs to be kept in sync with the Uyuni database. As soon as the key is accepted in Salt, the onboarding process in Uyuni starts.

The onboarding process will look for existing systems in the Uyuni database by searching for the minion_id and the machine-id. Depending on the outcome, the following scenarios are possible:

- If nothing is found, the new system gets created.
- In case an entry with the minion_id or the machine-id is found, that system will be migrated to match the new system.
- In case there is a match for both entries, and they are not the same system, the onboarding will be aborted with an error.
- In this case the administrator needs to resolve the conflict by removing at least one of the systems.

4.2. SSH Push Contact Method

SSH Push (ssh-push) is used in environments where Salt clients cannot reach the Uyuni Server directly. In this environment, clients are located in a firewall-protected zone called a DMZ. No system within the DMZ is authorized to open a connection to the internal network where the Uyuni Server is located.

SSH Push opens a tunnel only from Uyuni to the client, but the reverse channel goes directly. Such a scenario might not work everywhere. Therefore also SSH Push (with tunnel) is available as contact method. That also opens a reverse tunnel and thus you can communicate through all firewalls which otherwise might block the connection from client to server.

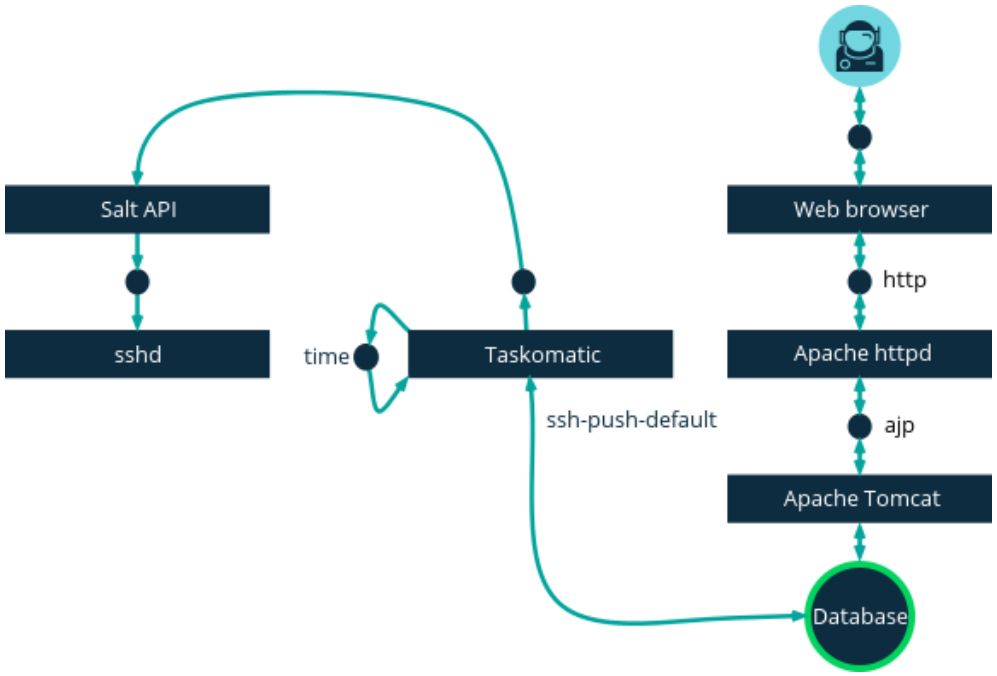
SSH Push is also to use if installing a daemon agent on clients is not possible.

The SSH Push method has serious limitations. It does not scale well, and consumes more Server resources and network bandwidth than the plain Salt method (default). The Push SSH method is not at all supported with large setups (1000 clients and more).

The server uses the SSH Push to contact the clients at regular intervals, checking in and performing scheduled actions and events.

Re-installing systems using the provisioning model is not currently supported on clients managed with SSH Push.

This image demonstrates the SSH Push process path. All items left of the Taskomatic block represent processes running on the Uyuni client.



To use SSH Push, you must have the SSH daemon running on the client, and reachable by the salt-api daemon running on the Uyuni Server. Additionally, the required Python version will be deployed with the Salt Bundle on the client system.

Before beginning with the following registering procedure, define an activation key with the SSH Push contact method configured. This method expects that there is a direct connection with HTTPS to the Server.

You need to use the Web UI or API to register these clients with the Uyuni Server. See the following procedure or example.

Procedure: Registering Clients With SSH Push

1. In the Uyuni Web UI, navigate to **Systems › Bootstrapping** and complete the appropriate fields.
2. Select an activation key with the SSH Push contact method configured. For more information about

activation keys, see **Client-configuration › Activation-keys**.

3. Check the Manage system completely via SSH checkbox.
4. Click **[Bootstrap]** to begin registration.
5. Confirm that the system has been registered correctly by navigating to **Systems › Overview**.

Example: API Access to Push via SSH

You can use the API to manage which contact method to use. This example Python code sets the contact method to ssh-push.

Valid values are:

- default (pull)
- ssh-push
- ssh-push-tunnel

```
client = xmlrpclib.Server(MLM_HOST + "/rpc/api", verbose=0)
key = client.auth.login(MLM_LOGIN, MLM_PASSWORD)
client.system.setDetails(key, 1000012345, {'contact_method' : 'ssh-push'})
```

4.2.1. Available Parameters

When you are configuring SSH Push, you can modify parameters that are used when a system is registered, including the host, activation key, and password. The password is used only for bootstrapping, it is not saved anywhere. All future SSH sessions are authorized via a key/certificate pair. These parameters are configured in **Systems › Bootstrapping**.

You can also configure persistent parameters that are used system-wide, including the sudo user to access the system as an unprivileged user instead of as root.

Use mgrctl term before running steps inside the server container.

Procedure: Configuring Unprivileged SSH Access

1. Ensure you have the latest spacewalk-taskomatic and spacewalk-certs-tools packages installed on the Uyuni Server.
2. On each client system, create an appropriate unprivileged user.
3. On each client system, edit the sudoers file:

```
sudo visudo
```

4. Grant sudo access to the user by adding this line at the end of the sudoers file. Replace <user> with the name of the user that is bootstrapping the client in the Web UI:

```
<user>  ALL=NOPASSWD: /usr/bin/python3, /var/tmp/venv-salt-minion/bin/python
```

This procedure grants root access without requiring a password, which is required for registering the client. When the client is successfully installed it runs with root privileges, so the access is no longer required. We recommend that you remove the line from the sudoers file after the client has been successfully installed.

5. Inside the Uyuni Server container, edit the /etc/rhn/rhn.conf configuration file, and add or amend this line to include the unprivileged username:

```
ssh_push_sudo_user = <user>
```

6. After changing this configuration parameter you must restart services such as salt-secrets-config.service, tomcat.service, and taskomatic.service. To cover all needed services, it is the best to restart the Uyuni Server as root. Outside of the container, from the container host, enter:

```
mgradm restart
```

4.2.2. Action Execution

The SSH Push feature uses taskomatic to execute scheduled actions using salt-ssh. The taskomatic job periodically checks for scheduled actions and executes them. The SSH Push feature executes a complete salt-ssh call based on the scheduled action.

By default, twenty Salt SSH actions can be executed at a time. You can increase the number of actions that can be executed in parallel, by adding these lines to your configuration file, and adjusting the value of parallel_threads upwards. We recommend you keep the number of parallel actions low, to avoid problems:

```
taskomatic.sshminion_action_executor.parallel_threads = <number>
org.quartz.threadPool.threadCount = <value of parallel_threads + 20>
```

This adjusts the number of actions that can run in parallel on any one client and the total number of worker threads used by taskomatic. If actions needs to be run on multiple clients, actions are always executed sequentially on each client.

If the clients are connected through a proxy, you need to adjust the MaxSessions settings on the proxy. In this case, set the number of parallel connections to be three times the total number of clients.

4.2.3. Future Features

There are some features that are not yet supported on SSH Push. These features do not work on Salt SSH clients:

- OpenSCAP auditing
- Beacons, resulting in:
  - Installing a package on a system using zypper does not invoke the package refresh.
  - Virtual Host functions (for example, a host to guests) does not work if the virtual host system is Salt SSH-based.

For more information:

- about Salt SSH in general, see **Specialized-guides › Salt** and https://docs.saltproject.io/en/latest/topics/ssh/.
- about SSH key rotation, see specialized-guides:salt/salt-ssh.pdf.

4.3. SSH Push (With Tunnel) Contact Method

SSH Push (with tunnel) (ssh-push-tunnel) is used in environments where clients cannot reach the Uyuni Server directly. In this environment, clients are located in a firewall-protected zone called a DMZ. No system within the DMZ is authorized to open a connection to the internal network, including the Uyuni Server.

In other words: SSH Push (with tunnel) also creates a reverse tunnel from the client to the Uyuni Server, not only from the server to the client.

The server uses SSH to contact the clients at regular intervals, checking in and performing scheduled actions and events.

Re-installing systems using the provisioning model is not currently supported on clients managed with SSH Push.

The tunnel is used to provide the access to the server through the encrypted tunnel. The repositories assigned to the SSH Push client (with tunnel) are provided through this tunnel only, thus it is not possible to use package manager tools directly from the client system because the repositories are available only while the tunnel is up. In other words, access is only possible if the session is initiated by the server. All package managing operations on the client can be performed from the server side only.

Use mgrctl term before running steps inside the server container.

For tunneling connections via SSH, a port number is required for tunneling via HTTPS. The port number used by

default is 1233. To overwrite it, inside the container, you can add a custom port numbers greater than 1024 to /etc/rhn/rhn.conf:

```
ssh_push_port_https = high_port
```

After changing this configuration parameter you must restart services such as salt-secrets-config.service, tomcat.service, and taskomatic.service. To cover all needed services, it is the best to restart the Uyuni Server as root. Outside of the container, from the container host, enter:

```
mgradm restart
```

For security reasons, you might want to use sudo with SSH, to access the system as an unprivileged user instead of as root.

Procedure: Configuring Unprivileged SSH Access

1. On each client system, create an appropriate unprivileged user.
2. On each client system, edit the sudoers file:

   ```
   sudo visudo
   ```

3. Grant sudo access to the user by adding this line at the end of the sudoers file. Replace <user> with the name of the user that is bootstrapping the client in the Web UI:

   ```
   <user>  ALL=NOPASSWD: /usr/bin/python3, /var/tmp/venv-salt-minion/bin/python
   ```

   This procedure grants root access without requiring a password, which is required for registering the client. When the client is successfully installed it runs with root privileges, so the access is no longer required. We recommend that you remove the line from the sudoers file after the client has been successfully installed.

4. Inside the Uyuni Server container, edit the /etc/rhn/rhn.conf configuration file, and add or amend this line to include the unprivileged username:

   ```
   ssh_push_sudo_user = <user>
   ```

After changing this configuration parameter you must restart services such as salt-secrets-config.service, tomcat.service, and taskomatic.service. To cover all needed services, it is the best to restart the Uyuni Server as root. Outside of the container, from the container host, enter:

```
mgradm restart
```

You need to use the Web UI or API to register these clients with the Uyuni Server.

Before you begin, you need to ensure that you have specified which ports to use for SSH tunneling. If you have registered clients before changing the port numbers, they need to be registered again with a re-activation key.

- For more information about bootstrapping, see **Client-configuration › Registration-bootstrap**.
- For more information about bootstrapping, see client-configuration:activation-keys.pdf.

Example: API Access to SSH Push (with tunnel)

You can use the API to manage which contact method to use. This example Python code sets the contact method to ssh-push-tunnel.

```
client = xmlrpclib.Server(MLM_HOST + "/rpc/api", verbose=0)
key = client.auth.login(MLM_LOGIN, MLM_PASSWORD)
client.system.setDetails(key, 1000012345, {'contact_method' : 'ssh-push-tunnel'})
```

Valid values are:

- default (pull)
- ssh-push
- ssh-push-tunnel

4.4. Salt Bundle

4.4.1. What is Salt Bundle?

The Salt Bundle is a single binary package containing Salt Minion, Python 3, required Python modules, and libraries.

The Salt Bundle is shipped with Python 3 and all the requirements for Salt to run. Thus Salt Bundle does not use the Python version install on the client as system software. The Salt Bundle can be installed on clients that do not meet the requirements for a given Salt version.

It is also possible to use the Salt Bundle on systems that run a Salt Minion connected to a Salt Master other than the Uyuni Salt Master.

4.4.2. Client Registration With Salt Bundle as a Minion

The registration method with the Salt Bundle is the recommended registration method. This section explains the advantages and limitations of the current implementation.

The Salt Bundle is provided as the venv-salt-minion package that consists of Salt, Python 3, and the Python modules Salt depends on.

Bootstrapping with Web UI is using Salt Bundle as well, so bootstrapping with Web UI is not Python dependant. Using the Salt Bundle, it is no longer needed that the client provides any Python interpreter or modules.

If you bootstrap new clients, registration with the Salt Bundle is the default method. You can switch existing clients to the Salt Bundle method. If you switch, the salt-minion package and its dependencies will stay installed.

4.4.2.1. Using the Salt Bundle With the Salt Minion

The Salt Bundle can be used with the Salt Minion managed by the Salt Master other than Uyuni Server at the same time. If the Salt Bundle is installed on a client Uyuni Server will manage the configuration files of the Salt Bundle, the configuration files of salt-minion will not be managed in this case. For more information, see Salt Bundle configuration.

- To bootstrap a client with the Salt Minion managed by the Salt Master other than Uyuni Server it is recommended to use mgr-bootstrap --force-bundle when generating the bootstrap script, or to set FORCE_VENV_SALT_MINION to 1 in the bootstrap script.
- For bootstrapping with Web UI mgr_force_venv_salt_minion set to true pillar can be specified globally. For more information, see **Specialized-guides › Salt**.

4.4.2.2. Switching From Salt Minion to Salt Bundle

The Salt state util.mgr_switch_to_venv_minion is available to switch from salt-minion to venv-salt-minion. It is recommended to switch to venv-salt-minion in two steps to avoid trouble with shifting processes:

Procedure: SwitchingWwith util.mgr_switch_to_venv_minion State to venv-salt-minion

1. Apply util.mgr_switch_to_venv_minion with no pillar specified first. This will result in the switch to venv-salt-minion with copying configuration files etc. It will not clean up the original salt-minion configurations and its packages.

```
salt <minion_id> state.apply util.mgr_switch_to_venv_minion
```

2. Apply util.mgr_switch_to_venv_minion with mgr_purge_non_venv_salt set to True to remove salt-minion and with mgr_purge_non_venv_salt_files set to True to remove all the files related to salt-minion. This second step ensures the first step was processed, and then removes the old configuration files and the

now obsolete salt-minion package.

```
salt <minion_id> state.apply util.mgr_switch_to_venv_minion
pillar='{"mgr_purge_non_venv_salt_files": True, "mgr_purge_non_venv_salt": True}'
```

4.4.2.3. Additional Concerns

- In case of running the second step only and the first step, state apply process could fail as it requires stopping the salt-minion which is used to execute the command on the client side.
- It is also possible to avoid installing the Salt Bundle and keep using salt-minion instead. In this case, specify one of these options:
  - Execute mgr-bootstrap with --no-bundle option.
  - Set AVOID_VENV_SALT_MINION to 1 in the generated bootstrap script.
  - For bootstrap state set the mgr_avoid_venv_salt_minion pillar to True in /srv/pillar/salt_bundle_config.sls.

4.4.3. SSH Push With the Salt Bundle

The Salt Bundle is also used when performing SSH Push actions to clients.

A shell script deploys the Salt Bundle onto the target system without installing venv-salt-minion before any Salt command is executed. Because the Salt Bundle contains the whole Salt code base, no salt-thin is deployed. SSH Push (including bootstrapping using the Web UI) uses the Python 3 interpreter within the bundle. The target system does not need to have any other Python interpreter installed.

The Python 3 deployed with the Bundle is used to handle SSH Push session on the client, so SSH Push (including bootstrapping with Web UI) is not dependant on Python installed on the system.

Using salt-thin can be enabled as a fallback method, but it requires Python 3 to be installed on the client. This method is not recommended nor supported and exists for development purposes only. Set web.ssh_use_salt_thin to true in the /etc/rhn/rhn.conf configuration file.

- The bootstrap repository must be created before bootstrapping the client with Web UI. SSH Push is using the Salt Bundle taken from the bootstrap repository based on the detected target operating system. For more information, see client-configuration:bootstrap-repository.pdf.
- SSH Push is using /var/tmp to deploy Salt Bundle to and execute Salt commands on the client with the bundled Python. Therefore you must not mount /var/tmp with the noexec option. It is not possible to bootstrap the clients, which have /var/tmp mounted with noexec option, with the Web UI because the bootstrap process is using

SSH Push to reach a client.

4.4.4. Extend Salt Bundle With Python Packages using pip

The Salt Bundle includes pip to make it possible to extend the functionality of the bundled Salt Minion with extra Python packages.

By default, salt <minion_id> pip.install <package-name> installs the Python package specified by <package_name> into /var/lib/venv-salt-minion/local.

If needed, the path /var/lib/venv-salt-minion/local can be overridden by setting the VENV_PIP_TARGET environment variable for the venv-salt-minion.service. It is recommended to use a systemd drop-in configuration file for the service. It could be done with the configuration file /etc/systemd/system/venv-salt-minion.service.d/10-pip-destination.conf:

```
[Service]
Environment=VENV_PIP_TARGET=/new/path/local/venv-salt-minion/pip
```

The Python packages installed through pip are not changing on updating the Salt Bundle. To ensure that such packages are available and functional after an update, it is recommended to install them with a Salt state that is applied after Salt Bundle updates.

Chapter 5. Client Registration

There are several ways to register clients to your Uyuni Server. This section covers the various available methods. It also contains information specific to the operating system you intend to run on the client.

Before you begin, check that:

- The client has the date and time synchronized correctly with the Uyuni Server before registration.
- You have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

Handling the Installer Updates Channel after Bootstrapping

Once a client system has been bootstrapped, the **Installer Updates** channel should be removed. The standard update channel already includes the necessary updates, making this channel redundant.

Additionally, during migrations, this channel is unnecessary and should not be used.

Do not register the Uyuni Server base OS to Uyuni itself. The Uyuni Server base OS must be managed individually or by using another separate Uyuni Server.

To manage Uyuni Server Containers, use the mgradm tool.

5.1. Registration Methods

There are several ways to register clients to your Uyuni Server.

- For only a few clients, we recommend that you register clients using the Uyuni Web UI. For more information, see **Client-configuration › Registration-webui**.
- If you want more control over the process, or have to register many clients, we recommend that you create a bootstrap script. For more information, see **Client-configuration › Registration-bootstrap**.
- For even more control over the process, executing a single commands on the command line can be useful. For more information, see **Client-configuration › Registration-cli**.

The client must have the date and time synchronized correctly with the Uyuni Server before registration.

You must create an activation key first, to use bootstrap script or command line method. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

Do not register the Uyuni Server to itself. The Uyuni Server must be managed individually or by using another separate Uyuni Server. For more information about using multiple

servers, see **Specialized-guides › Large-deployments**.

5.1.1. Register Clients With the Web UI

5.1.1.1. Introduction

Bootstrapping clients with the Web UI is using **Specialized-guides › Salt** to execute the bootstrap process on the client. Salt SSH uses the Salt Bundle with the Python interpreter included. Therefore, no other Python interpreter needs to be installed on the client.

Salt Bundle is made available together with the bootstrap repository. Therefore the bootstrap repository must be created before starting the bootstrap process for the client. A shell script detects the operating system on the client and deploys the Salt Bundle from the appropriate bootstrap repository, using the same logic as the bootstrap script.

For more information, see Prepare to Create a Bootstrap Repository.

Do not register the Uyuni Server to itself. The Uyuni Server must be managed individually or by using another separate Uyuni Server. For more information about using multiple servers, see **Specialized-guides › Large-deployments**.

5.1.1.2. Register Clients With the Web UI

Procedure: Registering Clients With the Web UI

1. In the Uyuni Web UI, navigate to **Systems › Bootstrapping**.
2. In the Host field, type the fully qualified domain name (FQDN) of the client to be bootstrapped.
3. In the SSH Port field, type the SSH port number to use to connect and bootstrap the client. By default, the SSH port is 22.
4. In the User field, type the username to log in to the client. By default, the username is root.
5. Select an Authentication method:
    a. To bootstrap the client with an SSH key, in the Authentication field, check SSH Private Key, and upload the SSH private key to use to log in to the client. If your SSH private key requires a passphrase, type it into the SSH Private Key Passphrase field, or leave it blank for no passphrase.
    b. To bootstrap the client with a password, in the Authentication field, check Password, and type the password to log in to the client.
6. In the Activation Key field, select the activation key that is associated with the software channel you want to use to bootstrap the client. For more information, see **Client-configuration › Activation-keys**.

7. OPTIONAL: In the Proxy field, select the proxy to register the client to.
8. By default, the Disable SSH Strict Key Host Checking checkbox is selected. This allows the bootstrap process to automatically accept SSH host keys without requiring you to manually authenticate.
9. OPTIONAL: Check the Manage System Completely via SSH checkbox. If you check this option, the client is configured to use SSH for its connection to the server, and no other contact method is configured.

   For more information about contact methods, see **Client-configuration › Contact-methods-intro**.

10. Click **[Bootstrap]** to begin registration.
11. When the bootstrap process has completed, your client is listed at **Systems › System List**.

- SSH private keys are stored only for the duration of the bootstrapping process. They are deleted from the Uyuni Server as soon as bootstrapping is complete.
- When new packages or updates are installed on the client using Uyuni, any end user license agreements (EULAs) are automatically accepted. To review a package EULA, open the package details page in the Web UI.

5.1.1.3. Handling of Locally Assigned Repositories

Having repositories assigned directly to clients not served by Uyuni is not a common use case. It can cause trouble. Therfore bootstrapping via Salt disables all local repositories at the beginning of the bootstrap process.

Later, during every use of the channel state, for example when executing a Highstate or a package installation, all locally assigned repositories are disabled again.

All software packages which are used on the clients should come from channels served by Uyuni. For more information about creating a custom channel, see Custom Channels at **Administration › Custom-channels**.

5.1.2. Register Clients With a Bootstrap Script

5.1.2.1. Introduction

Registering clients with a bootstrap script gives you control over parameters, and can help if you have to register a large number of clients at once.

To register clients using a bootstrap script, we recommend you create a template bootstrap script to begin, which can then be copied and modified. The bootstrap script you create is executed on the client when it is registered, and ensures all the necessary packages are deployed to the client. Some parameters in the bootstrap script ensure the client system can be assigned to its base channel, using activation key and GPG key.

It is important that you check the repository information carefully, to ensure it matches the base channel

repository. If the repository information does not match exactly, the bootstrap script cannot download the correct packages.

Additional considerations:

- All clients need a bootstrap repository. It is automatically created and regenerated on the Uyuni Server when products are synchronized. A bootstrap repository includes packages for installing Salt on clients, and for registering clients. For more information about creating a bootstrap repository, see **Client-configuration › Bootstrap-repository**.
- openSUSE Leap 15 and SLE 15 use Python 3 by default. Bootstrap scripts based on Python 2 must be re-created for openSUSE Leap 15 and SLE 15 systems. If you register openSUSE Leap 15 or SLE 15 systems using Python 2, the bootstrap script fails.

GPG keys and Uyuni client tools

The GPG key used by Uyuni Client Tools is not trusted by default. When you create your bootstrap script, add a path to the file containing the public key fingerprint with the ORG_GPG_KEY parameter.

To access a shell inside the server container run mgrctl term on the container host. From there, one can run the CLI tools as usual.

5.1.2.2. Create a bootstrap script with mgr-bootstrap

The mgr-bootstrap command generates custom bootstrap scripts. A bootstrap script is used by Uyuni client systems for simplifying their initial registration and configuration.

The arguments --activation-keys and --script, are the only mandatory arguments. On the Uyuni Server, as root at the command line execute it with the mandatory arguments. Replace <ACTIVATION_KEY and <EDITED_NAME> with your values:

1. From the command prompt of the Uyuni container host, run the following command as the root user to enter the server container:

```
mgrctl term
```

2. Execute the following command (adjust the values as needed)

```
mgr-bootstrap --activation-keys=<ACTIVATION_KEY> --script=bootstrap-<EDITED_NAME>.sh
```

The mgr-bootstrap command offers several other options, including the ability to set a specific hostname, set specific GPG keys, and set the registration method (salt-minion or salt-bundle).

- If you wish to create a bootstrap script to register against the Proxy, you can do so by using the following command from the Server container:

```
mgr-boostrap --hostname <PROXY_FQDN>
```

This command will create a new bootstrap script with default name bootstrap.sh and it will overwrite the existing bootstrap.sh file which is used for the Server.

- To specify a different script, use the following comamnd:

```
mgr-bootstrap --hostname <PROXY_FQDN> --script=boostrap-<PROXY
-SCRIPT>.sh
```

For more information, see the mgr-bootstrap man page, or run mgr-bootstrap --help.

5.1.2.3. Create a bootstrap script from Web UI

You can use the Uyuni Web UI to create an editable bootstrap script.

Procedure: Creating a bootstrap script

1. In the Uyuni Web UI, navigate to **Admin › Manager Configuration › Bootstrap Script**.
2. The required fields are pre-populated with values derived from previous installation steps. For details on each setting, see **Reference › Admin**.
3. Click **[Update]** to create the script.
4. The bootstrap script is generated and stored on the server in the /srv/www/htdocs/pub/bootstrap directory. Alternatively, you can access the bootstrap script over HTTPS. Replace <example.com> with the host name of your Uyuni Server:

```
https://<example.com>/pub/bootstrap/bootstrap.sh
```

Do not disable SSL in your bootstrap script. Ensure that Enable SSL is checked in the Web UI, or that the setting USING_SSL=1 exists in the bootstrap script. If you disable SSL, the registration process requires custom SSL certificates.

For more information about custom certificates, see **Administration › Ssl-certs**.

5.1.2.4. Edit a bootstrap script

You can copy and modify the template bootstrap script you created to customize it. A minimal requirement when modifying a bootstrap script for use with Uyuni is the inclusion of an activation key. Most packages are signed with GPG, so you also need to have trusted GPG keys on your system to install them.

In this procedure, you need to know the exact name of your activation keys. Navigate to **Home › Overview** and, in the Tasks box, click Manage Activation Keys. All keys created for channels are listed on this page. You must enter the full name of the key you wish to use in the bootstrap script exactly as presented in the key field. For more information about activation keys, see **Client-configuration › Activation-keys**.

Procedure: Modifying a bootstrap script

1. From the command prompt of the Uyuni container host, run the following command as the root user to enter the server container:

```
mgrctl term
```

2. On your Uyuni Server, as root at the command line change to the bootstrap directory with:

```
cd /srv/www/htdocs/pub/bootstrap/
```

3. Create and rename two copies of the template bootstrap script for use with each of your clients.

```
cp bootstrap.sh bootstrap-sles12.sh
cp bootstrap.sh bootstrap-sles15.sh
```

4. Open bootstrap-sles15.sh for modification. Scroll down until you can see the text shown below. If exit 1 exists in the file, comment it out by typing a hash or pound sign (#) at the beginning of the line. This activates the script. Enter the name of the key for this script in the ACTIVATION_KEYS= field:

```
echo "Enable this script: comment (with #'s) this block (or, at least just"
echo "the exit below)"
echo
#exit 1

# can be edited, but probably correct (unless created during initial install):
# NOTE: ACTIVATION_KEYS *must* be used to bootstrap a client machine.
ACTIVATION_KEYS=1-sles15
```

```
ORG_GPG_KEY=
```

Instead of editing the script manually, user can pass the following environment variables at runtime:

- ACTIVATION_KEYS: Activation keys to use for registration
- ORG_GPG_KEY: Path or identifier of the GPG key
- REACTIVATION_KEY: Reactivation key for previously registered systems
- MGR_SERVER_HOSTNAME: Hostname of the Server or Proxy to register the client against

Using environment variables allows dynamic input at runtime and makes it easier to reuse the same bootstrap script across different systems or environments.

5. When you have finished, save the file, and repeat this procedure for the second bootstrap script.

By default, bootstrap script will try to install venv-salt-minion if it is available in the bootstrap repository and salt-minion if there is no Salt bundle in the bootstrap repository. It is possible to avoid installing Salt bundle and keep using salt-minion if you need it for some reason.

For more information, see **Client-configuration › Contact-methods-saltbundle**.

5.1.2.5. Register clients running the bootstrap script

When you have finished creating your script, you can use it to register clients.

Procedure: Running the bootstrap script

1. From the command prompt of the Uyuni container host, run the following command as the root user to enter the server container:

```
mgrctl term
```

2. On the Uyuni Server, change to the bootstrap directory:

```
cd /srv/www/htdocs/pub/bootstrap/
```

3. Run this command to execute the bootstrap script on the client; replace EXAMPLE.COM with the host name of your client:

```
cat bootstrap-sles15.sh | ssh root@EXAMPLE.COM /bin/bash
```

4. Alternatively, on the client, run this command:

```
ACTIVATION_KEYS="17-someactivationkey" \
MGR_SERVER_HOSTNAME="proxy.example.com" \
ORG_GPG_KEY="mykey" \
REACTIVATION_KEY=my-reactivation-key \
curl -Sks https://server_hostname/pub/bootstrap/bootstrap.sh | /bin/bash
```

If you do not need to override any values, you can omit the environment variables entirely:

```
curl -Sks https://server_hostname/pub/bootstrap/bootstrap.sh | /bin/bash
```

To avoid problems, make sure the bootstrap script is executed using bash.

This script downloads the required dependencies located in the repositories directory you created earlier.

5. When the script has finished running, you can check that the client is registered correctly. Open the Uyuni Web UI and navigate to **Systems › Overview** to ensure the new client is listed. If the client is not listed, in the Uyuni Web UI navigate to **Salt › Keys** and check whether the client key is accepted.

When new packages or updates are installed on the client using Uyuni, any end user license agreements (EULAs) are automatically accepted. To review a package EULA, open the package detail page in the Web UI.

5.1.3. Register Clients on the Command Line

5.1.3.1. Introduction

Salt clients are registered accurately with the default bootstrap methods in most cases.

However, you can use Salt to register the client to the Uyuni Server manually by editing the Salt minion file on the client, and providing the fully qualified domain name (FQDN) of the server.

This method:

- uses ports 4505 and 4506 inbound to the server.
- requires no configuration on the Uyuni Server aside from ensuring that these ports are open.
- requires that you have installed the venv-salt-minion (Salt bundle) or the salt-minion package on the Salt client before registration. Both use configuration files in different locations and filenames remain the same. The systemd service filename is different.

Bootstrapping this way will only work if you use the salt-minion being part of the client tools channels or of an official SUSE distributions.

5.1.3.2. Salt Bundle Configuration

Salt Bundle (venv-salt-minion)

- /etc/venv-salt-minion/
- /etc/venv-salt-minion/minion
- /etc/venv-salt-minion/minion.d/NAME.conf
- systemd service file: venv-salt-minion.service

For more information about the Salt bundle, see **Client-configuration › Contact-methods-saltbundle**.

Procedure: Registering Clients with Salt Bundle Configuration File

1. On the Salt client, open the minion configuration file. The configuration file is either located at:

Listing 1. Configuration File

```
/etc/venv-salt-minion/minion
```

or:

Listing 2. Configuration File

```
/etc/venv-salt-minion/minion.d/NAME.conf
```

2. In the file add or edit the FQDN of the Uyuni Server or Proxy, and the activation key if any. Also add the other configuration parameters listed below.

Listing 3. Configuration Parameters

```
master: SERVER.EXAMPLE.COM

grains:
  susemanager:
    activation_key: "<Activation_Key_Name>"

server_id_use_crc: adler32
enable_legacy_startup_events: False
enable_fqdns_grains: False
```

3. Restart the venv-salt-minion service:

```
systemctl restart venv-salt-minion
```

4. On the Uyuni Server, accept the new client key; replace <client> with the name of your client:

```
salt-key -a '<client>'
```

5.1.3.3. Client Configuration

Client (salt-minion)

- /etc/salt/
- /etc/salt/minion
- /etc/salt/minion.d/NAME.conf
- systemd service file: salt-minion.service

Procedure: Registering Clients with Salt Minion Configuration File

1. On the Salt client, open the minion configuration file. The configuration file is either located at:

```
/etc/salt/minion
```

or:

```
/etc/salt/minion.d/NAME.conf
```

2. In the file add or edit the FQDN of the Uyuni Server or Proxy, and the activation key if any. Also add the other configuration parameters listed below.

```
master: SERVER.EXAMPLE.COM

grains:
  susemanager:
    activation_key: "<Activation_Key_Name>"

server_id_use_crc: adler32
enable_legacy_startup_events: False
enable_fqdns_grains: False
```

3. Restart the salt-minion service:

```
systemctl restart salt-minion
```

4. On the Uyuni Server, accept the new client key; replace <client> with the name of your client:

```
salt-key -a '<client>'
```

For more information about the Salt minion configuration file, see Configuring the Salt Minion.

5.2. SUSE Client Registration

You can register SUSE Linux Enterprise clients to Uyuni Server.

To register a new client to Uyuni Server, first synchronize software channels for the new client's operating system and architecture by using either the Web UI or command line tools.

Then, synchronize the client tool repository for the newly added operating system by using command line tools.

The method and details varies depending on the client's operating system. This is described in the following sections.

5.2.1. Preliminary Steps or Checks

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

Do not register a Uyuni Server to itself. The Uyuni Server must be managed individually or by using another separate Uyuni Server. For more information about using multiple servers, see **Specialized-guides › Large-deployments**.

5.2.2. Check Previous Registration Status

If the client was registered to SCC, SMT, or RMT previously, remove such a registration with SUSEConnect before migrating the client to Uyuni Server. Do not forget to remove the old registration first. Otherwise repositories that are no longer needed, will be added to the client after the client has been migrated to a newer version of a SUSE operating system with Uyuni.

To de-register a SUSE Linux Enterprise 12 or 15 client, on the client, as root, execute:

```
SUSEConnect --de-register
SUSEConnect --cleanup
```

For more information about detailed cleanup commands and verification steps, see https://www.suse.com/de-de/support/kb/doc/?id=000019054.

5.2.3. Registering SUSE Linux Enterprise Clients

This section contains information about registering clients running SUSE Linux Enterprise operating systems.

Use the instructions in this chapter for preparing all SUSE Linux Enterprise products, including:

- SUSE Linux Enterprise Server for SAP
- SUSE Linux Enterprise Desktop
- SUSE Linux Enterprise
- SUSE Linux Enterprise Real Time

You can also use these instructions for older SUSE Linux Enterprise versions and service packs.

5.2.3.1. Add Software Channels

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

Before you register SUSE Linux Enterprise clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The products you need for this procedure are:

Table 21. SLE Products - WebUI

OS Version	Product Name
SUSE Linux Enterprise Server 16.0	SUSE Linux Enterprise Server 16.0 x86_64
SUSE Linux Enterprise Server 15 SP7	SUSE Linux Enterprise Server 15 SP7 x86_64
SUSE Linux Enterprise Server 15 SP6	SUSE Linux Enterprise Server 15 SP6 x86_64
SUSE Linux Enterprise Server 15 SP5	SUSE Linux Enterprise Server 15 SP5 x86_64
SUSE Linux Enterprise Server 15 SP4	SUSE Linux Enterprise Server 15 SP4 x86_64
SUSE Linux Enterprise Server 15 SP3	SUSE Linux Enterprise Server 15 SP3 x86_64
SUSE Linux Enterprise Server 15 SP2	SUSE Linux Enterprise Server 15 SP2 x86_64
SUSE Linux Enterprise Server 15 SP1	SUSE Linux Enterprise Server 15 SP1 x86_64
SUSE Linux Enterprise Server 12 SP5	SUSE Linux Enterprise Server 12 SP5 x86_64

Procedure: Adding software channels

1. In the Uyuni Web UI, navigate to **Admin › Setup Wizard › Products**.
2. Locate the appropriate products for your client operating system and architecture using the search bar, and check the appropriate product. This will automatically check all mandatory channels. Also all recommended channels are checked as long as the include recommended toggle is turned on. Click the arrow to see the complete list of related products, and ensure that any extra products you require are checked.
3. Click **[Add Products]** and wait until the products have finished synchronizing.

Alternatively, you can add channels at the command prompt. The channels you need for this procedure are:

Table 22. SLE Products - CLI

OS Version	Base Channel
SUSE Linux Enterprise Server 16.0	sle-product-sles-16.0-x86_64
SUSE Linux Enterprise Server 15 SP7	sle-product-sles15-sp7-pool-x86_64
SUSE Linux Enterprise Server 15 SP6	sle-product-sles15-sp6-pool-x86_64
SUSE Linux Enterprise Server 15 SP5	sle-product-sles15-sp5-pool-x86_64

OS Version	Base Channel
SUSE Linux Enterprise Server 15 SP4	sle-product-sles15-sp4-pool-x86_64
SUSE Linux Enterprise Server 15 SP3	sle-product-sles15-sp3-pool-x86_64
SUSE Linux Enterprise Server 15 SP2	sle-product-sles15-sp2-pool-x86_64
SUSE Linux Enterprise Server 15 SP1	sle-product-sles15-sp1-pool-x86_64
SUSE Linux Enterprise Server 12 SP5	sle-product-sles15-sp5-pool-x86_64

To find channel names of older products, at the command prompt on the Uyuni Server, as root, use the mgr-sync command:

```
mgr-sync list --help
```

Then specify the argument you are interested in. For example, channels:

```
mgr-sync list channels [-c]
```

Procedure: Adding software channels at the command prompt

1. At the command prompt on the Uyuni container host, as root, add the appropriate channels:

```
mgrctl exec -- mgr-sync add channel <channel_label_1>
mgrctl exec -- mgr-sync add channel <channel_label_2>
mgrctl exec -- mgr-sync add channel <channel_label_n>
```

2. Synchronization starts automatically. If you want to synchronize the channels manually, use:

```
mgrctl exec -- mgr-sync sync --with-children <channel_name>
```

3. Ensure the synchronization is complete before continuing.

To add the client tools, add these channels from the command prompt:

Table 23. SUSE Linux Enterprise Channels - CLI

OS Version	Client Channel
SUSE Linux Enterprise Server 16.0	sles16-0-uyuni-client

OS Version	Client Channel
SUSE Linux Enterprise Server 15 SP7	sles15-sp7-uyuni-client
SUSE Linux Enterprise Server 15 SP6	sles15-sp6-uyuni-client
SUSE Linux Enterprise Server 15 SP5	sles15-sp5-uyuni-client
SUSE Linux Enterprise Server 15 SP4	sles15-sp4-uyuni-client
SUSE Linux Enterprise Server 15 SP3	sles15-sp3-uyuni-client
SUSE Linux Enterprise Server 15 SP2	sles15-sp2-uyuni-client
SUSE Linux Enterprise Server 15 SP1	sles15-sp1-uyuni-client
SUSE Linux Enterprise Server 12 SP5	sles12-sp5-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

5.2.3.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

SUSE Linux Enterprise channels can be very large. Synchronization can sometimes take several hours.

5.2.3.3. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

- Use the same GPG key for both SUSE Linux Enterprise Server 15 and SUSE Linux Enterprise Server 12 clients. The correct key is called sle12-gpg-pubkey-39db7c82.key.
- SUSE Linux Enterprise Server 16 clients use a different GPG key. The correct key is called suse16-gpg-pubkey-09d9ea69.key.

5.2.3.4. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically

created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.2.4. Registering SLE Micro Clients

This section contains information about registering clients running SLE Micro operating systems 5.1, 5.2, 5.3, 5.4, and 5.5 on x86-64, arm64, and IBM Z (s390x) architectures.

The SLE Micro uses transactional updates. Transactional updates are atomic (all updates are applied only if all updates succeed) and support rollbacks. They do not affect a running system as no changes are activated until after the system is rebooted.

For more information on transactional updates and rebooting, see https://documentation.suse.com/sles/html/SLES-all/cha-transactional-updates.html.

The client registration described in this chapter, consists of these steps:

- Synchronize software channels for the new client's operating system and architecture by using either Web UI or command-line interface.
- Synchronize the client tool repository for the newly added operating systems by using command-line interface.
- Register the client with Uyuni Server by using the Web UI or the command-line interface.

Additional sections describe ways to check and verify the registration procedure.

5.2.4.1. Add Software Channels

Before you register SLE Micro clients to the Uyuni Server, you need to add the required software channels, and synchronize them.

You can add the software channels with the Web UI or from the command line.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

For the Web UI procedure, you need the following products:

Table 24. SLE Micro Products - WebUI

OS Version	Product Name
SLE Micro 5.5 x86-64	SUSE Linux Enterprise Micro 5.5 x86_64
SLE Micro 5.5 arm64	SUSE Linux Enterprise Micro 5.5 aarch64
SLE Micro 5.5 s390x	SUSE Linux Enterprise Micro 5.5 s390x
SLE Micro 5.4 x86-64	SUSE Linux Enterprise Micro 5.4 x86_64
SLE Micro 5.4 arm64	SUSE Linux Enterprise Micro 5.4 aarch64
SLE Micro 5.4 s390x	SUSE Linux Enterprise Micro 5.4 s390x
SLE Micro 5.3 x86-64	SUSE Linux Enterprise Micro 5.3 x86_64
SLE Micro 5.3 arm64	SUSE Linux Enterprise Micro 5.3 aarch64
SLE Micro 5.3 s390x	SUSE Linux Enterprise Micro 5.3 s390x
SLE Micro 5.2 x86-64	SUSE Linux Enterprise Micro 5.2 x86_64
SLE Micro 5.2 arm64	SUSE Linux Enterprise Micro 5.2 aarch64
SLE Micro 5.2 s390x	SUSE Linux Enterprise Micro 5.2 s390x
SLE Micro 5.1 x86-64	SUSE Linux Enterprise Micro 5.1 x86_64
SLE Micro 5.1 arm64	SUSE Linux Enterprise Micro 5.1 aarch64
SLE Micro 5.1 s390x	SUSE Linux Enterprise Micro 5.1 s390x

Procedure: Adding software channels

1. In the Uyuni Web UI, navigate to **Admin › Setup Wizard › Products**.
2. Locate the appropriate products for your client operating system and architecture using the search bar, and check the appropriate product. This will automatically check all mandatory channels. Also all recommended channels are checked as long as the include recommended toggle is turned on. Click the arrow to see the complete list of related products, and ensure that any extra products you require are checked.
3. Click **[Add Products]** and wait until the products have finished synchronizing.

Alternatively, you can add channels from the command prompt. For this procedure, you need the following products:

Table 25. SLE Micro Products - CLI

OS Version	Base Channel	Updates Channel
SLE Micro 5.5 x86-64	sle-micro-5.5-pool-x86_64	sle-micro-5.5-updates-x86_64
SLE Micro 5.5 arm64	sle-micro-5.5-pool-arm64	sle-micro-5.5-updates-arm64
SLE Micro 5.5 IBM Z (s390x)	sle-micro-5.5-pool-s390x	sle-micro-5.5-updates-s390x
SLE Micro 5.4 x86-64	sle-micro-5.4-pool-x86_64	sle-micro-5.4-updates-x86_64
SLE Micro 5.4 arm64	sle-micro-5.4-pool-arm64	sle-micro-5.4-updates-arm64
SLE Micro 5.4 IBM Z (s390x)	sle-micro-5.4-pool-s390x	sle-micro-5.4-updates-s390x
SLE Micro 5.3 x86-64	sle-micro-5.3-pool-x86_64	sle-micro-5.3-updates-x86_64
SLE Micro 5.3 arm64	sle-micro-5.3-pool-arm64	sle-micro-5.3-updates-arm64
SLE Micro 5.3 IBM Z (s390x)	sle-micro-5.3-pool-s390x	sle-micro-5.3-updates-s390x
SLE Micro 5.2 x86-64	suse-microos-5.2-pool-x86_64	suse-microos-5.2-updates-x86_64
SLE Micro 5.2 arm64	suse-microos-5.2-pool-aarch64	suse-microos-5.2-updates-aarch64
SLE Micro 5.2 IBM Z (s390x)	suse-microos-5.2-pool-s390x	suse-microos-5.2-updates-s390x
SLE Micro 5.1 x86-64	suse-microos-5.1-pool-x86_64	suse-microos-5.1-updates-x86_64
SLE Micro 5.1 arm64	suse-microos-5.1-pool-aarch64	suse-microos-5.1-updates-aarch64
SLE Micro 5.1 IBM Z (s390x)	suse-microos-5.1-pool-s390x	suse-microos-5.1-updates-s390x

Procedure: Adding software channels at the command prompt

1. At the command prompt on the Uyuni container host, as root, add the appropriate channels:

```
mgrctl exec -- mgr-sync add channel <channel_label_1>
mgrctl exec -- mgr-sync add channel <channel_label_2>
mgrctl exec -- mgr-sync add channel <channel_label_n>
```

2. Synchronization starts automatically. If you want to synchronize the channels manually, use:

```
mgrctl exec -- mgr-sync sync --with-children <channel_name>
```

3. Ensure the synchronization is complete before continuing.

5.2.4.2. Client Tools

Without client tools onboarding clients will fail. Client tools you can only add from the command line.

To add the client tools, add these channels from the command prompt:

Table 26. SLE Micro Channels - CLI

OS Version	Client Channel
SLE Micro 5.5	sle-micro-5.5-uyuni-client
SLE Micro 5.4	sle-micro-5.4-uyuni-client
SLE Micro 5.3	suse-micro-5.3-uyuni-client
SLE Micro 5.2	suse-microos-5.2-uyuni-client
SLE Micro 5.1	sle-microos-5.1-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

5.2.4.3. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

5.2.4.4. Register Clients

SLE Micro clients require a reboot after registering.

Following the bootstrapping process, automatic booting is disabled on SLE Micro clients. This change was implemented due to intermittent automatic reboots, which could occurr before Salt could relay the results of applying the bootstrap Salt state.

Although a reboot is automatically scheduled after registration is completed, it is respecting the default reboot manager maintenance window. This window may be several hours after the client is registered. It is advisable to manually reboot the client after the registration script finishes, to speed up the registration and to see the system appear in the system list.

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

When using a bootstrap script with SLE Micro systems, ensure that the certificate section of the script has this content:

```
ORG_CA_CERT=RHN-ORG-TRUSTED-SSL-CERT
ORG_CA_CERT_IS_RPM_YN=0
```

Either edit the bootstrap script directly and add the settings, or create the bootstrap script with these parameters:

```
mgrctl exec -ti -- mgr-bootstrap --script=bootstrap-sle-micro.sh \
    --ssl-cert=/srv/www/htdocs/pub/RHN-ORG-TRUSTED-SSL-CERT
```

5.2.4.5. Reboot SLE Micro

SLE Micro is a transactional system. Transactional updates in general support several reboot methods. It is recommended to use systemd for rebooting in systems managed by Uyuni. Using other methods can lead to undesired behavior.

When bootstrapping a transactional system on Uyuni, systemd will be configured as the reboot method (REBOOT_METHOD), if the system is in its default configuration. Such a configuration allows Uyuni to control the reboot action, and rebooting can be performed immediately or scheduled with Uyuni as wanted.

5.2.4.5.1. Background Information

By default, the reboot method during client installation is set to auto. With the auto boot method, rebootmgrd will be used to reboot the system according to the configured policies if the service is running. Policies can be to reboot instantly or during a maintenance window. For more information, see the rebootmgrd(8) man page. Otherwise if rebootmgrd is not running, Uyuni will call systemctl reboot.

Using any method different from systemd may cause undesired behavior.

5.2.5. Registering SL Micro Clients

This section contains information about registering clients running SL Micro operating system 6.0 x86-64, arm64, and IBM Z (s390x).

The SL Micro uses transactional updates. Transactional updates are atomic (all updates are applied only if all updates succeed) and support rollbacks. They do not affect a running system as no changes are activated until after the system is rebooted.

For more information on transactional updates and rebooting, see https://documentation.suse.com/sles/

html/SLES-all/cha-transactional-updates.html.

5.2.5.1. Add Software Channels

Before you register SL Micro clients to the Uyuni Server, you need to add the required software channels, and synchronize them.

You can add the software channels with the Web UI or from the command line.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

For the Web UI procedure, you need the following products:

Table 27. SL Micro 6.1 Products - WebUI

OS Version	Product Name
SL Micro 6.1 x86-64	SUSE Linux Micro 6.1 x86_64
SL Micro 6.1 arm64	SUSE Linux Micro 6.1 arch64
SL Micro 6.1 s390x	SUSE Linux Micro 6.1 s390x
SL Micro 6.1 ppc64le	SUSE Linux Micro 6.1 ppc64le

Table 28. SL Micro 6.0 Products - WebUI

OS Version	Product Name
SL Micro 6.0 x86-64	SUSE Linux Micro 6.0 x86_64
SL Micro 6.0 arm64	SUSE Linux Micro 6.0 arch64
SL Micro 6.0 s390x	SUSE Linux Micro 6.0 s390x

Procedure: Adding software channels

1. In the Uyuni Web UI, navigate to **Admin › Setup Wizard › Products**.
2. Locate the appropriate products for your client operating system and architecture using the search bar, and check the appropriate product. This will automatically check all mandatory channels. Also all recommended channels are checked as long as the include recommended toggle is turned on. Click the arrow to see the complete list of related products, and ensure

that any extra products you require are checked.

3. Click [Add Products] and wait until the products have finished synchronizing.

Alternatively, you can add channels from the command prompt. For this procedure, you need the following products:

Table 29. SL Micro 6.1 Products - CLI

OS Version	Base Channel
SL Micro 6.1 x86-64	sl-micro-6.1-pool-x86_64

Table 30. SL Micro 6.0 Products - CLI

OS Version	Base Channel
SL Micro 6.0 x86-64	sl-micro-6.0-pool-x86_64

Procedure: Adding software channels at the command prompt

1. At the command prompt on the Uyuni container host, as root, add the appropriate channels:

```
mgrctl exec -- mgr-sync add channel <channel_label_1>
mgrctl exec -- mgr-sync add channel <channel_label_2>
mgrctl exec -- mgr-sync add channel <channel_label_n>
```

2. Synchronization starts automatically. If you want to synchronize the channels manually, use:

```
mgrctl exec -- mgr-sync sync --with-children <channel_name>
```

3. Ensure the synchronization is complete before continuing.

5.2.5.2. Client Tools

Without client tools onboarding clients will fail.

To add the client tools, add these channels from the command prompt:

Table 31. SL Micro Channels - CLI

OS Version	Client Channel
SL Micro 6.1	sl-microos-6.1-uyuni-client
SL Micro 6.0	sl-microos-6.0-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

5.2.5.3. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the

synchronization of a channel log file:

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

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

5.2.5.4. Register Clients

SL Micro clients require a reboot after registering. Although a reboot is automatically scheduled after registration is completed, it is respecting the default reboot manager maintenance window. This window may be several hours after the client is registered. It is advisable to manually reboot the client after the registration script finishes, to speed up the registration and to see the system appear in the system list.

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

When using a bootstrap script with SL Micro systems, ensure that the certificate section of the script has this content:

```
ORG_CA_CERT=RHN-ORG-TRUSTED-SSL-CERT
ORG_CA_CERT_IS_RPM_YN=0
```

Either edit the bootstrap script directly and add the settings, or create the bootstrap script with these parameters:

```
mgrctl exec -ti -- mgr-bootstrap --script=bootstrap-sl-micro.sh \
    --ssl-cert=/srv/www/htdocs/pub/RHN-ORG-TRUSTED-SSL-CERT
```

5.2.5.5. Reboot SL Micro

SL Micro is a transactional system. Transactional updates in general support several reboot methods. It is recommended to use systemd for rebooting in systems managed by Uyuni. Using other methods can lead to undesired behavior.

When bootstrapping a transactional system on Uyuni, systemd will be configured as the reboot method (REBOOT_METHOD), if the system is in its default configuration. Such a configuration allows Uyuni to control the reboot action, and rebooting can be performed immediately or scheduled with Uyuni as wanted.

5.2.5.5.1. Background Information

By default, the reboot method during client installation is set to auto. With the auto boot method, rebootmgrd will be used to reboot the system according to the configured policies if the service is running. Policies can be to reboot instantly or during a maintenance window. For more information, see the rebootmgrd(8) man page. Otherwise if rebootmgrd is not running, Uyuni will call systemctl reboot.

Using any method different from systemd may cause undesired behavior.

5.3. openSUSE Client Registration

You can register openSUSE and openSUSE Leap Micro clients to your Uyuni Server. The method and details varies depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

Do not register a Uyuni Server to itself. The Uyuni Server must be managed individually or by using another separate Uyuni Server. For more information about using multiple servers, see **Specialized-guides › Large-deployments**.

5.3.1. Registering openSUSE Leap Clients

This section contains information about registering clients running openSUSE Leap operating systems. Uyuni supports openSUSE Leap 15 and openSUSE Leap 16 clients using Salt.

Bootstrapping is supported for starting openSUSE Leap clients and performing initial state runs such as setting repositories and performing profile updates.

5.3.1.1. Add Software Channels

Before you register openSUSE Leap clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are:

- openSUSE Leap 15: x86_64 and aarch64.
- openSUSE Leap 16: x86_64, aarch64, ppc64le and s390x

For full list of supported products and architectures, see **Client-configuration › Supported-features**.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

For example, when working with x86_64 architecture, you need this product:

Table 32. openSUSE Leap Channels - CLI

OS Version	openSUSE Leap 16.0	openSUSE Leap 15.6	openSUSE Leap Leap 15.5	openSUSE Leap Leap 15.4
Base Channel	opensuse_leap16_0	opensuse_leap15_6	opensuse_leap15_5	opensuse_leap15_4
Client Channel	opensuse_leap16_0-uyuni-client	opensuse_leap15_6-uyuni-client	opensuse_leap15_5-uyuni-client	opensuse_leap15_4-uyuni-client
Updates Channel		opensuse_leap15_6-updates	opensuse_leap15_5-updates	opensuse_leap15_4-updates
Non-OSS Channel	opensuse_leap16_0-non-oss	opensuse_leap15_6-non-oss	opensuse_leap15_5-non-oss	opensuse_leap15_4-non-oss
Non-OSS Updates Channel		opensuse_leap15_6-non-oss-updates	opensuse_leap15_5-non-oss-updates	opensuse_leap15_4-non-oss-updates
Backports Updates Channel		opensuse_leap15_6-backports-updates	opensuse_leap15_5-backports-updates	opensuse_leap15_4-backports-updates
SLE Updates Channel		opensuse_leap15_6-sle-updates	opensuse_leap15_5-sle-updates	opensuse_leap15_4-sle-updates
openh264 codecs	opensuse_leap16_0-openh264	opensuse_leap15_6-sle-updates	opensuse_leap15_5-sle-updates	opensuse_leap15_4-sle-updates

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
```

```
... <child_channel_label_n>
```

To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

5.3.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

openSUSE Leap channels can be very large. Synchronization can sometimes take several hours.

5.3.1.3. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.3.1.4. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.4. Registering openSUSE Tumbleweed Clients

This section contains information about registering clients running openSUSE operating systems. Uyuni supports openSUSE Tumbleweed clients using Salt.

Bootstrapping is supported for starting openSUSE clients and performing initial state runs such as setting repositories and performing profile updates.

5.4.1. Add Software Channels

Before you register openSUSE clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are: x86_64 and aarch64. For full list of supported products and architectures, see **Client-configuration › Supported-features**.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

For example, when working with x86_64 architecture, you need this product:

Table 33. openSUSE Products - WebUI

OS Version	Product Name
openSUSE Tumbleweed	openSUSE Tumbleweed x86_64

Procedure: Adding software channels

1. In the Uyuni Web UI, navigate to **Admin › Setup Wizard › Products**.
2. Locate the appropriate products for your client operating system and architecture using the search bar, and check the appropriate product. This will automatically check all mandatory channels. Also all recommended channels are checked as long as the include recommended toggle is turned on. Click the arrow to see the complete list of related products, and ensure that any extra products you require are checked.
3. Click **[Add Products]** and wait until the products have finished synchronizing.

Alternatively, you can add channels at the command prompt. The channels you need for this procedure are:

Table 34. openSUSE Channels - CLI

OS Version	Base Channel
openSUSE	opensuse-tumbleweed-pool

Procedure: Adding software channels at the command prompt

1. At the command prompt on the Uyuni container host, as root, add the appropriate channels:

```
mgrctl exec -- mgr-sync add channel <channel_label_1>
mgrctl exec -- mgr-sync add channel <channel_label_2>
mgrctl exec -- mgr-sync add channel <channel_label_n>
```

2. Synchronization starts automatically. If you want to synchronize the channels manually, use:

```
mgrctl exec -- mgr-sync sync --with-children <channel_name>
```

3. Ensure the synchronization is complete before continuing.

Table 35. openSUSE Channels - CLI

OS Version	openSUSE Tumbleweed
Base Channel	opensuse_tumbleweed
Client Channel	opensuse_tumbleweed-uyuni-client
Updates Channel	opensuse_tumbleweed-updates
Non-OSS Channel	opensuse_tumbleweed-non-oss
Non-OSS Updates Channel	opensuse_tumbleweed-non-oss-updates
Backports Updates Channel	opensuse_tumbleweed-backports-updates
SLE Updates Channel	opensuse_tumbleweed-sle-updates

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

5.4.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.

2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

openSUSE channels can be very large. Synchronization can sometimes take several hours.

5.4.3. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.4.4. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.4.5. Registering openSUSE Leap Micro Clients

This section contains information about registering clients running openSUSE Leap Micro operating systems on x86-64 and aarch64 architectures.

The openSUSE Leap Micro is an ultra-reliable, lightweight operating system purpose built for edge computing. It leverages the enterprise hardened security and compliance components of SUSE Linux Enterprise and merges them with a modern, immutable, developer-friendly OS platform.

The openSUSE Leap Micro uses transactional updates. Transactional updates are atomic (all updates are applied only if all updates succeed) and support rollbacks. They do not affect the running system because no changes are activated until the system is rebooted. This information is displayed in the **Systems › Details › Overview** subtab.

For more information on transactional updates and rebooting, see https://documentation.suse.com/sles/html/SLES-all/cha-transactional-updates.html.

Table 36. openSUSE Channels - CLI

OS Version	openSUSE Leap Micro 6.1	openSUSE Leap Micro 5.5	openSUSE Leap Micro 5.4	openSUSE Leap Micro 5.3
Base Channel	opensuse_micro6_1	opensuse_micro5_5	opensuse_micro5_4	opensuse_micro5_3
Client Channel	opensuse_micro6_1 -uyuni-client	opensuse_micro5_5 -uyuni-client	opensuse_micro5_4 -uyuni-client	opensuse_micro5_3 -uyuni-client
SLE Updates Channel	NA	opensuse_micro5_5 -sle-updates	opensuse_micro5_4 -sle-updates	opensuse_micro5_3 -sle-updates

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

5.4.5.1. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

openSUSE Leap Micro channels can be very large. Synchronization can sometimes take several hours.

5.4.5.2. Register Clients

openSUSE Leap Micro clients require reboot after registering.

Following the bootstrapping process, automatic booting is disabled on openSUSE Leap

Micro. This change was implemented due to intermittent automatic reboots, which could occurr before Salt could relay the results of applying the bootstrap salt state.

Reboot is automatically scheduled after registration is completed, but it is respecting the default reboot manager maintenance window. This window may be several hours after the client is registered. To speed up openSUSE Leap Micro registration, manually reboot the client after the registration script finishes.

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.5. Alibaba Cloud Linux Client Registration

You can register Alibaba Cloud Linux clients to your Uyuni Server. The method and details vary depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

5.5.1. Registering Alibaba Cloud Linux Clients

This section contains information about registering clients running Alibaba Cloud Linux operating systems.

Some Alibaba Cloud Linux 2 instances will need two tries to register successfully.

5.5.1.1. Add Software Channels

Before you register Alibaba Cloud Linux clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 37. Alibaba Cloud Linux Channels - CLI

OS Version	Core Channel	Updates Channel	Client Channel
Alibaba Cloud Linux 2	alibaba-2	alibaba-2-updates	alibaba-2-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

5.5.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

5.5.1.3. Create an Activation Key

You need to create an activation key that is associated with your Alibaba Cloud Linux channels.

For more information on activation keys, see **Client-configuration › Activation-keys**.

5.5.1.4. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

Some Alibaba Cloud Linux 2 instances will fail to register on the first try. This is due to a to a known bug in the Alibaba Cloud Linux 2 image.

The python-urlgrabber3 package is provided both as a Python pip package and an RPM package, which can cause a conflict on the first attempt to register.

If your instance is based on one of the affected image versions, the client should register correctly on the second registration attempt.

5.6. AlmaLinux Client Registration

You can register AlmaLinux clients to your Uyuni Server. The method and details vary depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key.

- For more information about creating activation keys, see **Client-configuration › Activation-keys**.
- For more information about migrating AlmaLinux to SUSE Liberty Linux, see client-configuration:clients-sleses.pdf.

5.6.1. Registering AlmaLinux Clients

This section contains information about registering clients running AlmaLinux operating systems.

When created at AWS, AlmaLinux instances always have the same machine-id id at /etc/machine-id. Make sure you regenerate the machine-id after the instance is created. For more information, see **Administration › Troubleshooting**.

5.6.1.1. Add Software Channels

Registering AlmaLinux clients to Uyuni is tested with the default SELinux configuration of enforcing with a targeted policy. You do not need to disable SELinux to register AlmaLinux clients to Uyuni.

Before you can register AlmaLinux clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are: x86_64 and aarch64, on version 9 additionally ppc64le and s390x. For full list of supported products and architectures, see **Client-configuration › Supported-features**.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 38. AlmaLinux Channels - CLI

OS Version	Base Channel	Client Channel	AppStream Channel
AlmaLinux 9	almalinux9	almalinux9-uyuni-client	almalinux9-appstream
AlmaLinux 8	almalinux8	almalinux8-uyuni-client	almalinux8-appstream

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command. Ensure you specify the

correct architecture:

```
mgrctl exec -- spacewalk-common-channels \
-a <architecture> \
<base_channel_name> \
<child_channel_name_1> \
<child_channel_name_2> \
... <child_channel_name_n>
```

2. If automatic synchronization is turned off, synchronize the channels on the container host with the following command:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>-<architecture>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

For AlmaLinux 9 and AlmaLinux 8 clients, add both the Base and AppStream channels. You require packages from both channels. If you do not add both channels, you cannot create the bootstrap repository, due to missing packages.

If you are using modular channels, you must enable the Python 3.6 module stream on the AlmaLinux 8 client. If you do not provide Python 3.6, the installation of the spacecmd package will fail.

You might notice some disparity in the number of packages available in the AppStream channel between upstream and the Uyuni channel. You might also see different numbers if you compare the same channel added at a different point in time. This is due to the way that AlmaLinux manages their repositories. AlmaLinux removes older version of packages when a new version is released, while Uyuni keeps all of them, regardless of age.

5.6.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

5.6.1.3. Create an Activation Key

You need to create an activation key that is associated with your AlmaLinux channels.

For more information on activation keys, see **Client-configuration › Activation-keys**.

5.6.1.4. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the adminstrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.6.1.5. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.6.1.6. Manage Errata

When you update AlmaLinux clients, the packages include metadata about the updates.

5.7. Amazon Linux Client Registration

You can register Amazon Linux clients to your Uyuni Server. The method and details vary depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

5.7.1. Registering Amazon Linux Clients

This section contains information about registering clients running Amazon Linux operating systems.

When created at AWS, Amazon Linux 2 instances always have the same machine-id id at /etc/machine-id. If you are creating Amazon Linux 2 instances, make sure you regenerate the machine-id after the instances are created. For more information, see **Administration › Troubleshooting**.

Amazon Linux 2023 is not affected by this.

5.7.1.1. Add Software Channels

Before you register Amazon Linux clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are: x86_64 and aarch64. For full list of supported products and architectures, see **Client-configuration › Supported-features**.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 39. Amazon Linux Channels - CLI

OS Version	Base Channel	Client Channel
Amazon Linux 2023	amazonlinux2023	amazonlinux2023-uyuni-client

OS Version	Base Channel	Client Channel
Amazon Linux 2	amazonlinux2-core	amazonlinux2-uyuni-client

For Amazon Linux 2, make sure you also add and synchronize amazonlinux2-extra-docker channel if you plan to use Docker at your Amazon Linux instances.

For Amazon Linux 2023, make sure you also add and synchronize amazonlinux2023-kernel-livepatch channel if you plan to use Kernel Live patches at your Amazon Linux instances.

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

5.7.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

5.7.1.3. Create an Activation Key

You need to create an activation key that is associated with your Amazon Linux channels.

For more information on activation keys, see **Client-configuration › Activation-keys**.

5.7.1.4. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.7.1.5. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.8. CentOS Client Registration

You can register CentOS clients to your Uyuni Server. The method and details varies depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key.

- For more information about creating activation keys, see **Client-configuration › Activation-keys**.
- For more information about migrating CentOS to SUSE Liberty Linux, see client-configuration:clients-sleses.pdf.

5.8.1. Registering CentOS Clients

This section contains information about registering clients running CentOS operating systems.

You are responsible for arranging access to CentOS base media repositories and CentOS installation media, as well as connecting Uyuni Server to the CentOS content delivery network.

Registering CentOS clients to Uyuni is tested with the default SELinux configuration of enforcing with a targeted policy. You do not need to disable SELinux to register CentOS clients to Uyuni.

5.8.1.1. Add Software Channels

Before you can register CentOS clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are: x86_64 and aarch64. For full list of supported products and architectures, see **Client-configuration › Supported-features**.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 40. CentOS Channels - CLI

OS Version	Base Channel	Client Channel	Updates/Appstream Channel
CentOS 7	centos7	centos7-uyuni-client	centos7-updates

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command. Ensure you specify the correct architecture:

```
mgrctl exec -- spacewalk-common-channels \
-a <architecture> \
<base_channel_name> \
<child_channel_name_1> \
<child_channel_name_2> \
... <child_channel_name_n>
```

2. If automatic synchronization is turned off, synchronize the channels on the container host with the following command:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>-<architecture>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

If you are using modular channels, you must enable the Python 3.6 module stream on the client. If you do not provide Python 3.6, the installation of the spacecmd package will fail.

You might notice some disparity in the number of packages available in the AppStream channel between upstream and the Uyuni channel. You might also see different numbers if you compare the same channel added at a different point in time. This is due to the way that CentOS manages their repositories. CentOS removes older version of packages when a new version is released, while Uyuni keeps all of them, regardless of age.

5.8.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.

2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

5.8.1.3. Create an Activation Key

You need to create an activation key that is associated with your CentOS channels.

For more information on activation keys, see **Client-configuration › Activation-keys**.

5.8.1.4. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.8.1.5. Register Clients

CentOS 7 will fail to onboard due to the fact that the /etc/yum.repos.d/CentOS-Base.repo has URLs enabled, and thus causing yum to attempt to find the repositories using

fastmirror. This will cause the bootstrap to fail with the error message:

```
Could not resolve host: mirrorlist.centos.org; Unknown error
```

To avoid the issue you can remove the CentOS-Base.repo file with the command:

```
rm -f /etc/yum.repos.d/CentOS-Base.repo
```

Or, if the file needs to remain, you can add enabled=0 to each of the URL sections.

In either case, then rebootstrap.

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.8.1.6. Manage Errata

This section is only applicable to non-containerized Uyuni and it will be removed after CentOS 7 will go end-of-life.

When you update CentOS clients, the packages do not include metadata about the updates. You can use a third-party errata service to obtain this information.

The authors of CEFS provide patches or errata on a best-effort basis, in the hope they are useful but with no guarantees of correctness or currency. This could mean that the patch dates could be incorrect, and in at least one case, the published data was shown to be more than a month old. For more information on these cases, see https://github.com/stevemeier/cefs/issues/28#issuecomment-656579382 and https://github.com/stevemeier/cefs/issues/28#issuecomment-656573607.

Any problems or delays with the patch data might result in unreliable patch information being imported to your Uyuni Server. This would cause reports, audits, CVE updates, or other patch-related information to also be incorrect. Please consider alternatives to using this service, such as independently verifying patch data, or choosing a different operating system, depending on your security-related requirements and certifications criteria.

Procedure: Installing an Errata Service

1. On the Uyuni Server, from the command prompt, as root, add the sle-module-development-tools module:

```
SUSEConnect --product sle-module-development-tools/15.2/x86_64
```

2. Install errata service dependencies:

```
zypper in  perl-Text-Unidecode
```

3. Add or edit this line in /etc/rhn/rhn.conf:

```
java.allow_adding_patches_via_api = centos7-x86_64-updates,centos7-x86_64,centos7-
x86_64-extras
```

4. Restart Tomcat:

```
systemctl restart tomcat
```

5. Create a file for your errata script:

```
touch /usr/local/bin/cent-errata.sh
```

6. Edit the new file to include this script, editing the repository details as required. This script fetches the errata details from an external errata service, unpacks it, and publishes the details:

```
#!/bin/bash
mkdir -p /usr/local/centos
cd /usr/local/centos
rm *.xml
wget -c http://cefs.steve-meier.de/errata.latest.xml
wget -c https://www.redhat.com/security/data/oval/v2/RHEL7/rhel-7.oval.xml.bz2
bzip2 -d rhel-7.oval.xml.bz2
wget -c http://cefs.steve-meier.de/errata-import.tar
tar xvf errata-import.tar
chmod +x /usr/local/centos/errata-import.pl
export SPACEWALK_USER='<adminname>';export SPACEWALK_PASS='<password>'
/usr/local/centos/errata-import.pl --server '<servername>' \
--errata /usr/local/centos/errata.latest.xml  \
--include-channels=centos7-x86_64-updates,centos7-x86_64,centos7-x86_64-extras \
--publish --rhsa-oval /usr/local/centos/rhel-7.oval.xml
```

7. Set up a cron job to run the script daily:

```
ln -s /usr/local/bin/cent-errata.sh /etc/cron.daily
```

For more information on this tool, see https://cefs.steve-meier.de/.

5.9. Debian Client Registration

You can register Debian clients to your Uyuni Server. The method and details varies depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

5.9.1. Registering Debian Clients

This section contains information about registering clients running Debian operating systems.

Bootstrapping can be used with Debian clients for performing initial state runs, and for profile updates.

5.9.1.1. Prepare to Register

Some preparation is required before you can register Debian clients to the Uyuni Server:

- Ensure DNS is correctly configured and provides an entry for the client. Alternatively, you can configure the /etc/hosts files on both the Uyuni Server and the client with the appropriate entries.
- The client must have the date and time synchronized with the Uyuni Server before registration.

5.9.1.2. Add Software Channels

Before you can register Debian clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 41. Debian 12 Channels - CLI

OS Version	Base Channel	Client Channel	Updates Channel	Security Channel
Debian 12	debian-12-pool-amd64-uyuni	debian-12-amd64-uyuni-client	debian-12-amd64-main-updates-uyuni	debian-12-amd64-main-security-uyuni

Table 42. Debian 13 Channels - CLI

Channel description	Channel name
Main	debian-13-pool-amd64-uyuni
Main Updates	debian-13-amd64-main-updates-uyuni
Main Security	debian-13-amd64-main-security-uyuni
Main Backports	debian-13-amd64-main-backports-uyuni
Contrib	debian-13-amd64-contrib-uyuni
Contrib Updates	debian-13-amd64-contrib-updates-uyuni
Contrib Security	debian-13-amd64-contrib-security-uyuni
Contrib Backports	debian-13-amd64-contrib-backports-uyuni
Non-Free	debian-13-amd64-non-free-uyuni
Non-Free Updates	debian-13-amd64-non-free-updates-uyuni
Non-Free Security	debian-13-amd64-non-free-security-uyuni
Non-Free Backports	debian-13-amd64-non-free-backports-uyuni
Non-Free-Firmware	debian-13-amd64-non-free-firmware-uyuni
Non-Free-Firmware Updates	debian-13-amd64-non-free-firmware-updates-uyuni
Non-Free-Firmware Security	debian-13-amd64-non-free-firmware-security-uyuni
Non-Free-Firmware Backports	debian-13-amd64-non-free-firmware-backports-uyuni
Client Tools	debian-13-amd64-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

5.9.1.3. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

Debian channels can be very large. Synchronization can sometimes take several hours.

5.9.1.4. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client

depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

Debian clients can require multiple GPG keys to be installed.

When synchronizing third-party Debian repositories, you will need to import the appropriate GPG key on the server. If the GPG key is missing, synchronization will fail.

For Debian repositories, only the metadata is signed. Therefore importing a GPG key for the software channel is not needed. Packages will not be re-signed by Uyuni.

To see which GPG keys are already imported to Uyuni Server, run the following command:

```
mgrctl exec -- gpg --homedir /var/lib/spacewalk/gpgdir --list-keys
```

To import a new GPG key, run the following command:

```
mgradm gpg add <filename>.gpg
```

5.9.1.5. Root Access

The root user on Debian is disabled by default for SSH access.

To be able to onboard using a regular user, you need to edit the sudoers file.

Procedure: Granting Root User Access

1. On the client, edit the sudoers file:

   ```
   sudo visudo
   ```

   Grant sudo access to the user by adding this line at the end of the sudoers file. Replace <user> with the name of the user that is bootstrapping the client in the Web UI:

   ```
   <user>  ALL=NOPASSWD: /usr/bin/python, /usr/bin/python2, /usr/bin/python3,
   /var/tmp/venv-salt-minion/bin/python
   ```

   This procedure grants root access without requiring a password, which is required for registering the client. When the client is successfully installed it runs with root privileges, so the access is no longer required. We recommend that you remove the line from the sudoers file after the client has been successfully installed.

5.9.1.6. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.10. openEuler Client Registration

You can register openEuler clients to your Uyuni Server. The method and details varies depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

5.10.1. Registering openEuler Clients

This section contains information about registering clients running openEuler operating systems.

When created at AWS, openEuler instances always have the same machine-id id at /etc/machine-id. Make sure you regenerate the machine-id after the instance is created. For more information, see **Administration › Troubleshooting**.

5.10.1.1. Add Software Channels

Before you register openEuler clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are: x86_64 and aarch64.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 43. openEuler Channels - CLI

OS Version	Core Channel	Client Channel	Update Channel	EPOL Channel	Everything Channel
openEuler 22.03	openeuler2203	openeuler2203-uyuni-client	openeuler2203-update	openeuler2203-epol	openeuler2203-everything

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

5.10.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

5.10.1.3. Create an Activation Key

You need to create an activation key that is associated with your openEuler channels.

For more information on activation keys, see **Client-configuration › Activation-keys**.

5.10.1.4. Trust GPG Keys on Clients

Operating systems either trust their own GPG keys directly or at least ship them installed with the minimal system. But third party packages signed by a different GPG key need manual handling. The clients can be successfully bootstrapped without the GPG key being trusted. However, you cannot install new client tool packages or update them until the keys are trusted.

Clients now use GPG key information entered for a software channel to manage the trusted keys. When a software channel with GPG key information is assigned to a client, the key is trusted when the channel is refreshed or the first package is installed from this channel.

The GPG key URL parameter in the software channel page can contain multiple key URLs separated by "whitespace". In case it is a file URL, the GPG key file must be deployed on the client before the software channel is used.

The GPG keys for the Client Tools Channels of Red Hat based clients are deployed on the client into /etc/pki/rpm-gpg/ and can be referenced with file URLs.

Only in case a software channel is assigned to the client they will be imported and trusted by the system.

Because Debian based systems sign only metadata, there is no need to specify extra keys for single channels. If a user configures an own GPG key to sign the metadata as described in "Use Your Own GPG Key" in **Administration › Repo-metadata** the deployment and trust of that key is executed automatically.

5.10.1.5. User Defined GPG Keys

Users can define custom GPG keys to be deployed to a client.

By providing some pillar data and providing the GPG key files in the Salt filesystem, they are automatically deployed to the client.

These keys are deployed into /etc/pki/rpm-gpg/ on RPM based operating systems and to /usr/share/keyrings/ on Debian systems:

Define the pillar key [literalcustom_gpgkeys for the client you want to deploy the key to and list the names of the key file.

```
cat /srv/pillar/mypillar.sls
custom_gpgkeys:
  - my_first_gpg.key
  - my_second_gpgkey.gpg
```

Additionally in the Salt filesystem create a directory named gpg and store there the GPG key files with the name specified in the custom_gpgkeys pillar data.

```
ls -la /srv/salt/gpg/
/srv/salt/gpg/my_first_gpg.key
/srv/salt/gpg/my_second_gpgkey.gpg
```

The keys are deployed to the client at /etc/pki/rpm-gpg/my_first_gpg.key and /etc/pki/rpm-gpg/my_second_gpgkey.gpg.

The last step is to add the URL to the GPG key URL field of the software channel. Navigate to **Software › Manage › Channels** and select the channel you want to modify. Add to GPG key URL the value file:///etc/pki/rpm-gpg/my_first_gpg.key.

5.10.1.6. GPG Keys in Bootstrap Scripts

Procedure: Trusting GPG Keys on Clients Using a Bootstrap Script

1. On the Uyuni Server, at the command prompt, check the contents of the /srv/www/htdocs/pub/ directory. This directory contains all available public keys. Take a note of the key that applies to the channel assigned to the client you are registering.
2. Open the relevant bootstrap script, locate the ORG_GPG_KEY= parameter and add the required key. For example:

```
uyuni-gpg-pubkey-0d20833e.key
```

You do not need to delete any previously stored keys.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. A software channel cannot be assigned to a client when the GPG key is not trusted.

5.10.1.7. Register Clients

openEuler clients are registered in the same way as all other clients. For more information, see **Client-configuration › Registration-overview**.

5.11. Oracle Client Registration

You can register Open Enterprise Server clients to your Uyuni Server. The method and details varies depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key.

- For more information about creating activation keys, see **Client-configuration › Activation-keys**.

5.11.1. Registering Open Enterprise Server Clients

This section contains information about registering clients running Open Enterprise Server operating systems.

5.11.1.1. Add Software Channels

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

Before you register Open Enterprise Server clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The products you need for this procedure are:

Table 44. OES Products - WebUI

OS Version	Product Name
Open Enterprise Server 24.4	Open Enterprise Server 24.4 x86_64
Open Enterprise Server 23.4	Open Enterprise Server 23.4 x86_64

Procedure: Adding software channels

1. In the Uyuni Web UI, navigate to **Admin › Setup Wizard › Products**.
2. Locate the appropriate products for your client operating system and architecture using the search bar, and check the appropriate product. This will automatically check all mandatory channels. Also all recommended channels are checked as long as the include recommended toggle is turned on. Click the arrow to see the complete list of related products, and ensure that any extra products you require are checked.
3. Click **[Add Products]** and wait until the products have finished synchronizing.

Alternatively, you can add channels at the command prompt. The channels you need for this procedure are:

Table 45. OES Products - CLI

OS Version	Base Channel	Name
Open Enterprise Server 24.4	oes24.4-pool-x86_64	OES24.4-Pool for x86_64
Open Enterprise Server 23.4	oes23.4-pool-x86_64"	OES23.4-Pool for x86_64

To find channel names of older products, at the command prompt on the Uyuni Server, as root, use the mgr-sync command:

```
mgr-sync list --help
```

Then specify the argument you are interested in. For example, channels:

```
mgr-sync list channels [-c]
```

Procedure: Adding software channels at the command prompt

1. At the command prompt on the Uyuni container host, as root, add the appropriate channels:

```
mgrctl exec -- mgr-sync add channel <channel_label_1>
mgrctl exec -- mgr-sync add channel <channel_label_2>
mgrctl exec -- mgr-sync add channel <channel_label_n>
```

2. Synchronization starts automatically. If you want to synchronize the

channels manually, use:

```
mgrctl exec -- mgr-sync sync --with-children <channel_name>
```

3. Ensure the synchronization is complete before continuing.

To add the client tools, add these channels from the command prompt:

Table 46. Open Enterprise Channels - CLI

OS Version	Client Channel	Updates
Open Enterprise Server 24.4	oes24.4-sle-manager-tools15-pool-x86_64	oes24.4-sle-manager-tools15-updates-x86_64
Open Enterprise Server 23.4	oes23.4-sle-manager-tools15-pool-x86_64	oes23.4-sle-manager-tools15-updates-x86_64

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

5.11.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.

2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

SUSE Linux Enterprise channels can be very large. Synchronization can sometimes take several hours.

5.11.1.3. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.11.1.4. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.12. Oracle Client Registration

You can register Oracle Linux clients to your Uyuni Server. The method and details varies depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key.

- For more information about creating activation keys, see **Client-configuration › Activation-keys**.
- For more information about migrating Oracle Linux to SUSE Liberty Linux, see client-configuration:clients-sleses.pdf.

5.12.1. Registering Oracle Linux Clients

This section contains information about registering clients running Oracle Linux operating systems.

Direct synchronizing Unbreakable Linux Network (ULN) repositories with Uyuni are not currently supported. An Oracle Local Distribution for ULN must be used. For more information about setting up a local ULN mirror, see the Oracle documentation provided at https://docs.oracle.com/en/operating-systems/oracle-linux/software-management/sfw-mgmt-UseSoftwareDistributionMirrors.html#local-uln-mirror.

5.12.1.1. Add Software Channels

Before you register Oracle Linux clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are: x86_64 and aarch64. For full list of supported products and architectures, see **Client-configuration › Supported-features**.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 47. Oracle Channels - CLI

OS Version	Base Channel	Client Channel	Updates Channel
Oracle Linux 9	oraclelinux9	oraclelinux9-uyuni-client	oraclelinux9-appstream
Oracle Linux 8	oraclelinux8	oraclelinux8-uyuni-client	oraclelinux8-appstream
Oracle Linux 7	oraclelinux7	oraclelinux7-uyuni-client	-

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

For Oracle Linux 9 and Oracle Linux 8 clients, add both the Base and AppStream channels. You require packages from both channels. If you do not add both channels, you cannot create the bootstrap repository, due to missing packages.

If you are using modular channels, you must enable the Python 3.6 module stream on the client. If you do not provide Python 3.6, the installation of the spacecmd package will fail.

5.12.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.

2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

5.12.1.3. Create an Activation Key

You need to create an activation key that is associated with your Oracle Linux channels.

For more information on activation keys, see **Client-configuration › Activation-keys**.

5.12.1.4. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

For Oracle Linux 9 and Oracle Linux 8 clients use

```
ol8-gpg-pubkey-82562EA9AD986DA3.key
```

For Oracle Linux 7 clients use

```
ol67-gpg-pubkey-72F97B74EC551F0A3.key
```

5.12.1.5. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.13. Raspberry Pi OS Client Registration

You can register Raspberry Pi OS clients to your Uyuni Server. The method and details depend on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

5.13.1. Registering Raspberry Pi OS Clients

This section contains information about registering clients running Raspberry Pi OS operating systems.

Bootstrapping can be used with Raspberry Pi OS clients for performing initial state runs, and for profile updates.

5.13.1.1. Prepare to Register

Some preparation is required before you can register Raspberry Pi OS clients to the Uyuni Server:

- Ensure DNS is correctly configured and provides an entry for the client. Alternatively, you can configure the /etc/hosts files on both the Uyuni Server and the client with the appropriate entries.
- The client must have the date and time synchronized with the Uyuni Server before registration.

5.13.1.2. Add Software Channels

Before you register Raspberry Pi OS clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are: arm64 and armhf.

The channels you need for this procedure are:

Table 48. Raspberry Pi 12 OS Channels - CLI

Channel description	arm64	armhf
Base Channel	raspberrypios-12-pool-arm64-uyuni	raspberrypios-12-pool-armhf-uyuni
Client Channel	raspberrypios-12-arm64-uyuni-client	raspberrypios-12-armhf-uyuni-client
Updates Channel	raspberrypios-12-arm64-main-updates-uyuni	-
Contributions Channel	raspberrypios-12-arm64-contrib-uyuni	raspberrypios-12-armhf-contrib-uyuni
Non-Free Channel	raspberrypios-12-arm64-non-free-uyuni	raspberrypios-12-armhf-non-free-uyuni
Non-Free Firmware Channel	raspberrypios-12-arm64-non-free-firmware-uyuni	-
Raspberry Channel	raspberrypios-12-arm64-raspberry-uyuni	raspberrypios-12-armhf-raspberry-uyuni
Contribution Updates	raspberrypios-12-arm64-contrib-updates-uyuni	-
Non-Free Updates	raspberrypios-12-arm64-non-free-updates-uyuni	-
Non-Free Firmware Updates	raspberrypios-12-arm64-non-free-firmware-updates-uyuni	-
Security Main Channel	raspberrypios-12-arm64-main-security-uyuni	-
Security Contribution Channel	raspberrypios-12-arm64-contrib-security-uyuni	-
Security Non-Free Channel	raspberrypios-12-arm64-non-free-security-uyuni	-
Security Non-Free Firmware Channel	raspberrypios-12-arm64-non-free-firmware-security-uyuni	-

Channel description	arm64	armhf
RPI Channel	-	raspberrypios-12-armhf-rpi-uyuni

Table 49. Raspberry Pi 13 OS Channels - CLI

Channel description	arm64	armhf
Main Channel	raspberrypios-13-pool-arm64-uyuni	raspberrypios-13-pool-armhf-uyuni
Main Updates Channel	raspberrypios-13-arm64-main-updates-uyuni	-
Main Security Channel	raspberrypios-13-arm64-main-security-uyuni	-
Main Backports Channel	raspberrypios-13-arm64-main-backports-uyuni	-
Contrib Channel	raspberrypios-13-arm64-contrib-uyuni	raspberrypios-13-armhf-contrib-uyuni
Contrib Updates Channel	raspberrypios-13-arm64-contrib-updates-uyuni	-
Contrib Security Channel	raspberrypios-13-arm64-contrib-security-uyuni	-
Contrib Backports Channel	raspberrypios-13-arm64-contrib-backports-uyuni	-
Non-free Channel	raspberrypios-13-arm64-non-free-uyuni	raspberrypios-13-armhf-non-free-uyuni
Non-free Updates Channel	raspberrypios-13-arm64-non-free-updates-uyuni	-
Non-free Security Channel	raspberrypios-13-arm64-non-free-security-uyuni	-
Non-free Backports Channel	raspberrypios-13-arm64-non-free-backports-uyuni	-
Non-free-firmeware Channel	raspberrypios-13-arm64-non-free-firmware-uyuni	-

Channel description	arm64	armhf
Non-free-firmeware Updates Channel	raspberrypios-13-arm64-non-free-firmware-updates-uyuni	-
Non-free-firmeware Security Channel	raspberrypios-13-arm64-non-free-firmware-security-uyuni	-
Non-free-firmeware Backports Channel	raspberrypios-13-arm64-non-free-firmware-backports-uyun	-
Raspberry Channel	raspberrypios-13-arm64-raspberry-uyuni	raspberrypios-13-armhf-raspberry-uyuni
RPI Channel	-	raspberrypios-13-armhf-rpi-uyuni
Client Channel	raspberrypios-13-arm64-uyuni-client	raspberrypios-13-armhf-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
... <child_channel_label_n>
```

   To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

You need all the new channels fully synchronized before bootstrapping any Raspberry Pi OS client.

5.13.1.3. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

Raspberry Pi OS channels can be very large. Synchronization can sometimes take several hours.

5.13.1.4. Create an Activation Key

You need to create an activation key that is associated with your Raspberry Pi OS channels.

For more information on activation keys, see **Client-configuration › Activation-keys**.

5.13.1.5. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client

depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

Raspberry Pi OS clients can require multiple GPG keys to be installed.

When synchronizing third-party Raspberry Pi OS repositories, you will need to import the appropriate GPG key on the server. If the GPG key is missing, synchronization will fail.

For Raspberry Pi OS repositories, only the metadata is signed. Therefore importing a GPG key for the software channel is not needed. Packages will not be re-signed by Uyuni.

To see which GPG keys are already imported to Uyuni Server, run the following command:

```
mgrctl exec -- gpg --homedir /var/lib/spacewalk/gpgdir --list-keys
```

To import a new GPG key, run the following command:

```
mgradm gpg add <filename>.gpg
```

5.13.1.6. Root Access

The root user on Raspberry Pi OS is disabled by default for SSH access.

To be able to onboard using a regular user, you need to edit the sudoers file.

Procedure: Granting Root User Access

1. On the client, edit the sudoers file:

   ```
   sudo visudo
   ```

   Grant sudo access to the user by adding this line at the end of the sudoers file. Replace <user> with the name of the user that is bootstrapping the client in the Web UI:

   ```
   <user>  ALL=NOPASSWD: /usr/bin/python, /usr/bin/python2, /usr/bin/python3,
   /var/tmp/venv-salt-minion/bin/python
   ```

   This procedure grants root access without requiring a password, which is required for registering the client. When the client is successfully installed it runs with root privileges, so the access is no longer required. We recommend that you remove the line from the sudoers file after the client has been successfully installed.

5.13.1.7. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.14. Red Hat Client Registration

You can register Red Hat Enterprise Linux clients to your Uyuni Server using either the Red Hat content delivery network (CDN), or Red Hat update infrastructure (RHUI). The method and details varies depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key.

- For more information about creating activation keys, see **Client-configuration › Activation-keys**.
- For more information about migrating Red Hat Enterprise Linux to SUSE Liberty Linux, see client-configuration:clients-sleses.pdf.

5.14.1. Registering Red Hat Enterprise Linux Clients with CDN

This section contains information about using the Red Hat content delivery network (CDN) to register clients running Red Hat Enterprise Linux operating systems.

For information about using Red Hat update infrastructure (RHUI) instead, see **Client-configuration › Clients-rh-rhui**.

You are responsible for arranging access to Red Hat base media repositories and RHEL installation media, as well as connecting Uyuni Server to the Red Hat content delivery network. You must obtain support from Red Hat for all your RHEL systems. If you do not do this, you might be violating your terms with Red Hat.

5.14.1.1. Import Entitlements and Certificates

Red Hat clients require a Red Hat certificate authority (CA) and entitlement certificate, and an entitlement key.

Entitlement certificates are embedded with expiration dates, which match the length of the support

subscription. To avoid disruption, you need to repeat this process at the end of every support subscription period.

Red Hat supplies a subscription manager tool to manage subscription assignments. It runs locally to track installed products and subscriptions. Clients must be registered with the subscription manager to obtain certificates.

Red Hat clients use a URL to replicate repositories. The URL changes depending on where the Red Hat client is registered.

Red Hat clients can be registered in three different ways:

- Red Hat content delivery network (CDN) at redhat.com
- Red Hat Satellite Server
- Red Hat update infrastructure (RHUI) in the cloud

This guide covers clients registered to Red Hat CDN. You must have at least one system registered to the CDN, with an authorized subscription for repository content.

For information about using Red Hat update infrastructure (RHUI) instead, see **Client-configuration › Clients-rh-rhui**.

Satellite certificates for client systems require a Satellite server and subscription. Clients using Satellite certificates are not supported with Uyuni Server.

Entitlement certificates are embedded with expiration dates, which match the length of the support subscription. To avoid disruption, you need to repeat this process at the end of every support subscription period.

Red Hat supplies the subscription-manager tool to manage subscription assignments. It runs locally on the client system to track installed products and subscriptions. Register to redhat.com with subscription-manager, then follow this procedure to obtain certificates.

Procedure: Registering Clients to Subscription Manager

1. On the client system, at the command prompt, register with the subscription manager tool:

   ```
   subscription-manager register
   ```

   Enter your Red Hat Portal username and password when prompted.

2. Run command:

```
subscription-manager activate
```

3. Copy your entitlement certificate and key from the client system, to a location that the Uyuni Server can access:

```
cp /etc/pki/entitlement/ /<example>/entitlement/
```

Your entitlement certificate and key both have a file extension of .pem. The key also has key in the filename.

4. Copy the Red Hat CA Certificate file from the client system, to the same web location as the entitlement certificate and key:

```
cp /etc/rhsm/ca/redhat-uep.pem /<example>/entitlement
```

To manage repositories on your Red Hat client, you need to import the CA and entitlement certificates to the Uyuni Server. This requires that you perform the import procedure three times, to create three entries: one each for the entitlement certificate, the entitlement key, and the Red Hat certificate.

Procedure: Importing Certificates to the Server

1. On the Uyuni Server Web UI, navigate to **Systems › Autoinstallation › GPG and SSL Keys**.
2. Click **[Create Stored Key/Cert]** and set these parameters for the entitlement certificate:
   - In the Description field, type Entitlement-Cert-date.
   - In the Type field, select SSL.
   - In the Select file to upload field, browse to the location where you saved the entitlement certificate, and select the .pem certificate file.
3. Click **[Create Key]**.
4. Click **[Create Stored Key/Cert]** and set these parameters for the entitlement key:
   - In the Description field, type Entitlement-key-date.
   - In the Type field, select SSL.
   - In the Select file to upload field, browse to the location where you saved the entitlement key, and select the .pem key file.
5. Click **[Create Key]**.
6. Click **[Create Stored Key/Cert]** and set these parameters for the Red Hat certificate:
   - In the Description field, type redhat-uep.
   - In the Type field, select SSL.

- In the Select file to upload field, browse to the location where you saved the Red Hat certificate, and select the certificate file.

7. Click **[Create Key]**.

5.14.1.2. Add Software Channels

Before you register Red Hat clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 50. Red Hat Channels - CLI

OS Version	Base Channel	Client Channel	Tools Channel
Red Hat 9	rhel9-pool-uyuni	-	rhel9-uyuni-client
Red Hat 8	rhel8-pool-uyuni	-	rhel8-uyuni-client
Red Hat 7	rhel7-pool-uyuni	-	rhel7-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command. Ensure you specify the correct architecture:

```
mgrctl exec -- spacewalk-common-channels \
-a <architecture> \
<base_channel_name> \
<child_channel_name_1> \
<child_channel_name_2> \
... <child_channel_name_n>
```

2. If automatic synchronization is turned off, synchronize the channels on the container host with the following command:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>-<architecture>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

5.14.1.3. Prepare Custom Repositories and Channels

To mirror the software from the Red Hat CDN, you need to create custom channels and repositories in Uyuni that are linked to the CDN by a URL. You must have entitlements to these products in your Red Hat Portal for this to work correctly. You can use the subscription manager tool to get the URLs of the repositories you want to mirror:

```
subscription-manager repos
```

You can use these repository URLs to create custom repositories. This allows you to mirror only the content you need to manage your clients.

You can only create custom versions of Red Hat repositories if you have the correct entitlements in your Red Hat Portal.

The details you need for this procedure are:

Table 51. Red Hat Custom Repository Settings

Option	Setting
Repository URL	The content URL provided by Red Hat CDN
Has Signed Metadata?	Uncheck all Red Hat Enterprise repositories
SSL CA Certificate	redhat-uep
SSL Client Certificate	Entitlement-Cert-date
SSL Client Key	Entitlement-Key-date

Procedure: Creating Custom Repositories

1. On the Uyuni Server Web UI, navigate to **Software › Manage › Repositories**.
2. Click **[Create Repository]** and set the appropriate parameters for the repository.
3. Click **[Create Repository]**.
4. Repeat for all repositories you need to create.

The channels you need for this procedure are:

Table 52. Red Hat Custom Channels

OS Version	Base Channel
Red Hat 9	rhel9-pool-uyuni

OS Version	Base Channel
Red Hat 8	rhel8-pool-uyuni
Red Hat 7	rhel7-pool-uyuni

Procedure: Creating Custom Channels

1. On the Uyuni Server Web UI, navigate to **Software › Manage › Channels**.
2. Click **[Create Channel]** and set the appropriate parameters for the channels.
3. In the Parent Channel field, select the appropriate base channel.
4. Click **[Create Channel]**.
5. Repeat for all channels you need to create. There should be one custom channel for each custom repository.

You can check that you have created all the appropriate channels and repositories, by navigating to **Software › Channel List › All**.

For Red Hat 9 and Red Hat 8 clients, add both the Base and AppStream channels. You require packages from both channels. If you do not add both channels, you cannot create the bootstrap repository, due to missing packages.

If you are using modular channels, you must enable the Python 3.6 module stream on the client. If you do not provide Python 3.6, the installation of the spacecmd package will fail.

When you have created all the channels, you can associate them with the repositories you created:

Procedure: Associating Channels with Repositories

1. On the Uyuni Server Web UI, navigate to **Software › Manage › Channels**, and click the channel to associate.
2. Navigate to the Repositories tab, and check the repository to associate with this channel.
3. Click **[Update Repositories]** to associate the channel and the repository.
4. Repeat for all channels and repositories you need to associate.
5. OPTIONAL: Navigate to the Sync tab to set a recurring schedule for synchronization of this repository.
6. Click **[Sync Now]** to begin synchronization immediately.

5.14.1.4. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

Red Hat Enterprise Linux channels can be very large. Synchronization can sometimes take several hours.

Procedure: OPTIONAL: Creating a Salt State to Deploy Configuration Files

1. On the Uyuni Server Web UI, navigate to **Configuration › Channels**.
2. Click **[Create State Channel]**.
   - In the Name field, type subscription-manager: disable yum plugins.
   - In the Label field, type subscription-manager-disable-yum-plugins.
   - In the Description field, type subscription-manager: disable yum plugins.
   - In the SLS Contents field, leave it empty.
3. Click **[Create Config Channel]**
4. Click **[Create Configuration File]**
   - In the Filename/Path field type /etc/yum/pluginconf.d/subscription-manager.conf.
   - In the File Contents field type:

```
[main]
```

```
enabled=0
```

5. Click **[Create Configuration File]**
6. Take note of the value of the field Salt Filesystem Path`.
7. Click on the name of the Configuration Channel.
8. Click on View/Edit 'init.sls' File
   - In the File Contents field, type:

```
configure_subscription-manager-disable-yum-plugins:
  cmd.run:
    - name: subscription-manager config --rhsm.auto_enable_yum_plugins=0
    - watch:
      - file: /etc/yum/pluginconf.d/subscription-manager.conf
  file.managed:
    - name: /etc/yum/pluginconf.d/subscription-manager.conf
    - source: salt:///etc/yum/pluginconf.d/subscription-manager.conf
```

9. Click **[Update Configuration File]**.

The Creating a Salt State to Deploy Configuration Files procedure is optional.

Procedure: Creating a System Group for Red Hat Enterprise Linux Clients

1. On the Uyuni Server Web UI, navigate to **Systems › System Groups**.
2. Click **[Create Group]**.
   - In the Name field, type rhel-systems.
   - In the Description field, type All RHEL systems.
3. Click **[Create Group]**.
4. Click States tab.
5. Click Configuration Channels tab.
6. Type subscription-manager: disable yum plugins at the search box.
7. Click **[Search]** to see the state.
8. Click the checkbox for the state at the Assign column.
9. Click **[Save changes]**.
10. Click **[Confirm]**.

If you already have RHEL systems added to Uyuni, assign them to the new system group, and then apply the highstate.

Procedure: Adding the System Group to Activation Keys

You need to modify the activation keys you used for RHEL systems to include the system group created above.

1. On the Uyuni Server Web UI, navigate to **Systems › Activation Keys**.
2. For each the Activation Keys you used for RHEL systems, click on it and:
3. Navigate to the Groups tab, and the Join subtab.
4. Check Select rhel-systems.
5. Click **[Join Selected Groups]**.

5.14.1.5. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

For the Red Hat custom channels, if you want to check the Enable GPG Check field, you need to populate the GPG Key URL field. You can use the file URL of the GPG key stored in the directory /etc/pki/rpm-gpg of the Red Hat minion.

Example: file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release

For the complete list of the Red Hat product signing keys, see https://access.redhat.com/security/team/key.

5.14.1.6. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.14.2. Registering Red Hat Enterprise Linux clients with RHUI

This section contains information about using Red Hat update infrastructure (RHUI) to register clients running Red Hat Enterprise Linux operating systems.

If you are running clients in a public cloud, such as Amazon EC2, use this method.

It is possible to use RHUI in conjunction with the Red Hat content delivery network (CDN) to manage your Red Hat Enterprise Linux subscriptions. For information about using Red Hat CDN, see **Client-configuration › Clients-rh-cdn**.

You are responsible for connecting Uyuni Server to the Red Hat update infrastructure. All clients that get updates using this RHUI certificate need to be correctly licensed, please check with your cloud provider and the Red Hat terms of service for more information.

When Red Hat Enterprise Linux clients registered with RHUI are switched off, Red Hat might declare the certificate invalid. In this case, you need to turn the client on again, or get a new RHUI certificate.

5.14.2.1. Import entitlements and certificates

In the past it was required to import the certificates and entitlement data manual into Uyuni Server. This task has been automated by using the same mechanism as for SUSE PAYG instances. For more information, see **Specialized-guides › Public-cloud-guide**.

This guide covers clients registered to Red Hat update infrastructure (RHUI). You must have at least one system registered to RHUI, with an authorized subscription for repository content.

For information about using Red Hat content delivery network (CDN) instead, see **Client-configuration › Clients-rh-cdn**.

Satellite certificates for client systems require a Satellite server and subscription. Clients using Satellite certificates are not supported with Uyuni Server.

The PAYG connection regular checks with the client to get the latest authentication data. It is important that the client stays running and is regular updated. If this does not happen, repository synchronization will fail with authentication errors at some point in time.

Update any Red Hat 7 instance before connecting it.

A Red Hat 9 instance needs to be configured with the crypto policy LEGACY to be able to connect it. Execute sudo update-crypto-policies --set LEGACY to configure it accordingly.

5.14.2.2. Connecting to Red Hat update infrastructure

Procedure: Connecting new Red Hat instance

1. In the Uyuni Web UI, navigate to **Admin › Setup Wizard › PAYG**, and click **[Add PAYG]**.
2. Start with the page section PAYG connection Description.
3. In the Description field, add the description.
4. Move to the page section Instance SSH connection data.
5. In the Host field, enter the instance DNS or IP address to connect from Uyuni.
6. In the SSH Port field, enter the port number or use default value 22.
7. In the User field, enter the username as specified in the cloud.
8. In the Password field, enter the password.
9. In the SSH Private Key field, enter the instance key.
10. In the SSH Private Key Passphrase field, enter the key passphrase.

Authentication keys must always be in PEM format.

If you are not connecting directly to the instance, but via SSH bastion, proceed with Procedure: Adding SSH bastion connection data.

Otherwise, continue with Procedure: Finishing Red Hat connecting.

Procedure: Adding SSH bastion connection data

1. Navigate to the page section Bastion SSH connection data.
2. In the Host field, enter the bastion hostname.
3. In the SSH Port field, enter the bastion port number.
4. In the User field, enter the bastion username.
5. In the Password field, enter the bastion password.
6. In the SSH Private Key field, enter the bastion key.
7. In the SSH Private Key Passphrase field, enter the bastion key passphrase.

Complete the setup with Procedure: Finishing Red Hat connecting.

Procedure: Finishing Red Hat connecting

1. To complete adding new Red Hat connection data, click **[Create]**.

2. Return to PAYG connection data Details page. The updated connection status is displayed on the top section named Information.
3. Connection status is shown in Admin > Setup Wizard > Pay-as-you-go screen, too.
4. If the authentication data for the instance is correct, the column Status shows Credentials successfully updated.

If invalid data is entered at any point, the newly created instance is shown in Admin > Setup Wizard > PAYG, with column Status displaying an error message.

As soon as the authentication data is available on the server, repositories were added for all available repositories on the connected instance. The repositories can be seen in Software > Manage > Repositories

A Red Hat connection will create custom repositories which are owned by organization `1` by default. If a different organization should own the autogenerated repositories, configure java.rhui_default_org_id in /etc/rhn/rhn.conf.

This only defines and updates the repositories. If you want to use a repository for a managed client, you need to specify a Software Channel and connect the repositories to it.

5.14.2.3. Add software channels

Before you register Red Hat clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 53. Red Hat Channels - CLI

OS Version	Base Channel	Client Channel	Tools Channel
Red Hat 7	rhel7-pool-uyuni	-	rhel7-uyuni-client
Red Hat 8	rhel8-pool-uyuni	-	rhel8-uyuni-client
Red Hat 9	rhel9-pool-uyuni	-	rhel9-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command. Ensure you specify the correct architecture:

```
mgrctl exec -- spacewalk-common-channels \
-a <architecture> \
<base_channel_name> \
<child_channel_name_1> \
<child_channel_name_2> \
... <child_channel_name_n>
```

2. If automatic synchronization is turned off, synchronize the channels on the container host with the following command:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>-<architecture>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

5.14.2.4. Prepare custom channels

To mirror the software from RHUI, you need to create custom channels in Uyuni that are linked to autogenerated repositories.

The channels you need for this procedure are:

Table 54. Red Hat Custom Channels

OS Version	Base Channel
Red Hat 7	rhel7-pool-uyuni
Red Hat 8	rhel8-pool-uyuni
Red Hat 9	rhel9-pool-uyuni

Procedure: Creating Custom Channels

1. On the Uyuni Server Web UI, navigate to **Software › Manage › Channels**.
2. Click **[Create Channel]** and set the appropriate parameters for the channels.
3. In the Parent Channel field, select the appropriate base channel.
4. Click **[Create Channel]**.
5. Repeat for all channels you need to create. There should be one custom channel for each custom repository.

You can check that you have created all the appropriate channels and repositories, by navigating to **Software ›**

Channel List › All.

For Red Hat 9 and Red Hat 8 clients, add both the Base and AppStream channels. You require packages from both channels. If you do not add both channels, you cannot create the bootstrap repository, due to missing packages.

When you have created all the channels, you can associate them with the repositories you created:

Procedure: Associating Channels with Repositories

1. On the Uyuni Server Web UI, navigate to **Software › Manage › Channels**, and click the channel to associate.
2. Navigate to the Repositories tab, and check the repository to associate with this channel.
3. Click **[Update Repositories]** to associate the channel and the repository.
4. Repeat for all channels and repositories you need to associate.
5. OPTIONAL: Navigate to the Sync tab to set a recurring schedule for synchronization of this repository.
6. Click **[Sync Now]** to begin synchronization immediately.

5.14.2.5. Check synchronization status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

3. Each child channel generates its own log during the synchronization

> progress. You need to check all the base and child channel log files to be sure that the synchronization is complete.

Red Hat Enterprise Linux channels can be very large. Synchronization can sometimes take several hours.

5.14.2.6. Manage GPG keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.14.2.7. Register clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.15. Rocky Linux Client Registration

You can register Rocky Linux clients to your Uyuni Server. The method and details vary depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key.

- For more information about creating activation keys, see **Client-configuration › Activation-keys**.
- For more information about migrating Rocky Linux to SUSE Liberty Linux, see client-configuration:clients-sleses.pdf.

5.15.1. Registering Rocky Linux Clients

This section contains information about registering clients running Rocky Linux operating systems.

Registering Rocky Linux clients to Uyuni is tested with the default SELinux configuration of enforcing with a targeted policy. You do not need to disable SELinux to register Rocky Linux clients to Uyuni.

5.15.1.1. Add Software Channels

Before you can register Rocky Linux clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

The architectures currently supported are: x86_64 and aarch64, on version 9 additionally ppc64le and s390x. For full list of supported products and architectures, see **Client-configuration › Supported-features**.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 55. Rocky Linux Channels - CLI

OS Version	Base Channel	Client Channel	AppStream Channel
Rocky Linux 9	rockylinux9	rockylinux9-uyuni-client	rockylinux9-appstream
Rocky Linux 8	rockylinux8	rockylinux8-uyuni-client	rockylinux8-appstream

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command. Ensure you specify the correct architecture:

```
mgrctl exec -- spacewalk-common-channels \
-a <architecture> \
<base_channel_name> \
<child_channel_name_1> \
<child_channel_name_2> \
... <child_channel_name_n>
```

2. If automatic synchronization is turned off, synchronize the channels on the container host with the following command:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>-<architecture>
```

3. Ensure the synchronization is complete before continuing.

The client tools channel provided by spacewalk-common-channels is sourced from Uyuni and not from SUSE.

For Rocky Linux 9 and Rocky Linux 8 clients, add both the Base and AppStream channels. You require packages from both channels. If you do not add both channels, you cannot create the bootstrap repository, due to missing packages.

You might notice some disparity in the number of packages available in the AppStream channel between upstream and the Uyuni channel. You might also see different numbers if you compare the same channel added at a different point in time. This is due to the way that Rocky Linux manages their repositories. Rocky Linux removes older version of packages when a new version is released, while Uyuni keeps all of them, regardless of age.

If you are using modular channels with Rocky Linux 8, you must enable the Python 3.6 module stream on the client. If you do not provide Python 3.6, the installation of the spacecmd package will fail.

5.15.1.2. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

3. Each child channel generates its own log during the synchronization

> progress. You need to check all the base and child channel log files to be sure that the synchronization is complete.

5.15.1.3. Create an Activation Key

You need to create an activation key that is associated with your Rocky Linux channels.

For more information on activation keys, see **Client-configuration › Activation-keys**.

5.15.1.4. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

> Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. A software channel cannot be assigned to a client when the GPG key is not trusted.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.15.1.5. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.15.1.6. Manage Errata

When you update Rocky Linux clients, the packages include metadata about the updates.

5.16. Ubuntu Client Registration

You can register Ubuntu clients to your Uyuni Server. The method and details varies depending on the operating system of the client.

Before you start, ensure that the client has the date and time synchronized correctly with the Uyuni Server.

You must also have created an activation key. For more information about creating activation keys, see **Client-configuration › Activation-keys**.

5.16.1. Registering Ubuntu Clients

This section contains information about registering clients running Ubuntu operating systems.

Bootstrapping is supported for starting Ubuntu clients and performing initial state runs such as setting repositories and performing profile updates. However, the root user on Ubuntu is disabled by default, so to use bootstrapping, you require an existing user with sudo privileges for Python.

Canonical does not endorse or support Uyuni.

5.16.1.1. Add Software Channels

Before you register Ubuntu clients to your Uyuni Server, you need to add the required software channels, and synchronize them.

In the following section, descriptions often default to the x86_64 architecture. Replace it with other architectures if appropriate.

The channels you need for this procedure are:

Table 56. Ubuntu Channels - CLI

OS Version	Base Channel	Main Channel	Updates Channel	Security Channel	Client Channel
Ubuntu 24.04	ubuntu-2404-pool-amd64-uyuni	ubuntu-2404-amd64-main-uyuni	ubuntu-2404-amd64-main-updates-uyuni	ubuntu-2404-amd64-main-security-uyuni	ubuntu-2404-amd64-uyuni-client
Ubuntu 22.04	ubuntu-2204-pool-amd64-uyuni	ubuntu-2204-amd64-main-uyuni	ubuntu-2204-amd64-main-updates-uyuni	ubuntu-2204-amd64-main-security-uyuni	ubuntu-2204-amd64-uyuni-client

Procedure: Adding Software Channels at the Command Prompt

1. With the spacewalk-common-channels command you can add the appropriate channels. At the command prompt on the Uyuni container host, as root, execute the following command:

```
mgrctl exec -- spacewalk-common-channels \
<base_channel_label> \
<child_channel_label_1> \
<child_channel_label_2> \
```

```
... <child_channel_label_n>
```

To list all available repositories, execute the command:

```
mgrctl exec -- spacewalk-common-channels -l
```

2. If automatic synchronization is turned off, synchronize the channels:

```
mgrctl exec -- spacewalk-repo-sync -p <base_channel_label>
```

3. Ensure the synchronization is complete before continuing.

You need all the new channels fully synchronized before bootstrapping any Ubuntu client.

5.16.1.2. Mirror Ubuntu ESM packages

Canonical provides Expanded Security Maintenance (**ESM**) packages for Ubuntu Pro users and customers. These packages offer longer maintenance (10 to 12 years) for several operating system components and selected applications.

These repositories can also be synchronized within Uyuni if you extract the required **GPG keys** and your personal **Bearer Token** from a system registered to Ubuntu Pro.

5.16.1.2.1. Extract GPG keys and Bearer Token

Register an Ubuntu host with Ubuntu Pro. You will find your personal registration token in the Ubuntu Pro Dashbaord. An Ubuntu One acconut is required for this.

```
sudo apt-get install ubuntu-advantage-tools
sudo pro attach <perosnal_token>
```

After registration, you will find the Bearer Token in the file /etc/apt/auth.conf.d/90ubuntu-advantage:

```
machine esm.ubuntu.com/apps/ubuntu/ login bearer password <token>  # ubuntu-pro-client
machine esm.ubuntu.com/infra/ubuntu/ login bearer password <token>  # ubuntu-pro-client
```

One dedicated bearer token is used per repository.

Configure the following repositories within Uyuni:

5.16.1.2.2. Configure Ubuntu ESM repositories

Use the following URLs for creating the repositories:

Table 57. Ubuntu ESM repositories

URL	Description
https://bearer:<token>@esm.ubuntu.com/infra/ubuntu/dists/<release>-infra-updates/main/binary-<arch>/	Operating system functional updates
https://bearer:<token>@esm.ubuntu.com/infra/ubuntu/dists/<release>-infra-security/main/binary-<arch>/	Operating system security updates
https://bearer:<token>@esm.ubuntu.com/apps/ubuntu/dists/<release>-apps-updates/main/binary-<arch>/	Application functional updates
https://bearer:<token>@esm.ubuntu.com/apps/ubuntu/dists/<release>-apps-security/main/binary-<arch>/	Application security updates

Replace <token> with your personal Bearer Token. Also, arch and release must be replaced with one of the following values:

Table 58. Ubuntu ESM architectures and releases

Architectures	Releases
amd64, arm64, armel, armhf, i386, powerpc, ppc64el, s390x	bionic, focal, jammy, noble, trusty, xenial

In order for Uyuni to synchronize the repositories, the corresponding GPG keys (ubuntu-advantage-esm-infra-trusty.gpg, ubuntu-advantage-esm-apps.gpg) must be imported. These are located on a system registered with Ubuntu Pro under /etc/apt/trusted.gpg.d. Copy these files to the Uyuni system and import them as follows:

```
mgradm gpg add /path/to/gpg.key
```

Create the appropriate child channels below already synchronized Ubuntu parent channels. After that, repositories can be synchronized.

The procedure shown here can be used to circumvent the subscription limitations - however, this constitutes a breach of the Terms of Service and may have **legal consequences**. There must always be sufficient subscriptions for the number of systems used.

5.16.1.3. Check Synchronization Status

Procedure: Checking Synchronization Progress From the Web UI

1. In the Uyuni Web UI, navigate to **Software › Manage › Channels**, then click the channel associated to the repository.
2. Navigate to the Repositories tab, then click Sync and check Sync Status.

Procedure: Checking synchronization progress from the command prompt

1. To list available logs before tailing, on the container host, run the following command:

```
mgrctl exec ls /var/log/rhn/reposync/
```

2. At the command prompt on the Uyuni container host, as root, check the synchronization of a channel log file:

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

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

Ubuntu channels can be very large. Synchronization can sometimes take several hours.

5.16.1.4. Manage GPG Keys

Clients use GPG keys to check the authenticity of software packages before they are installed. Only trusted software can be installed on clients.

Trusting a GPG key is important for security on clients. It is the task of the administrator to decide which keys are needed and can be trusted. Because a software channel cannot be used when the GPG key is not trusted, the decision of assigning a channel to a client depends on the decision of trusting the key.

For more information about GPG keys, see **Client-configuration › Gpg-keys**.

5.16.1.5. Root Access

The root user on Ubuntu is disabled by default for SSH access.

To be able to onboard using a regular user, you need to edit the sudoers file.

This issue happens with self-installed versions of Ubuntu. If the default user has been granted administrative privileges during installation time, a password is required to perform privilege escalation using sudo. With cloud instances this does not happen because cloud-init automatically creates a file under /etc/sudoers.d and grants privilege escalation through sudo without the need for a password.

5.16.1.5.1. Grant Root User Access

Procedure: Granting Root User Access

1. On the client, edit the sudoers file:

```
sudo visudo
```

Grant sudo access to the user by adding this line at the end of the sudoers file. Replace <user> with the name of the user that is bootstrapping the client in the Web UI:

```
<user>  ALL=NOPASSWD: /usr/bin/python, /usr/bin/python2, /usr/bin/python3,
/var/tmp/venv-salt-minion/bin/python
```

This procedure grants root access without requiring a password, which is required for registering the client. When the client is successfully installed it runs with root privileges, so the access is no longer required. We recommend that you remove the line from the sudoers file after the client has been successfully installed.

5.16.1.5.2. Bootstrap as Install-created User via SSH

To bootstrap an Ubuntu client via SSH you must add the install-created user to the sudo group. Then run the bootstrap script from the client.

Procedure: Adding Install-created User to sudo Group and Bootstrapping via SSH

1. On the client, as root, run from the command line (replace <username> with the name of the install-created user):

```
sudo usermod -aG sudo <username>
```

2. Bootstrap the client system from its command line (replace <SERVER_FQDN> with the fully qualified domain name of the Uyuni Server):

```
sudo su -
curl -Sks https://<SERVER_FQDN>/pub/bootstrap/bootstrap-script.sh | /bin/bash
```

Ubuntu can only be bootstrapped using the corresponding Ubuntu bootstrap script run from the client system's command line after issuing sudo su - as above. It cannot be bootstrapped via the Uyuni Web UI due to the fact that the root user is disabled on Ubuntu by default, and that the Web UI does not permit for privilege escalation of the Ubuntu install-created user.

5.16.1.6. Register Clients

To register your clients, you need a bootstrap repository. By default, bootstrap repositories are automatically created, and regenerated daily for all synchronized products. You can manually create the bootstrap repository from the command prompt on the container host:

```
mgrctl exec -ti mgr-create-bootstrap-repo
```

For more information on registering your clients, see **Client-configuration › Registration-overview**.

5.17. Client Registration to a Proxy

Proxy servers can act as a broker and package cache for clients. Registering clients to a proxy is similar to registering them directly to the Uyuni Server, with a few key differences.

These sections contain information on registering clients to a proxy using the Web UI, commands on the command line, or a bootstrap script. There are also procedures how you can move clients from one Uyuni Proxy to another one or to the Uyuni Server.

Within the Web UI, proxy pages show information about clients. You can see a list of clients that are connected to a proxy by clicking the name of the proxy in **Systems › System List › Proxy**, then select the Proxy subtab of the Details tab.

A list of chained proxies for a client can be seen by clicking the name of the client in **Systems › All**, then select the Connection subtab of the Details tab.

5.17.1. Move Clients Between Proxies

You can move clients (Salt) and Salt SSH push clients between proxies without the need to repeat the registration process.

You cannot move chained proxies. Instead of moving a chained proxy, create a new proxy, move the clients, and delete the old proxy.

Procedure: Moving Clients or Salt SSH Push Client Between Proxies

1. In the Uyuni Web UI, navigate to the System Details page for the client you want to move between proxies.
2. Navigate to the Connection tab. Then follow the Change proxy link to see the drop-down menu.
3. From the New Proxy drop-down menu select the proxy you want the client to move to, and click **[Change Proxy]**.

Procedure: Moving Multiple Clients or Salt SSH Push Clients Between Proxies with SSM

1. In the Uyuni Web UI, navigate to **Systems › System List** and check each client to move, this adds the clients to the system set manager.
2. Navigate to **Systems › System Set Manager**, and go to the **Misc › Proxy`` ` tab.**
3. From the New Proxy drop-down menu select the proxy you want the clients to move to, and click **[Change Proxy]**.

The same functionality is also available with the system.changeProxy API call.

5.17.1.1. Background Information

The effect of this function differs between normal Salt clients and Salt SSH push clients.

5.17.1.1.1. Default Clients

The function schedules a Salt state action, which modifies master: setting in the susemanager.conf Salt client configuration file to point to the new proxy. Then the function restarts the Salt client.

Changing master: by manually editing the susemanager.conf file has the same effect and is supported, too.

When the client restarts and reconnects via the new proxy, the server updates the proxy path in the database and schedules another action for refreshing the channel URLs.

5.17.1.1.2. Salt SSH Push Clients

The function updates the proxy path immediately in the database and new action for refreshing the channel URLs is scheduled.

5.17.2. Move Clients from Proxies to the Server

If you want to move a client from a proxy to the server, select None from proxy list.

5.17.3. Register Clients to a Proxy With the Web UI

You can register clients to the Uyuni Proxy using the Web UI.

A bootstrap repository is needed for non-SLE clients in general and for SLE clients before version 15.

For information about creating a bootstrap repository, see **Client-configuration › Bootstrap-repository**.

Procedure: Registering Clients to a Proxy with the Web UI

1. In the Uyuni Web UI, navigate to **Systems › Bootstrapping**.
2. In the Host field, type the fully qualified domain name (FQDN) of the client to be bootstrapped.
3. In the SSH Port field, type the SSH port number to use to connect and bootstrap the client. By default, the SSH port is 22.
4. In the User field, type the username to log in to the client. By default, the username is root.
5. In the Authentication Method field, select the authentication method to use for bootstrapping the client.
    - For password authentication, in the Password field, type password to log in to the client.
    - For SSH Private key authentication, enter the private key and the associated passphrase. The key is only stored for as long as the bootstrapping process takes to complete.
6. In the Activation Key field, select the activation key that is associated with the software channel you want to use to bootstrap the client.
7. In the Proxy field, select the proxy server you want to register to.
8. By default, the Disable SSH Strict Key Host Checking checkbox is selected. This allows the bootstrap process to automatically accept SSH host keys without requiring you to manually authenticate.
9. OPTIONAL: Check the Manage System Completely via SSH checkbox. If you check this option, the client is configured to use SSH for its connection to the server, and no other connection method is configured.
10. Click **[Bootstrap]** to begin registration.

When the bootstrap process has completed, your client is listed at **Systems › System List**.

5.17.4. Register Clients to a Proxy on the Command Line

Instead of the Web UI, you can use the command line to register a client to a proxy. This procedure requires that you have installed the Salt package on the client before registration. For SLE 12 based clients, you also

must have activated the Advanced Systems Management module.

Procedure: Registering Clients to a Proxy Using the Command Line

1. Choose a client configuration file located at:

```
/etc/salt/minion
```

   or:

```
/etc/salt/minion.d/NAME.conf
```

   This is sometimes also called a minion file.

2. Add the proxy FQDN as the master to the client configuration file:

```
master: PROXY123.EXAMPLE.COM
```

3. Restart the salt-minion service:

```
systemctl restart salt-minion
```

4. On the server, accept the new client key; replace <client> with the name of your client:

```
salt-key -a '<client>'
```

5.17.5. Register Clients to a Proxy with a Bootstrap Script

Clients can be registered through the Uyuni Proxy with a bootstrap script. This is done almost the same way as registering clients directly with the Uyuni Server.

Create the bootstrap script in the Uyuni Server container with the mgr-bootstrap command line tool. mgr-bootstrap requires parameters such as the fully qualified domain name (FQDN) of the proxy, activation keys, or GPG keys. FQDN of the proxy is mandatory. All other parameters depend on the specific setup.

The bootstrap script then deploys all necessary information to the clients.

Procedure: Registering Clients to a Proxy with a Bootstrap Script

1. Create a client activation key on the Uyuni Server using the Web UI. For more information, see **Client-configuration › Activation-keys**.
2. On the container host of the server, start a terminial in the container:

```
mgrctl term
```

a. In the container, to create the bootstrap script, execute the mgr-bootstrap command, for example, with these options:

```
mgr-bootstrap --hostname=MLM_PROXY --activation-keys=ACTIVATION_KEY \
  --script bootstrap-MLM_PROXY.sh
```

Replace MLM_PROXY with the host name of your proxy.

With the --script option you save the bootstrap script with a descriptive name. If needed, use additional command line options to customize your bootstrap script. To view available options type mgr-bootstrap --help from the command line.

b. OPTIONAL: Edit the resulting bootstrap script.

3. Execute the bootstrap script. There are two options:

- Transfer the script to the client and run it directly on the clients. Alternatively, because the proxy forwards requests to the server, the client can download it from http://MLM_PROXY/pub/bootstrap-MLM_PROXY.sh. Replace MLM_PROXY with the host name of your proxy.
- Execute the script from the proxy with ssh. Replace MLM_PROXY with the host name of the proxy and <client.example.com> with the host name of the client:

```
cat /srv/www/htdocs/pub/bootstrap/bootstrap-MLM_PROXY.sh | ssh
root@<client.example.com> /bin/bash
```

5.18. Registering Clients on a Public Cloud

When you have your Uyuni Server set up, you are ready to start registering clients.

5.18.1. Add Products and Synchronize Repositories

Ensure you have already added the corresponding products for your clients and synced the repositories to Uyuni. This is required to create the bootstrap repositories used for registering clients.

For more information, see **Specialized-guides › Public-cloud-guide**.

5.18.2. Prepare On-demand Images

An instance started from an on-demand image provided by SUSE is automatically registered, and the update infrastructure and SUSE Linux Enterprise modules are activated. To use your on-demand image as a Uyuni client, you need to disable this automation before you begin.

Procedure: Preparing On-demand Images

1. Log in to the on-demand instance.
2. At the command prompt, as root, remove the registration data and repositories:

```
registercloudguest --clean
```

3. Remove the trigger service for automatic registration:

```
systemctl disable guestregister.service
```

4. in Microsoft Azure, there is an additional service that needs to be disabled:

```
systemctl disable regionsrv-enabler-azure.timer
```

5.18.3. Register Clients

In the Uyuni Web UI, navigate to **Systems › Bootstrapping**, then fill in the Host, SSH Port, User, and Password fields. Make sure you use stable FQDNs for the Host field, or Uyuni cannot find your host when your Public Cloud gives you a different short-lived FQDNS.

Public cloud images usually do not allow SSH login with username and password, but only SSH with a certificate. If you want to use bootstrap from the Web UI, you need to enable SSH login with username and SSH key. You can do this by navigating to **Systems › Bootstrapping** and changing the authentication method.

If your cloud provider is Microsoft Azure, you can log in with username and password. To do this, you need to allow the AzureUser to run commands as root without a password. To do this, open the /etc/sudoers.d/waagent file, and add or edit this line:

```
AzureUser ALL=(ALL) NOPASSWD: ALL
```

Allowing the AzureUser to run commands as root without a password carries a security risk. Use this method for testing only. Do not do this for production systems.

When the bootstrap process has completed successfully, your client is listed at **Systems › System List**.

- If you want more control over the process or have to register many clients, create a bootstrap script. For more information, see **Client-configuration › Registration-bootstrap**.
- For Salt clients and even more control over the process, executing single commands on the command line can be useful. For more information, see **Client-configuration › Registration-cli**.
- When registering clients launched from a public cloud image (for example, AWS AMI), you need to do

some additional configuration to prevent them from over-writing each other. For more information about registering clones, see **Administration › Troubleshooting**.

5.18.4. Activation Keys

Activation keys are used to ensure that your clients have the correct software entitlements, are connecting to the appropriate channels, and are subscribed to the relevant groups. Each activation key is bound to an organization, which you can set when you create the key.

For more on activation keys, see **Client-configuration › Activation-keys**.

5.18.5. Automatic Registration of Clients Created by Terraform

New clients created by Terraform can be automatically registered to Uyuni. Registration can be achieved in two ways:

- cloud-init based registration
- remote execution provisioner based registration

5.18.5.1. cloud-init Based Client Registration

Registering by leveraging cloud-init is the preferred way of automatic registering of the newly created virtual machines. This solution avoids configuring an SSH connection to the host. It can also be used regardless of the tool used for client creation.

User can pass the set of user data when deploying the image with Terraform, to automatically register the machine to Uyuni. user_data is run only once at bootstrap, and only the first time the machine is started.

Before using cloud-init to register clients, the user must configure:

- Bootstrap script. For more information, see **Client-configuration › Registration-bootstrap**.
- Activation keys. For more information, see **Client-configuration › Activation-keys**.

The following command will download the bootstrap script and register the new machine when it is created. It should be added to the cloud-init configuration:

```
curl -s http://hub-server.tf.local/pub/bootstrap/bootstrap-default.sh | bash -s
```

Any time user_data is updated to change the provisioning, Terraform will destroy and then recreate the machines with a new IP, etc.

For more information about cloud-init on AWS, see https://registry.terraform.io/providers/hashicorp/

template/latest/docs/data-sources/cloudinit_config.

For a cloud-init example, see https://registry.terraform.io/providers/hashicorp/cloudinit/latest/docs/data-sources/cloudinit_config#example-usage.

5.18.5.2. remote-exec Provisioner Based Registration

The second solution for automatic registering of the newly created virtual machines uses Terraform's remote-exec provisioner.

remote-exec provisioner interacts with the newly created machines. It opens an SSH connection and can run commands on that machine.

When using remote-exec provisioner to register clients, the user must ensure that the machine running Terraform will have access to the new virtual machine after its creation.

The remaining requirements are the same as when using cloud-init Based Client Registration:

- Bootstrap script. For more information, see **Client-configuration › Registration-bootstrap**.
- Activation keys. For more information, see **Client-configuration › Activation-keys**.

The following command will download the bootstrap script and register the new machine when it is created. It should be defined as the remote command to run:

```
curl -s http://hub-server.tf.local/pub/bootstrap/bootstrap-default.sh | bash -s
```

For more information about remote-exec provisioner, see https://www.terraform.io/docs/provisioners/remote-exec.html.

Chapter 6. Client Upgrades

Clients use the versioning system of their underlying operating system, and require regular upgrades.

For SCC registered clients using SUSE operating systems, you can perform upgrades within the Uyuni Web UI. For supported SUSE Linux Enterprise 15 upgrade paths, see https://documentation.suse.com/sles/15-SP6/html/SLES-all/cha-upgrade-paths.html

To upgrade clients running SLE 12 to SLE 15, the upgrade is automated, but you need to do some preparation steps before you begin. For more information, see **Client-configuration › Client-upgrades-major**.

You can also automate client upgrades using the content lifecycle manager. For more information, see **Client-configuration › Client-upgrades-lifecycle**.

For more information about product migration such as service pack upgrades, openSUSE Leap minor version upgrades, or openSUSE Leap to SUSE Linux Enterprise migrations, see **Client-configuration › Client-upgrades-product-migration**.

For more information about upgrading unregistered openSUSE Leap clients, see **Client-configuration › Client-upgrades-uyuni**.

6.1. Major Version Upgrade

The clients must have the latest available service pack (SP) for the installed operating system, with all the latest updates applied. Before you start, ensure that the system is up to date and all updates have been installed successfully.

The upgrade is controlled by YaST and AutoYaST, it does not use Zypper.

6.1.1. Prepare to Migrate

Before you can migrate your client from SLE 12 to SLE 15, you need to:

1. Prepare installation media
2. Declare an autoinstallation distribution
3. Create an activation key
4. Create an autoinstallation profile

6.1.1.1. Prepare Installation Media

Procedure: Preparing Installation Media

1. On the container host, download an ISO image with the installation sources.
2. Use mgradm to import the installation data from the ISO image:

```
mgradm distribution copy <image_name>.iso <image_name>
```

3. Take a note of the distribution path reported by mgradm. You will need it when you declare the distribution to Uyuni.

This image can be used for multiple autoinstallation distributions.

For more information, see **Client-configuration › Autoinst-distributions**.

6.1.1.2. Declare an Autoinstallation Distribution

Procedure: Declaring an Autoinstallation Distribution

1. In the Uyuni Web UI, navigate to **Systems › Autoinstallation › Distributions**.
2. Click Create Distribution , and complete these fields:

   In the Distribution Label field, enter a name to identify your autoinstallation distribution. For example, sles15sp6-x86_64. * In the Tree Path field, enter the path to the installation media you already saved. * Select the matching Base Channel. This must match the installation media. * Select the Installer Generation. This must match the installation media. * OPTIONAL: Specify kernel options to use when booting this distribution. There are multiple ways to provide kernel options. Only add options here that are generic for the distribution.

3. Click **[Create Autoinstallable Distribution]**.

6.1.1.3. Create an Activation Key

For example, to switch from the old SLE 12 base channel to the new SLE 15 channel, you need an activation key.

Procedure: Creating an Activation Key

1. In the Uyuni Server Web UI, navigate to **Systems › Activation Keys** and click Create Key.
2. Enter a description for your key.
3. Enter a key or leave it blank to generate an automatic key.
4. OPTIONAL: If you want to limit the usage, enter your value in the Usage text field.
5. Select the SLE-Product-SLES15-SP6-Pool for x86_64 base channel.

6. OPTIONAL: Select any Add-On System Types. For more information, see https://documentation.suse.com/sles/15-SP6/html/SLES-all/article-modules.html.
7. Click **[Create Activation Key]**.
8. Click the Child Channels tab and select the required channels.
9. Click **[Update Key]**.

6.1.1.4. Create an Autoinstallation Profile

Autoinstallation profiles contain all the installation and configuration data needed to install a system. They can also contain scripts to be executed after the installation is complete. For example scripts that you can use as a starting point, see https://github.com/SUSE/manager-build-profiles/tree/master/AutoYaST.

For valid AutoYaST upgrade settings, see https://doc.opensuse.org/projects/autoyast/#CreateProfile-upgrade.

Procedure: Creating an Autoinstallation Profile

1. In the Uyuni Web UI, navigate to **Systems › Autoinstallation › Profiles** and upload your autoinstallation profile script.

   For example scripts that you can use as a starting point, see:

   https://github.com/SUSE/manager-build-profiles/tree/master/AutoYaST.

2. In the Kernel Options field, type `autoupgrade=1`.

   Optionally, you can also include the `Y2DEBUG=1` option. The debug setting is not required but can help with investigating any future problems you might encounter.

   Clients running in Azure cloud must add `textmode=1 console=ttyS0` to Kernel Options.

3. Paste the autoinstallation profile or use the file upload field.
4. Click **[Create]** to save.
5. When the uploaded profile requires variables to be set, navigate to **Systems › Autoinstallation › Profiles**, select the profile to edit, and navigate to the Variables tab.

   Specify the required variables, using this format:

```
<key>=<value>
```

6.1.2. Migration

Before you begin, check that all the channels referenced in the autoinstallation profile are available and fully synchronized.

You can monitor the mirroring progress in /var/log/rhn/reposync/<channel-label>.log.

Procedure: Migrating

1. In the Uyuni Server Web UI, navigate to Systems and select the client to be upgraded.
2. Navigate to the Provisioning tab, and select the autoinstallation profile you uploaded.
3. Click **[Schedule Autoinstallation and Finish]**. The system downloads the required files, change the bootloader entries, reboot, and start the upgrade.

Next time the client synchronizes with the Uyuni Server, it receives a re-installation job. The re-installation job fetches the new kernel and initrd packages. It also writes a new /boot/grub/menu.lst (GRUB Legacy) or /boot/grub2/grub.cfg (GRUB 2), containing pointers to the new kernel and initrd packages.

When the client next boots, it uses grub to boot the new kernel with its initrd. PXE booting is not used during this process.

Approximately three minutes after the job was fetched, the client goes down for reboot.

For clients, use the spacewalk/minion_script snippet to register the client again after migration has completed.

6.2. Upgrade Using the Content Lifecycle Manager

When you have many SUSE Linux Enterprise Server clients to manage, you can automate in-place upgrades using the content lifecycle manager.

6.2.1. Prepare to Upgrade

Before you can upgrade your clients, you need to make these preparations:

- Create a content lifecycle project
- Create an activation key
- Create an autoinstallable distribution
- Create an autoinstallation profile

Procedure: Creating a Content Lifecycle Project

1. Create a content lifecycle project for your distribution.

   For more information, see **Administration › Content-lifecycle**.

2. Ensure you a choose a short but descriptive name for your project.
3. Include all source channel modules that you require for your distribution.
4. Add filters as required, and set up at least one environment.

Procedure: Creating an Activation Key

1. Create an activation key for your distribution.

   For more information, see **Client-configuration › Activation-keys**.

2. Ensure your activation key includes all filtered project channels.

Procedure: Creating an Autoinstallable Distribution

1. Create an autoinstallable distribution for every base channel you want to migrate.

   For more information, see **Client-configuration › Autoinst-distributions**.

2. Give your distribution a label that references the name of the content lifecycle project.
3. In the Installer Generation field, select the SLES version you are using.

Procedure: Creating an Autoinstallation Profile

1. Create an autoinstallation profile for every target distribution and service pack you want to upgrade to.

   For more information, see **Client-configuration › Autoinst-profiles**.

2. You can use variables in the profile to distinguish between the different lifecycle environments.

For example autoinstallation profiles, see https://github.com/SUSE/manager-build-profiles/tree/master/AutoYaST.

Use these variables in your autointallation profiles for automating in-place upgrades:

Listing 4. Example: Variables for Use in Autoinstallation Profiles

```
registration_key=1-15sp1-demo-test
org=1
channel_prefix=15sp1-demo-test
distro_label=15sp1-demo-test
```

Listing 5. Example: Entry for Use in Autoinstallation Profiles

```
 <listentry>
     <ask_on_error config:type="boolean">true</ask_on_error>
     <media_url>https://$redhat_management_server/ks/dist/child/$channel_prefix-sle-
module-web-scripting15-sp1-pool-x86_64/$distro_label</media_url>
     <name>$channel_prefix SLE-Module-Web-Scripting15-SP1 Pool for x86_64 </name>
     <product>Web Scripting Module 15 SP1 x86_64 Pool</product>
</listentry>
```

6.2.2. Upgrade

When you have prepared the server for the upgrade, you can provision the clients.

Procedure: Provisioning the Clients

1. In the Uyuni Web UI, navigate to **Systems › System List**, and select the clients you want to provision to add them to the system set manager.
2. Navigate to **Systems › System Set Manager › Overview** and click the Provisioning tab.
3. Select the autoinstallation profile to use.

For clients that are able to use PXE, the migration is automated as soon as you have provisioned them. For all other clients, you can use Cobbler to perform the upgrade.

Procedure: Using Cobbler to Upgrade Clients

1. At the command prompt, as root, to get to a shell inside the container, run:

```
mgrctl term
```

2. Check the available Cobbler profiles:

```
cobbler profile list
```

3. Build the ISO file with your chosen profile and distribution:

```
cobbler buildiso --iso=/tmp/SLE_15-sp1.iso --profiles=SLE_15-sp1:1:Example
--distro=SLE_15-sp1
```

For more information about using CD-ROMs to provision clients, see **Client-configuration › Autoinst-cdrom**.

6.3. Product Migration

6.3.1. Introduction

Product migration allows you to upgrade SLE-based client systems from an Service Pack (SP) level to a later one. For example, you can migrate SUSE Linux Enterprise Server 15 SP5 to SUSE Linux Enterprise Server 15 SP6. You can also upgrade clients such as Red Hat Enterprise Linux or CentOS to SUSE Liberty Linux.

Product migration requires that all repositories which are enabled on the client and which should be migrated must be valid, otherwise the migration will abort.

Uyuni supports the following migration paths:

6.3.1.1. Migration within the same major version

Product migration is for upgrading within the same major version. You cannot use product migration to migrate from SUSE Linux Enterprise Server 12 to SUSE Linux Enterprise Server 15. For more information about major upgrades, see **Client-configuration › Client-upgrades-major**.

6.3.1.2. Migration of openSUSE Leap to a later minor version or to the corresponding SUSE Linux Enterprise Server SP

You can also migrate openSUSE Leap to a later minor version or to the corresponding SUSE Linux Enterprise Server SP level, for example:

- openSUSE Leap 15.5 to 15.6
- openSUSE Leap 15.6 to SUSE Linux Enterprise Server 15 SP6

6.3.1.3. Migration of SUSE Linux Enterprise Server to the corresponding SUSE Linux Enterprise Server for SAP Applications SP

You can also migrate SUSE Linux Enterprise Server to the corresponding SUSE Linux Enterprise Server for SAP Applications SP level, for example:

- SUSE Linux Enterprise Server 15 SP5 to SUSE Linux Enterprise Server for SAP Applications 15 SP5

In SUSE Linux Enterprise Server 12 and later, SUSE supports service pack skipping if SUSE Customer Center provides it. For example, you can upgrade from SUSE Linux Enterprise Server 15 to SP2, without installing SP1.

For supported SUSE Linux Enterprise Server upgrade paths, see https://documentation.suse.com/en-us/sles/15-SP6/html/SLES-all/cha-upgrade-paths.html#sec-upgrade-paths-supported.

- All recommended extensions are automatically enabled when you migrate.
- During migration, Uyuni automatically accepts any required licenses (EULAs) before installation.

6.3.2. Single System Migration

Before starting the product migration:

- Ensure there are no pending updates or patches. Check the System Status on the client system's **Details › Overview** page, and install all offered updates or patches. If your client system is not up to date, product migration may fail.
- Make sure all the channels of the target product are fully synchronized. To check the synchronization status in the Web UI, navigate to the **Admin › Setup Wizard › Products** page.
- Ensure you have a working system backup available, in case of an emergency. Product migration does not have a rollback feature. When the migration procedure has begun, rolling back is not possible.

Procedure: Performing a Single System Migration

1. From the **Systems › Overview** page, select a client.
2. From the system details page of the client, navigate to the **Software › Product Migration** tab.
3. Select the target migration path and click **[Select Channels]**.
4. From the Product Migration - Channels page select the correct base channel, including Mandatory Child Channels and any additional Optional Child Channels.
5. OPTIONAL: Check Allow Vendor Change to allow packages that have changed vendors to be installed. If this occurs, a notification is shown with details before the migration is started.

To migrate openSUSE Leap to SUSE Linux Enterprise Server, you must check the Allow Vendor Change option.

6. Click **[Schedule Migration]** when your channels have been configured properly.

6.3.3. Product Mass Migration

If you want to migrate a large number of clients to the next SP version, you can use Uyuni API calls.

The spacecmd commandline tool provides a system_scheduleproductmigration sub command, which can be used to schedule a migration for a large number of clients to the next minor version.

6.3.3.1. Perform a Product Mass Migration

The product mass migration operation is dangerous and the process should be tested thoroughly. At least, do a dry-run first.

Be careful not to upgrade systems unintentionally.

Procedure: Performing a Product Mass Migration

1. List available migration targets, and take note of the system IDs you want to migrate:

```
spacecmd api -- system.listMigrationTargets -A 1000010001
```

2. For each system ID, call listMigrationTarget and check that the desired target product is available.
    - If the system ID has an available target, call system.scheduleProductMigration.
    - If the desired target is not available, skip the system.
3. Adapt this template for your environment:

```
target = '[....]'
basechannel = 'channel-label'
system_ids = [1, 2, 3]

session = auth.login(user, pass)
for system in system_ids
  if system.listMigrationTargets(session, system).ident == target
    system.scheduleProductMigration(session, system, target, basechannel, [], False,
<now>)
  else
    print "Cannot migrate to requested target -- skipping system"
  endif
endfor
```

6.3.3.2. Example: SLES 15 SP2 to SLES 15 SP3

For this example, a group will be created temporarily to facilitate the mass migration.

Procedure: Creating a Mass Product Migration Group

1. In the Uyuni Web UI, navigate to **Systems › System Groups**, and click **[Create Group]**.
2. Name the group mpm-target-sles15sp3.
    - Only systems subscribed to the same base channel should be added to the created group. In the example, only systems subscribed to SLE-Product-SLES15-SP2-Pool for x86_64 should be added to the group.

      For more information about adding clients to groups, see **Client-configuration › System-groups**.

Procedure: Adding Systems to the Group

1. Get the targets for all the systems in the group by running:

```
spacecmd -- system_listmigrationtargets group:mpm-target-sles15sp3
```

2. The command output a string of "IDs."
    - Only select a target, which is reported for **all** systems.
    - The string is the identifier for the MIGRATIONTARGET of the other command.

The spacecmd sub-commands system_scheduleproductmigration and system_listmigrationtargets are looping over all systems that are part of the group.

If there are 100 systems in the group, you will see 100 actions scheduled.

All systems in the group must support the same migration target.

Procedure: Running the Mass Migration Command

1. The syntax for the system_scheduleproductmigration command is as follows:

```
spacecmd -- system_scheduleproductmigration <SYSTEM> <BASE_CHANNEL_LABEL> \
    <MIGRATION_TARGET> [options]
```

2. For this example to upgrade all systems in the group mpm-target-sles15sp3 from SLES 12 SP2 to SLES 15 SP, enter on the command line:

```
spacecmd -- system_scheduleproductmigration group:mpm-target-sles15sp3 \
    sle-product-sles15-sp3-pool-x86_64 "[190,203,195,1242]" -d
```

6.3.3.2.1. Mandatory Syntax Explained

To see syntax usage and options for system_scheduleproductmigration, run:

```
spacecmd system_scheduleproductmigration help
```

<SYSTEM>

For this example we will use the group we created to select all of the systems from that group:

```
group:mpm-target-sles15sp3
```

<BASE_CHANNEL_LABEL>

This is the label for the target base channel. In this case, the system is being upgraded to SLES 15 SP3, and the label is sle-product-sles15-sp3-pool-x86_64.

To see a list of all base channels currently mirrored, run:

```
spacecmd softwarechannel_listbasechannels
```

Keep in mind you cannot upgrade to a channel unless it is an available target for your current base channel.

<MIGRATION_TARGET>

To identify this value for systems in the group group:mpm-target-sles15sp3, run:

```
spacecmd -- system_listmigrationtargets group:mpm-target-sles15sp3
```

The MIGRATION_TARGET parameter must be passed in the following format; note necessary shell quotation to prevent sideeffects with brackets:

```
"[190,203,195,1242]"
```

Options

- -s START_TIME
- -d pass this flag, if you want to do a dry run (it is recommended to run a dry run before the actual migration)
- -c CHILD_CHANNELS (comma-separated child channels labels with no spaces)

  In this case we included the -d option, which can be removed after a successful dry run.

If successful, the command output for each scheduled system will look like this:

```
Scheduling Product migration for system mpm-sles152-1
Scheduled action ID: 66
```

You can also track the action, in this case the dry run, in the Web UI for a given system in the group. From the system details page of the client, navigate to **Events › History**. If there are any failures during the dry run, the system should be investigated.

If all is well, the -d option can be removed from the command to run the real migration. After the migration is complete, you can reboot the system from the Uyuni Web UI.

6.4. Upgrade Uyuni Clients

In this section, we use openSUSE Leap as an example.

6.4.1. Prepare to Upgrade

Procedure: Preparing the Client Upgrade

1. At the command prompt on the Uyuni Server, as root, use the spacewalk-common-channels command to add the appropriate channels.

```
spacewalk-common-channels \
opensuse_leap15_4 \
opensuse_leap15_4-non-oss \
opensuse_leap15_4-non-oss-updates \
opensuse_leap15_4-updates \
opensuse_leap15_4-uyuni-client
```

2. Fully synchronize all channels with spacewalk-repo-sync.
3. In the Uyuni Server Web UI, navigate to **Software › Manage › Channels** and click the Uyuni Client Tools for openSUSE Leap 15.4 (x86_64) channel name.
4. In the upper right corner, click **[Manage Channel]**.
5. Click the Repositories tab, and select External - Uyuni Client Tools for openSUSE Leap 15.3 (x86_64).
6. Click **[Update Repositories]**.
7. Navigate to **Repositories › Sync** subtab, and click **[Sync Now]**.
8. Do the same with openSUSE Leap 15.4 (x86_64) and External - openSUSE Leap 15.3 (x86_64).

Unfold openSUSE Leap 15.4 (x86_64) to see all child channels populated with packages.

6.4.2. Upgrade

To upgrade a client you replace the software repositories and update the software, and finally reboot the client.

Procedure: Upgrading the Client

1. In the Uyuni Server Web UI, navigate to **Systems** and click the name of the client.
2. Click **Software › Software Channels**, and as the base channel select the openSUSE Leap 15.5 channel that is listed in the Customs Channels list.
3. In the Child Channels pane, select the 15.5 child channels.
4. Click **[Next]**, and Confirm Software Channel Change with **[Confirm]**.

5. Click **Software › Packages › Upgrade**, and select all the packages to be updated on the client, and then apply the selection. Click **[Upgrade Packages]**, check the details, and click **[Confirm]** to complete the update.
6. Reboot the client.

If you need to update many clients, you can create an action chain of this command sequence on the Uyuni Server. You can use the action chain to perform updates on multiple clients at the same time.

Chapter 7. Client Deletion

If you need to remove a client from your Uyuni Server, you can:

- use the Web UI to delete it
- remove a client from the command line.

7.1. Delete a Client with the Web UI

Procedure: Deleting a client

1. In the Uyuni Web UI, navigate to **Systems › System List** and select the client to delete.
2. Click **[Delete System]**.
3. Check the details and click **[Delete Profile]** to confirm.
4. For Salt clients, Uyuni attempts to clean up additional configuration. If the client cannot be contacted, you are given the option to cancel the deletion, or delete the client without cleaning up the configuration files.

You can also delete multiple clients using the System Set Manager. For more information about the System Set Manager, see **Client-configuration › System-set-manager**.

Cleaning up a client only disables Salt and stops the service if possible. It does not uninstall the package.

7.2. Delete a client on the command line (with API call)

Procedure: Deleting a client from the server

1. Delete the client with the FQDN (Fully Qualified Domain Name):

```
spacecmd system_delete FQDN
```

spacecmd system_delete also deletes the Salt key.

system_delete offers the following options:

```
usage: system_delete [options] <SYSTEMS>

    options:
```

```
        -c TYPE - Possible values:
           *  'FAIL_ON_CLEANUP_ERR' - fail in case of cleanup error,
           *  'NO_CLEANUP' - do not cleanup, just delete,
           *  'FORCE_DELETE' - try cleanup first but delete server anyway
          in case of error
```

7.3. Delete client from the command line

This process is for Uyuni clients only. Do not run it on the Uyuni Server itself.

You must not execute the following procedure on clients running Red Hat Enterprise Linux, Debian, or clones. Instead of zypper use equivalent packager commands such as yum, dnf, or apt.

Procedure: Deleting SLES 12 and 15 clients

1. Stop the salt-minion service:

```
systemctl stop salt-minion
```

2. Remove the repositories and configuration files:

```
rm -f /etc/zypp/repos.d/susemanager\:bootstrap.repo
rm -f /etc/zypp/repos.d/susemanager\:channels.repo
rm -r /etc/sysconfig/rhn/
rm -r /etc/salt/
```

3. Remove Client Packages:

```
zypper rm salt salt-minion python*-salt sle-manager-tools-release
```

Procedure: Salt bundle client - manual registration cleanup

1. To unregister, run:

```
systemctl stop venv-salt-minion
zypper rm -y venv-salt-minion sle-manager-tools-release
rm -f /etc/zypp/repos.d/susemanager\:bootstrap.repo
rm -f /etc/zypp/repos.d/susemanager\:channels.repo
rm -r /etc/venv-salt-minion/*
```

2. Remove client machine ID:

```
rm /etc/sysconfig/rhn/systemid
```

For information about the Salt bundle, see **Client-configuration › Contact-methods-saltbundle**.

Chapter 8. Client Operations

In addition to registering, upgrading, installing software, or deleting clients other operations can be performed. Uyuni clients can be managed individually or as a set of clients. A set of clients can grouped with System Set Manager for a one time action or permanently with System Groups.

For advanced client configuratin options general Configuration Management is available. You can obtain Custom System Information, power on or off, and reboot clients using the Uyuni Web UI.

The following sections contain detailed descriptions for each of these operations.

8.1. Package Management

Clients use packages to install, uninstall, and upgrade software.

To manage packages on a client, navigate to Systems, click the client to manage, and navigate to the **Systems › Software › Packages** subtab. The options available in this section vary depending on the type of client you have selected, and its current channel subscriptions.

Most package management actions can be added to action chains. For more about action chains, see **Reference › Schedule**.

When packages are installed or upgraded, licenses or EULAs are automatically accepted.

8.1.1. Compare Packages Using Profiles

You can compare the packages installed on a client with a stored profile, or with packages installed on another client. When the comparison is made, you can choose to modify the selected client to match.

To compare packages against a profile, you need to have stored a profile. Profiles are created from the packages on a currently installed client. When the profile has been created, you can use it to install more clients with the same packages installed.

Procedure: Creating a Stored Profile

1. In the Uyuni Web UI, navigate to Systems, click the client to base your profile off, and navigate to the **Systems › Software › Packages › Profiles** subtab.
2. Click **[Create System Profile]**.
3. Type a name and description for your profile and click **[Create Profile]**.

Procedure: Comparing Client Packages

1. In the Uyuni Web UI, navigate to Systems, click the client to compare, and navigate to the **Systems › Software › Packages › Profiles** subtab. To compare with a stored profile, select the profile and click **[Compare]**.
2. To compare with another client, select the client name and click **[Compare]** to see a list of differences between the two clients.

8.1.2. Orphaned Packages

Orphaned packages are packages synchronized by Uyuni that are not associated with a software channel. Therefore, orphaned packages are usually not available to Uyuni clients and users cannot install such packages without additional effort.

A package can become orphaned as a result of one of the following events:

- A synchronized repository removes a package. By default, Uyuni unlinks such a package from the channel, but does not remove the package.
- A repository supersedes a package with a newer version and thus removes the previous version.
- The reposync process got interrupted (for example, because of an out of space exception) and thus downloaded packages were not associated with a channel.
- Users manually uploaded packages, but did not associate them with any channel.

Orphaned packages cost space in user environment and cannot be easily distributed to clients because they are not associated with a channel. Orphaned package can make sense with specific workflows like bootstrapping or customer-specific procedures.

You can view orphaned packages in the Web UI by clicking **Software › Manage › Packages › view Packages in no channel**.

Uyuni periodically runs a taskomatic job that searches for orphaned packages and modifies the package organization ID to `1`. This means that you can delete orphaned packages only after the taskomatic job execution. If you encounter an orphaned package that you cannot delete, wait 24 hours and try the deletion again.

Delete orphaned packages:

- with command line tools targeting individual packages. For example:

```
spacecmd package_remove zypper-1.14.52-150400.1.9.x86_64
```

- with command line tools targeting all orphaned packages at once:

```
spacecmd package_removeorphans
```

8.2. Patch Management

You can use custom patches within your organization to manage clients. This allows you to issue patch alerts for packages in custom channels, schedule patch installation, and manage patches across organizations.

8.2.1. Create Patches

To use a custom patch, you need to create the patch, add packages to it and add it to one or more channels.

Procedure: Creating a Custom Patch

1. In the Uyuni Web UI, navigate to **Patches › Manage Patches**, click **[Create Patch]**.
2. In the Create Patch section, use these details:
    - In the Synopsis field, type a short description of the patch.
    - In the Advisory field, type a label for the patch. We recommend you devise a naming convention for your organization to make patch management easier.
    - In the Advisory Release field, enter a release number for your patch. For example, if this is the first version of this patch, use `1`.
    - In the Advisory Type field, select the type of patch to use. For example, Bug Fix Advisory for a patch that fixes errors.
    - If you selected an advisory type of Security Advisory, in the Advisory Severity field, select the severity level to use.
    - In the Product field, type the name of the product this patch refers to.
    - OPTIONAL: In the Author field, type the name of the author of the patch.
    - Complete the Topic, Description, and Solution fields with further information about the patch.
3. OPTIONAL: In the Bugs section, specify the information of any related bugs, using these details:
    - In the ID field, enter the bug number.
    - In the Summary field, type a short description of the bug.
    - In the Bugzilla URL field, type the address of the bug.
    - In the Keywords field, type any keywords related to the bug. Use a comma between each keyword.
    - Complete the References and Notes fields with further information about the bug.
    - Select one or more channels to add the new patch to.

4. Click **[Create Patch]**.

You can also create patches by cloning an existing one. Cloning preserves package associations and simplifies issuing patches.

Procedure: Cloning Patches

1. In the Uyuni Web UI, navigate to **Patches › Clone Patches**.
2. In the View patches potentially applicable to: field, select the software channel for the patch you want to clone.
3. Select the patch or patches you want to clone, and click **[Clone Patches]**.
4. Select one or more channels to add the cloned patch to.
5. Confirm the details to begin the clone.

When you have created a patch, you can assign packages to it.

Procedure: Assigning Packages to a Patch

1. In the Uyuni Web UI, navigate to **Patches › Manage Patches**, and click the the advisory name of the patch to see the patch details.
2. Navigate to the **Packages › Add** tab.
3. In the Channel field, select the software channel that contains the packages you want to assign to the patch, and click **[View Packages]**. You can select All managed packages to see the available packages in all channels.
4. Check the packages you want to include, and click **[Add Packages]**.
5. Confirm the details of the packages, and click **[Confirm]** to assign them to the patch.
6. Navigate to the **Packages › List/Remove** tab to check that the packages have been assigned correctly.

When packages are assigned to a patch, the patch cache is updated to reflect the changes. The cache update might take a couple of minutes.

If you need to change the details of an existing patch, you can do so from the Patches Management page.

Procedure: Editing and Deleting Existing Patch Alerts

1. In the Uyuni Web UI, navigate to **Patches › Manage Patches**.
2. Click the advisory name of the patch to see the patch details.
3. Make the changes as required, and click **[Update Patch]**.
4. To delete a patch, select the patch in the Patches Management page, and click **[Delete Patches]**. Deleting

patches might take a few minutes.

8.2.2. Apply Patches to Clients

When a patch is ready, you can apply it to clients either singly, or with other patches.

Each package within a patch is part of one or more channels. If the client is not subscribed to the channel, the update is not installed.

If the client has a more recent version of a package already installed, the update is not installed. If the client has an older version of the package installed, the package is upgraded.

Procedure: Applying All Applicable Patches

1. In the Uyuni Web UI, navigate to **Systems › Overview** and select the client you want to update.
2. Navigate to the **Software › Patches** tab.
3. Click **[Select All]** to select all applicable patches.
4. Click **[Apply Patches]** to update the client.

If you are signed in with Administrator privileges, you can also perform larger batch upgrades for clients.

Procedure: Applying a Single Patch to Multiple Clients

1. In the Uyuni Web UI, navigate to **Patches › Patch List**.
2. Locate the patch you want to apply, and click the number under the Systems column for that patch.
3. Select the clients you want to apply the patch to, and click **[Apply Patches]**.
4. Confirm the list of clients to perform the update.

Procedure: Applying Multiple Patches to Multiple Clients

1. In the Uyuni Web UI, navigate to **Systems › Overview** and check the clients you want to update to add them to the system set manager.
2. Navigate to **Systems › System Set Manager** and naviagte to the Patches tab.
3. Select the patches you want to apply to the clients and click **[Apply Patches]**.
4. Schedule a date and time for the update to occur, and click **[Confirm]**.
5. To check the progress of the update, navigate to **Schedule › Pending Actions**.

Scheduled package updates are installed using the contact method configured for each client. For more information, see **Client-configuration › Contact-methods-intro**.

8.3. System Locking

System locks are used to prevent actions from occurring on a client. For example, a system lock prevents a client from being updated or restarted. This is useful for clients running production software, or to prevent accidental changes. You can disable the system lock when you are ready to perform actions.

8.3.1. System Locks on Clients

When a client is locked, or put into blackout mode, no actions can be scheduled, execution commands are disabled, and a yellow banner is displayed on the System Details page. In this mode, actions can be scheduled for the locked client using the Web UI or the API, but the actions fail.

The locking mechanism is not available for Salt SSH clients.

Procedure: System Locking a Client

1. In the Uyuni Web UI, navigate to the System Details page for the client you want to lock.
2. Navigate to the Formulas tab, check the system lock formula, and click **[Save]**.
3. Navigate to the **Formulas › System Lock** tab, check Lock system, and click **[Save]**. On this page, you can also enable specific Salt modules while the client is locked.
4. When you have made your changes, you might need to apply the highstate. In this case, a banner in the Web UI notifies you. The client remains locked until you remove the system lock formula.

For more information about blackout mode in Salt, see https://docs.saltproject.io/en/latest/topics/blackout.

8.3.2. Package Locks

Package locking can be used on several clients, but different feature sets are available. You must differentiate between SUSE Linux Enterprise and openSUSE (zypp-based) versus Red Hat Enterprise Linux or Debian clients.

8.3.2.1. Package Locks on Zypp-based Systems

Package locks are used to prevent unauthorized installation or upgrades to software packages. When a package has been locked, it shows a padlock icon, indicating that it cannot be installed. Any attempt to install a locked package is reported as an error in the event log.

Locked packages cannot be installed, upgraded, or removed, neither through the Uyuni Web UI, nor directly on the client machine using a package manager. Locked packages also indirectly lock any dependent packages.

Procedure: Using Package Locks

1. Navigate to the **Software › Packages › Lock** tab on the managed system to see a list of all available packages.
2. Select the packages to lock, and click **[Request Lock]**. Pick date and time for the lock to activate. By default, the lock is activated as soon as possible. Note that the lock might not activate immediately.
3. To remove a package lock, select the packages to unlock and click **[Request Unlock]**. Pick date and time as with activating the lock.

8.3.2.2. Package Locks on Red Hat Enterprise Linux- and Debian-like Systems

Some Red Hat Enterprise Linux- and Debian-like systems have package locking available on clients.

On Red Hat Enterprise Linux- and Debian-like systems, package locks are only used to prevent unauthorized upgrades or removals to software packages. When a package has been locked, it shows a padlock icon, indicating that it cannot be changed. Any attempt to change a locked package is reported as an error in the event log.

Locked packages cannot be upgraded or removed, neither through the Uyuni Web UI, nor directly on the client machine using a package manager. Locked packages also indirectly lock any dependent packages.

Procedure: Using Package Locks

1. On Red Hat Enterprise Linux 7 systems, install yum-plugin-versionlock, and on Red Hat Enterprise Linux 8 or 9 systems, install python3-dnf-plugin-versionlock as root. On Debian systems, the apt tool has the locking feature included.
2. Navigate to the **Software › Packages › Lock** tab on the managed system to see a list of all available packages.
3. Select the packages to lock, and click **[Request Lock]**. Pick date and time for the lock to activate. By default, the lock is activated as soon as possible. Note that the lock might not activate immediately.
4. To remove a package lock, select the packages to unlock and click **[Request Unlock]**. Pick date and time as with activating the lock.

8.4. Configuration Management

You can use configuration files and channels to manage configuration for your clients, rather than configuring each client manually.

Configuration parameters are scripted and stored in configuration files. You can write configuration files directly using the Uyuni Web UI, or you can upload or link to files that exist in other locations.

Configuration files can be centrally managed. Centrally managed configuration files are provided by global configuration channels and can be applied to any client subscribed to the Uyuni Server.

Configuration channels are used to organize configuration files. You can subscribe clients to configuration channels, and deploy configuration files as required.

Configuration files are version-controlled, so you can add configuration settings, test them on your clients, and roll back to a previous revision as required. When you have created your configuration channels, you can also perform comparisons between various configuration files, and between revisions of the same configuration file.

Centrally managed configuration files are provided by global configuration channels.

This table shows the supported features, where:

- ✔ features are supported by SUSE
- ✖ features are not supported by SUSE
- ? features are under consideration, and may or may not be supported at a later date.

Table 59. Configuration Management Supported Features

Feature	Status
Global Configuration Channels	✔
Deploying Files	✔
Comparing Files	?
Locally Managed Files	✔ (with Salt features)
Sandbox Files	✖
Applying the Highstate	✔
File Import from a Client	✖
Jinja Templating	✔
Configuration Macros	✔ (with Salt features: grains, pillar data, etc.)

8.4.1. Create Configuration Channels

8.4.1.1. Central Configuration Channel

To create a new central configuration channel:

Procedure: Creating Central Configuration Channel

1. In the Uyuni Web UI, navigate to **Configuration › Channels**, and click **[Create Config Channel]**.
2. Type a name for the channel.
3. Type a label for the channel. This field must contain only letters, numbers, hyphens (-) and underscores (_).
4. Type a description for the channel that allows you to distinguish it from other channels.
5. Click **[Create Config Channel]** to create the new channel.

8.4.1.2. Salt State Channel

You can also use a configuration channel to manage Salt states on clients:

Procedure: Creating a Salt State Channel

1. In the Uyuni Web UI, navigate to **Configuration › Channels**, and click **[Create State Channel]**.
2. Type a name for the channel.
3. Type a label for the channel. This field must contain only letters, numbers, hyphens (-) and underscores (_).
4. Type a description for the channel that allows you to distinguish it from other channels.
5. Type the SLS Contents for the init.sls file.
6. Click **[Create Config Channel]** to create the new channel.

8.4.2. Add Configuration Files, Directories, or Symbolic Links

When you have created a configuration channel you can add a configuration file, directory, or symbolic link:

Procedure: Adding a Configuration File, Directory, or Symbolic Link

1. In the Uyuni Web UI, navigate to **Configuration › Channels**, and click the name of the configuration channel that you want to add a configuration file to, and navigate to the **Add Files › Create File** subtab.
2. In the File Type field, choose whether you want to create a text file, directory, or symbolic link.
3. In the Filename/Path field, type the absolute path to the location where the file should be deployed.
4. If you are creating a symbolic link, type the target file and path in the Symbolic Link Target Filename/Path field.
5. Type the User name and Group name for the file in the Ownership field, and the File Permissions Mode.
6. If the client has SELinux enabled, you can configure SELinux contexts to enable the required file attributes (for example: user, role, and file type).

7. If the configuration file includes a macro, enter the symbol that marks the beginning and end of the macro.
8. Enter the configuration file contents in the File Contents text box, using the script drop-down box to choose the appropriate scripting language.
9. Click **[Create Configuration File]**.

8.4.3. Subscribe Clients to Configuration Channels

You can subscribe individual clients to configuration channels by navigating to **Systems › System List**, selecting the client you want to subscribe, and navigating to the Configuration tab. To subscribe multiple clients to a configuration channel, you can use the system set manager (SSM).

Procedure: Subscribing Multiple Clients to Configuration Channels

1. In the Uyuni Web UI, navigate to **Systems › Systems List** and select the clients you want to work with.
2. Navigate to **Systems › System Set Manager**, and go to the **Configuration › Subscribe to Channels** subtab to see the list of available configuration channels.
3. OPTIONAL: Click the number in the Systems currently subscribed column to see which clients are currently subscribed to the configuration channel.
4. Check the configuration channels you want to subscribe to, and click **[Continue]**.
5. Rank the configuration channels using the up and down arrows. Where settings conflicts occur between configuration channels, channels closer to the top of the list take precedence.
6. Determine how the channels are applied to the selected clients. Click **[Subscribe With Lowest Priority]** to add the new channels at a lower priority than currently subscribed channels. Click **[Subscribe with Highest Priority]** to add the new channels at a higher priority than currently subscribed channels. Click **[Replace Existing Subscriptions]** to remove existing channels and replace them with the new channels.
7. Click **[Apply Subscriptions]**.

If new configuration channel priorities conflict with existing channels, the duplicate channel is removed and replaced according to the new priority. If the client's configuration priorities are going to be reordered by an action, the Web UI requires you to confirm the change before proceeding.

8.4.4. Compare Configuration Files

You can also use the system set manager (SSM) to compare the configuration file deployed on clients with the configuration file stored on the Uyuni Server.

Procedure: Comparing Configuration Files

1. In the Uyuni Web UI, navigate to **Systems › Systems List** and select the clients subscribed to the configuration files you want to compare.
2. Navigate to **Systems › System Set Manager**, and go to the **Configuration › Compare Files** subtab to the list of available configuration files.
3. OPTIONAL: Click the number in the Systems column to see which clients are currently subscribed to the configuration file.
4. Check the configuration files to compare, and click **[Schedule File Comparison]**.

8.4.5. Jinja templating on clients

Jinja templating is possible on Salt clients. Jinja provides variables from pillars or grains. They can be used in configuration files or Salt states.

For more information, see https://docs.saltproject.io/salt/user-guide/en/latest/topics/jinja.html with this example:

```
{% if grains.os_family == 'RedHat' %}
  {% set dns_cfg = '/etc/named.conf' %}
{% elif grains.os_family == 'Debian' %}
  {% set dns_cfg = '/etc/bind/named.conf' %}
{% else %}
  {% set dns_cfg = '/etc/named.conf' %}
{% endif %}
dns_conf:
  file.managed:
    - name: {{ dns_cfg }}
    - source: salt://dns/files/named.conf
```

8.5. Power Management

8.5.1. Introduction

You can power on, power off, and reboot clients using the Uyuni Web UI.

This feature uses either the IPMI or Redfish protocol and is managed using a Cobbler profile. The selected client must have a power management controller supporting one of these protocols.

For Redfish, ensure you can establish a valid SSL connection between the client and the Uyuni Server. You must have trusted the certificate authority used to sign the SSL Server Certificate of the Redfish management controller. The CA certificate must be in .pem format, and stored on the Uyuni Server at /etc/pki/trust/anchors/. When you have saved the certificate, run update-ca-certificate.

Procedure: Enabling Power Management

1. In the Uyuni Web UI, navigate to **Systems › Systems List**, select the client you want to manage, and navigate to the **Provisioning › Power Management** tab.
2. In the Type field, select the power management protocol to use.
3. Complete the details for the power management server, and click the appropriate button for the action to take, or click **[Save only]** to save the details without taking any action.

You can apply power management actions to multiple clients at the same time by adding them to the system set manager. For more information about using the system set manager, see **Client-configuration › System-set-manager**.

8.5.2. Power Management and Cobbler

The first time you use a power management feature, a Cobbler system record is automatically created, if one does not yet exist for the client. These automatically created system records are not bootable from the network, and include a reference to a dummy system image. This is needed because Cobbler does not currently support system records without profiles or images.

Cobbler power management uses fence-agent tools to support protocols other than IPMI. Only IPMI and Redfish protocols are supported by Uyuni. You can configure your client to use other protocols by adding the fence-agent names as a comma-separated list to the java.power_management.types configuration parameter in the rhn.conf configuration files.

8.6. Custom System Information

You can include customized system information about your clients. System information is defined as key:value pairs, which can be assigned to clients. For example, you can define a key:value pair for a particular processor, then assign that key to all clients that have that processor installed. Custom system information is categorized, and can be searched using the Uyuni Web UI.

Before you begin, you need to create a key that allows you to store custom information.

Procedure: Creating a Custom System Information Key

1. In the Uyuni Web UI, navigate to **Systems › Custom System Info**, and click **[Create Key]**.
2. In the Key Label field, add a name for your key. Do not use spaces. For example, intel-x86_64-quadcore.
3. In the Description field, provide any additional information required.
4. Repeat for each key you require.

The information is available via Salt pillar. You can retrieve this information with a command such as:

```
salt $minionid pillar.get custom_info:key1
```

This command will result in an output such as:

```
$minionid:
    val1
```

When you have created some custom system information keys, you can apply them to clients.

Procedure: Applying Custom Information Keys to Clients

1. In the Uyuni Web UI, navigate to Systems, click the client to apply custom information to, and navigate to the **Details › Custom Info** tab.
2. Click **[Create Value]**.
3. Locate the value you want to apply, and click the key label.
4. In the Value field, provide any additional information.
5. Click **[Update Key]** to apply the custom information to the client.

For more information about configuration management, see **Client-configuration › Configuration-management**.

8.7. System Set Manager

8.7.1. Introduction

The system set manager (SSM) is used to perform actions on more than one client at a time. SSM creates ephemeral sets of clients, making it useful for one-off actions that you need to apply to a number of clients. If you want more permanent sets, consider using system groups instead. For more information about system groups, see **Client-configuration › System-groups**.

The actions available for use in SSM are listed in table. The icons in this table indicate:

- ✔ this action is available in SSM for this client type
- ✖ this action is not available in SSM for this client type
- ? this action is under consideration for this client type, and may or may not be supported at a later date.

Table 60. Available SSM Actions

List systems	✓
Install patches	✓
Schedule patch updates	✓
Upgrade packages	✓
Install packages	✓
Remove packages	✓
Verify packages	✗
Create groups	✓
Manage groups	✓
Channel memberships	✓
Channel subscriptions	✗
Deploy/diff channels	✗
Autoinstall clients	✗
Tag for snapshot	✗
Remote commands	✗
Power management	✗
Update system preferences	✓
Update hardware profiles	✓
Update package profiles	✓
Set/remove custom values	✓
Reboot clients	✓
Migrate clients to another organization	✓
Delete clients	✓

You can select clients for the SSM in several ways:

- Navigate to **Systems › System List** and check the clients you want to work with.
- Navigate to **Systems › System Groups**, and click **[Use in SSM]** for the system group you want to work with.
- Navigate to **Systems › System Groups**, check the group you want to work with, and click **[Work with**

Group].

When you have selected the clients you want to work with, navigate to **Systems › System Set Manager**, or click the systems selected icon in the top menu bar.

The details in SSM might differ slightly from the details in other parts of the Uyuni Web UI. In SSM, all available updates are shown. This allows you to upgrade to packages that might not be the latest version.

8.7.2. Change Base Channels in SSM

You can use SSM to change the base channel of more than one client at the same time.

Changing the base channel significantly changes the packages and patches available to the affected clients. Use with caution.

Procedure: Using SSM to Change Base Channels for Multiple Clients

1. In the Uyuni Web UI, navigate to **Systems › System List**, check the clients you want to work with, and navigate to **Systems › System Set Manager**.
2. Navigate to the Channels subtab.
3. Locate the current base channel in the list, and verify that the number shown in the Systems column is correct. You can click the number in this column to see more details of the clients you are changing.
4. Select the new base channel in the Desired base Channel field, and click **[Next]**.
5. For each child channel, select No change, Subscribe, or Unsubscribe, and click **[Next]**.
6. Check the changes you are making, and choose a time for the action to occur.
7. Click **[Confirm]** to schedule the changes.

8.8. System Groups

You can use system groups to make it easier to manage a large number of clients. Groups can be used to perform bulk actions on clients such as applying updates, configuration channels, salt states, or formulas.

You can organize clients into groups in any way that works for your environment. For example, you could organize clients on which operating system is installed, which physical location they are in, or the type of workload they are handling. Clients can be in any number of groups, so you can define your groups in different ways.

When you have clients organized into groups, you can perform updates on all clients in one or more groups, or on intersections between groups. For example, you can define one group for all clients with web server software, and another group for all SLES clients. You can then perform updates on all clients with web server

software, or use the intersection between the groups, and update all SLES clients with web server software.

8.8.1. Create Groups

You need to create some groups before you can use them to organize your clients.

Procedure: Creating a New System Group

1. In the Uyuni Web UI, navigate to **Systems › System Groups**.
2. Click **[Create Group]**.
3. Give your new group a name and a description.
4. Click **[Create Group]** to save your group.
5. Repeat for each group you require.

8.8.2. Add Clients to Groups

You can add individual clients to your groups, or add multiple clients at the same time.

Procedure: Adding A Single Client to a Group

1. In the Uyuni Web UI, navigate to **Systems › System List** and click the name of the client to add.
2. Navigate to the **Groups › Join** tab.
3. Check the group to join and click **[Join Selected Groups]**.

Procedure: Adding Multiple Clients to a Group

1. In the Uyuni Web UI, navigate to **Systems › System Groups** and click the name of the group to add clients to.
2. Navigate to the Target systems tab.
3. Check the clients to add and click **[Add Systems]**.

Procedure: Adding Multiple Clients to a Group with SSM

1. In the Uyuni Web UI, navigate to **Systems › System List** and check each client to add, this adds the clients to the system set manager.
2. Navigate to **Systems › System Set Manager**, and go to the Groups tab.
3. Locate the group to join and check Add.
4. Click **[Alter Membership]**.

5. Click **[Confirm]** to join the clients to the selected group.

For more information about the system set manager, see **Client-configuration › System-set-manager**.

You can see which clients are in a group by navigating to **Systems › System Groups**, clicking the name of the group, and navigating to the Systems tab.

8.8.3. Work with Groups

When you have your clients arranged into groups, you can use your groups to manage updates.

In the Uyuni Web UI, navigate to **Systems › System Groups**. The list shows an icon if there are updates available for any of the clients in the group. The list shows a question mark icon if checking the update status is disabled for any of the clients in the group. Click the icon to see more information about the updates available and to apply them to the clients.

You can also work with more than one group at a time. Select the groups you want to work with, and click **[Work with union]** to select every client in every selected group.

Alternatively, you can work on intersections of groups. Select two or more groups, and click **[Work with intersection]** to select only those clients that exist in all the selected groups. For example, you might have one group for all clients with web server software, and another group for all SLES clients. The intersection of these groups would be all SLES clients with web server software.

8.9. System Types

Clients are categorized by system type. Every client can have both a base system type, and an add-on system type assigned.

Base system type is Salt for all clients.

Add-on system types include Virtualization Host, for clients that operate as virtual hosts, and Container Build Host for clients that operate as a build host.

You can adjust the add-on system type by navigating to **Systems › System List › System Types**. Check the clients you want to change the add-on system type for, select the Add-On System Type, and click either **[Add System Type]** or **[Remove System Type]**.

Chapter 9. Operating System Installation

Generally, you register clients that are already running. You might have installed these machines manually just before registering them to Uyuni, or they might be pre-existing systems that were installed before you added Uyuni to your environment.

Alternatively, you can use Uyuni to help you install an operating system and register it to Uyuni in one go. This method is partially or totally automated, so you can save time answering installer questions, and is especially useful if you have many clients you want to install and register.

There are several ways to install an operating system from Uyuni:

- in-place, on clients that are already registered;
- over the network, using PXE boot;
- preparing an installation CD-ROM or an USB key, and then going to the machine to boot on that medium;
- as part of the Uyuni for Retail solution.

The in-place reinstallation method assumes that a previous operating system has already been installed on the client, and that the client has already been registered to Uyuni.

For information about the in-place installation method, see **Client-configuration › Autoinst-reinstall**.

The network boot installation method works on unformatted machines. However, it can only be performed in certain network configurations:

- the Uyuni Server, or one of its proxies, are on the same local network as the machine you want to install, or you have a DHCP relay that allows you to cross all routers in between;
- you are able to set up a new DHCP server or to configure an existing one;
- the client to install is able to boot with PXE, and you can configure it to do so.

The removable medium method allows you to bypass these network constraints. However, it assumes the machine is able to read CD-ROMs or USB keys, and boot from them. It also requires physical access to the client machine.

For information about the removable media method, see **Client-configuration › Autoinst-cdrom**.

For information about the Uyuni for Retail approach, see **Retail › Uyuni-retail-overview**.

Autoinstallation of Ubuntu and Debian clients is not supported. These operating systems must be installed manually.

The autoinstallation features of Uyuni are based on a software named Cobbler. For more information about

Cobbler, see https://cobbler.readthedocs.io.

SUSE only supports Cobbler functions that are available in the Uyuni Web UI, or through the Uyuni API. The sole command-line command supported by Cobbler is buildiso. Only supported features are documented here.

9.1. Reinstall Registered Systems

The in-place reinstallation starts from the local client system. There is therefore no need for the client to be able to boot over network with PXE.

To reinstall a registered client in-place, you must define an autoinstallable distribution and an autoinstallation profile. For information, see **Client-configuration › Autoinst-distributions** and **Client-configuration › Autoinst-profiles**.

When you have defined the autoinstallation profile and distribution, you can perform the reinstallation.

Procedure: Reinstall an Already Registered Client

1. In the Uyuni Web UI, navigate to **Systems › Systems List**, select the client to reinstall, and go to the **Provisioning › Autoinstallation › Schedule** subtab.
2. Select the autoinstallation profile that you prepared, select a proxy if needed, and click **[Schedule Autoinstallation and Finish]**.
3. You can monitor progress of the installation by navigating to **Provisioning › Autoinstallation › Session Status**, or on the client directly. The client reboots, and in the boot menu selects a new choice called reinstall-system.

The installation then proceeds over HTTP protocol.

9.2. Install via a CD-ROM or a USB Key

For clients that are not yet registered to Uyuni, and if network boot over PXE is not an option, a bootable CD-ROM or USB key can be used to install the system.

One option to prepare such a removable medium is to use Cobbler. For information about using Cobbler to prepare an ISO image, see Build an ISO Image With Cobbler.

For SUSE systems, it is often recommended to prepare an ISO image using KIWI. For more information, see Build a SUSE ISO Image With KIWI.

In all cases, you use the resulting image to burn a CD-ROM or prepare a USB key.

9.2.1. Build an ISO Image With Cobbler

Cobbler can create ISO boot images that contain a set of distributions, kernels, and a menu that works in a similar way to a PXE installation.

Building ISOs with Cobbler is not supported on IBM Z.

In order to prepare an ISO image with Cobbler, you need to prepare a distribution and a profile, similar to using network boot over PXE. For information about creating a distribution, see **Client-configuration › Autoinst-distributions**. For information about creating a profile, see **Client-configuration › Autoinst-profiles**.

The Cobbler buildiso command takes parameters to define the name and output location of the boot ISO. Specifying the distribution with --distro is mandatory when running buildiso command. --iso is the output location:

```
mgrctl exec -- cobbler buildiso --iso=/path/to/boot.iso --distro=<your-distro-label>
```

You must use distribution and profile labels as listed by Cobbler, and not simply as shown in the Web UI. To list the names of distributions and profiles stored by Cobbler, run the commands:

```
mgrctl exec -- cobbler distro list
mgrctl exec -- cobbler profile list
```

The boot ISO includes all profiles and systems by default. You can limit which profiles and systems are used with the --profiles and --systems options:

```
mgrctl exec -- cobbler buildiso --systems="system1 system2 system3" \
  --profiles="<your-profile1-label> <your-profile2-label> <your-profile3-label>" \
  --distro=<your-distro-label>
```

With --esp you can enable the built boot ISOs with Secure Boot. You explicitly specify the EFI System Partition (ESP). By default, Cobbler generates the ESP partition, which disables Secure Boot.

```
mgrctl exec -- cobbler buildiso \
  --esp="/usr/share/tftpboot-installation/SLE-15-SP6-x86_64/boot/x86_64/efi" \
  --iso=/path/to/boot.iso --distro=<your-distro-label>
```

Procedure: Finding efi

1. On the container host, execute the following command to get the distro name:

   ```
   mgrctl exec -- cobbler distro list
   ```

   This command outputs strings such as sles15-sp6:1:SUSE.

2. On the container host, execute the following command to get information about the distro files location:

```
mgrctl exec -- cobbler distro report --name sles15-sp6:1:SUSE
```

This command outputs a report such as the following:

```
Name                   : sles15-sp6:1:SUSE
Architecture           : x86_64
...output omitted...
Initrd                 : /usr/share/tftpboot-installation/SLE-15-SP6-
x86_64/boot/x86_64/loader/initrd
Kernel                 : /usr/share/tftpboot-installation/SLE-15-SP6-
x86_64/boot/x86_64/loader/linux
...output omitted...
```

3. See the contents of the boot directory. In the example above, the boot partition is the /usr/share/tftpboot-installation/SLE-15-SP6-x86_64/boot/x86_64/efi file, but this can differ based on the ISO distributor.

If you cannot write an ISO image to a public tmp directory, check your systemd settings in /usr/lib/systemd/system/cobblerd.service.

9.2.2. Build a SUSE ISO Image With KIWI

KIWI is an image creation system. You can use KIWI to create a bootable ISO image to be used by the target system for installation of a SUSE system. When the system is rebooted or switched on, it boots from the image, loads the AutoYaST configuration from your Uyuni, and installs SUSE Linux Enterprise Server according to the AutoYaST profile.

To use the ISO image, boot the system and type autoyast at the prompt (assuming you left the label for the AutoYaST boot as autoyast). Press `Enter` to begin the AutoYaST installation.

For more information about KIWI, see http://doc.opensuse.org/projects/kiwi/doc/.

9.2.3. Build a Red Hat ISO Image With Cobbler

For more information, see client-configuration:autoinst-cdrom.pdf.

9.3. Autoinstallable Distributions

The autoinstallation process relies on an several files to initiate the installation. These files include the Linux kernel, an initial RAM disk, and other files required to boot the operating system in installation mode.

Uyuni uses the mgradm tool to copy the installation file from the source to the server container.

You can extract the needed files from a DVD image. For information, see Distribution Based on an ISO Image.

Alternatively, you can install the tftpboot-installation package. For information, see Distribution Based on a RPM Package.

You must also have a base channel synchronized on your Uyuni Server for the same operating system version as those files.

When you have the files ready, and the base channel synchronized, you need to declare the distribution. This operation associates the installation files to the base channel. The distribution can be referred to by one or more installation profiles. For information, see Declare an Autoinstallable Distribution.

9.3.1. Distribution Based on an ISO Image

This method assumes you have installation media for the operating system you want to install on the clients. This is usually a DVD .iso image that contains the Linux kernel, an initrd file, and other files required to boot the operating system in installation mode.

Procedure: Importing Files from Installation Media

1. Use mgradm to import installation data from the ISO image:

```
# mgradm distribution copy <image_name>.iso <image_name>
```

2. Take a note of the distribution path reported by mgradm. You will need it when you declare the distribution to Uyuni.

9.3.1.1. Distribution autodetection and registration

mgradm is able to automatically detect distribution name and register it to the server. Provided ISO image needs to contain a .treeinfo file.

Procedure: Import distribution file with autodetection and registration

1. Use mgradm:

```
# mgradm distribution copy --api-user <username> --api-password <password>
<image_name>.iso
```

9.3.2. Distribution Based on a RPM Package

This method works on SUSE systems. It is simpler than importing contents from an installation media, because

it uses prepackaged files for your installation system.

Procedure: Extracting Files from an Installation Package

1. On the Uyuni Server, install the package whose name starts with tftpboot-installation. You can determine its exact name with the command zypper se tftpboot-installation
2. You can install the package to different root to avoid need for restart using following command:

```
# mkdir /opt/tftpinstall
# zypper --installroot /opt/tftpinstall install tftpboot-installation-SLE-Micro-5.5-x86_64
```

3. Find the installation files with the command ls -d /opt/tftpinstall/usr/share/tftpboot-installation/*.
4. Copy installation files using mgradm:

```
# mgradm distribution copy /opt/tftpinstall/usr/share/tftpboot-installation/SLE-Micro-5.5-x86_64 SLE-Micro-5.5-x86_64
```

5. Take a note of the distribution path reported by mgradm tool. You will need it when you declare the distribution to Uyuni.
6. After mgradm tool finishes, you can remove /opt/tftpinstall directory.

This procedure prepares the installation of the same operating system version as the one that powers your Uyuni Server. If you want to install a different operating system or version on the client, you need to manually get the package tftpboot-installation-* from the distribution it belongs to. In the Package Search input box Uyuni, search the packages whose names start with tftpboot-installation, then look at the package's details. They show the local path below /var/spacewalk/.

9.3.3. Declare an Autoinstallable Distribution

The next step after extracting the autoinstallation files is to declare an autoinstallable distribution.

Procedure: Declaring an Autoinstallable Distribution

1. In the Uyuni Web UI, navigate to **Systems › Autoinstallation › Distributions**.
2. Click Create Distribution, and complete these fields:
    - In the Distribution Label field, enter a name to identify your autoinstallable distribution.
    - In the Tree Path field, enter the path to the installation media saved on your Uyuni Server.
    - Select the matching Base Channel. This must match the installation media.
    - Select the Installer Generation. This must match the installation media.

- OPTIONAL: Specify kernel options to use when booting this distribution. There are multiple ways to provide kernel options. Only add options here that are generic for the distribution.

3. Click **[Create Autoinstallable Distribution]**.

The installation files that you prepared might not contain the packages you need to install. If they are not included, add `useonlinerepo=1` to the Kernel Options field.

The package repositories contain metadata that can be unsigned. If the metadata is unsigned, add `insecure=1` to the Kernel Options field, or use your own GPG key as explained in **Client-configuration › Autoinst-owngpgkey**.

These kernel options are needed for example when you use the "online installer" ISO images instead of the full DVD, or when you use the tpboot-installation package.

Navigate to **Systems › Autoinstallation › Distributions** to manage your autoinstallable distributions.

9.3.4. Handling Kernel Options for Distributions and Profiles

Uyuni is able to combine the kernel options that you assign. This is done using a special inheritance logic. There are three object types that are relevant for this:

1. Distributions (or short "Distros")
2. Profiles
3. Systems

As a fourth special point of influence on the final kernel options is the Cobbler settings file /etc/cobbler/settings.yaml. The Cobbler settings file defines default kernel options for all distributions. This is not supported in the context of Uyuni.

Understanding raw and resolved values is crucial for managing kernel options effectively.

1. **Raw values**: These refer to values attached directly to a specific Cobbler item and stored as-is in Cobbler's internal database.
2. **Resolved values**: These values are dynamically generated at runtime, respecting the inheritance hierarchy of Cobbler items.

If you prefix an option with ! then the option will be removed from the final kernel command line.

Uyuni will manage the kernel options for both Profiles and Systems for you. As such you may only edit the kernel options for Distros.

9.3.4.1. Examples

9.3.4.1.1. Basic Inheritance Example

Distribution raw value

```
install=http://uyuni.server/ks/dist/SLES15SP4 self_update=0
```

Profile raw value

```
console=tty1
```

System raw value

```
console=ttyS0
```

Resolved value for a system inheriting this profile

```
install=http://uyuni.server/ks/dist/SLES15SP4 self_update=0 console=ttyS0
```

9.3.4.1.2. Option Removal Example

Distribution raw value

```
install=http://uyuni.server/ks/dist/SLES15SP4 self_update=0
```

Profile raw value

```
console=tty1
```

System raw value

```
!self_update
```

Resolved value for a system inheriting this profile

```
install=http://uyuni.server/ks/dist/SLES15SP4 console=ttyS0
```

9.4. Autoinstallation Profiles

Within Uyuni, you can use two different types of profiles, depending on the operating system of the clients you

want to install:

- For SUSE Linux Enterprise or openSUSE clients, use AutoYaST.
- For Red Hat Enterprise Linux clients, use Kickstart.

An autoinstallation profile determines how the operating system will be installed. For example, you can specify additional kernel parameters to be passed to the installer.

The most important part of the profile is the **autoinstallation file**. When you perform an installation manually, you must provide information to the installer, such as partitioning and networking information and user details. The autoinstallation file is a method of providing this information in a scripted form. This type of file is sometimes also referred to as an **answers file**.

You can use both AutoYaST and Kickstart profiles if you want to install clients with different operating systems.

- For information about how to declare profiles, see Declare the Profile
- For information about AutoYaST profiles, see AutoYaST Profiles.
- For information about Kickstart profiles, see Kickstart Profiles.

The autoinstallation file contained in the profile can include variables and code snippets. For information about variables and code snippets, see Templates Syntax.

9.4.1. Declare the Profile

When you have prepared an autoinstallation file and distribution, you can create profiles to manage autoinstallation on your Uyuni Server. The profile will determine how to install this distribution you selected. One way to create a profile is to upload an AutoYaST or Kickstart file. Alternatively, for Kickstart only, you can use the Web UI wizard.

Procedure: Creating an Autoinstallation Profile by Upload

1. In the Uyuni Web UI, navigate to **Systems › Autoinstallation › Profiles**.
2. Click **[Upload Kickstart/AutoYaST File]**.
3. In the Label field, type a name for the profile. Do not use spaces.
4. In the Autoinstall Tree field, select the autoinstallable distribution to use for this profile.
5. In the Virtualization Type field, select the type of virtualization to use for this profile, or select None if you do not want to use this profile to create a new virtual machine.
6. Copy the contents of your autoinstallation file into the File Contents field, or upload the file directly using the File to Upload field.

For more information about the details to include here, see AutoYaST Profiles or Kickstart Profiles.

7. Click **[Create]** to create the profile.

Procedure: Creating a Kickstart Profile by Wizard

1. In the Uyuni Web UI, navigate to **Systems › Autoinstallation › Profiles**.
2. Click **[Create Kickstart Profile]**.
3. In the Label field, type a name for the profile. Do not use spaces.
4. In the Base Channel field, select the base channel to use for this profile. This field is populated from the distributions available. If the base channel you need is not available, check that you have created the distribution correctly.
5. In the Virtualization Type field, select the type of virtualization to use for this profile, or select None for no virtualization.
6. Click **[Next]**.
7. In the Distribution File Location type the path to the installation media installed on the Uyuni Server.
8. Click **[Next]**.
9. Provide a password for the root user on the client.
10. Click **[Finish]**.
11. Review the details of your new profile, and customize as required.

When you are creating your autoinstallation profile, you can check Always use the newest Tree for this base channel. This setting allows Uyuni to automatically pick the latest distribution that is associated with the specified base channel. If you add new distributions later, Uyuni uses the most recently created or modified.

Changing the Virtualization Type usually requires changes to the profile bootloader and partition options. This can overwrite your customization. Verify new or changed settings before saving them, by navigating to the Partitioning tab.

The kernel options from the distribution and the profile are combined.

You can change the details and settings of your autoinstallation profiles by navigating to **Systems › Autoinstallation › Profiles** and clicking the name of the profile you want to edit. Alternatively, navigate to **Systems › System List**, select the client you want to provision, and navigate to the **Provisioning › Autoinstallation** subtab.

9.4.2. AutoYaST Profiles

An AutoYaST profile consists of a Label that identifies the profile, an Autoinstall Tree that points to an

autoinstallable distribution, various options, and, most importantly, an AutoYaST installation file.

The AutoYaST installation file is an XML file that give directions to the AutoYaST installer. AutoYaST calls it a "control file." For the full syntax of AutoYaST installation files, see https://doc.opensuse.org/projects/autoyast/#cha-configuration-installation-options.

SUSE provides templates of AutoYaST installation files that you can use as a starting point for your own custom files. You will find the templates at https://github.com/SUSE/manager-build-profiles in the AutoYast directory. Each of these profiles requires you to set some variables before you use it. Check the README file included with the script to determine which variables you need. For more information about using variables in AutoYaST scripts, see Variables.

Provided AutoYaST templates do not set any user password. Consider setting up root and other user accounts and passwords or other means of authentication. For more information about user accounts in the AutoYaST profiles, see https://doc.opensuse.org/projects/autoyast/#Configuration-Security-users-and-groups.

These are the most important sections in the AutoYaST installation file for installing with Uyuni:

- <add-on> allows to add child channels to the installation. For an example, see https://doc.opensuse.org/projects/autoyast/#Software-Selections-additional.
- `<general>$SNIPPET('spacewalk/sles_no_signature_checks')</general> disables signature checks
- <software> allows to specify product for the Unified Installer
  - See https://doc.opensuse.org/projects/autoyast/#CreateProfile-Software with a "<software>" example
- <init-scripts config:type="list">$SNIPPET('spacewalk/minion_script')</init-scripts> allows the client to register to Uyuni as a Salt client.
- <pre-scripts config:type="list">$SNIPPET('spacewalk/root_ca')</pre-scripts> will copy and deploy the server SSL CA certificate on the new machine.
- <add-on><add_on_products config:type="list">$SNIPPET('spacewalk/autoyast_channels')</add_on_products></add-on> automatically adds all the channels of the selected distribution as sources. For more information about AutoYaST, see https://doc.opensuse.org/projects/autoyast/.

A more recent, Salt-based alternative to AutoYaST, is Yomi. For information about Yomi, see **Specialized-guides › Salt**.

9.4.3. Kickstart Profiles

Kickstart profiles offer a large number of configuration options. To create these profiles, you can upload them, or use a dedicated wizard.

Kickstart profiles allow you to use file preservation lists. If you have many custom configuration files located on a client you want to reinstall with Kickstart, you can save them as a list, and associate that list with the Kickstart profile.

Procedure: Creating a File Preservation List

1. In the Uyuni Web UI, navigate to **Systems › Autoinstallation › File Preservation** and click **[Create File Preservation List]**.
2. Enter a suitable label, and list absolute paths to all files and directories you want to save.
3. Click **[Create List]**.
4. Include the file preservation list in your Kickstart profile.
5. Navigate to **Systems › Autoinstallation › Profiles** and select the profile you want to edit, go to the **System Details › File Preservation** subtab, and select the file preservation list to include.

File preservation lists are limited to a total size of `1` MB. Special devices like `/dev/hda1` and `/dev/sda1` cannot be preserved. Only use file and directory names, you cannot use regular expression wildcards.

For more information about Kickstart, see the Red Hat documentation.

9.4.4. Templates Syntax

Parts of your installation file are replaced during the installation. Variables are replaced with single values, and code snippets are replaced with whole sections of text. Escaped symbols or sections are not replaced.

A template engine called Cheetah allows Cobbler to do these replacements. This mechanism allows you to reinstall large numbers of systems, without having to manually create profiles for each of them.

You can create autoinstallation variables and code snippets within the Uyuni Web UI. Within a profile, the Autoinstallation File tab allows you to see the result of the substitutions.

- For information about variables, see Variables.
- For information about code snippets, see Code Snippets.
- For information about escaping symbols or text blocks, see Escaping.

9.4.4.1. Variables

Autoinstallation variables can be used to substitute values into Kickstart and AutoYaST profiles. To define a variable, from the profile, navigate to the Variables subtab, and create a name=value pair in the text box.

For example, you could create a variable that holds the IP address of the client, and another that holds the address of its gateway. Those variables can then be defined for all the clients installed from the same profile. To do that, add these lines to the Variables text box:

```
ipaddr=192.168.0.28
gateway=192.168.0.1
```

To use the variable, prepend a $ sign in the profile to substitute the value. For example, the network part of a Kickstart file may look like the following:

```
network --bootproto=static --device=eth0 --onboot=on --ip=$ipaddr \
  --gateway=$gateway
```

The $ipaddr is resolved to 192.168.0.28, and the $gateway to 192.168.0.1.

In installation files, variables use a hierarchy. System variables take precedence over profile variables, which in turn take precedence over distribution variables.

9.4.4.2. Code Snippets

Uyuni comes with a large number of predefined code snippets. Navigate to **Systems › Autoinstallation › Autoinstallation Snippets** to see the list of existing snippets.

Use a snippet by inserting the $SNIPPET() macro in your autoinstallation file. For example, in Kickstart:

```
$SNIPPET('spacewalk/redhat_register_using_salt')
```

Or, in AutoYaST:

```
<init-scripts config:type="list">
  $SNIPPET('spacewalk/minion_script')
</init-scripts>
```

The macro is parsed by Cobbler and substituted with the contents of the snippet. You can also store your own code snippets to use in autoinstallation files later on. Click **[Create Snippet]** to create a new code snippet.

This example sets up a Kickstart snippet for a common hard drive partition configuration:

```
clearpart --all
```

```
part /boot --fstype ext3 --size=150 --asprimary
part / --fstype ext3 --size=40000 --asprimary
part swap --recommended

part pv.00 --size=1 --grow

volgroup vg00 pv.00
logvol /var --name=var vgname=vg00 --fstype ext3 --size=5000
```

Use the snippet with, for example:

```
$SNIPPET('my_partition')
```

9.4.4.3. Escaping

If the autoinstallation file contains shell script variables like $(example), the content needs to be escaped with a backslash: \$(example). Escaping the $ symbol prevents the templating engine from evaluating the symbol as an internal variable.

Text blocks such as code fragments or scripts can be escaped by wrapping them with the \#raw and \#end raw directives. For example:

```
#raw
#!/bin/bash
for i in {0..2}; do
 echo "$i - Hello World!"
done
#end raw
```

Any line with a # symbol followed by a whitespace is treated as a comment and is therefore not evaluated. For example:

```
# start some section (this is a comment)
echo "Hello, world"
# end some section (this is a comment)
```

9.5. Unattended Provisioning

You can use an API call to declare an association between a client identified by its MAC address and an autoinstallation profile. Next time the system reboots, it starts the installation based on the specified profile.

Procedure: Reinstallation From a Manually Declared Profile

1. On the Uyuni Server, at the command prompt, use the system.createSystemRecord API call. In this example, replace name with the name of your client, <profile> with the profile label, <iface> with the name of the interface on the client such as eth0, and <hw_addr> with its hardware address such as 00:25:22:71:e7:c6:

```
$ spacecmd api -- --args '["<name>", "<profile>", "", "", \
  [ {"name": "<iface>", "mac": "<hw_addr>"} ]]' \
  system.createSystemRecord
```

2. Power on the client. It boots from the network, and the correct profile is selected for installation.

This command creates a system record at Cobbler. You may also specify additional parameters, like kernel options, the IP address of the client, and its domain name. For more information, see the API documentation for createSystemRecord call.

9.6. Use Your Own GPG Key

If the repositories you are using for autoinstallation have unsigned metadata, you usually have to use the insecure=1 kernel parameter as an option of the autoinstallable distribution, and use a spacewalk/sles_no_signature_checks code snippet in the AutoYaST installation file.

A safer alternative is to provide your own GPG key.

This technique applies to SUSE clients only.

Procedure: Include Your Own GPG Key

1. Create a GPG key.
2. Use it to sign the package's metadata.
3. Add it to the initial RAM disk of your installation media.
4. To copy GPG keys to the container use mgradm gpg add. This command copies the GPG key and adds it to the customer keyring.
5. Run command mgradm restart. This command creates a unique keyring using the SUSE and the customer keyring.

When you signed the metadata with your new GPG key, any already onboarded client will not know about the new key. Ideally, you should sign the metadata before you register any client.

For already onboarded clients that use those repositories, the workaround is to disable GPG key checking on them.

Chapter 10. Virtual Host Managers

Virtual Host Managers (VHMs) are used to gather information from a range of client types.

VHMs can be used to collect private or public cloud instances and organize them into virtualization groups. With your virtualized clients organized this way, Taskomatic collects data on the clients for display in the Uyuni Web UI. VHMs also allow you to use subscription matching on your virtualized clients.

You can create a VHM on your Uyuni Server, and use it to inventory available public cloud instances. You can also use a VHM to manage clusters created with Kubernetes.

- For more information on using a VHM with Amazon Web Services, see **Client-configuration › Vhm-aws**.
- For more information on using a VHM with Microsoft Azure, see **Client-configuration › Vhm-azure**.
- For more information on using a VHM with Google Compute Engine, see **Client-configuration › Vhm-gce**.
- For more information on using a VHM with Nutanix, see **Client-configuration › Vhm-nutanix**.
- For more information on using a VHM with VMWare vSphere, see **Client-configuration › Vhm-vmware**.
- For more information on using a VHM with other hosts, see **Client-configuration › Vhm-file**.

10.1. Virtual Host Manager and Amazon Web Services

You can use a virtual host manager (VHM) to gather instances from Amazon Web Services (AWS).

The VHM allows Uyuni to obtain and report information about your clusters. For more information on VHMs, see **Client-configuration › Vhm**.

10.1.1. Create an Amazon EC2 VHM

The Virtual Host Manager (VHM) runs on the Uyuni Server.

Ensure you have installed the virtual-host-gatherer-libcloud package on the Uyuni Server.

Procedure: Creating an Amazon EC2 VHM

1. In the Uyuni Web UI, navigate to **Systems › Virtual Host Managers**.
2. Click **[Create]** and select Amazon EC2 from the drop-down menu.
3. In the Add an Amazon EC2 Virtual Host Manager section, use these parameters:
    - In the Label field, type a custom name for your VHM.
    - In the Access Key ID field, type the access key ID provided by Amazon.

- In the Secret Access Key field, type the secret access key associated with the Amazon instance.
- In the Region field, type the region to use.
- In the Zone field, type the zone your VM is located in. This is required for subscription matching to work. For more information about setting regions and zones, see [susesupport_and_vm_zones].

4. Click **[Create]** to save your changes and create the VHM.
5. On the Virtual Host Managers page, select the new VHM.
6. On the Properties page, click **[Refresh Data]** to inventory the new VHM.

To see which objects and resources have been inventoried, navigate to **Systems › System List › Virtual Systems**.

Instances running on the Amazon public cloud report a UUID to the Uyuni Server in the format of an i followed by seventeen hexadecimal digits:

```
I1234567890abcdef0
```

10.1.2. AWS Permissions for Virtual Host Manager

For security reasons, always grant the least privilege possible for a task to be performed. Using an Access Key with excessive permissions for users connecting to AWS is not advised.

For Uyuni to gather the information required from AWS, the VHM needs permission to describe EC2 instances and addresses. One method to grant this is to create a new IAM user (Identity and Access Management) specific to this task, create a policy as follows and attach to the user:

```
{
    "Version": "2012-10-17",
    "Statement":[
        {
            "Effect": "Allow",
            "Action": [
                "ec2:DescribeAddresses",
                "ec2:DescribeInstances"
            ],
            "Resource": "*"
        }
    ]
}
```

You can limit permissions more by restricting access to specific regions. For more information, see https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ExamplePolicies_EC2.html#iam-example-read-only.

10.2. Virtual Host Manager and Azure

You can use a virtual host manager (VHM) to gather instances from Microsoft Azure.

The VHM allows Uyuni to obtain and report information about your virtual machines. For more information on VHMs, see **Client-configuration › Vhm**.

10.2.1. Prerequisites

The VHM you create needs to have the correct permissions assigned, in order for it to access the Azure VM.

Log in to your Azure account as the subscription administrator, and ensure that the Azure user account and application are in the correct groups. The group that the application is in determines the role it has, and therefore the permissions.

10.2.2. Create an Azure VHM

The Virtual Host Manager (VHM) runs on the Uyuni Server.

Ensure you have installed the virtual-host-gatherer-libcloud package on the Uyuni Server.

Procedure: Creating an Azure VHM

1. In the Uyuni Web UI, navigate to **Systems › Virtual Host Managers**.
2. Click **[Create]** and select Azure from the drop-down menu.
3. In the Add an Azure Virtual Host Manager section, use these parameters:
    - In the Label field, type a custom name for your VHM.
    - In the Subscription ID field, type the subscription ID found in Azure portal > Services > Subscriptions page.
    - In the Application ID field, type the application ID that you collected when you registered the application.
    - In the Tenant ID field, type the tenant ID provided by Azure that you collected when you registered the application.
    - In the Secret Key field, type the secret key associated with the Azure instance.
    - In the Zone field, type the zone your VM is located in. For example, for West Europe, enter westeurope. This is required for subscription matching to work.
4. Click **[Create]** to save your changes and create the VHM.
5. On the Virtual Host Managers page, select the new VHM.

6. On the Properties page, click **[Refresh Data]** to inventory the new VHM.

To see which objects and resources have been inventoried, navigate to **Systems › System List › Virtual Systems**.

10.2.3. Assigning permissions

If the permissions are not set correctly, you might receive an error like this when you run virtual-host-gatherer:

```
General error: [AuthorizationFailed] The client 'client_name' with object id 'object_ID'
does not have authorization to perform action 'Microsoft.Compute/virtualMachines/read'
over scope '/subscriptions/not-very-secret-subscription-id' or the scope is invalid. If
access was recently granted, please refresh your credentials.
```

To determine the correct credentials, run this command at the prompt on the Uyuni Server:

```
virtual-host-gatherer -i input_azure.json -o out_azure.json -vvv
```

The input_azure.json file should contain this information:

```
[
    {
        "id": "azure_vhm",
        "module": "Azure",
        "subscription_id": "subscription-id",
        "application_id": "application-id",
        "tenant_id": "tenant-id",
        "secret_key": "secret-key",
        "zone": "zone"
    }
]
```

10.2.4. Azure UUID

Instances running on the Azure public cloud report this UUID to the Uyuni Server:

```
13f56399-bd52-4150-9748-7190aae1ff21
```

10.3. Virtual Host Manager and Google Compute Engine

You can use a virtual host manager (VHM) to gather instances from Google Compute Engine (GCE).

The VHM allows Uyuni to obtain and report information about your virtual machines. For more information on VHMs, see **Client-configuration › Vhm**.

10.3.1. Prerequisites

The VHM you create needs to have the correct permissions assigned to access the GCE VM.

Log in to your Google Cloud Platform account as an administrator, and use the Cloud Identity and Access Management (IAM) tool to ensure that the service account has the appropriate roles.

10.3.2. Create a GCE VHM

The Virtual Host Manager (VHM) runs on the Uyuni Server.

To run a VHM, your Uyuni Server needs to have port 443 open, to access the clients.

Ensure you have installed the virtual-host-gatherer-libcloud package on the Uyuni Server.

Before you begin, log in to the GCE panel, and download a certificate file. Store this file locally on your Uyuni Server, and take note of the path.

Procedure: Creating a GCE VHM

1. In the Uyuni Web UI, navigate to **Systems › Virtual Host Managers**.
2. Click **[Create]** and select Google Compute Engine from the drop-down menu.
3. In the Add a Google Conpute Engine Virtual Host Manager section, use these parameters:
    - In the Label field, type a custom name for your VHM.
    - In the Service Account Email field, type the email address associated with your service account.
    - In the Cert Path field, type the local path on the Uyuni Server to the key that you downloaded from the GCE panel.
    - In the Project ID field, type the project ID used by the GCE instance.
    - In the Zone field, type the zone your VM is located in. This is required for subscription matching to work.
4. Click **[Create]** to save your changes and create the VHM.
5. On the Virtual Host Managers page, select the new VHM.
6. On the Properties page, click **[Refresh Data]** to inventory the new VHM.

To see which objects and resources have been inventoried, navigate to **Systems › System List › Virtual Systems**.

10.3.3. Assigning Permissions

If the permissions are not set correctly, you might receive an error like this when you run virtual-host-gatherer:

```
ERROR: {'domain': 'global', 'reason': 'forbidden', 'message': "Required
'compute.zones.list' permission for 'projects/project-id'"}
ERROR: Could not connect to the Google Compute Engine Public Cloud using specified
credentials.
```

To determine the correct credentials, run this command at the prompt on the Uyuni Server:

```
virtual-host-gatherer -i input_google.json -o out_google.json -vvv
```

The input_google.json file should contain this information:

```
[
    {
        "id": "google_vhm",
        "module": "GoogleCE",
        "service_account_email": "mail@example.com",
        "cert_path": "secret-key",
        "project_id": "project-id",
        "zone": "zone"
    }
]
```

10.3.4. GCE UUID

Instances running on the Google public cloud report this UUID to Uyuni Server:

```
152986662232938449
```

10.4. Virtualization with Nutanix

You can use Nutanix AHV virtual machines with Uyuni by setting up a virtual host manager (VHM). To begin, you need to set up a VHM on your Uyuni Server, and inventory the available VM hosts.

10.4.1. VHM Setup

The Virtual Host Manager (VHM) runs on the Uyuni Server.

Ensure you have installed the virtual-host-gatherer-Nutanix package on the Uyuni Server.

To run a VHM, your Uyuni Server must have port 9440 open to access the Nutanix Prism Element API.

Procedure: Creating a Nutanix VHM

1. In the Uyuni Web UI, navigate to **Systems › Virtual Host Managers**.
2. Click **[Create]** and select Nutanix AHV.
3. In the Add a Nutanix AHV Virtual Host Manager section, use these parameters:
    - In the Label field, type a custom name for your VHM.
    - In the Hostname field, type the fully qualified domain name (FQDN) or host IP address.
    - In the Port field, type the Prism Element API port to use (for example, 9440).
    - In the Username field, type the username associated with the VM host.
    - In the Password field, type the password associated with the VM host user.
4. Click **[Create]** to save your changes and create the VHM.
5. On the Virtual Host Managers page select the new VHM.
6. On the Properties page, click **[Refresh Data]** to inventory the new VHM.

To see which objects and resources have been inventoried, navigate to **Systems › System List › Virtual Systems**.

Connecting to the Nutanix Prism API server from a browser using HTTPS can sometimes log an invalid certificate error. If this occurs, refreshing the data from the virtual host manager fails. A valid SSL certificate (not self-signed) is required on your Nutanix API server. If you are using a custom CA authority for your Nutanix SSL certificate, copy the custom CA certificate to /etc/pki/trust/anchors on the Uyuni Server.

Re-trust the certificate by running the update-ca-certificates command on the command line, and restart the spacewalk services.

After your VHM has been created and configured, Taskomatic runs data collection automatically. If you want to manually perform data collection, navigate to **Systems › Virtual Host Managers**, select the appropriate VHM, and click **[Refresh Data]**.

Uyuni ships with a tool called virtual-host-gatherer that can connect to VHMs using their API, and request information about virtual hosts. virtual-host-gatherer maintains the concept of optional modules, where each module enables a specific VHM. This tool is automatically invoked nightly by Taskomatic. Log files for the virtual-host-gatherer tool are located at /var/log/rhn/gatherer.log.

10.5. Virtualization with VMware

You can use VMware vSphere virtual machines, including ESXi and vCenter, with Uyuni by setting up a virtual host manager (VHM).

To begin, you need to set up a VHM on your Uyuni Server, and inventory the available VM hosts. Taskomatic can

then begin data collection using the VMs API.

10.5.1. VHM Setup

The Virtual Host Manager (VHM) runs on the Uyuni Server.

To run a VHM, your Uyuni Server needs to have port 443 open, to access the VMware API.

VMware hosts use access roles and permissions to control access to hosts and guests. Ensure that any VMware objects or resources that you want to be inventoried by the VHM have at least read-only permissions. If you want to exclude any objects or resources, mark them with no-access.

When you are adding new hosts to Uyuni, you need to consider if the roles and permissions that have been assigned to users and objects need to be inventoried by Uyuni.

For more information on users, roles, and permissions, see the VMware vSphere documentation: https://techdocs.broadcom.com/us/en/vmware-cis/vsphere.html

Procedure: Creating a VMware VHM

1. In the Uyuni Web UI, navigate to **Systems › Virtual Host Managers**.
2. Click **[Create]** and select VMware-based.
3. In the Add a VMware-based Virtual Host Manager section, use these parameters:
    - In the Label field, type a custom name for your VHM.
    - In the Hostname field, type the fully qualified domain name (FQDN) or host IP address.
    - In the Port field, type the ESXi API port to use (for example, 443).
    - In the Username field, type the username associated with the VM host.
    - In the Password field, type the password associated with the VM host user.
4. Click **[Create]** to save your changes and create the VHM.
5. On the Virtual Host Managers page select the new VHM.
6. On the Properties page, click **[Refresh Data]** to inventory the new VHM.

To see which objects and resources have been inventoried, navigate to **Systems › System List › Virtual Systems**.

Connecting to the ESXi server from a browser using HTTPS can sometimes log an invalid certificate error. If this occurs, refreshing the data from the virtual hosts server fails. To correct the problem, extract the certificate from the ESXi server, and copy it to /etc/pki/trust/anchors. Re-trust the certificate by running the update-ca-certificates

command on the command line, and restart the spacewalk services.

After your VHM has been created and configured, Taskomatic runs data collection automatically. If you want to manually perform data collection, navigate to **Systems › Virtual Host Managers**, select the appropriate VHM, and click **[Refresh Data]**.

Uyuni ships with a tool called virtual-host-gatherer that can connect to VHMs using their API, and request information about virtual hosts. virtual-host-gatherer maintains the concept of optional modules, where each module enables a specific VHM. This tool is automatically invoked nightly by Taskomatic. Log files for the virtual-host-gatherer tool are located at /var/log/rhn/gatherer.log.

10.5.2. Troubleshooting SSL Errors on VMware

If you see SSL errors while configuring your VMware installation, you need to download the CA certificate file from VMware, and trust it on Uyuni.

Procedure: Trusting VMware CA Certificates

1. Download the CA Certificate from your VMware installation. You can do this by logging in to your vCenter Web UI, and clicking **[Download trusted root CA certificates]**.
2. If the downloaded CA certificates file is in .zip format, extract the archive. The certificate files have a number as an extension. For example, certificate.0.
3. Copy the certificate files to your Uyuni Server, and save them to the /etc/pki/trust/anchors/ directory.
4. Change the filename suffix on the copied certificate to either .crt or .pem.
5. On the Uyuni Server, at the command prompt, update the CA certificate record:

```
update-ca-certificates
```

10.6. Virtualization with Other Third Party Providers

If you want to use a third-party virtualization provider other than Xen, KVM, or VMware, you can import a JSON configuration file to Uyuni.

Similarly, if you have a VMware installation that does not provide direct access to the API, a file-based VHM provides you with some basic management features.

This option is for importing files that have been created with the virtual-host-gatherer tool. It is not designed for manually created files.

Procedure: Exporting and Importing a JSON File

1. Export the JSON configuration file by running virtual-host-gatherer on the VM network.
2. Save the produced file to a location accessible by your Uyuni Server.
3. In the Uyuni Web UI, navigate to **Systems › Virtual Host Managers**.
4. Click **[Create]** and select File-based.
5. In the Add a file-based Virtual Host Manager section, use these parameters:
    - In the Label field, type a custom name for your VHM.
    - In the Url field, type the path to your exported JSON configuration file.
6. Click **[Create]** to save your changes and create the VHM.
7. On the Virtual Host Managers page, select the new VHM.
8. On the Properties page, click **[Refresh Data]** to inventory the new VHM.

Listing 6. Example: Exported JSON configuration file:

```
{
    "examplevhost": {
        "10.11.12.13": {
            "cpuArch": "x86_64",
            "cpuDescription": "AMD Opteron(tm) Processor 4386",
            "cpuMhz": 3092.212727,
            "cpuVendor": "amd",
            "hostIdentifier": "'vim.HostSystem:host-182'",
            "name": "11.11.12.13",
            "os": "VMware ESXi",
            "osVersion": "5.5.0",
            "ramMb": 65512,
            "totalCpuCores": 16,
            "totalCpuSockets": 2,
            "totalCpuThreads": 16,
            "type": "vmware",
            "vms": {
                "vCenter": "564d6d90-459c-2256-8f39-3cb2bd24b7b0"
            }
        },
        "10.11.12.14": {
            "cpuArch": "x86_64",
            "cpuDescription": "AMD Opteron(tm) Processor 4386",
            "cpuMhz": 3092.212639,
            "cpuVendor": "amd",
            "hostIdentifier": "'vim.HostSystem:host-183'",
            "name": "10.11.12.14",
            "os": "VMware ESXi",
            "osVersion": "5.5.0",
            "ramMb": 65512,
            "totalCpuCores": 16,
            "totalCpuSockets": 2,
            "totalCpuThreads": 16,
            "type": "vmware",
            "vms": {
                "49737e0a-c9e6-4ceb-aef8-6a9452f67cb5": "4230c60f-3f98-2a65-f7c3-
600b26b79c22",
                "5a2e4e63-a957-426b-bfa8-4169302e4fdb": "42307b15-1618-0595-01f2-
427ffcddd88e",
```

```
                "NSX-gateway": "4230d43e-aafe-38ba-5a9e-3cb67c03a16a",
                "NSX-l3gateway": "4230b00f-0b21-0e9d-dfde-6c7b06909d5f",
                "NSX-service": "4230e924-b714-198b-348b-25de01482fd9"
            }
        }
    }
}
```

For more information, see the man page on your Uyuni server for virtual-host-gatherer:

```
man virtual-host-gatherer
```

The README file of that package provides background information about the type of a hypervisor, etc.:

```
/usr/share/doc/packages/virtual-host-gatherer/README.md
```

The man page and the README file also contain example configuration files.

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