



# Getting Started

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## Getting Started

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SUSE LLC

10 Canal Park Drive

Suite 200

Cambridge MA 02141

USA

<https://www.suse.com/documentation> 

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# 1 Introduction

This quick-start provides guidance on setting up SUSE Manager server with KVM. You will learn the fundamentals of managing both traditional SUSE Manager clients and Salt clients. This guide is intended for system administrators.



## Note: SUSE Manager Version Information

In this manual if not other specified, SUSE Manager version 3.2 is assumed and this version is required if a feature is discussed. {susemgr} 3.2 and SUSE Manager 3.2 Proxy were originally released as a SLES 12 SP3 extension. Whenever features of the SUSE Manager{productnumber} host operating system are documented and not other specified version 12 SP3 is assumed.

## 1.1 What is SUSE Manager?

SUSE Manager lets you manage large sets of Linux systems and keep them up to date. It provides automated software management, asset management, and system provisioning. {susemgr} is a solution for organizations requiring absolute control of maintenance and package deployment on their servers. {susemgr} allows administrators to maintain a high level of security while facilitating and advancing an organizations system life-cycle requirements.

### Salt

The inclusion of *Salt* in SUSE Manager 3 provides powerful event-driven configuration and management capabilities for fine grained control of any modern infrastructure.

### Salt-master

SUSE Manager takes a commanding role as a Salt-master capable of orchestrating thousands of Salt-minions (SUSE Manager Clients) via remote execution.

### Distribution Management

SUSE Manager is fully compatible with Red Hat Satellite Server and offers seamless management of both SUSE Linux Enterprise and Red Hat Enterprise Linux client systems.

## 1.2 Overview


SUSE Manager may be integrated within your network infrastructure in multiple ways. In this guide you will perform the following steps for an initial test setup.

- Install SUSE Linux Enterprise Server with SUSE Manager as an extension
- Setup SUSE Manager Server via YaST
- Register SUSE Manager with SCC (SUSE Customer Center)
- Synchronize a repository channel for use with both traditional clients and Salt minions
- Create an authentication key to act as an ID for the synced repository channel
- Add the new authentication key to a bootstrap template script and connect a traditional client
- Register a Salt minion with SUSE Manager (salt-master) and assign it a channel with an authentication key

## 1.3 Prerequisites for Installation

This guide requires that you have created an account with SCC (SUSE Customer Center). During installation of both SUSE Linux Enterprise Server (SLES) and SUSE Manager, SCC credentials will be requested and you must enter them to receive the latest packages and updates. The following procedure will guide you through obtaining your SCC *Organizational Credentials*.

### PROCEDURE: OBTAINING YOUR SCC ORGANIZATION CREDENTIALS

1. Open a browser and direct it to <https://scc.suse.com/login> .
2. If you have not done so, create an account now.
3. Log in to your new SCC account.
4. Under the *Management tools* widget select *Manage Users*.
5. Click the *Organization Credentials* tab.
6. Keep this information handy during SUSE Manager setup.

## 1.4 Obtaining Installation Media

After logging into your SCC account, you can find the installation images provided at the following addresses.

Select one and continue reading:

- Just Enough Operating System (JeOS) 290 MB [JeOS - Media Download \(https://www.suse.com/products/server/jeos/\)](https://www.suse.com/products/server/jeos/) ↗
- SLES DVD image 3 GB [SUSE Linux Enterprise Server - Media Download \(https://www.suse.com/products/server/download/\)](https://www.suse.com/products/server/download/) ↗



### Note: Just Enough Operating System (JeOS) vs. Full Media Image

The SLES JeOS image provides the quickest route for setup of a test environment. The JeOS image total size is about 290 MB. The alternative would be the 3 GB SLES DVD image. Both installation media are appropriate, but depend upon available bandwidth or your application needs. Both methods of installation will be covered in this guide.

## 1.5 Hardware Requirements

Review the following table for SUSE Manager hardware and software requirements. For installation on z Systems, see:

- Book “Advanced Topics”, Chapter 1 “SUSE Manager on IBM z Systems”

TABLE 1.1: **HARDWARE REQUIREMENTS**

Hardware	Recommended
CPU	Multi-core 64-bit CPU (x86_64, IBM POWER)
RAM:	<i>Test Server</i> Minimum 4 GB
	<i>Base Installation</i> Minimum 16 GB
	<i>Production Server</i> Minimum 32 GB
Disk Space:	<i>/ (root)</i> The default JeOS root partition size of 24 GB is sufficient for this guide

Hardware	Recommended
	<u>/var/lib/pgsql</u> Minimum 50 GB
	<u>/var/pacewalk</u> Minimum 50 GB per SUSE product and 200 GB per Red Hat product

## 1.6 Base Host Operating System

SUSE Manager 3.2 is based on SLES {sles-version} {sp-version} as the host operating system.

## 1.7 Supported Client Systems

Clients with the following operating systems are supported for registration with SUSE Manager. If you plan on using the new Salt features, ensure your clients are supported.



### Note: Supported Versions and SP Levels


Client operating system versions and SP levels must be under general support (normal or LTSS) to be supported with SUSE Manager. For details on the Expanded Support Lifecycle and minor Red Hat Enterprise Linux release versions, see <https://www.suse.com/lifecycle>  SUSE Linux Enterprise Server with Expanded Support .

TABLE 1.2: SUPPORTED CLIENT SYSTEMS

Operating Systems	Architecture	Traditional Clients	Salt Clients
SUSE Linux Enterprise 11 SP4	x86, x86_64, Itanium, IBM POWER, z Systems	Supported	Supported
SUSE Linux Enterprise 12 SP1, SP2, SP3	x86_64, IBM POWER(ppc64le), z Systems	Supported	Supported



Operating Systems	Architecture	Traditional Clients	Salt Clients
<i>Latest minor release</i> <i>Red Hat Enterprise</i> <i>Linux Server 6</i>	x86, x86_64	Supported	Supported
<i>Latest minor release</i> <i>Red Hat Enterprise</i> <i>Linux Server 7</i>	x86, x86_64	Supported	Supported
Novell Open Enter- prise Server 11, SP1, SP2, SP3 LTSS	x86, x86_64	Supported	Supported
Open Enterprise Server 2015, 2015 SP1, 2018	x86, x86_64	Supported	Supported

## 1.8 Network Requirements

To successfully complete this guide some network requirements must be met. The following section will walk you through these requirements.

### Fully Qualified Domain Name (FQDN)

The SUSE Manager server must resolve its FQDN correctly or cookies will not work properly on the WebUI.

- SUSE Linux Enterprise Server Documentation - Configuring Host Name and DNS ([https://www.suse.com/documentation/sles-12/book\\_sle\\_admin/data/sec\\_basicnet\\_yast.html#sec\\_basicnet\\_yast\\_change\\_host](https://www.suse.com/documentation/sles-12/book_sle_admin/data/sec_basicnet_yast.html#sec_basicnet_yast_change_host)) ↗

### Hostname and IP Address

To ensure that the SUSE Manager domain name can be resolved by its clients, both server and client machines must be connected to a working Domain Name System (DNS) server. This guide assumes the required infrastructure exists within your environment. For more information on setting up a (DNS) server see:

- SUSE Linux Enterprise Server Documentation - The Domain Name System ([https://www.suse.com/documentation/sles-12/book\\_sle\\_admin/data/cha\\_dns.html](https://www.suse.com/documentation/sles-12/book_sle_admin/data/cha_dns.html)) ↗

### Using a Proxy When Installing from SUSE Linux Enterprise Media

If you are on an internal network and do not have access to SUSE Customer Center, you can setup and use a proxy during a SUSE Linux Enterprise installation. For more information on configuring a proxy for access to SUSE Customer Center during a SUSE Linux Enterprise installation see:

- SUSE Linux Enterprise Server Documentation - Using a Proxy During Installation ([https://www.suse.com/documentation/sled-12/singlehtml/book\\_sle\\_deployment/book\\_sle\\_deployment.html#sec.i.yast2.start.parameters.proxy](https://www.suse.com/documentation/sled-12/singlehtml/book_sle_deployment/book_sle_deployment.html#sec.i.yast2.start.parameters.proxy)) ↗



### Important: Naming Your Server

The hostname of SUSE Manager must not contain uppercase letters as this may cause *jabberd* to fail. Choose the hostname of your SUSE Manager server carefully. Although changing the server name is possible, it is a complex process and unsupported.

## 1.9 Firewall Port Rules

In a production environment SUSE Manager server and its clients should always utilize firewall rules. The following table provides an overview of required ports.

Traditional client systems connect to SUSE Manager via port 443. In addition, enabling push actions from SUSE Manager to client systems, requires inbound connections on port 5222. If SUSE Manager will also push to a SUSE Manager proxy, you must allow inbound connections on port 5269.

**TABLE 1.3: REQUIRED PORTS ON SUSE MANAGER SERVER**

Port	Direction	Reason
67	Inbound	Required when configured as a DHCP server for systems requesting IP addresses
69	Inbound	Used when configured as a PXE server and allows installation and re-installation of PXE-boot enabled systems
80	Outbound	Used to contact SUSE Customer Center
443	Inbound	All WebUI, traditional client, and proxy server requests and SUSE Manager uses this port for SUSE Customer Center inbound traffic
443	Outbound	SUSE Manager uses this port to reach SUSE Customer Center unless running in disconnected mode with RMT or SMT
4505	Inbound	Required by the Salt-master to accept communication requests via TCP from minions
4506	Inbound	Required by the Salt-master to accept communication requests via TCP from minions

Port	Direction	Reason
5222	Inbound	When you wish to push actions to clients this port is required by the <i>osad</i> daemon running on the client systems
5269	Inbound/Outbound	Needed if you push actions to or via a SUSE Manager Proxy
	Outbound	Squid HTTP proxy for outgoing connections. It could be any port you configure

For more information on disconnected setup and port configuration, see:

- 
-

## 2 JeOS Installation

### 2.1 Virtual Machine Manager (virt-manager) Settings

This chapter provides the required (KVM) settings for installation of SUSE Linux Enterprise Just Enough Operating System (JeOS) 12 as the base for SUSE Manager. A kernel virtual machine (KVM) combined with Virtual Machine Manager (*virt-manager*) will be used as a sandbox for your first installation.



#### Tip: SUSEVirtualization Guide

For more information on virtualization, see: [SUSE Linux Enterprise Virtualization Guide \(https://www.suse.com/documentation/sles-12/singlehtml/book\\_virt/book\\_virt.html\)](https://www.suse.com/documentation/sles-12/singlehtml/book_virt/book_virt.html) ↗

Enter the following settings when creating a new virtual machine using **virt-manager**. In the following table replace *version* with the actual product version string.

KVM Settings	
Installation Method	Import Existing Disk Image
OS:	Linux
Version:	SLES < VERSION > -JeOS-for-kvm-and-xen.x86_64-GM.qcow2
Memory:	4096 MB
CPU's:	2
Storage Format:	.qcow2 24 GB (Default) JeOS Root Partition
Virtual Disks:	
VirtIO Disk 2	101 GB for <u>/var/spacewalk</u>
VirtIO Disk 3	50 GB for <u>/var/lib/pgsql</u>

KVM Settings	
VirtIO Disk 4	4 GB for swap
Name:	test-setup
Network	Bridge <i>br0</i>



### Tip: SUSE Virtualization Guide

For more information on virtualization, see: [SUSE Linux Enterprise Virtualization Guide](https://www.suse.com/documentation/sles-12/singlehtml/book_virt/book_virt.html) ([https://www.suse.com/documentation/sles-12/singlehtml/book\\_virt/book\\_virt.html](https://www.suse.com/documentation/sles-12/singlehtml/book_virt/book_virt.html)) ↗

## 2.2 JeOS KVM Settings

Create 3 additional virtual disks required for the SUSE Manager storage partitions.

### PROCEDURE: CREATING THE REQUIRED PARTITIONS WITH KVM

1. Create a new virtual machine using the downloaded JeOS KVM image and select *Import existing disk image*.
2. Configure RAM and number of CPUs (At least 4 GB RAM and 2 CPUs).
3. Name your KVM machine and select the *Customize configuration before install* check box.
4. Select the *Add Hardware* button and create three new virtual disks with the following specifications. These disks will be partitioned and mounted in *Procedure: Preparing JeOS for SUSE Manager Installation*.

VirtIO Storage Disks	Name	Sizing
VirtIO Disk 2	spacewalk	101 GB
VirtIO Disk 3	pgsql	50 GB
VirtIO Disk 4	swap	4 GB

5. Click *Begin Installation* and your new VM will boot from the JeOS image.

Proceed through the basic JeOS installation prompts until you reach the command line.



## Tip: Root Password

During the basic installation prompts you are asked to enter the root password. Select a strong password and then in the next message box *Confirm root Password*.

## 2.3 Preparing JeOS for SUSE Manager

### PROCEDURE: PREPARING JEOS FOR SUSE MANAGER INSTALLATION

1. Register with SCC:

```
SUSEConnect -e`EMAIL_ADDRESS` -r`SUSE_MANAGER_CODE`
```

2. Add SUSE Manager repositories:

```
SUSEConnect -p SUSE-Manager-Server/<productnumber>/x86_64 -r`SUSE_MANAGER_CODE`
```

3. Install yast2-storage with all required dependencies (approx. 40 packages, 30 MB when installed). This basic administration package is required for preparing storage partitions:

```
zypper in -t package yast2-storage
```

4. Partition and mount the virtual disks at the following locations using YaST Partitioner (yast2 disk).

VirtIO Storage Disks	Name	Storage Size	File System Type
VirtIO Disk 2	<u>/var/spacewalk</u>	101 GB	XFS
VirtIO Disk 3	<u>/var/lib/pgsql</u>	50 GB	XFS
VirtIO Disk 4	<u>swap</u>	4 GB	swap

5. SLES by default uses the BTRFS file system. A mount point is created automatically for /var/lib/pgsql/ (even when not installed). This must be removed or commented out from the /etc/fstab entries. As root edit /etc/fstab and comment out or remove the line:

```
/var/lib/pgsql btrfs subvol=@/var/lib/pgsql 0 0
```



## Warning: Removing the `pgsql` in the `/etc/fstabEntry`

If you do not remove this line from `fstab` the first time you shutdown the server you will lose your database. This occurs because you will have duplicate entries in the `fstab`. *Updated tools shipped with recent SPs will no longer require human intervention.*

6. Exit the partitioner and install the SUSE Manager pattern:

```
zypper in -t pattern suma_server
```

For proceeding with SUSE Manager setup, see: [Setup SUSE Manager with YaST \(suma-setup-with-yast-sumasetup.xml#suma-setup-with-yast-sumasetup\)](#) ↗



## 3 SUSE Linux Enterprise Server Installation

This chapter provides the required KVM settings for installation of SUSE Linux Enterprise Server media as the base for SUSE Manager. A kernel virtual machine KVM combined with Virtual Machine Manager (**virt-manager**) will be used as a sandbox for this installation.

### 3.1 SLES KVM Requirements

Enter the following settings when creating a new virtual machine using **virt-manager** (replace version with the actual version string):

KVM Settings for SLES	
Installation Method:	Local install media (ISO image or CDROM)
OS:	Linux
Version:	<u>SLE - [replaceable] version - Serv-</u> <u>er-x86_64-GM-DVD1.iso</u>
Memory:	4096 MB
CPUs:	2
Storage Format:	ISO 3 GB
Disk Space:	234 GB split between 4 GB swap and 130 GB mounted at <u>/var/spacewalk/</u>
	(Virtual Disk 1) and 50 GB mounted at <u>/</u> <u>var/lib/pgsql</u>
	(Virtual Disk 2). The rest for the root parti- tion (100 GB + ).
Name:	<u>example-server</u>
Network	Bridge <u>br0</u>

### 3.1.1 SLES KVM Settings


This section provides guidance on installation of SUSE Manager utilizing the full installation media with KVM and **virt-manager**. This section assumes you have previously setup an account with SCC and downloaded the SLES full installation media.

#### PROCEDURE: PREPARING FOR SLES INSTALLATION

1. In **virt-manager** select *File > New Virtual Machine*.
2. Select *Local install media (ISO image or CDRROM)*.
3. Ensure *Use ISO Image* is selected then click *Browse* and locate the full SLES image you downloaded from your SCC account.
4. Configure your machine with at least 4096 MB RAM and a minimum of 2 CPUs.
5. Create a storage device with a minimum of 234 GB storage space for the installation. During the partitioning setup of the SLES installation this disk should be partitioned into the following disks:

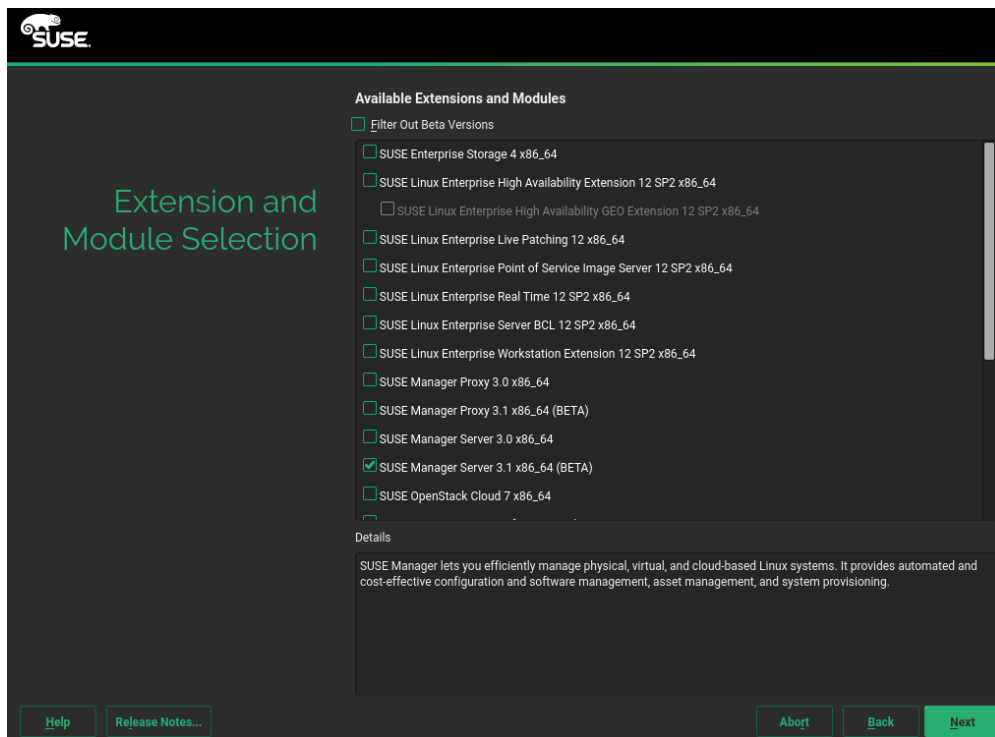
Disk Space Requirements
4 GB <u>swap</u>
130 GB XFS partition (or dedicated virtual disk) for <u>/var/pacewalk/</u>
50 GB XFS partition (or dedicated virtual disk) for <u>/var/lib/pgsql/</u>

6. The remaining storage space will be used by the operating system for the root partition. Select *Finish* to begin the installation.

Installation of SUSE Linux Enterprise Server will begin. For more information on completing an installation of SUSE Linux Enterprise Server, see: [SUSE Linux Enterprise Installation Quickstart \(https://www.suse.com/documentation/sles-12/book\\_quickstarts/data/sec\\_sle\\_installquick.html\)](https://www.suse.com/documentation/sles-12/book_quickstarts/data/sec_sle_installquick.html) .

## 3.2 Selecting the SUSE Manager Extension

1. During the SUSE Linux Enterprise Server installation you will be presented with the *Extension and Module Selection*.
2. Select the SUSE Manager Extension and then click the *Next* button.
3. Complete the SUSE Linux Enterprise Server installation.



## 4 SUSE Manager Setup

### 4.1 Topics

This section covers SUSE Manager setup. You will perform the following procedures:

- Start SUSE Manager setup via YaST or command line
- Create the main administration account with the SUSE Manager Web UI
- Name your base organization and add login credentials
- Sync the SUSE Linux Enterprise product channel from SUSE Customer Center

### 4.2 SUSE Manager Setup

This section will guide you through SUSE Manager setup procedures.

#### PROCEDURE: SUSE MANAGERS SETUP

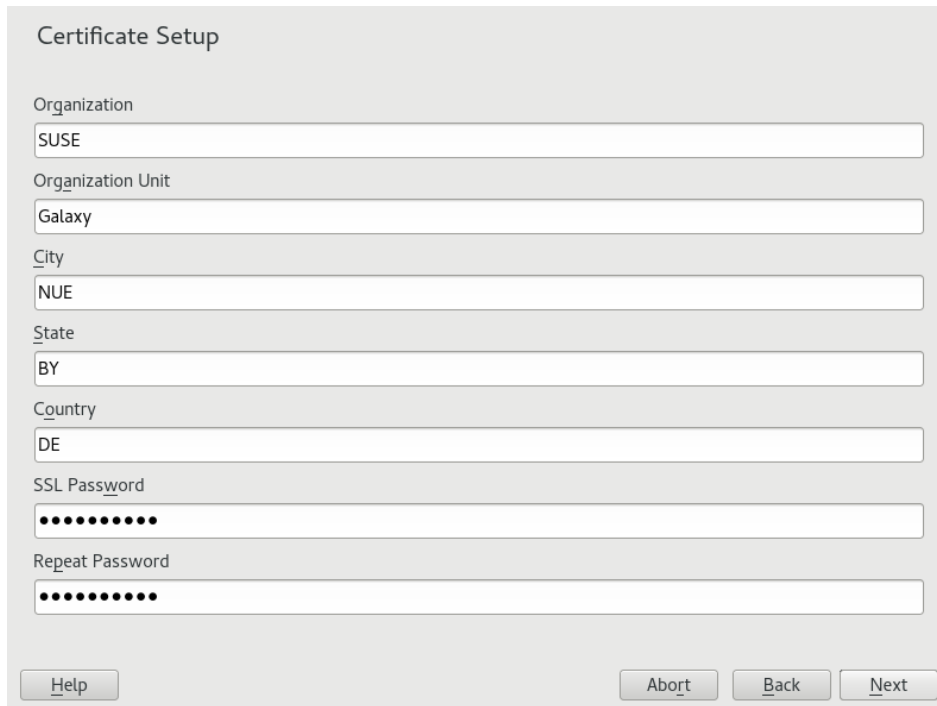
1. Login to the SUSE Manager server desktop and perform one of the following actions to begin setup:
  - Select *Applications > System Tools > YaST > SUSE Manager Setup*.
  - Open a terminal as root and type `yast2 susemanager_setup` to begin setup.
2. From the introduction screen select *SUSE Manager Setup > Setup SUSE Manager from scratch* then select *Next* to continue.
3. Enter the email address that should receive status notifications about SUSE Manager. The number of emails sent from SUSE Manager can be extensive, therefore notifications via email may be disabled from the Web UI after setup.
4. Select *Next* to continue.
5. Enter your certificate information and a password. The password should be stored in a secure location.



## Important: Certificate Password

*Without this password it will not be possible to set up a SUSE Manager Proxy Server.*

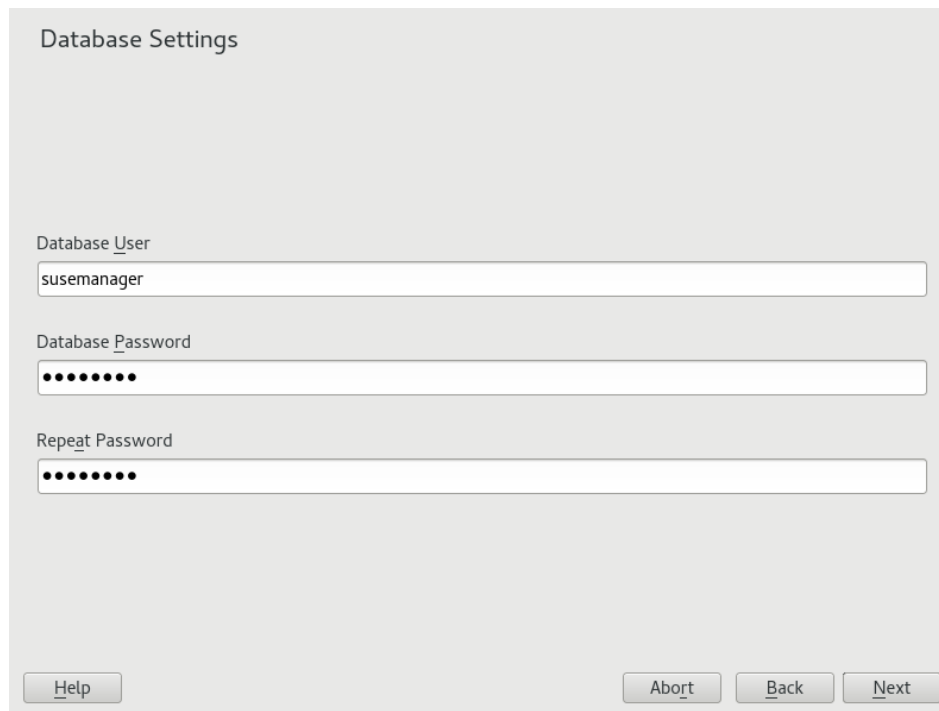
6. Select *Next* to continue.



The image shows a 'Certificate Setup' dialog box with the following fields and buttons:

- Organization: SUSE
- Organization Unit: Galaxy
- City: NUE
- State: BY
- Country: DE
- SSL Password: (masked with dots)
- Repeat Password: (masked with dots)
- Buttons: Help, Abort, Back, Next

7. From the *SUSE Manager Setup > Database Settings* screen, enter a database user and password. This password should be stored in a secure location. Select *Next* to continue.



Database Settings

Database User  
susemanager

Database Password  
●●●●●●

Repeat Password  
●●●●●●

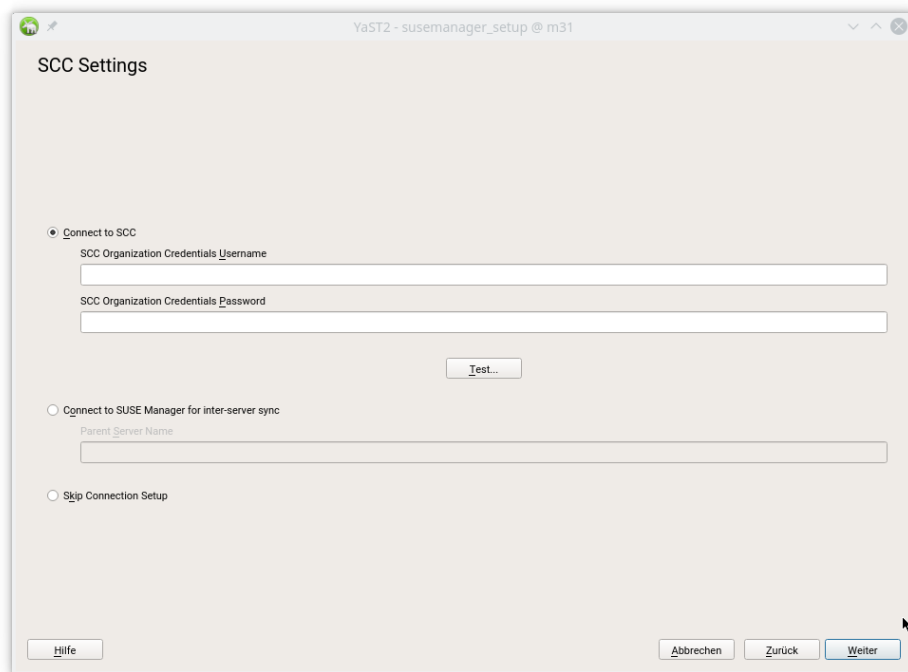
Help Abort Back Next

8. Enter your SUSE Customer Center Organization Credentials. Open <https://sc-c.suse.com/login> to register or access to your organization credentials.



### Note: *Skip*

If you are using SUSE Enterprise products, SUSE Manager requires that you connect to SUSE Customer Center for software, updates and patches. You will not be able to synchronize or provide Enterprise channels to your clients without this information. However if you would like to work with open source software channels and repositories then select the *Skip* button to continue. You can setup your SUSE Customer Center credentials or configure inter-server sync at a later time.



9. Select *Next* to continue.
10. Select *Yes* to run setup when prompted.
11. Once setup has completed, select *Next* to continue. You will be presented with the new SUSE Manager Web UI address.
12. Select *Finish* to complete SUSE Manager setup.

In the next section you will create the administrator's account and synchronize with SUSE Customer Center.

#### 4.2.1 Creating the Main Administration Account

This section will walk you through creating your organizations main administration account for SUSE Manager.



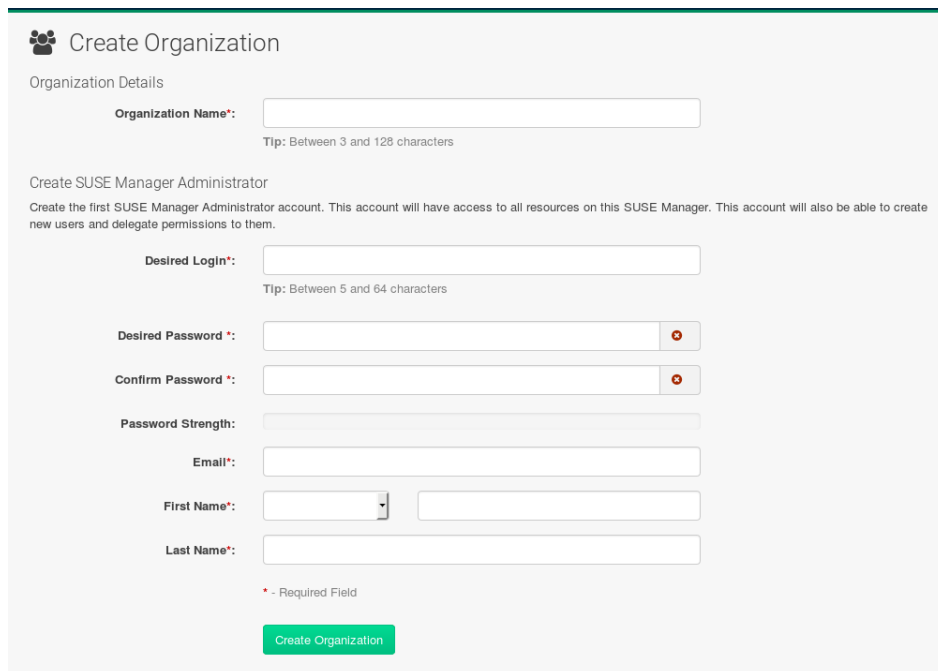
#### Warning: Admin and User Accounts

The main administration account is the *highest authority account* within SUSE Manager and therefore account access information should be stored in a secure location.

For security it is recommended that the main administrator creates *low level admin accounts* designated for administration of organizations and individual groups.

#### PROCEDURE: SETUP THE MAIN ADMINISTRATION ACCOUNT

1. Open a browser and direct it to the SUSE Manager Server URL provided after completing setup.
2. Add your organization name to the *Create Organization* › *Organization Name* field.
3. Add your username and password to the *Create Organization* › *Desired Login* and *Create Organization* › *Desired Password* fields.
4. Fill in the Account Information fields including an email for system notifications.
5. Select *Create Organization* to finish creating your administration account.



The screenshot shows the 'Create Organization' form in SUSE Manager. The form is titled 'Create Organization' with a group icon. It is divided into two main sections: 'Organization Details' and 'Create SUSE Manager Administrator'. The 'Organization Details' section has a single field for 'Organization Name\*' with a tip: 'Between 3 and 128 characters'. The 'Create SUSE Manager Administrator' section has a description: 'Create the first SUSE Manager Administrator account. This account will have access to all resources on this SUSE Manager. This account will also be able to create new users and delegate permissions to them.' This section contains several fields: 'Desired Login\*' (tip: 'Between 5 and 64 characters'), 'Desired Password \*' (with a strength indicator), 'Confirm Password \*' (with a strength indicator), 'Email\*', 'First Name\*' (with a dropdown menu), and 'Last Name\*'. A legend indicates that '\*' denotes a 'Required Field'. A green 'Create Organization' button is at the bottom.

You should now be presented with the SUSE Manager Front Page. In the next section you will prepare the server for connecting the first client.



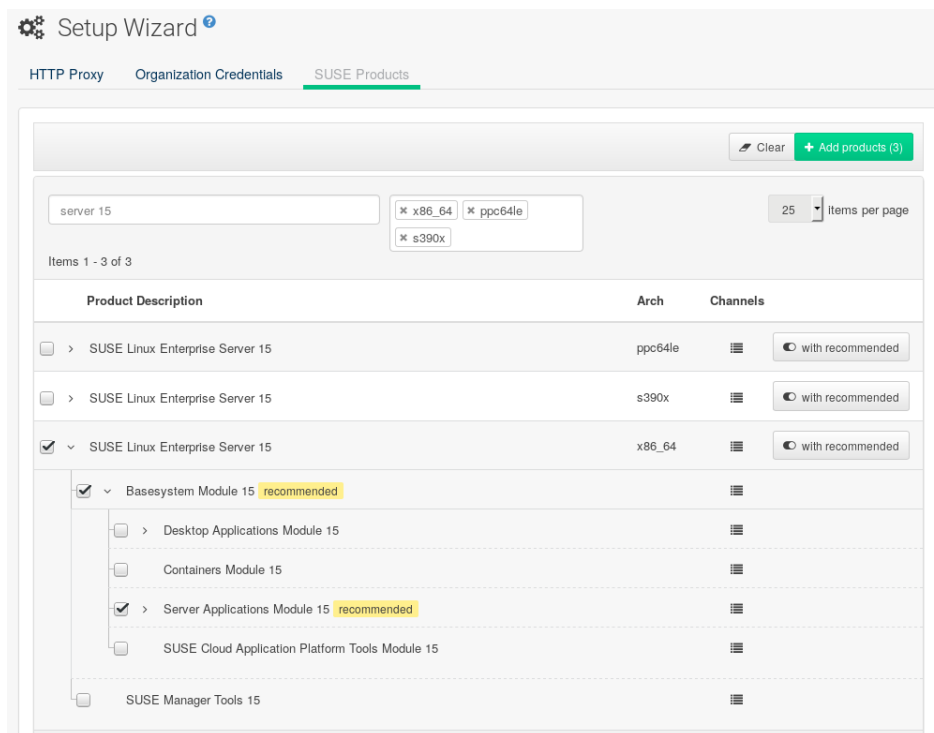
## 4.2.2 Syncing Products from SUSE Customer Center

SUSE Customer Center (SCC) maintains a collection of repositories which contain packages, software and updates for all supported enterprise client systems. These repositories are organized into channels each of which provide software specific to a distribution, release and architecture. After synchronizing with SCC clients may receive updates, and be organized into groups and assigned to specific product software channels.

This section covers synchronizing with SCC from the Web UI and adding your first client channel.

### PROCEDURE: SYNCHRONIZING WITH SUSE CUSTOMER CENTER

1. From the SUSE Manager Web UI start page select *Admin > Setup Wizard*.
2. From the *Main Menu > Admin > Setup Wizard* page select the *SUSE Products* tab. Wait a moment for the products list to populate. If you previously registered with SUSE Customer Center a list of products will populate the table. This table lists architecture, channels, and status information. For more information, see:



3. Since Your SUSE Linux Enterprise client is based on x86\_64 architecture scroll down the page and select the check box for this channel now.

- Add channels to SUSE Manager by selecting the check box to the left of each channel. Click the arrow symbol to the left of the description to unfold a product and list available modules.
- Start product synchronization by clicking the *Add Products* button.

After adding the channel SUSE Manager will schedule the channel to be copied. This can take a long time as SUSE Manager will copy channel software sources from the SUSE repositories located at SUSE Customer Center to local /var/spacewalk/ directory of your server.



### Tip: PostgreSQL and Transparent Huge Pages

In some environments, *Transparent Huge Pages* provided by the kernel may slow down PostgreSQL workloads significantly.

To disable *Transparent Huge Pages* set the transparent\_hugepage kernel parameter to never. This has to be changed in /etc/default/grub and added to the line GRUB\_CMDLINE\_LINUX\_DEFAULT, for example:

```
GRUB_CMDLINE_LINUX_DEFAULT="resume=/dev/sda1 splash=silent quiet showopts  
elevator=noop transparent_hugepage=never"
```

To write the new configuration run grub2-mkconfig -o /boot/grub2/grub.cfg. To update the grub2 during boot run grub2-install /dev/sda.

Monitor channel synchronization process in real-time by viewing channel log files located in the directory /var/log/rhn/reposync:

```
tailf /var/log/rhn/reposync/<CHANNEL_NAME>.log
```

After the channel sync process has completed proceed to: *Chapter 5, Registering Clients*

## 5 Registering Clients

### 5.1 Introduction

Releases prior to SUSE Manager 2.1 were shipped with a **traditional** client management framework (which is still fully supported today). SUSE Manager 3 and later include the Salt framework in addition to the **traditional** framework.

#### Salt

Is an end-to-end data-center automation tool which may also be used outside the scope of SUSE Manager to introduce reactive, real-time orchestration, and configuration management. Managed systems can coexist using both **traditional** and **Salt** frameworks. This functionality provides a safe learning environment when switching to **Salt** while you continue to maintain existing deployments.



### 5.2 Creating Activation Keys

The following procedure will guide you through creating the activation keys for your test channels. Activation keys can be used with both Salt and traditional clients.

Activation keys define the number of software entitlements, channels, and groups a client system is allowed to subscribe to. This information is passed on to all systems registered with said key. Each activation key is bound to the organization for which it has been created.

#### PROCEDURE: CREATING ACTIVATION KEYS

1. As the administrator login to the SUSE Manager Web UI.
2. Switch to *Systems > Activation Keys*.
3. Click the *Create Key* link at the upper right corner.

 **Create Activation Key** 

Activation Key Details

Systems registered with this activation key will inherit the settings listed below.

**Description:**   
 Use this to describe what kind of settings this key will reflect on systems that use it. If left blank, this field will be filled in 'None'.

**Key:**   
 Activation key can contains only numbers [0-9], letters [a-z A-Z], '-', '\_' and '.'.  
 Leave blank for automatic key generation. Note that the prefix is an indication of the SUSE Manager organization the key is associated with.

**Usage:**   
 Leave blank for unlimited use.

**Base Channel:**   
 Choose "SUSE Manager Default" to allow systems to register to the default SUSE Manager provided channel that corresponds to the installed SUSE Linux version. Instead of the default, you may choose a particular SUSE provided channel or a custom base channel, but if a system using this key is not compatible with the selected channel, it will fall back to its SUSE Manager Default channel.

**Add-On System Types:** ☐ Container Build Host  
☐ Virtualization Host

**Contact Method:**


**Universal Default:** ☐  
 Tip: Only one universal default activation key may be set for this organization. By setting this key as universal default, you will remove universal default status from the current universal default key if it exists. If this key is set as universal default, then newly-registered systems to your organization will inherit the properties of this key.

4. Enter an *Activation Key Details* > *Description* to identify the generated activation key.
5. Enter a human readable *Activation Key Details* > *Key* string value such as **SLES12-SP3** to represent the distribution and service pack associated with the key.



### Warning: Allowed Characters

For all SUSE Products do not use commas within the key string. Red Hat Products require commas. For more information, see .

6. Select the SUSE Linux Enterprise channel that was added during [First Channel Sync](#) ([proc-quickstart-first-channel-sync.xml#proc-quickstart-first-channel-sync](#))  from the *Activation Key Details* > *Base Channels* drop down.
7. For this guide leave *Activation Key Details* > *Contact Method* set to default.
8. *Activation Key Details* > *Universal Default* should remain unchecked. Click *Create Activation Key* to complete creation of the activation key.

## 5.3 Creating the SUSE Manager Tools Repository

In this section you will create a tools repository on the SUSE Manager Server for providing client tools. The client tools repository contains packages for installing Salt on minions as well as required packages for registering traditional clients during the bootstrapping procedure. These packages will be installed from the newly generated repository during the registration process. In the following procedure you will create the SUSE Linux Enterprise tools repository.



### Important: Creating a Tools Repository when an SCC Channel has not been Synced

Before following the procedure to create the tools repository make sure the SUSE vendor channel you will be using with your client has been completely synced. You can check this by running `tail -f /var/log/rhn/reposync/<CHANNEL_NAME>.log` as *root*. In the following example replace `version` with the actual version string:

```
# tail -f /var/log/rhn/reposync/sles`version`-pool-x86_64.log
```

Once completed you should see the following output in your terminal:

```
2017/12/12 15:20:32 +02:00 Importing packages started.
2017/12/12 15:22:02 +02:00 1.07 %
...
2017/12/12 15:34:25 +02:00 86.01 %
2017/12/12 15:35:49 +02:00 Importing packages finished.
2017/12/12 15:35:49 +02:00 Linking packages to channel.
...
2017/12/12 15:35:59 +02:00 Sync completed.
```

### PROCEDURE: GENERATING THE TOOLS REPOSITORY FOR SUSE LINUX ENTERPRISE

1. Open a terminal on the server as root and enter the following command to list available bootstrap repositories:

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

2. Then invoke the same command using the listed repository as the product label to actually create the bootstrap repository:

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

3. SUSE Manager will create and add the client tools to the newly created repositories directory located at /srv/www/htdocs/pub/repositories/ .

This repository is suitable for both Server and Desktop of SUSE Linux Enterprise .

## 5.4 Registering Traditional Clients

### 5.4.1 Generating a Bootstrap Script

This section goes over generating a template bootstrap script which will be copied and modified for use with “traditional” clients. Traditional clients register with SUSE Manager via a bootstrap script executed on the client which deploys all necessary packages to it. The bootstrap script contains parameters which assigns a client system to its base channel. Two of these important parameters are:

- Activation Keys
- GNU Privacy Guard (GPG) Keys



#### Note: Using the --traditional [option]

As of SUSE Manager 3.1 the --traditional option must be used if creating a bootstrap script from the command line via the mgr-bootstrap command for traditional clients. Generated bootstrap scripts target Salt minions by default.



#### Note: Bootstrap Scripting Best Practices

It is possible to use various methods to register clients for use with SUSE Manager in mass using bootstrap. Using batch scripts for mass registration of both VM and Bare Metal machines is a possibility. Some of these methods will be covered in the *Best Practices Guide* and will be added as examples at a later time.

## ! Important: SLES 15 and Python 3

SLES 15 utilizes Python 3 as its default system version. Due to this change any older bootstrap scripts(based on python 2) must be re-created for SLES 15 systems. Attempting to register SLES 15 systems with SUSE Manager using Python 2 versions of the bootstrap script will fail.

The following procedure will guide you through generating a bootstrap script.

### PROCEDURE: CREATING A BOOTSTRAP SCRIPT

1. From the SUSE Manager Web UI, browse to *Main Menu > Admin > Manager Configuration > Bootstrap Script*. For more information, see .
2. Uncheck *SUSE Manager Configuration - Bootstrap > Bootstrap Script > Bootstrap using Salt*. Use default settings and click the *Update* button.

The screenshot shows the 'SUSE Manager Configuration - Bootstrap' web interface. At the top, there is an information icon and a title. Below the title, a paragraph explains that the information will be used to generate bootstrap scripts and that they will be available from a specific server. A note mentions that manual configuration may still be required and provides a file path for the bootstrap script. Below this, there are tabs for 'General', 'Bootstrap Script', 'Organizations', 'Restart', 'Cobbler', and 'Bare-metal systems'. The 'Bootstrap Script' tab is selected. The main section is titled 'Client Bootstrap Script Configuration' and contains several configuration options: 'SUSE Manager server hostname' (manager.example.com), 'SSL cert location' (/srv/www/htdocs/pub/rhn-org-trusted-ssl-cert-1.0-1.noarch.rpm), 'Bootstrap using Salt' (unchecked), 'Enable SSL' (checked), 'Enable Client GPG checking' (checked), 'Enable Remote Configuration' (unchecked), 'Enable Remote Commands' (unchecked), 'Client HTTP Proxy' (empty), 'Client HTTP Proxy username' (empty), and 'Client HTTP Proxy password' (empty). An 'Update' button is located at the bottom right of the configuration section.



## Warning: Using SSL

Unchecking *Enable SSL* in the Web UI or setting `USING_SSL=0` in the bootstrap script is not recommended. If you disable SSL nevertheless you will need to manage custom CA certificates to be able to run the registration process successfully.

3. A template bootstrap script is generated and stored on the server's file system in the `/srv/www/htdocs/pub/bootstrap` directory.

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

The bootstrap script is also available at <https://example.com/pub/bootstrap/bootstrap.sh>.

*Section 5.4.2, "Editing the Bootstrap Script"* will cover copying and modifying your bootstrap template for use with each client.

## 5.4.2 Editing the Bootstrap Script

In this section you will copy and modify the template bootstrap script you created from *Section 5.4.1, "Generating a Bootstrap Script"*.

A minimal requirement when modifying a bootstrap script for use with SUSE Manager is the inclusion of an activation key. Depending on your organizations security requirements it is strongly recommended to include one or more (GPG) keys (for example, your organization key, and package signing keys). For this tutorial you will be registering with the activation keys created in the previous section.

### PROCEDURE: MODIFYING THE BOOTSTRAP SCRIPT

1. Login as root from the command line on your SUSE Manager server.
2. Navigate 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-sles11.sh
```



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

4. Open `sles12.sh` for modification. Scroll down and modify both lines marked in green. You must comment out `exit 1` with a hash mark (`\#`) to activate the script and then enter the name of the key for this script in the `ACTIVATION_KEYS=` field as follows:

```
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-sles12
ORG_GPG_KEY=
```

5. Once you have completed your modifications save the file and repeat this procedure for the second bootstrap script. Proceed to [Section 5.4.3, "Connecting Clients"](#).



### Note: Finding Your Keys

To find key names you have created: In the Web UI, click *Home > Overview > Manage Activation keys > Key Field*. 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.

## 5.4.3 Connecting Clients

This section covers connecting your clients to SUSE Manager with the modified bootstrap script.

### PROCEDURE: RUNNING THE BOOTSTRAP SCRIPT

1. From your SUSE Manager Server command line as root navigate to the following directory:

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

2. Run the following command to execute the bootstrap script on the client:

```
cat MODIFIED-SCRIPT.SH \
```

```
| ssh root@example.com /bin/bash
```

3. The script will execute and proceed to download the required dependencies located in the repositories directory you created earlier. Once the script has finished running, log in to the Web UI and click *Systems > Overview* to see the new client listed.

This concludes the bootstrap section of this guide. [Section 5.5, “Registering Salt Clients”](#) will go over registering Salt minions for use with SUSE Manager.

## 5.5 Registering Salt Clients

There are currently three methods for registering Salt minions. The following section describes the first method and uses a bootstrap repository. The second method is to create a bootstrap script using `mgr-bootstrap`. Bootstrapping Salt minions with `mgr-bootstrap` is performed in the same manner as bootstrapping traditional clients; for more information, see [Section 5.4, “Registering Traditional Clients”](#). The third method is performed from the SUSE Manager{webui} ; find this method located in .



### Important: Deprecation Warning

The `mgr-bootstrap --salt` option will be deprecated as of SUSE Manager 3.1. To bootstrap a Salt minion call `mgr-bootstrap` from the command line as you would for a traditional system.

The following section assumes you have created a SUSE Manager tools repository. You can review creating a tools repository in [Section 5.3, “Creating the SUSE Manager Tools Repository”](#).



### Warning: Ensure the Salt Master is Reachable During Bootstrap

The Salt master and its proxy should always be reachable via both IP address and the FQDN. In the following rare scenario:

- The Salt master (SUSE Manager) is in some DNS.
- Your Minions are in a different subnet bound to an alternate DNS and the Salt master record is absent.

- The Salt master cannot know that the minion is not utilizing the same DNS record. The the Salt master nevertheless sends the FQDN of itself to the minion expecting it to join.
- The minion looks for a different DNS, one where the master record does not exist therefore bootstrap fails.

Once you have fully synced a base channel from the Web UI for clients to obtain software sources from, for example: SLES12-SP3-Pool\_for\_x86\_64 perform the following procedure to register a Salt minion.

#### PROCEDURE: REGISTERING SALT MINIONS

1. On your minion as root enter the following command:

```
zypper ar http://`FQDN.SUSE.Manager.com`/pub/repositories/sle/12/3/bootstrap/ \
sles12-sp3
```



#### Note

Do not use HTTPS. Use HTTP instead to avoid errors.

2. After adding the repository containing the necessary Salt packages execute:

```
zypper in salt-minion
```

3. Modify the minion configuration file to point to the fully qualified domain name (FQDN) of the SUSE Manager server (master):

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

Find and change the line:

```
master: salt
```

to:

```
master:`FQDN.SUSE.Manager.com`
```

4. Restart the Salt minion with:

```
systemctl restart salt-minion
```

or on non-systemd OS:

```
rcsalt-minion restart
```

Your newly registered minion should now show up within the Web UI under *Salt > Onboarding*. Accept the key to begin management.

## 6 Getting Started with Salt

### 6.1 Introduction


This section introduces you to the new Salt features added in SUSE Manager 3. This chapter assumes you have completed all previous Getting Started sections. At a minimum have the following setup:

- A freshly installed SUSE Manager server with a main admin account and a synced product channel
- Preferably two registered Salt minions to experiment with.

If you find yourself stuck at any point refer to the *SaltStack Get Started* tutorial located at <https://docs.saltstack.com/en/getstarted/fundamentals/index.html> .



#### Note

This guide does not attempt to cover all that Salt has to offer. This guide is a primer for using Salt with SUSE Manager. For comprehensive Salt documentation, see <https://docs.saltstack.com/en/latest/contents.html> .

The current version of Salt in SUSE Manager is 2018.3.0.

### 6.2 Understanding Salt Calls

#### Salt Calls

Salt calls are defined by three main properties:

```
salt 'target' <function> [arguments]
```

#### Target

Use the second property in a Salt call to target a single machine or group of machines. Specify the minion or group of minions you would like to run a function on.

## General Targeting

List available grains on all minions:

```
salt '*' grains.ls
```

Ping a specific minion:

```
salt 'web1.example.com' test.ping
```

## Glob Targeting

Ping all minions using a domain:

```
salt '*example.com' test.ping
```

Display the OS name of all minions with the label webserver:

```
salt 'webserver*' grains.item oscodename
```

## List Targeting

```
salt -L 'webserver.example.com,db.example.com' test.ping
```

## Regular Expression Targeting

You may use PCRE-compliant regular expressions:

```
salt -E '(?!web)' test.ping
```

## IP Address Targeting

List minion IP addresses:

```
salt '*' network.ip_addrs
```

Ping a specific minion IP address:

```
salt -S '172.31.60.74' test.ping
```

Ping all minions on a subnet:

```
salt -S 172.31.0.0/16 test.ping
```



### Tip: Lookup a Subnet Using the **ip** Command

You can use the **ip** command to find the subnet mask in the format of 192.168.1.1/24:

```
ip -o -f inet addr show | awk '/scope global/ {print $4}'
```

## Function

Once you have specified a target, provide the function you would like to call. Functions also accept arguments. Arguments are space-delimited, for example:

```
salt '*' cmd.run 'echo "Hello: $FIRST_NAME"' env='{FIRST_NAME: "John"}'
```

## Locating Additional Minion Functions

Find more functions which can be called on minions by running:

```
salt '*' sys.doc
```

A full list of callable functions are located here: <https://docs.saltstack.com/en/2015.8/ref/modules/all/index.html> ↗

## Arguments

Provides the extra data needed by a function you are calling. The command pkg.install requires an argument specifying a package to install. YaST has been selected for installation, for example:

```
salt '*' pkg.install yast2
```

# 6.3 Common Salt Terminology

## Grains

Grains provide information about the hardware of a minion. For example, the operating system, IP addresses, network interfaces, memory, etc. When running a Salt command from keep in mind any modules and functions called are run locally from the system being called. Salt modules are stored on minions and master within the following directory:

```
/usr/lib/python2.7/site-packages/salt/
```

List all available grains with the `grains.ls` function:

```
salt '*' grains.ls
```

List collected grain system data by using the `grains.items` function:

```
salt '*' grains.items
```

For more information on grains, see <https://docs.saltstack.com/en/latest/topics/grains/>.

## States

States are templates which place systems into a known configuration, for example which applications and services are installed and running on those systems. States are a way for you to describe what each of your systems should look like. Once written, states are applied to target systems automating the process of managing and maintaining a large numbers of systems into a known state. For more information on states, see [https://docs.saltstack.com/en/latest/topics/tutorials/starting\\_states.html](https://docs.saltstack.com/en/latest/topics/tutorials/starting_states.html).



### Warning: Updating Salt

Do not update `salt` itself using Salt states. First update all other system packages using Salt states then update `salt` as a separate stand-alone step from the SUSE Manager{webui}.

## Pillar

Pillars unlike grains are created on the master. Pillar files contain information about a minion or group of minions. Pillars allow you to send confidential information to a targeted minion or group of minions. Pillars are useful for sensitive data, configuration of minions, variables, and any arbitrary data which should be defined. For more information on pillars, see <https://docs.saltstack.com/en/latest/topics/tutorials/pillar.html>.

## Beacons


Beacons allow an admin to use the event system in Salt to monitor non-Salt processes. Minions may use beacons to hook into many types of system processes for constant monitoring. Once a targeted monitored activity occurs an event is sent on the Salt event bus that may be used to trigger a reactor.



### Important: Enabling Beacons

To work with beacons on Salt minions the package `python-pyinotify` must be installed for SUSE systems. For RES systems install `python-inotify`. This package is not installed automatically during the salt minion package installation.

### Note: Peer Communication with salt-broker

The salt-broker acts like a switch and not like a hub, therefore Peer communication will only work for minions behind the same broker/Proxy. For more information on Salt and peer communication see: <https://docs.saltstack.com/en/latest/ref/peer.html> 

## 6.4 Useful Salt Commands

The following list provides several useful Salt commands.

### salt-run

Print a list of all minions that are up:

```
salt-run manage.up
```

Print a list of all minions that are down:

```
salt-run manage.down
```

Print a list with the current status of all Salt minions:

```
salt-run manage.status
```

Check the version of Salt running on the master and active minions:

```
salt-run manage.versions
```

### salt-cp

Copy a file to a minion or set of minions.

```
salt-cp '*' foo.conf /root
```

For more information, see <https://docs.saltstack.com/en/latest/ref/cli/salt-cp.html>.

### **salt-key -l**

List public keys:

```
salt-key -l
```

### **salt-key -A**

Accept all pending keys:

```
salt-key -A
```

## 6.5 Salt File Locations and Structure

The following screen describes Salt file structures and their locations used by the SUSE Manager server. These files are listed in [/etc/salt/master.d/susemanager.conf](#):

```
# Configure different file roots

file_roots:
  base:
    - /usr/share/susemanager/salt      #Should not be touched by a user
    - /srv/susemanager/salt           #Should not be touched by a user
    - /srv/salt                       #Your custom states go here

# Configure different pillar roots

pillar_roots:
  base:
    - /usr/share/susemanager/pillar   #Should not be touched by a user
    - /srv/pillar                     #Custom pillars go here

# Extension modules path

extension_modules: /usr/share/susemanager/modules

# Master top configuration

master_tops:
  mgr_master_tops: True
```

The following tips should be kept in mind when working with [/etc/salt/master.d/susemanager.conf](#).

- Files listed are searched in the order they appear.
- The first file found is called.

### 6.5.1 file\_roots

SUSE Manager as the Salt master reads its state data from three specific file root directories.

#### `/usr/share/susemanager/salt`

This directory is created by SUSE Manager and its content generated by the `/usr/share/susemanager/modules/tops/mgr_master_tops.py` python module. It is shipped and updated together with SUSE Manager and includes certificate setup and common state logic that will be applied to packages and channels.



#### Warning: Do Not Edit

You should not edit or add custom Salt data to this directory.

#### `/srv/susemanager/salt`

This directory is created by SUSE Manager and contains assigned channels and packages for minions, groups, and organizations. These files will be overwritten and regenerated. A good analogy for this directory would be the SUSE Manager database translated into Salt directives.



#### Warning: Do Not Edit

You should not edit or add custom Salt data to this directory.

#### `/srv/salt`

The directory `/srv/salt` is for your custom state data, salt modules etc. SUSE Manager does not perform any actions on this directory. However the state data placed here affects the Highstate of minions and is merged with the result generated by SUSE Manager.



#### Note: Editable

Place custom Salt data here.

## 6.5.2 pillar\_roots

SUSE Manager as the Salt master reads its pillar data from two specific pillar root directories.

### `/usr/share/susemanager/pillar`

This directory is generated by SUSE Manager. It is shipped and updated together with SUSE Manager.



### Warning: Do Not Edit

You should not edit or add custom Salt data to this directory.

### `/srv/pillar`

SUSE Manager by default does not touch or do anything with this directory. However the custom pillar data placed here is merged with the pillar result created by SUSE Manager.



### Tip: Editable Directory

Place your custom Salt pillar data here.

## 6.6 Install the SUSE Manager Locale Formula

The following section provides guidance on installing and using SUSE provided Salt formulas.

### PROCEDURE: INSTALLING THE LOCALE FORMULA

1. Install the locale formula with:

```
zypper install locale-formula
```



### Note

This installs the package contents to `/usr/share/susemanager/formulas/{meta-data,states}`

2. After installing the RPM, log in to the SUSE Manager Web UI.
3. Browse to the *Main Menu > System Details* page of any minion you would like to apply the formula to.

4. On the *Main Menu > System Details* page you will see a new *Formulas* tab. Select it to view a list of installed formulas.
5. From the *Formulas* list select *Formulas > Locale* and click *Save*.
6. A new tab will appear next to the *Formula > Locale* subtab. Select the new *Formulas > Locale* tab.
7. The *Formulas > Locale* tab contains options for setting the language, keyboard layout, time-zone, and whether hardware clock is set to UTC. Select the desired options and click *Save*.
8. Run the following command to verify pillar settings. The output has been truncated.

```
salt '$your_minion' pillar.items
```

```
...
  keyboard_and_language:
    -----
    keyboard_layout:
      English (US)
    language:
      English (US)
  machine_password:
    foobar
  mgr_server:
    manager_server
  org_id:alt '$your_minion_here'
    1
  timezone:
    -----
    hardware_clock_set_to_utc:
      True
    name:
      CET
  ...
```

9. Apply this state to your minion by applying the highstate from the command line with:

```
salt '$your_minion' state.highstate
```



## Note

You can also apply the highstate from the previous formula tab from the SUSE Manager Web UI by clicking *System Details > States > Apply Highstate*.