

SUSE Manager 4.3

Quick Start Guide

May 23 2022



Table of Contents

Quick Start	1
1. Quick Start SUMA Server	2
1.1. Install SUSE Manager Server	2
1.2. Set up SUSE Manager with YaST	5
1.3. Create the main administraton account	7
1.4. Synchronize with SUSE Customer Center	8
2. Quick Start SUMA Proxy	11
2.1. Install SUSE Manager Proxy	11
2.2. Register SUSE Manager Proxy	12
2.3. Set up` SUSE Manager Proxy	17
3. GNU Free Documentation License	19

Quick Start

Updated: 2022-05-23

This guide shows you how to use install and configure a single SUSE Manager Server or Proxy.

It contains instructions for a selection of simple setup ups, workflows and some common use cases.

You can read Quick Start Guides for:

- [Quick Start SUMA Server](#)
- [Quick Start SUMA Proxy](#)

Chapter 1. Quick Start SUMA Server

This guide shows you how to install and configure a single SUSE Manager Server for x86-64 architecture from the SUSE Linux Enterprise installation media with the Unified Installer.

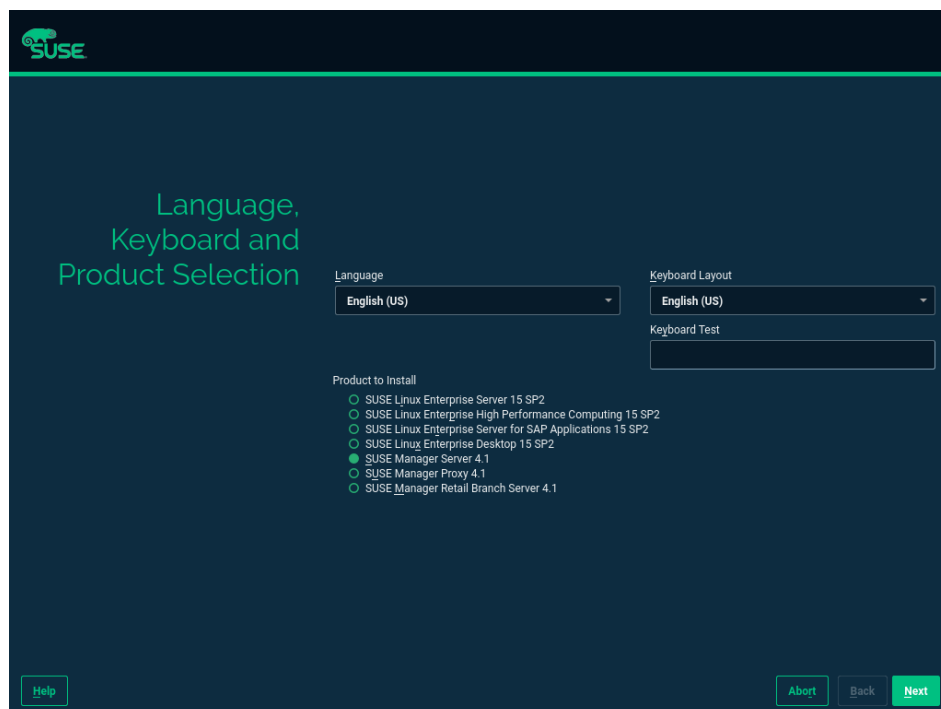
For this topic we assume that you already have valid organization credentials with SUSE Customer Center and have obtained a registration code for your SUSE Manager, for example from a "SUSE Manager Lifecycle Management+" subscription.

1.1. Install SUSE Manager Server

This section describes how to install SUSE Manager Server from the SUSE Linux Enterprise installation media.

Procedure: Installing SUSE Manager Server from a DVD Image

1. Boot your system with the Unified Installer. If booting fails you might need to adjust the boot order in the BIOS.
2. When prompted, select **Installation**.
3. In the **Language, Keyboard and Product Selection** screen, check **SUSE Manager Server**, and click **[Next]**.



4. Read and agree to the End User Licence Agreement, and click **[Next]**.

5. In the **Registration** screen, check the **Register System via scc.suse.com** checkbox, enter your SUSE Customer Center credentials, and click **[Next]**.

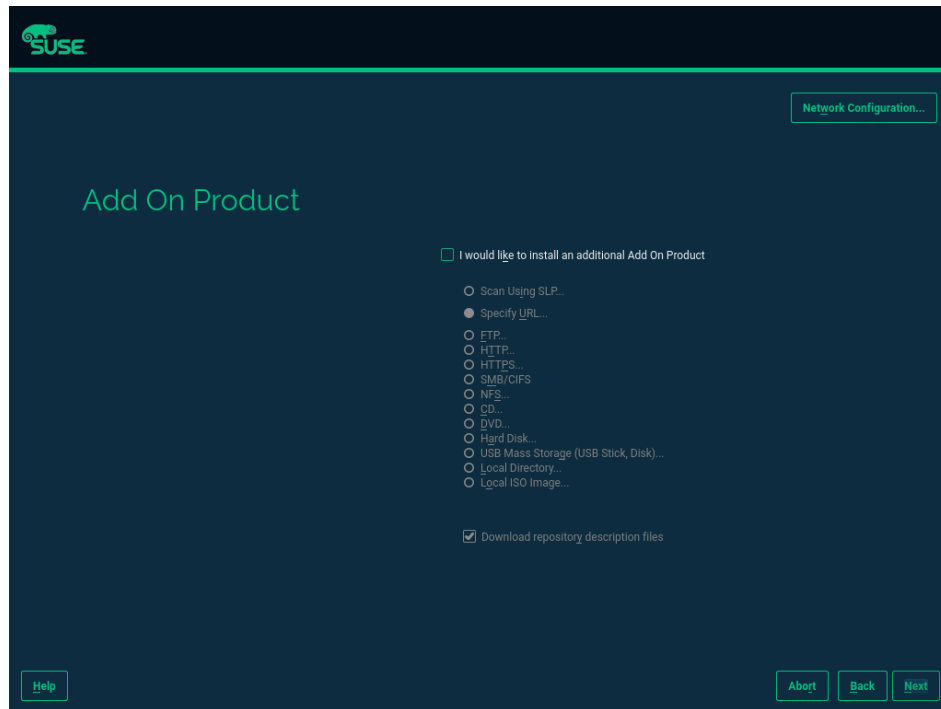
The screenshot shows the 'Registration' screen for SUSE Manager Server 4.1. The title 'Registration' is in large green text on the left. On the right, under 'SUSE Manager Server 4.1', it says 'Please select your preferred method of registration.' There are three radio button options: 'Register System via scc.suse.com' (selected), 'Register System via local RMT Server', and 'Skip Registration'. The first option has input fields for 'E-mail Address' and 'Registration Code'. The second option has a dropdown for 'Local Registration Server URL' with 'https://rmt.example.com' selected. At the bottom right are 'Abort', 'Back', and 'Next' buttons. At the bottom left is a 'Help' button. A 'Network Configuration...' link is in the top right corner.

6. In the **Extension and Module Selection** screen, select additional extensions or modules you require, and click **[Next]**. Mandatory modules are pre-selected and you cannot disable them.

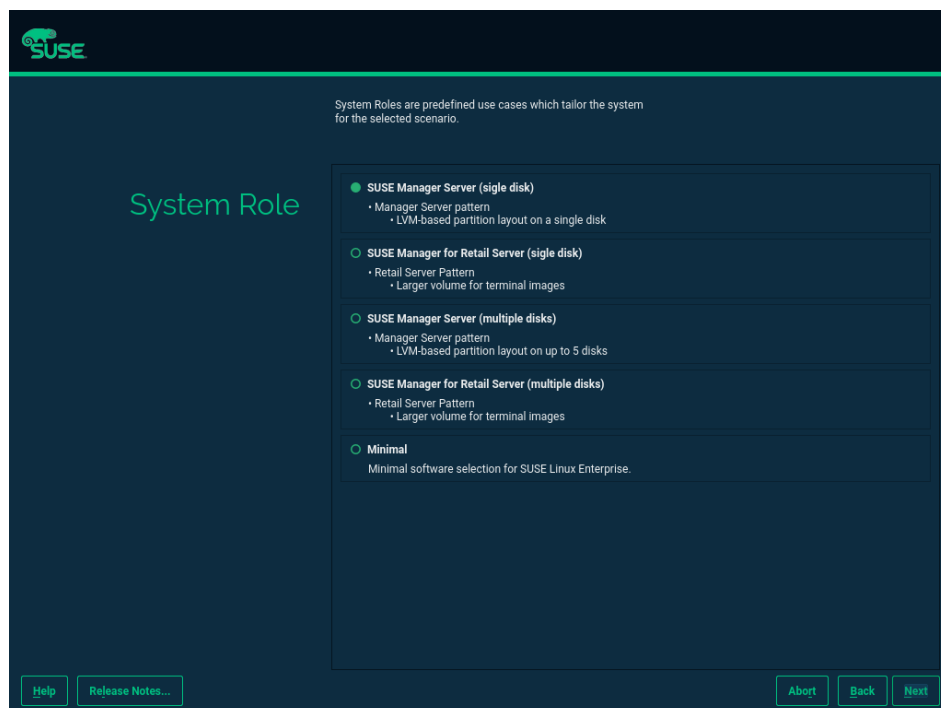
The screenshot shows the 'Extension and Module Selection' screen. The title 'Extension and Module Selection' is in large green text on the left. On the right, under 'Available Extensions and Modules', there is a checkbox for 'Hide Development Versions' which is checked. Below it is a list of modules with checkboxes: 'SUSE Package Hub 15 SP2 x86_64' (unchecked), 'Basesystem Module 15 SP2 x86_64' (checked), 'Containers Module 15 SP2 x86_64' (unchecked), 'Desktop Applications Module 15 SP2 x86_64' (unchecked), 'Development Tools Module 15 SP2 x86_64' (unchecked), 'Legacy Module 15 SP2 x86_64' (unchecked), 'Public Cloud Module 15 SP2 x86_64' (unchecked), 'Python 2 Module 15 SP2 x86_64' (unchecked), 'SUSE Manager Server Module 4.1 x86_64' (checked), 'Server Applications Module 15 SP2 x86_64' (checked), and 'Web and Scripting Module 15 SP2 x86_64' (checked). Below the list is a 'Details (English only)' section with a text box stating: 'This module contains the python 2 packages. Access to the Python 2 Module is included in your SUSE Linux Enterprise subscription. The module has a different lifecycle than SUSE Linux Enterprise itself. Packages in the this module are usually supported for at most three years.' At the bottom right are 'Abort', 'Back', and 'Next' buttons. At the bottom left is a 'Help' button.

7. OPTIONAL: In the **Add On Product** screen, select any additional or add-on products you

require, and click [**Next**]. We do not recommend that you run any other workloads on SUSE Manager. Only use add-ons that you absolutely require, such as driver repositories from your hardware vendor.



8. In the **System Role** screen, check the **SUSE Manager Server** checkbox, and click [**Next**].



9. In the **Suggested Partitioning** screen, either accept the default values, or use the [**Guided Setup**] or [**Expert Partitioner**] options to customize your partitioning model, and click [**Next**]

].

10. In the **Clock and Time Zone** screen, enter your region and timezone, and click **[Next]**.
11. In the **Local Users** screen, create a new user, and click **[Next]**.
12. In the **System Administrator "root"** screen, create the "root" user, and click **[Next]**.
13. Review the settings on the **Installation Settings** screen.
14. On the **Installation Settings** screen click **[Install]**.

1.2. Set up SUSE Manager with YaST

This section guides you through SUSE Manager setup using YaST.

Procedure: SUSE Manager Setting up

1. On the SUSE Manager Server, at the command line, use the `yast2 susemanager_setup` command to begin setup.
2. From the introduction screen select **SUSE Manager Setup › Setup SUSE Manager from scratch** and click **[Next]** to continue.
3. Enter an email address to receive status notifications and click **[Next]** to continue. SUSE Manager can sometimes send a large volume of notification emails. You can disable email notifications in the Web UI after setup, if you need to. For more information on disabling email notifications, see **Reference › Users**.
4. Enter your certificate information and a password. If you intend to use a custom SSL certificate, you need to have set this up first. For more information about SSL certificates, see **Administration › Ssl-certs**.

```

YaST2 - susemanager_setup @ g137

Certificate Setup

Organization
Example
Organization Unit
Example Dep.
City
n
State
by
Country
DE
SSL Password
XXXXXXXXXX
Repeat Password
XXXXXXXXXX

[Help] [Back] [Abort] [Next]

F1 Help F8 Back F9 Abort F10 Next

```

5. Click **[Next]** to continue.
6. From the SUSE Manager Setup › Database Settings screen, enter a database user and password and click **[Next]** to continue.

```

YaST2 - susemanager_setup @ g137

Database Settings

Database User
susemanager
Database Password
XXXXXXXXXX
Repeat Password
XXXXXXXXXX

[Help] [Back] [Abort] [Next]

F1 Help F8 Back F9 Abort F10 Next

```

7. Click **[Next]** to continue.
8. Click **[Yes]** to run setup when prompted, and wait for it to complete.
9. Click **[Next]** to continue. Take a note of the address of the SUSE Manager Web UI.
10. Click **[Finish]** to complete SUSE Manager setup.

1.3. Create the main administrator account

This section guides you through creating your organization's main administration account for SUSE Manager

Procedure: Setting Up the Main Administration Account

1. In the browser, enter the address provided after completing setup. With this address you open the SUSE Manager Web UI.
2. In the Web UI, navigate to the **Create Organization › Organization Name** field and enter your organization name.
3. In the **Create Organization › Desired Login** and **Create Organization › Desired Password** fields, enter your username and password.
4. Fill in the Account Information fields including an email for system notifications.
5. Click [**Create Organization**] to finish creating your administration account.

The screenshot shows the 'Create Organization' web form. At the top, there is a header with a group icon and the title 'Create Organization'. Below this, the 'Organization Details' section contains a text input field for 'Organization Name*' with a tip: 'Between 3 and 128 characters'. The next section is 'Create SUSE Manager Administrator', which includes 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*' with a tip 'Between 5 and 64 characters', 'Desired Password*' and 'Confirm Password*' (both with red 'x' icons indicating validation), 'Password Strength' (a progress bar), 'Email*', 'First Name*' (with a dropdown arrow), and 'Last Name*'. A legend at the bottom indicates that '*' denotes a 'Required Field'. A green 'Create Organization' button is located at the bottom center of the form.

You are now presented with the SUSE Manager Home › Overview page.

When you have finished creating the main administrator account on the new SUSE Manager Server, you need to mirror the products from SCC.

1.4. Synchronize with SUSE Customer Center

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

Procedure: Entering Organization Credentials

1. In the SUSE Manager Web UI, select **Admin › Setup Wizard**.
2. From the **Setup Wizard** page select the **[Organization Credentials]** tab.
3. Click **[Add a new credential]**.
4. In the dialog, enter **Username** and **Password**, and confirm with **[Save]**.

When the credentials are confirmed with a check-mark icon, proceed with [Procedure: Synchronizing with SUSE Customer Center](#).

Procedure: Synchronizing with SUSE Customer Center

1. In the Web UI, navigate to **Admin › Setup Wizard**.
2. From the **Setup Wizard** page select the **[SUSE Products]** tab. If you previously registered with SUSE Customer Center a list of products will populate the table. This operation could take up to a few minutes. You can monitor the progress of the operation in section on the right **Refresh the product catalog from SUSE Customer Center**. The table of products lists architecture, channels, and status information. For more information, see [Reference › Admin](#).

Setup Wizard

HTTP Proxy | Organization Credentials | **SUSE Products**

Filter by product Description | Filter by architecture | 25 items per page

Items 1 - 25 of 94

Product Description	Arch	Channels
<input type="checkbox"/> Open Enterprise Server 2018	x86_64	
<input type="checkbox"/> RHEL Expanded Support 5	i386	
<input type="checkbox"/> RHEL Expanded Support 5	x86_64	
<input type="checkbox"/> > RHEL Expanded Support 6	i386	
<input type="checkbox"/> > RHEL Expanded Support 6	x86_64	
<input type="checkbox"/> > RHEL Expanded Support 7	x86_64	
<input type="checkbox"/> SUSE Container as a Service Platform 1.0	x86_64	
<input type="checkbox"/> SUSE Container as a Service Platform 2.0	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP2	i586	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP2	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP3	i586	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP3	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP4	i586	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 11 SP4	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 12	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 12 SP1	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 12 SP2	x86_64	
<input type="checkbox"/> > SUSE Linux Enterprise Desktop 12 SP3	x86_64	
<input checked="" type="checkbox"/> > SUSE Linux Enterprise Desktop 15	x86_64	100%
<input type="checkbox"/> > SUSE Linux Enterprise High Performance Computing 15	aarch64	include recommended
<input type="checkbox"/> > SUSE Linux Enterprise High Performance Computing 15	x86_64	include recommended
<input type="checkbox"/> > SUSE Linux Enterprise Server 10 SP3	i586	
<input type="checkbox"/> > SUSE Linux Enterprise Server 10 SP3	ia64	
<input type="checkbox"/> > SUSE Linux Enterprise Server 10 SP3	ppc	
<input type="checkbox"/> > SUSE Linux Enterprise Server 10 SP3	s390x	

Page 1 of 4

First | Prev | Next | Last

← Prev 3 of 3

Refresh the product catalog from SUSE Customer Center

○ Channels
○ Channel Families
○ Products
○ Product Channels
○ Subscriptions

Refresh

Why aren't all SUSE products displayed in the list?

The products displayed on this list are directly linked to your Organization credentials (Mirror credentials) as well as your SUSE subscriptions.

If you believe there are products missing, make sure you have added the correct Organization credentials in the previous wizard step.

3. Use **Filter by product description** and **Filter by architecture** to filter the list of displayed products. If 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.

-
- Click **[Add Products]** to start product synchronization.

After adding the channel, SUSE Manager will schedule the channel to be synchronized. 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.

When the channel is fully synchronised, the bootstrap repository will be automatically created. The bootstrap repository is necessary for the succesful bootstrapping of creation of the activation key will be assciated with the clients can be bootstrapped following the steps This completes SUSE Manager installation and configuration, with channel preparation for the client bootstrapping.

When the channel synchronization process is complete, you can continue with client registration.

For more instructions, see [Client-configuration](#) › [Registration-overview](#).

Chapter 2. Quick Start SUMA Proxy

This guide shows you how to install and configure a single SUSE Manager Proxy for x86-64 architecture from the SUSE Linux Enterprise installation media with the Unified Installer.

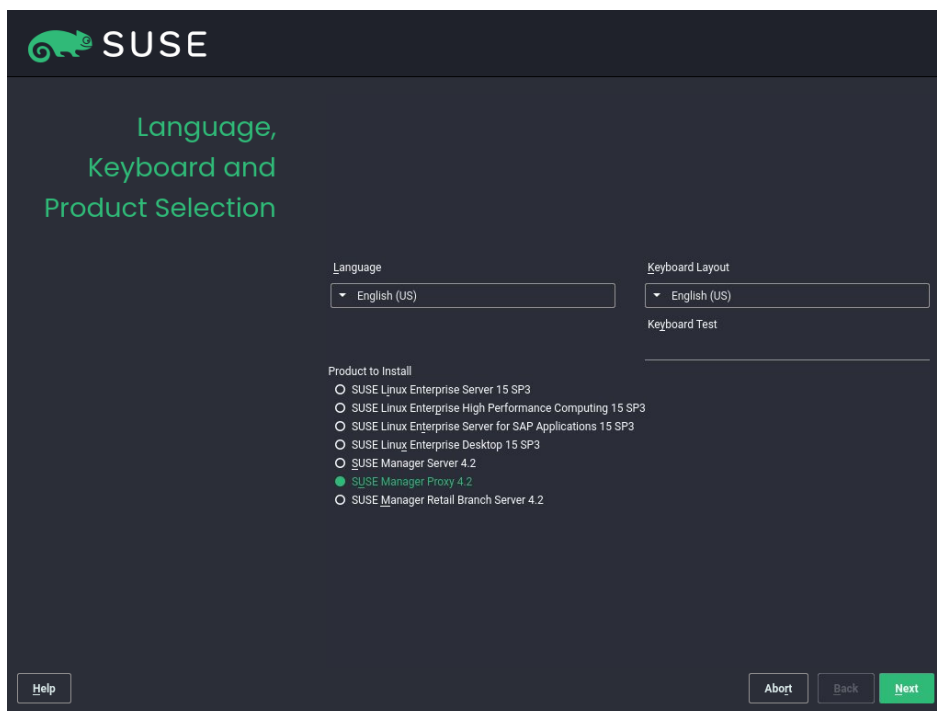
For this topic we assume that you already have valid organization credentials with SUSE Customer Center and have obtained a registration code for your SUSE Manager Proxy, for example from a "SUSE Manager Lifecycle Management+" subscription.

2.1. Install SUSE Manager Proxy

This guide shows you how to install and configure a single SUSE Manager Proxy for x86-64 architecture from the SUSE Linux Enterprise installation media with the Unified Installer.

Procedure: Installing SUSE Manager Proxy with the Unified Installer

1. To boot the Unified Installer from the installation image, you might need to adjust the boot order in the BIOS.
2. When prompted, select **Installation**.
3. In the **Language, Keyboard and Product Selection** screen, check the **SUSE Manager Proxy** checkbox, and click **[Next]**.



4. Read and agree to the End User Licence Agreement, and click **[Next]**.

5. In the **Registration** screen, check the **Register System via scc.suse.com** checkbox, enter your SUSE Customer Center credentials, and click **[Next]**.
6. In the **Available Extensions and Modules** screen, select any extensions or modules you require, and click **[Next]**. **Basesystem**, **SUSE Manager Proxy**, and **Server Applications** are pre-selected and mandatory for the SUSE Manager Proxy installation. OPTIONAL: In the following **Add On Product** screen, select any additional or add-on products you require, and click **[Next]**.
7. In the **System Role** screen, check the **SUSE Manager Proxy** checkbox, and click **[Next]**.
8. In the **Suggested Partitioning** screen, accept the default values, or use the **[Guided Setup]** or **[Expert Partitioner]** options to customize your partitioning model, and click **[Next]**.
9. In the **Clock and Time Zone** screen, enter your region and timezone, and click **[Next]**.
10. In the **Local Users** screen, create a new user, and click **[Next]**.
11. Review the settings on the **Installation Settings** screen, and then click **[Install]**.

2.2. Register SUSE Manager Proxy



Before you can select the correct child channels while creating the activation key, ensure you have completely downloaded the SUSE Manager Proxy 4.3 channel and all the recommended and mandatory SUSE Linux Enterprise 15 SP4 channels.

Procedure: Registering the Proxy

1. Create an activation key based on the **SLE-Product-SUSE-Manager-Proxy-4.3-Pool** base channel. For more information about activation keys, see [Client-configuration](#) › [Activation-keys](#).

Create Activation Key

Activation Key Details

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

Description:

SUSE Manager 4.2 Proxy

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:

1- suse_manager_4.2_proxy

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:

SLE-Product-SUSE-Manager-Proxy-4.2-Pool for x86_64

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.

Child Channels:

▼ SLE-Product-SUSE-Manager-Proxy-4.2-Pool for x86_64


 include recommended

Figure 1. Proxy activation key

- From the **Child Channels** listing select the recommended channels by clicking the **include recommended** icon:

- SLE-Module-Basesystem15-SP4-Pool
- SLE-Module-Basesystem15-SP4-Updates
- SLE-Module-Server-Applications15-SP4-Pool
- SLE-Module-Server-Applications15-SP4-Updates
- SLE-Module-SUSE-Manager-Proxy-4.3-Pool
- SLE-Module-SUSE-Manager-Proxy-4.3-Updates

The **SLE-Product-SUSE-Manager-Proxy-4.3-Updates** channel is mandatory.

Child Channels:

▼ **SLE-Product-SUSE-Manager-Proxy-4.2-Pool for x86_64**

☐ include recommended

- ☐ SLE-Module-Basesystem15-SP3-Pool for x86_64 Proxy 4.2  recommended 
- ☐ SLE-Module-Basesystem15-SP3-Updates for x86_64 Proxy 4.2  recommended 
- ☐ SLE-Module-Server-Applications15-SP3-Pool for x86_64 Proxy 4.2  recommended 
- ☐ SLE-Module-Server-Applications15-SP3-Updates for x86_64 Proxy 4.2  recommended 
- ☐ SLE-Module-SUSE-Manager-Proxy-4.2-Pool for x86_64  recommended 
- ☐ SLE-Module-SUSE-Manager-Proxy-4.2-Updates for x86_64  recommended 
- ☒ SLE-Product-SUSE-Manager-Proxy-4.2-Updates for x86_64  mandatory 

Any system registered using this activation key will be subscribed to the selected child channels.

Add-On System Types:

- ☐ Ansible Control Node
- ☐ Container Build Host
- ☐ Monitoring
- ☐ OS Image Build Host
- ☐ Virtualization Host

Contact Method:

Default

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.

Create Activation Key

Figure 2. Base and Child Proxy Channel

3. To bootstrap a proxy, use the bootstrap script. For more information about bootstrap scripts, see [Client-configuration](#) › [Registration-bootstrap](#).

SUSE Manager Configuration - Bootstrap

The following information will be used to generate bootstrap scripts. These bootstrap scripts can be used to configure a client to use this SUSE Manager to receive updates. Once the bootstrap scripts have been generated, they will be available from [this server](#).

Please note that some manual configuration of these scripts may still be required. The bootstrap script can be found on the SUSE Manager Server's filesystem here: `/srv/www/htdocs/pub/bootstrap`

[General](#) [Bootstrap Script](#) [Organizations](#) [Restart](#) [Cobbler](#) [Bare-metal systems](#) [Monitoring](#)

Client Bootstrap Script Configuration

SUSE Manager server hostname*

suma42server.suse.de

SSL cert location*

/srv/www/htdocs/pub/rhn-org-trusted-ssl-cert-1.0-1.noarch.rpm

Bootstrap using Salt

☒

Enable Client GPG checking

☒

Enable Remote Configuration

☐

Enable Remote Commands

☐

Client HTTP Proxy

Client HTTP Proxy username

Client HTTP Proxy password

Update

Figure 3. Modifying bootstrap script

- Alternatively, in the SUSE Manager Web UI, navigate to **System** › **Bootstrapping**.

Bootstrap Minions ?

You can add systems to be managed by providing SSH credentials only. SUSE Manager will prepare the system remotely and will perform the registration.


Host:	<input type="text" value="proxy-42.suse.de"/>
SSH Port:	<input type="text" value="22"/>
User:	<input type="text" value="root"/> 
Authentication Method:	<input checked="" type="radio"/> Password <input type="radio"/> SSH Private Key
Password:	<input type="password" value="e.g., *****"/>
Activation Key:	<input type="text" value="1-suse_manager_4.2_proxy"/>
Proxy:	<input type="text" value="None"/>
<input checked="" type="checkbox"/> Disable SSH strict host key checking during bootstrap process	
<input type="checkbox"/> Manage system completely via SSH (will not install an agent)	
<input type="button" value="+ Bootstrap"/> <input type="button" value="Clear fields"/>	

Figure 4. Bootstrapping a proxy from GUI

5. Navigate to **System Details** › **Software** › **Software Channels**, and check that the four proxy channels (**Pool** and **Updates** for **SLE-PRODUCT** and **SLE-MODULE**) plus the recommended channels are selected. **SLE-PRODUCT-Pool** must be the base channel and the others are child channels.

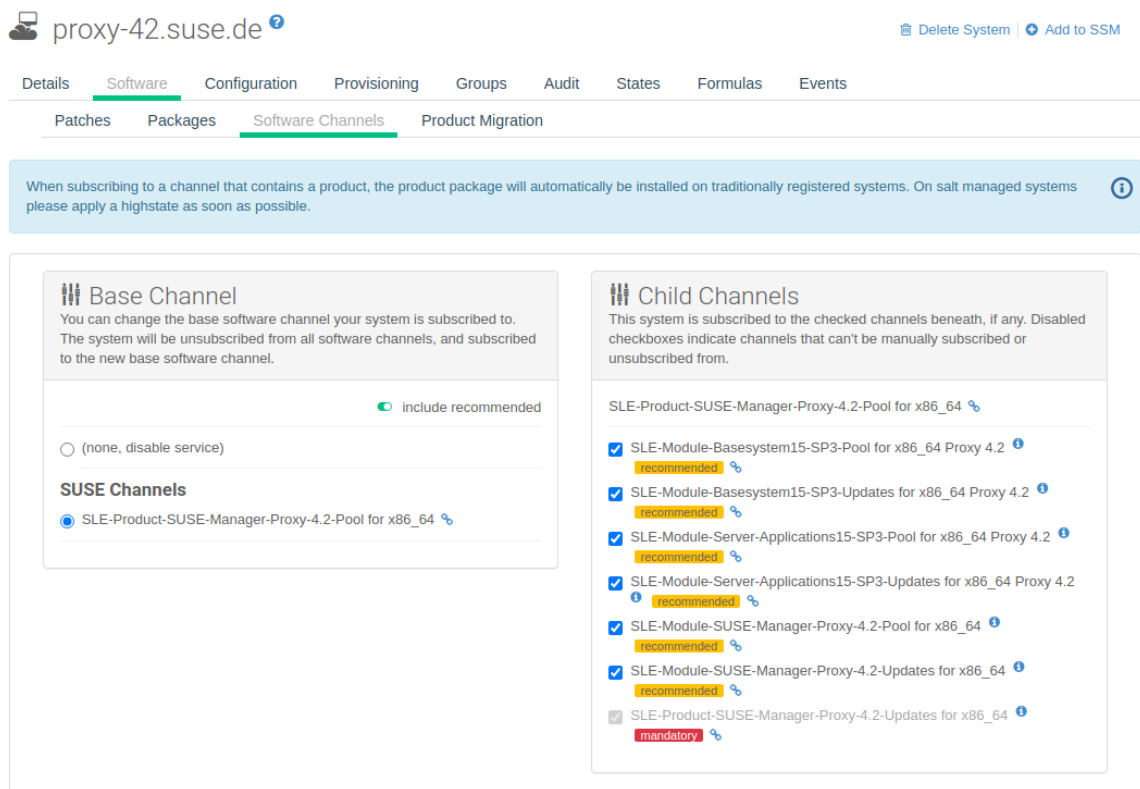


Figure 5. Proxy Channels

2.3. Set up SUSE Manager Proxy

Make sure the TCP ports **4505** and **4506** are open on the proxy. The proxy must be able to reach the SUSE Manager Server or a parent proxy on these ports.

Procedure: Copy Server Certificate and Key

1. The proxy will share some SSL information with the SUSE Manager Server.
2. Copy the certificate and its key from the SUSE Manager Server or the parent proxy.
3. As root, enter the following commands on the proxy using your SUSE Manager Server or parent Proxy (named **PARENT**):

```
mkdir -m 700 /root/ssl-build
cd /root/ssl-build
scp root@PARENT:/root/ssl-build/RHN-ORG-PRIVATE-SSL-KEY .
scp root@PARENT:/root/ssl-build/RHN-ORG-TRUSTED-SSL-CERT .
scp root@PARENT:/root/ssl-build/rhn-ca-openssl.cnf .
```

4. Run **configure-proxy.sh** The **configure-proxy.sh** script finalizes the setup of your SUSE Manager

Proxy.

5. Execute the interactive **configure-proxy.sh** script. Pressing **Enter** without further input will make the script use the default values provided between brackets []. Otherwise, use the values specific for your environment.

When the proxy configuration process is complete, you can continue with client registration. For more instructions, see [Client-configuration](#) › [Client-proxy](#).

Chapter 3. GNU Free Documentation License

Copyright © 2000, 2001, 2002 Free Software Foundation, Inc. 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA. Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

0. PREAMBLE

The purpose of this License is to make a manual, textbook, or other functional and useful document "free" in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or noncommercially. Secondly, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of "copyleft", which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software.

We have designed this License in order to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference.

1. APPLICABILITY AND DEFINITIONS

This License applies to any manual or other work, in any medium, that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. Such a notice grants a world-wide, royalty-free license, unlimited in duration, to use that work under the conditions stated herein. The "Document", below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as "you". You accept the license if you copy, modify or distribute the work in a way requiring permission under copyright law.

A "Modified Version" of the Document means any work containing the Document or a portion of it, either copied verbatim, or with modifications and/or translated into another language.

A "Secondary Section" is a named appendix or a front-matter section of the Document that deals exclusively with the relationship of the publishers or authors of the Document to the Document's overall subject (or to related matters) and contains nothing that could fall directly within that

overall subject. (Thus, if the Document is in part a textbook of mathematics, a Secondary Section may not explain any mathematics.) The relationship could be a matter of historical connection with the subject or with related matters, or of legal, commercial, philosophical, ethical or political position regarding them.

The "Invariant Sections" are certain Secondary Sections whose titles are designated, as being those of Invariant Sections, in the notice that says that the Document is released under this License. If a section does not fit the above definition of Secondary then it is not allowed to be designated as Invariant. The Document may contain zero Invariant Sections. If the Document does not identify any Invariant Sections then there are none.

The "Cover Texts" are certain short passages of text that are listed, as Front-Cover Texts or Back-Cover Texts, in the notice that says that the Document is released under this License. A Front-Cover Text may be at most 5 words, and a Back-Cover Text may be at most 25 words.

A "Transparent" copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, that is suitable for revising the document straightforwardly with generic text editors or (for images composed of pixels) generic paint programs or (for drawings) some widely available drawing editor, and that is suitable for input to text formatters or for automatic translation to a variety of formats suitable for input to text formatters. A copy made in an otherwise Transparent file format whose markup, or absence of markup, has been arranged to thwart or discourage subsequent modification by readers is not Transparent. An image format is not Transparent if used for any substantial amount of text. A copy that is not "Transparent" is called "Opaque".

Examples of suitable formats for Transparent copies include plain ASCII without markup, Texinfo input format, LaTeX input format, SGML or XML using a publicly available DTD, and standard-conforming simple HTML, PostScript or PDF designed for human modification. Examples of transparent image formats include PNG, XCF and JPG. Opaque formats include proprietary formats that can be read and edited only by proprietary word processors, SGML or XML for which the DTD and/or processing tools are not generally available, and the machine-generated HTML, PostScript or PDF produced by some word processors for output purposes only.

The "Title Page" means, for a printed book, the title page itself, plus such following pages as are needed to hold, legibly, the material this License requires to appear in the title page. For works in formats which do not have any title page as such, "Title Page" means the text near the most prominent appearance of the work's title, preceding the beginning of the body of the text.

A section "Entitled XYZ" means a named subunit of the Document whose title either is precisely XYZ or contains XYZ in parentheses following text that translates XYZ in another language. (Here

XYZ stands for a specific section name mentioned below, such as "Acknowledgements", "Dedications", "Endorsements", or "History".) To "Preserve the Title" of such a section when you modify the Document means that it remains a section "Entitled XYZ" according to this definition.

The Document may include Warranty Disclaimers next to the notice which states that this License applies to the Document. These Warranty Disclaimers are considered to be included by reference in this License, but only as regards disclaiming warranties: any other implication that these Warranty Disclaimers may have is void and has no effect on the meaning of this License.

2. VERBATIM COPYING

You may copy and distribute the Document in any medium, either commercially or noncommercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute. However, you may accept compensation in exchange for copies. If you distribute a large enough number of copies you must also follow the conditions in section 3.

You may also lend copies, under the same conditions stated above, and you may publicly display copies.

3. COPYING IN QUANTITY

If you publish printed copies (or copies in media that commonly have printed covers) of the Document, numbering more than 100, and the Document's license notice requires Cover Texts, you must enclose the copies in covers that carry, clearly and legibly, all these Cover Texts: Front-Cover Texts on the front cover, and Back-Cover Texts on the back cover. Both covers must also clearly and legibly identify you as the publisher of these copies. The front cover must present the full title with all words of the title equally prominent and visible. You may add other material on the covers in addition. Copying with changes limited to the covers, as long as they preserve the title of the Document and satisfy these conditions, can be treated as verbatim copying in other respects.

If the required texts for either cover are too voluminous to fit legibly, you should put the first ones listed (as many as fit reasonably) on the actual cover, and continue the rest onto adjacent pages.

If you publish or distribute Opaque copies of the Document numbering more than 100, you must

either include a machine-readable Transparent copy along with each Opaque copy, or state in or with each Opaque copy a computer-network location from which the general network-using public has access to download using public-standard network protocols a complete Transparent copy of the Document, free of added material. If you use the latter option, you must take reasonably prudent steps, when you begin distribution of Opaque copies in quantity, to ensure that this Transparent copy will remain thus accessible at the stated location until at least one year after the last time you distribute an Opaque copy (directly or through your agents or retailers) of that edition to the public.

It is requested, but not required, that you contact the authors of the Document well before redistributing any large number of copies, to give them a chance to provide you with an updated version of the Document.

4. MODIFICATIONS

You may copy and distribute a Modified Version of the Document under the conditions of sections 2 and 3 above, provided that you release the Modified Version under precisely this License, with the Modified Version filling the role of the Document, thus licensing distribution and modification of the Modified Version to whoever possesses a copy of it. In addition, you must do these things in the Modified Version:

- A. Use in the Title Page (and on the covers, if any) a title distinct from that of the Document, and from those of previous versions (which should, if there were any, be listed in the History section of the Document). You may use the same title as a previous version if the original publisher of that version gives permission.
- B. List on the Title Page, as authors, one or more persons or entities responsible for authorship of the modifications in the Modified Version, together with at least five of the principal authors of the Document (all of its principal authors, if it has fewer than five), unless they release you from this requirement.
- C. State on the Title page the name of the publisher of the Modified Version, as the publisher.
- D. Preserve all the copyright notices of the Document.
- E. Add an appropriate copyright notice for your modifications adjacent to the other copyright notices.
- F. Include, immediately after the copyright notices, a license notice giving the public permission to use the Modified Version under the terms of this License, in the form shown in the Addendum below.

-
- G. Preserve in that license notice the full lists of Invariant Sections and required Cover Texts given in the Document's license notice.
 - H. Include an unaltered copy of this License.
 - I. Preserve the section Entitled "History", Preserve its Title, and add to it an item stating at least the title, year, new authors, and publisher of the Modified Version as given on the Title Page. If there is no section Entitled "History" in the Document, create one stating the title, year, authors, and publisher of the Document as given on its Title Page, then add an item describing the Modified Version as stated in the previous sentence.
 - J. Preserve the network location, if any, given in the Document for public access to a Transparent copy of the Document, and likewise the network locations given in the Document for previous versions it was based on. These may be placed in the "History" section. You may omit a network location for a work that was published at least four years before the Document itself, or if the original publisher of the version it refers to gives permission.
 - K. For any section Entitled "Acknowledgements" or "Dedications", Preserve the Title of the section, and preserve in the section all the substance and tone of each of the contributor acknowledgements and/or dedications given therein.
 - L. Preserve all the Invariant Sections of the Document, unaltered in their text and in their titles. Section numbers or the equivalent are not considered part of the section titles.
 - M. Delete any section Entitled "Endorsements". Such a section may not be included in the Modified Version.
 - N. Do not retitle any existing section to be Entitled "Endorsements" or to conflict in title with any Invariant Section.
 - O. Preserve any Warranty Disclaimers.

If the Modified Version includes new front-matter sections or appendices that qualify as Secondary Sections and contain no material copied from the Document, you may at your option designate some or all of these sections as invariant. To do this, add their titles to the list of Invariant Sections in the Modified Version's license notice. These titles must be distinct from any other section titles.

You may add a section Entitled "Endorsements", provided it contains nothing but endorsements of your Modified Version by various parties—for example, statements of peer review or that the text has been approved by an organization as the authoritative definition of a standard.

You may add a passage of up to five words as a Front-Cover Text, and a passage of up to 25

words as a Back-Cover Text, to the end of the list of Cover Texts in the Modified Version. Only one passage of Front-Cover Text and one of Back-Cover Text may be added by (or through arrangements made by) any one entity. If the Document already includes a cover text for the same cover, previously added by you or by arrangement made by the same entity you are acting on behalf of, you may not add another; but you may replace the old one, on explicit permission from the previous publisher that added the old one.

The author(s) and publisher(s) of the Document do not by this License give permission to use their names for publicity for or to assert or imply endorsement of any Modified Version.

5. COMBINING DOCUMENTS

You may combine the Document with other documents released under this License, under the terms defined in section 4 above for modified versions, provided that you include in the combination all of the Invariant Sections of all of the original documents, unmodified, and list them all as Invariant Sections of your combined work in its license notice, and that you preserve all their Warranty Disclaimers.

The combined work need only contain one copy of this License, and multiple identical Invariant Sections may be replaced with a single copy. If there are multiple Invariant Sections with the same name but different contents, make the title of each such section unique by adding at the end of it, in parentheses, the name of the original author or publisher of that section if known, or else a unique number. Make the same adjustment to the section titles in the list of Invariant Sections in the license notice of the combined work.

In the combination, you must combine any sections Entitled "History" in the various original documents, forming one section Entitled "History"; likewise combine any sections Entitled "Acknowledgements", and any sections Entitled "Dedications". You must delete all sections Entitled "Endorsements".

6. COLLECTIONS OF DOCUMENTS

You may make a collection consisting of the Document and other documents released under this License, and replace the individual copies of this License in the various documents with a single copy that is included in the collection, provided that you follow the rules of this License for verbatim copying of each of the documents in all other respects.

You may extract a single document from such a collection, and distribute it individually under this License, provided you insert a copy of this License into the extracted document, and follow

this License in all other respects regarding verbatim copying of that document.

7. AGGREGATION WITH INDEPENDENT WORKS

A compilation of the Document or its derivatives with other separate and independent documents or works, in or on a volume of a storage or distribution medium, is called an "aggregate" if the copyright resulting from the compilation is not used to limit the legal rights of the compilation's users beyond what the individual works permit. When the Document is included in an aggregate, this License does not apply to the other works in the aggregate which are not themselves derivative works of the Document.

If the Cover Text requirement of section 3 is applicable to these copies of the Document, then if the Document is less than one half of the entire aggregate, the Document's Cover Texts may be placed on covers that bracket the Document within the aggregate, or the electronic equivalent of covers if the Document is in electronic form. Otherwise they must appear on printed covers that bracket the whole aggregate.

8. TRANSLATION

Translation is considered a kind of modification, so you may distribute translations of the Document under the terms of section 4. Replacing Invariant Sections with translations requires special permission from their copyright holders, but you may include translations of some or all Invariant Sections in addition to the original versions of these Invariant Sections. You may include a translation of this License, and all the license notices in the Document, and any Warranty Disclaimers, provided that you also include the original English version of this License and the original versions of those notices and disclaimers. In case of a disagreement between the translation and the original version of this License or a notice or disclaimer, the original version will prevail.

If a section in the Document is Entitled "Acknowledgements", "Dedications", or "History", the requirement (section 4) to Preserve its Title (section 1) will typically require changing the actual title.

9. TERMINATION

You may not copy, modify, sublicense, or distribute the Document except as expressly provided for under this License. Any other attempt to copy, modify, sublicense or distribute the Document is void, and will automatically terminate your rights under this License. However, parties who have

received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

10. FUTURE REVISIONS OF THIS LICENSE

The Free Software Foundation may publish new, revised versions of the GNU Free Documentation License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. See <http://www.gnu.org/copyleft/>.

Each version of the License is given a distinguishing version number. If the Document specifies that a particular numbered version of this License "or any later version" applies to it, you have the option of following the terms and conditions either of that specified version or of any later version that has been published (not as a draft) by the Free Software Foundation. If the Document does not specify a version number of this License, you may choose any version ever published (not as a draft) by the Free Software Foundation.

ADDENDUM: How to use this License for your documents

Copyright (c) YEAR YOUR NAME.

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the section entitled "GNU Free Documentation License".

If you have Invariant Sections, Front-Cover Texts and Back-Cover Texts, replace the " with...Texts." line with this:

with the Invariant Sections being LIST THEIR TITLES, with the Front-Cover Texts being LIST, and with the Back-Cover Texts being LIST.

If you have Invariant Sections without Cover Texts, or some other combination of the three, merge those two alternatives to suit the situation.

If your document contains nontrivial examples of program code, we recommend releasing these examples in parallel under your choice of free software license, such as the GNU General Public License, to permit their use in free software.