



SUSE Linux Enterprise Server for SAP Applications
11 SP4

The Guide

The Guide

SUSE Linux Enterprise Server for SAP Applications 11 SP4

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SUSE LLC

1800 South Novell Place


Provo, UT 84606

USA

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Contents

About This Guide vi

- 1 Overview vi
- 2 Additional Documentation and Resources vi
- 3 Feedback vii
- 4 Documentation Conventions vii
- 1 What is SUSE Linux Enterprise Server for SAP Applications? 1**
 - 1.1 Overview 2
 - 1.2 Software Components 2
 - 1.3 Services for SUSE Linux Enterprise Server for SAP Applications 3
- 2 Default Installation Scenarios 5**
 - 2.1 Planning the Installation 5
 - Download and Installation Preparations 5 • Hardware Requirements 5
 - 2.2 Booting the Installation Medium 5
 - 2.3 *SLES for SAP Applications — Installation* 7
 - 2.4 *SLES for SAP Applications — Installation with Wizard* 8
 - Data Required for Installing the System (with Wizard) 8 • Selecting *SLES for SAP Applications — Installation with Wizard* from the DVD Boot Menu 9 • Preparing System for Automated Installation 9 • Password for the System Administrator root 11 • Hostname, Domain Name, and IP Address 12 • Domain Name Service (DNS) and Time Server (NTP) 13 • Registration 14 • System Configuration Settings 15 • SAP Product Installation 16

- 2.5 *SLES for SAP Applications — Installation with External Profile* 25
 - About AutoYaST 26 • Partitioning with AutoYaST 26

3 Background Information on Partitioning 27

- 3.1 Stage 1: Partitioning for the Operating System 27
- 3.2 Stage 2: Partitioning for the SAP System 27

4 Remote Installation from a Network Server 29

- 4.1 Installing with Installation Media from the Network 29
- 4.2 Copying SAP Media Sets from a Remote Server with the Installation Wizard 30

5 SUSE Linux Enterprise Server for SAP Applications Components 31

- 5.1 SUSE Linux Enterprise High Availability Extension 31
- 5.2 Resource Agents for SAP HANA System Replication 31
 - SAPHana Resource Agent 32 • SAPHanaTopology Resource Agent 33 • For More Information 33
- 5.3 Configuring SUSE Linux Enterprise Server for SAP Applications 33
 - Kernel: Page-Cache Limit 33 • Ports Configuration 34 • Important Log Files 35
- 5.4 The Installation Wizard 35
 - Supplement Media 36 • ClamSAP 39

A Downloading CryptoAddOn (SAPCryptoLib) 40

B Documentation Updates 41

- B.1 December 08, 2016 41
- B.2 February 29, 2016 41
- B.3 July 31, 2015 41
- B.4 October 28, 2013 42

About This Guide

SUSE® Linux Enterprise Server for SAP Applications is the reference platform for SAP's software development. It is optimized in various ways for SAP applications. This guide provides detailed information about installing and customizing SUSE Linux Enterprise Server for SAP Applications. SUSE Linux Enterprise Server High Availability Extension is also part of SUSE Linux Enterprise Server for SAP Applications.

1 Overview

The SUSE Linux Enterprise Server for SAP Applications Guide is divided into the following chapters:

What is SUSE Linux Enterprise Server for SAP Applications?

Here you will find an overview of SUSE Linux Enterprise Server for SAP Applications.

Default Installation Scenarios

This chapter explains in detail the available installation scenarios for SUSE Linux Enterprise Server for SAP Applications.

Remote Installation from a Network Server

This chapter provides details about remote installation scenarios for SUSE Linux Enterprise Server for SAP Applications.

SUSE Linux Enterprise Server for SAP Applications Components

In this chapter the components are listed and additionally you will find hints about configuring SUSE Linux Enterprise Server for SAP Applications.

2 Additional Documentation and Resources

Chapters in this manual contain links to additional documentation resources that are either available on the system or on the Internet.

For an overview of the documentation available for your product and the latest documentation updates, refer to <http://documentation.suse.com> .

3 Feedback

Several feedback channels are available:

Bugs and Enhancement Requests

For services and support options available for your product, refer to <http://www.suse.com/support/>.

To report bugs for a product component, log into the Novell Customer Center from <http://www.suse.com/support/> and select *My Support* > *Service Request*.

Mail

For feedback on the documentation of this product, you can also send a mail to doc-team@suse.com. Make sure to include the document title, the product version and the publication date of the documentation. To report errors or suggest enhancements, please provide a concise description of the problem and refer to the respective section number and page (or URL).

4 Documentation Conventions

The following typographical conventions are used in this manual:

- /etc/passwd: directory names and filenames
- placeholder: replace placeholder with the actual value
- PATH: the environment variable PATH
- ls, --help: commands, options, and parameters
- user: users or groups
- Alt, Alt – F1: a key to press or a key combination; keys are shown in uppercase as on a keyboard
- *File*, *File* > *Save As*: menu items, buttons
- amd64, em64t, ipf > This paragraph is only relevant for the architectures amd64, em64t, and ipf. The arrows mark the beginning and the end of the text block. ◁

IBM Z, ipseries ➤ This paragraph is only relevant for the architectures System z and ipseries. The arrows mark the beginning and the end of the text block. ◀

- *Dancing Penguins* (Chapter *Penguins*, ↑Another Manual): This is a reference to a chapter in another manual.

1 What is SUSE Linux Enterprise Server for SAP Applications?

SUSE® Linux Enterprise Server for SAP Applications is a bundle of software and services that addresses the specific needs of SAP users. It is the only operating system that is optimized for all SAP software solutions.

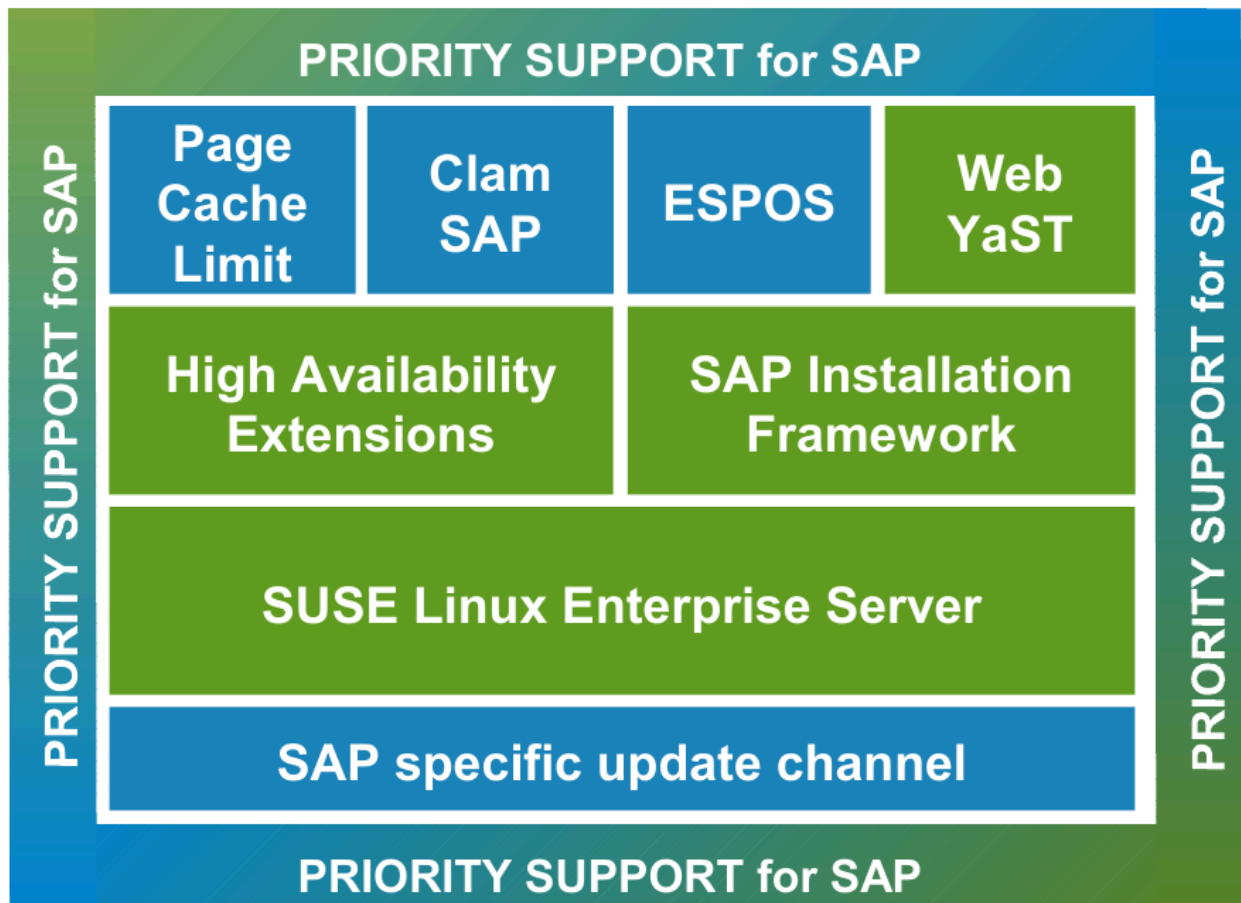


FIGURE 1.1: WHAT IS SUSE LINUX ENTERPRISE SERVER FOR SAP APPLICATIONS?

1.1 Overview

Target use cases include:

- Unix to Linux Migrations and Replatforming
- SAP Appliances
- SAP Cloud Deployments

SUSE Linux Enterprise Server for SAP Applications consists of software components (see [Section 1.2, “Software Components”](#)) and service offerings (see [Section 1.3, “Services for SUSE Linux Enterprise Server for SAP Applications”](#)).

1.2 Software Components

SUSE Linux Enterprise Server

The current release is based on SUSE Linux Enterprise Server 11 SP4. SUSE Linux Enterprise Server is the most interoperable platform for mission-critical computing, both physical and virtual.

Installation Wizard

The Installation Wizard offers a guided installation path for both the SUSE Linux Enterprise Server operating system and the SAP application.

Additionally, the workflow can be extended by 3rd party vendors or customers with the help of the “Supplement Media” (see [Section 5.4.1, “Supplement Media”](#)).

SUSE Linux Enterprise High Availability Extension

This component consists of:

- Cluster manager
- Cluster file system
- Resource agents, also for SAP

For more information about SUSE Linux Enterprise High Availability Extension, see the *High Availability Guide* (http://documentation.suse.com/sle_ha/) and the *Best Practice Guides* (<http://www.suse.com/products/sles-for-sap/resource-library/sap-best-practices.html>).

Page-Cache Limit

Limit the kernel file system cache size to influence swapping behavior. With this feature you can gain better performance by allocating memory to an application. For more information, see [Section 5.3.1, “Kernel: Page-Cache Limit”](#).

ClamSAP

ClamSAP is a new antivirus toolkit integration. For more information, see [Section 5.4.2, “ClamSAP”](#).

1.3 Services for SUSE Linux Enterprise Server for SAP Applications

Extended Service Pack Overlap Support

SUSE Linux Enterprise Server for SAP Applications includes Extended Service Pack Overlap Support. This extends the overlapping support period for two service packs by one year. This allows to perform a service pack migration within a 18 months time period as opposed to 6 months. With Extended Service Pack Overlap Support migrations can be scheduled more easily and testing before migration can be performed under lesser time constraints, while still remaining under full support and receiving all relevant maintenance updates. Extended Service Pack Overlap Support is a unique offering being part of SUSE Linux Enterprise Server for SAP Applications.

Additional Update Channel

- Allows SAP-specific patches
- Updates for SAP-specific packages

SUSE Linux Enterprise Server Priority Support for SAP Applications

Subscriptions for SUSE Linux Enterprise Server for SAP Applications include SUSE Linux Enterprise Server Priority Support for SAP Applications. SUSE Linux Enterprise Server Priority Support for SAP Applications offers technical support for SUSE Linux Enterprise Server for SAP Applications directly from SAP. The joint support infrastructure, used by support engineers from SUSE Technical Support and SAP, is based upon SAP Solution Manager and offers a seamless communication with both SAP and SUSE in a “1 Face to the Customer” manner, thus reducing complexity and lowering the total cost of ownership.

For background information, see SAP Note 1056161: SUSE Priority Support for SAP Applications <https://launchpad.support.sap.com/#/notes/1056161> .

2 Default Installation Scenarios

After planning the installation with downloading the software and checking the minimal hardware requirements, there are three default installation scenarios:

- *SLES for SAP Applications — Installation*
- *SLES for SAP Applications — Installation with Wizard*
- *SLES for SAP Applications — Installation with External Profile*

2.1 Planning the Installation

Plan the installation with downloading the software and checking the minimal hardware requirements.

2.1.1 Download and Installation Preparations

1. Download the DVD 1 ISO image of SUSE® Linux Enterprise Server for SAP Applications 11 (electronic media kit).
2. Burn the image onto a physical DVD and ensure that it is bootable. Alternatively, you might use a virtual CD-ROM device for installation into a virtual machine.

2.1.2 Hardware Requirements

CPU

64bit (x86_64).

Hard Disk

For the *Installation with Wizard*, at least 10 GB hard disk space for the system volume plus space for the swap partition and 200 GB for the data partition are required.

2.2 Booting the Installation Medium

Different scenarios are available to install SUSE Linux Enterprise Server for SAP Applications 11. Select the preferred installation scenario from the DVD boot menu.



Note: Installing on the POWER Architecture

Since version 11 SP4, SUSE Linux Enterprise Server for SAP Applications supports the POWER architecture. On POWER, you perform a SUSE Linux Enterprise Server standard installation as outlined in the *SLES Deployment Guide*. Then you finish the installation of the product with the “SAP Product Installation”.

On POWER, *Installation with Wizard* is not available.



FIGURE 2.1: DVD BOOT MENU

Boot from Hard Disk

Booting the system installed on the local hard disk.

SLES for SAP Applications — Installation (see [Section 2.3, “SLES for SAP Applications — Installation”](#))

A standard SLES installation prepared for installing SAP applications later. You can install SAP applications with 3rd party installation routines.

This scenario is suitable for experienced administrators who want to install SUSE Linux Enterprise Server for SAP Applications according to their own plan. The default package selection is already adapted to SAP installations.

SLES for SAP Applications — Installation with Wizard (see [Section 2.4, “SLES for SAP Applications — Installation with Wizard”](#))

This is a guided installation of the operating system and an SAP application. After the installation of the operating system the SAP Installation Wizard will start for installation of a validated SAP solution.

SLES for SAP Applications — Installation with External Profile (see [Section 2.5, “SLES for SAP Applications — Installation with External Profile”](#))

This installation is driven by a user-provided AutoYaST profile. There are no SUSE-provided SAP optimizations.

This scenario is suitable for experienced users who are familiar with AutoYaST and want to deploy their own AutoYaST profiles to install SUSE Linux Enterprise Server for SAP Applications.

Rescue System

Starting a minimal Linux system without a graphical user interface. For more information, see the *Administration Guide*, Chapter 34, Common Problems and Their Solutions; find the *Administration Guide* at <https://documentation.suse.com/sles/11-SP4/>.

Memory Test

Testing the system RAM using repeated read and write cycles. For more information, see the *Administration Guide* Chapter 34, Common Problems and Their Solutions.

2.3 *SLES for SAP Applications — Installation*

The first part is a standard manual SUSE Linux Enterprise Server installation; for details about such a SLES installation, see the *SLES Deployment Guide*, Chapter 6, “Installation with YaST”. In addition, the SAP Application Server Base (`sap-loc` and `sapconf`) pattern will be installed by default and basic settings will be configured.

You will be prompted for all common installation settings, like partitioning of storage devices, network, or software packages.

2.4 *SLES for SAP Applications — Installation with Wizard*

This is a guided installation of the operating system with optimized settings for SAP applications. During this installation scenario, the following installation and configuration steps will take place and interactive settings are required or possible.

2.4.1 Data Required for Installing the System (with Wizard)

The following data is required for the SUSE Linux Enterprise Server part of the installation (required per physical server):

| | |
|--|--|
| Hostname | |
| Domain | |
| IP address | |
| Subnet mask | |
| Domain searchlist (DNS) | |
| IP for name server | |
| IP for gateway | |
| Master password for the system installation (root password) | |

The following data is required for the SAP part of the installation (required per SAP system):

| | |
|--|--|
| SAP System ID of the system to be built up | |
| Virtual hostname (*) | |
| Virtual IP address for SAP service (*) | |
| Virtual netmask (*) | |
| Instance number of the SAP system | |

| | |
|--|--|
| Solution Manager key for the SAP system (*) | |
| System T-Shirt Sizing (S, M, L, or customer-specific size) (*) | |
| Database Log Mode (*) | |

(*) not required for TREX.

2.4.2 Selecting *SLES for SAP Applications — Installation with Wizard* from the DVD Boot Menu

From the DVD boot menu (see [Figure 2.1, “DVD Boot Menu”](#)), select *SLES for SAP Applications — Installation with Wizard*. The installation process loads and configures a Linux system with all requirements for an SAP installation. To view the boot messages and copyright notices during this process, press **Esc**. On completion of this process, the YaST installation program starts and displays the graphical installer, which will run mostly automatically.

2.4.3 Preparing System for Automated Installation

After analyzing your computer, the next YaST pop-up dialog will let you specify the volume configuration. Here you configure the volume for the system and swap space. The data volume comes later, after you select the SAP Application.

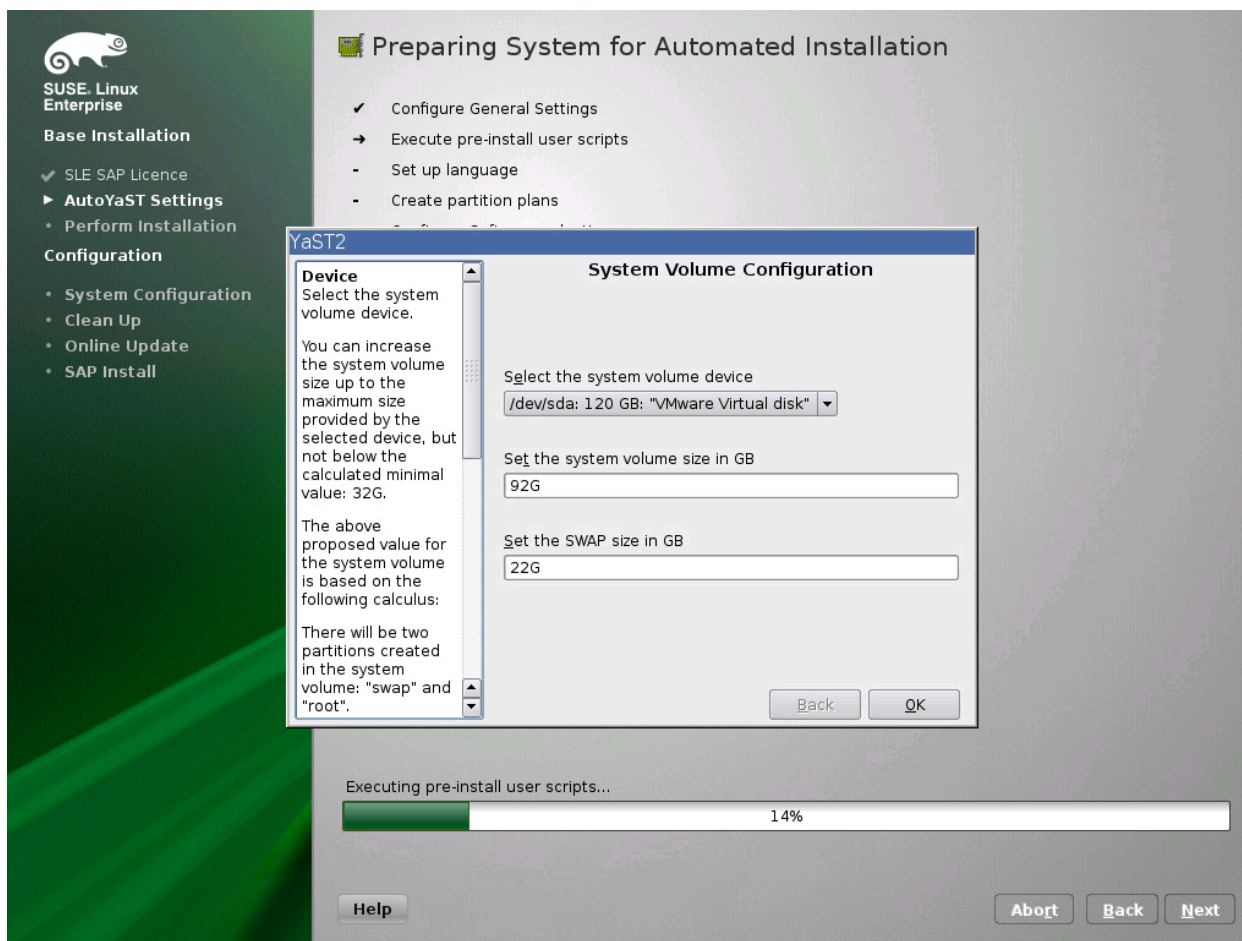


FIGURE 2.2: SYSTEM VOLUME CONFIGURATION

If there is just one hard disk, keep it as the system volume device and set the size of the system volume (and the swap space) in GB in the lower field and confirm it; see *Figure 2.2, “System Volume Configuration”*.



Tip: Size of the System Volume

Normally, at least 10 GB is required for the system volume. The swap space depends on the available main memory (RAM). For more information, see the SAP Note 1597355: <https://launchpad.support.sap.com/#/notes/1597355>.

If there is more than one hard disk, select the right one as the system volume device and set the size of the system volume (and the swap space) in GB in the lower fields and confirm it. For more information about partitioning, see *Chapter 3, Background Information on Partitioning*.



Warning: Deleting Data

If you confirm the storage volume configuration, all existing data on the hard disk will be deleted. If you do not want this to happen, turn off the system.

After confirmation, YaST performs the software installation. Packages are installed one by one, so you can see the progress.

2.4.4 Password for the System Administrator root

When all packages are installed, the basic installation is finished, and the system is rebooted for initial configuration, you will be prompted to enter a Password for the System Administrator `root`; see [Figure 2.3, "Password for root User"](#).

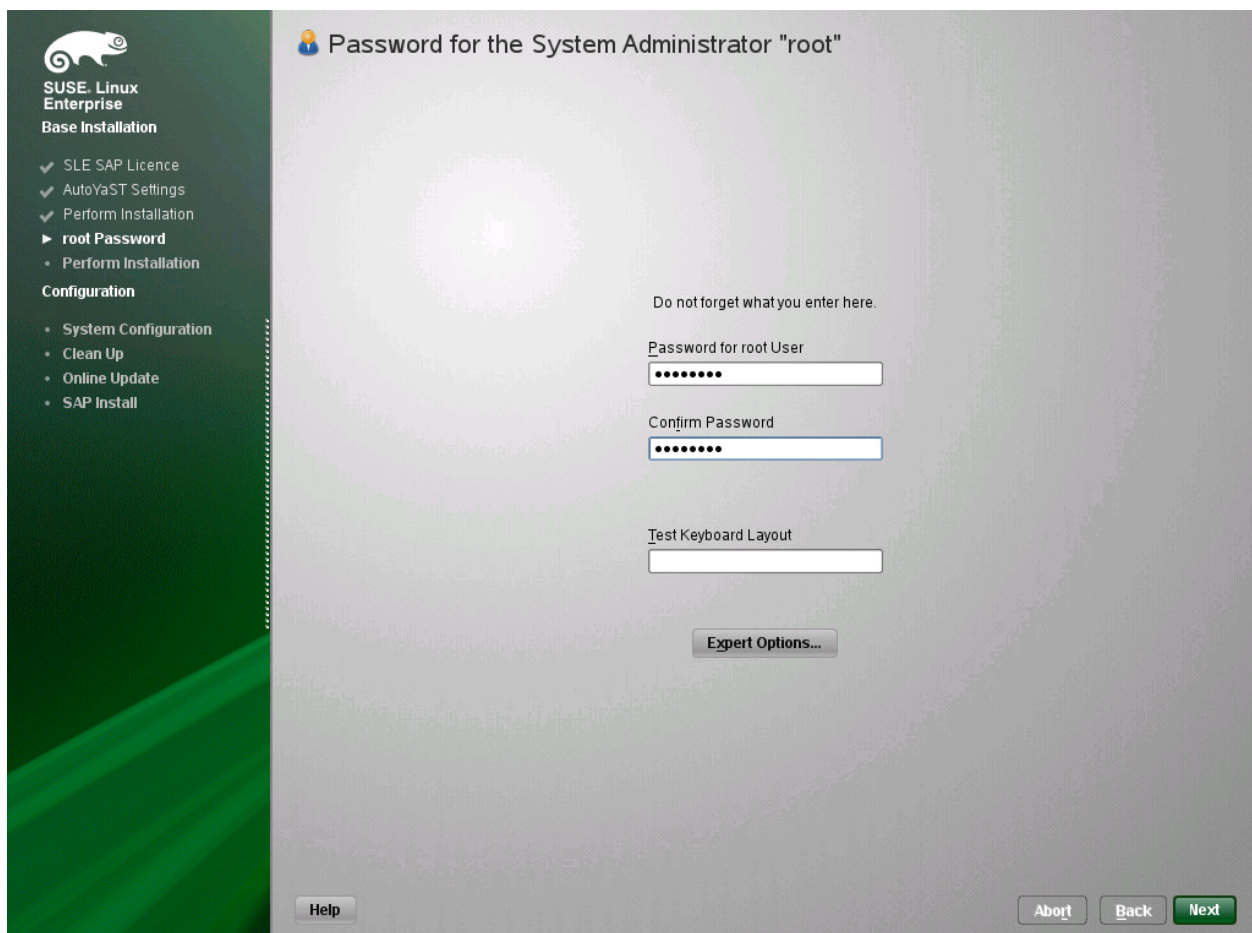


FIGURE 2.3: PASSWORD FOR ROOT USER

root is the name of the superuser, or the administrator of the system. Unlike regular users (who may or may not have permission to access certain areas or execute certain commands on the system), root has unlimited access to change the system configuration, install programs, and set up new hardware. The root account should only be used for system administration, maintenance, and repair. Logging in as root for daily work is rather risky: a single mistake could lead to irretrievable loss of system files.

For verification purposes, the password for root must be entered twice. Do not forget the root password. Once entered, this password cannot be retrieved.

The root password can be changed any time later in the installed system. To do so, run YaST and start *Security and Users > User and Group Management*.



Warning: The root User

The root user has all the permissions needed to make changes to the system. To carry out such tasks, the root password is required. You cannot carry out any administrative tasks without this password.

2.4.5 Hostname, Domain Name, and IP Address

The next dialog starts with the network configuration; see *Figure 2.4, “Hostname, Domain Name, and IP Address”*.

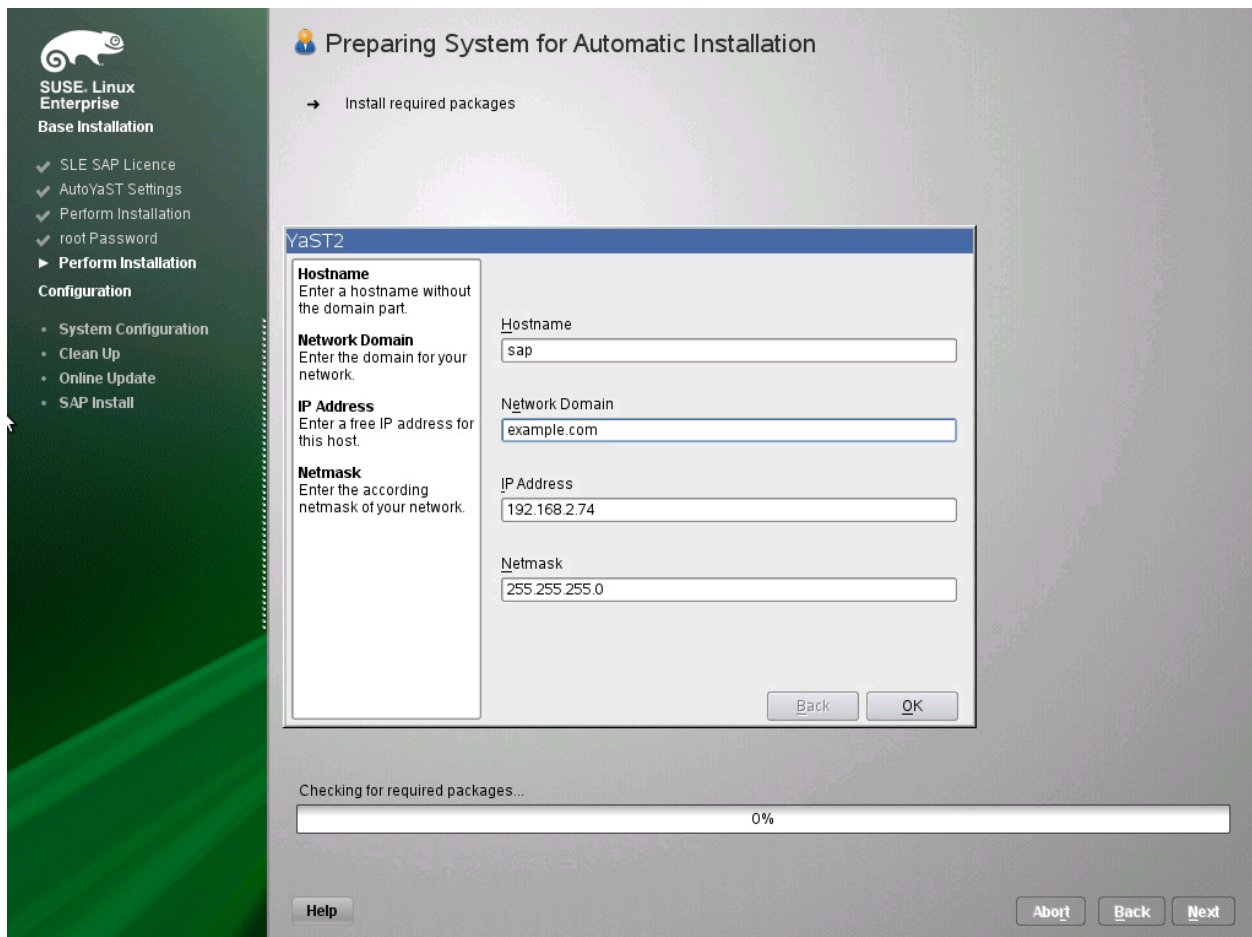


FIGURE 2.4: HOSTNAME, DOMAIN NAME, AND IP ADDRESS

The *Hostname* is the computer's name in the network. The *Domain Name* is the name of the network. A hostname and domain are proposed by default. If your system is part of a network, the hostname has to be unique in this network, whereas the domain name has to be common to all hosts on the network.

Also enter the *IP Address* and *Netmask* for this host. The IP address must be unique and the netmask has to be common to all hosts on the network.

2.4.6 Domain Name Service (DNS) and Time Server (NTP)

The next dialog continues with the network configuration; see [Figure 2.5, "Domain Name Service \(DNS\) and Time Server \(NTP\)"](#).

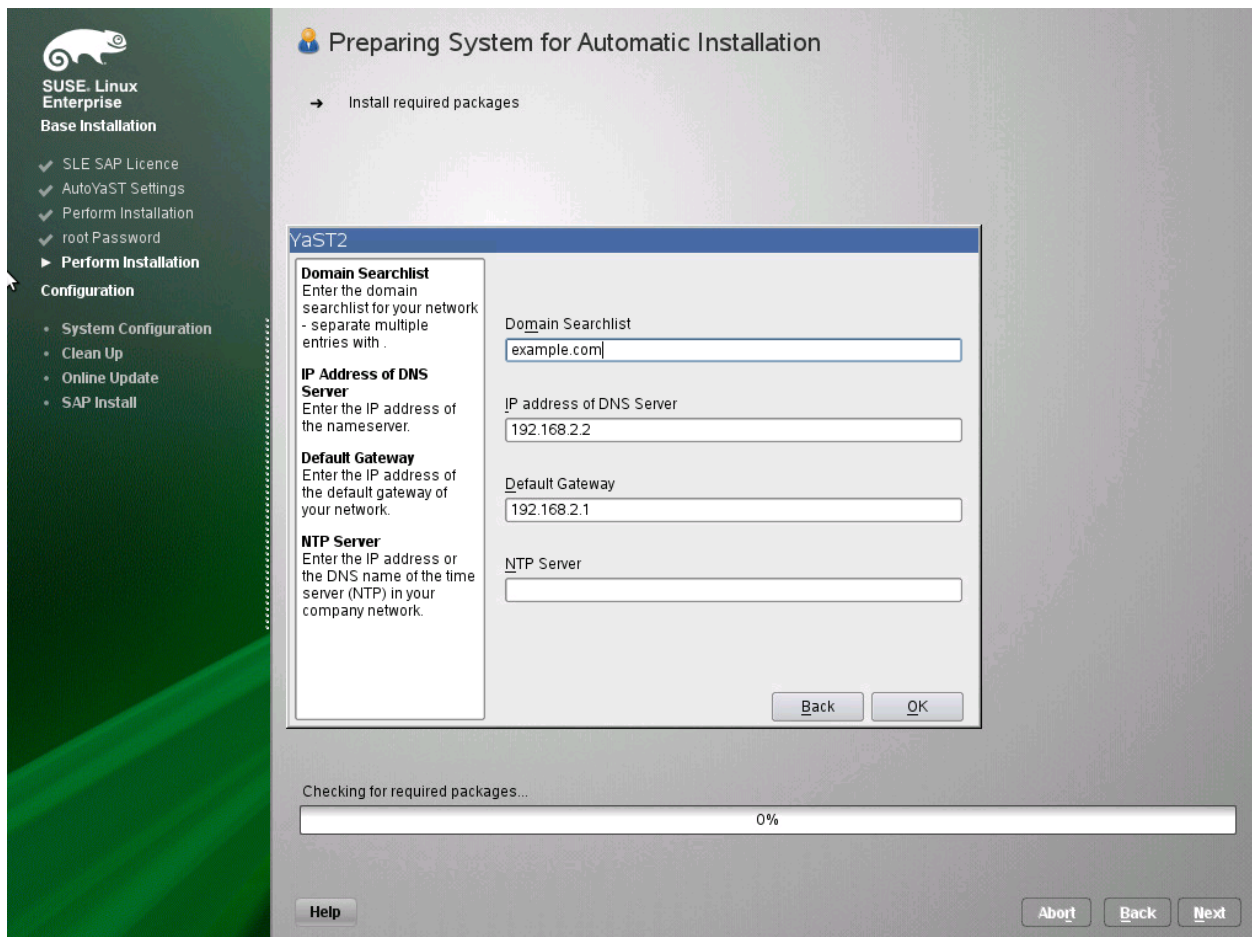


FIGURE 2.5: DOMAIN NAME SERVICE (DNS) AND TIME SERVER (NTP)

For Domain Name Service (DNS) configuration, enter the *Domain Searchlist* and the *IP Address of DNS Server* plus the IP address of the *Default Gateway* of your network.

Also enter the address of the *NTP Server* to synchronize automatically via Network Time Protocol (NTP).

2.4.7 Registration

To get technical support and product updates, you need to register and activate your product with the Novell Customer Center; see [Figure 2.6, "Registration"](#). This dialog provides assistance for doing so. Find detailed information about Novell Customer Center at <http://www.novell.com/documentation/ncc/>.

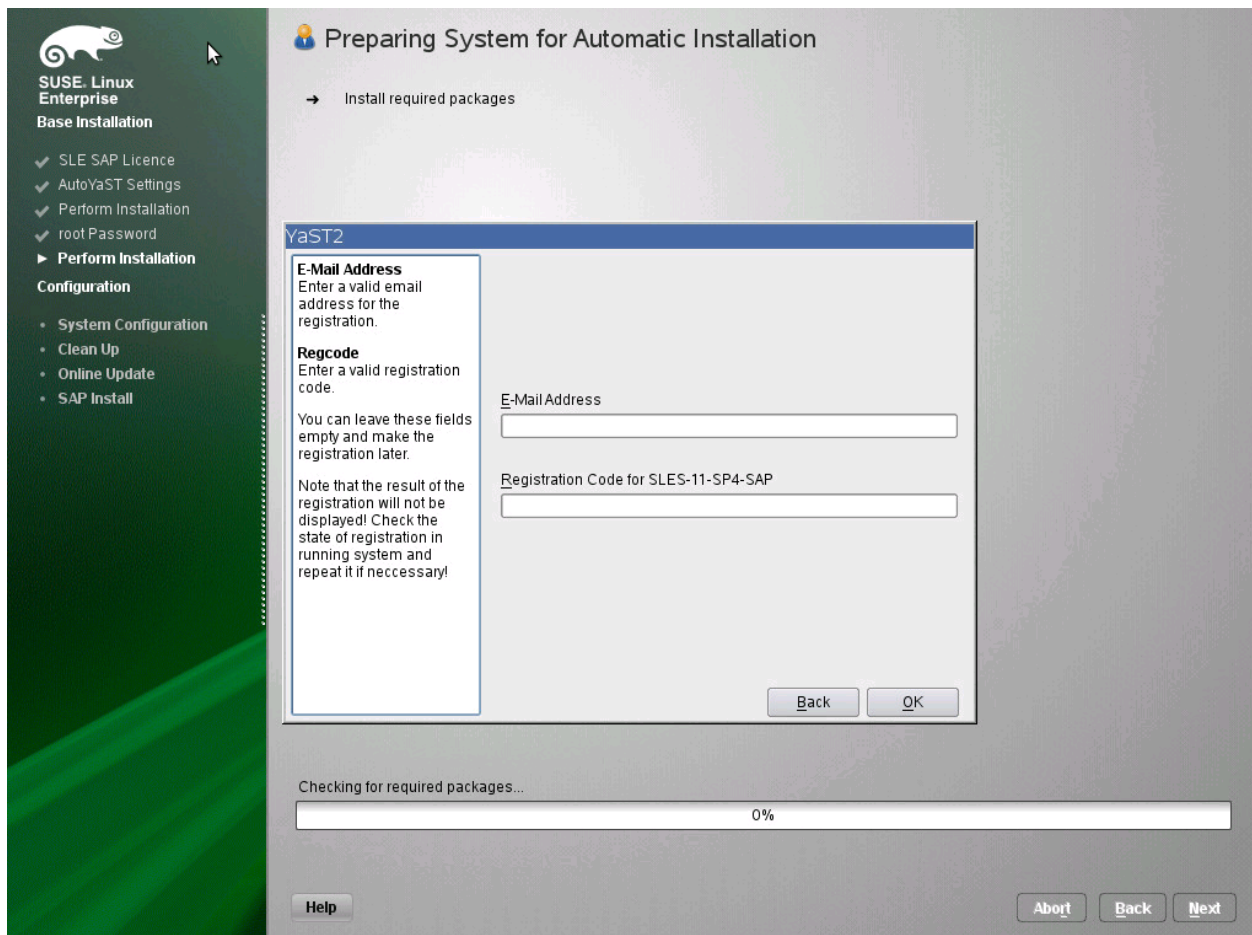


FIGURE 2.6: REGISTRATION

Enter your *E-Mail Address* and *Registration Code* for the product. If you provide the registration code now, operating system updates will be installed automatically during the installation of the system.

2.4.8 System Configuration Settings

After confirming the registration data, the system will be configured with the supplied settings. No user action is required at this stage.



Warning: Firewall Disabled

This wizard-based installation scenario disables the firewall (SuSEfirewall2) completely.

If needed, you can activate the firewall after the installation. If you activate the firewall after the installation, you must open all required ports manually. For more information about required ports, see [Section 5.3.2, “Ports Configuration”](#).

2.4.9 SAP Product Installation

After an automatic reboot and applying previously supplied configuration settings, you are prompted to continue with the *SAP Product Installation* using the SAP Installation Wizard. The SAP Installation Wizard will install the SAP application from the SAP media kits you received from SAP.



Tip: SAP Product Installation Default Settings

The SAP Product Installation default settings are specified and documented in `/etc/sysconfig/sap-installation-wizard`. You can change them according to your needs.

PROCEDURE 2.1: SAP PRODUCT INSTALLATION

1. Select *Create SAP file systems and start SAP product installation* and confirm the pop-up (see [Figure 2.7, “SAP Product Installation”](#)) if you want to continue with the installation right away. Otherwise, it is possible to just prepare the SAP product installation with *Only create SAP Business One file systems, do not install SAP products now*, or completely interrupt the installation process at this point with *Finish wizard and proceed to OS login* and resume it after a system restart.



Important: Creating SAP Business One File Systems Only Works On Hardware Certified for Business One

To use the functionality *Only create SAP Business One file systems, do not install SAP products now*, your hardware needs to be certified for Business One. Additionally, follow the hardware setup instructions in *SAP Note 1944415: Hardware Configuration Guide and Software Installation Guide for SUSE Linux Enterprise Server with SAP HANA and SAP Business One* (<https://launchpad.support.sap.com/#/notes/1944415> [↗](#)).

Otherwise, this option will not create a new file system and the installation workflow ends at this point.

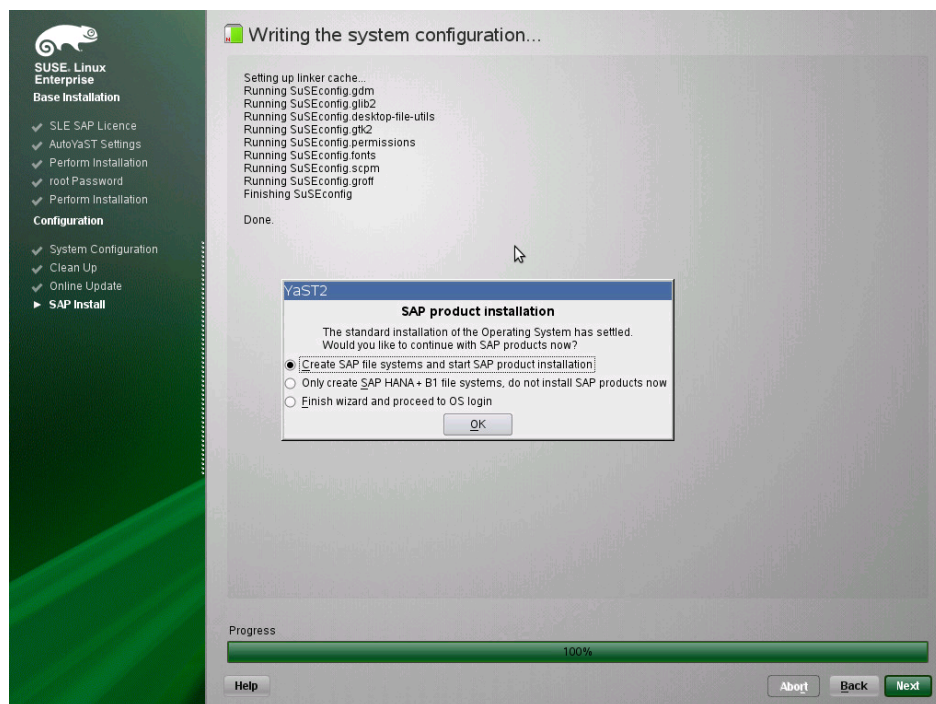


FIGURE 2.7: SAP PRODUCT INSTALLATION



Tip: Resuming SAP Installation after System Restart

To resume the SAP installation with the wizard, start YaST and select the *SAP Product Installer (Computer)*, then in the YaST Control Center click *Miscellaneous > SAP Product Installer*; see [Figure 2.8, “YaST Control Center: SAP Product Installer”](#)). The functionality is the same, but the layout of the dialogs is different; the left progress pane is only displayed when continuing with the installation without a restart.

The following screen shots document the installation with the *SAP Product Installer* that runs after a restart of the system.

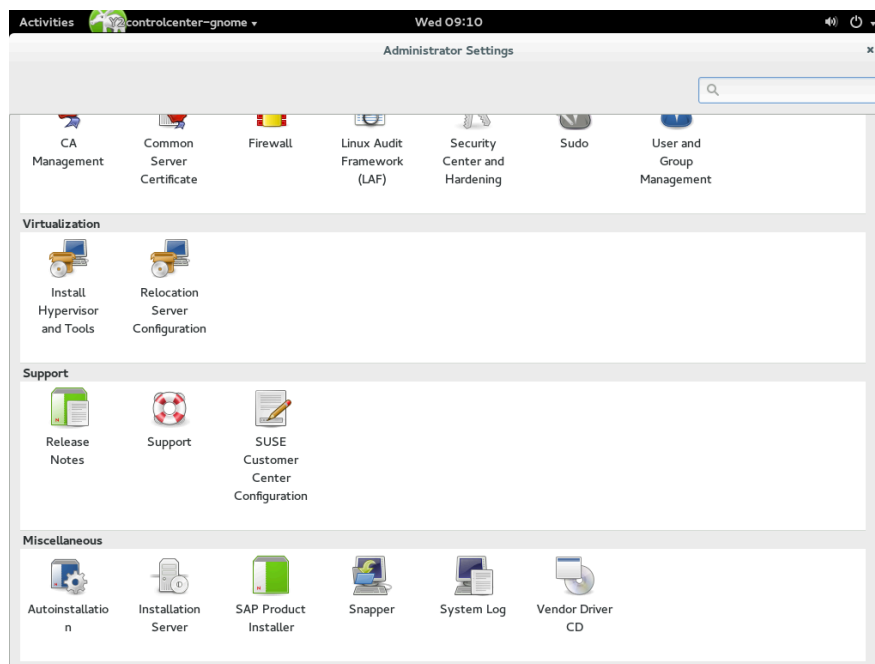


FIGURE 2.8: YAST CONTROL CENTER: SAP PRODUCT INSTALLER

2. In the next dialog provide the *Location of the SAP Installation Master*; see [Figure 2.9, "SAP Installation Wizard: SAP Installation Master Location"](#). The location can either be a local source or a remotely provided installation source.

Local Source

- a directory (dir:// and /path/to/dir/)
- a locally connected hard disk (device:// and devicename/path/to/dir/on/device)
- a USB mass storage (usb:// and /path/to/dir/on/USB)
- a CD-ROM (cdrom://)

A Remotely Provided Installation Source

- NFS (nfs:// and server_name/path/to/dir/on/server)
- SMB (smb:// and [username:password@]server_name/path/to/dir/on/server[?workgroup=workgroup_name])

—select the corresponding option from the pull-down list on the left.



Tip: Remote Location Specification

If you want to install from an NFS source, you must enter the name of the server and the complete path to the media data. For more information about setting up a remote installation server, see [Chapter 4, Remote Installation from a Network Server](#).

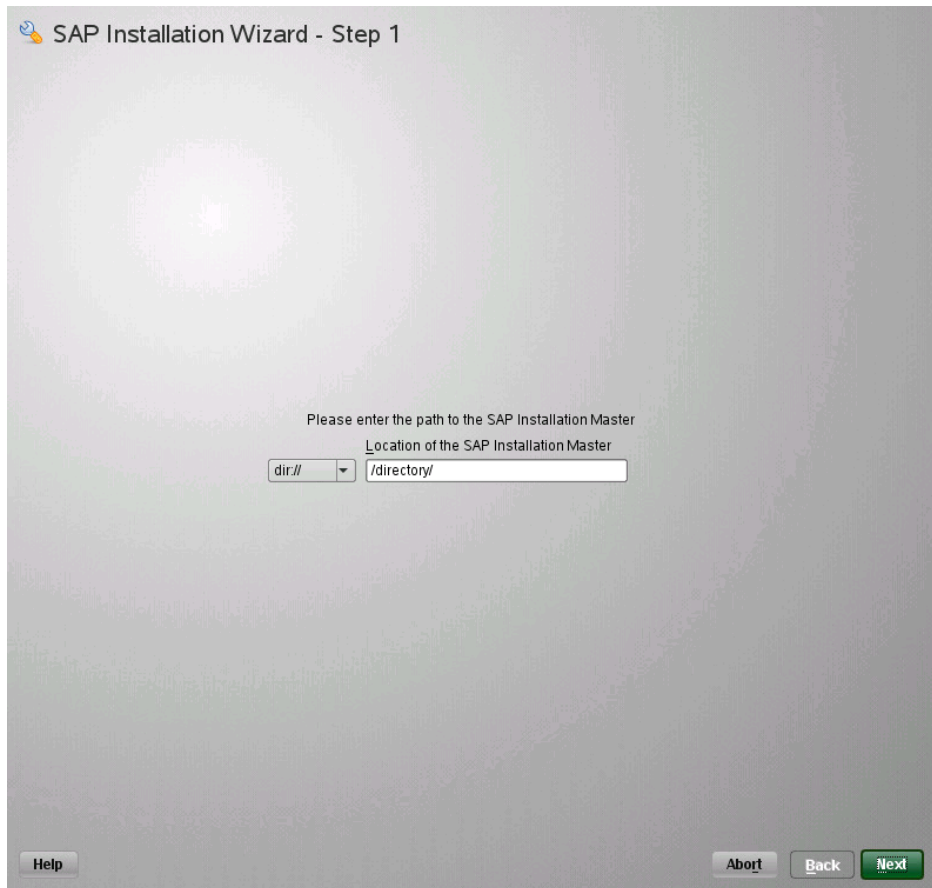


FIGURE 2.9: SAP INSTALLATION WIZARD: SAP INSTALLATION MASTER LOCATION

3. Only in the case of a NetWeaver installation, in the next dialog you must select the *Installation Mode* such as *SAP Standard System*, *SAP Standalone Engines*, etc. and the *Database* such as *IBM DB2*, *MaxDB*, etc. you want to deploy. In the case of a B1 or HANA installation, such a selection does not exist. See [Figure 2.10, "SAP Installation Wizard: Installation Mode and Database"](#). Click *Help* for information.

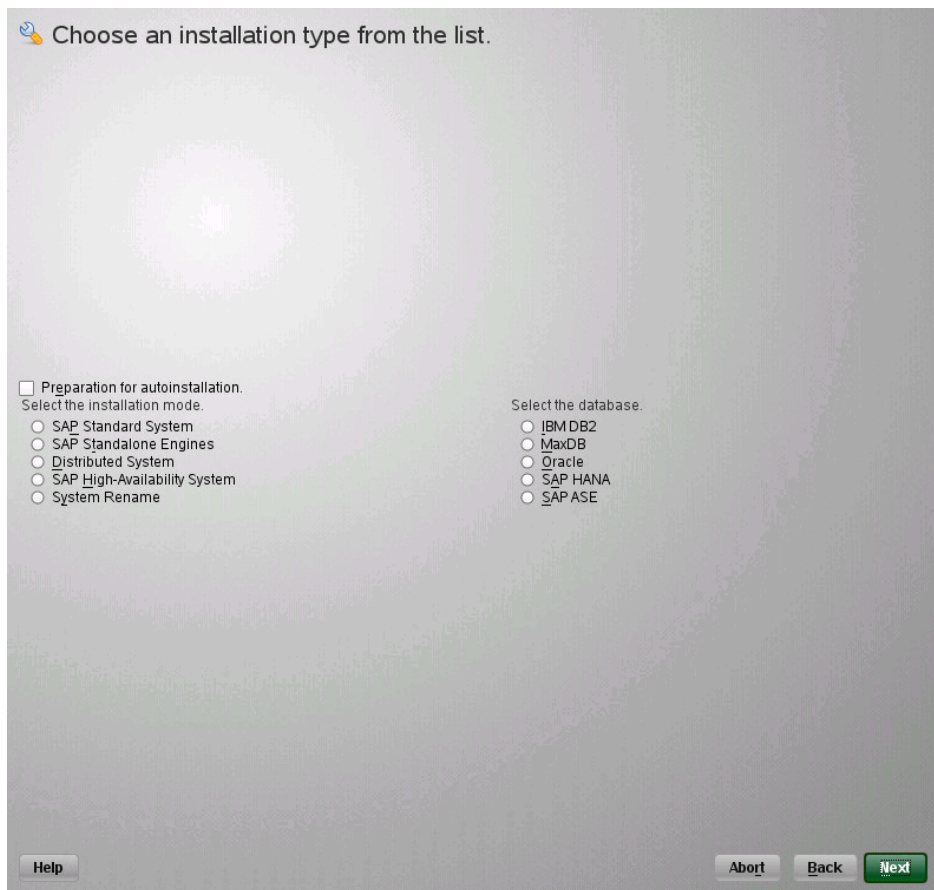


FIGURE 2.10: SAP INSTALLATION WIZARD: INSTALLATION MODE AND DATABASE

Enable *Preparation for autoinstallation*, if you only want to enter the installation parameters, but not perform the actual installation now. In this case, the installer will copy the product images to `/data/SAP_CDs` and prepare an installation environment for every product as follows:

```
/data/SAP_INST/0/Instmaster  
/data/SAP_INST/1/Instmaster  
/data/SAP_INST/2/Instmaster  
...
```

If you later actually want to run the auto installation, set `SAP_AUTO_INSTALL="yes"` in `/etc/sysconfig/sap-installation-wizard`. If you then click the *SAP Product Installer* in the YaST Control Center to run the auto installation, all settings will be displayed and offered for optional fine-tuning (NetWeaver) or the parameters are written to the AutoYaST files in the `/data/SAP_INST/number` directories, where you can modify them according to your needs (HANA/B1).

4. In case of a NetWeaver installation you now select a *SAP Product*. The offerings of available products depend on the media set and installation master you received from SAP; for example, see *Figure 2.11, “SAP Installation Wizard: SAP Products”*.

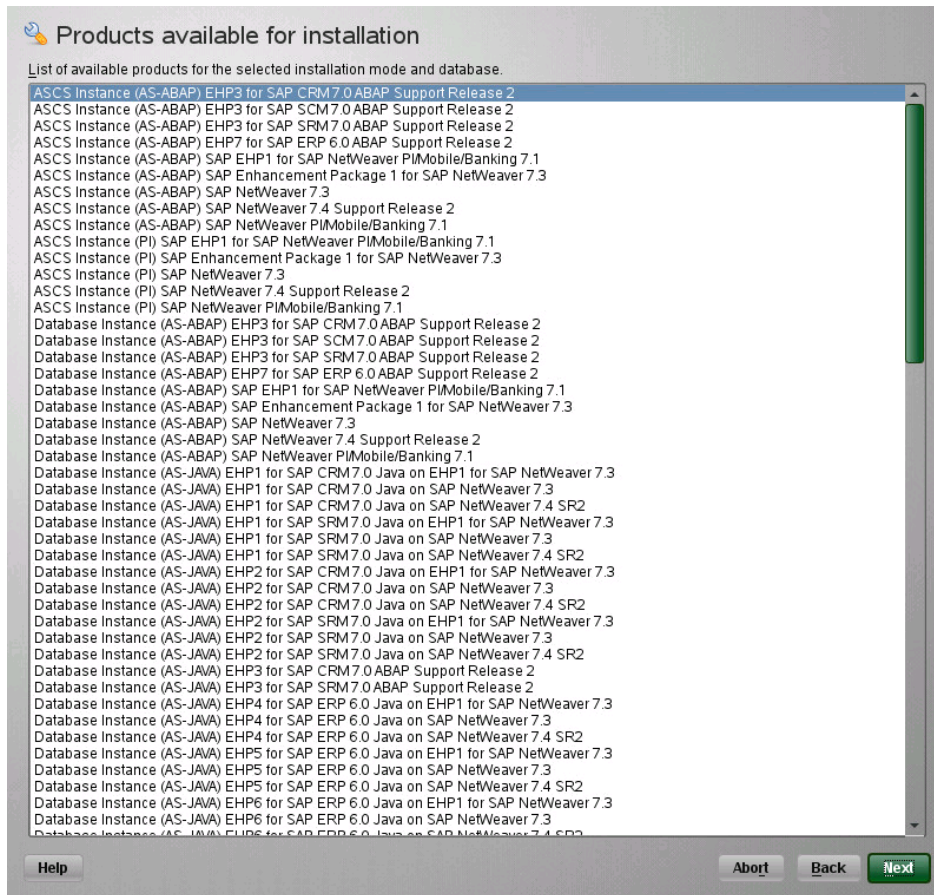


FIGURE 2.11: SAP INSTALLATION WIZARD: SAP PRODUCTS

5. For example, select *SAP NetWeaver 7.4* and click *Next*. Now the relevant part of the SAP media will be copied to the hard drive of the machine for the following SAP installation (after copying, see the contents of `/data/SAP_CDs`; the layout is explained later in this chapter). This is repeated for all necessary SAP media, with some additional simple questions.
6. You are asked to provide the *Location of the SAP Medium* and if additional media are needed, you can also add them afterwards; see (here you see the list of already copied or linked SAP media). Click *Help* for information.

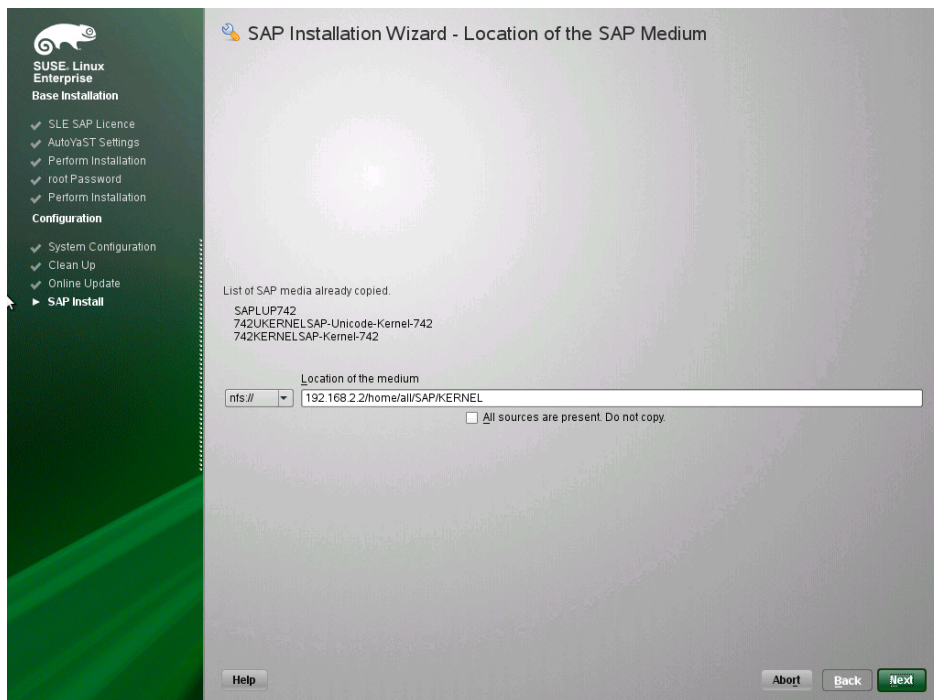


FIGURE 2.12: SAP INSTALLATION WIZARD: ADDITIONAL SAP MEDIA

7. Then you can optionally copy a *Supplement* or *3rd-Party Medium*. For more information about a Supplement Media, see [Section 5.4.1, “Supplement Media”](#).
8. At this point, all data (product images) required for the SAP installation is selected and copied to `/data/SAP_CDs`, one directory per medium, e.g.:

```
/data/SAP_CDs:
742-KERNEL-SAP-Kernel-742
742-UKERNEL-SAP-Unicode-Kernel-742
RDBMS-MAX-DB-LINUX_X86_64
SAP-NetWeaver-740-SR2-Installation-Export-CD-1-3
SAP-NetWeaver-740-SR2-Installation-Export-CD-2-3
SAP-NetWeaver-740-SR2-Installation-Export-CD-3-3
```

`/data/SAP_CDs` is the default directory as specified in the `/etc/sysconfig/sap-installation-wizard` configuration file.

9. In the following configuration dialogs, enter the details for the SAP installation. First, specify the *System T-Shirt-Sizing*.

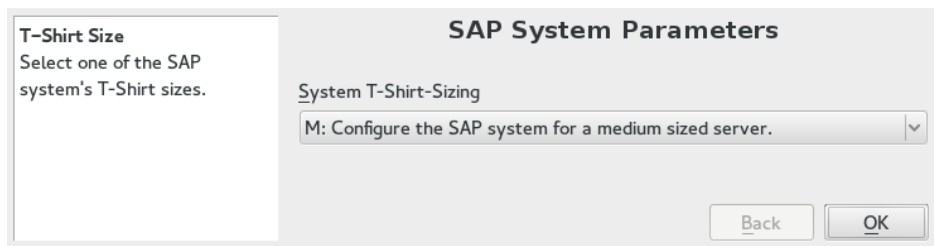


FIGURE 2.13: SAP SYSTEM PARAMETERS: T-SHIRT-SIZING

10. In *Figure 2.14, "SAP Virtual Network Settings"*, then enable and enter the virtual network settings, if needed. For details, see the online help on the left.

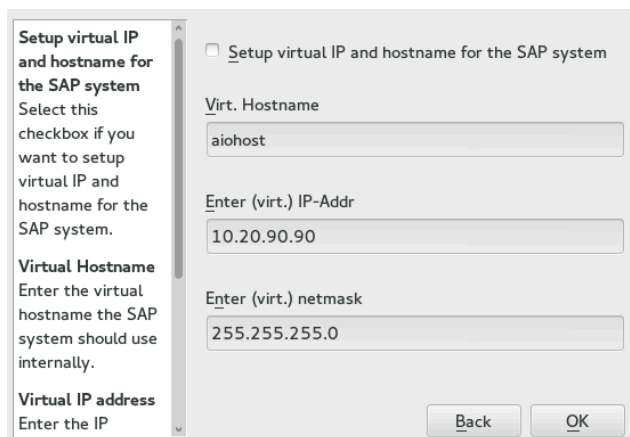


FIGURE 2.14: SAP VIRTUAL NETWORK SETTINGS

11. Now all installation data (media and settings) is available to the wizard, and the final deployment of the SAP system can take place with the SAP installer (SAPinst).

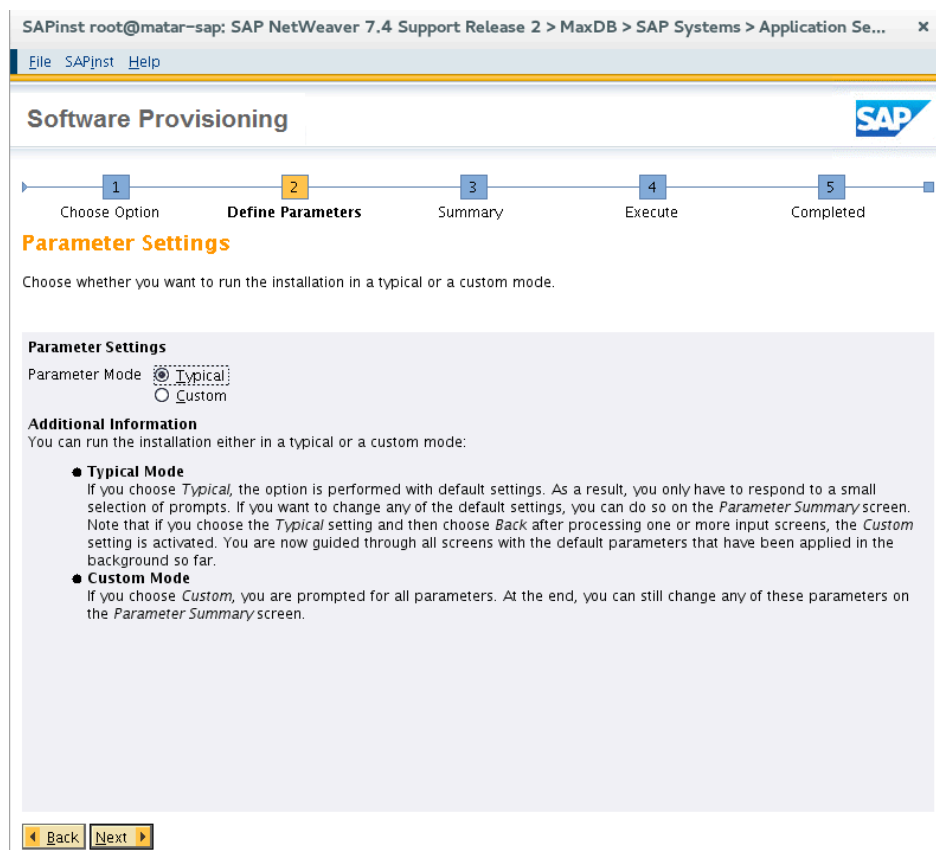


FIGURE 2.15: SAP INSTALLER (SAPINST): DEFINING PARAMETERS

The SAP installer displays a visualization of the installation steps it performs; see *Figure 2.16, “SAP Installer (SAPinst)”*.

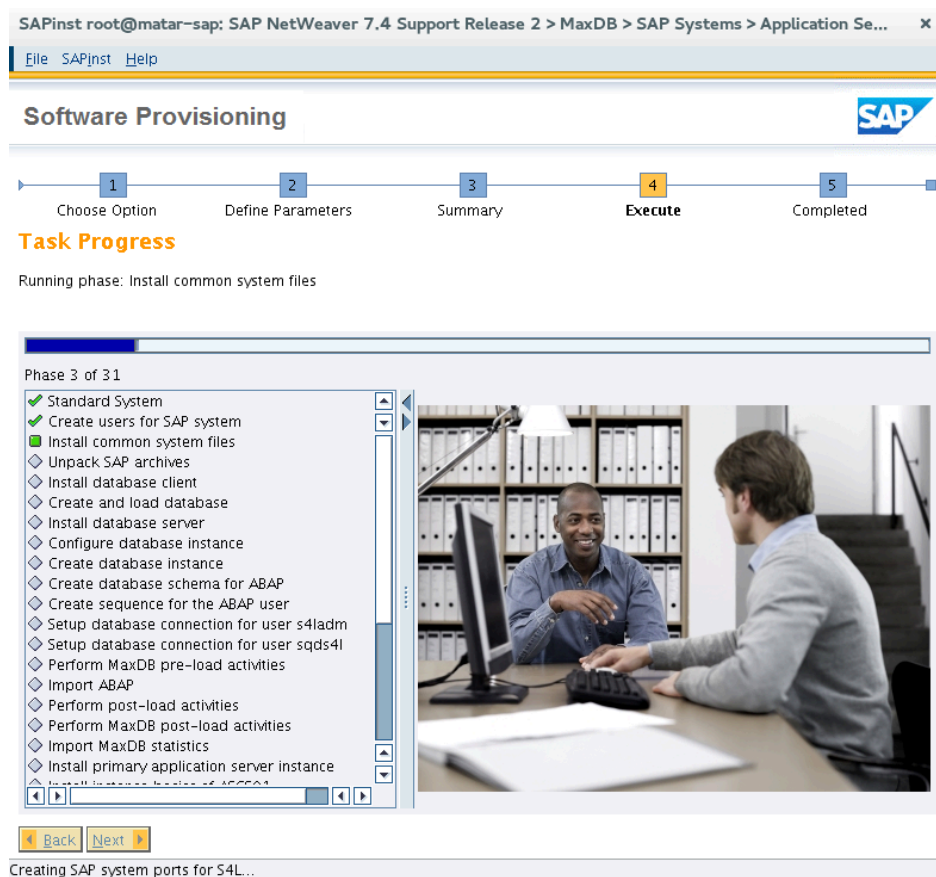


FIGURE 2.16: SAP INSTALLER (SAPINST)




Note: Installation Progress

Depending on your machine, it takes a while until the SAPinst tool shows up.

After the SAP installer has finished, you will see a short summary of the installation data.

2.5 SLES for SAP Applications — Installation with External Profile

This installation is driven by a user-provided AutoYaST profile and there is no wizard support. This scenario is suitable for experienced users who are familiar with AutoYaST and want to deploy their own AutoYaST profiles to install SUSE Linux Enterprise Server for SAP Applica-


tions. For more information about AutoYaST profiles, see the *SLES AutoYaST Guide* (the *AutoYaST Guide* comes with the product or is available from <http://documentation.suse.com/sles/11-SP4/> ).

In order to use a user-provided AutoYaST profile, select “Install SLES for SAP Applications — Installation with External Profile” from the DVD Boot Menu. Within the boot options, change the `autoyast=usb:///` parameter to the location of a user-provided AutoYaST profile, or enter the location when YaST asks for it in the next dialog.

You can also reference the SAP specific pattern, the HA and WebYaST components and SAP-specific IBM Java in your AutoYaST profile and then install it during this installation scenario. As everything else, these components are *not* preselected and you must include this yourself in your `autoyast.xml` file.

2.5.1 About AutoYaST

AutoYaST is a system for installing one or more SUSE Linux systems automatically and without user intervention. AutoYaST installations are performed using an AutoYaST profile with installation and configuration data. That profile can be created using the AutoYaST configuration interface and can be provided to YaST during installation in different ways.

For more information about AutoYaST, see the *SUSE Linux Enterprise Server 11 AutoYaST Guide* (the *AutoYaST Guide* comes with the product or is available from <http://documentation.suse.com/sles/11-SP4/> ).

2.5.2 Partitioning with AutoYaST

For standard systems find pre-defined partitioning settings in `/usr/share/YaST2/include/sap-installation-wizard/`. These could serve as examples if you want to create your custom partitioning scripts.

For background information on partitioning, see [Chapter 3, Background Information on Partitioning](#).

3 Background Information on Partitioning

During installation partitioning will be done in two steps. The first step happens while installing the operating system (stage 1, see [Section 2.4.3, “Preparing System for Automated Installation”](#)), and the second step while installing your SAP product (stage 2, see [Section 2.4.9, “SAP Product Installation”](#)).

3.1 Stage 1: Partitioning for the Operating System

During stage 1 of the installation (see [Section 2.4.3, “Preparing System for Automated Installation”](#)), partitions for the operating system will be created.

A logical volume group (LVG) named `system` will be created. This LVG contains two logical volumes (LVs) named `root_lv` and `swap_lv`. The size of `swap_lv` will be calculated according to the SAP Note 1597355 (<https://launchpad.support.sap.com/#/notes/1597355>). For `root_lv`, 35 GB will be assumed at first, and the sum of `root_lv` and `swap_lv` will be displayed as *Set the system volume size in GB*.

You can change both, the size of the system volume (*Set the system volume size in GB*) and the size of the swap partition (*Set the SWAP size in GB*). When doing this, mind some caveats:

- The size of the system volume could not exceed the physical size of the device minus 1 GB; 1 GB will be reserved for boot or for UEFI.
- Better do not change the size of the swap partition.
- `root_lv` should not be smaller than 5 GB.



Note: Error Messages

Only if the size of the system volume (plus 1 GB) exceeds the physical size of the device or if the swap partition exceeds the size of the system volume, error messages are issued.

3.2 Stage 2: Partitioning for the SAP System

After installing the operating system the partitioning for the SAP system will take place. This can be done during stage 2 of the installation phase or in the running system.

The partitioning for the SAP system is not controlled by `autoinst.xml` that is used for the installation of the operating system. The `autoinst` functionality no longer exists in the running system. Instead the following files are controlling the partitioning for the SAP system:

In `/etc/sap-installation-wizard.xml` the `<partitioning>` tag defines for which SAP programs which files for controlling the partitioning are used. These files will be taken from `/usr/share/YaST2/include/sap-installation-wizard/`. In case there is no `<partitioning>` tag for the wanted SAP product, `base_partitioning.xml` will be used.

The files for controlling the partitioning are basically AutoYaST control files that contain a partitioning section only. There are several extensions:

- If the `<partitioning_defined>` tag is set to `true`, the partitioning will be performed without any user interaction. This, for example, is preconfigured in files for controlling the partitioning of known hardware such as Dell, Fujitsu, HP, or IBM Server systems. If the SAP Installation Wizard recognizes this hardware, the appropriated file will be selected.
- For every partition you can specify the `<size_min>` tag. The size value can be given as a string in the format of `RAM*N`. This way you can specify, how large the partition should be minimally (x -times (N) the size of the available memory (RAM)).

For all NW based products `base_partitioning.xml` will be used.

If you need something different (e.g., for TREX), proceed as follows:

1. In `/usr/share/YaST2/include/sap-installation-wizard/` create a new file for controlling the partitioning (e.g., `TREX_partitioning.xml`). You can base the new file on `base_partitioning.xml` and change it according to your needs.
2. In `/etc/sap-installation-wizard.xml`, at the `TREX` following tag insert:

```
<partitioning>TREX_partitioning.xml</partitioning>
```




Warning: Do Not Edit `base_partitioning.xml`

Do Not Edit `base_partitioning.xml` directly. With the next update this file will be overridden.

For more information on partitioning with AutoYaST, see the *Chapter 4.4 “Partitioning”* of the *AutoYaST Guide*.

4 Remote Installation from a Network Server


For detailed information about installing SUSE Linux Enterprise Server from a network server in general, see the *Deployment Guide*, Chapter 14, “Remote Installation” (the *Deployment Guide* comes with the product or is available from <http://documentation.suse.com/sles/11-SP4/> ).

The following section provides a short description about installing from a network server.

4.1 Installing with Installation Media from the Network

1. Copy the SUSE Linux Enterprise Server for SAP Applications DVD content to a Web server (e.g., example.com) to the directory `/srv/www/htdocs/sap_repo`.
2. Boot from DVD.
3. Choose one of the boot menu options and edit the command line:
 1. remove the parameter `instmode=cd` from the command line
 2. change `netsetup=0` to `netsetup=1` and `autoyast=file:///` to `autoyast=http://example.com/sap_repo/`, and
 3. add the parameter `install=http://example.com/sap_repo`.

With `netsetup=1` you will start the network.

This is all you need for a network installation. If you want to avoid using a DVD to bootstrap the system and boot from the network via PXE, read the *AutoYaST Guide* about setting up a PXE environment (the *AutoYaST Guide* comes with the product or is available from <http://documentation.suse.com/sles/11-SP4/> .

4.2 Copying SAP Media Sets from a Remote Server with the Installation Wizard

It is possible to copy the SAP media sets from a remote server (NFS, SMB, etc.). For example, if you want to put the SAP media sets on an NFS Server, proceed as follows:

1. Create a directory `/srv/www/htdocs/sap_repo` on your installation server.
2. Edit the `/etc/exports` file on the installation server by adding the following:

```
/srv/www/htdocs/sap_repo *(ro,root_squash,sync)
```
3. In `/srv/www/htdocs/sap_repo` create a directory for every SAP media you have, for example `kernel`, `java`, `maxdb`, etc., which will give you a hint about the contents.
4. Copy the contents of all SAP media with `cp -a` to the corresponding directory.



Tip: Avoid Copying on a Windows Operating System

Do not copy the media on a Windows operating system because it may break permission settings and capitalization of files and directories.

Now you can install from the NFS server; e.g., from `http://example.com:/srv/www/htdocs/sap_repo`.

For information about installing SUSE Linux Enterprise Server from an NFS server, see the *Deployment Guide*, Chapter 14.2, “Remote Installation” and Section 14.2.2.

5 SUSE Linux Enterprise Server for SAP Applications Components

SUSE® Linux Enterprise Server for SAP Applications consists of several components such as SUSE Linux Enterprise High Availability Extension, the Kernel page-cache limit feature, and an Installation Wizard, which are briefly explained in the following sections.

5.1 SUSE Linux Enterprise High Availability Extension

The SUSE Linux Enterprise High Availability Extension add-on is part of SUSE Linux Enterprise Server for SAP Applications.

For more information about SUSE Linux Enterprise High Availability Extension, see

- the *High Availability Guide* at http://documentation.suse.com/sle_ha/ and
- the *Best Practice Guides* at <http://www.suse.com/products/sles-for-sap/resource-library/sap-best-practices.html>.

5.2 Resource Agents for SAP HANA System Replication

SUSE Linux Enterprise Server for SAP Applications supports SAP HANA System Replication using components of SUSE Linux Enterprise High-Availability Extension and two additional resource agents (RA).



Important: Package Update

The features described below are supported starting with version 0.151 of the package SAPHanaSR. Make sure to update to this version or a newer version of the package.

5.2.1 SAPHana Resource Agent

This resource agent from SUSE supports scale-up scenarios by checking the SAP HANA database instances for whether a takeover needs to happen. Unlike with the pure SAP solution, takeovers can be automated.

It is configured as a master/slave resource: The master assumes responsibility for the SAP HANA databases running in primary mode, whereas the slave is responsible for instances that are operated in synchronous (secondary) status. In case of a takeover, the secondary (slave resource instance) can automatically be promoted to become the new primary (master resource instance).

This resource agent supports system replication for the following in scale-up scenarios:

- **Performance-Optimized Scenario.** Two systems (A and B) in the same SUSE Linux Enterprise High-Availability Extension cluster, one primary (A) and one secondary (B). The primary system (A) is replicated synchronously to the secondary system (B).
- **Cost-Optimized Scenario.** The basic setup of A and B is the same as in the *Performance-Optimized Scenario*. However, the secondary system (B) is also used for non-productive purposes, such as for a development or QA database. The production database is only kept on permanent memory, such as a hard disk. If a takeover needs to occur, the non-productive system is stopped before the takeover is processed. The system resources for the productive database are then increased as quickly as possible via an SAP hook call-out script.
- **Chain/Multi-Tier Scenario.** Three systems (A, B, and C), of which two are located in the same SUSE Linux Enterprise High-Availability Extension cluster (A and B). The third system (C) is located externally. The primary system (A) is replicated synchronously to the secondary system (B). The secondary system (B) is replicated asynchronously to the external system (C).

If a takeover from A to B occurs, the connection between B and C remains untouched. However, B is not allowed to be the source for two systems (A and C), as this would be a “star” topology which is not supported with current SAP HANA versions (such as SPS11). Using SAP HANA commands, you can then manually decide what to do:

- The connection between B and C can be broken, so that B can connect to A.
- If replication to the external system site is more important than local system replication, the connection between B and C can be kept.

For all of the scenarios, SUSE Linux Enterprise Server for SAP Applications supports both single-tenant and multi-tenant SAP HANA databases. That is, you can use SAP HANA databases that serve multiple SAP applications.

5.2.2 SAPHanaTopology Resource Agent

To make configuring the cluster as simple as possible, SUSE has developed the `SAPHanaTopology` resource agent. This agent runs on all nodes of a SUSE Linux Enterprise High-Availability Extension cluster and gathers information about the status and configurations of SAP HANA system replications. It is designed as a normal (stateless) clone.

5.2.3 For More Information

For more information, see:

- The *High Availability Guide* at <https://documentation.suse.com/sles-12/>.
- The *White Papers* and *Best Practice Guides* at <https://documentation.suse.com/sbp/all/>. In particular, see *Automate your SAP HANA System Replication Failover* (<https://www.suse.com/programs/sap/hana/replication-techcast/>).

5.3 Configuring SUSE Linux Enterprise Server for SAP Applications

5.3.1 Kernel: Page-Cache Limit

Problem

The kernel swaps out rarely accessed memory pages in order to use freed memory pages as cache to speed up file system operations, for instance during backup operations.

Some SAP solutions use large amounts of memory for accelerated access to business data. Parts of this memory are seldom accessed. When a user request then needs to access paged out memory, the response time is poor. It is even worse, when an SAP solution running on Java incurs a Java garbage collection. The system starts heavy page-in (disc I/O) activity and has a poor response time for an extended period of time.

Solution

A new kernel tune option has been introduced that allows the system administrator to limit the amount of page-cache that the kernel uses when there is competition between application memory and page-cache. This option tells the kernel that once the page-cache is filled to the configured limit, application memory is more important and should thus not be paged out. No pages will be paged out if the memory footprint of the workload plus the configured page-cache limit do not exceed the amount of physical RAM in the system. Two new kernel options are available for configuration:

- `vm.pagecache_limit_mb (/proc/sys/vm/pagecache_limit_mb)`
- `vm.pagecache_limit_ignore_dirty (/proc/sys/vm/pagecache_limit_ignore_dirty)`

For permanent use, set them in `/etc/sysctl.conf`, e.g.

```
vm.pagecache_limit_mb = 1024
vm.pagecache_limit_ignore_dirty = 0
```

For background information, see SAP Note 1557506: Linux paging improvements <https://launchpad.support.sap.com/#/notes/1557506>.

5.3.2 Ports Configuration

SAP applications require many open ports and port ranges in the firewall. The exact numbers depend on the selected instances, for example:

- 3200-3399,
- 3600,
- 4700-4899,
- 7200-7299,
- 50000-59999.

It is also necessary to open 1128 and 1129 (TCP and UDP), and all the ports needed for the databases used (Oracle, DB2, MaxDB, Sybase).



Warning: Firewall Activation

The firewall is disabled if you use the wizard, and enabled if you use the normal setup.

5.3.3 Important Log Files

The most important files for this product are:

- Auto-installation related log files are in /var/adm/autoinstall/.
- The installation wizard is a YaST module. Thus you will find wizard related log entries in /var/log/YaST/y2log.
- We use a library for all SAP knowledge. Thus you will find related log entries in /var/log/SAPmedia.log.

5.4 The Installation Wizard

The Installation Wizard offers a guided installation path for both the SUSE Linux Enterprise Server operating system and the SAP applications.

Additionally, it includes an installation framework for 3rd party extensions.

The Installation Wizard consists of four parts:

1. Installation of the operating system (SUSE Linux Enterprise Server).
2. SAP Wizard Part 1: Copying all required SAP media to the local disk or use a shared storage medium.
3. SAP Wizard Part 2: Collecting all parameters for the actual installation by querying the user interactively.
4. SAP Wizard Part 3: Running the SAP Installer.

It is possible to run most of these parts separately. This way, very flexible installation scenarios are possible. Here are some examples:

- Just prepare a machine with the operating system (SUSE Linux Enterprise Server) and run the SAP Wizard later.
- Just prepare a machine with the operating system (SUSE Linux Enterprise Server), copy the SAP media, and collect the SAP installation parameters.

You can copy such an installation to other machines, maybe adjusting just a few SAP installation parameters. Then finally run the SAP Installer.

5.4.1 Supplement Media

The basic idea of the “Supplement Media” is to enable partners or customers to add their own tasks or workflows to the Installation Wizard.

It is done by adding a small XML file, which will be part of an AutoYaST XML file. This file must be called `product.xml`; then it will be included in the workflow.

This can be used for various types of additions, such as adding your own RPMs, running your own scripts, setting up a cluster file system or creating your own dialogs and scripts.

5.4.1.1 `product.xml`

The `product.xml` file looks like a normal AutoYaST XML file, but with some restrictions.

The restrictions relate to the fact that only the parts for the second stage of the installation can be run, because the first stage was executed before.

Both XML files (`autoyast.xml` and `product.xml`) will be merged after the media is read and a “new” AutoYaST XML file is generated on the fly for the additional workflow.

The following areas or sections will be merged:

```
<general>
  <ask-list>           ❶
  ...
<software>           ❷
  <post-packages>
  ...
<scripts>
  <chroot-scripts>    ❸
  <post-scripts>      ❹
  <init-scripts>      ❺
  ...
```

- ❶ see [Section 5.4.1.2, “Own AutoYaST Ask Dialogs”](#)
- ❷ see [Section 5.4.1.3, “Install Additional Packages”](#)
- ❸ after the package installation, before the first boot
- ❹ during the first boot of the installed system, no services running
- ❺ during the first boot of the installed system, all services up and running

All other sections will be replaced.

For the details of other customization options, see the *SLES AutoYaST Guide*, Chapter 4.12. “Custom User Scripts”.

5.4.1.2 Own AutoYaST Ask Dialogs

For a general overview and details of the Ask feature of AutoYaST, see Chapter 4.17. “Ask the User for Values During Installation” of the *SLES AutoYaST Guide* (the *AutoYaST Guide* comes with the product or is available from <http://documentation.suse.com/sles/11-SP4/>).

For the supplement media you can only use dialogs within the `cont` stage (`<stage>cont</stage>`), which means they are executed after the first reboot.

Your file with the dialogs will be merged with the base AutoYaST XML file.

As a best practice, your dialog should have a dialog number and an element number, best with steps of 10. This helps to include later additions and also could be used as targets for jumping over a dialog or element dependent on decisions. We also use this in our base dialogs and if you provide the right dialog number and element number, you can place your dialog between our base dialogs.

You can store the answer to a question in a file, to use it in one of your scripts later. Be aware that you *must* use the prefix `/tmp/ay` for this, because the Installation Wizard will copy such files from the `/tmp` directory to the directory where your media data also will be copied. This is done because the next supplement media could have the same dialogs or same answer file names and would overwrite the values saved here.

Here is an example with several options:

```
<?xml version="1.0"?>
<!DOCTYPE profile>
<profile xmlns="http://www.suse.com/1.0/yast2ns"
  xmlns:config="http://www.suse.com/1.0/configs">
  <general>
    <ask-list config:type="list">
      <ask>
        <stage>cont</stage>
        <dialog config:type="integer">20</dialog>
        <element config:type="integer">10</element>
        <question>What is your name?</question>
        <default>Enter your name here</default>
        <help>Please enter your full name within the field</help>
        <file>/tmp/ay_q_my_name</file>
        <script>
          <filename>my_name.sh</filename>
```

```

        <rerun_on_error config:type="boolean">true</rerun_on_error>
        <environment config:type="boolean">true</environment>
        <source><![CDATA[
function check_name() {
    local name=$1
    LC_ALL=POSIX
    [ -z "$name" ] && echo "You need to provide a name." && return 1
    return 0
}
check_name "$VAL"
]]>
        </source>
        <debug config:type="boolean">false</debug>
        <feedback config:type="boolean">true</feedback>
    </script>
</ask>
</ask-list>
</general>
</profile>

```

5.4.1.3 Install Additional Packages

You can also install RPM packages within the `product.xml` file. To do this, you can use the `<post-packages>` element for installation in stage 2.

For more information, see the SLES AutoYaST Guide, Chapter 4.5.6. “Installing Packages during Stage 2”. An example looks as follows:

```

...
<software>
  <post-packages config:type="list">
    <package>yast2-cim</package>
  </post-packages>
</software>
...

```

5.4.1.4 Example Directory for the Supplement Media

```

# ls
/
|--product.xml

```

5.4.2 ClamSAP


ClamSAP is a new antivirus toolkit integration with the SAP Virus Scan Interface that improves cross-platform threat detection.

ClamSAP is a 'C' shared library to link between ClamAV and the virus scan interface of SAP (NW-VSI). An SAP application can use the ClamAV engine to scan for malicious uploads in HTTP uploads for example. If you want to use Virus Scan within SAP applications, you can use Virus Scan Interface in SAP (*Transaction > VSCAN*). There is an open source adapter for the ClamAV engine at <http://freshmeat.net/projects/clamsap/>. The library allows integration of ClamAV into SAP and works also on Unix, where most other antivirus products do not run.

ClamAV is an open source (GPL) antivirus engine designed for detecting Trojans, viruses, malware, and other malicious threats. It is the de facto standard for mail gateway scanning. It provides a high performance multi-threaded scanning daemon, command line utilities for on-demand file scanning, and an intelligent tool for automatic signature updates. For more information, see <http://www.clamav.net>.

A Downloading CryptoAddOn (SAPCryptoLib)

Starting with SAP NetWeaver 7.03/7.3 the cryptographic functionality is already included in the SAP NetWeaver DVDs for most countries and does not have to be specified separately. In case the cryptographic functionality is not included, download the SAPCRYPTOLIB and follow the documentation on how to install the library: *Installing the Cryptolib*.

SAPCRYPTOLIB is available to entitled customers and partners at <http://www.service.sap.com/swdc> . Click *Installations and Upgrades* > *Browse our Download Catalog* > *SAP Cryptographic Software*. If you are an SAP customer or partner, contact the SAP subsidiary in the country from which you want to download the library, e.g. by opening a message on Service Marketplace under component XX-SER-SWFL-EXPORT asking for access to this section of the download area. You will be provided with the instructions required to download the package. You need the package for platform linux-x86_64-glibc2.3.



Tip: Renaming Downloaded File

It might be necessary to rename the downloaded file to SAPCRYPTO.SAR.



Important

If you are not an SAP partner yourself but rather working together with an SAP partner, contact your partner to get access to the required archive. Be aware that the installed server must not cross a border in order to avoid violating export regulations.

B Documentation Updates

This section contains information about documentation content changes made to the *SUSE Linux Enterprise Server for SAP Applications Guide*.

This document was updated on the following dates:

- *Section B.1, "December 08, 2016"*
- *Section B.2, "February 29, 2016"*
- *Section B.3, "July 31, 2015"*
- *Section B.4, "October 28, 2013"*

B.1 December 08, 2016

Updates were made to the following sections. The changes are explained below.

Section 2.4.9, "SAP Product Installation"

Add note that Business One-certified hardware is required to be able to create a Business One file system.

B.2 February 29, 2016

Updates were made to the following sections. The changes are explained below.

Section 5.2, "Resource Agents for SAP HANA System Replication"

Add section.

Section 2.1, "Planning the Installation"

Clarify that only DVD 1 is necessary for installation (doccomment#30069).

B.3 July 31, 2015

Updates were made to the following sections. The changes are explained below.

Section 2.2, "Bootting the Installation Medium"

Add note about installing on POWER.

Section 2.4.9, “SAP Product Installation”

Update according to the new SAP media format.

B.4 October 28, 2013

Updates were made to the following sections. The changes are explained below.

Chapter 2, Default Installation Scenarios

Update “Hardware Requirements”, “Hard Disk” space, and adjust the following text accordingly.

Chapter 3, Background Information on Partitioning

New chapter.

Appendix B, Documentation Updates

New appendix.