SUSE Linux Enterprise Server

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Architecture-Specific Information

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Introduction

This manual describes the steps necessary to prepare for the installation of SUSE®
Linux Enterprise Server on x86, AMD64, Intel EM64T, and Itanium computers. It in-
troduces the steps required to prepare for various installation methods and provides
useful information. Chapters of the *Reference* manual are referenced where applicable.
The list of hardware requirements provides an overview of supported systems supported
by SUSE Linux Enterprise Server. Find information about available installation methods
and several common known problems. Also learn how to control the installation, provide
installation media, and boot with regular methods.

1 Required Background

To keep the scope of these guidelines manageable, certain technical assumptions have
been made. It is assumed that:

- You have some computer experience and are familiar with common technical terms.

- You are familiar with the documentation for your system and the network on which
  it runs.

- You have a basic understanding of Linux systems.

2 Documentation Conventions

The following typographical conventions are used in this manual:

- `/etc/passwd`: filenames and directory names

- *`placeholder`*: replace *`placeholder`* with the actual value

- `PATH`: the environment variable PATH

- `ls`, `--help`: commands, options, and parameters

- `user`: users or groups

- $\boxed{\text{Alt}}$, $\boxed{\text{Alt}}$ + $\boxed{\text{F1}}$: 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 specified architectures. The arrows mark the beginning and the end of the text block. ◄

- *Dancing Penguins* (Chapter Penguins, ↑*Reference*): This is a reference to a chapter in another book.

3 Acknowledgments

The Linux operating system has developed over a period of several years from a one-man show of the inventor, Linus Torvalds, into a fantastic project to which countless developers from all over the world have contributed. Thanks are due to everyone who has helped make this project a success.

System Requirements for Operating Linux

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The SUSE® Linux Enterprise Server operating system can be operated on a wide range of hardware. It is impossible to list all the different combinations of hardware SUSE Linux Enterprise Server supports. However, to provide you with a guide to help you during the planning phase, the minimum requirements are presented here.

If you want to be sure that a given computer configuration will work, find out which computers have been certified by SUSE. Find a list of these computers at `http://developer.novell.com/yessearch/Search.jsp`.

1.1 Hardware for x86

Computers based on x86 constitute a cost-effective way of building high-performance systems. The preconditions to operating SUSE Linux Enterprise Server on this platform are as follows:

CPU
  The number of CPUs supported depends on the kernel used. Specifically, these are as follows:

Table 1.1   *CPUs Supported by the Kernel*

Kernel	Oldest CPU Type	Maximum Number of CPUs
kernel-default	PentiumPro, Athlon	1

Kernel	Oldest CPU Type	Maximum Number of CPUs
kernel-smp	PentiumPro, Athlon MP	32
kernel-bigsmp	Pentium II, Athlon XP	128

Memory Requirements

A minimum of 512 MB is required. The minimum recommended memory is 1 GB. For a multiprocessor system, 256 MB per processor is required. Systems with less than 1 GB main memory need additional swap space that extends the virtual memory to 1 GB.

Hard Disk Requirements

The disk requirements depend largely on the installation. Commonly, you need more space than the installation software itself needs to have a system that works properly. Minimal requirements for different selections are:

System	Hard Disk Requirements
Minimal X Window System	1.2 GB
GNOME Desktop	3.2 GB
KDE Desktop	2.7 GB
All patterns	7 GB

Boot Methods

The computer can be booted from CD, USB hard drive, floppy, or the network. A special boot server is required to boot over the network. This boot server can be configured with SUSE Linux Enterprise Server. To use USB hard drives, the BIOS or firmware must support booting from USB devices. Create an bootable USB hard drive with `mkbootdisk`, which is found on the first installation CD in the directory `/boot/i386/` or `/boot/x86_64`. For more information, read the documentation in the `/boot` directory.

1.2 Hardware for Itanium

The Itanium architecture is 64-bit and allows operation of large servers.

CPU
> Itanium II (older Itanium CPUs are no longer supported). Dual core CPUs and hyperthreading are also supported.

Maximum Number of CPUs
> At most, 1024 CPUs are supported. For the calculation of the CPU count, a dual-core CPU counts as two CPUs and a hyperthreaded CPU with two siblings also counts as two CPUs. 1024 CPUs could mean 512 dual cores, 512 single cores with hyperthreading, or 256 dual cores with hyperthreading.

Memory
> A minimum of 1GB RAM per CPU socket is required.

Hard Disk Requirements
> The disk requirements depend largely on the installation selected. Commonly, you need more space than the installed software itself needs to have a system that works properly. Minimal requirements for different selections are:

System	Hard Disk Requirements
Minimal System	4 GB
Recommended	10 GB

Boot Methods
> Options for booting the computer depend on the available hardware. All boot methods available to the machine should work. A special boot server is required to use PXE boot over the network. This may also be set up with SUSE Linux Enterprise Server.

1.3 Hardware for AMD64 and Intel EM64T

The AMD64 and Intel EM64T architectures support the simple migration of x86 software to 64 bits. Like the x86 architecture, they constitute a value-for-money alternative.

CPU
All CPUs available on the market to date are supported. This includes dual-core CPUs.

Maximum Number of CPUs
The maximum number of CPUs supported by AMD64 and Intel EM64T is eight.

Memory Requirements
A minimum of 512 MB of memory is required. Requirements depend on the application. However, the minimum recommended is 1024 MB or 512 MB per CPU on multiprocessor computers. The theoretical upper limit on the amount of memory supported by the kernel is 512 GB.

Hard Disk Requirements
The disk requirements depend largely on the installation selected. The required space for this architecture is similar to x86 but you should plan some space for compatibility libraries. Minimum requirements for different selections are:

System	Hard Disk Requirements
Minimal X Window System	1.4 GB
GNOME Desktop	3.5 GB
KDE Desktop	3 GB
All patterns	8.5 GB

Boot Methods
The computer can be booted from CD or network. A special boot server is required to boot over the network. This can be set up with SUSE Linux Enterprise Server.

Controlling the Installation

2

Control the installation in one of several ways. The method most frequently used is to install SUSE® Linux Enterprise Server from the computer console. Other options are available for different situations. Find more information about the available installation methods in Chapter 2, *Deployment Strategies* (↑Installation and Administration).

2.1 Installation on the Computer Console

The simplest way to install SUSE Linux Enterprise Server is using the computer console. With this method, a graphical installation program guides you through the installation. This installation method is discussed in detail in Chapter 3, *Installation with YaST* (↑Installation and Administration).

You can still perform the installation on the console without a working graphics mode. The text-based installation program offers the same functionality as the graphical version. Find some hints about navigation in this mode in Section 7.11.1, "Navigation in Modules" (Chapter 7, *System Configuration with YaST*, ↑Installation and Administration).

2.2 Installation Using a Serial Console

For this installation method, you need a second computer that is connected by a *null modem* cable to the computer on which to install SUSE Linux Enterprise Server. De-

pending on the hardware, even the firmware or BIOS of the computer may already be accessible to the serial console. If this is possible, you can carry out the entire installation using this method. To activate the serial console installation, additionally specify the parameter `console=ttyS0` at the boot prompt directly after the boot process has completed and before the installation system starts.

On most computers, there are two serial interfaces, *ttyS0* and *ttyS1*. For the installation, you need a terminal program like minicom or screen. To initiate the serial connection, launch the screen program in a local console by entering the following command:

```
screen /dev/ttyS0 9600
```

This means that screen listens to the first serial port with a baud rate of 9600. From this point on, the installation proceeds similarly to the text-based installation over this terminal.

2.3 Installation with SSH

If you do not have direct access to the computer hardware and, for example, the installation should be launched from a management console, control the entire installation process over the network. To do this, enter the parameters `UseSSH=1` and `SSHPassword=<secret>` at the boot prompt. An SSH daemon is then launched in the system and you can log in to the system as user `root` with the password "secret". To connect, use the command `ssh -X root@<ipaddr>`.

If you do not have a DHCP server available in your local network, manually assign an IP address to the installation system. Do this by entering the option `HostIP=<ipaddr>` at the boot prompt.

As soon as you are logged in to the installation system, launch the actual installation with the command `yast` for a text-based installation or `yast2` to proceed with the graphical installation. This then guides you through the installation. This procedure is described in detail in Section 4.1.5, "Simple Remote Installation via SSH—Dynamic Network Configuration" (Chapter 4, *Remote Installation*, ↑Installation and Administration).

2.4 Installation over VNC

If you do not have direct access to the system, but want a graphical installation, install SUSE Linux Enterprise Server over VNC. This method is described in detail in Section 4.5.1, "VNC Installation" (Chapter 4, *Remote Installation*, ↑Installation and Administration).

As suitable VNC clients are also available for other operating systems, such as Microsoft Windows and MacOS, the installation can also be controlled from computers running those operating systems.

2.5 Installation with AutoYaST

If you need to install SUSE Linux Enterprise Server on a number of computers with similar hardware, it is recommended to perform the installations with the aid of AutoYaST. In this case, start by installing one SUSE Linux Enterprise Server and use this to create the necessary AutoYaST configuration files.

AutoYaST is extensively documented in Chapter 5, *Automated Installation* (↑Installation and Administration).

Boot and Installation Media

3

When installing the system, the media for booting and for installing the system may be different. All combinations of supported media for booting and installing may be used.

3.1 Boot Media

Booting a computer depends on the capabilities of the hardware used and the availability of media for the respective boot option.

Booting from CD or DVD
> This is the most common possibility of booting a system. It is straightforward for most computer users, but requires a lot of interaction for every installation process.

Booting from a USB Hard Drive or Floppy Disk
> Depending on the hardware used, it is possible to boot from a USB hard drive or a floppy disk. The respective media must be created with the utility `mkbootdisk`, which can be found together with its documentation on the first CD or DVD in the directory `/boot/<architecture>`.

Booting from the Network
> You can only boot a computer directly from the network if this is supported by the computer's firmware or BIOS. This booting method requires a boot server that provides the needed boot images over the network. The exact protocol depends on your hardware. Commonly you need several services, such as tftp and dhcp or pxeboot. If you need a boot server, also read Section 4.1.3, "Remote Installation

via VNC—PXE Boot and Wake on LAN" (Chapter 4, *Remote Installation*, ↑Installation and Administration).

3.2 Installation Media

The installation media contain all the necessary packages and meta information that is necessary to install a SUSE Linux Enterprise Server. These must be available to the installation system after booting for installation. Several possibilities to provide the installation media to the system are available with SUSE Linux Enterprise Server.

Installation CD or DVD
> All necessary data is delivered on the boot media. Depending on the selected installation, if you install a CD version, several disk changes may be necessary.

Networked Installation
> If you plan to install several systems, providing the installation media over the network makes things a lot easier. It is possible to install from many common protocols, such as NFS, HTTP, FTP, or SMB. For more information about how to run such an installation, refer to Chapter 4, *Remote Installation* (↑Installation and Administration).

Dealing with Boot and Installation Problems

4

Prior to delivery, SUSE® Linux Enterprise Server is subjected to an extensive test program. Despite this, problems occasionally occur during boot or installation.

4.1 Problems Booting

Boot problems may prevent the YaST installer from starting on your system. Another symptom is when your system does not boot after the installation has been completed.

Installed System Boots, Not Media
> Change your computer's firmware or BIOS so that the boot sequence is correct. To do this, consult the manual for your hardware.

The Computer Hangs
> Change the console on your computer so that the kernel outputs are visible. Be sure to check the last outputs. This is normally done by pressing $\boxed{F2}$. If you are unable to resolve the problem, consult the SUSE Linux Enterprise Server support staff. To log all system messages at boot time, use a serial connection as described in Chapter 2, *Controlling the Installation* (page 11).

The Itanium Boot Loader
> If you have manually altered the kernel or initrd on your system, run `/sbin/elilo` before shutting down the computer. If you leave out this step, your system may not be bootable.

Boot Disk

The boot disk is a useful interim solution if you have difficulties configuring the other possibilities or if you want to postpone the decision regarding the final boot mechanism. A boot disk may also be a suitable solution in connection with OS/2 or Windows NT.

This approach only works if your system has a floppy drive. The boot disk can be created with YaST. See Section 7.5.3, "Boot and Rescue Disks" (Chapter 7, *System Configuration with YaST*, ↑Installation and Administration).

Virus Warning after Installation

There are BIOS variants that check the structure of the boot sector (MBR) and erroneously display a virus warning after the installation of GRUB or LILO. Solve this problem by entering the BIOS and looking for corresponding adjustable settings. For example, switch off *virus protection*. You can switch this option back on again later. It is unnecessary, however, if Linux is the only operating system you use.

4.2 Problems Installing

If an unexpected problem occurs during installation, information is needed to determine the cause of the problem. Use the following directions to find useful information:

- Check the outputs on the various consoles. You can switch consoles with the key combination `Ctrl` + `Alt` + `Fn`. For example, obtain a shell in which to execute various commands by pressing `Ctrl` + `Alt` + `F2`.

- Try launching the installation in failsafe mode. If the installation works without problems in this case, there is an incompatibility that causes either `ACPI` or `APIC` to fail. In some cases, a BIOS or firmware update fixes this problem.

- Check the system messages on a console in the installation system by entering the command `dmesg`.

4.3 Redirecting the Boot Source to the Boot CD

To facilitate the installation process and avoid accidental installations, the default setting on the installation CD for SUSE® Linux Enterprise Server is that your system is booted from the first hard disk. At this point, an installed boot loader normally takes over control of the system. This means that the boot CD can stay in the drive during an installation. To start the installation, choose one of the installation possibilities in the boot menu of the media.