



SUSE LINUX Enterprise Server

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 Processor Family computers. It introduces the steps required to prepare for various installation methods and provides useful information.

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 the 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.

Typographic Conventions

The following typographic conventions are used in this book:

Example	Meaning
YaST	programs
<code>/etc/passwd</code>	files or directories

<code><placeholder></code>	replace the character string <code>placeholder</code> (including the angle brackets) with the actual value
<code>PATH</code>	an environment variable called <code>PATH</code>
<code>192.168.1.2</code>	the value of a variable
<code>ls</code>	commands
<code>user</code>	users
<code>(Alt)</code>	press this key
<code>(Ctrl)-(Alt)-(Del)</code>	keys to press simultaneously
<code>"Permission denied"</code>	system messages
<code>'System update'</code>	menu item or button text

Acknowledgements

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

Part I

Preparatory Measures

System Requirements for Operating Linux

The SUSE LINUX Enterprise Server operating system can be operated on a wide range of hardware. It is simply not possible to list all the different combinations of hardware SUSE LINUX 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 a given computer configuration will work, find out which computers have been certified by SUSE. Find a list of these computers on the web page http://www.suse.com/us/business/certifications/certified_hardware/index.html.

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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:

Kernel	Oldest CPU Type	Maximum Number of CPUs
kernel-default	PentiumPro, Athlon	1
kernel-smp	PentiumPro, Athlon MP	32
kernel-bigsm	Pentium II, Athlon XP	128

Memory Requirements A minimum of 256 MB is required. The minimum recommended memory is 512 MB. For a multiprocessor system, 256 MB per processor is required.

Boot Methods The computer can be booted from CD, 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.

1.2 Hardware for Itanium Processor Family

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

CPU Itanium II (older Itanium CPUs are no longer supported)

Maximum Number of CPUs The number of CPUs supported depends on the kernel used. The standard kernel supports 128 CPUs. The special sn2 kernel from the `kernel-sn2` package can be run with up to 512 CPUs.

Memory A minimum of 512MB RAM is required. 1GB per CPU is recommended.

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.

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.

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

Memory Requirements A minimum of 256MB of memory is required. Requirements depend on the application. However, the minimum recommended is 512MB or 256MB per CPU on multiprocessor computers. The theoretical upper limit on the amount of memory supported by the kernel is 512GB.

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

Control the installation 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.

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2.1 Installation on the Computer Console

The simplest way to install SUSE LINUX Enterprise Server is via the computer console. Under this method, a graphical installation program guides you through the installation. This installation method is discussed in detail in the *Installation and Administration* manual.

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. It is also described in *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. On most computers, there are two serial interfaces, *ttyS0* and *ttyS1*. For the installation, you need a terminal program like `minicom` or `screen`. For example, 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 over this terminal.

An installation carried out using the serial console is very similar to a text-based installation directly on the system. To tell the system to use this installation method, additionally specify the parameter `console=ttyS0` at the boot prompt directly after the boot process has completed and before the installation system starts.

If your computer's firmware or BIOS can also communicate over a serial console, you can carry out the entire installation using this method.

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`. In this case, a text-based YaST is launched, as in the case of an installation with serial console. This then guides you through the installation.

2.4 Installation via VNC

If you do not have direct access to the system, but you would still like to have a graphical installation, install SUSE LINUX Enterprise Server via VNC. This method is described in detail in the *Installation and Administration* manual.

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. After installing the `autoyast2` package, find its manual in the `/usr/share/doc/packages/autoyast2/html/` directory.

Installation Server

The term *installation server* covers two quite different things. First, it can refer to a computer that makes available all the files required by the installation system to carry out the installation. However, where the computer is booted from the network, it is also possible to make the installation system itself available from a server.

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3.1 Boot Server

You can only boot a computer directly from the network if it is supported by the computer's firmware or BIOS. You need several services, such as dhcp and tftp, and you must configure them appropriately.

A boot server can make life a lot easier for administrators, as this means it is no longer necessary to supply the computer with boot media. However, the configuration process takes longer, depending on the computer used.

If you need a boot server, read relevant sections in the *Installation and Administration* manual. It is also recommended at this point paying closer attention to the services used.

3.2 Server for the Installation

Every installation process requires data contained on the CDs supplied with SUSE LINUX Enterprise Server. Either insert the relevant CDs into the computer's CD-ROM drive or make all this data available on the network.

With SUSE LINUX Enterprise Server, optionally provide all the necessary data on a single central computer in the network. A YaST module that enables a computer to make the installation source available through SLP has been specifically developed for this case.

Consult the *Installation and Administration* manual for details. For the actual installation, specify the boot parameter `install=slp`.

Part II

Installation

Booting for the Installation Process

Depending on your requirements, there are several possible ways of installing SUSE LINUX Enterprise Server on your computer. In addition to the standard installation via CD-ROM, you can also install SUSE LINUX Enterprise Server directly from the network. Specifically on x86 computers, there is an additional possibility of installing the software by floppy disk.

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4.1 Booting from CD-ROM

On all computers that have a bootable CD-ROM drive it is possible to install SUSE LINUX Enterprise Server from CDs. You can even launch the installation from CD-ROM then use an installation server in the network for the actual installation. Refer to the *Installation and Administration* manual for information about this option.

Insert the boot CD into the drive and restart the computer. If everything functions correctly, a boot screen appears. Depending on the hardware used, this may be graphical or text-based.

At this point, specify any boot parameters necessary for the installation program `linuxrc` and the kernel to influence the installation. Find further reference material in the *Installation and Administration* manual and in the kernel documentation. After installing the `kernel-docs` package, find the kernel documentation in directory `/usr/share/doc/kernel`.

4.2 Booting from the Network

If your computer's firmware or BIOS supports booting from the network, you can also install SUSE LINUX Enterprise Server entirely from the network. To do this, you need a boot server, as described in the *Installation and Administration* manual. An installation server is also required for this installation method, as described in the section *Configuration of a Central Installation Server* in the *Installation and Administration* manual.

Make sure your computer's firmware or BIOS is configured so it boots from the network. After switching on the computer, you may need to activate the network boot process by pressing an appropriate function key. In case of doubt, consult the manual for your computer.

Once the boot process has successfully completed, a boot prompt appears, allowing you to specify any boot parameters at this point.

4.3 Booting from Floppy

Booting from floppy is not supported on all architectures. The boot process is different from the other boot methods in that several floppies are needed during the boot process.

If you can only start your system from floppies, create boot floppies from the floppy images supplied. For further information, refer to the *Installation and Administration* manual.

First, configure the BIOS on your computer so it can boot from floppy. Then insert the kernel floppy and all the other floppies requested in the correct sequence.

After the boot process has completed, `linuxrc` prompts for an installation source. In this case, use an installation source on the network or make other installation sources available locally. In case of difficulty, consult the SUSE LINUX Enterprise Server support team.

Available Installation Methods

The SUSE LINUX Enterprise Server installation is usually controlled manually on each system. An automatic installation mode is also available.

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5.1 Manual Installation

Whenever you control the installation using a console, it is said to be a manual installation. This includes installation over the console, over a serial console, over SSH, and over VNC.

In each of these cases, you are guided through the installation sequence by graphical or text-based instructions.

Braille display can also be used as the output console. This enables the visually impaired to install and administer this operating system without assistance.

5.2 AutoYaST

In the case of AutoYaST, simply pass an appropriate configuration file to the installation system. This file is written in XML, but it can also be created by a YaST module. As soon as the installation has been initiated, AutoYaST takes over and carries out the entire installation. In this case, no further interaction is required.

Rebooting the System and the Boot Sequence

To ensure that your system automatically starts following the installation, make the appropriate configuration settings in your firmware or BIOS.

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6.1 Adjusting the Boot Sequence

On many computers, it is necessary to alter the boot sequence defined in the BIOS. After the computer firmware has been installed, specify the default device from which the computer should be booted.

6.2 The Itanium Processor Family

► IPF

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. ◀

6.3 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 must not be removed from the drive during an installation.

Part III

Appendix

Dealing with Boot Problems

Prior to delivery, SUSE LINUX Enterprise Server is subjected to an extensive test program. Despite this, occasionally problems can occur during installation.

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7.1 Problems Booting

- *The computer boots the installed system*

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 **(F2)**. If this does not solve the problem, consult the SUSE LINUX Enterprise Server support staff.

7.2 Problems Installing

During the installation various problems which cannot be contained in advance can occur. What is important at this point is how to obtain 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.
- Check the system messages on a console in the installation system by entering the command `dmesg`.