



SUSE LINUX

ADMINISTRATION GUIDE

9. Edition 2004

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Contents

I	Installation	5
1	Installation	7
1.1	Text-Based Installation with YaST	8
1.1.1	The Start Screen	8
1.1.2	The Basis: linuxrc	9
1.2	Starting SUSE LINUX	13
1.2.1	The Graphical SUSE Screen	14
1.3	Special Installation Procedures	15
1.3.1	Installation Without CD-ROM Support	15
1.3.2	Installation from a Network Source	15
1.4	Tips and Tricks	17
1.4.1	Creating a Boot Disk in DOS	17
1.4.2	Creating a Boot Disk in a UNIX-Type System	19
1.4.3	Booting from a Floppy Disk (SYSLINUX)	20
1.4.4	Using CD 2 for Booting	20
1.4.5	Supported CD-ROM Drives	21
1.5	ATAPI CD-ROM Hangs While Reading	21
1.6	Permanent Device File Names for SCSI Devices	22
1.7	Partitioning for Experts	23
1.7.1	Size of the Swap Partition	23
1.7.2	Suggested Partitioning Schemes	23

1.7.3	Optimization	25
1.8	LVM Configuration	27
1.8.1	Logical Volume Manager (LVM)	28
1.9	Soft RAID	35
1.9.1	Common RAID Levels	36
1.9.2	Soft RAID Configuration with YaST	36
1.9.3	Troubleshooting	37
1.9.4	For More Information	37
2	Updating the System and Package Management	39
2.1	Updating SUSE LINUX	40
2.1.1	Preparations	40
2.1.2	Updating with YaST	42
2.1.3	Manual Update	42
2.1.4	Updating Individual Packages	44
2.2	Software Changes from Version to Version	45
2.2.1	From 7.3 to 8.0	45
2.2.2	From 8.0 to 8.1	46
2.2.3	From 8.1 to 8.2	48
2.2.4	From 8.2 to 9.0	49
2.2.5	From 9.0 to 9.1	49
2.3	RPM — the Package Manager	52
2.3.1	Verifying Package Authenticity	53
2.3.2	Managing Packages: Install, Update, and Uninstall	53
2.3.3	RPM and Patches	55
2.3.4	RPM Queries	57
2.3.5	Installing and Compiling Source Packages	59
2.3.6	Compiling RPM Packages with build	61
2.3.7	Tools for RPM Archives and the RPM Database	62

II	Configuration	63
3	YaST in Text Mode (ncurses)	65
3.1	Usage	66
3.1.1	The YaST Control Center	66
3.1.2	The YaST Modules	67
3.2	Restriction of Key Combinations	68
3.3	Starting the Individual Modules	69
3.4	YaST Online Update	69
3.4.1	The YOU Module	69
3.4.2	Online Update from the Command Line	69
4	The X Window System	71
4.1	Optimizing the Installation of the X Window System	72
4.1.1	Screen Section	74
4.1.2	Device Section	76
4.1.3	Monitor and Modes Section	77
4.2	Installing and Configuring Fonts	78
4.2.1	Font Systems	78
4.3	OpenGL — 3D Configuration	83
4.3.1	Hardware Support	83
4.3.2	OpenGL Drivers	84
4.3.3	The Diagnosis Tool 3Ddiag	85
4.3.4	OpenGL Test Utilities	85
4.3.5	Troubleshooting	85
4.3.6	Installation Support	86
4.3.7	Additional Online Documentation	86

5	Printer Operation	87
5.1	Printing Basics	88
5.1.1	Important Standard Printer Languages	88
5.1.2	Processing Print Jobs	88
5.1.3	Various Printing Systems	91
5.2	Preconditions for Printing	92
5.2.1	General Requirements	92
5.2.2	Finding the Right Printer Driver	92
5.2.3	The Issue with GDI Printers	94
5.3	Configuring a Printer with YaST	96
5.3.1	Print Queues and Configurations	96
5.3.2	Printer Configuration with YaST: The Basics	96
5.3.3	Automatic Configuration	98
5.3.4	Manual Configuration	98
5.4	Configuring Applications	101
5.5	The CUPS Printing System	102
5.5.1	Naming Conventions	102
5.5.2	IPP and Server	102
5.5.3	Configuration of a CUPS Server	103
5.5.4	Network Printers	104
5.5.5	Internal CUPS Print Job Processing	105
5.5.6	Tips and Tricks	107
5.6	Printing from Applications	109
5.7	Command-Line Tools for the CUPS Printing System	110
5.7.1	Managing Local Queues	110
5.7.2	Managing Remote Queues	112
5.7.3	Using Command-Line Tools for CUPS Troubleshooting	113
5.8	Printing in a TCP/IP Network	114
5.8.1	Terminology	114
5.8.2	Quick Configuration of a Client Machine	115
5.8.3	Protocols for Printing in TCP/IP Networks	116
5.8.4	Filtering for Network Printers	124
5.8.5	Remote Printer Troubleshooting	130
5.8.6	Print Servers Supporting Both LPD and IPP	133

6	Additional Information on Printing	135
6.1	Manual Configuration of Local Printer Ports	136
6.1.1	Parallel Ports	136
6.1.2	USB Ports	138
6.1.3	The IrDA Printer Interface	140
6.1.4	Serial Ports	140
6.2	Manual Configuration of LPRng and lpdfilter	141
6.3	The LPRng Print Spooler	141
6.3.1	Printing from Applications	142
6.4	Command-Line Tools for LPRng	142
6.4.1	Managing Local Queues	143
6.4.2	Managing Remote Queues	145
6.4.3	Command-Line Tools for LPRng Troubleshooting . . .	146
6.5	The Print Filter of LPRng and lpdfilter	146
6.5.1	Configuration of lpdfilter	148
6.5.2	Customization of lpdfilter	148
6.5.3	Troubleshooting Hints for lpdfilter	155
6.6	Working with Ghostscript	156
6.6.1	Sample Operations with Ghostscript	157
6.7	Working with a2ps	160
6.7.1	Using a2ps to Prepare a Text File for Printing	161
6.8	Reformatting PostScript with psutils	161
6.8.1	psnup	162
6.8.2	pstops	162
6.8.3	psselect	164
6.8.4	Using Ghostscript to View the Output	165
6.9	ASCII Text Encoding	165
6.9.1	A Sample Text	166

7	Booting and Boot Managers	169
7.1	Booting a PC	170
7.1.1	Master Boot Record	170
7.1.2	Boot Sectors	171
7.1.3	Booting DOS or Windows	171
7.2	Boot Concepts	171
7.3	Map Files, GRUB, and LILO	172
7.4	Booting with GRUB	173
7.4.1	The GRUB Boot Menu	174
7.4.2	The File device.map	178
7.4.3	The File /etc/grub.conf	179
7.4.4	The GRUB Shell	179
7.4.5	Setting a Boot Password	180
7.4.6	Boot Problems with GRUB	181
7.4.7	For More Information	181
7.5	Uninstalling the Linux Boot Loader	181
7.5.1	Restoring the MBR (DOS, Win9x, or ME)	182
7.5.2	Restoring the MBR of Windows XP	182
7.5.3	Restoring the MBR of Windows 2000	182
7.6	Creating Boot CDs	183
7.6.1	Procedure	183
7.6.2	Boot CD with ISOLINUX	183
8	Linux on Mobile Devices	185
8.1	PCMCIA	186
8.1.1	The Hardware	186
8.1.2	The Software	186
8.1.3	Configuration	188
8.1.4	Troubleshooting	190
8.1.5	Installation with PCMCIA	194
8.1.6	Other Utilities	195
8.1.7	Updating the Kernel or PCMCIA Package	195

8.1.8	For More Information	196
8.2	SCPM — System Configuration Profile Management	196
8.2.1	Basic Terminology and Concepts	197
8.2.2	The YaST Profile Manager	198
8.2.3	Configuring SCPM	198
8.2.4	Creating and Managing Profiles	198
8.2.5	Switching Configuration Profiles	199
8.2.6	Advanced Profile Settings	200
8.2.7	Profile Selection at Boot	201
8.2.8	Troubleshooting	202
8.3	IrDA — Infrared Data Association	203
8.3.1	Software	204
8.3.2	Configuration	204
8.3.3	Usage	204
8.3.4	Troubleshooting	205
8.4	Bluetooth — Wireless Connections	206
8.4.1	Profiles	206
8.4.2	Software	206
8.4.3	Configuration	206
8.4.4	System Components and Useful Tools	207
8.4.5	Examples	209
8.4.6	Troubleshooting	211
8.4.7	For More Information	212
9	Power Management	213
9.1	Power Saving Functions	214
9.2	APM	216
9.2.1	The APM Daemon (apmd)	217
9.2.2	Further Commands	218
9.3	ACPI	218
9.3.1	ACPI in Action	219
9.4	Rest for the Hard Disk	224

9.5	powersave	225
9.5.1	Configuration of powersave	226
9.5.2	Configuration of APM and ACPI	226
9.5.3	Additional ACPI Features	228
9.5.4	Troubleshooting	229
9.6	The YaST Power Management Module	232

III System 237

10 SUSE LINUX on AMD64 Systems 239

10.1	Hardware	240
10.2	Software	240
10.3	Running 32-bit Software	241
10.4	Software Development in a 64-bit Environment	241
10.5	For More Information	241

11 The Linux Kernel 243

11.1	Kernel Update	244
11.2	Kernel Sources	245
11.3	Kernel Configuration	245
11.3.1	Configuration on the Command Line	245
11.3.2	Configuration in Text Mode	246
11.3.3	Configuration in the X Window System	246
11.4	Kernel Modules	246
11.5	Hardware Detection with the Help of hwinfo	247
11.5.1	Handling Modules	247
11.5.2	/etc/modprobe.conf	248
11.5.3	Kmod — the Kernel Module Loader	248
11.6	Settings in the Kernel Configuration	249
11.7	Compiling the Kernel	249
11.8	Installing the Kernel	250
11.9	Cleaning Your Hard Disk after Compilation	251

12	Special Features of SUSE LINUX	253
12.1	Linux Standards	254
12.1.1	Linux Standard Base (LSB)	254
12.1.2	File System Hierarchy Standard (FHS)	254
12.1.3	teTeX — TeX in SUSE LINUX	254
12.1.4	Example Environment for FTP Server	254
12.1.5	Example Environment for HTTP Server	255
12.2	Hints on Special Software Packages	255
12.2.1	Package bash and /etc/profile	255
12.2.2	cron Package	256
12.2.3	Log Files: the Package logrotate	256
12.2.4	Man Pages	258
12.2.5	The Command ulimit	258
12.2.6	The free Command	259
12.2.7	The File /etc/resolv.conf	260
12.2.8	Settings for GNU Emacs	260
12.3	Bootng with the Initial Ramdisk	261
12.3.1	Concept of the Initial Ramdisk	262
12.3.2	The Order of the Booting Process with initrd	262
12.3.3	Boot Loaders	263
12.3.4	Using initrd in SUSE	263
12.3.5	Possible Difficulties — Custom Kernels	265
12.3.6	Prospects	265
12.4	linuxrc	266
12.4.1	Main Menu	266
12.4.2	Settings / Preferences	266
12.4.3	System Information	266
12.4.4	Loading Modules	268
12.4.5	Entering Parameters	268
12.4.6	Start Installation / System	269
12.4.7	Passing Parameters to linuxrc	270
12.5	The SUSE Rescue System	272

12.5.1	Starting the Rescue System	272
12.5.2	Working with the Rescue System	273
12.6	Virtual Consoles	276
12.7	Keyboard Mapping	276
12.8	Local Adjustments — I18N and L10N	277
12.8.1	Some Examples	278
12.8.2	Settings for Language Support	279
13	The SUSE LINUX Boot Concept	281
13.1	The init Program	282
13.2	Runlevels	282
13.3	Changing Runlevels	284
13.4	Init Scripts	285
13.4.1	Adding init Scripts	287
13.5	The YaST Runlevel Editor	289
13.6	SuSEconfig and /etc/sysconfig	290
13.7	The YaST sysconfig Editor	292
IV	Network	295
14	Linux in the Network	297
14.1	TCP/IP — The Protocol Used by Linux	298
14.1.1	Layer Model	299
14.1.2	IP Addresses and Routing	302
14.1.3	Domain Name System	305
14.2	IPv6 — The Next Generation Internet	306
14.2.1	Advantages of IPv6	307
14.2.2	The IPv6 Address System	308
14.2.3	IPv4 versus IPv6 — Moving between the Two Worlds	313
14.2.4	For More Information	315
14.3	Manual Network Configuration	315
14.3.1	Configuration Files	316

14.3.2	Start-Up Scripts	322
14.4	Network Integration	323
14.4.1	Requirements	323
14.4.2	Configuration with YaST	323
14.4.3	Hotplug and PCMCIA	325
14.4.4	Configuring IPv6	325
14.5	Routing in SUSE LINUX	326
14.6	DNS — Domain Name System	327
14.6.1	Starting the Name Server BIND	327
14.6.2	The Configuration File /etc/named.conf	328
14.6.3	Important Configuration Options	329
14.6.4	The Configuration Section Logging	330
14.6.5	Zone Entry Structure	331
14.6.6	Structure of Zone Files	332
14.6.7	Secure Transactions	335
14.6.8	Dynamic Update of Zone Data	337
14.6.9	DNSSEC	337
14.6.10	For More Information	338
14.7	LDAP — A Directory Service	338
14.7.1	LDAP versus NIS	340
14.7.2	Structure of an LDAP Directory Tree	340
14.7.3	Server Configuration with slapd.conf	343
14.7.4	Data Handling in the LDAP Directory	348
14.7.5	For More Information	352
14.8	NIS — Network Information Service	354
14.8.1	NIS Master and Slave Servers	354
14.8.2	The NIS Client Module of YaST	357
14.9	NFS — Shared File Systems	359
14.9.1	Importing File Systems with YaST	359
14.9.2	Importing File Systems Manually	360
14.9.3	Exporting File Systems with YaST	360
14.9.4	Exporting File Systems Manually	360

14.10	DHCP	363
14.10.1	The DHCP Protocol	363
14.10.2	DHCP Software Packages	364
14.10.3	The DHCP Server dhcpd	365
14.10.4	Hosts with Fixed IP Addresses	367
14.10.5	The SUSE LINUX Version	368
14.10.6	For More Information	369
14.11	Time Synchronization with xntp	369
14.11.1	Configuration in a Network	370
14.11.2	Establishing a Local Time Normal	370
15	The Apache Web Server	373
15.1	Basics	374
15.1.1	Web Server	374
15.1.2	HTTP	374
15.1.3	URLs	374
15.1.4	Automatic Display of a Default Page	375
15.2	Setting up the HTTP Server with YaST	375
15.3	Apache Modules	376
15.4	New Features of Apache 2	377
15.5	Threads	378
15.6	Installation	378
15.6.1	Package Selection in YaST	378
15.6.2	Activating Apache	379
15.6.3	Modules for Active Contents	379
15.6.4	Other Recommended Packages	379
15.6.5	Installation of Modules with apxs	379
15.7	Configuration	380
15.7.1	Configuration with SuSEconfig	380
15.7.2	Manual Configuration	381
15.8	Using Apache	385
15.9	Active Contents	385

15.9.1	Server Side Includes: SSI	387
15.9.2	Common Gateway Interface: CGI	387
15.9.3	GET and POST	387
15.9.4	Languages for CGI	388
15.9.5	Generating Active Contents with Modules	388
15.9.6	mod_perl	388
15.9.7	mod_php4	391
15.9.8	mod_python	391
15.9.9	mod_ruby	391
15.10	Virtual Hosts	392
15.10.1	Name-Based Virtual Hosts	392
15.10.2	IP-Based Virtual Hosts	393
15.10.3	Multiple Instances of Apache	394
15.11	Security	395
15.11.1	Minimizing the Risk	395
15.11.2	Access Permissions	395
15.11.3	Staying Updated	395
15.12	Troubleshooting	396
15.13	For More Information	396
15.13.1	Apache	396
15.13.2	CGI	396
15.13.3	Security	397
15.13.4	Additional Sources	397
16	File Synchronization	399
16.1	Data Synchronization Software	400
16.1.1	InterMezzo	400
16.1.2	Unison	401
16.1.3	CVS	401
16.1.4	mailsync	401
16.2	Determining Factors for Selecting a Program	402
16.2.1	Client-Server versus Peer-to-Peer	402

16.2.2	Portability	402
16.2.3	Interactive versus Automatic	402
16.2.4	Speed	402
16.2.5	Conflicts: Incidence and Solution	403
16.2.6	Selecting and Adding Files	403
16.2.7	History	403
16.2.8	Data Volume and Hard Disk Requirements	404
16.2.9	GUI	404
16.2.10	User Friendliness	404
16.2.11	Security against Attacks	405
16.2.12	Protection against Data Loss	405
16.3	Introduction to InterMezzo	406
16.3.1	Architecture	406
16.3.2	Configuring an InterMezzo Server	407
16.3.3	Configuring InterMezzo Clients	408
16.3.4	Troubleshooting	408
16.4	Introduction to Unison	409
16.4.1	Uses	409
16.4.2	Requirements	409
16.4.3	Using Unison	409
16.4.4	More Information	410
16.5	Introduction to CVS	410
16.5.1	Uses	410
16.5.2	Configuring a CVS Server	411
16.5.3	Using CVS	412
16.5.4	More Information	413
16.6	Introduction to mailsync	413
16.6.1	Uses	413
16.6.2	Configuration and Use	413
16.6.3	Possible Problems	415
16.6.4	More Information	416

17 Heterogenous Networks	417
17.1 Samba	418
17.1.1 Introduction to Samba	418
17.1.2 Installing and Configuring the Server	420
17.1.3 Samba as Login Server	424
17.1.4 Installing Clients	425
17.1.5 Optimization	426
17.2 Netatalk	426
17.2.1 Configuring the File Server	427
17.2.2 Configuring the Print Server	431
17.2.3 Starting the Server	431
17.2.4 Additional Information	432
17.3 NetWare Emulation with MARSNWE	432
17.3.1 Starting the NetWare Emulator MARSNWE	433
17.3.2 The Configuration File /etc/nwserv.conf	433
17.3.3 Access to and Administration of NetWare Servers	435
17.3.4 IPX Router with ipxrip	436
18 Internet	437
18.1 The smpppd as Dial-up Assistant	438
18.1.1 Program Components for the Internet Dial-Up	438
18.1.2 Configuring smpppd	438
18.1.3 Configuring kinternet and cinternet for Remote Use	439
18.2 Configuring an ADSL or T-DSL Connection	440
18.2.1 Default Configuration	440
18.2.2 DSL Connection by Dial-on-Demand	441
18.3 Proxy Server: Squid	442
18.3.1 Squid as Proxy Cache	442
18.3.2 Some Facts about Proxy Caches	442
18.3.3 System Requirements	444
18.3.4 Starting Squid	446
18.3.5 The Configuration File /etc/squid/squid.conf	447
18.3.6 Transparent Proxy Configuration	452
18.3.7 Squid and Other Programs	455

19 Security in the Network	461
19.1 Masquerading and Firewalls	462
19.1.1 Masquerading Basics	462
19.1.2 Firewalling Basics	464
19.1.3 SuSEfirewall2	465
19.2 SSH — Secure Shell, the Safe Alternative	468
19.2.1 The OpenSSH Package	469
19.2.2 The ssh Program	469
19.2.3 scp — Secure Copy	470
19.2.4 sftp — Secure File Transfer	470
19.2.5 The SSH Daemon (sshd) — Server-Side	470
19.2.6 SSH Authentication Mechanisms	472
19.2.7 X, Authentication, and Other Forwarding Mechanisms	473
19.3 Network Authentication — Kerberos	474
19.3.1 Kerberos Terminology	475
19.3.2 How Kerberos Works	476
19.3.3 Users' View of Kerberos	479
19.3.4 For More Information	480
19.4 Installing and Administering Kerberos	481
19.4.1 Choosing the Kerberos Realms	481
19.4.2 Setting up the KDC Hardware	482
19.4.3 Clock Synchronization	483
19.4.4 Log Configuration	483
19.4.5 Installing the KDC	484
19.4.6 Configuring Kerberos Clients	486
19.4.7 Remote Kerberos Administration	489
19.4.8 Creating Kerberos Host Principals	490
19.4.9 Enabling PAM Support for Kerberos	491
19.4.10 Configuring SSH for Kerberos Authentication	492
19.4.11 Using LDAP and Kerberos	493
19.5 Security and Confidentiality	496
19.5.1 Basic Considerations	496
19.5.2 Local Security and Network Security	496
19.5.3 Some General Security Tips and Tricks	505
19.5.4 Using the Central Security Reporting Address	507

V	Appendixes	509
A	File Systems in Linux	511
B	Access Control Lists in Linux	521
C	Manual Page of e2fsck	533
D	Manual Page of reiserfsck	539
E	The GNU General Public License	543
	Bibliography	551

Welcome

The SUSE LINUX Administration Guide provides background information about the way your SUSE LINUX operates. This book introduces Linux system administration basics such as file systems, kernels, boot processes, an Apache web server, and secure authentication.

The SUSE LINUX Administration Guide comprises five major categories:

Installation Details about special installation types, updates, LVM, and RAID.

Configuration Configuration of the boot loader, X Window System, printer operation, and mobile computing with Linux.

System Special characteristics of a SUSE LINUX system, details about the kernel, boot concepts, and init processes.

Network Integration in (heterogeneous) networks, configuring an Apache web server, file synchronization, and security aspects.

Appendices File Systems and Access Control Lists

The digital versions of the SUSE LINUX manuals are available in the directory `/usr/share/doc/manuals/`.

New Features in the Administration Guide

Changes in the documentation since SUSE LINUX 9.0:

- The chapter about using mobile devices has been complemented by a detailed section about the use of Bluetooth (see Section 8.4 on page 206).
- The power management chapter has been expanded with information about the `powersave` package (see Section 9.5 on page 225 and Section 9.6 on page 232).
- The Apache chapter has been optimized for the use of Apache 2 (see Section 15 on page 373).
- The Samba section has been optimized for the use of Samba 3 (see Section 17.1 on page 418).
- The chapter about printing now focuses on CUPS (see Chapter 5 on page 87).
- The X Window System contains a detailed section about the use of fonts in SUSE LINUX (see Section 4.2 on page 78).

Typographical Conventions

The following typographical conventions are used in this guide:

- `YaST`: programs
- `/etc/passwd`: file or directory names
- `<placeholder>`: replace `<placeholder>` with the actual value
- `PATH`: the environment variable `PATH`
- `ls`: commands
- `--help`: options and parameters
- `user`: users

- **Alt**: a key to press
- 'File': menu items, buttons
- "Process killed": system messages

Acknowledgment

With a lot of voluntary commitment, the developers of Linux cooperate on a global scale to promote the development of Linux. We thank them for their efforts — this distribution would not exist without them. Furthermore, we want to thank Frank Zappa and Pawar. Last but not least, special thanks to LINUS TORVALDS!

Have a lot of fun!

Your SUSE Team

8.4 Bluetooth — Wireless Connections

Bluetooth is a wireless technology for connecting various devices. Two important characteristics distinguish Bluetooth from IrDA: the individual devices do not need to “see” each other directly and several devices can be connected in a network with a maximum data rate of 720 Kbps (in the current version 1.1). Theoretically, Bluetooth is even capable of communicating through walls. However, in practice this largely depends on the properties of the walls and the device class. There are three device classes with maximum transmission ranges between ten and a hundred meters.

8.4.1 Profiles

In Bluetooth, services are defined by means of profiles, such as the file transfer profile, the basic printing profile, and the personal area network profile. To enable a device to use the services of another device, both must understand the same profile — a piece of information that is often missing on the device package and in the manual. Although some manufacturers strictly comply with the definitions of the individual profiles, others do not. Nevertheless, the communication between the devices usually works smoothly.

8.4.2 Software

To be able to use Bluetooth, you need a Bluetooth adapter (built-in or external), drivers, and a Bluetooth protocol stack. By default, the Linux kernel contains the basic drivers needed for using Bluetooth. The Bluez system is used as protocol stack. Additionally, install all packages associated with Bluetooth (`bluez-libs`, `bluez-bluefw`, `bluez-pan`, `bluez-sdp`, and `bluez-utils`), as these provide some necessary services and utilities.

8.4.3 Configuration

The configuration files described in this section can only be modified by the user `root`. Currently, there is no graphical user interface for setting the parameters. Therefore, the files must be modified with a text editor.

A PIN number provides basic protection against unwanted connections. Mobile phones usually query the PIN when establishing the first contact (or when setting up a device contact on the phone). For two devices to be able to communicate, both must identify themselves with the same PIN. On the computer, the PIN is located in the file `/etc/bluetooth/pin`. Currently, only one PIN is supported in Linux, regardless of the number of installed Bluetooth devices. Thus, multiple devices cannot be addressed with different PINs. Accordingly, you need to set the same PIN on all devices or deactivate the PIN authentication entirely.

Note

Security of Bluetooth Connections

Despite the PINs, the transmission between two devices may not be entirely secure.

Note

`/etc/bluetooth/hcid.conf` is main configuration file for Linux Bluetooth. Various settings, such as the device names and the security modes, can be modified in this file. Usually, the settings should be adequate. The file contains comments describing the options for the various settings.

`security auto;` is one of the most important settings. If necessary, a PIN is activated for the identification. If problems are encountered, the option `auto` disables the PIN. Depending on your preferences and your security needs, set this option to `none` never to use PIN numbers or to `user` to use PIN numbers.

Another important section is the one beginning with `device {`. In this section, define the name under which the host should be displayed on the other side. The device class (`Laptop`, `Server`, etc.), authentication, and encryption are defined in this section.

8.4.4 System Components and Useful Tools

The operability of Bluetooth depends on the interaction of various services. At least two background daemons are needed: `hcid` (*host controller interface*), which serves as an interface for the Bluetooth device and controls it, and `sdpd` (*service discovery protocol*), by means of which a device can find out which services the host makes available. If they are not activated automatically when the system is started, both `hcid` and `sdpd` can be activated with the command `rcbluetooth start`. This command must be executed as `root`.

The following paragraphs describe the main tools needed for working with Bluetooth. Currently, only command-line programs are available. Extensions for Konqueror (KDE desktop) and Nautilus (GNOME desktop) are under development. This functionality may have been implemented after the editorial deadline. In this case, the URL `sdp://` should display local Bluetooth devices (physically connected to the host) as well as remote Bluetooth devices (accessible by way of a wireless connection).

Note

Other functionalities of the above-mentioned Bluetooth applications can be viewed with `man <program_name>`.

Note

Some of the commands can only be executed as `root`. This includes the command `l2ping <device_address>` for testing the connection to a remote device.

hcitool

`hcitool` can be used to determine whether local and remote devices are detected. The command `hcitool dev` should list your devices. The output generates a line in the form `<interface_name> <device_address>` for every detected local device.

The command `hcitool name <device_address>` can be used to determine the device name of a remote device. If, for example, another computer is detected, the displayed class and device name corresponds to the information in the file `/etc/bluetooth/hcid.conf` on the remote computer. Local devices addresses generate an error output.

hciconfig

Get more information about the local device with `/sbin/hciconfig`. Search for remote devices (that are not connected physically to the host) with the command `hcitool inq`. Three values are displayed for every detected device: the device address, the clock offset, and the device class. The device address is important, as other commands use it for identifying the target device. The clock offset mainly serves technical purposes. In the class, the device type and the service type are encoded as a hexadecimal value.

sdptool

The program `sdptool` can be used to check which services are made available by a specific device. The command `sdptool browse <device_address>` returns all services of a device. The command `sdptool search <service_code>` can be used to search for a specific service. This command scans all accessible devices for the requested service. If one of the devices offers the service, the program prints the (full) service name returned by the device together with a brief description. A list of all possible service codes can be viewed by entering `sdptool` without any parameters.

8.4.5 Examples

The following two examples demonstrate some of the capabilities of Bluetooth.

Network Connection between Two Hosts

The first example shows the establishment of a network connection between two hosts with `pand` (*personal area networking*). The following commands must be executed by the user `root`. The description focuses on the Bluetooth-specific actions and does not provide a detailed explanation of the network command (`ip`):

Start `pand` with the command `pand -s` on one of the two hosts (referred to as *H1*). Determine the device address of the second host (*H2*) by running `hcitool inq` on this host. Run `pand -c <device_address>` to establish a connection. If you query the available network interfaces with `ip link show`, an entry such as the following should be displayed (the local device address should be displayed instead of `00:12:34:56:89:90`):

```
bnep0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop qlen 1000
    link/ether 00:12:34:56:89:90 brd ff:ff:ff:ff:ff:ff
```

This interface must be assigned an IP address and activated. This can be done with the following two commands. On *H1*:

```
ip addr add 192.168.1.3/24 dev bnep0
ip link set bnep0 up
```

On *H2*:

```
ip addr add 192.168.1.4/24 dev bnep0
ip link set bnep0 up
```

Now *H1* can be accessed from *H2* under the IP 192.168.1.3. Use the command `ssh 192.168.1.4` to access *H2* from *H1* (provided *H2* runs an `sshd`, which is activated by default in SUSE LINUX). The command `ssh 192.168.1.4` can also be run as a “normal” user.

File Transfer from a Mobile Phone to the Host

The second example shows how to transfer a photograph created with a mobile phone with a built-in digital camera to a computer (without incurring additional costs for the transmission of a multimedia message). Although the menu structure may differ on various mobile phones, the procedure is usually quite similar. Refer to the manual of your phone, if necessary. This example describes the transfer of a photograph from a Sony Ericsson mobile phone to a laptop. The service Obex-Push must be available on the computer and the computer must grant the mobile phone access. In the first step, the service is made available on the laptop. This is done by means of the `opd` daemon from the package `bluez-utils`. Start the daemon with the following command:

```
opd --mode OBEX --channel 10 --daemonize --path /tmp --sdp
```

Two important parameters are used: `--sdp` registers the service with the `sdpc` and `--path /tmp` instructs the program where to save the received data — in this case to `/tmp/`. You can also specify any other directory to which you have write access.

Now the mobile phone must “get to know” the computer. To do this, open the ‘Connect’ menu on the phone and select ‘Bluetooth’. If necessary, click ‘Turn On’ before selecting ‘My devices’. Select ‘New device’ and let your phone search for the laptop. If a device is detected, its name appears in the display. Select the device associated with the laptop. If you encounter a PIN query, enter the PIN specified in `/etc/bluetooth/pin`. Now your phone knows the laptop and is able to exchange data with the laptop. Exit the current menu and go to the image menu. Select the image to transfer and press ‘More’. In the next menu, press ‘Send’ to select a transmission mode. Select ‘Via Bluetooth’. The laptop should be listed as a target device. Select the laptop to start the transmission. The image is then saved to the directory specified with the `opd` command. In the same way, you can also transfer audio tracks to the laptop.

8.4.6 Troubleshooting

If you have difficulties establishing a connection, proceed as follows:

- Check the output of `hcitool dev`. Is the local device listed? If not, the `hciid` may not have been started at all or the device may not be recognized as a Bluetooth device (either because the driver is not able to do this or because the device is defective). Restart the daemon with the command `rcbluetooth restart` and check `/var/log/messages` to see if any errors occurred.
- Does the computer “see” other devices when you execute `hcitool inq`? Try the command twice — the connection may have been faulty, as the frequency band for Bluetooth is also used by other devices.
- Make sure that the PIN in `/etc/bluetooth/pin` is the same as the PIN of the remote device.
- Try to establish the connection from the other device. Check if this device sees the computer.
- The first example (network connection) does not work. This may be due to various reasons. Possibly one of the two hosts does not understand the `ssh` protocol. Try if `ping 192.168.1.3` or `ping 192.168.1.4` works. If it does, check if `sshd` is active. Another problem could be that you already have other addresses that conflict with the address `192.168.1.X` used in the example. If this is the case, try other addresses, such as `10.123.1.2` and `10.123.1.3`.
- In the second example, the laptop does not appear as the target device. Does the mobile device recognize the Obex-Push service on the laptop? In ‘My devices’, select the respective device and view the list of ‘Services’. If Obex-Push is not displayed (even after the list is updated), the problem is caused by the `opd` on the laptop. Is the `opd` active? Do you have write access to the specified directory?
- Does the second example work in reverse order? If `obexftp` is installed, this should work with `obexftp -b <device_address> -B 10 -p <image>` on some devices (Siemens and Sony Ericsson have been tested, other devices may or may not support this action).

8.4.7 For More Information

An extensive overview of various instructions for the use and configuration of Bluetooth is available at <http://www.holtmann.org/linux/bluetooth/>.

Useful information and instructions:

Connection to PalmOS PDA:

<http://www.cs.ucl.ac.uk/staff/s.zachariadis/btpalmlinux.html>

Official howto for the integrated Bluetooth protocol stack in the kernel:

<http://bluez.sourceforge.net/howto/index.html>

Bibliography

- [1] *SUSE LINUX (User Guide)*. SUSE, 9. Edition ©2004 .
- [2] EDWARD C. BAILEY. *Maximum RPM*. ©1997 . ISBN 1-888172-78-9.
- [3] BRYAN COSTALES, ERIC ALLMAN, NEIL RICKERT. *sendmail*. ©1993 . ISBN 1-56592-056-2.
- [4] WERNER ALMESBERGER. *LILO User's guide*.
`file:///usr/share/doc/lilo/user.dvi`.
- [5] OLAF KIRCH. *LINUX Network Administrator's Guide*. ©1995 . ISBN 1-56592-087-2.
- [6] SIMON GARFINKEL, GENE SPAFFORD. *Practical UNIX Security*. ©1993 . ISBN 0-937175-72-2.
- [7] CRAIG HUNT. *TCP/IP Network Administration*. ©1995 . ISBN 3-930673-02-9.
- [8] TIM O'REILLY, GRACE TODINO. *Managing UUCP and Usenet*. ©1992 . ISBN 0-937175-93-5.
- [9] MATT WELSH. *Linux Installation and Getting Started*. 2. Edition ©1994 . ISBN 3-930419-03-3.
- [10] LINDA LAMB. *Learning the vi Editor*. ©1990 . ISBN 0-937175-67-6.
- [11] MATT WELSH, LARS KAUFMAN. *Running Linux*. ©1995 O'Reilly. ISBN 1-56592-100-3.
- [12] WILLIAM R. CHESWICK, STEVEN M. BELLOVIN. *Firewalls and Internet Security (Repelling the Wily Hacker)*. 2. Edition ©2003 Addison-Wesley Pub Co. ISBN 0-201-63466-X.

- [13] BRENT CHAPMAN, ELISABETH D. ZWICKY. *Building Internet Firewalls*. ©1995 O'Reilly and Associates. ISBN 1-565-92124-0.
- [14] CLIFFORD STOLL. *Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage*. ©2000 Pocket Books. ISBN 0-743-41146-3.
- [15] BRIAN TUNG. *Kerberos: A Network Authentication System*. ©1999 Fischer-TB. Verlag. ISBN 0-201-37924-4.

Index

A

ACLs 521–532

- access 522, 525
- check algorithm 531
- default 522, 528
- masks 526
- structure 523

addresses

- IP 302
- MAC 302

ADSL

- configuring 440–441
- dial-on-demand 441

Apache 47, 255, 373–397

- apxs 379
- CGI 387
- configuring 380–385
- content negotiation 376
- default page 375
- DocumentRoot 381
- flags 381
- installing 378–380
- logging 384, 385
- modules 376
 - activating 380
 - loading 382
 - mod_perl 388
 - mod_php4 391
 - mod_python 391
 - mod_ruby 391
- permissions 382, 395
- security 395
- Squid 455
- SSI 384, 387
- starting 379

- threads 378
- troubleshooting 396
- virtual hosts 376, 392–394

APM

- kernel parameters 45

AppleTalk *see* Netatalk

ASCII

- encoding 165

autofs 46

B

Bash

- .bashrc 255
- .profile 255
- profile 255

BIND 327–335

BIOS 170

- virus protection 14

Bluetooth 206

- hciconfig 208
- hcitool 208
- opd 210
- pand 209
- sdptool 209

boot disks 171

- creating
 - DOS 17
- creating with dd 19
- creating with rawrite 18

booting 169–539

- BIOS 170
- boot loaders 173, 263
- boot managers 169–171
- boot sectors 171
- CD 2, from 20
- CMOS 170

- concepts	171	- afpd.conf	428
- DOS	171	- apache2	380
- floppy disks, from	17, 20	- AppleVolumes.default	429
- graphic	14	- AppleVolumes.system	431
· disabling	14	- atalkd.conf	428
- GRUB	14, 173–181	- boot/grub/menu.lst	174
- initial ramdisk	261–265	- config	245
- initrd		- crontab	256
· creating	264	- csh.cshrc	278
- LILO	14	- CUPS	
- linuxrc	262	· lptions	112
- map files	172	- cupsd.conf	104
- methods	13	- dhclient.conf	364
- PCMCIA, from	190	- dhcp	317
- system freezes	14	- dhcpd.conf	365
- Windows	171	- exports	361, 363, 453
- Windows NT	171	- foomatic/filter.conf	49
		- fstab	27, 274
C		- grub.conf	179
cardmgr	325	- gshadow	52
cards		- host.conf	319
- graphics		· alert	319
· drivers	77	· multi	319
- network		· nospoof	319
· testing	323	· order	319
- PCMCIA	186–196, 325	· trim	319
· removing	188	- HOSTNAME	322
- wireless	325	- hosts	305, 318
CD-ROM drives		- httpd.conf	255, 380, 381
- ATAPI	21	- ifcfg-*	317
- supported	21	- init.d/boot	46
chown	51	- inittab	276, 282, 284
CID-keyed fonts	83	- intersync	407
CJK	276	- irda	204
CMOS	170	- kernel	264
commands		- krb5.conf	486, 488, 492
- cardctl	195	- krb5.keytab	491
- chown	51	- language	277, 278
- free	259	- lilo.conf	250, 263
- head	51	- logfiles	46
- ifport	194	- logrotate.conf	257
- mii_tool	194	- lpd.conf	141
- nice	51	- lpd.perms	141
- sort	51	- lpdfilter	146, 148
- tail	51	- menu.lst	250, 263
configuration files	316	- modprobe.conf	50, 248
- .bashrc	255, 259	- modules.conf	50, 136
- .emacs	260	- modules.dep	247
- .lptions	108, 112	- named.conf	327–335, 447
- .mailsync	413	- Netatalk	427
- .profile	255	- netatalk.conf	427, 432
- .xsession	473	- network	194, 317
- acpi	219	· providers	440

- networks 319
- nscd.conf 322
- nsswitch.conf 320
- nwserv.conf 433
- openldap 493
- pam_unix2.conf 491
- papd.conf 431
- pcmcia 187–189, 192, 193
- permissions 505
- powermanagement 217, 219
- printcap 141, 146, 147
- profile 255, 258, 278
- rc.config 45, 290
- resolv.conf 260, 317, 327, 446
- routes 326
- samba 423
- services 423
- slapd.conf 343, 494, 495
- smb.conf 107, 418, 420
- smppd.conf 438
- smpppd-c.conf 439
- squid.conf ... 446, 447, 450, 453, 455, 458
- squidguard.conf 458
- ssh_config 492
- sshd_config 473, 492
- suseconfig 292
- sysconfig 45, 290–292
- syslinux.cfg 263
- wireless 317
- XF86Config 72
 - Device 76
 - Monitor 77
 - Screen 74
- xinetd.d/cups-lpd 133
- xml/catalog 49
- xml/suse-catalog.xml 49
- configuring 290
 - Apache 380–385
 - booting 173
 - DNS 327
 - IPv6 325
 - IrDA 204
 - Netatalk 427
 - networks
 - manually 315–326
 - printing 96–100
 - routing 326
 - Samba 420–425
 - Squid 447
 - SSH 468
- consoles
 - assigning 276

- graphical
 - disabling 14
 - switching 276
- core files 258
- cpuspeed 225
- crashes 533, 539
- cron 256
- CVS 401, 410–413

D

- daemons
 - lpd 141
- depmod 247
- DHCP 363–369
 - dhcpcd 365–366
 - packages 364
 - server 365–366
 - static address assignment 367
- disks
 - boot
 - creating 183
 - booting from 171
 - floppy
 - formatting 19
- DNS 305
 - BIND 327–335
 - configuring 327
 - domains 317
 - forwarding 328
 - logging 330
 - mail exchanger 306
 - name servers 317
 - NIC 305
 - options 329
 - reverse lookup 334
 - security and 504
 - Squid and 447
 - starting 327
 - top level domain 305
 - troubleshooting 327
 - zones
 - files 332
- domain name system *see* DNS
- DOS
 - sharing files 418

E

- e-mail
 - synchronizing 401
 - mailsync 413–416
- e2fsck 533
- editors
 - Emacs 260–261

- Emacs 260–261
 - .emacs 260
 - default.el 260
- encoding
 - UTF-8 51
- environment variables
 - CUPS_SERVER 102
 - PRINTER 143
- F**
- fdisk 182
 - mbr 182
- FHS *see* file systems, FHS
- file systems 511–520
 - access control lists 521–532
 - e2fsck 533
 - Ext2 512–513
 - Ext3 513–514
 - FHS 254
 - JFS 515–516
 - LFS 519
 - limitations 519
 - ReiserFS 515
 - reiserfsck 539
 - repairing 275
 - selecting 512
 - supported 517–518
 - terms 511
 - TeX and 254
 - XFS 516–517
- files
 - finding 46
 - printing 110, 112, 143, 145
 - synchronizing 399–416
 - CVS 401, 410–413
 - InterMezzo 400, 406–408
 - mailsync 401, 413–416
 - Unison 401, 409–410
- firewalls 462
 - packet filters 462, 464
 - Squid and 453
 - SUSEfirewall2 462
 - SuSEfirewall2 465
- font systems 78
 - CID-keyed fonts 83
 - X11 core fonts 82
 - Xft 79
- fonts 78
 - CID-keyed 83
 - X11 core 82
 - Xft 79
- FTP
 - servers 47, 254

- G**
- Ghostscript 156–160
 - drivers 92
- GPL 543
- graphics
 - 3D 83–86
 - 3Ddiag 85
 - diagnosis 85
 - SaX2 84
 - testing 85
 - troubleshooting 85
 - cards
 - drivers 77
 - GLIDE 83–86
 - OpenGL 83–86
 - drivers 83
 - testing 85
- graphics cards
 - 3D 83–86
 - drivers 83
 - installation support for 86
 - support for 83
- groups
 - name changes 46
- GRUB 173
 - boot menu 174
 - boot password 180
 - device names 175
 - GRUB shell 179
 - grub.conf 179
 - partition names 175
 - problems 181
 - uninstalling 181
- gs *see* Ghostscript
- H**
- hard disks
 - parallel use of 25
- harden_suse 47
- hardware
 - CD-ROM drives
 - ATAPI 21
 - Promise controller 41
 - SCSI devices 22
- hciconfig 208
- hcitool 208
- head 51
- help
 - info pages 258
 - man pages 258
 - X 77

I

I18N	277
inetd	48
info pages	258
init	282
- adding scripts	287
- inittab	282
- scripts	285–288
input method	
- CJK	276
insmod	247
installation support	
- 3D graphics cards and	86
installing	
- boot loader	13
- GRUB	173
- linuxrc	9
- network, from	15–17
- packages	53
- PCMCIA	194
- text mode	8–13
Internet	
- cinternet	439
- dial-up	438–439
- kinternet	439
- smpppd	438–439
- web servers	<i>see</i> Apache
IP addresses	
- classes	302
- dynamic assignment	363
- IPv6	306
· configuring	325
- masquerading	462
- private	304
IPX	
- MARSNWE	432
IrDA	203–205
- configuring	204
- starting	204
- stopping	204
- troubleshooting	205

J

jade	<i>see</i> SGML, openjade
jade_dsl	48

K

Kerberos	474–481
- administering	481–495
- authenticators	475
- clients	
· configuring	486–488
- clock skew	488

- clock synchronization	483
- configuring	
· clients	486–488
- credentials	475
- installing	481–495
- kadmin	490
- KDC	482–486
· administering	489
· nsswitch.conf	482
· resolv.conf	482
· starting	486
- keytab	491
- LDAP and	493–495
- logging	483
- master key	484
- PAM support	491
- principals	475
· creating	485
· host	490
- realms	481
· creating	484
- session key	476
- SSH configuration	492
- ticket-granting service	478
- tickets	475, 478
kernels	244–251
- caches	259
- compiling	244, 249
- configuring	245–249
- daemon	248
- error messages	249
- installing	250–251
- limits	520
- modprobe.conf	248
- module loader	248
- modules	246–248
· compiling	249
· modprobe.conf	50
· network cards	323
· parport	136
· PCMCIA	186
- parameters	
· APM	45
- pcmcia	191
- problems	265
- sources	245
- System.map	250
- version 2.6	50
keyboard	
- layout	276
- mapping	276
· compose	276
· multikey	276

Kmod *see* kernels, module loader

L

L10N 277

laptops 185–196

- IrDA 203–205

- power management 213–225

- SCPM 196

LDAP 338–353

- access control 347

- ACLs 345

- adding data 348

- deleting data 352

- directory tree 340

- Kerberos and 493–495

- ldapadd 348

- ldapdelete 352

- ldapmodify 350

- ldapsearch 351

- modifying data 350

- searching data 351

- server configuration 343

LFS 519

license *see* GPL

Lightweight Directory Access Protocol . *see*
LDAP

LILO

- configuring 14

- uninstalling 181

Linux

- networks and 297

- sharing files with another OS ... 418,
426

Linux Standard Base *see* LSB

linuxthreads 50

Local Area Networks .. *see* networks, LANs

locale

- UTF-8 51

locate 46

log files 256

- apache2 385, 396

- boot.msg 218

- httpd 383, 385, 396

- installation 44

- InterMezzo 408

- messages 188, 191, 327, 467

- Squid 446, 449, 454

- Unison 410

- XFree86 85

logging

- logrotate 257

· configuring 257

Logical Volume Manager *see* LVM

logrotate 256

lprsetup 141

LSB 254

- installing packages 52

lsmod 248

LVM

- YaST 28

M

MacOS

- sharing files 426

man pages 258

MARSNWE 432

- configuring 433

- IPX 433, 436

- permissions 434

- printing 435

- starting 433

masquerading 462

- configuring with SuSEfirewall2 . 465

Master Boot Record *see* MBR

MBR 170

memory

- RAM 259

modinfo 248

modprobe 248

modules

- loading 268

- parameters 268

mountd 363

N

name servers *see* DNS

NAT *see* masquerading

Netatalk 426

- AppleDouble 430

- configuring 427

- guest servers 428

- permissions 429

- printing 431

- restrictions 427

- starting 431

- TCP/IP and 428

NetWare

- administering from Linux 435

- emulating 432

Network File System *see* NFS

Network Information Service *see* NIS

networks 297

- authentication

· Kerberos 474–481

- base network address 304

- broadcast address 304

- configuration files 316–322
- configuring 315–326
 - IPv6 325
- DHCP 363
- DNS 305
- integrating 323–326
- LANs 323–326
 - wireless 325
- localhost 304
- netmasks 303
- printing 104, 114
- routing 302, 303
- TCP/IP 298
- NFS 359
 - clients 359
 - exporting 360
 - importing 360
 - mounting 360
 - permissions 361
 - servers 360
- nfsd 363
- NGPT 50
- nice 51
- NIS 354–358
 - autofs 46
 - clients 357
 - masters 354–356
 - slaves 354–356
- notebooks *see* laptops
- NPTL 50, 51
- NSS 320
 - databases 320
- nVidia 48

O

- opd 210
- OpenOffice.org
 - printing 107
- OpenSSH *see* SSH
- OS/2
 - sharing files 418

P

- packages
 - building 49
 - compiling 59
 - compiling with build 61
 - installing 53
 - LSB 52
 - package manager 52
 - RPMs 52
 - uninstalling 53
 - verifying 53

- packet filters *see* firewalls
- pand 209
- partitioning
 - expert 23
 - fdisk 182
 - partition table 170
 - swap 23
 - YaST 27
- PCMCIA 186–196
 - booting from 190
 - card manager 187
 - cardctl 195
 - configuring 188–190
 - driver assignment 193
 - IDE 190
 - installing with 194
 - IrDA 203–205
 - ISDN 189
 - modems 189
 - modules 187
 - network cards 189, 325
 - problems 190
 - removing cards 188
 - restarting 187
 - SCSI 190
 - starting
 - preventing 191
 - systems 186
 - troubleshooting 190
 - utilities 195
- permissions
 - ACLs 521–532
 - file permissions 258
- pine 46
- ports
 - scanning 454
- PostgreSQL
 - updating 41
- PostScript
 - reformatting 161–165
- power management 213–225
 - ACPI 213, 218–223, 226
 - APM 213, 216–218, 226
 - battery monitor 215
 - charge level 227
 - cpufreqd 225
 - cpuspeed 225
 - hibernation 215
 - powersave 225–231
 - standby 214
 - suspend 214
 - YaST 232
- powersave 225

- configuration 226
 - printing 87–91, 135
 - a2ps 160
 - applications, from 101, 109
 - banner (cover) page 100
 - command line, from the 110, 142
 - configuring 96
 - CUPS 103–104
 - LRPng and lpdfilter 141
 - ports 136–140
 - YaST 96
 - CUPS 96, 102–108
 - OpenOffice.org 107
 - troubleshooting 108, 113
 - cups-lpd 115
 - drivers 92–95
 - duplex 150
 - files 110, 112, 143, 145
 - filters 88
 - configuring 148
 - customizing 148–149
 - example 149
 - lpdfilter 146–156
 - troubleshooting 155–156
 - foomatic-filters 49
 - GDI printers 94–95
 - configuring 154
 - supported 95
 - Ghostscript 156
 - Ghostscript drivers 92–93
 - IPP 102
 - IrDA 204
 - jobs
 - deleting 111, 113
 - processing 105
 - removing 143, 145
 - status 110, 143, 145
 - languages 88
 - lpc 144
 - lpq 145
 - lpr 143, 145
 - LPRng 49, 97
 - commands 142
 - lprsetup 141
 - network printers 104
 - networks 114
 - troubleshooting 130
 - PPD 103
 - printer languages 88
 - ASCII 88
 - ESC 88
 - PCL 88
 - PostScript 88
 - processing 88–91, 105
 - protocols 116
 - queues 88, 96, 99
 - controlling 144–145
 - managing 110–114
 - options 111
 - raw 107, 147
 - remote 112–113, 145
 - removing jobs 143, 145
 - status 110, 112, 143, 145
 - Tools 143–146
 - requirements 92
 - Samba 419
 - servers
 - CUPS 115
 - IPP 115
 - LPD 115
 - network 115
 - print server box 114
 - print servers 114
 - spooler 88
 - lpd 141–142
 - supported printers 92
 - troubleshooting 146
 - CUPS 108, 113
 - network 130
 - protocols
 - IPP 102
 - SMB 418
 - proxies *see* Squid
 - advantages 442
 - caches 442
 - transparent 452
- ## R
- RAID
 - soft 35
 - reiserfsck 539
 - remote login 46
 - rescue system 272
 - starting 272
 - using 273
 - RFCs 298
 - rmmod 247
 - routing 302, 326
 - masquerading 462
 - netmasks 303
 - routes 326
 - static 326
 - RPM 52–62
 - database
 - rebuilding 55, 59
 - dependencies 53

- patches 55
- queries 57
- rpmnew 53
- rpmorig 53
- rpmsave 53
- security 506
- SRPMS 60
- tools 62
- uninstalling 55
- updating 54
- verify 58
- verifying 53
- version 49
- rpmbuild 49, 52
- runlevels 282–285
 - changing 284–285
 - editing in YaST 289

S

Samba 418–426

- clients 419, 425
- configuring 420–425
- help 426
- installing 420
- login 424
- names 419
- NetBIOS 419
- optimizing 426
- permissions 423
- printers 419
- printing 425
- security 423
- servers 420–425
- shares 419, 421
- SMB 418
- starting 420
- stopping 420
- swat 423
- TCP/IP and 418

SCPM 196

- configuring 198
- managing profiles 198

screen

- resolution 76

scripts

- acpid_proxy 221
- apmd_proxy 218
- hotplug 188
- init.d 282, 285–288, 322
 - boot 286
 - boot.local 287
 - boot.setup 287

- halt 287
- Netatalk 431
- network 322
- nfsserver 322, 361
- portmap 322, 361
- rc 284, 285, 287
- sendmail 322
- squid 446
- xinetd 322
- ypbind 322
- ypserv 322
- irda 204
- lpdfilter 146
 - guess 147
- mkinitrd 264
- modify_resolvconf 260, 318
- pcmcia 188, 325
 - network 194
- SuSEconfig 290–292
 - disabling 292

SCSI devices

- configuring 22
- file names, assigning 22

sdptool 209

security 496–507

- attacks 503–504
- booting 497, 499
- bugs and 500, 502
- DNS 504
- engineering 496
- firewalls 462
- local 497–501
- network 501–504
- passwords 498
- permissions 499–500
- reporting problems 507
- RPM signatures 506
- Samba 423
- serial terminals 497
- Squid 442
- SSH 468–474
- tcpd 507
- tips and tricks 505
- viruses 500
- worms 504
- X and 501

serial ports

- IrDA 140
- parallel 136–138
- serial 140
- USB 138–140

SGML

- directories 52

- openjade 48
- SMB *see* Samba
- software
 - compiling 59
- sort 51
- source
 - compiling 59
- spm 59
- Squid 442
 - access controls 455
 - ACLs 450
 - Apache 455
 - cachemgr.cgi 455, 456
 - caches 442, 443
 - size 445
 - Calamaris 458, 459
 - configuring 447
 - CPU and 445
 - directories 446
 - DNS 447
 - features 442
 - firewalls and 453
 - log files 446, 449, 454
 - object status 444
 - permissions 446, 450
 - RAM and 445
 - reports 458, 459
 - security 442, 443
 - squidGuard 457
 - starting 446
 - statistics 455, 456
 - stopping 446
 - system requirements 444
 - transparent proxies 452, 454
 - troubleshooting 446
 - uninstalling 447
- SSH 468–474
 - authentication mechanisms 472
 - daemon 470
 - key pairs 471, 472
 - scp 470
 - sftp 470
 - ssh 469
 - ssh-agent 473
 - ssh-keygen 472
 - sshd 470
 - X and 473
- sx 49
- system
 - freezes 14
 - information 266
 - limiting resource use 258
 - localizing 277

- optimizing 25
- rescuing 272
- resources
 - viewing 193
- service configuration .. *see* sysconfig
- updating 39–49, 62

T

- T-DSL *see* ADSL
- tail 51
- TCP/IP 298
 - ICMP 299
 - IGMP 299
 - layer model 299
 - packets 299, 301
 - services 298
 - TCP 298
 - UDP 299
- thread packages
 - NPTL 51
- TrueType *see* X, TrueType fonts

U

- ulimit 258
 - options 258
- uninstalling
 - GRUB 181
 - LILO 181
- updating 39–49, 62
 - base system 42
 - log files 44
 - manually 42
 - problems 41, 44
 - YaST 42

USB

- booting from 171, 172

users

- name changes 46

UTF-8

- encoding 51

W

- web servers 47
 - Apache *see* Apache
 - setting up 255
- whois 306
- Windows
 - NT boot manager 171
 - sharing files 418
- wireless connections
 - Bluetooth 206

X

X	71
- character sets	78
- CID-keyed fonts	83
- drivers	77
- font systems	78
- fonts	78
- help	77
- optimizing	72
- SaX2	73
- security	501
- SSH and	473
- TrueType fonts	78
- virtual screen	76
- X11 core fonts	82
- xf86config	73
- XFree86	72
- Xft	79
- xft	78
X Window System	<i>see</i> X
XF86Config	
- color depth	75
- Depth	75
- Device	75
- Display	75
- Files	73
- InputDevice	73
- Modeline	75
- modelines	73

- Modes	74, 75
- Monitor	73, 75
- ServerFlags	73
Xft	79
xinetd	48
XML	
- catalog	49
- directories	52
- openjade	48

Y

YaST	
- 3D	84
- LVM	28
- ncurses	65
- network configuration	323–325
- NIS clients	357
- online update	69
- partitioning	27
- power management	232
- printing	96
- runlevel editor	289
- soft RAID	35
- sysconfig editor	292
- text mode	8–13, 65–70
· modules	69
· troubleshooting	8
- updating	42
YP	<i>see</i> NIS