Linux Frequently Asked Questions with Answers

Robert Kiesling, kiesling@ix.netcom.com October 4, 1998

This is the list of Frequently Asked Questions for Linux, the free Unix for just about every computer hardware platform on the planet. Originally written for 386/486/586 Intel/ISA bus machines, versions exist for Alpha, MIPS, ARM, 680x0, and PPC processors, and many others. (See the question, "1.1 ()" below.) This document should be read in conjunction with the Linux Documentation Project's HOWTO series. ("2.5 ()" and, "2.1 ()") The `INFO-SHEET` and `META-FAQ`, which are found in the same place, also list sources of Linux information. Please look at these documents, and, "12.1 ()" before posting to a Usenet news group. You can also get Postscript, HTML, SGML, and plain ASCII versions of this document. ("13.2 ()")

Contents

1 Introduction and General Information

1.1 What is Linux?

Linux is the free Unix written from scratch by Linus Torvalds with assistance from a loosely-knit team of hackers from across the Internet. Linux aims towards POSIX compliance, and has all of the features you would expect of a modern, fully fledged Unix: true multitasking, virtual memory, shared libraries, demand loading, shared, copy-on-write executables, proper memory management, and TCP/IP networking.

Linux runs mainly on 386/486/586-based PC's, using the hardware facilities of the 80386 processor family (TSS segments, et al.) to implement these features. Ports to other architectures are underway. (See, "1.5 ()")

See the Linux `INFO-SHEET` for more details. ("2.1 ()")

The Linux kernel is distributed under the GNU General Public License. ("1.9 ()")

———————————————————————————-

1.2 Where do I start?

There are a handful of major Linux distributions. For information about them, and how they are installed, see Matthew Welsh's *Installation and Getting Started*, or IGS for short. It's located at the Linux Documentation Project Home Page, *http://sunsite.unc.edu/LDP*.

There is also an Installation HOWTO on the LDP Home Page.

Most of the distributions are available via anonymous FTP from various Linux archive sites. ("2.5 ()") There are also a large number of other releases which are distributed less globally that suit special local and national needs.

———————————————————————————-

1.3 What software does Linux support?

Linux supports GCC, Emacs, the X Window System, all the standard Unix utilities, TCP/IP (including SLIP and PPP), and all of the hundreds of programs that people have compiled or ported to it.

There is a DOS emulator, called DOSEMU. The latest stable release is 0.98.1. The FTP archives are at *ftp://ftp.dosemu.org/dosemu.* The Web site is htmlurl url="http://www.dosemu.org" name="http://www.dosemu.org">.

The emulator can run DOS itself and some (but not all) DOS applications. Be sure to look at the `README` file to determine which version you should get. Also, see the `DOSEMU-HOWTO` (slightly dated at this point–it doesn't cover the most recent version of the program), at *sunsite.unc.edu/pub/Linux/docs/HOWTO.*

Work has been progressing on an emulator for Microsoft Windows binaries. (“3.10 ()”)

iBCS2 (Intel Binary Compatibility Standard) emulator code for SVR4 ELF and SVR3.2 COFF binaries can be included in the kernel as a compile-time option. There is information at *tsx-11.mit.edu/pub/linux/BETA/ibcs2/README.*

For more information see the `INFO-SHEET`, which is one of the HOWTO's (“2.1 ()” and, “5.2 ()”)

Some companies have commercial software available, including Motif. They announce their availability in comp.os.linux.announce–try searching the archives. (“2.9 ()”)

——————————————————————————————————-

1.4 Does Linux run on my computer? What hardware is supported?

Giving Linux a try requires a machine with an Intel '386, '486, or '586 processor with at least 2Mb of RAM and a single floppy drive. To do anything useful, more RAM and disk space is needed. (“1.7 ()”)

VESA Local Bus and PCI are supported.

MCA (IBM's proprietary bus) and ESDI hard drives are mostly supported. There is further information on the MCA bus and what cards Linux supports on the Micro Channel Linux Web page, *http://glycerine.itsmm.uni.edu/mca.*

Linux runs on '386 family based laptops, with X on most of them. There is a Web page at *http://www.cs.utexas.edu/users/kharker/linux-laptop/.*

For details of exactly which PC's, video cards, disk controllers, etc. work see the `INFO-SHEET` and the `Hardware-HOWTO`. (See “2.1 ()”)

There is a port of Linux to the 8086, known as the Embeddable Linux Kernel Subset (ELKS). This is a 16-bit subset of the Linux kernel which will mainly be used for embedded systems. See *http://www.linux.org.uk/Linux8086.html* for more information. Linux will never run fully on an 8086 or '286, because it requires task-switching and memory management facilities not found on these processors.

Linux supports multiprocessing with Intel MP architecture. See the file `Documentation/smp.tex` in the Linux kernel source code distribution.

See the next question for a (probably incomplete) list of hardware platforms Linux has been ported to.

——————————————————————————————————-

1.5 What ports to other processors are there?

There is a reasonably complete list of Linux ports at *http://www.ctv.es/USERS/xose/linux/linux_ports.html,* and at *http://www.linuxhq.com/dist-index.html.*

A project has been underway for a while to port Linux to suitable 68000-series based systems like Amigas and Ataris. The Linux/m68K FAQ is located at *www.clark.net/pub/lawrencc/linux/faq/faq.html.* The URL of the Linux/m68k home page is *www.linux-m68k.*

There is a linux-680x0 mailing list. (“2.8 ()”)

There is (or was) a FTP site for the Linux-m68k project on *ftp.phil.uni-sb.de/pub/atari/linux-68k*, but this address may no longer be current.

Debian GNU/Linux is being ported to Alpha, Sparc, PowerPC, and ARM platforms. There are mailing lists for all of them. See *http://www.debian.org/MailingLists/subscribe.*

One of the Linux-PPC project pages has moved recently. Its location is *http://www.linuxppc.org*, and the archive site is *ftp.linuxppc.org/linuxppc.*

There is a Linux-PPC support page at *www.cs.nmt.edu/˜linuxppc/.* There you will find the kernel that is distributed with Linux.

Apple now supports MkLinux development on Power Macs, based on OSF and the Mach microkernel. See *http://www.mklinux.apple.com.*

A port to the 64-bit DEC Alpha/AXP is at *http://www.azstarnet.com/˜axplinux/.* There is a mailing list at vger.rutgers.edu. (“2.8 ()”)

Ralf Baechle is working on a port to the MIPS, initially for the R4600 on Deskstation Tyne machines. The Linux-MIPS FTP sites are *ftp.fnet.fr/linux-mips* and *ftp://ftp.linux.sgi.com/pub/mips-linux.* Interested people may mail their questions and offers of assistance to *linux@waldorf-gmbh.de.*

There is also a MIPS channel on the Linux Activists mail server and a linux-mips mailing list. (“2.8 ()”)

There are currently two ports of Linux to the ARM family of processors. One of these is for the ARM3, fitted to the Acorn A5000, and it includes I/O drivers for the 82710/11 as appropriate. The other is to the ARM610 of the Acorn RISC PC. The RISC PC port is currently in its early to middle stages, owing to the need to rewrite much of the memory handling. The A5000 port is in restricted beta testing. A release is likely soon.

For more, up-to-date information, read the newsgroup `comp.sys.acorn.misc`. There is a FAQ at *http://www.arm.uk.linux.org*

The Linux SPARC project is a hotbed of activity. There is a FAQ available from Jim Mintha’s Linux for SPARC Processors page, *http://www.geog.ubc.ca/sparclinux.html.* The SPARC/Linux archives are at *vger.rutgers.edu/pub/linux/Sparc.*

There is also a port (“Hardhat”) to SGI/Indy machines. The URL is *http://www.linux.sgi.com.*

——————————————————————————————-

1.6 How much hard disk space does Linux need?

About 10Mb for a very minimal installation, suitable for trying Linux, and not much else.

You can fit an installation that includes X into 80Mb. Installing Debian GNU/Linux takes 500Mb–1GB, including kernel source code, some space for user files, and spool areas.

——————————————————————————————-

1.7 How much memory does Linux need?

At least 4MB, and then you will need to use special installation procedures until the disk swap space is installed. Linux will run comfortably in 4MB of RAM, although X Windows Apps will run slowly because they need to swap out to disk.

Some recent applications, like Netscape, require 64MB of physical memory.

——————————————————————————————-

1.8 How much memory can Linux use?

A number of people have asked how to address more than 64 MB of memory, which is the default upper limit. Place the following in your lilo.conf file:

```
append="mem=XXM"
```

Where "XX" is the amount of memory, specified as megabytes; for example, '128M'. For further details, see the lilo manual page.

——————————————————————————————-

1.9 Is Linux public domain? Copyrighted?

The Linux kernel copyright belongs to Linus Torvalds. He has placed it under the GNU General Public License, which basically means that you may freely copy, change, and distribute it, but you may not impose any restrictions on further distribution, and you must make the source code available.

This is not the same as Public Domain. See the Copyright FAQ, *rtfm.mit.edu/pub/usenet/news.answers/law/copyright*, for details.

Full details are in the file `COPYING` in the Linux kernel sources (probably in `/usr/src/linux` on your system).

The licenses of the utilities and programs which come with the installations vary. Much of the code is from the GNU Project at the Free Software Foundation, and is also under the GPL.

Note that discussion about the merits or otherwise of the GPL should be posted to the news group `gnu.misc.discuss`, and not to the `comp.os.linux` hierarchy.

==

2 Network sources and resources.

——————————————————————————————-

2.1 Where can I get the HOWTO's and other documentation?

Look in the following places, and the sites that mirror them.

- *ftp.funet.fi : /pub/OS/Linux/doc/HOWTO*
- *tsx-11.mit.edu : /pub/linux/docs/HOWTO*
- *sunsite.unc.edu : /pub/Linux/docs/HOWTO*

For a complete list of Linux FTP sites, see, "2.5 ()"

If you don't have access to FTP, try the FTP-by-mail servers at *ftpmail@decwrl.dec.com*, *ftpmail@doc.ic.ac.uk*, or *ftp-mailer@informatik.tu-muenchen.de*.

A complete list of HOWTO's and Mini-HOWTO's is available in the file `HOWTO-INDEX` in the `docs/HOWTO` directory at the FTP sites, and on the Web at *http://sunsite.unc.edu/LDP/HOWTO/HOWTO-INDEX.html*, but here is a (possibly incomplete) list:

```
AX25-HOWTO                          Access-HOWTO
Assembly-HOWTO                      Benchmarking-HOWTO
BootPrompt-HOWTO                    Bootdisk-HOWTO
CD-Writing-HOWTO                    CDROM-HOWTO
Chinese-HOWTO                       Commercial-HOWTO
Consultants-HOWTO                   Cyrillic-HOWTO
DNS-HOWTO                           DOS-to-Linux-HOWTO
DOSEMU-HOWTO                        Danish-HOWTO
Distribution-HOWTO                  ELF-HOWTO
Emacspeak-HOWTO                     Ethernet-HOWTO
Finnish-HOWTO                       Firewall-HOWTO
Ftape-HOWTO                         GCC-HOWTO
German-HOWTO                        HAM-HOWTO
HOWTO-INDEX                         Hardware-HOWTO
Hebrew-HOWTO                        IPX-HOWTO
ISP-Hookup-HOWTO                    Installation-HOWTO
Intranet-Server-HOWTO               Italian-HOWTO
Java-CGI-HOWTO                      Kernel-HOWTO
Keyboard-and-Console-HOWTO          MGR-HOWTO
MILO-HOWTO                          Mail-HOWTO
NET-3-HOWTO                         NFS-HOWTO
NIS-HOWTO                           News-HOWTO
Optical-Disk-HOWTO                  PCI-HOWTO
PCMCIA-HOWTO                        PPP-HOWTO
Pilot-HOWTO                         Polish-HOWTO
Printing-HOWTO                      Printing-Usage-HOWTO
RPM-HOWTO                           Reading-List-HOWTO
SCSI-HOWTO                          SCSI-Programming-HOWTO
SMB-HOWTO                           Serial-HOWTO
Serial-Programming-HOWTO            Shadow-Password-HOWTO
Slovenian-HOWTO                     Sound-HOWTO
Sound-Playing-HOWTO                 Spanish-HOWTO
TeTeX-HOWTO                         Thai-HOWTO
Tips-HOWTO                          UMSDOS-HOWTO
UPS-HOWTO                           UUCP-HOWTO
User-Group-HOWTO                    VAR-HOWTO
VMS-to-Linux-HOWTO                  XFree86-HOWTO
XFree86-Video-Timings-HOWTO
3-Button-Mouse
```

The following Mini-HOWTO's are available from *http://sunsite.unc.edu/pub/Linux/HOWTO/mini*:

```
ADSM-Backup                         AI-Alife
Advocacy                            Backup-With-MSDOS
Battery-Powered                     Boca
BogoMips                            Bridge
Bridge+Firewall                     Clock
Colour-ls                           Comeau-C++
DHCPd                               Dial-On-Demand
Diald                               Dip+SLiRP+CSLIP
Diskless                            Dynamic-IP-Hacks
```

`Ext2fs-Undeletion`	`GTEK-BBS-550`
`HTML-Validation`	`IO-Port-Programming`
`IP-Alias`	`IP-Masquerade`
`IP-Subnetworking`	`JE`
`Jaz-Drive`	`Kerneld`
`Key-Setup`	`LBX`
`Large-Disk`	`Linux+DOS+Win95`
`Linux+DOS+Win95+OS2`	`Linux+NT-Loader`
`Linux+OS2+DOS`	`Linux+Win95`
`Loadlin+Win95`	`Locales`
`MIDI+SB`	`Mail-Queue`
`Mail2News`	`Man-Page`
`Multiple-Disks-Layout`	`Multiple-Ethernet`
`NFS-Root`	`NFS-Root-Client`
`Netscape+Proxy`	`Offline-Mailing`
`Online-Support`	`PLIP`
`PPP-over-minicom`	`Pager`
`Partition`	`Print2Win`
`Process-Accounting`	`Proxy-ARP`
`Public-Web-Browser`	`Qmail+MH`
`Quota`	`RCS`
`Remote-Boot`	`Remote-X-Apps`
`SLIP+proxyARP`	`SLIP-PPP-Emulator`
`Sendmail+UUCP`	`Software-Building`
`Software-RAID`	`Soundblaster-16`
`Soundblaster-AWE64`	`StarOffice`
`Swap-Space`	`Term-Firewall`
`Tiny-News`	`Token-Ring`
`Upgrade`	`VPN`
`Virtual-wu-ftpd`	`Visual-Bell`
`Win95+Win+Linux`	`Windows-Modem-Sharing`
`WordPerfect`	`X-Big-Cursor`
`XFree86-XInside`	`Xterm-Title`
`Xterminal`	`ZIP-Drive`
`ZIP-Install`	

In addition, translations of the HOWTO's are available from *sunsite.unc.edu/pub/Linux/docs/HOWTO/translations* and mirrors worldwide. Translations in the following languages are available:

`Chinese (zh)`	`Croatian(hr)`
`French (fr)`	`German (de)`
`Hellenic (el)`	`Indonesian (id)`
`Italian (it)`	`Japanese (jp)`
`Korean (ko)`	`Polish (pl)`
`Spanish (es)`	`Slovenian (sl)`
`Swedish (sv)`	`Turkish (tr)`

The HOWTO's are also on the Web, at the Linux Documentation Project's Home Page, *http://sunsite.unc.edu/LDP*.

More of these documents are always in preparation. Please get in touch with Timothy Bynum, *tjbynum@sunsite.unc.edu*, the HOWTO coordinator, if you are interested in writing one. The file *sunsite.unc.edu/pub/Linux/HOWTO/HOWTO-INDEX* contains guidelines for writing a HOWTO. He has a Web page that lists current HOWTO updates and additions at *wallybox.cei.net/~tjbynum/HOWTO/projects.*

The Guide Series produced by the Linux Documentation Project is available from *http://sunsite.unc.edu/LDP*. Please read them if you are new to Unix and Linux. Here is a list of those available so far:

- *The Linux Documentation Project Manifesto*, by Matt Welsh.
- *Installation and Getting Started Guide*, by Matt Welsh.
- *The Linux Kernel*, by David Rusling.
- *The Network Administrator's Guide*, by Olaf Kirch.
- *The Linux Programmer's Guide*, by Sven Goldt, Sven van der Meer, Scott Burkett, and Matt Welsh.
- *The Linux System Administrator's Guide, Version 0.5*, by Lars Wirzenius.

In addition, there is a FAQ for Linux kernel developers at *http://www.tux.org/html/*.

——————————————————————————-

2.2 Where should I look on the World Wide Web for Linux stuff?

Two Web pages in particular provide good starting point for general Linux information: Linux International's Home Page, at *http://www.li.org*, and the Linux Online's Linux Home Page at *http://www.linux.org/*.

Both of these pages provide links to other sites, information about general information, distributions, new software, documentation, and news.

Greg Hankins, *gregh@cc.gatech.edu*, maintains the Linux Documentation Project Home Page, at *http://sunsite.unc.edu/LDP*. This page refers to all of the HOWTO's and FAQ's, both those which are available in HTML (WWW) format, and those which aren't.

——————————————————————————-

2.3 What newsgroups are there for Linux?

`Comp.os.linux.announce` is the moderated announcements group; you should read this if you intend to use Linux: it contains information about software updates, new ports, user group meetings, and commercial products. It is the ONLY newsgroup that may carry commercial postings. Submissions for that group should be e-mailed to *linux-announce@news.ornl.gov.*

`comp.os.linux.announce`, however, is not archived on DejaNews or Alta Vista. The only archive for the news group seems to be *www.iki.fi/mjr/linux/cola.html.*

[Axel Boldt]

Also worth reading are the following other groups in the `comp.os.linux.*` hierarchy–you may find many common problems too recent for the documentation but are answered in the newsgroups.

```
comp.os.linux.setup
comp.os.linux.hardware
comp.os.linux.networking
```

```
comp.os.linux.x
comp.os.linux.development.apps
comp.os.linux.development.system
comp.os.linux.advocacy
comp.os.linux.misc
```

Remember that Linux is POSIX compatible, and most all of the material in `comp.unix.*` and `comp.windows.x.*` groups will be relevant. Apart from hardware considerations, and some obscure or very technical low-level issues, you'll find that these groups are good places to start.

Please read "12.1 ()" before posting. Cross posting between different `comp.os.linux.*` groups is rarely a good idea.

There may well be Linux groups local to your institution or area–check there first.

See also "2.7 ()"

Other regional and local newsgroups also exist–you may find the traffic more manageable there. The French Linux newsgroup is `fr.comp.os.linux`. The German one is `de.comp.os.linux`. In Australia, try `aus.computers.linux`. In Croatia there is `hr.comp.linux`. In Italy, there is `it.comp.linux`.

——-

2.4 Where can I find out about Linux and the Millennium (Y2K) bug?

The Debian/GNU Linux people have a statement on their Web site at *http://www.debian.org*

Essentially, Linux uses libraries that store dates as 32-bit integers, which count the seconds since 1970. This counter will not overflow until the year 2038, by which time the library programmers will (hopefully) have upgraded the system software to store dates as 64-bit integers.

This, of course, does not mean that applications are not susceptible to the millennium bug, if they do not use the standard library routines.

The Free Software Foundation has a Web page about Y2K issues in GNU software at *http://www.fsf.org/software/year2000.html*

There is also a Usenet newsgroup, comp.software.year-2000, for general discussion of Y2K issues.

——-

2.5 Where can I get Linux material by FTP?

There are three main archive sites for Linux:

- *ftp.funet.fi (Finland) : /pub/OS/Linux*
- *sunsite.unc.edu (US) : /pub/Linux*
- *tsx-11.mit.edu (US) : /pub/linux*

The best place to get the Linux kernel is *ftp.cs.helsinki.fi/pub/Linux_Kernel.* Linus Torvalds uploads the most recent kernel versions to this site.

Of the U.S. distributions, Debian GNU/Linux is available at *ftp.debian.org/pub/debian.* Red Hat Linux's home site is *ftp.redhat.com*, and Linux Slackware's is *ftp.cdrom.com.*

The contents of these sites is mirrored (copied, usually approximately daily) by a number of other sites. Please use a site close to you–it will be faster for you and easier on the network.

- *ftp.sun.ac.za/pub/linux/sunsite/* (South Africa)
- *ftp.is.co.za/linux/sunsite/* (South Africa)
- *ftp.cs.cuhk.hk/pub/Linux/* (Hong Kong)
- *ftp.cs.cuhk.hk/pub/Linux/* (Hong Kong)
- *ftp.spin.ad.jp/pub/linux/sunsite.unc.edu/* (Japan)
- *ftp.nuri.net/pub/Linux/* (Korea)
- *ftp.jaring.my/pub/Linux/* (Malaysia)
- *ftp.nus.sg/pub/unix/Linux/* (Singapore)
- *ftp.nectec.or.th/pub/mirrors/linux/* (Thailand)
- *mirror.aarnet.edu.au/pub/linux/* (Australia)
- *sunsite.anu.edu.au/pub/linux/* (Australia)
- *ftp.monash.edu.au/pub/linux/* (Australia)
- *ftp.univie.ac.at/systems/linux/sunsite/* (Austria)
- *ftp.fi.muni.cz/pub/UNIX/linux/* (Czech Republic)
- *ftp://sunsite.fri.uni-lj.si/pub/linux/* (Slovenia)
- *ftp.funet.fi/pub/Linux/sunsite/* (Finland)
- *ftp.univ-angers.fr/pub/Linux/* (France)
- *ftp.iut-bm.univ-fcomte.fr* (France)
- *ftp.ibp.fr/pub/linux/sunsite/* (France)
- *ftp.loria.fr/pub/linux/sunsite/* (France)
- *ftp.dfv.rwth-aachen.de/pub/linux/sunsite/* (Germany)
- *ftp.germany.eu.net/pub/os/Linux/Mirror.SunSITE/* (Germany)
- *ftp.tu-dresden.de/pub/Linux/sunsite/* (Germany)
- *ftp.uni-erlangen.de/pub/Linux/MIRROR.sunsite/* (Germany)
- *ftp.gwdg.de/pub/linux/mirrors/sunsite/* (Germany)
- *ftp.rz.uni-karlsruhe.de/pub/linux/mirror.sunsite/* (Germany)
- *ftp.ba-mannheim.de/pub/linux/mirror.sunsite/* (Germany)
- *ftp.uni-paderborn.de/pub/Mirrors/sunsite.unc.edu/* (Germany)
- *ftp.uni-rostock.de/Linux/sunsite/* (Germany)
- *tp.rus.uni-stuttgart.de/pub/unix/systems/linux/MIRROR.sunsite/* (Germany)
- *ftp.uni-tuebingen.de/pub/linux/Mirror.sunsite/* (Germany)
- *ftp.rz.uni-ulm.de/pub/mirrors/linux/sunsite/* (Germany)

- *ftp.kfki.hu/pub/linux/* (Hungary)
- *linux.italnet.it/pub/Linux/* (Italy)
- *ftp.unina.it/pub/linux/sunsite/* (Italy)
- *giotto.unipd.it/pub/unix/Linux/* (Italy)
- *cnuce-arch.cnr.it/pub/Linux/* (Italy)
- *ftp.flashnet.it/mirror2/sunsite.unc.edu/* (Italy)
- *ftp.nijenrode.nl/pub/linux/sunsite.unc-mirror/* (Netherlands)
- *ftp.LeidenUniv.nl/pub/linux/sunsite/* (Netherlands)
- *ftp.nvg.unit.no/pub/linux/sunsite/* (Norway)
- *ftp://sunsite.icm.edu.pl/pub/Linux/sunsite.unc.edu/* (Poland)
- *ftp.rediris.es/software/os/linux/sunsite/* (Spain)
- *sunsite.rediris.es/software/linux/* (Spain)
- *ftp.cs.us.es/pub/Linux/sunsite-mirror/* (Spain)
- *ftp.etse.urv.es/pub/mirror/linux/* (Spain)
- *ftp.etsimo.uniovi.es/pub/linux/* (Spain)
- *ftp.luna.gui.es/pub/linux.new/* (Spain)
- *ftp.switch.ch/mirror/linux/* (Switzerland)
- *ftp.metu.edu.tr/pub/linux/sunsite/* (Turkey)
- *unix.hensa.ac.uk/mirrors/sunsite/pub/Linux/* (UK)
- *ftp.maths.warwick.ac.uk/mirrors/linux/sunsite.unc-mirror/* (UK)
- *ftp.idiscover.co.uk/pub/Linux/sunsite.unc-mirror/* (UK)
- *sunsite.doc.ic.ac.uk/packages/linux/sunsite.unc-mirror/* (UK)
- *ftp.dungeon.com/pub/linux/sunsite-mirror/* (UK)
- *ftp.io.org/pub/mirrors/linux/sunsite/* (Canada)
- *ftp.cc.gatech.edu/pub/linux/* (US)
- *ftp.cdrom.com/pub/linux/sunsite/* (US)
- *ftp.siriuscc.com/pub/Linux/Sunsite/* (US)
- *ftp.engr.uark.edu/pub/linux/sunsite/* (US)
- *ftp.infomagic.com/pub/mirrors/linux/sunsite/* (US)
- *linux.if.usp.br/pub/mirror/sunsite.unc.edu/pub/Linux/* (Brazil)
- *farofa.ime.usp.br/pub/linux/* (Brazil)

Not all of these mirror all of the other “source” sites, and some have material not available on the “source” sites.

————————————————————————————————-

2.6 I don't have FTP access. Where do I get Linux?

The easiest thing is probably to find a friend with FTP access. If there is a Linux user's group near you, they may be able to help.

If you have a reasonably good email connection, you could try the FTP-by-mail servers at *ftpmail@ftp.sunet.se*, *ftpmail@garbo.uwasa.fi*, or *ftpmail@ftp.uni-stuttgart.de.*

Linux is also available via traditional mail on CD-ROM. The file *sunsite.unc.edu/pub/Linux/docs/HOWTO/Installation-HOWTO*, and the file *sunsite.unc.edu/pub/Linux/docs/HOWTO/Distribution-HOWTO* contain information on these distributions.

——————————————————————————-

2.7 I don't have Usenet access. Where do I get information?

A digest of comp.os.linux.announce is available by mailing the word "subscribe" (without the quotes) as the body of a message to *linux-announce-REQUEST@news-digests.mit.edu.* Subscribing to this list is a good idea, as it carries important information and documentation about Linux.

Please remember to use the `*-request` addresses for your subscribe and unsubscribe messages; mail to the other address is posted to the news group.

——————————————————————————-

2.8 What mailing lists are there?

The Linux developers now mainly use the Majordomo server at *majordomo@vger.rutgers.edu.* Send a message with the word "lists" (without the quotes) in the body to get a list of lists there. Add a line with the word, "help," to get the standard Majordomo help file that lists instructions for subscribing and unsubscribing to the lists.

Most of the lists are used by Linux developers to talk about technical issues and future developments. These are not intended for new users' questions.

There is a `linux-newbie` list where, "no question is too stupid." Unfortunately, it seems that few experienced users read that list, and it has very low volume.

——————————————————————————-

2.9 Are the newsgroups archived anywhere?

The Usenet Linux news groups are archived at *http://www.dejanews.com*, *http://www.reference.com*, and *http://altavista.digital.com*

Sunsite.unc.edu/pub/Linux/docs/linux-announce.archive contains archives of `comp.os.linux.announce`. These are mirrored from *src.doc.ic.ac.uk/usenet*, which also archives `comp.os.linux`, `comp.os.linux.development.apps`, and `comp.os.linux.development.system`.

There is an 'easy to access' archive of `comp.os.linux.announce` on the World Wide Web at *http://www.leo.org/archiv/linux/archiv/ann_ index.html* which supports searching and browsing.

==

3 Compatibility with other operating systems.

————————————————————————————-

3.1 Can Linux share my disk with DOS? OS/2? 386BSD? Win95?

Yes. Linux uses the standard MS-DOS partitioning scheme, so it can share your disk with other operating systems. Note, however, that many other operating systems may not be exactly compatible. DOS's `FDISK.EXE` and `FORMAT.EXE`, for example, can overwrite data in a Linux partition, because they sometimes incorrectly use partition data from the partition's boot sector rather than the partition table.

In order to prevent programs from doing this, it is a good idea to zero out–under Linux–the start of a partition you created, before you use MS-DOS–or whatever–to format it. Type:

```
$ dd if=/dev/zero of=/dev/hdXY bs=512 count=1
```

where `hdXY` is the relevant partition; e.g., `/dev/hda1` for the first partition of the first (IDE) disk.

Linux can read and write the files on your DOS and OS/2 FAT partitions and floppies using either the DOS file system type built into the kernel or mtools. There is kernel support for the VFAT file system used by Windows 9x and Windows NT.

For information about FAT32 partition support, see *http://bmrc.berkeley.edu/people/chaffee/fat32.html.*

See, "1.3 ()" for details and status of the emulators for DOS, MS Windows, and System V programs.

See also, "3.6 ()", "3.9 ()", "3.7 ()", and "3.8 ()"

There are said to be NTFS drivers under development, which should support compression as a standard feature.

————————————————————————————-

3.2 How do I access files on my DOS partition or floppy?

Use the DOS file system, type, for example:

```
$ mkdir /dos
$ mount -t msdos -o conv=text,umask=022,uid=100,gid=100 /dev/hda3 /dos
```

If it's a floppy, don't forget to umount it before ejecting it!

You can use the `conv=text/binary/auto`, `umask=nnn`, `uid=nnn`, and `gid=nnn` options to control the automatic line-ending conversion, permissions and ownerships of the files in the DOS file system as they appear under Linux. If you mount your DOS file system by putting it in your `/etc/fstab`, you can record the options (comma-separated) there, instead of defaults.

Alternatively, you can use mtools, available in both binary and source form on the FTP sites. ("2.5 ()")

A kernel patch (known as the fd-patches) is available which allows floppies with nonstandard numbers of tracks and/or sectors to be used; this patch is included in the 1.1 alpha testing kernel series.

————————————————————————————-

3.3 Does Linux support compressed ext2 file systems?

As of recently, it does. Information about them is located at *http://www.netspace.net.au/˜reiter/e2compr/.*

There is also a Web site for the e2compr patches The code is still experimental and consists of patches for the 2.0 and 2.1 kernels. For more information about the project, including the latest patches, and the address of the mailing list, look up the URL at *http://debs.fuller.edu/e2compr/.*

[Roderich Schupp]

Zlibc is a program that allows existing applications to read compressed (GNU gzip'ed) files as if they were not compressed. Look on sunsite.unc.edu in /pub/Linux/libs/. The author is Alain Knuff.

There is also a compressing block device driver, "DouBle," by Jean-Marc Verbavatz, which can provide on-the-fly disk compression in the kernel. The source-only distribution is located at sunsite.unc.edu in the directory /pub/Linux/patches/diskdrives/. This driver compresses inodes and directory information as well as files, so any corruption of the file system is likely to be serious.

There is also a package called tcx (Transparently Compressed Executables), which allows you to keep infrequently compressed executables compressed and only uncompress them temporarily when in use. It is located on sunsite.unc.edu in the directory /pub/Linux/utils/compress/.

——————————————————————————-

3.4 Can I use my Stacked/DBLSPC/etc. DOS drive?

Until recently, not very easily. You can access DOS 6.X volumes from the DOS emulator ("1.3 ()"), but it's harder than accessing a normal DOS volume via the DOS kernel option, a module, or mtools.

There is a recently added package, dmsdos, which reads and writes compressed file systems like DoubleSpace/DriveSpace in MS-DOS 6.x and Win95, as well as Stacker versions 3 and 4. It is available in the archives on *ftp://sunsite.unc.edu/pub/Linux/system/Filesystem/dosfs.*

There is a module available for the Linux kernel which can do read-only access of compressed volume. Look at *sunsite.unc.edu/pub/Linux/system/filesystems/dosfs/.*

——————————————————————————-

3.5 Can I access OS/2 HPFS partitions from Linux?

Yes, but Linux access to HPFS partitions is read-only. HPFS file system access is available as an option when compiling the kernel or as a module. See the `Documentation/filesystems/hpfs.txt` file in the kernel source distribution. ("7.6 ()") Then you can mount HPFS partition, using, for example:

```
$ mkdir /hpfs
$ mount -t hpfs /dev/hda5 /hpfs
```

——————————————————————————-

3.6 Can Linux access Amiga file systems?

The Linux kernel has support for the Amiga Fast File System (AFFS) version 1.3 and later, both as a compile-time option and as a module. The file `Documentation/filesystems/affs.txt` in the Linux kernel source distribution has more information.

See "7.6 ()".

Linux supports AFFS hard-drive partitions only. Floppy access is not supported due to incompatibilities between Amiga floppy controllers and PC and workstation controllers. The AFFS driver can also mount disk partitions used by the Un*x Amiga Emulator, by Bernd Schmidt.

——————————————————————————————-

3.7 Can Linux access BSD, SysV, etc. UFS?

Recent kernels can mount (read only) the UFS file system used by System V; Coherent; Xenix; BSD; and derivatives like SunOS, FreeBSD, NetBSD, and NeXTStep. UFS support is available as a kernel compile-time option and a module.

See, "7.6 ()"

——————————————————————————————-

3.8 Can Linux access SMB file systems?

Linux supports read/write access of Windows for Workgroups and Windows NT SMB volumes. See the file Documentation/filesystems/smbfs.txt of the Linux kernel source distribution, and "7.6 ()" in this FAQ.

There is also a suite of programs called Samba which provide support for WfW networked file systems (provided they're for TCP/IP). Information is available in the README file at *sunsite.unc.edu/pub/Linux/system/network/samba/*.

There is a SMB Web site at *samba.anu.edu.au/samba/*.

——————————————————————————————-

3.9 Can Linux access Macintosh file systems?

There is a set of user-level programs that read and write the Macintosh Hierarchical File System (HFS). It is available at *sunsite.unc.edu/pub/Linux/utils/disk-management*.

——————————————————————————————-

3.10 Can I run Microsoft Windows programs under Linux?

WINE, a MS Windows emulator for Linux, is still not ready for general distribution. If you want to contribute to its development, look for the status reports in the `comp.emulators.ms-windows.wine` newsgroup.

There is also a FAQ, compiled by P. David Gardner, at *sunsite.unc.edu/pub/Linux/docs/faqs/Wine-FAQ/*.

In the meantime, if you need to run MS Windows programs, the best bet–seriously–is to reboot. LILO, the Linux boot loader, can boot one of several operating systems from a menu. See the LILO documentation for details.

Also, LOADLIN (a DOS program to load a Linux, or other OS, kernel is one way to make Linux co-exist with DOS. LOADLIN is particularly handy when you want to install Linux on a 3rd or 4th drive on a system (or when you're adding a SCSI drive to a system with an existing IDE).

In these cases, it is common for LILO's boot loader to be unable to find or load the kernel on the "other" drive. So you just create a C:\LINUX directory (or whatever), put LOADLIN in it with a copy of your kernel, and use that.

LOADLIN is a VCPI compliant program. Win95 will want to, "shutdown into DOS mode," to run it (as it would with certain other DOS protected-mode programs).

Earlier versions of LOADLIN sometimes required a package called REALBIOS.COM, which required a boot procedure on an (almost) blank floppy to map the REALBIOS interrupt vectors (prior to the loading of any software drivers). (Current versions don't seem to ship with it, and don't seem to need it).

[Jim Dennis]

——————————————————————————————-

3.11 How can I boot Linux from OS/2's Boot Manager?

1. Create a partition using OS/2's `FDISK.EXE` (Not Linux's `fdisk`).
2. Format the partition under OS/2, either with FAT or HPFS. This is so that OS/2 knows about the partition being formatted. (This step is not necessary with OS/2 'warp' 3.0.)
3. Add the partition to the Boot Manager.
4. Boot Linux, and create a file system on the partition using `mkfs -t ext2` or `mke2fs`. At this point you may, if you like, use Linux's `fdisk` to change the code of the new partition to type 83 (Linux Native)–this may help some automated installation scripts find the right partition to use.
5. Install Linux on the partition.
6. Install LILO on the Linux partition–NOT on the master boot record of the hard drive. This installs LILO as a second-stage boot loader on the Linux partition itself, to start up the kernel specified in the LILO configuration file. To do this, you should put

   ```
   boot = /dev/hda2
   ```

   (where `/dev/hda2` is the *partition* you want to boot from) in your `/etc/lilo/config` or `/etc/lilo.config` file.
7. Make sure that it is the Boot Manager partition that is marked active, so that you can use Boot Manager to choose what to boot.

There is a set of HOWTO's on the subject of multi-boot systems on the LDP Home Page, *http://sunsite.unc.edu/LDP/*.

——————————————————————————————-

3.12 How can I share a swap partition between Linux and MS Windows?

See the Mini-HOWTO on the subject. The Mini-HOWTO is currently unmaintained but is available at *ftp://sunsite.unc.edu/pub/Linux/docs/HOWTO/mini/unmaintained*.

==

4 Linux's handling of file systems, disks, and drives

——————————————————————————————-

4.1 How can I get Linux to work with my disk?

If your disk is an IDE or EIDE drive, you should read the file `/usr/src/linux/drivers/block/README.ide` (part of the Linux kernel source code). This README contains many helpful hints about IDE drives. Many modern IDE controllers do translation between 'physical' cylinders/heads/sectors, and 'logical' ones.

SCSI disks are accessed by linear block numbers. The BIOS invents some 'logical' cylinder/head/sector fiction to support DOS.

An IBM PC-compatible BIOS will usually not be able to access partitions which extend beyond 1024 logical cylinders, and will make booting a Linux kernel from such partitions using LILO problematic at best.

You can still use such partitions for Linux or other operating systems that access the controller directly.

It's recommend that you create at least one Linux partition entirely under the 1024 logical cylinder limit, and boot from that. The other partitions will then be okay.

Also there seems to be a bit of trouble with the newer Ultra-DMA drives. I haven't gotten the straight scoop on them–but they are becoming a very common problem at the SVLUG installfests. When you can get 8 to 12 Gig drives for $200 to $300 it's no wonder.

[Jim Dennis]

——————————————————————————————-

4.2 How can I undelete files?

In general, this is very hard to do on Unices because of their multitasking nature. Undelete functionality for the ext2fs file system is being worked on, but don't hold your breath.

There are a number of packages available which instead provide new commands for deleting and copying which move deleted files into a 'wastebasket' directory. The files can be recovered until cleaned out automatically by background processing.

Alternatively, you can search the raw disk device which holds the file system in question. This is hard work, and you will need to be logged in as root to do this.

——————————————————————————————-

4.3 Is there a defragmenter for ext2fs etc.?

Yes. There is `defrag`, a Linux file system defragmenter for ext2, Minix, and old-style ext file systems. It is available at *sunsite.unc.edu/pub/Linux/system/filesystems/defrag-0.70.tar.gz.*

Users of the ext2 file system can probably do without `defrag`, because ext2 contains extra code to keep fragmentation reduced even in very full file systems.

——————————————————————————————-

4.4 How do I format and create a file system on a floppy?

To format a 3.5-inch, high density floppy:

```
$ fdformat /dev/fd0H1440
$ mkfs -t ext2 -m 0 /dev/fd0H1440 1440
```

For a 5.25 inch floppy, use `fd0h1200` and `1200` as appropriate. For the 'B' drive use `fd1` instead of `fd0`.

The `-m 0` option tells `mkfs.ext2` not to reserve any space on the disk for the superuser–usually the last 10% is reserved for root.

The first command performs a low-level format. The second creates an empty file system. You can mount the floppy like a hard disk partition and simply `cp` and `mv` files, etc.

Device naming conventions generally are the same as for other Unices. They can be found in Matt Welsh's *Installation and Getting Started* Guide. (See "2.1 ()") A more detailed and technical description is *Linux Allocated Devices* by H. Peter Anvin, *hpa@zytor.com*, which is included in LaTeX and ASCII form in the kernel source distribution (probably in `/usr/src/kernel/Documentation`), as `devices.tex` and `devices.txt`.

——————————————————————————————————————-

4.5 I get nasty messages about inodes, blocks, and the like.

You may have a corrupted file system, probably caused by not shutting Linux down properly before turning off the power or resetting. You need to use a recent shutdown program to do this–for example, the one included in the util-linux package, available on sunsite and tsx-11.

If you're lucky, the program fsck (or e2fsck or xfsck as appropriate if you don't have the automatic fsck front-end) will be able to repair your file system. If you're unlucky, the file system is trashed, and you'll have to re-initialize it with mkfs (or mke2fs, mkxfs, etc.), and restore from a backup.

NB: don't try to check a file system that's mounted read/write–this includes the root partition, if you don't see

```
VFS: mounted root ... read-only
```

at boot time.

——————————————————————————————————————-

4.6 My swap area isn't working.

When you boot (or enable swapping manually) you should see

```
Adding Swap: NNNNk swap-space
```

If you don't see any messages at all you are probably missing

```
swapon -av
```

(the command to enable swapping) in your `/etc/rc.local` or `/etc/rc.d/*` (the system startup scripts), or have forgotten to make the right entry in `/etc/fstab`:

```
/dev/hda2       none       swap       sw
```

for example.

If you see

```
Unable to find swap-space signature
```

you have forgotten to run `mkswap`. See the manual page for details; it works much like `mkfs`.

Running, 'free' in addition to showing free memory, should display:

```
             total       used        free
Swap:        10188       2960        7228
```

[Andy Jefferson]

Take a look also at the Installation HOWTO for detailed instructions of how to set up a swap area.

——————————————————————————————————-

4.7 How do I remove LILO so my system boots DOS again?

Using DOS (MS-DOS 5.0 or later, or OS/2), type `FDISK /MBR` (which is not documented). This will restore a standard MS-DOS Master Boot Record. If you have DR-DOS 6.0, go into FDISK in the normal way and then select the 'Re-write Master Boot Record' option.

If you don't have MS-DOS or DR-DOS, you need to have the boot sector that LILO saved when you first installed it. You did keep that file, didn't you? It's probably called `boot.0301` or some such. Type

```
dd if=boot.0301 of=/dev/hda bs=445 count=1
```

(or `/dev/sda` if you're using a SCSI disk). This may also wipe out your partition table, so beware! If you're desperate, you could use

```
dd if=/dev/zero of=/dev/hda bs=512 count=1
```

This will erase your partition table and boot sector completely: you can then reformat the disk using your favorite software. But this will render the contents of your disk inaccessible–you'll lose it all unless you're an expert.

Note that the DOS MBR boots whichever (single!) partition is flagged as 'active'. You may need to use `fdisk` to set and clear the active flags on partitions appropriately.

——————————————————————————————————-

4.8 Why can't I use fdformat except as root?

The system call to format a floppy can only be done as root, regardless of the permissions of `/dev/fd0*`. If you want any user to be able to format a floppy, try getting the `fdformat2` program. This works around the problems by being setuid to root.

——————————————————————————————————-

4.9 My ext2fs partitions are checked each time I reboot.

See "9.12 (EXT2-fs: warning: mounting unchecked file system.)".

——————————————————————————————————-

4.10 My root file system is read-only!

Remount it. If `/etc/fstab` is correct, you can simply

```
mount -n -o remount /
```

If `/etc/fstab` is wrong, you must give the device name and possibly the type, too: e.g.

```
mount -n -o remount -t ext2 /dev/hda2 /
```

To understand how you got into this state, see, "9.12 (EXT2-fs: warning: mounting unchecked file system.)"

——————————————————————————————-

4.11 I have a huge /proc/kcore! Can I delete it?

None of the files in /proc are really there–they're all, "pretend," files made up by the kernel, to give you information about the system and don't take up any hard disk space.

/proc/kcore is like an 'alias' for the memory in your computer. Its size is the same as the amount of RAM you have, and if you read it as a file, the kernel does memory reads.

——————————————————————————————-

4.12 My AHA1542C doesn't work with Linux.

The option to allow disks with more than 1024 cylinders is only required as a workaround for a PC-compatible BIOS misfeature and should be turned 'off' under Linux. For older Linux kernels you need to turn off most of the 'advanced BIOS' options–all but the one about scanning the bus for bootable devices.

==

5 Porting, compiling and obtaining programs

——————————————————————————————-

5.1 How do I compile programs?

Most Linux software is written in C and compiled with the GNU C compiler. GCC is a part of every Linux distribution. The latest compiler version, documentation, and patches are on *ftp://ftp.gnu.org/pub/gnu/*.

Programs that are written in C++ must be compiled with the GNU G++ compiler, which is also included in Linux distributions and available from the same place as GCC.

To build version 2.0.x kernels, you will need GCC version 2.7.2.x. Trying to build a Linux kernel with a different compiler, like GCC 2.8.x, EGCS, or PGCC, may cause problems until code dependencies of the 2.7.2.x compilers are fixed.

Information on the EGCS compiler is at htmlurl url="http://egcs.cygnus.com" name="http://egcs.cygnus.com">.

Note that at this time, the kernel developers are not answering bug requests for 2.0.x version kernels, but instead are concentrating on developing 2.1.x version kernels.

[J.H.M. Dassen]

——————————————————————————————-

5.2 How do I port XXX to Linux?

In general, Unix programs need very little porting. Simply follow the installation instructions. If you don't know–and don't know how to find out–the answers to some of the questions asked during the installation procedure, you can guess, but this tends to produce buggy programs. In this case, you're probably better off asking someone else to do the port.

If you have a BSD-ish program, you should try using `-I/usr/include/bsd` and `-lbsd` on the appropriate parts of the compilation lines.

——————————————————————————————-

5.3 What is ld.so and where do I get it?

`Ld.so` is the dynamic library loader. Each binary using shared libraries used to have about 3K of start-up code to find and load the shared libraries. Now that code has been put in a special shared library, `/lib/ld.so`, where all binaries can look for it, so that it wastes less disk space, and can be upgraded more easily.

`Ld.so` can be obtained from *tsx-11.mit.edu/pub/linux/packages/GCC/* and mirror sites. The latest version at the time of writing is `ld.so.1.9.5.tar.gz`.

`/lib/ld-linux.so.1` is the same thing for ELF ("8.2 ()") and comes in the same package as the `a.out` loader.

——————————————————————————————-

5.4 How do I upgrade the libraries withough trashing my system?

Note: You should always have a rescue disk set ready when you perform this procedure, in the likely event that something goes wrong!

This procedure is especially difficult if you're upgrading very old libraries like libc4. But you should be able to keep libc4 on the same system with libc5 libraries for the programs that still need them. The same holds true for upgrading from libc5 to the newer-yet glibc2 libraries.

The problem with upgrading dynamic libraries is that, the moment you remove the old libraries, the utilities that you need to upgrade to the new version of the libraries don't work. There are ways around around this. One is to temporarily place a spare copy of the run time libraries, which are in /lib/, in /usr/lib/, or /usr/local/lib/, or another directory that is listed in the /etc/ld.so.conf file.

For example, when upgrading libc5 libraries, the files in /lib/ might look something like:

```
libc.so.5
libc.so.5.4.33
libm.so.5
libm.so.5.0.9
```

These are the C libraries and the math libraries. Copy them to another directory that is listed in /etc/ld.so.conf, like /usr/lib/.

```
cp -df /lib/libc.so.5* /usr/lib/
cp -df /lib/libm.so.5* /usr/lib/
ldconfig
```

Be sure to run ldconfig to upgrade the library configuration.

The files libc.so.5 and libm.so.5 are symbolic links to the actual library files. When you upgrade, the new links will not be created if the old links are still there, unless you use the -f flag with cp. The -d flag to cp will copy the symbolic link itself, and not the file it points to.

If you need to overwrite the link to the library directly, use the -f flag with ln.

For example, to copy new libraries over the old ones, try this. Make a symbolic link to the new libraries first, then copy both the libraries and the links to /lib/, with the following commands.

```
ln -sf ./libm.so.5.0.48 libm.so.5
ln -sf ./libc.so.5.0.48 libc.so.5
cp -df libm.so.5* /lib
cp -df libc.so.5* /lib
```

Again, remember to run ldconfig after you copy the libraries.

If you are satisfied that everything is working correctly, you can remove the temporary copies of the old libraries from /usr/lib/ or wherever you copied them.

——————————————————————————————-

5.5 Has anyone ported / compiled / written XXX for Linux?

First, look in the Linux Software Map–it's at *sunsite.unc.edu/pub/Linux/docs/linux-software-map*, and on the other FTP sites. A search engine is available on the World Wide Web at *http://www.boutell.com/lsm/*.

Check the FTP sites ("2.5 ()") first–search the `ls-lR` or `INDEX` files for appropriate strings.

Also look at the Linux Projects Map, *ftp.ix.de/pub/ix/Linux/docs/Projects-Map.gz*.

There's a search engine for Linux FTP archives at http://lfw.linuxhq.com/

Also check out the Freshmeat Web site *http://www.freshmeat.org*, which is really cool. ("8.7 ()"

If you don't find anything, you could download the sources to the program yourself and compile them. See "5.2 ()" If it's a large package that may require some porting, post a message to `comp.os.linux.development.apps`.

If you compile a large-ish program, please upload it to one or more of the FTP sites, and post a message to `comp.os.linux.announce` (submit your posting to *linux-announce@news.ornl.gov*).

If you're looking for an application program, the chances are that someone has already written a free version. The `comp.sources.wanted` FAQ has instructions for finding the source code.

——————————————————————————————-

5.6 Can I use code or a compiler compiled for a 486 on my 386?

Yes, unless it's the kernel.

The -m486 option to GCC, which is used to compile binaries for x486 machines, merely changes certain optimizations. This makes for slightly larger binaries that run somewhat faster on a 486. They still work fine on a 386, though, with a small performance hit.

However, from version 1.3.35 the kernel uses 486 or Pentium-specific instructions if configured for a 486 or Pentium, thus making it unusable on a 386.

GCC can be configured for a 386 or 486; the only difference is that configuring it for a 386 makes -m386 the default and configuring for a 486 makes -m486 the default. In either case, these can be overridden on a per-compilation basis or by editing /usr/lib/gcc-lib/i*-linux/n.n.n/specs.

There is an Alpha version of GCC which knows how to do optimization well for the 586, but it is quite unreliable, especially at high optimization settings. The Pentium GCC can be found on tsx-11.mit.edu in /pub/linux/ALPHA/pentium-gcc. I'd recommend using the ordinary 486 GCC instead; word has it that using -m386 produces code that's better for the Pentium, or at least slightly smaller.

——————————————————————————————-

5.7 What does gcc -O6 do?

Currently, the same as -O2 (GCC 2.5) or -O3 (GCC 2.6, 2.7). Any number greater than that does the same thing. The Makefiles of newer kernels use -O2, and you should probably do the same.

——————————————————————————————-

5.8 Where are linux/*.h and asm/*.h?

The files `/usr/include/linux/` and `/usr/include/asm/` are often soft links to the directories where the kernel headers are. They are usually under /usr/src/kernel*/.

If you don't have the kernel sources, download them–see, "7.6 ()"

Then, use `rm` to remove any garbage, and `ln` to create the links:

```
rm -rf /usr/include/linux /usr/include/asm
ln -sf /usr/src/linux/include/linux /usr/include/linux
ln -sf /usr/src/linux/include/asm /usr/include/asm
```

`/usr/src/linux/include/asm/` is a symbolic link to an architecture-specific asm directory–if you have a freshly unpacked kernel source tree, you must make symlinks. You'll also find that you may need to do 'make config' in a newly-unpacked kernel source tree, to create linux/autoconf.h.

——————————————————————————————-

5.9 I get errors when I try to compile the kernel.

See the previous question regarding the header files.

Remember that when you apply a patch to the kernel, you must use the `-p0` or `-p1` option: otherwise, the patch may be misapplied. See the `patch` manual page for details.

"`ld: unrecognized option '-qmagic'`" means that you should get a newer linker, from *ftp://tsx-11.mit.edu/pub/linux/packages/GCC/*, in the file `binutils-2.8.1.0.1.bin.tar.gz`.

——————————————————————————————-

5.10 How do I make a shared library?

For ELF,

```
gcc -fPIC -c *.c
gcc -shared -Wl,-soname,libfoo.so.1 -o libfoo.so.1.0 *.o
```

For `a.out`, get tools-n.nn.tar.gz from tsx-11.mit.edu, in /pub/linux/packages/GCC/src/. It comes with documentation that will tell you what to do. Note that `a.out` shared libraries are a very tricky business. Consider upgrading your libraries to ELF shared libraries. See the ELF HOWTO, at *sunsite.unc.edu/pub/Linux/docs/HOWTO/*

——————————————————————————-

5.11 My executables are (very) large.

With an ELF compiler ("8.2 ()"), the most common cause of large executables is the lack of an appropriate .so library link for one of the libraries you're using. There should be a link like libc.so for every library like libc.so.5.2.18.

With an `a.out compiler` the most common cause of large executables is the `-g` linker (compiler) flag. This produces (as well as debugging information in the output file) a program which is statically linked–one which includes a copy of the C library instead of a dynamically linked copy.

Other things worth investigating are `-O` and `-O2`, which enable optimization (check the GCC documentation), and `-s` (or the strip command) which strip the symbol information from the resulting binary (making debugging totally impossible).

You may wish to use `-N` on very small executables (less than 8K with the `-N`), but you shouldn't do this unless you understand its performance implications, and definitely never with daemons.

——————————————————————————-

5.12 Does Linux support threads or lightweight processes?

As well as the Unix multiprocessing model involving heavyweight processes, which is of course part of the standard Linux kernel, there are several implementations of lightweight processes or threads. Recent kernels implement a thread model, kthreads. In addition, there are the following packages available for Linux.

- GNU glibc2 for Linux has optional support for threads. The archive is available from the same place as glibc2, *ftp://ftp.gnu.org/pub/gnu*
- In sipb.mit.edu:/pub/pthread or ftp.ibp.fr:/pub/unix/threads/pthreads. Documentation isn't in the package, but is available on the World Wide Web at http://www.mit.edu:8001/people/proven/home_page.html. Newer Linux libc's contain the pthreads source. The GNU Ada compiler on sunsite.unc.edu in /pub/Linux/devel/lang/ada/gnat-3.01-linux+elf.tar.gz contains binaries made from that source code.
- In ftp.cs.washington.edu:/pub/qt-001.tar.Z is QuickThreads. More information can be found in the technical report, available on the same site as /tr/1993/05/UW-CSE-93-05-06.PS.Z.
- In gummo.doc.ic.ac.uk/rex/ is lwp, a very minimal implementation.
- In ftp.cs.fsu.edu:/pub/PART/, an Ada implementation. This is useful mainly because it has a lot of Postscript papers that you'll find useful in learning more about threads. This is not directly usable under Linux.

Please contact the authors of the packages in question for details.

——————————————————————————-

5.13 Where can I get 'lint' for Linux?

Roughly equivalent functionality is built into GCC. Use the -Wall option to turn on most of the useful extra warnings. See the GCC manual for more details (type control-h followed by i in Emacs and select the entry for GCC).

There is a freely available program called 'lclint' that does much the same thing as traditional lint. The announcement and source code are available at on larch.lcs.mit.edu in /pub/Larch/lclint/; on the World Wide Web, look at http://larch-www.lcs.mit.edu:8001/larch/lclint.html.

——————————————————————————-

5.14 Where can I find kermit for Linux?

Kermit is distributed under a non-GPL copyright that makes its terms of distribution somewhat different. The sources and some binaries are available on *kermit.columbia.edu.*

The WWW Home Page of the Columbia University Kermit project is *http://www.columbia.edu/kermit/.*

==

6 Solutions to common miscellaneous problems.

——————————————————————————-

6.1 free dumps core.

In Linux 1.3.57 and later, the format of /proc/meminfo was changed in a way that the implementation of free doesn't understand.

Get the latest version, from sunsite.unc.edu, in /pub/Linux/system/Status/ps/procps-0.99.tgz.

——————————————————————————-

6.2 My clock is very wrong.

There are two clocks in your computer. The hardware (CMOS) clock runs even when the computer is turned off, and is used when the system starts up and by DOS (if you use DOS). The ordinary system time, shown and set by "date," is maintained by the kernel while Linux is running.

You can display the CMOS clock time, or set either clock from the other, with /sbin/clock program–see "man 8 clock."

There are various other programs that can correct either or both clocks for system drift or transfer time across the network. Some of them may already be installed on your system. Try looking for adjtimex (corrects for drift), netdate, and getdate (get the time from the network), or xntp (accurate, full-featured network time daemon).

——————————————————————————-

6.3 Setuid scripts don't seem to work.

That's right. This feature has been disabled in the Linux kernel on purpose, because setuid scripts are almost always a security hole. Sudo and SuidPerl can provide more security that setuid scripts or binaries, especially if execute permissions are limited to a certain user ID or group ID.

If you want to know why setuid scripts are a security hole, read the FAQ for comp.unix.questions.

——————————————————————————————-

6.4 Free memory as reported by free keeps shrinking.

The "free" figure printed by free doesn't include memory used as a disk buffer cache–shown in the "buffers" column. If you want to know how much memory is really free add the "buffers" amount to "free"–newer versions of free print an extra line with this info.

The disk buffer cache tends to grow soon after starting Linux up. As you load more programs and use more files, the contents get cached. It will stabilize after a while.

——————————————————————————————-

6.5 When I add more memory, the system slows to a crawl.

This is a common symptom of a failure to cache the additional memory. The exact problem depends on your motherboard.

Sometimes you have to enable caching of certain regions in your BIOS setup. Look in the CMOS setup and see if there is an option to cache the new memory area which is currently switched off. This is apparently most common on a '486.

Sometimes the RAM has to be in certain sockets to be cached.

Sometimes you have to set jumpers to enable caching.

Some motherboards don't cache all of the RAM if you have more RAM per amount of cache than the hardware expects. Usually a full 256K cache will solve this problem.

If in doubt, check the manual. If you still can't fix it because the documentation is inadequate, you might like to post a message to comp.os.linux.hardware giving *all* of the details–make, model number, date code, etc., so other Linux users can avoid it.

——————————————————————————————-

6.6 Some programs (e.g. xdm) won't let me log in.

You are probably using non-shadow password programs and are using shadow passwords.

If so, you have to get or compile a shadow password version of the programs in question. The shadow password suite can be found at tsx-11.mit.edu:/pub/linux/sources/usr.bin/shadow/. This is the source code. The binaries are probably in linux/binaries/usr.bin/.

——————————————————————————————-

6.7 Some programs let me log in with no password.

You probably have the same problem as in "6.6 ()", with an added wrinkle.

If you are using shadow passwords, you should put a letter 'x' or an asterisk in the password field of /etc/passwd for each account, so that if a program doesn't know about the shadow passwords it won't think it's a passwordless account and let anyone in.

——————————————————————————————-

6.8 My machine runs very slowly when I run GCC / X / ...

You may have too little real memory. If you have less RAM than all the programs you're running at once, Linux will swap to your hard disk instead and thrash horribly. The solution in this case is to not run so many things at once or buy more memory. You can also reclaim some memory by compiling and using a kernel with less options configured. See "7.6 ()".

You can tell how much memory and swap you're using with the free command, or by typing:

```
cat /proc/meminfo
```

If your kernel is configured with a RAM disk, this is probably wasted space and will cause things to go slowly. Use LILO or rdev to tell the kernel not to allocate a RAM disk (see the LILO documentation or type `man rdev`).

——-

6.9 I can only log in as root.

You probably have some permission problems, or you have a file /etc/nologin.

In the latter case, put `rm -f /etc/nologin` in your `/etc/rc.local` or `/etc/rc.d/*` scripts.

Otherwise, check the permissions on your shell, and any file names that appear in error messages, and also the directories that contain these files, up to and including the root directory.

——-

6.10 My screen is all full of weird characters instead of letters.

You probably sent some binary data to your screen by mistake. Type `echo '\033c'` to fix it. Many Linux distributions have a command, "reset," that does this.

If that doesn't help, try a direct screen escape command.

```
echo <Ctrl-V><Ctrl-O>
```

This resets the default font of a Linux console. Remember to hold down the Control key and type the letter, instead of, for example, 'Ctrl-V'. The sequence

```
echo <Ctrl-V><Esc>c
```

causes a full screen reset. If there's data left on the shell command line after typing a binary file, press Ctrl-C a few times to restore the shell command line.

[Bernhard Gabler]

——-

6.11 I have screwed up my system and can't log in to fix it.

Reboot from an emergency floppy or floppy pair. For example, the Slackware boot and root disk pair in the install subdirectory of the Slackware distribution.

There are also two, do-it-yourself rescue disk creation packages in *sunsite.unc.edu/pub/Linux/system/Recovery.* These are better because they have your own kernel on them, so you don't run the risk of missing devices and file systems.

Get to a shell prompt and mount your hard disk with something like

```
mount -t ext2 /dev/hda1 /mnt
```

Then your file system is available under the directory `/mnt` and you can fix the problem. Remember to unmount your hard disk before rebooting (`cd` somewhere else first, or it will say it's busy).

——-

6.12 I've discovered a huge security hole in `rm`!

No you haven't. You are obviously new to Unix and need to read a good book to find out how things work. Clue: the ability to delete files under Unix depends on permission to write in that directory.

——-

6.13 `lpr(1)` and/or `lpd(8)` don't work.

First make sure that your `/dev/lp*` port is correctly configured. Its IRQ (if any) and port address need to match the settings on the printer card. You should be able to dump a file directly to the printer.

```
cat the_file >/dev/lp1
```

If lpr gives you a message like "myname@host: host not found," it may mean that the TCP/IP loopback interface, lo, isn't working properly. Loopback support is compiled into most distribution kernels. Check that the interface is configured with the `ifconfig` command. By Internet convention, the network number is 127.0.0.0, and the local host address is 127.0.0.1. If everything is configured correctly, you should be able to telnet to your own machine and get a `login` prompt.

Make sure that `/etc/hosts.lpd` contains the machine's host name.

If your machine has a network-aware `lpd`, like the one that comes with LPRng, make sure that `/etc/lpd.perms` is configured correctly.

Also look at the `Printing-HOWTO` "2.1 ()".

——-

6.14 Timestamps on files on MS-DOS partitions are set incorrectly.

There is a bug in the program "`clock`" (often found in `/sbin`). It miscounts a time zone offset, confusing seconds with minutes or something like that. Get a recent version.

——-

6.15 How do I get LILO to boot the `vmlinux` file?

>From kernel versions 1.1.80 on, the compressed kernel image, which is what LILO needs to find, is in `arch/i386/boot/zImage`. The `vmlinux` file in the root directory is the uncompressed kernel, and you shouldn't try to boot it.

This was changed to make it easier to build kernel versions for several different processors from one source tree.

==

7 How do I do this or find out that ... ?

———————————————————————————-

7.1 How can I get scrollback in text mode?

With the default US keymap, you can use Shift with the PageUp and PageDown keys. (The gray ones, not the ones on the numeric keypad.) With other keymaps, look in `/usr/lib/keytables`. You can remap the ScrollUp and ScrollDown keys to be whatever you like. For example, to remap them to the keys on an 84-key, AT keyboard.

The "screen" program, *http://vector.co.jp/vpack/browse/person/an010455.html* provides a searchable scrollback buffer and the ability to take “snapshots” of text-mode screens.

You can’t increase the amount of scrollback, because it is implemented using the video memory to store the scrollback text. You may be able to get more scrollback in each virtual console by reducing the total number of VC’s. See `linux/tty.h`.

———————————————————————————-

7.2 How do I switch virtual consoles? How do I enable them?

In text mode, press Left Alt-F1 to Alt-F12 to select the consoles `tty1` to `tty12`; Right Alt-F1 gives `tty13` and so on. To switch out of X Windows you must press Ctrl-Alt-F1, etc; Alt-F5 or whatever will switch back.

If you want to use a VC for ordinary login, it must be listed in `/etc/inittab`, which controls which terminals and virtual consoles have login prompts. The X Window System needs at least one free VC in order to start.

———————————————————————————-

7.3 How do I set the time zone?

Change directory to `/usr/lib/zoneinfo/`. Get the time zone package if you don’t have this directory. The source is available as *sunsite.unc.edu/pub/Linux/system/admin/time/timesrc-1.2.tar.gz*.

Then make a symbolic link named `localtime` pointing to one of the files in this directory (or a subdirectory), and one called `posixrules` pointing to `localtime`. For example:

```
ln -sf US/Mountain localtime
ln -sf localtime posixrules
```

This change will take effect immediately–try `date(1)`.

The manual page for tzset describes setting the time zone. Some programs recognize the TZ environment variable, but this is not POSIX-correct.

You should also make sure that your Linux kernel clock is set to the correct `GMT` time–type `date -u` and check that the correct UTC time is displayed. (“6.2 ()”)

——————————————————————————————————-

7.4 What version of Linux and what machine name am I using?

Type:

```
uname -a
```

——————————————————————————————————-

7.5 How can I enable or disable core dumps?

By using the `ulimit` command in `bash`, the `limit` command in `tcsh`, or the `rlimit` command in `ksh`. See the appropriate manual page for details.

This setting affects all programs run from the shell (directly or indirectly), not the whole system.

If you wish to enable or disable core dumping for all processes by default, you can change the default setting in `linux/sched.h`–see the definition of `INIT_TASK`, and look also in `linux/resource.h`.

——————————————————————————————————-

7.6 How do I upgrade/recompile my kernel?

See the Kernel HOWTO or the README files which come with the kernel release on ftp.cs.helsinki.fi, in `/pub/Software/Linux/Kernel/` and mirrors. (See “2.5 ()”) You may already have a version of the kernel source code installed on your system, but if it is part of a standard distribution it is likely to be somewhat out of date (this is not a problem if you only want a custom configured kernel, but it probably is if you need to upgrade.)

With newer kernels you can (and should) make all of the following targets. Don’t forget that you can specify multiple targets with one command.

```
make clean dep install modules modules_install
```

Also remember to update the module dependencies.

```
depmod -a
```

Remember that to make the new kernel boot you must run LILO after copying the kernel into your root partition–the Makefile in recent kernels has a special zlilo target for this; try:

```
make zlilo
```

Kernel version numbers with an odd minor version (ie, 1.1.x, 1.3.x) are the testing releases; stable production kernels have even minor versions (1.0.x, 1.2.x). If you want to try the testing kernels you should probably subscribe to the linux-kernel mailing list. (See “2.8 ().”)

——————————————————————————————————-

7.7 Can I have more than 3 serial ports by sharing interrupts?

Yes, but you won't be able to use simultaneously two ordinary ports which share an interrupt (without some trickery). This is a limitation of the ISA Bus architecture.

See the Serial HOWTO for information about possible solutions and workarounds for this problem.

——————————————————————————————-

7.8 How do I make a bootable floppy?

Make a file system on it with bin, etc, lib and dev directories–everything you need. Install a kernel on it and arrange to have LILO boot it from the floppy (see the LILO documentation, in lilo.u.*.ps).

If you build the kernel (or tell LILO to tell the kernel) to have a RAM disk the same size as the floppy the RAM disk will be loaded at boot time and mounted as root in place of the floppy.

See the Bootdisk HOWTO.

——————————————————————————————-

7.9 How do I remap my keyboard to UK, French, etc.?

For recent kernels, get /pub/Linux/system/Keyboards/kbd-0.90.tar.gz from sunsite.unc.edu. Make sure you get the appropriate version; you have to use the right keyboard mapping package for your kernel version.

For older kernels you have to edit the top-level kernel Makefile, in /usr/src/linux.

You may find more helpful information in The Linux Keyboard and Console HOWTO, by Andries Brouwer, at *sunsite.unc.edu/pub/Linux/docs/HOWTO*.

——————————————————————————————-

7.10 How do I get NUM LOCK to default to on?

Use the setleds program, for example (in /etc/rc.local or one of the /etc/rc.d/* files):

```
for t in 1 2 3 4 5 6 7 8
do
    setleds +num < /dev/tty$t > /dev/null
done
```

Setleds is part of the kbd package ("7.9 ()").

Alternatively, patch your kernel. You need to arrange for KBD_DEFLEDS to be defined to (1 << VC_NUMLOCK) when compiling drivers/char/keyboard.c.

——————————————————————————————-

7.11 How do I set (or reset) my initial terminal colors?

The following shell script should work for VGA consoles:

```
for n in 1 2 4 5 6 7 8; do
        setterm -fore yellow -bold on -back blue -store > /dev/tty$n
        done
```

Substitute your favorite colors, and use /dev/ttyS$n for serial terminals.

To make sure they are reset when people log out (if they've been changed):

Replace the references to "getty" (or "mingetty" or "uugetty" or whatever) in `/etc/inittab` with references to "`/sbin/mygetty`."

```
#!/bin/sh
setterm -fore yellow -bold on -back blue -store > $1
exec /sbin/mingetty $@
```

[Jim Dennis] ——————————————————————————-

7.12 How can I have more than 128Mb of swap?

Use several swap partitions or swap files–Linux supports up to 16 swap areas, each of up to 128Mb.

Very old kernels only supported swap partition sizes up to 16Mb.

Linux on machines with 8KB paging, like Alpha and Sparc64, support a swap partition up to 512KB. The 128KB limitation comes from PAGE_SIZE*BITSPERBYTE on machines with 4KB paging, but is 512KB on machines with 8KB paging. The limit is due to the use of a single page allocation map.

The file `mm/swapfile.c` has all of the gory details.

[Peter Moulder, Gordon Weast]

===

8 Miscellaneous information and questions answered.

——————————————————————————-

8.1 How do I program XYZ under Linux?

Read the manuals, or a good book on Unix. Manual pages (type "man man") are usually a good source of reference information on exactly how to use a particular command or function.

There is also a lot of GNU Info documentation, which is often more useful as a tutorial. Run Emacs and type C-h i, or type info info if you don't have or don't like Emacs. Note that the Emacs libc node may not exactly describe the latest Linux libc, or GNU glibc2. But the GNU progject and LDP are always looking for volunteers to upgrade their library documentation.

Anyway, between the existing Texinfo documentation, and the manual pages in sections 2 and 3, should provide enough information to get started.

As with all free software, the best tutorial is the source code itself.

The latest release of the Linux manual pages, a collection of useful GNU Info documentation, and various other information related to programming Linux, can be found on sunsite.unc.edu in /pub/Linux/docs/man-pages.

——————————————————————————-

8.2 What's all this about ELF?

See the ELF HOWTO by Daniel Barlow–note, this is not the file move-to-elf, which is a blow-by-blow account of how to upgrade to ELF manually.

Linux has two different formats for executables, object files, and object code libraries, known as, "ELF." (The old format is called 'a.out'.) They have advantages, including better support for shared libraries and dynamic linking.

Both a.out and ELF binaries can coexist on a system. However, they use different shared C libraries, both of which have to be installed.

If you want to find out whether your system can run ELF binaries, look in `/lib` for a file named, "`libc.so.5`." If it's there, you probably have ELF libraries. If you want to know whether your installation actually is ELF you can pick a representative program, like `ls`, and run `file` on it:

```
-chiark:~> file /bin/ls
/bin/ls: Linux/i386 impure executable (OMAGIC) - stripped

valour:~> file /bin/ls
/bin/ls: ELF 32-bit LSB executable, Intel 80386, version 1, stripped
```

There is a patch to get 1.2.x to compile using the ELF compilers, and produce ELF core dumps, at tsx-11.mit.edu in /pub/packages/GCC/. You do not need the patch merely to run ELF binaries. 1.3.x and later do not need the patch at all.

——————————————————————————————-

8.3 What is a .gz file ? And a .tgz ? And ... ?

.gz (and .z) files are compressed using GNU gzip. You need to use gunzip (which is a symlink to the gzip command which comes with most Linux installations) to unpack the file.

.taz and .tz are tar files (made with Unix tar) compressed using standard Unix compress.

.tgz (or .tpz) is a tar file compressed with gzip.

.lsm is a Linux Software Map entry, in the form of a short text file. Details about the LSM and the LSM itself are available in the docs subdirectory on sunsite.unc.edu.

.deb is a Debian Binary Package - the binary package format used by the Debian GNU/Linux distribution. It is manipulated using dpkg and dpkg-deb (available on Debian systems and from ftp.debian.org).

.rpm is a Red Hat RPM package, which is used in the Red Hat distribution. They can be found on ftp.redhat.com.

.bz2 is a file compressed by the more recent bzip program.

The "file" command can often tell you what a file is.

If you find that gzip complains when you try to uncompress a gzip'ed file you probably downloaded it in ASCII mode by mistake. You must download most things in binary mode–remember to type binary as a command in FTP before using, "get," to get the file.

——————————————————————————————-

8.4 What does VFS stand for?

Virtual File System. It's the abstraction layer between the user and real file systems like ext2, Minix and MS-DOS. Among other things, its job is to flush the read buffer when it detects a disk change on the floppy disk drive.

```
VFS: Disk change detected on device 2/0
```

——————————————————————————————-

8.5 What is a BogoMip?

"BogoMips" is a contraction of "Bogus MIPS." MIPS stands for (depending who you listen to) Millions of Instructions per Second, or Meaningless Indication of Processor Speed.

The number printed at boot time is the result of a kernel timing calibration, used for very short delay loops by some device drivers.

As a very rough guide, the BogoMips rating for your machine will be approximately:

```
386SX           clock * 0.14
386DX           clock * 0.18
486Cyrix/IBM    clock * 0.33
486SX/DX/DX2    clock * 0.50
586             clock * 0.39
```

If the number is wildly lower, you may have the Turbo button or CPU speed set incorrectly, or have some kind of caching problem (as described in "6.5 ().")

For values people have seen with other, rarer, chips, see the BogoMips Mini-HOWTO, on sunsite.unc.edu in /pub/Linux/docs/howto/mini/BogoMips/.

——————————————————————————-

8.6 What is the Linux Journal and where can I get it?

The Linux Journal is a monthly magazine (printed on paper) that is available on news stands and via subscription worldwide. Email *linux@ssc.com* for details. Their URL is *http://www.ssc.com/*.

——————————————————————————-

8.7 What online/free periodicals exist for Linux?

There are a number of recent additions to the list of periodicals devoted to Linux.

- Linux Gazette. *http://www.linuxgazette.com.*
- Linux Weekly News. *http://www.lwn.net.*
- Slashdot. *http://www.slashdot.org.*
- Freshmeat. *http://www.freshmeat.org.*

[Jim Dennis, Robert Kiesling]

——————————————————————————-

8.8 How many people use Linux?

Linux is freely available, and no one is required to register their copy with any central authority, so it is difficult to know. Several businesses survive solely on selling and supporting Linux. The Linux newsgroups are some of the most heavily read on Usenet, so the number is likely in the hundreds of thousands. Accurate numbers probably don't exist.

However, one brave soul, Harald T. Alvestrand, *Harald.T.Alvestrand@uninett.no*, has decided to try, and asks that if you use Linux, send a message to *linux-counter@uninett.no* with one of the following subjects: "I use Linux at home," "I use Linux at work," or, "I use Linux at home and at work." He will also accept 'third party' registrations–ask him for details.

Alternatively, you can register using the WWW forms found at *http://domen.uninett.no/˜hta/linux/counter.html.*

He posts his counts to aun.uninett.no in /pub/misc/linux-counter/ or at the web page above.

——————————————————————————————-

8.9 How should I pronounce Linux?

This is a matter of religious debate, of course!

If you want to hear Linus himself say how he pronounces it, download english.au or swedish.au from ftp.funet.fi (in /pub/Linux/PEOPLE/Linus/SillySounds/). If you have a sound card or the PC-speaker audio driver you can hear them by typing

```
cat english.au >/dev/audio
```

The difference isn't in the pronunciation of Linux but in the language Linus uses to say, "hello."

For the benefit of those who don't have the equipment or inclination: Linus pronounces Linux approximately as Leenus, where the "ee" is pronounced as in "feet," but rather shorter, and the "u" is like a much shorter version of the French "eu" sound in "peur" (pronouncing it as the "u" in "put" is probably passable).

==

9 Frequently encountered error messages.

——————————————————————————————-

9.1 Modprobe can't locate module, "XXX," and similar messages.

These types of messages mostly occur at boot time or shutdown. If modprobe, insmod, or rmmod complain about not being able to find a module, add the following to the /etc/modules.conf or /etc/modutils/aliases file, whichever is present on your system.

```
alias <module-name> off
```

And use the name of the module that appears in the error message.

[J.H.M. Dassen]

——————————————————————————————-

9.2 Unknown terminal type linux and similar.

In early kernels the default console terminal type has changed from “console” to “linux.” You must edit /etc/termcap to change the line reading:

```
console|con80x25:\
```

to

```
linux|console|con80x25:\
```

(there may be an additional dumb in there–if so it should be removed.)

To get the editor to work you may need say

```
TERM=console
```

(for bash and ksh), or

```
setenv TERM console
```

for csh or tcsh.

Some programs use /usr/lib/terminfo instead of /etc/termcap. For these programs you should upgrade your terminfo, which is part of ncurses.

——————————————————————————————-

9.3 lp1 on fire

This is a joke/traditional error message indicating that some sort of error is being reported by your printer, but that the error status isn't a valid one. It may be that you have some kind of I/O or IRQ conflict–check your cards' settings. Some people report that they get this message when their printer is switched off. Hopefully it isn't really on fire ...

In newer kernels, this message reads, “lp1 reported invalid error status (on fire, eh?)”

——————————————————————————————-

9.4 INET: Warning: old style ioctl... called!

You are trying to use the old network configuration utilities. The new ones can be found on ftp.linux.org.uk in /pub/linux/Networking/PROGRAMS/NetTools/ (source only, I'm afraid).

Note that they cannot be used just like the old-style programs. See the NET-2 HOWTO for instructions on how to set up the old-style networking programs correctly. Even better, see the NET-3 HOWTO and upgrade your networking software.

——————————————————————————————-

9.5 ld: unrecognized option '-m486'

You have an old version of ld. Install a newer binutils package–this will contain an updated ld. Look on tsx-11.mit.edu in /pub/linux/packages/GCC/ for binutils-2.6.0.2.bin.tar.gz.

——————————————————————————————-

9.6 GCC says Internal compiler error.

If the fault is repeatable (i.e., it always happens at the same place in the same file–even after rebooting and trying again, using a stable kernel) you have discovered a bug in GCC. See the GCC Info documentation (type Control-h i in Emacs, and select GCC from the menu) for details on how to report the error–make sure you have the latest version, though.

Note that this is probably not a Linux-specific problem. Unless you are compiling a program many other Linux users also compile, you should not post your bug report to any of the comp.os.linux groups.

If the problem is not repeatable, you may be experiencing memory corruption–see 9.7 ().

——————————————————————————————-

9.7 make says Error 139

Your compiler driver (gcc) dumped core. You probably have a corrupted, buggy, or old version of GCC–get the latest release. Alternatively, you may be running out of swap space–see 6.8 ().

If this doesn't fix the problem, you are probably having problems with memory or disk corruption. Check that the clock rate, wait states, and refresh timing for your SIMMS and cache are correct (hardware manuals are sometimes wrong, too). If so, you may have some marginal SIMMS, or a faulty motherboard or hard disk or controller.

Linux, like any Unix, is a very good memory tester–much better than MS-DOS based memory test programs.

Reportedly, some clone x87 math coprocessors can cause problems. Try compiling a kernel with math emulation (7.6 ().) You may need to use the "no387" kernel command line flag on the LILO prompt to force the kernel to use math emulation, or it may be able to work and still use the '387, with the math emulation compiled in but mainly unused.

More information about this problem is available on the Web at *http://www.bitwizard.nl/sig11/*.

——————————————————————————————-

9.8 shell-init: permission denied when I log in.

Your root directory and all the directories up to your home directory must be readable and executable by everybody. See the manual page for chmod or a book on Unix for how to fix the problem.

——————————————————————————————-

9.9 No utmp entry. You must exec ... when I log in.

Your /var/run/utmp is screwed up. You should have

```
> /var/run/utmp
```

in your `/etc/rc.local` or `/etc/rc.d/*`. See ("6.11 ()") Note that the utmp may also be found in /var/adm/ or /etc/ on some older systems.

——————————————————————————————-

9.10 Warning–bdflush not running.

Modern kernels use a better strategy for writing cached disk blocks. In addition to the kernel changes, this involves replacing the old update program which used to write everything every 30 seconds with a more subtle daemon (actually a pair), known as bdflush.

Get bdflush-n.n.tar.gz from the same place as the kernel source code (7.6 ()) and compile and install it. Bdflush should be started before the usual boot-time file system checks. It will work fine with older kernels as well, so there's no need to keep the old update around.

————————————————————————————————-

9.11 Warning: obsolete routing request made.

This is nothing to worry about. The message means that your version route is a little out of date, compared to the kernel. You can make the message go away by getting a new version of route from the same place as the kernel source code. (7.6 ())

————————————————————————————————-

9.12 EXT2-fs: warning: mounting unchecked file system.

You need to run e2fsck (or fsck -t ext2 if you have the fsck front end program) with the -a option to get it to clear the 'dirty' flag, and then cleanly unmount the partition during each shutdown.

The easiest way to do this is to get the latest fsck, umount, and shutdown commands, available in Rik Faith's util-linux package ('2.5 ()") You have to make sure that your /etc/rc*/ scripts use them correctly.

NB: don't try to check a file system that's mounted read/write–this includes the root partition if you don't see

```
VFS: mounted root ... read-only
```

at boot time. You must arrange to mount the root file system read/only to start with, check it if necessary, and then remount it read/write. Read the documentation that comes with util-linux to find out how to do this.

Note that you need to specify the -n option to mount so it won't try to update /etc/mtab, since the root file system is still read-only, and this will otherwise cause it to fail.

————————————————————————————————-

9.13 EXT2-fs warning: maximal count reached.

This message is issued by the kernel when it mounts a file system that's marked as clean, but whose "number of mounts since check" counter has reached the predefined value. The solution is to get the latest version of the ext2fs utilities (e2fsprogs-0.5b.tar.gz at the time of writing) from the usual sites. ('2.5 ()")

The maximal number of mounts value can be examined and changed using the tune2fs program from this package.

————————————————————————————————-

9.14 EXT2-fs warning: checktime reached.

Kernels from 1.0 onwards support checking a file system based on the elapsed time since the last check as well as by the number of mounts. Get the latest version of the ext2fs utilities. “(9.13 ()”)

——————————————————————————————-

9.15 df says Cannot read table of mounted file systems.

There is probably something wrong with your `/etc/mtab` or `/etc/fstab` files. If you have a reasonably new version of mount, /etc/mtab should be emptied or deleted at boot time (in /etc/rc.local or /etc/rc.d/*), using something like

```
rm -f /etc/mtab*
```

Some versions of SLS have an entry for the root partition in /etc/mtab made in /etc/rc* by using rdev. This is incorrect–the newer versions of mount do this automatically.

Other versions of SLS have a line in /etc/fstab that looks like:

```
/dev/sdb1   /root   ext2   defaults
```

This is wrong. /root should read simply /.

——————————————————————————————-

9.16 fdisk says Partition X has different physical/logical ...

If the partition number (X, above) is 1, this is the same problem as in “9.17 ()”

If the partition begins or ends on a cylinder numbered greater than 1024, this is because the standard DOS disk geometry information format in the partition table can’t cope with cylinder numbers with more than 10 bits. You should see “4.1 ()”

——————————————————————————————-

9.17 fdisk: Partition 1 does not start on cylinder boundary.

The version of fdisk that comes with many Linux systems creates partitions that fail its own validity checking. Unfortunately, if you’ve already installed your system, there’s not much you can do about this, apart from copying the data off the partition, deleting and remaking it, and copying the data back.

You can avoid the problem by getting the latest version of fdisk, from Rik Faith’s util-linux package (available on all the usual FTP sites). Alternatively, if you are creating a new partition 1 that starts in the first cylinder, you can do the following to get a partition that fdisk likes.

- Create partition 1 in the normal way. A ‘p’ listing will produce the mismatch complaint.
- Type ‘u’ to set sector mode and do ‘p’ again. Copy down the number from the “End” column.
- Delete partition 1.
- While still in sector mode, re-create partition 1. Set the first sector to match the number of sectors per track. This is the sector number in the first line of the ‘p’ output. Set the last sector to the value you wrote down in the step above.

- Type ‘u’ to reset cylinder mode and continue with other partitions.

Ignore the message about unallocated sectors–they refer to the sectors on the first track apart from the Master Boot Record, and they are not used if you start the first partition in track 2.

——————————————————————————-

9.18 fdisk says partition n has an odd number of sectors.

The PC disk partitioning scheme works in 512-byte sectors, but Linux uses 1K blocks. If you have a partition with an odd number of sectors, the last sector is wasted. Ignore the message.

——————————————————————————-

9.19 mtools says cannot initialize drive XYZ

This means that mtools is having trouble accessing the drive. This can be due to several things.

Often this is due to the permissions on floppy drive devices (/dev/fd0* and /dev/fd1*) being incorrect–the user running mtools must have the appropriate access. See the manual page for chmod for details.

Most versions of mtools distributed with Linux systems (not the standard GNU version) use the contents of a file /etc/mtools to determine which devices and densities to use, in place of having this information compiled into the binary. Mistakes in this file often cause problems. There is often no documentation about this.

For the easiest way to access your MS-DOS files (especially those on a hard disk partition) see 3.2 () Note–you should never use mtools to access files on an msdosfs mounted partition or disk!

——————————————————————————-

9.20 At the start of booting: Memory tight

This means that you have an extra-large kernel, which means that Linux has to do some special memory-management magic to be able to boot itself from the BIOS. It isn’t related to the amount of physical memory in your machine. Ignore the message, or compile a kernel containing only the drivers and features you need. (“7.6 ())”

——————————————————————————-

9.21 My syslog says ‘end_request: I/O error, ...’.

This error message, and messages like it, almost always indicate a hardware error with a hard drive.

This commonly indicates a hard drive defect. The only way to avoid further data loss is to completely shut own the system. You must also make sure that whatever data is on the drive is backed up, and restore it to a non-defective hard drive.

This error message may also indicate a bad connection to the drive, especially with homebrew systems. If you install an IDE drive, ALWAYS use new cables. It’s probably is a good idea with SCSI drives, too.

In one instance, this error also seemed to coincide with a bad ground between the system board and the chassis. Be sure that all electrical connections are clean and tight before placing the blame on the hard drive itself.

[Peter Moulder, Theodore T’so]

——————————————————————————————-

9.22 You don't exist. Go away.

This is not a viral infection :-). It comes from programs like write, talk, and wall, if your invoking UID doesn't correspond to a valid user (probably due to /etc/passwd being corrupted), or if the session (pseudoterminal, specifically) you're using isn't properly registered in the utmp file (probably because you invoked it in a funny way).

===

10 The X Window System.

——————————————————————————————-

10.1 Does Linux support X Windows?

Yes. Linux uses XFree86 (the current version is 3.3.2, which is based on X11R6). You need to have a video card which is supported by XFree86. See the Linux XFree86 HOWTO for more details.

Most Linux distributions nowadays come with an X installation.

However, you can install or upgrade your own, from /pub/Linux/X11/Xfree86-* on sunsite.unc.edu and its mirror sites.

——————————————————————————————-

10.2 Where can I get an XF86Config for my system?

See the Linux XFree86 HOWTO, recent versions of Installation and Getting Started, and the instructions for the XF86Setup program.

The contents of the XF86Config file depend on the your exact combination of video card and monitor. It can either be configured by hand, or using the XF86Setup utility. Read the instructions that came with XFree86, in /usr/X11R6/lib/X11/etc. The file you probably need to look at most is README.Config.

You should *not* use the sample XF86Config.eg file which is included with newer versions of XFree86 verbatim, because the wrong video clock settings can damage your monitor.

Please don't post to comp.os.linux.x asking for an XF86Config, and please don't answer such requests.

——————————————————————————————-

10.3 xterm logins show up strangely in who, finger.

The xterm that comes with XFree86 2.1 and earlier doesn't correctly understand the format that Linux uses for the /var/adm/utmp file, where the system records who is logged in. It therefore doesn't set all the information correctly.

The Xterms in XFree86 3.1 and later versions fix this problem.

——————————————————————————————-

10.4 I can't get X Windows to work right.

Read the XFree86 HOWTO–note the question and answer section.

Try reading comp.windows.x.i386unix–specifically read the the FAQ for that group.

Please don't post X Windows or XFree86 related questions to comp.os.linux.x unless they are Linux-specific.

==

11 Questions applicable to very out-of-date software.

The questions in this section are only relevant to users of software that is at least three months old.

Please let me know if you find the answer to a problem you had here, as unused questions in this section will eventually disappear. (See "13.1 ()")

——————————————————————————-

11.1 fdisk says cannot use nnn sectors of this partition.

Originally Linux only supported the Minix file system, which cannot use more than 64Mb per partition. This limitation is not present in the more advanced file systems that are now available, such as ext2fs (the 2nd version of the Extended File System, the 'standard' Linux file system).

If you intend to use ext2fs you can ignore the message.

——————————————————————————-

11.2 GCC sometimes uses huge amounts of virtual memory and thrashes.

Older versions of GCC had a bug which made them use lots of memory if you tried to compile a program which had a large static data table in it.

You can either upgrade your version of GCC, or add more swap space if necessary, or just wait for the program to finish compiling.

==

12 How to get further assistance.

——————————————————————————-

12.1 You still haven't answered my question!

Please read all of this answer before posting. I know it's a bit long, but you may be about to make a fool of yourself in front of 50,000 people and waste hundreds of hours of their time. Don't you think it's worth spending some of your time to read and follow these instructions?

If you think an answer is incomplete or inaccurate, please e-mail Robert Kiesling at *kiesling@terracom.net*.

Read the appropriate Linux Documentation Project books–see "2.1 ()"

If you're a Unix newbie, read the FAQ for comp.unix.questions, and those for any of the other comp.unix.* groups that may be relevant.

Linux has so much in common with commercial Unices, that almost everything you read there will apply to Linux. The FAQs, like all FAQs, be found on rtfm.mit.edu in /pub/usenet/news.answers (the *mail-server@rtfm.mit.edu* can send you these files, if you don't have FTP access). There are mirrors of rtfm's FAQ archives on various sites–check the Introduction to *.answers posting, posted, or look in news-answers/introduction in the directory above.

Check the relevant HOWTO for the subject in question, if there is one, or an appropriate old style sub-FAQ document. Check the FTP sites.

Try experimenting–that's the best way to get to know Unix and Linux.

Read the documentation. Check the manual pages (type "man man" if you don't know about manual pages. Try "man -k subject"–it often lists useful and relevant manual pages.

Check the Info documentation (type C-h i, i.e. Control H followed by I in Emacs). This isn't just for Emacs. For example, the GCC documentation lives here as well.

There will also often be a README file with a package that gives installation and/or usage instructions.

Make sure you don't have a corrupted or out-of-date copy of the program in question. If possible, download it again and re-install it–you probably made a mistake the first time.

Read comp.os.linux.announce–this often contains very important information for all Linux users.

General X Window System questions belong in comp.windows.x.i386unix, not in comp.os.linux.x. But read the group first (including the FAQ), before you post.

Only if you have done all of these things and are still stuck, should you post to the appropriate comp.os.linux.* newsgroup. Make sure you read the next question first. "(12.2 ())"

——————————————————————————————-

12.2 What to put in a request for help.

Please read the following advice carefully about how to write your posting or email. Making a complete posting will greatly increase the chances that an expert or fellow user reading it will have enough information and motivation to reply.

This advice applies both to postings asking for advice and to personal email sent to experts and fellow users.

Make sure you give full details of the problem, including:

- What program, exactly, you are having problems with. Include the version number if known and say where you got it. Many standard commands tell you their version number if you give them a `-version` option.
- Which Linux release you're using (Red Hat, Slackware, Debian, or whatever) and what version of that release.
- The exact and complete text of any error messages printed.
- Exactly what behavior you expected, and exactly what behavior you observed. A transcript of an example session is a good way to show this.
- The contents of any configuration files used by the program in question and any related programs.
- What version of the kernel and shared libraries you have installed. The kernel version can be found by typing uname -a, and the shared library version by typing ls -l /lib/libc.so.4.
- Details of what hardware you're running on, if it seems appropriate.

You are in little danger of making your posting too long unless you include large chunks of source code or uuencoded files, so err on the side of giving too much information.

Use a clear, detailed Subject line. Don't put things like 'doesn't work', 'Linux', 'help', or 'question' in it–we already know that. Save the space for the name of the program, a fragment of an error message, or summary of the unusual behavior.

If you report an 'unable to handle kernel paging request' message, follow the instructions in the Linux kernel sources README file for turning the numbers into something more meaningful. If you don't do this, no one who reads your post will be able to do it for you. The mapping from numbers to function names varies from one kernel to another.

Put a summary paragraph at the top of your posting.

At the bottom of your posting, ask for responses by email and say you'll post a summary. Back this up by using Followup-To: poster. Then, actually post the summary in a few days or a week or so. Don't just concatenate the replies you got–summarize. Putting the word SUMMARY in your summary's Subject line is also a good idea. Consider submitting the summary to comp.os.linux.announce.

Make sure your posting doesn't have an inappropriate References: header line. This marks your article as part of the thread of the article referred to, which will often cause it to be junked by readers, along with the rest of a boring thread.

You might like to say in your posting that you've read this FAQ and the appropriate HOWTO's–this may make people less likely to skip your posting.

Remember that you should not post email sent to you personally without the sender's permission.

———————————————————————————-

12.3 I want to mail someone about my problem.

Try to find the author or developer of whatever program or component is causing you difficulty. If you have a contact point for your Linux distribution, you should use it.

Please put everything in your e-mail message that you would put in a posting asking for help.

Finally, remember that, despite the fact that most of the Linux community are very helpful and responsive to e-mailed questions, you're asking for help from unpaid volunteers, so you have no right to expect an answer.

==

13 Administrative information and acknowledgments.

———————————————————————————-

13.1 Feedback is invited.

Please send me your comments on this FAQ.

I accept contributions to the FAQ in any format. All contributions, comments, and corrections are gratefully received. Please send e-mail to *kiesling@terracom.net*.

If you wish to refer to a question in the FAQ, it's better for me if you do so by the question heading, rather than number. The question numbers are generated automatically, and I don't see them in the source file I edit.

I prefer comments in English to patch files–context diff is not my first language.

————————————————————————————————-

13.2 Formats in which this FAQ is available.

This document is available as an ASCII text file, an HTML World Wide Web page, Postscript, and as a USENET news posting.

All of these formats are generated from SGML source using SGML Tools and the LinuxDoc DTD.

The HTML version of this FAQ is available as *http://sunsite.unc.edu/LDP/* at other sites.

The Usenet version is posted regularly to news.answers, comp.answers, comp.os.linux.misc, and comp.os.linux.announce. It is archived at *ftp://rtfm.mit.edu/pub/usenet-by-hierarchy/comp/os/linux/misc/*.

The most recent text, HTML, SGML, and Postscript versions are available from the Linux archives at sunsite.unc.edu, and from *http://www.terracom.net/˜kiesling*

————————————————————————————————-

13.3 Authorship and acknowledgments.

This FAQ is compiled and maintained by Robert Kiesling *kiesling@ix.netcom.com*, with assistance and comments from Linux activists all over the world.

Special thanks are due to Matt Welsh, who moderated comp.os.linux.announce and comp.os.linux.answers, coordinated the HOWTO's and wrote substantial portions of many of them, Greg Hankins and Timothy Bynum, the former and current Linux Documentation Project HOWTO maintainers, Lars Wirzenius and Mikko Rauhala, the former and current moderators of comp.os.linux.announce, Marc-Michel Corsini, who wrote the original Linux FAQ, and Ian Jackson, the previous FAQ maintainer. Thanks also to Roman Maurer for his many updates and additions, especially with European Web sites, translations, and general miscellany.

Last but not least, thanks to Linus Torvalds and the other contributors to Linux for giving us something to talk about!

————————————————————————————————-

13.4 Disclaimer and Copyright.

Note that this document is provided 'as is'. The information in it is *not* warranted to be correct. Use it at your own risk.

Note that this restriction is not intended to prohibit charging for the service of printing or copying the document.

Exceptions to these rules may be granted. I would be happy to answer any questions regarding this copyright. E-mail me at *kiesling@ix.netcom.com*. As the license below says, these restrictions are here to protect the contributors, not to restrict you as educators and learners.

If you're a publishing company interested in distributing any of the LDP manuals, read on.

By the license given in the previous section, anyone is allowed to publish and distribute verbatim copies of the Linux Documentation Project manuals. You don't need our explicit permission for this. However, if you would like to distribute a translation or derivative work based on any of the LDP manuals, you must obtain permission from the author, in writing, before doing so.

All translations and derivative works of LDP manuals must be placed under the Linux Documentation License given in the previous section. That is, if you plan to release a translation of one of the manuals, it must be freely distributable by the above terms.

You may, of course, sell the LDP manuals for profit. We encourage you to do so. Keep in mind, however, that because the LDP manuals are freely distributable, anyone may photocopy or distribute printed copies free of charge, if they wish to do so.

We do not require to be paid royalties for any profit earned from selling LDP manuals. However, we would like to suggest that if you do sell LDP manuals for profit, that you either offer the author royalties, or donate a portion of your earnings to the author, the LDP as a whole, or to the Linux development community. You may also wish to send one or more free copies of the LDP manual that you are distributing to the author. Your show of support for the LDP and the Linux community will be very appreciated.

We would like to be informed of any plans to publish or distribute LDP manuals, just so we know how they're becoming available. If you are publishing or planning to publish any LDP manuals, please send email to Matt Welsh (email mdw@sunsite.unc.edu).

We encourage Linux software distributors to distribute the LDP manuals (such as the Installation and Getting Started Guide) with their software. The LDP manuals are intended to be used as the ''official'' Linux documentation, and we'd like to see mail-order distributors bundling the LDP manuals with the software. As the LDP manuals mature, hopefully they will fulfill this goal more adequately.

Matt Welsh, mdw@sunsite.unc.edu