

# Linux Basics

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# Outline

- ① Linux history
- ② Linux distributions
- ③ Linux insight

# Skill-Level

- Ever used linux?
- Installed Linux?
- What is a distribution?
- XUbuntu? Debian? Red Hat? Fedora? Gentoo? Arch Linux?
- `cat my_movie_collection | grep Hackers`
- `chmod 777 *`
- `./configure && make && make install`
- `make && make modules_install`
- `sed -i 's/teh/the/g' thesis.tex`
- LPIC?

# Skill-Level

- What do you want to know?

# Outline

- 1 Linux history
- 2 Linux distributions
- 3 Linux insight

# UNIX / GNU

- 1960s-1970: UNIX
- 1983: Richard Stallman started GNU (Free UNIX-like OS)
- 1987: MINIX by Andrew S. Tanenbaum
- 1991: GNU nearly complete // Kernel missing



# Linux

- MINIX only for 16Bit-Systems
- Linus Torvalds programmed a terminal emulator to access the UNIX-Server of his university
- wanted to take advantage of his new PC with an 80386 processor
- therefore OS independant
- used GNU C compiler on MINIX



# Torvalds on comp.os.minix

Hello everybody out there using minix -

I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

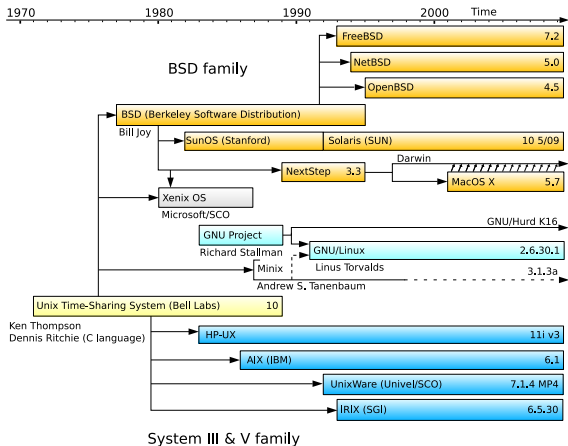
Linus (torvalds@kruuna.helsinki.fi)

PS. Yes it's free of any minix code, and it has a multi-threaded fs. It is NOT portable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-).

# Open Source

- Free as in freedom, not as in free-beer
- Sourcecode available
- Free to copy
- Free to change / redistribute
- Free Software Foundation and Open Source Initiative (OSI)
- Licenses: GPL, BSD, Apache, Beerware

# Unix timeline



# Outline

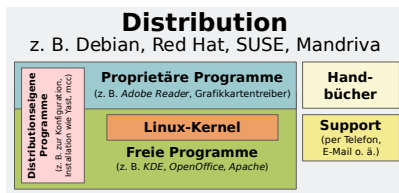
- 1 Linux history
- 2 Linux distributions**
- 3 Linux insight

# What's a distribution?

## Important

Linux is just the kernel, nothing more.

# What's a distribution?



## To build a distribution you need... (in general)

- the linux kernel,
- some GNU stuff,
- a package management system
- and applications



# Where are the differences?

Guide to your favourite Linux distro:

- Installtools (LFS vs. Ubuntu)
- Hardware compatibility (x86, devices, ...)
- Documentation / Support (active community, books)
- Principles (live, free software, KISS)
- License (GPL, DFSG)
- Package Layout (meta vs. binary)
- Help: Linux distribution chooser

# Package Management Systems

- Software repository
- Verify checksums / signatures of packages
- Updating
- Uninstalling
- Dependencies

# Types and Examples

- Binary packages
  - `deb` Debian package - `dpkg`, `apt`, `aptitude`, ..
  - `RPM` RPM Package Manager - `rpm`, `yum`, ...
- Source packages
  - `ebuild` How to retrieve, compile, and install a package in Gentoo's Portage system - `emerge`

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# Boot

Typical boot sequence:

- 1 BIOS
- 2 MBR
- 3 Boot Loader
- 4 Kernel (+initrd)
- 5 init

# Shell

- {Shell, Bash, zsh, screen, ksh}
- Command line interface
- Powerful tool

# Filesystem Hierarchy Standard (FHS)

- defines main directories and contents
- version 2.3 (2004)
- /
- virtual file system

# Filesystem Hierarchy Standard (FHS)

- static files
- variable files
- shareable files
- unshareable files

# Directory structure I

- `/bin`
- `/boot`
- `/dev`
- `/etc`
- `/home`
- `/lib`
- `/media`

# Directory structure I

- `/bin` (essential command binaries)
- `/boot` (bootloader files)
- `/dev` (devices)
- `/etc` (host-specific system-wide configuration files)
- `/home` (optional, user directories)
- `/lib` (kernel modules and dynamic libraries for `/bin` and `/sbin`)
- `/media` (optional, mount points for removable media)

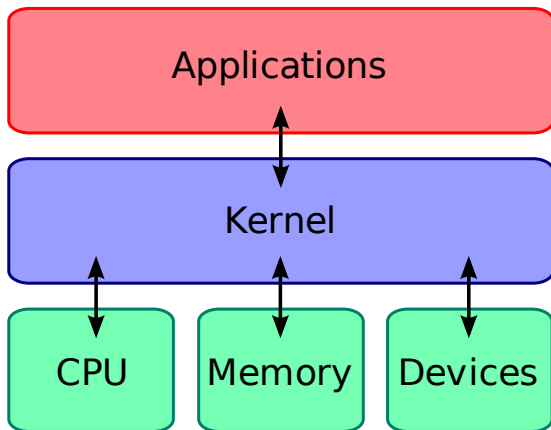
# Directory structure II

- /mnt
- /opt
- /root
- /sbin
- /srv
- /tmp
- /usr
- /var

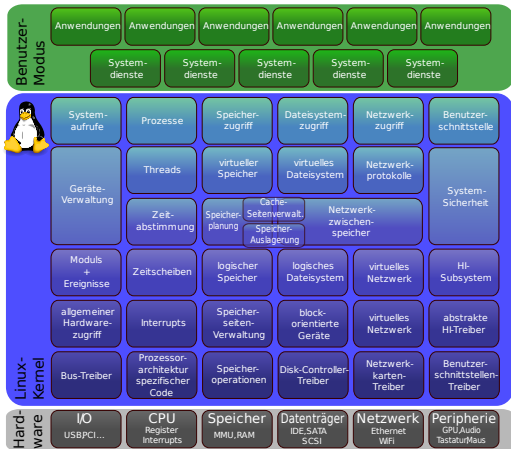
# Directory structure II

- /mnt (optional, temporarily mounted filesystems)
- /opt (optional software packages)
- /root (optional, “home“-directory for the root user)
- /sbin (essential system binaries, for root user only)
- /srv (service-data)
- /tmp (temporary files)
- /usr (secondary hierarchy for read-only user data)
- /var (variable data)

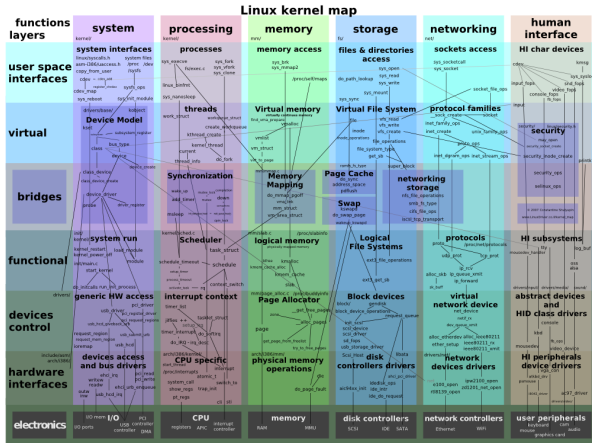
# Linux Kernel Layout



# Linux Kernel Structure



# Linux Kernel Map



# Linux Kernel

- version: 3.1 (“Wet Seal” / “Divemaster Edition“)
- december: 3.2 (“Saber-toothed Squirrel“)
- license: GPL 2 / proprietary (BLOBs)
- monolithic kernel
- c / assembler
- 14.856.072 loc in 37.098 files

# LPIC

- Linux Professional Institute
- Non-profit organization
- Vendor-independent certification for Linux system administrators and programmers
- Five year recertification policy

# LPIC Levels

- LPIC-1 (“Junior Level Linux Professional“)
  - Exam 101 - Systemarchitectures, Partitioning, Devices, Drivers, LFH, Package-Management, GNU-/Unix-Commands, ...
  - Exam 102 - Shell, Scripts, SQL, UI, Desktop, Network basics, Security, ...
- LPIC-2 (“Advanced Level Linux Professional“)
  - Exam 201 - Kernel, Filesystem, Hardware, System administration, Scripting, ...
  - Exam 202 - Network configuration, Mail/News, DNS, System security, ...
- LPIC-3 (“Senior Level Linux Professional“)
  - Six exams

Thanks for your attention.

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