Unix for Advanced Users[*]

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Administrative Issues

2 hours lecture, 1 hour tutorials.

5 CP (can be included as "free points").

Time and venue:

    Lecture: Monday 16:15-18:00, Bldg E1 4 (MPI), Room 024.

    Tutorials: Tuesday 16:15-18:00 (not every week), Room to be announced.

Examinations: Written exam at the end of the semester.

E-Mail:

    `uwe@mpi-inf.mpg.de`

Lecture web page:

    `http://www.mpi-inf.mpg.de/~uwe/lehre/unixfau/`

Registration:

    Lecture: on the lecture web page.
    (everybody!)

    Exams: using HISPOS.
    (if you want a certificate)

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[*]This document contains the text of the lecture slides (almost verbatim) plus some additional information. It is not a full script and does not contain the examples and additional explanations given during the lecture. Moreover it should not be taken as an example how to write a research paper – neither stylistically nor typographically.

Topics of the Course

Unix . . .

    in its generic sense, including but not limited to Linux

for Advanced . . .

    basic knowledge is assumed
    in particular: command-line interface, some programming

Users

    neither a system administration
    nor a system programming course

Focus of the course:

    Using the Unix tool box
    effectively, efficiently, safely
    in real life

Not handled in detail:

    System adminstration

    System programming

    Window systems, desktops

Contents:

    History of Unix
    Events, characters, codes, glyphs
    File system
    Programs and processes
    Shells
    Shell programming
    Quoting
    Regular expressions
    Efficient editing

1 History of Unix

Legally:

> UNIX is a registered trademark of The Open Group.
> (previous owners: Bell Labs, AT&T, USL, Novell.)

Colloquially, "Unix" (or "*nix", etc.) is used as a generic operating system name to describe UNIX system-like operating systems.

The Prehistory

1960s:

> Experimental operating system MULTICS developed by MIT, AT&T Bell Laboratories, General Electric).
>
> Goal: Multi-user system, dialog system.
>
> Many novel features, but no commercial success.
>
> AT&T Bell Laboratories (Ken Thompson and others) left the development team.
>
> Ken Thompson and Dennis Ritchie started working on a new operating system for a DEC PDP-7.

Unix at Bell Labs

Version 1 (1971):

> Developed by Computer Research Group, Bell Labs, running on a DEC PDP-7.
>
> Written in Assembler code.

Version 4 (1973):

> First version in C (Dennis Ritchie) for a PDP-11.
>
> → Portability.
>
> Used for text processing in the patent department.

Version 6 (1975):

> First version that was available to a larger user community outside of Bell Labs (including source code).
>
> In particular: used in universities → 1.xBSD.

Version 7 (1979):

First truly portable version.

Bourne shell replaced Thompson shell.

An "improvement over all preceding and following Unices" (Stephen Bourne).

Berkeley Software Distribution

BSD Unix (based on Version 6, Version 7):

2.xBSD (1978): for PDP-11, featuring csh and vi.

4.2BSD (1983), featuring job control and curses.

4.3BSD (1986): for VAX.

→ SunOS (SUN), Ultrix (DEC).

Unix at Bell Labs, ctd.

System III (1982), System V (1983):

First commercial Unix by AT&T.

Integrated some features of BSD, such as vi.

SVID (1984): AT&T: System V Interface Definition.

SVR4 (1988):

Combined System V, BSD, SunOS (by SUN, BSD-based).

→ Solaris 2 = SunOS 5.0 (SUN).

Standardization Wars

Standards and standardization committees:

X/Open standards group (1984):
Bull, ICL, Siemens, Olivetti, Nixdorf, Philips, Ericsson.
XPG (1985): X/OPEN Portability Guide

SVR4 (1988), developed by AT&T, Sun.

OSF (Open Software Foundation, 1988):
Apollo, Bull, DEC, HP, IBM, Nixdorf, Siemens,
Philips, Hitachi.

UI (Unix International, 1988):
AT&T, Sun.

Standards and standardization committees:

POSIX (1988):
IEEE (= Institute of Electrical and Electronics Engineers).

COSE (Common Open Software Environment, 1994/1996):
OSF + UI → "new OSF",
"new OSF" + X/Open → The Open Group.

Unix on Microcomputers

Xenix:

Microsoft (1980).

First Unix on Intel hardware (80x86).

At some time, "the most widespread version of the UNIX operating system, according to the number of machines on which it runs".

Sold to SCO in 1987.

Free Software

GNU:

Richard Stallman (1985):
GNU Manifesto,
Free Software Foundation,
General Public License.

Reaction to restrictive software licenses and software distributed without source code.

Operating system kernel "Hurd" did not get mature enough for general usage.

But: many utilities (e. g., emacs, bash, gcc).

386BSD, NetBSD, FreeBSD, OpenBSD:

Based on 4.3BSD (without any AT&T code!)

Lawsuit between AT&T/USL and Berkeley until 1994.

Linux:

Started by Linus B. Torvalds in 1991.

Version 1.0 in 1994.

Under GPL, but not by FSF.

Utility programs mostly from GNU project.

Essentially POSIX compatible + SysV/BSD extensions.

Many distributions: Debian, Gentoo, Knoppix, Red Hat, Slackware, SUSE, Ubuntu, ...

Latest Developments

Mac OS X:

Unlike previous versions of Apple's Mac OS, Mac OS X is based on a Unix kernel.

BSD → Nextstep → Mac OS X.