A Brief (and incomplete) History of Unix and Linux

Andre M. Maier, DHBW Ravensburg
dhbw@andre-maier.com

DHBW
Duale Hochschule
Baden-Württemberg

Andre M. Maier
Dept. of Computer Science

Multics (1)

- **Mult**iplexed **I**nformation and **C**omputing **S**ervice
- Experimental time sharing operating system
- Initial planning and development started in 1964
- Cooperative project (MIT, GE, Bell Labs)
- Developed for the GE-645 mainframe
- Many nifty technical innovations, e.g.
  - Multiuser-Support
  - Designed for high computing performance and large data storage
  - Possibility to share data between users

Multics (2)

- Critics considered Multics to be too bulky and too complex. Bell Labs eventually withdrew from the project in 1969.

- Multics development was completed in 1972

- Open-Source (Multics License) since 2007

- https://multicians.org/

Andre M. Maier
Dept. of Computer Science

The Dawn of Unix

- Bell Labs in 1969
  - Ken Thompson, Dennis Richie, Brian Kernighan, Douglas McIlroy, Joe Ossanna

- Goal: A new, smaller, and more efficient operating system based on the Multics experience.
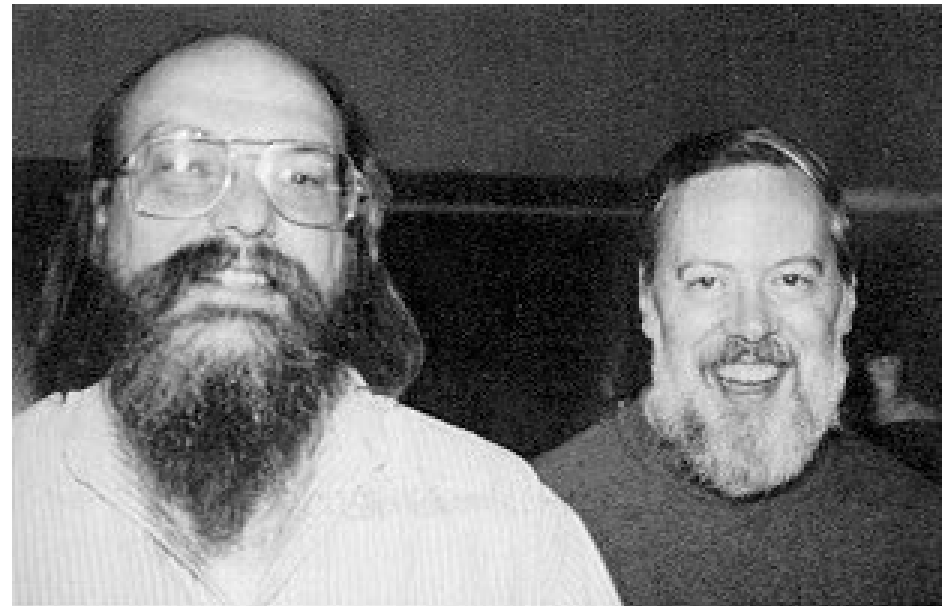
- Originally developed on a PDP-7 computer

Photo (Public Domain): Ken Thompson, Dennis Richie

DHBW
Duale Hochschule
Baden-Württemberg

1970s (1)

- The new OS was named Unics (Uniplexed Information and Computing Service)

- After adding text processing capabilities, Unix was ran on a PDP-11/20 for text processing of patent applications

- "Unix Programmer's Manual" (man pages) in 1971

- C programming language first appeared as a part of Unix Version 2 in 1972

- Presented to the world outside of Bell Labs in 1973

DHBW
Duale Hochschule
Baden-Württemberg

1970s (2)

- 1973: Unix version 5 released by AT&T, licensed to educational institutions

- 1975: Unix version 6, licensed to commerical companies for the first time (US$ 20,000 per license!)

- In the late 1970s
  - Version 7
  - Microprocessor port of Unix to the LSI-11
  - 8086 version of Unix (by Intel)

Andre M. Maier
Dept. of Computer Science

Later ...

- Multitude of implementations
  - System V
  - BSD
  - Xenix
  - and many more
- "Unix wars"
- Customers demanded standardization
- In 1993, most commercial variants of Unix based on System V with BSD features added.
- FreeBSD, OpenBSD, NetBSD
- MacOS, Solaris, HP-UX, AIX

Last survivor

DHBW
Duale Hochschule
Baden-Württemberg

Andre M. Maier
Dept. of Computer Science
CC BY-ND 4.0

7

Unix Philosophy

- Small is beautiful.

- Make each program do one thing well.

- Build a prototype as soon as possible.

- Choose portability over efficiency.

- Store data in flat text files.

- Use software leverage to your advantage.

- Use shell scripts to increase leverage and portability.

- Avoid captive user interfaces.

- Make every program a filter.

Mike Gancarz: The Unix Philosophy, 1994

Andre M. Maier
Dept. of Computer Science
CC BY-ND 4.0

Linux

- A kernel, developed by Linus Torvalds in 1991

- Was not meant to be a useful "product", but was developed purely out of educational interest

- Implements concepts of Unix, but has been written from scratch

- Version 1.0 released on March 14, 1994

Krd (photo)Von Sprat (crop/extraction) [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)], via Wikimedia Commons

Andre M. Maier
Dept. of Computer Science
CC BY-ND 4.0

GNU plus Linux (1)

- Richard Matthew Stallman (a.k.a. RMS) launched the GNU project in 1983

- **G**NU's **N**ot **U**nix

- RMS wanted to build a free ("libre") operating system

- "Free not as in free beer but as in free speech"

- Developed free versions of all commonly used Unix tools

- GNU-Kernel was still missing in 1991

Thesupermat [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)], from Wikimedia Commons

Andre M. Maier
Dept. of Computer Science
CC BY-ND 4.0

DHBW
Duale Hochschule
Baden-Württemberg

GNU plus Linux (2)

- A program is *free software* if the program's users have the four essential freedoms:

  – The freedom to run the program as you wish, for any purpose.

  – The freedom to study how the program works, and change it so it does your computing as you wish.

  – The freedom to redistribute copies so you can help others.

  – The freedom to distribute copies of your modified versions to others.

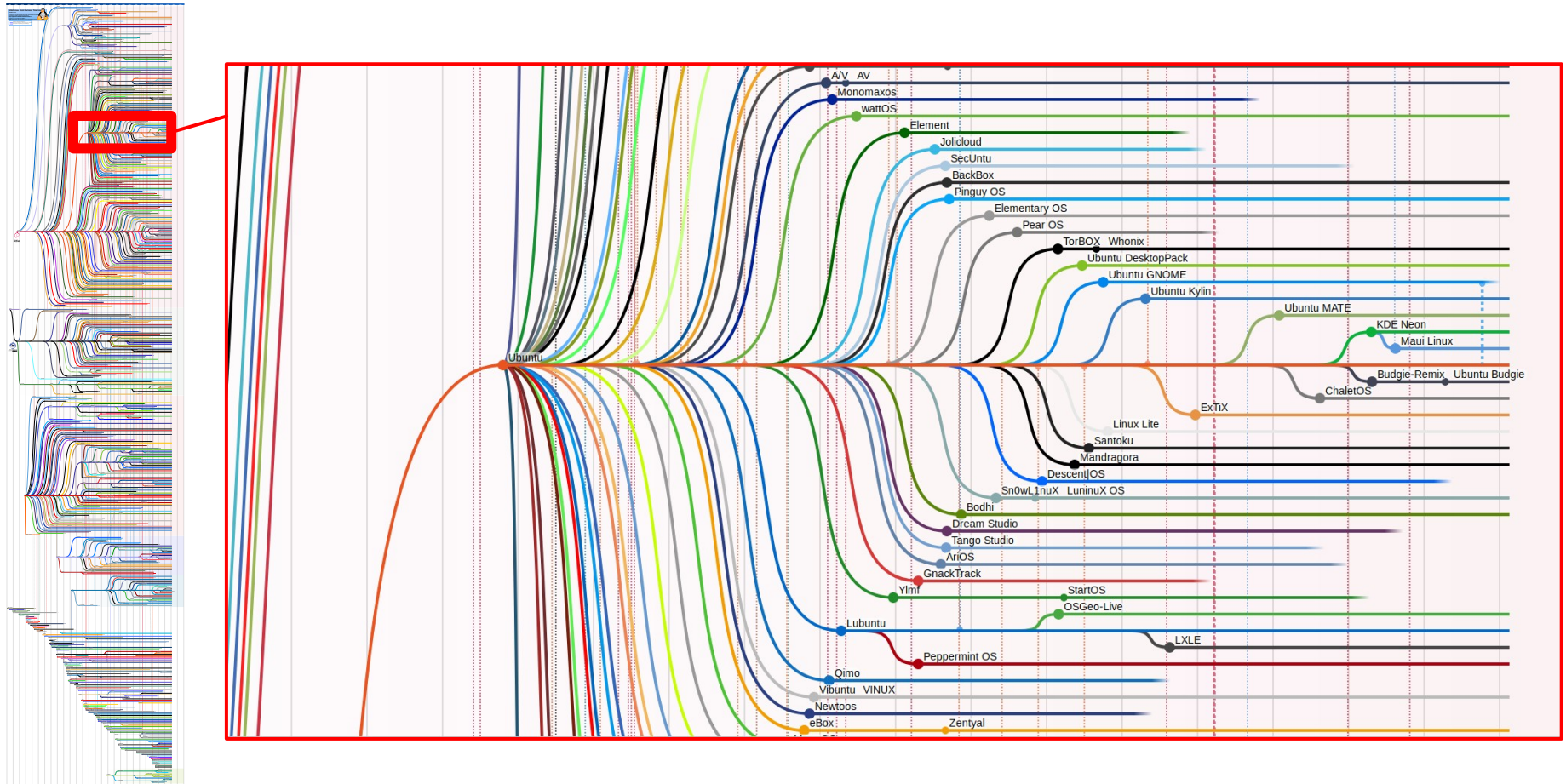*Source: https://www.gnu.org/philosophy/free-sw.html#f1*

GNU plus Linux (3)

- In December 1992, Linus Torvalds decided to put his Linux Kernel under the GNU General Public License Version 2 (GNU-GPLv2)

- GNU Utilities + Linux = complete operating system that is free software!

- GNU + Linux is erroneously called Linux

- Many modern Linux Distributions do not exclusively consist of free software (e.g. non-free device drivers). GNU + Linux + proprietary software

Andre M. Maier
Dept. of Computer Science

Linux Distributions (1)

- A *Linux Distribution* is a software collection that contains a fully configured Linux kernel, pre-installed tools and applications, and a package mangement system.

- Three major branches
  - Debian
  - Slackware
  - Red Hat

Andre M. Maier
Dept. of Computer Science
CC BY-ND 4.0

Linux Distributions (2)

Andre M. Maier
Dept. of Computer Science
CC BY-ND 4.0

Why are there so many distributions?

- A new Linux distribution may be created for many reasons, e.g.
    - Specific fields of application
    - Specific target devices
    - Specific target groups of users
    - Personal preferences (esthetics, usability, philosophy, religion, ...)
    - The feeling that X or Y can be done better

Andre M. Maier
Dept. of Computer Science
CC BY-ND 4.0

What distribution is best for you?

- It is generally hard to tell; All recommendations are based on personal, subjective experience.

- "The proof of the pudding is eating it."

- Newbies seem to prefer Ubuntu or Linux Mint

- LTS (Long-Term Support) versions are more reliable and sustainable

- Every feature and modification comes with potential bugs and instabilities.

- The more conveniences you enjoy, the less freedom you have.

Questions for Review

- What kind of computers was Multics designed for?

- What main goal did Thompson, Richie, et. al. have when they developed Unix?

- Which high-level programming language is strongly connected to Unix?

- Why were there so many flavors of Unix?

- Why did Linus Torvalds invent Linux?

- What does GNU + Linux mean?

- Name the four essential freedoms of free software.

- Explain the term "Linux Distribution".

DHBW
Duale Hochschule
Baden-Württemberg

Andre M. Maier
Dept. of Computer Science
CC BY-ND 4.0

17