A Brief (and incomplete) History of Unix and Linux

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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

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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/

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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

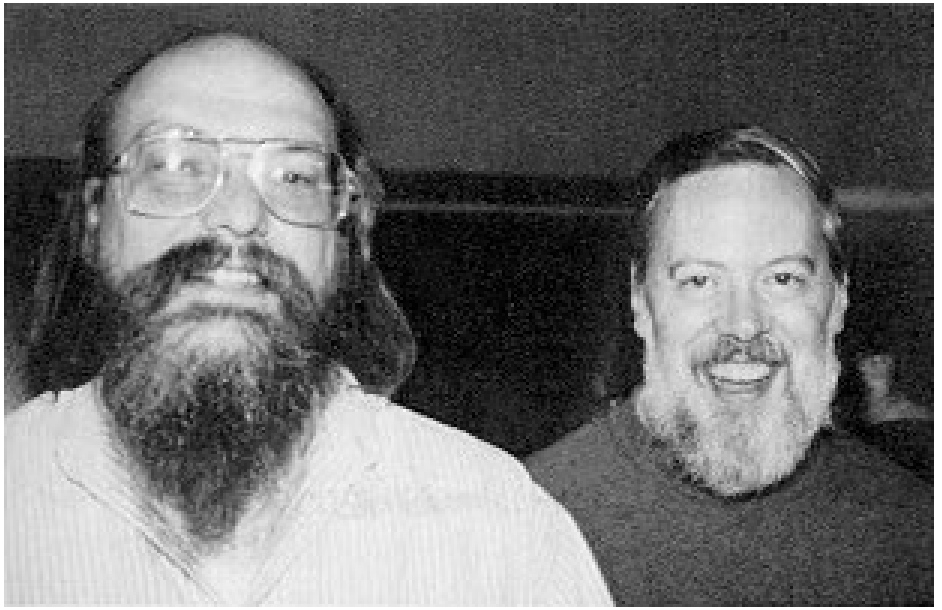

Photo (Public Domain): Ken Thompson, Dennis Richie

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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

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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)

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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

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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

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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

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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

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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

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GNU plus Linux (3)

- In December 1992, Linux 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 SW

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

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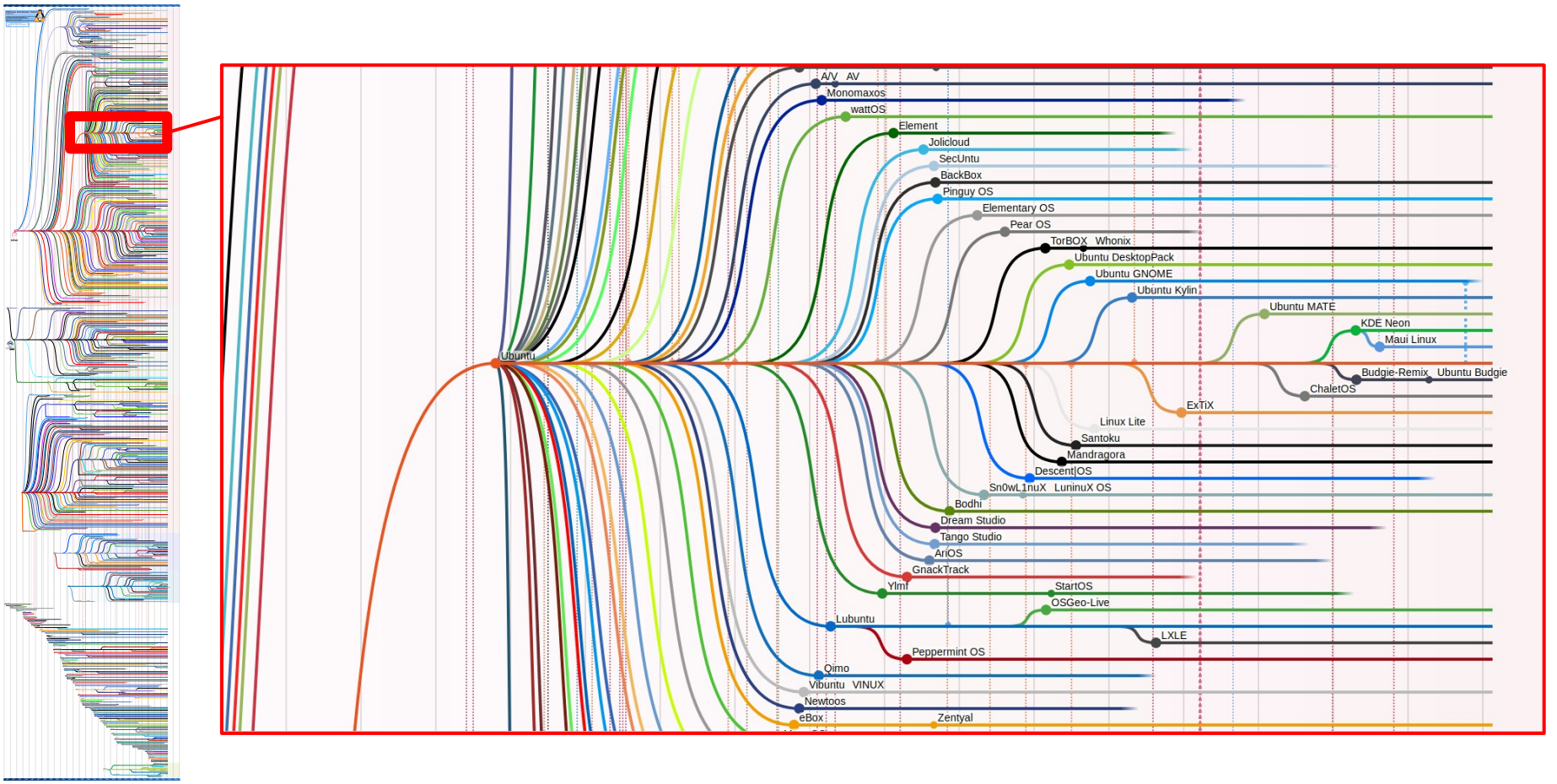
Linux Distributions (2)



Andreas Lundqvist (initially), Muhammad Herdiansyah (continued), Fabio Loli (continued) [GFDL 1.3 (www.gnu.org/licenses/fdl-1.3.html)], via Wikimedia Commons

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

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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.

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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”.

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