

Brief Unix History

- MULTIplexed Information and Computing Service (MULTICS) was introduced to solve the issue of unsatisfactory user waiting time (a kind of time sharing system)
- After Bell Labs dropped out of the MULTICS project, one of its researchers, Ken Thompson, was looking around for something to do
- He decided to implement a small version of MULTICS (using assembly language) on a discarded PDP-7 minicomputer with 8K RAM
 - □ Succeeded to do so in 1969
- His friend, Brian Kernighan (*a Canadian CS*), jokingly called this new product UNICS (*UNiplexed Information and Computing Service*)
- Later on, the spelling was changed from UNICS to UNIX
- Unix was then moved from PDP-7 to much more modern minicomputers, such as PDP-11/70 (a dominated minicomputer in the 1970's with 2 MB of RAM)

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Topic 01: Introduction to Operating Systems

Brief Unix History



Ken Thompson



Brian Kernighan

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Brief Unix History

- To facilitate writing operating systems for various computers, *Ken Thompson* attempted to design a high-level language called B, instead of writing operating systems in assembly

 ☐ He was not successful
- Later on, Dennis Ritchie further enriched B with structures and call it C (1973)
- *Ken Thompson* and *Dennis Ritchie* worked together to rewrite Unix in C
- PDP-11 (the choice of all university CS departments at that time) and Unix made an excellent coupling

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Ken Thompson



Dennis Ritchie

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- 1974: another copy of the Unix was produced at University of California at Berkeley (had some AT&T code in it)
- 1975: AT&T, the parent company of Bell Labs, licensed Unix to universities at a modest fee, source code included
- 1977: the first Unix version from Berkeley Software Distribution (BSD) was shipped
- 1978: the next version from BSD (called 2BSD) was shipped
- 1978: Andrew Tanenbaum wrote Mini Unix version (Minix) as a tool for teaching (had no AT&T code in it)
 - ☐ Minix used a Microkernel kernel
- 1979: AT&T decided to start selling Unix as a commercial product
 - □ BSD users are required to buy a licence from AT&T
 - ☐ Year after year, AT&T increased the price of the licence

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- 1979: CS professors saw the Unix as a good tool to use for teaching operating systems; yet they did not like the change in the AT&T policy to block them from reading the source code
- 1979: Researchers attempted to enhance Minix, but Tanenbaum refused
- 1980: Berkeley got a large contract from DARPA (the U.S. Defense Advanced Research Projects Agency) to develop Unix to run on various types of hardware
- **1982**: 4.1BSD supported TCP/IP
- 1982: AT&T produced Unix System III
- **1983**: 4.2BSD was released
- 1983: AT&T produced Unix System V, the first version to come with official support

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- 1984: AT&T produced the Unix System V Release 2 (SVR2)
- Situation at **1985**:
 - □ 1985: universities were not happy because AT&T had partial control over what they were doing
 - □ 1985: BSD programmers are not happy with the AT&T restrictions
 - □ 1985: BSD users are not happy with the AT&T licence fee
 - □ 1985: Berkeley Software Distribution decided to rewrite *from scratch* the parts of BSD that were based on AT&T Unix

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- 1985: Richard Stallman, with other programmers, started an organization called *Free Software Foundation* (*FSF*), where their source code can be examined, modified, shared, and distributed by anyone (*Open Source Software*)
- The first major goal for FSF is to create an operating system that could be shared and modified by anyone
- The decision was to write an operating system that is compatible with Unix, looks like Unix, able to run Unix program, but not Unix
- They decide to call it *GNU*, a recursive acronym meaning "*GNU*'s *Not Unix*"

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- Instead of having a *copyright* for GNU, they invented the idea of *copyleft* (*give everyone the permission* to run, copy, modify, and distribute the program, *but not the permission* to add restrictions of their own)
- To implement the idea of *copyleft*, Stallman wrote the *General Public License* (*GPL*) in **1989**
- From 1989 to 1991, FSF
 - □ had *programmed* a lot of important utilities
 - □ yet they *did not* have a finished kernel
- 1987: AT&T produced the Unix System V Release 3 (SVR3)
- 1989: AT&T produced the Unix System V Release 4 (SVR4)
- 1989: Berkeley Software Distribution offered the first totally open source BSD distribution 4.3BSD NET/1

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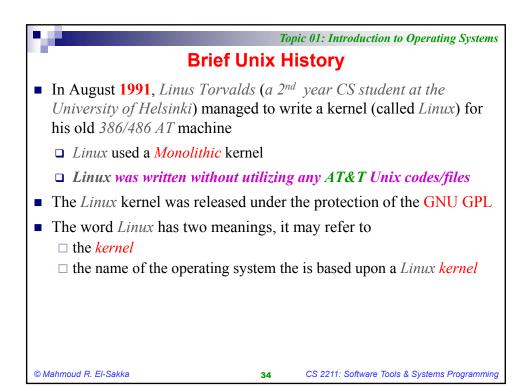


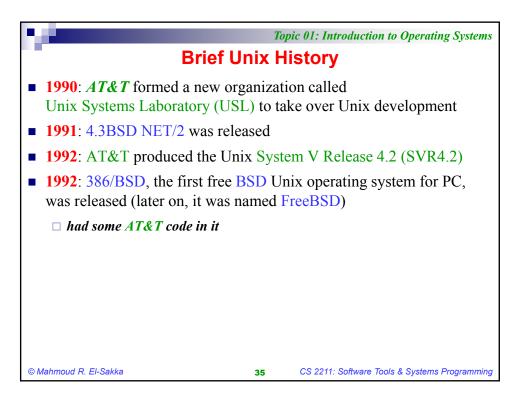
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- By **1991**:
 - □ PCs had been available for 10 years
 - □ Programmers, students, computer scientists shared the desire for an open source Unix-like operating system
 - □ AT&T had commercialized Unix and charged a lot of licence fee
 - □ BSD was available but it was encumbered by the AT&T license
 - ☐ Minix was okay, but far from perfect
 - ☐ GNU was distributed under the protection of the GPL copyleft, however its kernel was a long way from being finished

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- 1992-1994: BSD has been put itself in legal trouble with AT&T's Unix System Laboratories (USL) (a copyright violation issue)
- January 1994: The lawsuit was settled, largely in Berkeley's favor
 - ☐ Of the 18,000 files in the Berkeley distribution:
 - only three had to be removed
 - 70 modified to show USL copyright notices
 - ☐ A further condition of the settlement was that USL would not file further lawsuits against users and distributors of the Berkeley-owned code in the upcoming 4.4BSD release
- June 1994: 4.4BSD was released in two forms:
 - □ the freely distributable **4.4BSD-Lite** contained no AT&T source
 - □ **4.4BSD-Encumbered** which was available only to AT&T licensees
- 1995: The final release from Berkeley 4.4BSD-Lite Release 2

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- The BSD-USL lawsuit slowed the software development at BSD for nearly two years
- Due to this situation, *Linux*, which did not have such legal ambiguity, gained greater support
- **1992-present**, hundreds of *Linux distributions* (*distro*) have been developed/offering for free under the protection of the GNU GPL
 - □ Our CSD department is utilizing *Ubuntu GNOME 13.04* in its labs (*MC10*)
 - □ We also configured the same *Ubuntu* as a Virtual Machine (*VM*) on each PC at *MC08*

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- With *Linux*, nobody is stuck with something that they hate or don't want to use
 - ☐ You can choose your desktop environment
 - ☐ If you do not like the features of a *distro*, you can pick another one
 - Compare that to
 - o Windows, where users are mostly stuck with whatever Microsoft gives them
 - removing the Start button from Windows 8.0
 - making boot-to-desktop difficult
 - OS X, which doesn't offer you much in the way of customizations or options

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- **2001**: Apple decided to base its *MAC OS* on Unix (called *OS X*) where X here means 10 in Roman numbers
- 2001-2012, Apple released 9 new versions of its *OS X* (named after big cats): *OS X v. 10.0* (Cheetah), *OS X v. 10.1* (Puma), *OS X v. 10.2* (Jaguar), *OS X v. 10.3* (Panther), *OS X v. 10.4* (Tiger), *OS X v. 10.5* (Leopard), *OS X v. 10.6* (Snow Leopard), *OS X v. 10.7* (Lion), and *OS X v. 10.8* (Mountain Lion),
- In October 2013, Apple plans to release it newest *OS X* (*named after a location in California*): *OS X v. 10.9* (Mavericks)

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