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)

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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Brief Unix History

Ken Thompson　　　　　　　　Dennis Ritchie

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Brief Unix History

- **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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Brief Unix History

- **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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Brief Unix History

- **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

Brief Unix History

- **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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Brief Unix History

- 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

Brief Unix History

- 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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Brief Unix History

- In August **1991**, *Linus Torvalds* (*a 2nd year CS student at the University of Helsinki*) managed to write a kernel (called *Linux*) for his old *386/486 AT* machine
  - ❑ *Linux* used a *Monolithic* kernel
  - ❑ ***Linux was written without utilizing any AT&T Unix codes/files***
- The *Linux* kernel was released under the protection of the GNU GPL
- The word *Linux* has two meanings, it may refer to
  - ☐ the *kernel*
  - ☐ the name of the operating system the is based upon a *Linux kernel*

Brief Unix History

- **1990**: *AT&T* formed a new organization called Unix Systems Laboratory (USL) to take over Unix development
- **1991**: 4.3BSD NET/2 was released
- **1992**: AT&T produced the Unix System V Release 4.2 (SVR4.2)
- **1992**: 386/BSD, the first free BSD Unix operating system for PC, was released (later on, it was named FreeBSD)
  - ☐ ***had some AT&T code in it***

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Brief Unix History

- **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**

Brief Unix History

- 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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Brief Unix History

- 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
    - ○ *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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Brief Unix History

- **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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