



Chapter 2: Unix Standardization and Implementations

CMPS 105: Systems Programming
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In The Old Days...

- Before Unix, every hardware vendor had their own operating system
- These systems were completely proprietary
 - They were not open
 - You had to buy tools from the hardware vendor
- Code was not portable from one platform to another



Multics

- A joint OS venture between MIT, AT&T Bell Labs, and GE to develop a new OS
- Every good OS idea, up to a point, appeared in Multics
 - Virtual memory
 - File system
 - Security
 - Etc.
- As a result, Multics was huge and cumbersome
 - It eventually failed, although everyone liked the idea



Unix is Born

- Several researchers at AT&T Bell Labs still liked the idea of a new OS
- In 1969, they began by designing a new file system
 - Keep in mind that these were relatively new
- Then they added an assembler, a shell, process management, and some basic I/O
- Unix was born



Goals of Unix

- Unix was intended to be: small, flexible, portable, efficient, a programmer's tool
- It was really written by a group of hardcore programmers for themselves and people like them
- C was developed to facilitate UNIX development
- Another innovation: pipes and lots of small utilities
- Side note: the shortened names for everything were an accident



Different Versions of Unix

- AT&T licensed the Unix source code to Berkeley
- Researchers at Berkeley started working with it and made lots of changes: BSD Unix
 - But others couldn't use it without an AT&T license
- Eventually, Berkeley people rewrote the AT&T proprietary parts so that they could distribute theirs
- Later: SunOS/Solaris, DEC Ultrix, HP-UX, Xenix
- Even later: Linux was born
 - First really, truly open-source Unix



Brief History of Windows

- In the early 80s, IBM decided to produce a “personal computer”
 - 1 MHz processor, 5 MB HD, 128K RAM?
- They contacted a small software company led by Bill Gates to ask them if they would produce a version of their DOS system for the new “PC”
- First version of DOS wasn’t much of an OS
 - DOS stands for “Disk Operating System”
- Windows idea was stolen from Xerox PARC



Why Standards

- Problem: as soon as everyone gets their hands on something (C, UNIX, etc.) they start changing it to suit their needs
- Issues: Portability, modularity, reusability, interoperability, etc.
- Standards efforts driven by the government, and by corporations
- ANSI C, IEEE POSIX



Different Interfaces

- Many different flavors of UNIX support different system call interfaces
- POSIX specifies one set of interfaces and semantics
- Many extensions exist



Limits

- Portability requires that data types be the same on different architectures
 - Even if the hardware is different
- This requires careful standardization of the data types
 - How they are stored and interpreted, how many bits, formats, endian-ness, max, min, sign, ...



Some Limits

- Size of char, short, int, long
- Signed/unsigned
- Min/max values
- Pathnames
- Open files



Primitive System Data Types

caddr_t	clock_t	comp_t
dev_t	fd_set	fpos_t
gid_t	ino_t	mode_t
nlink_t	off_t	pid_t
ptrdiff_t	rlim_t	sig_atomic_t
sigset_t	size_t	ssize_t
time_t	uid_t	wchar_t