História dos Sistemas Operativos

Sistemas Operativos, 1º Semestre 2004-2005

History of Operating Systems

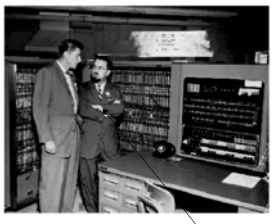
- Hardware technology
  - first generation: vacuum tubes
  - second generation: transistors
  - third generation: integrated circuits
  - fourth generation: graphics, personal computers, networking
- OS architecture
  - monolithic operating systems
  - microkernels
  - personal-computer operating systems
  - network operating systems

First-Generation Hardware

- "What you write is all you've got"
  - no operating system
  - no libraries
  - no compilers
  - no assemblers
  - no nothing

Primeiro Computador com Sistema Operativo

IBM 701



Designed by General Motors

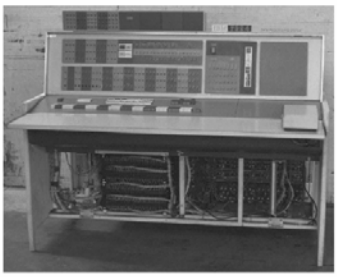
1956

Herb Grosch

2nd Generation Hardware

- Batch systems
- Concurrent I/O and computation
- Compilers
- Assemblers
- Libraries

IBM 7094



A mid-range 2nd-generation scientific computer. Among its features were core memory, a disk drive, and a subroutine-call instruction.

3rd Generation Hardware

- Multiprogramming
- Time sharing

- Big operating systems
  - OS/360 (IBM)
  - Multics (GE, MIT, Bell Labs)
- Little operating systems
  - Unix (Bell Labs)

UNIX

- Unix ran principally on DEC PDP-11s, but was ported to a few other machines and gained the reputation of being the first portable operating system (a very radical concept for software that had traditionally been written in assembly language...).
- A group at the University of California at Berkeley took Bell Lab's port of Unix to DEC's new architecture, the VAX. This version of Unix, known as BSD (Berkeley Software Distribution), or simply Berkeley Unix, was adopted by a large number of academic CS departments around the world.

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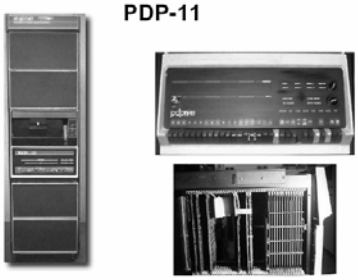
- If you had $10,000 to invest on January 1, 1962, how much would you invest in IBM?

Later 3rd Generation Hardware

- Minicomputers: proliferation of platforms and OS
  - Digital PDP-11
    RSX-11, RSTS-11, RT-11, etc.
  - Data General Nova, Eclipse
    RDOS, SOS, AOS
  - Hewlett Packard 2100, 3000
    BCS, DOS, MPE, MTS

PDP-11



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- It's now January 1, 1970; your stake in IBM is worth $22,557...

Late 70s, Early 80s

- Super minicomputers
  - DEC VAX-11, etc.
- Workstations
  - Apollo, Sun
- Personal computers
  - MITS Altair, Apple II, TRS-80, IBM PC, etc.
- Xerox PARC
  - Alto, Dorado, etc.

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- It's now January 1, 1975; your stake in IBM has gone down to $15,323...

VAX-11

Two operating systems
- VMS
  (sort of the predecessor of Windows NT)
- Berkeley Unix
  (the predecessor of Solaris and Linux)

Apollo

Apple II

PC Operating Systems

- Apple II
  - DOS 3.x
  - SOS, ProDOS
- Z80, 8080
  - CPM
- 8086
  - MS-DOS

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- It's now January 1, 1980; your IBM stake is worth $27,493.

PC Development

- Apple introduces the Apple III
- Microsoft, selling software, starts doing better in the PC market than IBM, selling hardware.
- Apple introduces the Lisa ...
- Apple introduces the Macintosh

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- It's January 1, 1985; your IBM stake has soared to $76,340.

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- It's March 13, 1986. Microsoft is going public.
- Do you put $10,000 into their IPO?

Toy Operating Systems

- 1987: Andrew Tanenbaum of Vrije Universiteit, Amsterdam, publishes a book: *Operating Systems: Design and Implementation*
  - included is source code for a complete toy operating system: Minix, sort of based on Unix
- 1991: Linus Torvalds buys an Intel 386 PC
  - MS-DOS doesn't support all its features (e.g., memory protection, multi-tasking)
  - "soups up" Minix to support all this
- January 1992: Torvalds releases Linux 0.12
- 1992: Tanenbaum declares Linux obsolete

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- It's January 1, 1990. Your stake in IBM is worth $64,775.
- The $10,000 you didn't put into Microsoft would now be worth $66,071.

Late 80's/Early 90's

- 1988: Most major Unix vendors get together and form OSF to produce a common Unix: OSF/1, based on IBM's AIX
- 1989: Microsoft begins work on NT
- 1990: OSF abandons AIX, restarts with Mach
- 1991: OSF releases OSF/1
- 1992: Sun releases Solaris 2
  - many SunOS (Solaris 1) programs are broken
- 1993: All major players but DEC have abandoned OSF/1
- 1993: Microsoft releases Windows NT 3.1
- 1994: Linux 1.0 released

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- It's January 1, 1995. Your IBM stake has dropped to $57,476…
- Your Microsoft stake would have been worth $391,339…

Late 90's

- IBM has has three different versions of Unix, all called "AIX"
- 1996: DEC renames its OSF/1 "Digital Unix"
- 1996: Microsoft releases Windows NT 4
- 1996: Linux 2.0 released
- 1998: DEC is purchased by Compaq; "Digital Unix" is renamed "Tru64 Unix"
- 1999: Sun's follow-on to Solaris 2.6 is called Solaris 7

Early 00's

- 2000: Microsoft releases Windows 2000 and Windows Me
- 2000: Linux 2.2 is released
- 2000: IBM "commits" to Linux (on servers)
- 2001: Linux 2.4 is released
- 2001: Microsoft releases Windows XP
- 2002: Compaq is purchased by HP
- 2003: SCO claims their code is in Linux, sues IBM; IBM countersues

$$$$$$$

- It's January 1, 2000:
- Your IBM stake is worth $377,423.
- Your Microsoft stake would have been worth $5,927,143.
- You should have sold instantly
  - on September 2, 2003
  - your IBM stake is worth $300,074
  - your Microsoft stake would have been worth $3,738,511