Operating Systems

What is an Operating System?

Definition 1

Software that manages the operation of a computer and its resources (memory, input and output, etc).

Definition 2

All of the software that comes with a computer.

Kernel

- The program that controls everything

- Bootloader starts the computer, loads the kernel

- Responsibilities of the kernel
    - Manages hardware (with device drivers)

    - Allocates resources (memory, disk space, etc)

    - Controls which processes are running (scheduler)

    - Provides an interface for interaction with user processes (with system calls)

Unix History

Unix Entry (from the Jargon File)

An interactive timesharing system invented in 1969 by Ken Thompson after Bell Labs left the Multics project, originally so he could play games on his scavenged PDP-7. Dennis Ritchie, the inventor of C, is considered a co-author of the system.

The turning point in Unix's history came when it was reimplemented almost entirely in C during 1972—1974, making it the first source-portable OS. Unix subsequently underwent mutations and expansions at the hands of many different people, resulting in a uniquely flexible and developer-friendly environment.

By 1991, Unix had become the most widely used multiuser general-purpose operating system in the world — and since 1996 the variant called Linux has been at the cutting edge of the open source movement.

Many people consider the success of Unix the most important victory yet of hackerdom over industry opposition.

Definition of Hacker (From the Jargon File)

A person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary.

RFC1392, the Internet Users' Glossary, usefully amplifies this as: A person who delights in having an intimate understanding of the internal workings of a system, computers and computer networks in particular.

Unix Versions and Derivatives

- AT&T Unix (Bell Labs)

- Berkeley Unix (University of California at Berkeley)

- Linux (Linux Torvalds)

- OS X (Apple)

- Android (Google)

Features of Unix

- Portable

- Multitasking

- Multiuser

- Hierarchical file system

- Pipelines

- Simple file model (sequence of bytes)

Unix Timeline (1)

1969 Unix implemented at AT&T Bell Labs

1973 Unix rewritten in C

1975 Unix unleashed on the outside world

1980 Microsoft introduces Xenix

1983 Richard Stallman begins the Gnu (Gnu's Not Unix) project, launched the free software movement

1984 BSD (Berkely Standard Distribution) released

1987 Microsoft sells Xenix to SCO (the Santa Cruz Operation)

1991 UNIX System Laboratories (USL) formed by AT&T

1991 Linux Torvalds starts work on Linux

1993 Novell acquires USL

1995 Novell sells licensing rights for Unix to SCO

1995 Red Hat Linux released

Unix Timeline (2)

2001 SCO sells Unix operation to Caldera

2001 OS X (now Mac OS) introduced by Apple

2002 Caldera changes name to SCO Group

2003 SCO Group claims copyright on Unix, sues IBM, Novell and others, sued by Red Hat

2004 Ubuntu Linux released

2007 Android introduced by Google

2007 iOS introduced by Apple

2010 Court decides that Novell owns copyrights.

2011 ChromeOS introduced by Google

OS Usage Share

	Linux	iOS, macOS	Windows	z/OS
Desktop, Laptop	7%	21%	68 %	
Embedded Systems	38%		11%	
MainFrame	28%			72%
Web Server	77%		23%	
Mobile	71%	28%		
Supercomputer	100%			

People: Ken Thompson

- Worked at Bell Labs

- Designed B (predecessor to C) with Dennis Ritchie

- Implemented the first version of Unix with Dennis Ritchie

- Now works at Google (codeveloper of go)

- Received 1983 Turing Award with Dennis Ritchie

People: Dennis Ritchie

- Worked at Bell Labs

- Created C

- Worked on Unix with Ken Thompson

- Now retired

- Received 1983 Turing Award with Ken Thompson

People: Brian Kernighan

- Worked at Bell Labs

- Coauthor of "The C Programming Language" with Dennis Ritchie

- Wrote many Unix utilities

- Coauthored AWK

- Coauthored "The Go Programming Languate"

- Now at Princeton

People: Bill Joy

- Worked on BSD at Berkeley

- Wrote Vi and the C shell

- Cofounded Sun Microsystems

- Now a venture capitalist

People: Richard Stallman

- Founded the Free Software Foundation

- Founded the GNU project (Gnu's Not Unix)

- Wrote GNU emacs, gcc (C compiler), gdb (debugger), Gnu make, etc.

- His goal was to create a completely free operating system (not really realized)

People: Linux Torvalds

- Developed Linux

- Built on the tools developed by Stallman for the GNU project

- Supported by the Linux Foundation

People: Steve Jobs

- Cofounded Apple

- Left Apple for NeXT

- Returned to Apple bringing NeXTSTEP which became Mac OS X.

People: Andy Rubin

- Founded Android, Inc.

- Sold Android to Google and joined Google

- Forced out of Google over sexual harassment