

Chapter 1

What is UNIX?

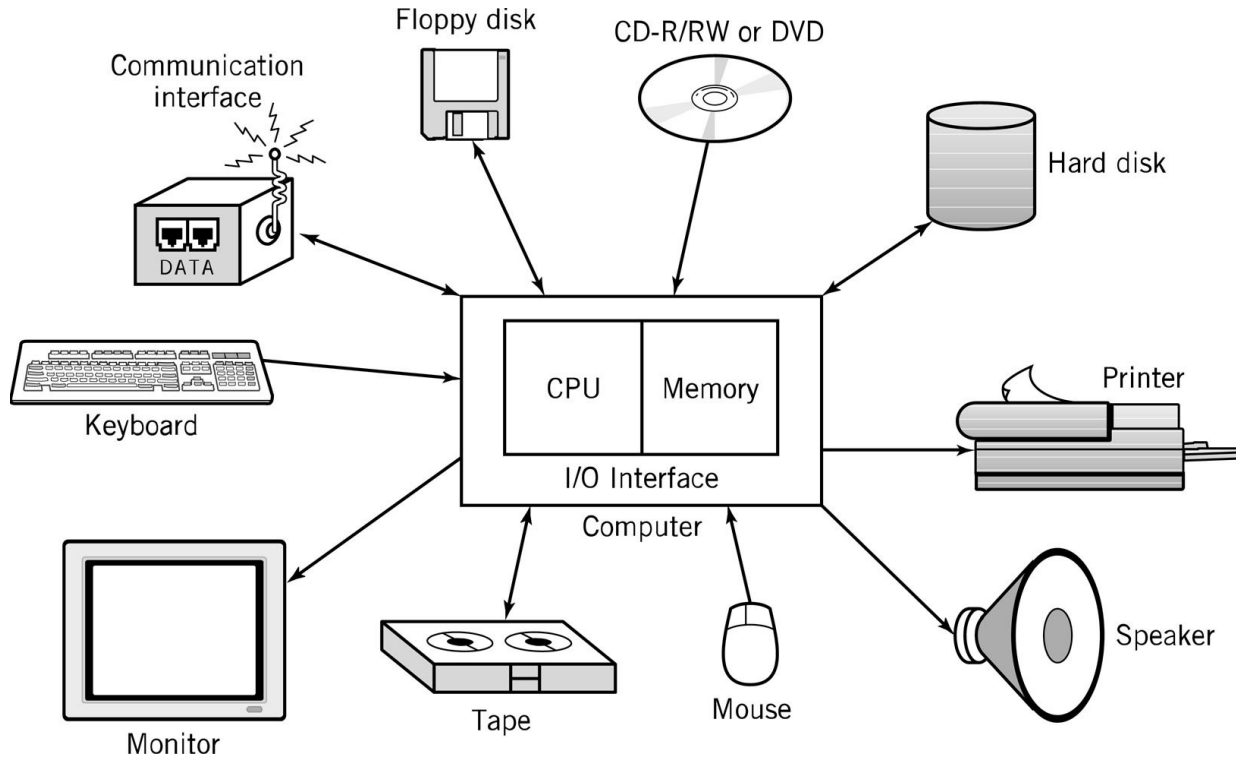
Graham Glass and King Ables,
UNIX for Programmers and Users,
Third Edition, Pearson Prentice Hall, 2003.

Original Notes by Raj Sunderraman
Converted to presentation and updated by
Michael Weeks

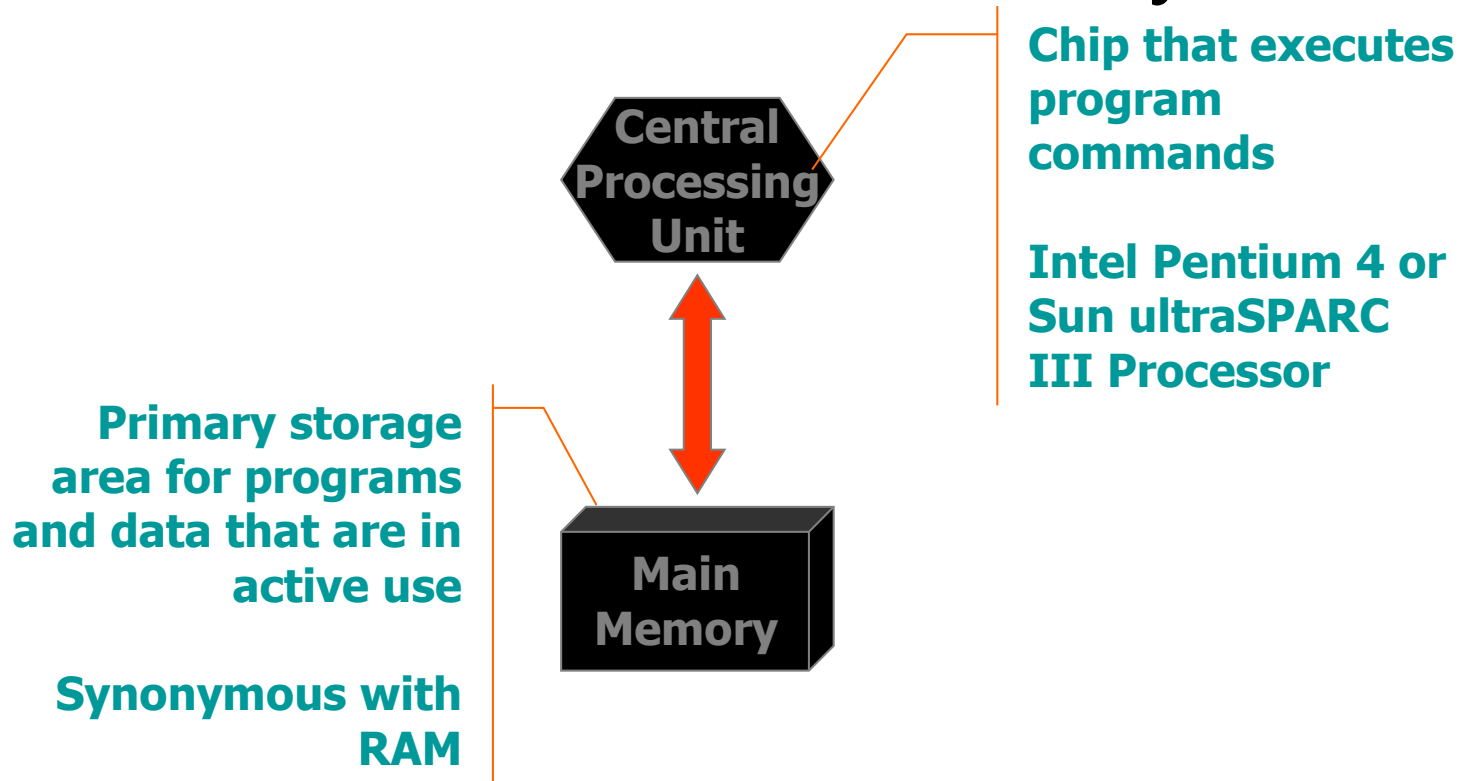
Computer Systems

- **Computer System : Hardware + Software**
- **Hardware: CPU, Memory (RAM/ROM), Disk drives, CD-ROM drives, Monitor, Graphics card, Keyboard, Mouse, Printer, Tape drive, Modem, Ethernet interface, Other peripherals.**
- **Software: Operating System, Application Programs**
- **UNIX is the name of a popular operating system.**

Typical Personal Computer System



Hardware Key Components (1) : CPU and Main Memory



Hardware Key Components (2) :

Secondary Memory Devices

Secondary memory devices provide long-term storage

**Hard disks
Floppy disks
ZIP disks
Writable
CDs
Tapes**

**Central
Processing
Unit**



**Main
Memory**

Information is moved between main memory and secondary memory as needed



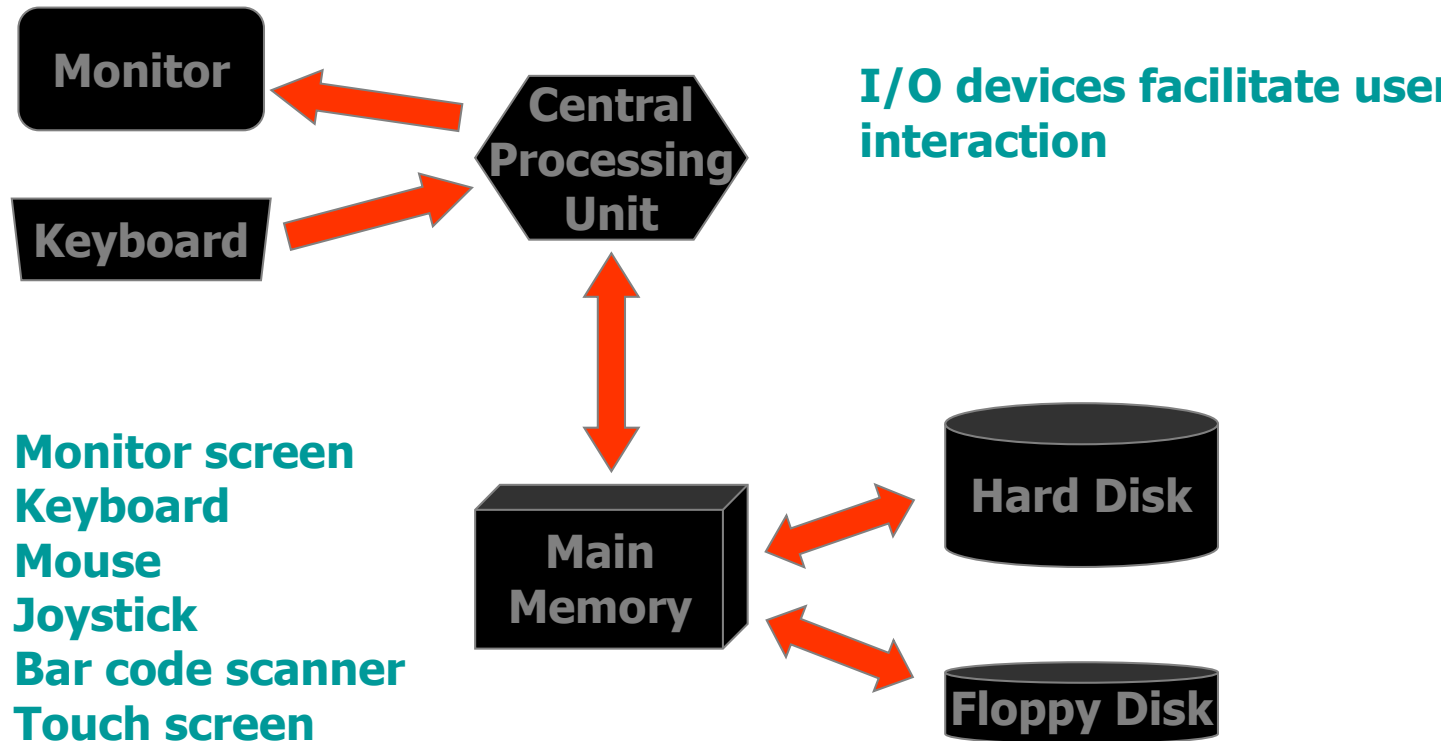
Hard Disk



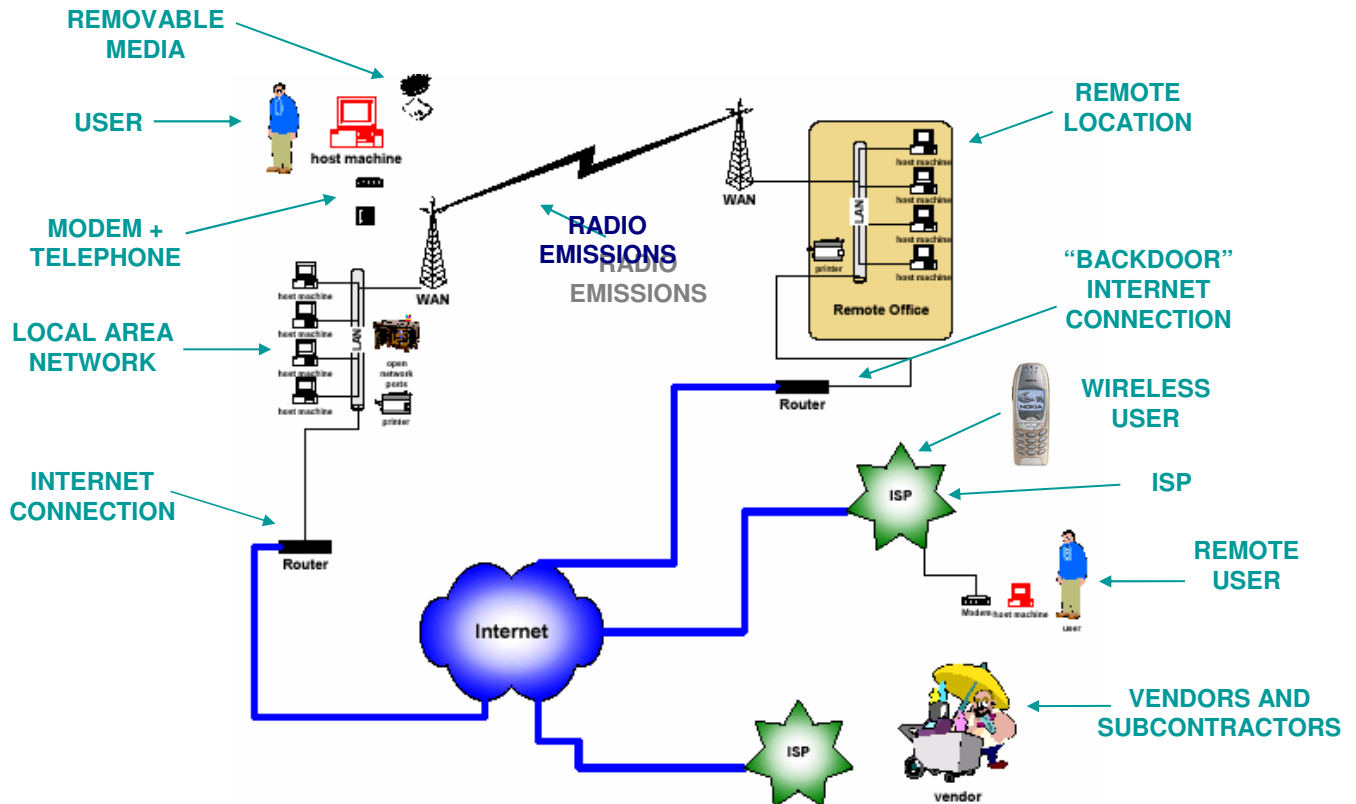
Floppy Disk

Hardware Key Components (3) :

Input / Output Devices

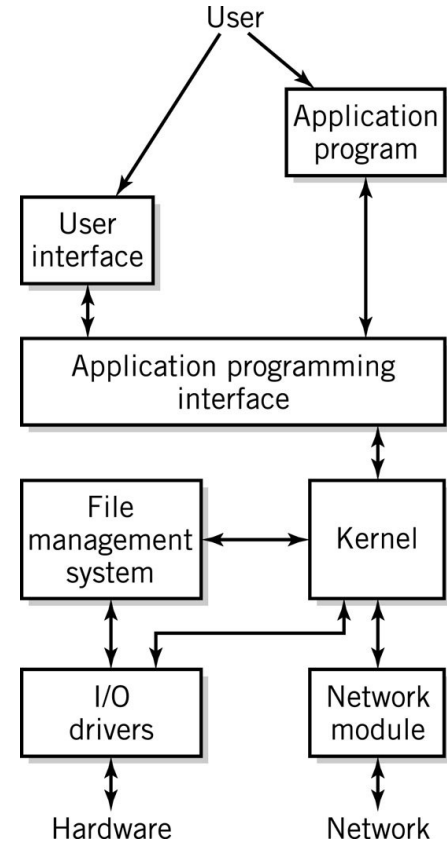


Computer Network

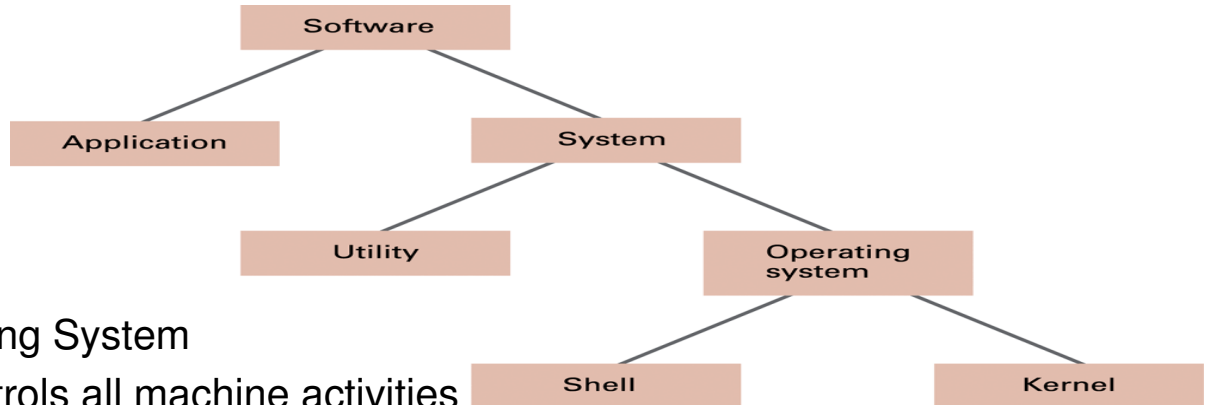


Software Component

- Applications
- *Operating System*
 - API: application program interface
 - File management
 - I/O
 - Kernel
 - Memory management
 - Resource scheduling
 - Program communication
 - Security
 - Network Module



Software Categories



- Operating System
 - controls all machine activities
 - Oversee operation of computer
 - Store and retrieve files
 - Schedule programs for execution
 - Coordinate the execution of programs
 - Provides the user interface to the computer
 - manages resources such as the CPU and memory
- Application program
 - generic term for any other kind of software
 - word processors, missile control systems, games
- Most operating systems and application programs have a *graphical user interface* (GUI)

The shell as an interface between users and the operating system

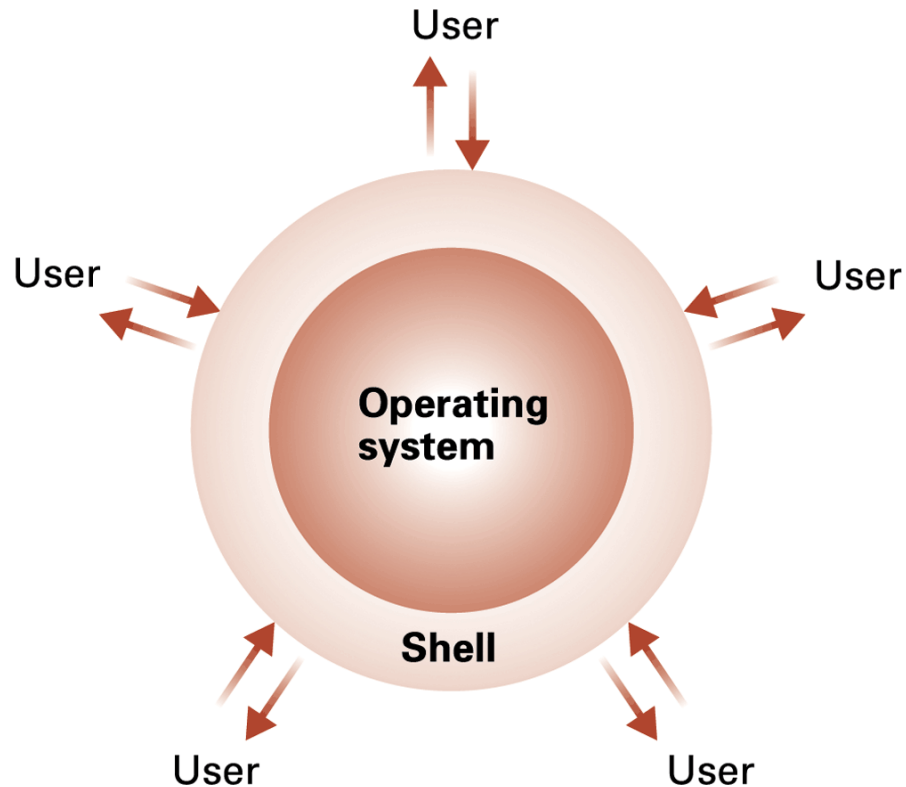
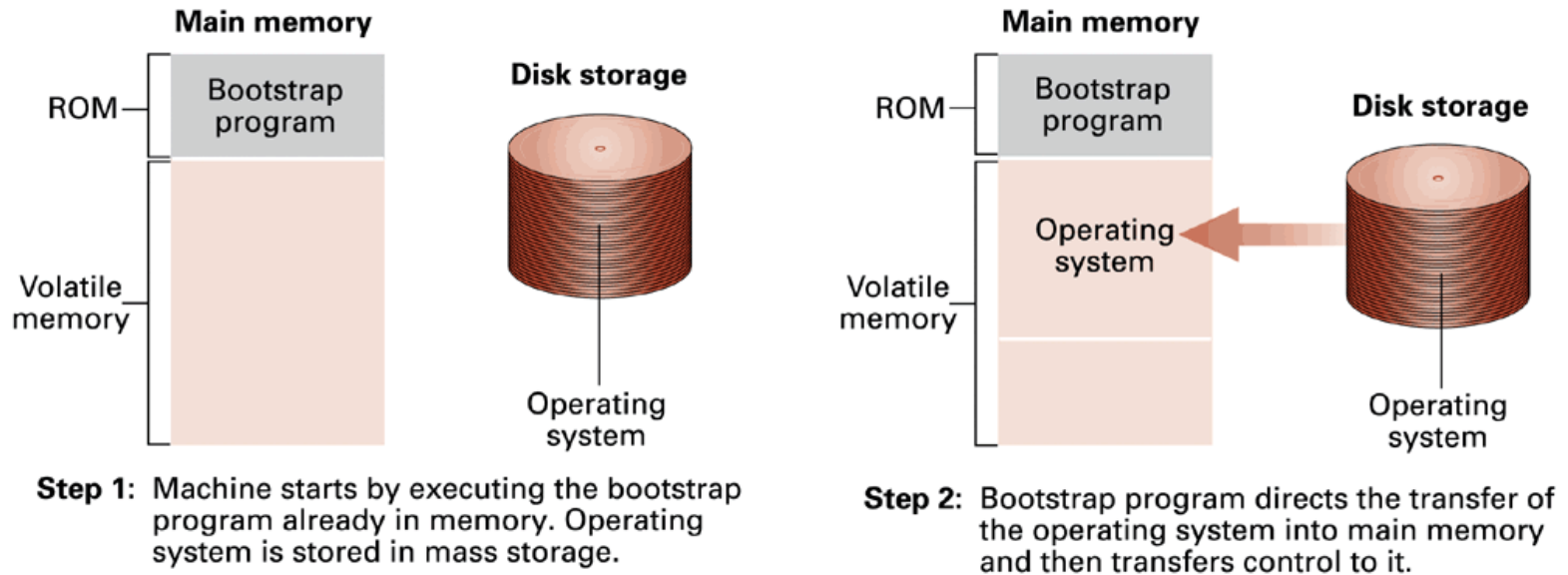
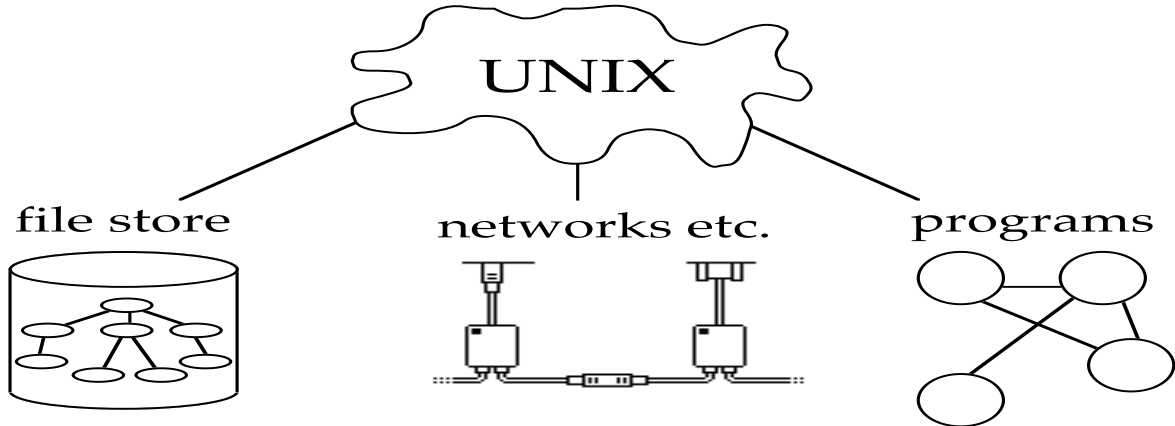


Figure 3.5 The booting process



UNIX is an operating system



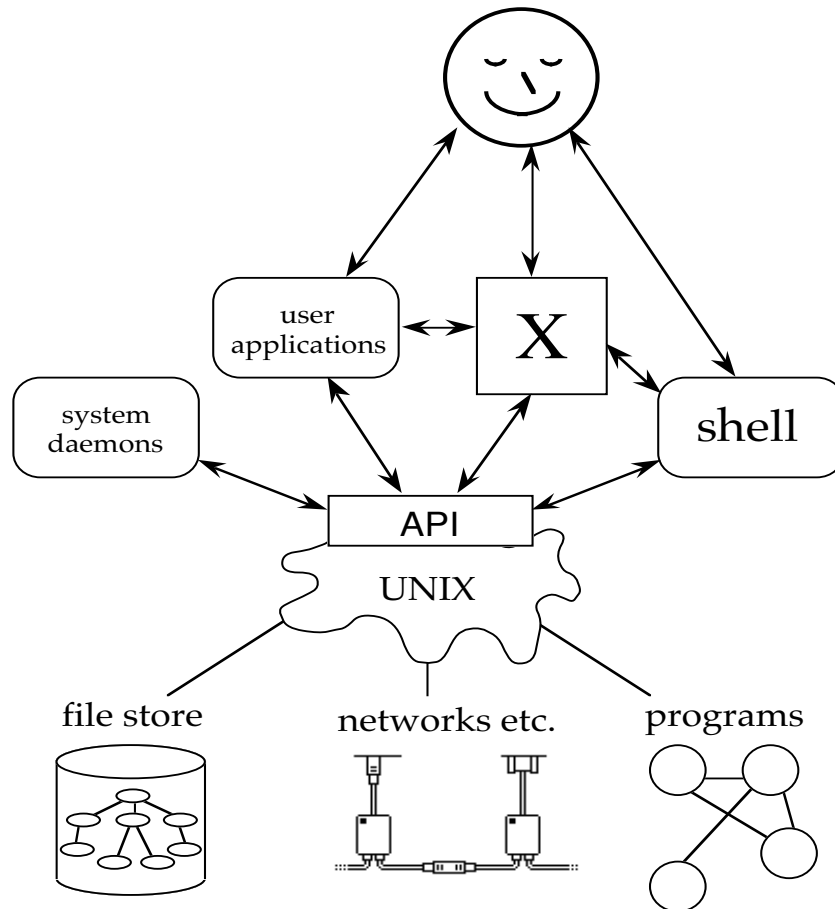
. Provides a framework for executing programs and storing files

.File: collection of data normally stored on disk.

.Program: collection of instructions/data that is stored in a file.

UNIX API – the system calls

ultimately everything works through system calls



Process

- When a program is executed, it is loaded into memory. It is called a *process* when it is executing.
- Most processes read/write data from/to files
- Processes and files have an owner
- UNIX supports hierarchical directory structure
- Files and processes have a location within the directory structure
- UNIX provides the capabilities to create, modify and destroy files, programs, and processes.

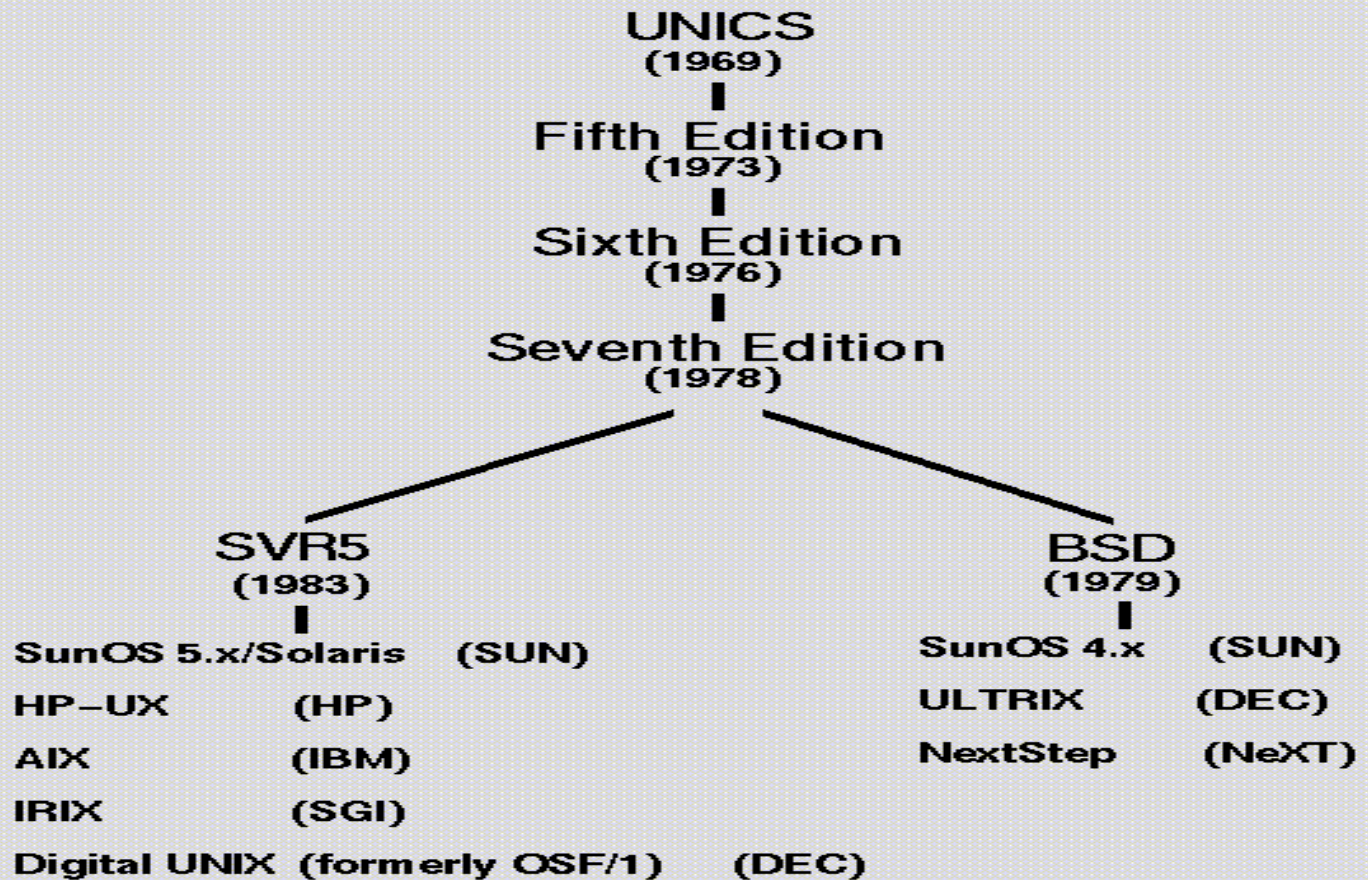
Unix Attributes

- . Sharing of resources: CPU (time slices), memory (pages), disk (blocks)**
- . Communication: process-device controller, process-process, etc. (pipes 1-way, sockets 2-way)**
- . Utilities: Unix comes with a large collection of utilities; we will study many of these.**
- . Programmer support: All kinds of compilers available; Access to parallel processing, file handling and interprocess communication via System calls in C**

Advantages of UNIX

- It is **multitasking**, therefore, multiple programs can run at one time.
- It is **multiuser**, allowing more than a single user to work at any given time. This is accomplished by sharing processing time between each user and utilizing distributed computing systems.
- It is **safe**, preventing one program from accessing memory or storage space allocated to another, and enables protection, requiring users to have permission to perform certain functions, i.e. accessing a directory, file, or disk drive

The Unix Family Tree



Two Main Varieties of Unix

- **System V (AT&T) and**
- **BSD (Berkeley Standard Distribution)**
 - **Both are merged now. SunOS, IRIX, AIX, HP-UX have features from both varieties although most are System V Unix.**
- **Other Unix versions you may have heard of:**
 - **Linux (Fedora, Red Hat, Ubuntu, SUSE, etc.)**
 - **Sun Java Desktop OS, Solaris**
 - **Apple OS/X**

Sub-Varieties of Unix

- **Linux (Runs on PC architecture)**
 - . **Fedora**
 - . **Red Hat**
 - . **Ubuntu**
 - . **Sun Java Desktop OS, etc.**
- **Sun Solaris (Runs on SPARC architecture)**
- **Apple OS/X (Runs on PowerPC and Intel platforms)**

Philosophies of Unix

- **Pipe mechanism**

- **Output of one process can be used as input for another process. e.g.**
 - `$ who | sort`
- **Using the pipe mechanism, complex tasks can be broken down into simpler ones and combined using pipes etc.**

- **Super user**

- **user who has complete control over the system resources. Typically the System's Administrator.**

Review

- Computer Systems
- Unix as an operating system
- Processes
- Unix Attributes
- Unix Varieties
- Unix Philosophies