Computers: Tools for an Information Age

System Software
Objectives

System Software

Operating system (OS)
- Popular Operating Systems

System Utilities
System Software
System Software

System software includes all of the programs needed to keep the computer and its peripheral devices running smoothly.

Two major categories of system software:

- Operating system (OS)
- System utilities
Operating system (OS)
The Operating System (OS)

- The operating system is a set of programs that perform certain basic functions.
- The functions of the operating system are:
  - Starting the computer
  - Managing programs
  - Distributing memory
  - Coordinating the processor and peripheral devices
  - Enabling user interaction with the computer
Starting the Computer

- The **cold booting** process begins when the power is turned on.

- There are several steps to a cold boot:

  1. ROM loads **BIOS** (basic input/output system) into the computer’s memory.
  2. BIOS conducts a **Power-on self-test (POST)** to check the input/output system for operability.
  3. BIOS searches for the OS. Settings in the **CMOS** (complementary metal-oxide semiconductor) determine where to look for the OS.
  4. The **kernel** (the essential OS components) is loaded into memory from storage.
  5. OS takes control of the computer.
1. The system is configured from the OS’s registry.
2. **Drivers** and **utility programs** are loaded into memory.
3. **System utilities** (volume control, antivirus software, etc.) are loaded into memory.
4. **Authentication** or **user login** occurs.
5. **User interface** begins, enabling user interaction with computer programs.
Managing Programs

- **Single-tasking** systems run one application program at a time.

- **Multitasking** operating systems have the ability to run more than one application program at a time.

- Multitasking is accomplished by:
  - **Foreground application**– Active program or program in use
  - **Background application**– Inactive program or program not in use
Example of Multitasking

Background Application

Foreground Application
Managing Memory

- The operating system allocates memory area for each running program. It keeps programs from interfering with each other.

- The OS uses virtual memory as an extension of RAM. Pages of data and instructions are swapped between RAM and the hard drive if RAM is full.

- The OS works with the direct memory access (DMA) controller to permit peripherals access to RAM.
Managing Virtual Memory
Providing the User Interface

- The **user interface** is that part of the operating system that enables the user to interact with it.

- Two types of user interfaces:
  - **Command-line** – Requires the user to type keywords or commands to enter data or give instructions.
  - **Graphical user interface (GUI)** – Uses a graphics environment made up of objects, icons, buttons and menus. The user is able to use a pointing device (mouse, joystick, etc.) or keyboard to enter data and issue commands.
Command-Line Interface
Graphical User Interface (GUI)
Popular Operating Systems
Popular Operating Systems

MS-DOS

UNIX

LINUX

MAC OS

WINDOWS XP
Developed by AT&T in 1970s
First preemptive multitasking system
Developed concepts of file management and path names
Client/server networking system
Widely used by corporations
MS-DOS

- Developed for IBM PCs in 1981
- Uses command-line interface
- Use is diminishing
MAC OS

- First to use graphical user interface in 1984
- Easiest operating system for beginners
Windows 3.X

- Includes Windows 3.0, 3.1, 3.11, and Windows for Workgroups 3.1
- Not a true operating system
- Uses cooperative multitasking
Windows 95
- True operating system
- Uses preemptive multitasking
- Downward compatible with DOS
- Considered a transitional system

Windows 98
- Improved version of Windows 95
- More stable than Windows 95
Windows CE (consumable electronics)

- System used in PDAs or palmtops
- Runs simplified versions of Windows programs
- Data can be transferred to PCs
- Includes handwriting and speech recognition
Windows NT

- Designed for client/server systems
- Two components:
  - Windows NT Workstation
  - Windows NT Server
- Oriented to business needs
- Offers security, remote administration, directory services, and server
Windows 2000

Two versions:
- Microsoft Windows 2000 Professional
- Microsoft Windows 2000 Server

Better stability and more features than Windows NT
Windows XP

- Replaces all previous versions of Windows

- Three versions:
  - Windows XP Home Edition
  - Windows XP Professional
  - Windows XP Server
Linux

- Developed in 1991 by UNIX
- Competes with Windows and MAC
- Powerful and free
- Growing fast in acceptance
- Uses Apache web server
System Utilities
System Utilities

*System utilities* are programs that help the operating system manage the computer system’s resources.

**Types of utilities:**
- File management
- File finders
- Backup utilities
- Antivirus software
- File compression
- Disk scanning
- File defragmentation
## File Management Utilities

- Known as a file manager.
- Enables the user to perform various tasks with files, folders, and directories on storage devices.
- Tasks include:
  - Creating folders
  - Saving, deleting, copying, and moving files and folders
  - Examining the contents of files
  - Launching application programs

### File Management Utilities

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<th>Name</th>
<th>Size</th>
<th>Type</th>
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File finders are programs that enable the user to find files on a storage device.
Backup utilities are programs that enable the user to copy data from the hard disk to another storage medium.
Antivirus software protects the computer from computer viruses.
A file compression utility reduces the size of a file.
A disk scanning utility is a program that detects and fixes **physical** and **logical** problems on storage devices.
A file defragmentation utility is a program that moves data on a storage device to improve performance.
Summary

1. An operating system manages programs, memory, and input/output devices, and it also provides a means of communicating with the user.

2. Multitasking enables you to work with more than one program at a time.

3. The basic types of interfaces are command-line and graphical user interface.

4. MAC OS introduced the GUI to personal computing.
5. There are many versions of Microsoft Windows.
   A. Windows 3X
   B. Windows 95
   C. Windows 98
   D. Windows NT
   E. Windows 2000
   F. Windows CE
   G. Windows XP

6. System utilities include:
   A. Backup programs
   B. File managers
   C. File finders
   D. Disk scanning programs
   E. Antivirus software
   F. File compression utilities
   G. Defragmentation programs