Computer Software

Systems software

– Is an interface or buffer between application software and hardware

– Controls the computer hardware and acts as an interface with applications programs

Definition

• A series of detailed instructions that control the operation of a computer system.

• Software exists as programs that are developed by computer programmers

Users

Application software

Operating and systems software

Hardware

Categories of software

• Systems software:

– This form of software manages and controls the operation of the computer system as it performs tasks on behalf of the user.

– System software is computer software designed to operate the computer hardware and to provide and maintain a platform for running application software

Examples Of Systems Software

• The computer BIOS and device Firmware,

– which provide basic functionality to operate and control the hardware connected to or built into the computer.

BIOS and device Firmware

- BIOS is a term that stands for basic input/output system.
- BIOS is really the link between hardware and software in a system.
- Most people know the term BIOS by another name *device drivers*, or just *drivers*.

BIOS and device Firmware

- The portion of the BIOS contained in ROM chips both on the motherboard and in some adapter cards is sometimes called firmware,
- which is a name given to software stored in chips rather than on disk.

BIOS and device Firmware

- The BIOS is boot firmware, designed to be the first code run by a PC when powered on.
- The initial function of the BIOS is to identify, test, and initialize system devices such as the video display card, hard disk, and floppy disk and other hardware

BOOTING

- The process of starting or restarting a computer is called **booting**

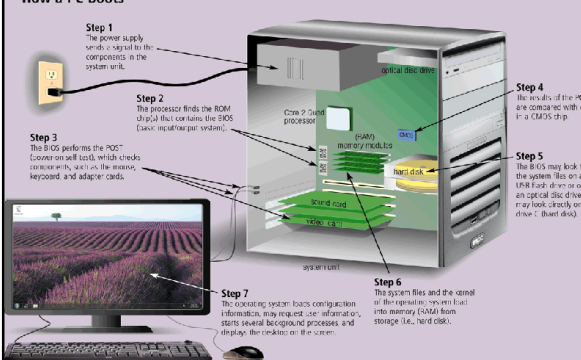| Cold boot	Warm boot
• Turning on a computer that has been powered off completely	• Using the operating system to restart a computer

11

BIOS and device Firmware

- BIOS programs are stored on a chip and are built to work with various devices.
- They provide a small library of basic input/output functions that can be called to operate and control the peripherals such as the keyboard, text display functions and so forth.

BOOTING

2

CMOS - Complementary Metal Oxide Semiconductor)

- This is a type of memory chip which stores information about the computer components, as well as settings for those components.
- The CMOS setup lets you change the time and date and settings for how devices are loaded at start up, like hard drives, disc drives, and floppy drives.

Examples Of Systems Software

- The Operating System
  - prominent examples being Microsoft Windows, Mac OS X and Linux.
  - **Linux** is an open-source, popular, multitasking UNIX-type operating system
  - **UNIX** is a multitasking operating system developed in the early 1970s

BOOTING

A boot drive is the drive from which your computer starts

- You can boot from a **boot disk**
- A **recovery disk** contains a few system files that will start the computer

14

The Operating System

- The operating system(OS) is the piece of software required by the computer to make sure that it works correctly and efficiently.
- It manages the computer and allows the user to communicate with the hardware.

Utility Software

- Utility software consists of programs which are designed to help with the maintenance of the computer and to ensure sure that it works correctly and efficiently.
  - e.g. disk defragmenter, anti-virus, firewall, backup, compression, disk cleaners, screensavers etc.

The Operating System

- Modern operating systems are typically stored on Hard disk and loaded into RAM when the computer is switched on.
- Storing the OS on disk means that it can be easily updated.
- Windows Vista and XP are updated on a daily basis.

Operating System Functions

- Perform common computer hardware functions (Input/Output)
- Provide a user interface
- Provide a degree of hardware independence
- Manage system memory
- Manage processing tasks
- Provide networking capability
- Control access to system resources
- Manage files

User Interface

- Graphical user interface (GUI)
  - A user interface that uses pictures (icons) and menus displayed on the screen to send commands to the computer system
  - E.g. Windows, MAC OS

Input/Output Management

• Input/Output Management has to do with all the actual data transfers and issue the appropriate control signals to the peripheral devices.
• Input/Output Management has to send the correct signals to the Hard Disk to tell it to access and read the data and send it to RAM.

20

Operating System Functions

- Hardware independence
  - Operating system (OS) provides hardware independence for application software
  - Application software interfaces with the operating system which interfaces with the hardware
  - When the hardware is changed, the operating system is changed so that the application software is not required to be changed
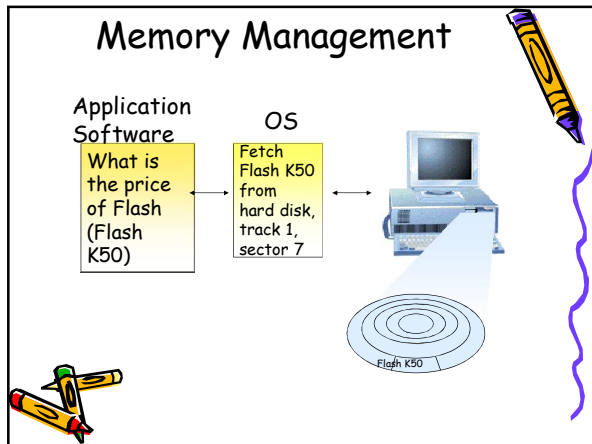
User Interface

- User interface
  - A function of the operating system that allows individuals to access and command the computer
- Command-based user interface
  - A particular user interface that requires text commands be given to the computer to perform basic activities
  - E.g., unix, DOS

Memory Management

- Memory management…
  - Controls how memory is accessed and maximizes available memory and storage

Memory Management

Application Software

OS

What is the price of Flash (Flash K50)

Fetch Flash K50 from hard disk, track 1, sector 7

Flash K50

Manage processing tasks

- Multitasking
  - A processing activity that allows a user to run more than one application at the same time
- Multithreading
  - A processing activity that is basically multitasking within a single application
- Time-sharing
  - A processing activity that allows more than one person to use a computer system at the same time

Virtual Memory & Paging

- Virtual memory
  - Memory that allocates space in secondary storage to supplement the immediate, functional memory capacity of RAM
  - Paging
    - A function of virtual memory allowing the computer to store currently needed pages in RAM while the rest of the pages wait in secondary storage

Operating System Functions

- Network capability
  - Aids in connecting the computer to a network
- Access to system resources
  - Provides security for unauthorized access
- File management
  - Ensures that files in secondary storage are available when needed, and they are protected against unauthorized usage

Memory

Disk

Program 1 (a few pages)
Program 2 (a few pages)
Program 3 (a few pages)
Program 4 (a few pages)
Program 5 (a few pages)
Program 6 (a few pages)
Other memory requirem

Operating system and system software

Programs and other software

Questions