

# Chapter 2

## Operating Systems

### 1- CHOOSE THE CORRECT ANSWER:

1.1- The primary job of the Operating System is

- a- Manage commands
- b- Manage users
- c- Manage programs
- d- **Manage resources**

1.2- Operating system manages

- a- Memory
- b- Processor
- c- I/O devices
- d- **All the above**

1.3- Unix operating system is

- a- Multitasking operating system
- b- Multiuser operating system
- c- Time sharing operating system
- d- **All the above**

1.4- In which of the operating systems, the response time is very crucial:

- a- Batch operating systems
- b- Time-Sharing systems
- c- **Real time operating systems**
- d- Windows

### 2- **What is an Operating System and state its functions?**

An *operating system* is a program that acts as an intermediary between a user of a computer and the computer hardware.

Main functions of an operating system are:

1. The operating system is an interface between the user and the computer
  - starts the execution of the programs
  - recognizes input from the keyboard or mouse and sends output to the video screen or printer
  - keeps track of files on the drives and controls access to these files
  - controls peripherals such as printers and modems
  - detects errors such as memory error, device failure, arithmetic overflow, etc. and provides error handling routines
  - collects performance statistics
2. The operating system manages the resources of the system
  - controls and allocates resources

System resources are memory, CPU, I/O devices, etc.

### 3- Describe briefly the evolution of Operating Systems?

Evolution of Operating Systems:

- Early Systems (1950s): where machines were large and run single user system.
- Simple Batch Systems (1960s): where operator batches jobs together sequentially to be executed by the monitor.
- Multiprogrammed Batch Systems (1970s): the operating system keeps several jobs in the job queue in memory at a time, which increases CPU utilization.
- Time-Sharing Systems (1970s): where multiple jobs in multitasking systems are executed by the CPU switching between them, and user may interact with each program while it is running. This allowed users to use the computer system interactively.
- Real-Time Systems (1970s): Special purpose operating systems. They are used when there are rigid time requirements on the operation of a processor, where processing must be done within the defined constraints, or the system fails.
- Personal/Desktop Systems (1980s): A computer system dedicated to a single user is referred to as a Personal Computer (PC).
- Multiprocessor Systems (1980s): Refers to the use of two or more central processing units (CPU) within a single computer system. These multiple CPUs are in a close communication sharing the computer bus, memory and other peripheral devices.
- Handheld Systems (1990s): A computer that can conveniently be stored in a pocket (of sufficient size) and used while you're holding it.

### 4- List and describe briefly four types of modern operating systems?

#### Types of Operating Systems

- CP/M: An Early Operating System
- DOS
- Microsoft Windows
- OS/2
- MAC OS
- Unix
- Linux

#### 1. Microsoft Windows

- Windows is a graphical user interface operating system
- developed and sold by Microsoft.
- Early versions ran on top of a separate version of DOS
- First stand-alone operating system was Windows 95

#### 2. Mac OS

- **Mac OS** is a graphical user interface-based operating systems
- Developed by Apple Inc. for their Macintosh line of computer systems.
- The original operating system was first introduced in 1984 as being integral to the original Macintosh, and referred to as the "System".
- Apple rebranded System version 7.6 as "Mac OS" in 1996.
- Up to major revision 9, from 1984 to 2000, it is historically known as Classic Mac OS.

### 3. UNIX

- **UNIX** is a multitasking, multiuser computer operating system that exists in many variants.
- Original Unix was developed at AT&T's Bell Labs research center
- It became a standard operating system for academia during the late 1970s and 1980s.
- UNIX operating systems are widely used in servers, workstations.

### 4. Linux

- Linux is Unix-like operating system.
- The Linux kernel, created by Linus Torvalds, was made available to the world for free and is also open source.
- Harder to manage than Windows, but offers more flexibility and configuration options.

### 5- Describe briefly file management in operating systems?

- To manage memory, the operating system uses files.
- A file is a collection of data or information that has a name, called the filename.
- The operating system has a file management system to organize and keep track of files.
- The most commonly used file system is the **hierarchical** one that uses **directories** to organize files into a **tree structure**.
- To access a file, you may need to specify the names of all the directories above it, that is to say specify its access **pathname**

(short: **path**), noting that each operating system has its own rules for specifying paths.

- Different operating systems impose different restrictions on filenames. For example, prohibit the use of certain characters (especially the wildcard) in a filename OR impose a limit on the length of a filename.

### **6- What is kernel?**

- The kernel is the core of an operating system.
- It is the software responsible for running programs and providing secure access to the machine's hardware.
- It decides when and how long a program should run (which is called scheduling).
- Kernels implement hardware abstraction (a set of instructions universal to all devices of a certain type) to hide the underlying complexity from applications and provide a clean and uniform interface.

### **7- What are real-time systems?**

- Special purpose operating systems.
- They are used when there are rigid time requirements on the operation of a processor, where processing must be done within the defined constraints, otherwise, the system fails.

### 8- Describe the objective of multiprogramming?

- The objective is to increase CPU utilization
- The operating system keeps several jobs (a subset of jobs in the job queue) in memory at a time.
- During the execution of one job, if it waits for an I/O operation to complete, the operating system switches to and executes another job-allowing multiprogramming.
- In this way, as long as there is always some job to execute, the CPU will never be idle.

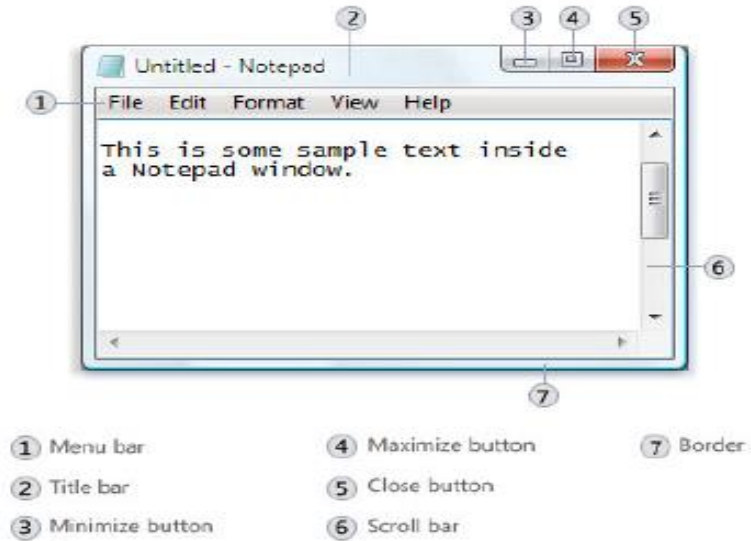
### 9- What are time sharing systems?

In time-sharing or multitasking systems, multiple jobs are executed by the CPU switching between them, but the switching occurs so frequently that the user may interact with each program while it is running which means that several (human) users use the computer system interactively.

Time-sharing operating systems:

- Using multiprogramming to handle multiple interactive jobs
- Processor's time is shared among multiple users
- Multiple users simultaneously access the system through terminals

**10- Illustrate with a graph the different components of a window in Microsoft Windows 7 OS.**



Menu bar	The menu bar displays the program menu. You send commands to the program by using the menu.
Title bar	The title bar displays the name of the current file and the name of the current program.
Minimize button	Use the Minimize button to temporarily decrease the size of a window or remove a window from view. While a window is minimized, its title appears on the taskbar.
Maximize button	Click the Maximize button and the window will fill the screen.
Close button	Click the Close button to exit the window and close the program.
Border	The border separates the window from the desktop. You resize the window by dragging its borders outward to expand it and inward to contract it.



Scroll bar	Let's you scroll the contents of the window to see information that is currently out of view.
Restore button	After you maximize a window, if you click the Restore button, the window will return to its former size.

### 11- What is the **Clipboard**?

- The Clipboard is the storage area for items that have been cut or copied.
- Each time you execute Cut or Copy, you replace the old information on the Clipboard with whatever you just cut or copied.
- You can paste Clipboard information as often as you like, until you replace it with something else

### 12- State if each of the following sentences is True or False and if false give the correct answer:

- a) MS. Windows is the first GUI operating system.  
( False )  
**Correct answer:** Apple's operating system is the first GUI operating system.
- b) Unix is a command-driven interface operating system.  
( True )
- c) The file manager is the core of an operating system.  
( False )  
**Correct answer:** The Kernel is the core of an operating system
- d) In search window of Windows, a wildcard character is a special symbol that stands for one or more unknown characters.  
( True )