

Characteristics of Computer



What is a Computer ?

- ❑ Computer is a *Man-made, Programmable Electronic device* that operates under the control of a set of Instructions that are stored in its *Memory*.
- ❑ A Computer Accepts data from an Input device and processes it into useful information which it displays on its Output device
- ❑ A Computer is a collection of Hardware and Software components that help you accomplish many different tasks.



Characteristics of a Computer

- ❑ **SPEED** : A Computer can perform tasks very fast In general, no human being can compete to solving the complex computation, faster than computer.
- ❑ **ACCURACY** : Since Computer is programmed, so what ever input we give it gives result with accurately.
- ❑ **DILIGENCE** : Computer can work for hours without any break and creating error.
- ❑ **VERSATILITY** : : We can use computer to perform completely different type of work at the same time.
- ❑ **POWER OF REMEMBERING** : Every piece of Information that a user stores on a Computer can be retained as long as is needed.
- ❑ **NO FEELING** : Computers are devoid of emotions, they have no feelings and no instincts because they are machines.

Main Functions of a Computer

- ❑ Data Input (Use Input Devices)
- ❑ Data Processing (Use Processor / CPU)
- ❑ Output Information (Use Output Devices)
- ❑ Storage/ Memory (Use Storage Devices)
- ❑ Communication (Use Network Devices)



Data, Process, Information

- ☐ Data
- ☐ Process – (Manual/Electronic)
- ☐ Information



NUMBER SYSTEM

NUMBER SYSTEM

When we type some letters or words, the computer translates them in numbers as computers can understand only numbers. A computer can understand positional number system where there are only a few symbols called digits and these symbols represent different values depending on the position they occupy in the number.

A value of each digit in a number can be determined using

- 1.The digit
- 2.The position of the digit in the number
- 3.The base of the number system (where base is defined as the total number of digits available in the number system).

Decimal Number System

The number system that we use in our day-to-day life is the decimal number system. Decimal number system has base 10 as it uses 10 digits from 0 to 9. In decimal number system, the successive positions to the left of the decimal point represent units, tens, hundreds, thousands and so on.

Each position represents a specific power of the base (10). For example, the decimal number 1234 consists of the digit 4 in the units position, 3 in the tens position, 2 in the hundreds position, and 1 in the thousands position, and its value can be written as

$$\begin{aligned} &(1 \times 1000) + (2 \times 100) + (3 \times 10) + (4 \times 1) \\ &(1 \times 10^3) + (2 \times 10^2) + (3 \times 10^1) + (4 \times 10^0) \\ &1000 + 200 + 30 + 4 \\ &1234 \end{aligned}$$

As a computer programmer or an IT professional, you should understand the following number systems which are frequently used in computers.

Binary Number System

Characteristics of binary number system are as follows:

Uses two digits, 0 and 1.

Also called base 2 number system

Each position in a binary number represents a 0 power of the base (2). Example 2^0

Last position in a binary number represents a x power of the base (2). Example 2^x where x represents the last position - 1.

Example

Binary Number : 10101_2

Octal Number System

Characteristics of octal number system are as follows:

Uses eight digits, 0,1,2,3,4,5,6,7.

Also called base 8 number system

Each position in an octal number represents a 0 power of the base (8). Example 8^0

Last position in an octal number represents a x power of the base (8). Example 8^x where x represents the last position - 1.

Example

Octal Number : 12570_8

Hexadecimal Number System

Characteristics of hexadecimal number system are as follows:

Uses 10 digits and 6 letters, 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F.

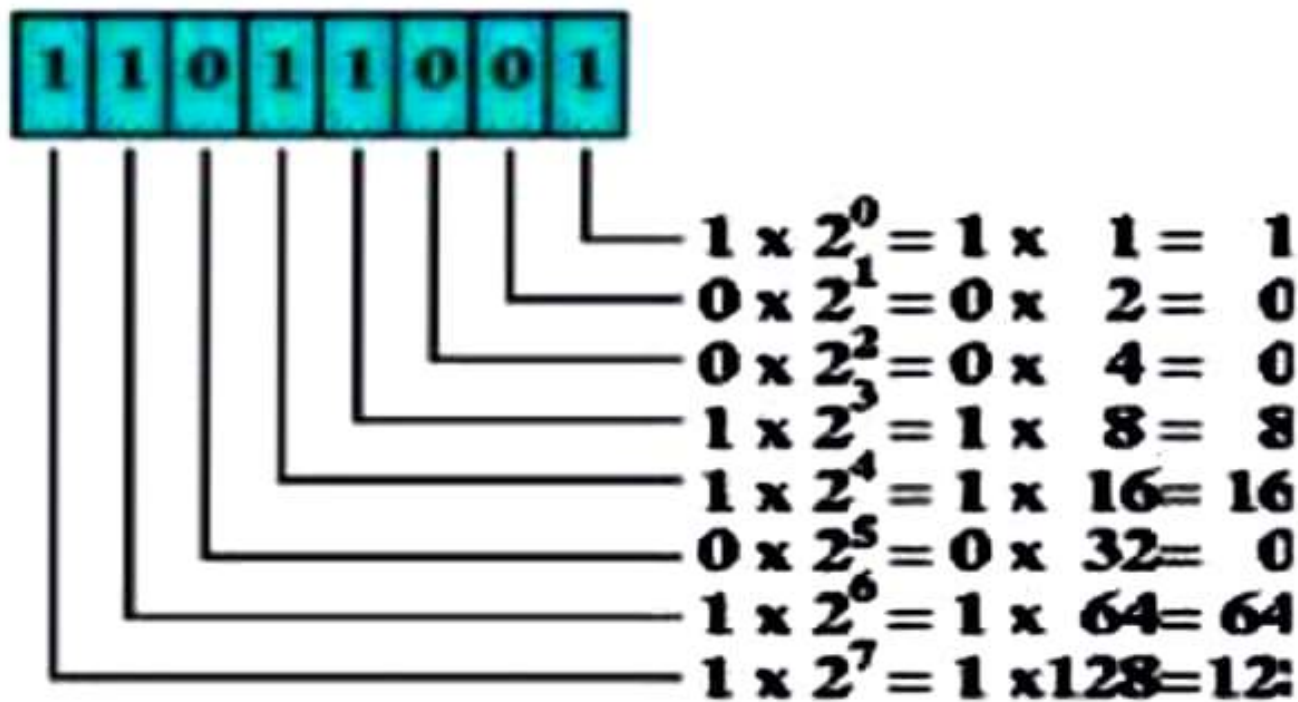
- Letters represents numbers starting from 10. A = 10. B = 11, C = 12, D = 13, E = 14, F = 15.
- Also called base 16 number system
- Each position in a hexadecimal number represents a 0 power of the base (16). Example 16^0
- Last position in a hexadecimal number represents a x power of the base (16). Example 16^x where x represents the last position - 1.

Decimal Into Binary

2	12345
2	6172
2	3086
2	1543
2	771
2	385
2	192
2	96
2	48
2	24
2	12
2	6
2	3
1	

1	LSB
0	
0	
1	
1	
1	
0	
0	
0	
0	
0	
0	
1	
1	MSB

Binary To Decimal



$$1 + 8 + 16 + 64 + 128 = 217$$

Binary Addition

A + B	SUM	CARRY
0 + 0	0	0
0 + 1	1	0
1 + 0	1	0
1 + 1	0	1

Binary Subtraction

$$\begin{array}{r} 001010 \\ \overset{1}{\cancel{1}}\overset{1}{\cancel{0}}\overset{1}{\cancel{1}}\overset{1}{\cancel{0}}\overset{1}{\cancel{1}} \\ - 1011.11 \\ \hline 1001.111 \end{array}$$

Binary Multiplication

Example:

$$0011010 \times 001100 = 100111000$$

$$\begin{array}{r} 0011010 = 26_{10} \\ \times 0001100 = 12_{10} \\ \hline 0000000 \\ 0000000 \\ 0011010 \\ 0011010 \\ \hline 0100111000 = 312_{10} \end{array}$$

Binary Division

$$101010 / 000110 = 000111$$

$$\begin{array}{r} 111 = 7_{10} \\ 000110 \overline{) 101010} = 42_{10} \\ \underline{-110} = 6_{10} \\ 1001 \\ \underline{-110} \\ 110 \\ \underline{-110} \\ 0 \end{array}$$

INTRODUCTION To OPERATING SYSTEM



WHAT OPERATING SYSTEMS DO

- The operating system controls the hardware and coordinates its use among the various application programs for the various users.
- We can also view a computer system as consisting of hardware, software, and data.
- The operating system provides the means for proper use of these resources in the operation of the computer system.
- An operating system simply provides an **environment** within which other programs can do useful work.
- To understand more fully the operating system's role, we explore operating systems from two viewpoints:
 - The user
 - The system.



DEFINING OPERATING SYSTEM

No universally accepted definition of **what** an OS:

- Operating systems exist to offer a reasonable way to solve the problem of creating a usable computing system.
- The fundamental goal of computer systems is to execute user programs and to make solving user problems easier.
- Since bare hardware alone is not particularly easy to use, application programs are developed.
 - These programs require certain common operations, such as those controlling the I/O devices.
 - The common functions of controlling and allocating resources are brought together into one piece of software: the **operating system**.



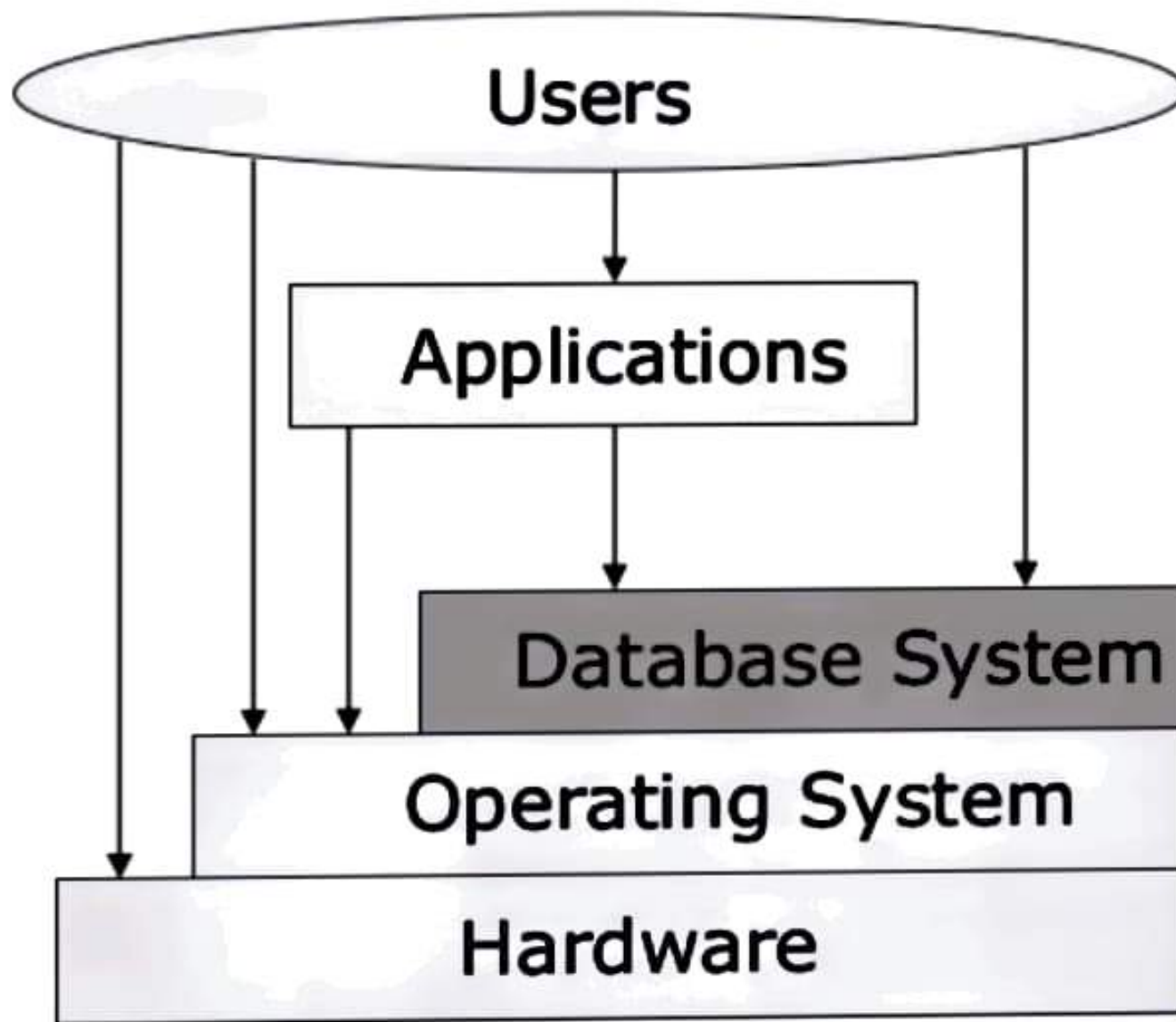
DEFINING OPERATING SYSTEM (CONT.)

No universally accepted definition of what is **part** of the OS:

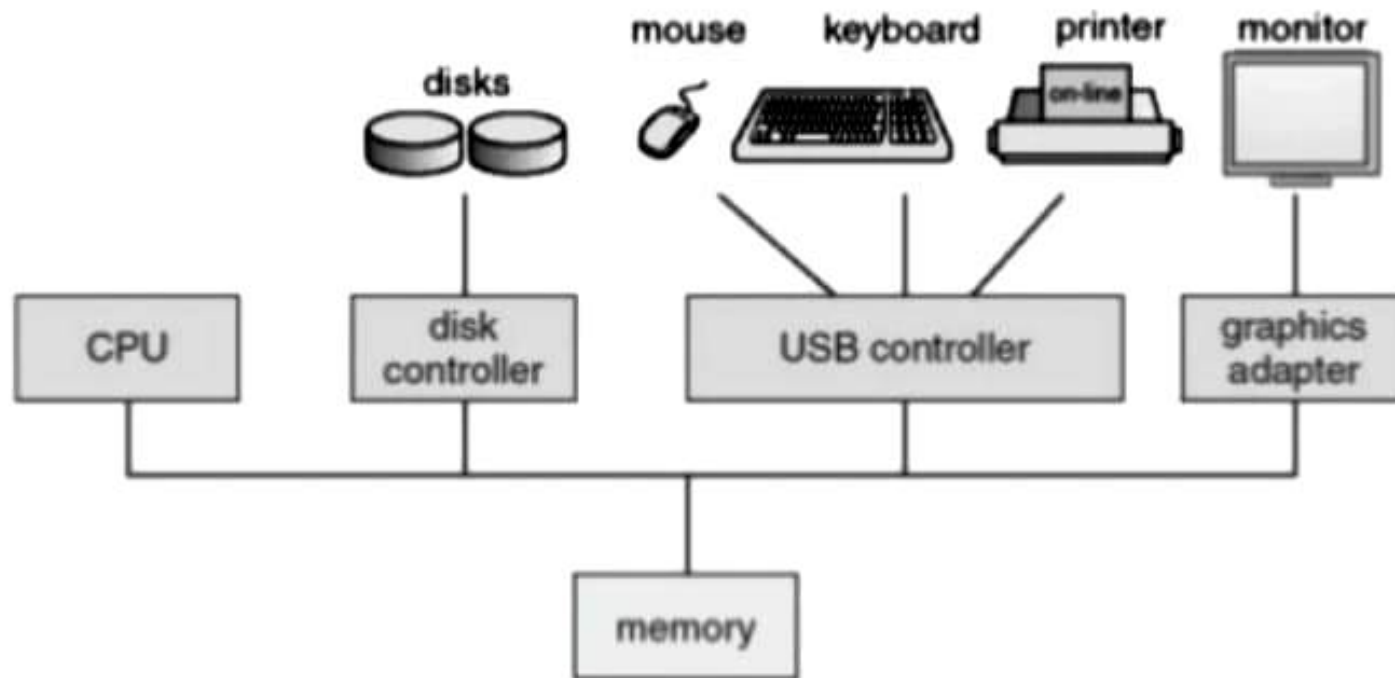
- A more common definition, and the one that we usually follow, is that the operating system is the one program running at all times on the computer -- usually called the **kernel**.
- Along with the kernel, there are two other types of programs:
 - System programs, which are associated with the operating system but are not necessarily part of the kernel.
 - Application programs, which include all programs not associated with the operation of the system.



EVOLUTION OF COMPUTER SYSTEMS



MODERN COMPUTER SYSTEM

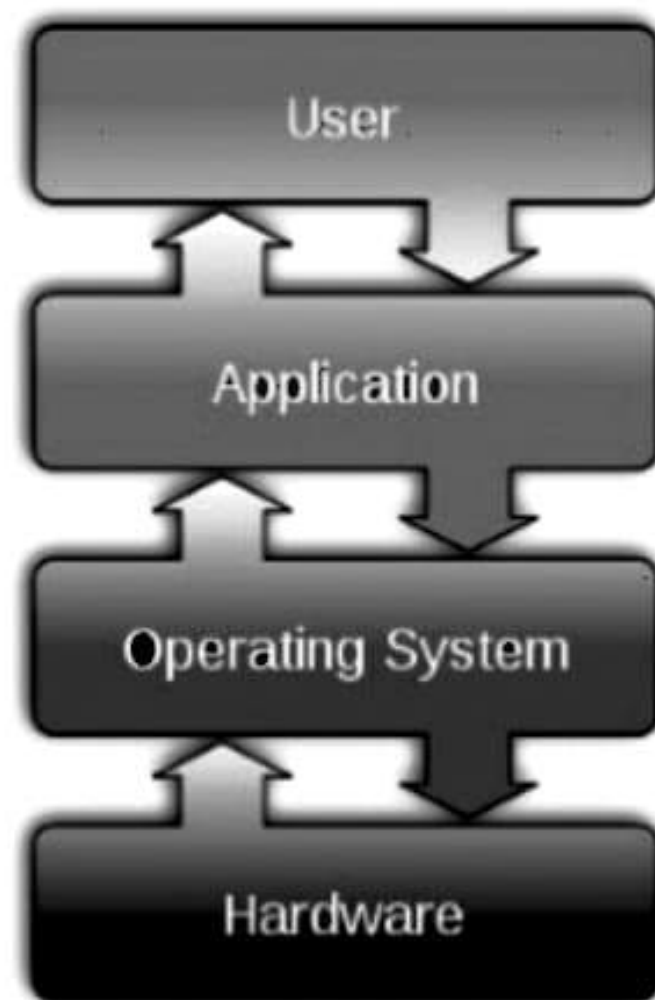


Operating Systems

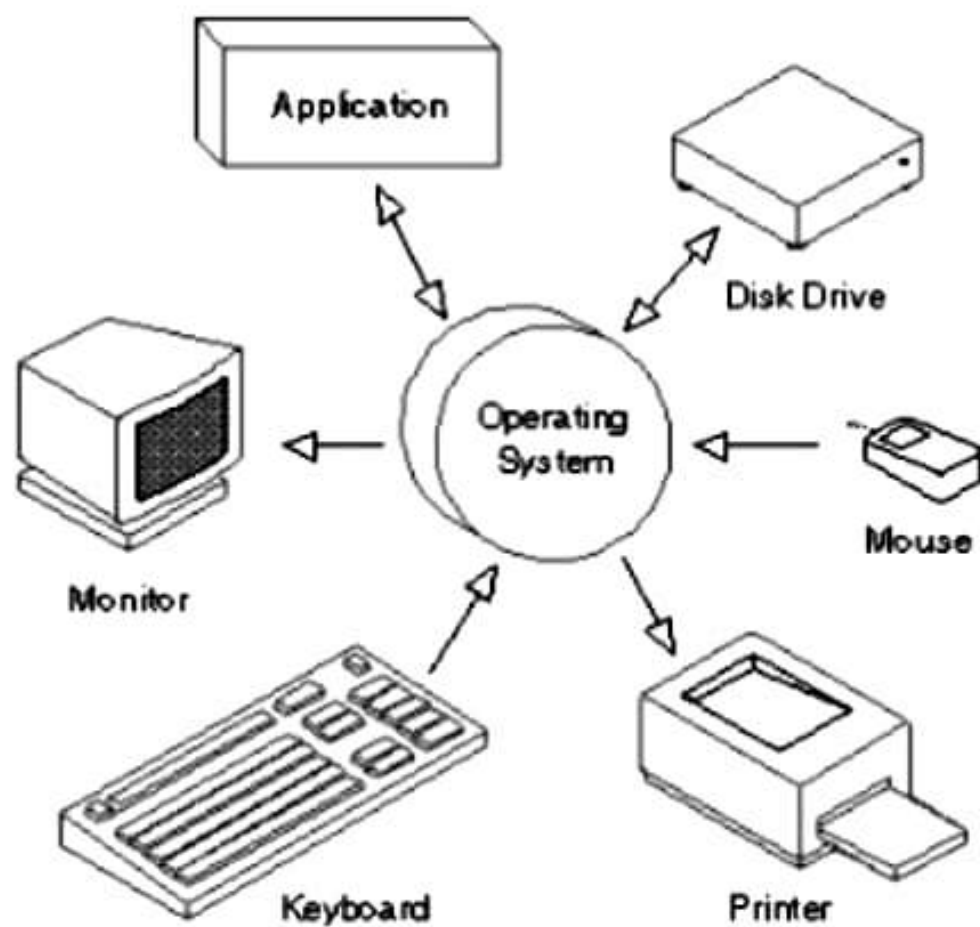
Operating Systems

- The operating system is the most important program that runs on a computer.
- Operating system is an interface between computer and user.
- It is responsible for the management and coordination of activities and the sharing of the resources of the computer.

Operating Systems



Operating Systems



Operating Systems

Types of Operating System

Multi-user vs. Single user

- A multi-user operating system allows multiple users to access a computer system concurrently.
- Time-sharing system can be classified as multi-user systems as they enable a multiple user access to a computer through the sharing of time.
- Single-user operating systems, as opposed to a multi-user operating system, are usable by a single user at a time.

Operating Systems

Major Functions of Operating System

- Resource management
- Data management
- Job management
- Standard means of communication between User and Computer

Operating Systems

Major Functions of Operating System

Resource Management

- The resource management function of an OS allocates computer resources such as CPU time, main memory, secondary storage, and input and output devices for use.

Operating Systems

Major Functions of Operating System

Data Management

- The data management functions of an OS govern the input and output of data and their location, storage, and retrieval.
- It also is responsible for storing and retrieving information on disk drives and for the organization of that information on the drive.

Operating Systems

Major Functions of Operating System

Job Management

- The job management function of an OS prepares, schedules, controls, and monitors jobs submitted for execution to ensure the most efficient processing.
- A job is a collection of one or more related programs and their data.

Operating Systems

Major Functions of Operating System

Standard Means of Communication between User and Computer

- The OS also establishes a standard means of communication between users and their computer systems.
- It does this by providing a user interface and a standard set of commands that control the hardware.

Operating Systems

User Interface

- A program that controls a display for the user (usually on a computer monitor) and that allows the user to interact with the system) .
- The user interface allows the user to communicate with the operating system.

Operating Systems

User Interface

- The user interface provides means of:
 - **Input** - allowing the users to manipulate a system
 - **Output** - allowing the system to indicate the effects of the users' manipulation.

Operating Systems

Types of User Interface

- Command line interface
- Graphical user interface

Operating Systems

Types of User Interface

Command Line Interface (CLI)

- A **command-line interface** is a mechanism for interacting with a computer operating system or software by typing commands to perform specific tasks.
- This method of instructing a computer to perform a given task is referred to as "entering" a command.
- Accept input via keyboard only.
- Not suitable for beginners.

Operating Systems

Types of User Interface

Command Line Interface (CLI)

- Examples of command:

Command	Description
DIR	To display list of files or folder
COPY	To copy file or folder
MD	To make new folder
CLS	To clear screen
Quit	To quit

Operating Systems

Types of User Interface

Graphical User Interface (GUI)

- Is a type of user interface which allows people to interact with computer with images rather than text commands.
- Accept input via keyboard and pointing devices.
- Easy to learn.

Operating Systems

Types of User Interface

Elements of Graphical User Interface

- Pointer
- Icons
- Desktop
- Windows
- Menus

Operating Systems

Types of User Interface

Pointer

- A symbol that appears on the display screen and that you move to select objects and commands.
- Usually, the pointer appears as a small angled arrow.



Operating Systems

Types of User Interface

Icons

- Small pictures that represent commands, files, or windows.



Operating Systems

Types of User Interface

Desktop

- The area on the display screen where icons are grouped is often referred to as the desktop because the icons are intended to represent real objects on a real desktop.

Operating Systems

Types of User Interface

Windows

- Used to divide the screen into different areas.
- In each window, you can run a different program or display a different file.

Operating Systems

Examples of Operating System

- MS-DOS
- Windows
- Mac OS
- Linux
- Solaris
- Android

Operating Systems

Windows

- Produced by Microsoft, Inc.
- Using graphical user interface.
- Support multitasking and multiuser.
- First version: Windows 1.0 (1985)
- Latest version: Windows 8



Operating Systems

- Types of User Interface
- Menus
- Most graphical user interfaces let you execute commands by selecting a choice from a menu.
- Two types of menu:
 - Pull-down menu
 - Pop-up menu

Conclusion

- Without Operating system the computers cannot run the application and we cannot do work in the computer.
- Therefore Operating system is very important in computer.