SOFTWARE

What is Software?

Computer Software: *This is the set or collection of instructions which make the computer work.*

It includes application software such as word processor which enable a user to perform a task and system software such as operating system which enables other software to run properly by interfacing with hardware and other software.
There are two types of computer software or simply software

i. System software (Operational Software)
ii. Application software

System Software

System software *is the computer software designed to operate and control the computer hardware and to provide a platform for running application software.*

Systems software is further subdivided into **operating systems, utilities, and firmware and network software**. The operating system is the program that actually makes the computer operates. Utilities are programs which either improves the functioning of the operating system or supply missing or additional functionality.

Following are functions of the system software

i. Storing and retrieving files
ii. Performing operations such as retrieving, loading, executing and storing application programs
iii. Performing a variety of system utility functions
iv. Booting the computer and making sure that all the hardware elements are working properly.

Application Software (Application Package)

Application software's *are programs that are designed to help the user accomplish specific tasks.*

They are controlled by an operating system which is the system software therefore cannot work without a system software. They are specific in function or operational goals.

Examples and Uses of Application Software

Software	Uses	Examples
1. Word processor	Typing documents	Ms Word, Lotus word pro, OpenOffice writer etc.
2. Spreadsheet	Calculating budgeting	Ms Excel, Lotus 1-2-3
3. Desktop publishing	Designing publications like newspaper and books	Adobe PageMaker, Ms publisher, Adobe InDesign
4. Computer Aided Design	Technical drawing	Auto CAD, Maya, Cinema 4D etc
5. Database	Keeping records and files	Ms Access, My SQL, FoxBase, Paradox etc.
6. Graphics software	Designing and manipulating graphics	Corel Draw, Photoshop

Similarities between System Software and Application Software

i. They are all set of instructions
ii. They are all stored inside the hardware as programs
iii. They are all non-tangible (non-physical)
iv. They are all tells the computer what to do
v. They are all developed by programming concepts and configured due to a desired object.

Differences between System Software and Application Software

System Software	Application Software
1. Controls application software	Controlled by system software
2. They are general in performance	They are specific in performance
3. Can operate without application software	Cannot operate without system software
4. Manage other software and hardware	Manage the accomplishing of a specific

	software
5. Complex set of instructions	Simple and specific set of instructions

Difference between Computer Hardware and Computer Software

Computer Hardware	Computer Software
1. Are tangible devices	Are not tangible
2. Are physical components	Are sets of instructions
3. Can store software programs inside its parts	Are stored inside the hardware parts as programs
4. They do not tells a computer what to do	They tells a computer what to do
5. Are designed and assembled physically with their parts and connections	Are the sets of instructions which developed by programming concepts

Operating System

Operating system (OS) *is an interface between the user and the computer hardware that facilitates the execution of other application programs and the access to hardware and software resources.*

Types of Operating

The classification of Operating system is categorized into two groups.

i. Classification of operating system based on their user interface
ii. Classification of operating system based on number of users and number of task

Classification of Operating System Based On Their User Interface

User interface is used to interact with the computer to perform various tasks. User gives commands to computer and enters the data into computer. Based on the user interface, there are two types of operating systems.

1. Graphical User Interface (GUI)
2. Command Line Interface (CLI)

Graphical User Interface (GUI) Operating System

Graphical user interface (GUI) operating system present commands in graphical form. For example, application programs, commands, disk drives, files etc. are presented in the form of icons.

Usually a command is given to the computer by clicking with mouse on the icon. GUI also provides menus, buttons and other graphical objects to the user to perform different tasks. GUI is very easy to interact with the computer.

Example
Examples of GUI operating systems are Windows, Linux, and Solaris. Today Windows is commonly used in PCs. In Windows, mouse is used as input device.

Features of Graphical User Interface OS

Interfacing
Provides commands in graphical form on the computer screen. The user gives commands to computer by clicking with mouse on the icon. The users have not to memorize commands. Usually mouse is used for interfacing with computer.

Control
Although a GUI offers a better control of a file system and computer resources but often users have to use command line to complete a specific tasks.

Ease
It is easy to learn and use.

Multitasking
GUI provides facility to open multiple programs each in a separate window. So it enables a user to view and to manipulate things at a time on computer screen.

Speed
A GUI is easier to use. However it is slower to perform different tasks.

Scripting
Although a GUI enables a user to create shortcuts or other similar sections to complete a task. However GUI does not provide the facility of scripting a sequence of commands to perform task.

Command Line Interface Operating System

A command line interface operating system provides a command prompt on the computer screen that allows the user to type in commands that can immediately provide results. The commands are given to the computer by typing on the keyboard. The commands are typed according to the predefined format. The main problem with command line interface is that users have to

memorize commands and rules of writing these commands. It is not an easy way to interface with the computer. This is downside for people who are not fond of memorizing commands.

Example
Examples of Command line operating systems are DOS (Disk Operating System), and Unix.

Features of Command Line OS

Interfacing
Provides a commands prompt on the computer screen. The user gives commands to computer by typing on the keyboard. The users have to memorize commands and rules of writing these commands. Usually keyboard is used for interfacing with computer.

Control
It provides full access to computer resources.

Ease
It is difficult to learn and use.

Multitasking
Although many command line operating systems allow multitasking, but it is difficult in these operating systems to view multiple things at a time on computer screen.

Speed
The command line interface is faster than GUI to perform different tasks.

Classification of Operating System Based On the Number of User and Number of Task

Following are main four types of operating system based on the number of user and number of task they perform.

Single User Single Task Operating System
Is the system software which is used by a single user and it can perform a single task at a time.
Example
The Palm operating system handheld computers (i.e. Android OS, Symbian OS) are good examples of a modem single user single task operating system.

Single User Multitask Operating System

This operating system allows a single user to simultaneously run multiple applications on their computer at a time. This is the type of operating system found on most personal desktop and laptop computers.

Example

Windows operating system (i.e. windows 10, windows 7), Mac OS etc.

Multiuser Multitask Operating System

This can be used by many users also can perform many functions at a time. The operating system must make sure that the requirements of the various users are balanced, and that each of the programs they are using has sufficient and separate resources so that a problem with one user does not affect the entire community of users.

Example

UNIX, Solaris, Linux, Windows NT are examples of multiuser multitask OS.

Real time Operating System

Often used as a control device in a dedicated application such as controlling experiments, medical imaging systems, and industrial control systems etc.

Example

RTlinux, VXWorks, Windows CE, QNX etc.

Functions of Operating System

There are many functions those are performed by operating system but the main goal of operating system is to provide the interface between the user and the hardware means of provides the interface for working on the system by the user.

The various Functions those are Performed by the Operating System are as Explained below:-

Interface Platform

It provides a graphical user interface to the user as well as an interface for running other application.

Resource Management

The resource management function of an OS allocates computer resources such as CPU times, main memory, secondary storage and input / output devices for use as well as managing software resources.

Memory Management

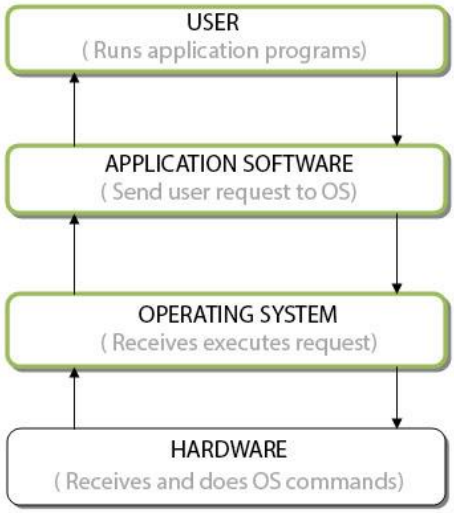
Decide which processes are loaded into memory when memory space becomes available.

Security Management
By security management operating system manages the alert messages, dialogue boxes, firewall and password.

File management
Refer to the way that the operating system manipulates, store, retrieve and save data.

Role of an Operating system
An operating system exists for two main purposes. One is that is responsible for the management and coordination of activities and the sharing of the resources of the computer. Another is that it provides an environment for the development and execution of programs.

Following is the diagram which shows the role of an operating system



Role of an operating system

Using Operating System

Procedure for Switching On and Off the Computer

Booting *is a process of powering on a computer and getting into the operating system.*
During the boot process, the computer will perform a self- diagnostic also known as POST and load necessary drivers and programs that help the computer and devices communicate.

Boot Devices

Booting can be done either through hardware (pressing the start button) or by giving software commands. Therefore, a boot device is a device that loads the operating system. Moreover, it

contains the instructions and files which start the computer. Examples are the hard drive, floppy disk drive, CD drive, etc. Among them, the hard drive is the most used one

Steps of Booting

We can describe the boot process in six steps:

1. **The Startup**

It is the first step that involves switching the power ON. It supplies electricity to the main components like BIOS and processor.

2. **BIOS and Power On Self-Test**

BIOS (Basic Input Output System): Is a program uses to get the computer system started after you turn it on.

The BIOS is built into all personal computer motherboards and is the first program to run when the computer powers up.

It provides the necessary functionality to start the boot sequence from the boot device, normally located on the primary hard drive.

POST (Power On Self-Test): This is the diagnostic testing sequence that a computer's BIOS runs to determine if the computer hardware like RAM, disk drives and other hardware are working correctly. It is a part of ROM-BIOS functionality. Moreover, if any error occurs, the system produces a beep sound.

3. **Loading of OS**

In this step, the operating system is loaded into the main memory. The operating system starts working and executes all the initial files and instructions.

4. **System Configuration**

In this step, the drivers are loaded into the main memory. Drivers are programs that help in the functioning of the peripheral devices.

5. **Loading System Utilities**

System utilities are basic functioning programs, for example, volume control, antivirus, etc. In this step, system utilities are loaded into the memory.

6. **User Authentication**

If any password has been set up in the computer system, the system checks for user authentication. Once the user enters the login Id and password correctly the system finally starts.

There are main two processes of booting up the computer.

i. Cold booting
ii. Warm booting

- ***Cold booting:*** *This is when the computer is started after being switched off.*

- ***Warm booting:*** *This is when the operating system alone is restarted without being switched off.*

Frequently Asked Questions (FAQs)

Q2. What is BIOS?

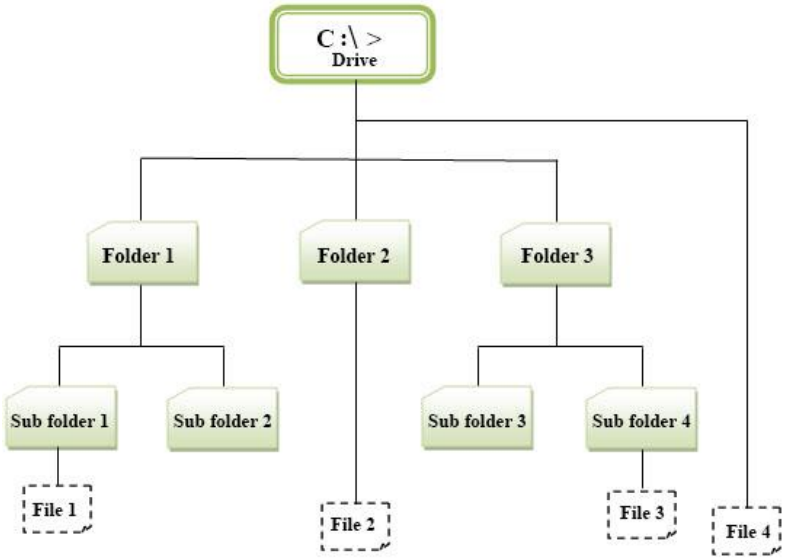
A2. BIOS stands for Basic Input/Output System. It helps in the functioning of all the input/output devices. Further, it also helps to start and initiate the working of all devices during the boot process.

How An Operating System Organise Information In A Three-Tier Hierarchy.

Most operating system organize information in a three – tier hierarchy

i. Drives
ii. Folder
iii. Files

The figure below shows how an operating system organizes information on a harddisk



Information organization 3-tier hierarchy

Drives (Directory)

The operating system recognizes storage media or devices as drives. Drives may be given letters A-Z to identify them.

Folder

A folder *is a named storage location where related files can be stored.*

Files

A file *is a collection of related data given a unique name for ease of access, manipulation and storage on a backing storage.*

Types of Files

There are three types of files namely

i. System files: This contains information that is critical for operation for the computer.

ii. Application files: This holds programs and is executable.

iii. Data files: This contains user's specific data.

The table below shows some extensions and whether it is a system, application or data file.

Extension	File type	Description
• Doc	Data	A Microsoft Word document file
• Txt	Data	A plain text file created using notepad
• Tif	Data	A graphic file created using application such as Adobe Photoshop
• Exe	Application file	The file that launches particular applications e.g. Windows.exe etc
• Bat	System file	File containing series of commands loaded during boot up
• Sys	System file	System files that perform fundamental operation in a computer