

Laptop Computers sometimes called briefcase computers, can be used on your lap and are very portable. Like a desktop computers, laptop computers have a full typewriter keyboard. Laptop computers can be connected to larger peripherals. For example- A regular size printer or a large monitor etc.

Notebook Computers are smaller in size than laptop computers. These computers are ideal for user who has to work away from their offices. The users of these computers might be a student, a journalist and a salesman etc. Example- IBM ThinkPad.

**Q.4 Describe Operating System. What are various types and functions of Operating System?**

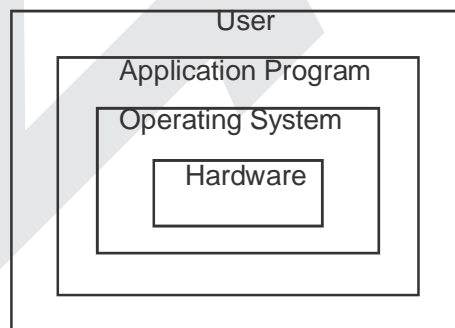
Or

**“Operating System as resource manager.” Describe.**

**Ans. Operating System :-** Operating system is a program that acts as an interface between the users and computer hardware and controls the execution of all kinds of programs. It is the most important program in the computer system. It is one program that executes all the time always as the computer is operational and it exits only when the computer is shut down. OS are the programs that make the computer work hence the name OS. It takes instructions in the form of commands from user and translates into machine understandable instructions. It gets the instructions executed by the CPU and translates the result back into user understandable form.

**Definition: - “An operating system is a set of programs, which are used to manage the overall operations of a computer, in order to achieve maximum efficiency of the computer system.”** In other words, an operating system is a large collection of software, which manages resources of the computer system, such as memory, processor, file system and input/output devices. It is the program within a computer system which helps users to run their applications.

**The position of operating system in overall computer is following :-**



The diagram clearly shows that the operating system directly controls computer hardware resources and other programs depend on the facilities provided by the operating system to gain access to computer system resources.

## Types of Operating System

The operating systems are classified as-

1. Single program operating system.
2. Batch processing system.
3. Multiprogramming operating system.
4. Multiuse or Multi-access operating system.
5. Multiprocessing operating system.
6. Real Time operating system.
7. Network operating system.
8. Distributed operating system.

**Single Program Operating System :-** Single program operating system refers to single pertaining to single user for example-MS-DOS. It has a single processor runs a single program and interacts with a single use at a time.

Only one program resides in the computer memory and it remains there till it is executed. It is also called Unit Programmed operating system. It is the simplest operating system because-

- The whole memory space is allocated to one program so memory management is not very difficult.
- The CPU has to execute only one program at a time so the CPU management also does not have any problem.

### **Limitation of the Operating System**

In single program operating system, the CPU remains idle most of the time because as compared to CPU speed, the speed of I/O devices is quite slow.

**Batch Operating System :-** Jobs with similar requirements were batched together and run through the computer as a group. The operating system handling a batch of programs known as Batch or Concurrent operating system. This operating system relieves the user from the difficult task of loading the next program after the execution of a previous program is completed. It must be remembered that a batch program operating system is a single program system because at a time only one program is being executed by the CPU.

In this operating system :-

- Memory is usually divided into two parts. One part is fixed for containing operating parts. One part is fixed for containing operating system and the other part contains user programs to be executed. When one program is executed, another program is loaded into same memory area.
- The CPU has to execute only one program at a time, so the CPU management also does not have problem.

### **Disadvantages**

- Non-Interactive Environment :- Batch operating system allows no interaction between users and executing programs.
- High Turn around Time :- The turn around time taken between Job submission and completion is very high.
- Off-Line debugging :- This means that a programmer can not correct bugs the moment it occurs.

**Multi Programming Operating System:-** Multiprogramming operating systems as compared to batch operating system are fairly better but sophisticated. Multiprogramming increases CPU utilization by organizing a number of jobs such that CPU always has one to execute.

Different forms of multiprogramming operating system are :-

- Multitasking or Multiprocessing operating system
- Time sharing operating system.

**Multitasking operating system :-** A running state of a program is called a process or a task. A multitasking operating system supports more than one active process simultaneously with a single CPU. It is also called serial multitasking or context switching which implies stopping one temporarily to work on another.

In these operating systems, CPU switches from one task to another so quickly that it gives the illusion to the user of executing all the tasks at the same time. Example- windows 95/98, windows NT etc.

**Time-Sharing Operating System :-** Time Sharing is a special case of multiprogramming operating system with a quick response time. It allows many users to simultaneously share the computer resources. It provides each user with a small portion of a time-shared computer. In a time shared system since each action or command takes a very small fraction of time, only a little CPU time is needed for each user.

As the CPU switches rapidly from one user to another user, each user is given the impression that he has his own computer, whereas actually one computer is being shared among many users.

**Multi user of multi-access operating system :-** Multi user operating system allows simultaneous access to a computer system through two or more terminals.

**Example: -** Railway Reservation System & Airline reservation system support hundreds of active terminals under control of a single program. Although it is associated with multiprogramming multitasking operating system does not imply multiprogramming or multitasking.

**Multiprocessing (Parallel) operating system :-** In multiprocessing operating system, multiple CPUs perform more than one job at one time. It differs from the time-sharing operating system in the manner that it refers to utilization of multiple CPUs.

In it the resources are allocated comfortably to the competing processes in a manner which results in a high throughput e.g.: - UNIX, MVS etc. Some mainframe and Supermini computers have multiple CPUs, each of which can handle several jobs.

**Real Time operating system: -** Real Time system is a special purpose operating system. It is used in those environments, where requests are accepted and processed in a short time, or within a specified time. Real time operating system has well defined, fixed time constraints. Its main characteristics are:-

- Fast response time
- Feedback mechanism
- Reliability

It has to handle a process within the specified time limit otherwise the system fails, resulting in a disaster

many a times. Such applications include- Scientific experiments, flight control, few military applications, industrial control etc.

**Network Operating System :-** a network operating system is a collection of S/W and associated protocols that allow a set of computers which are interconnected by a computer network to be used together. In a network operating system the users are aware of the existence of multiple computers.

Capabilities of network operating system :-

- Allowing users to access the various resources of the network nodes.
- Allowing the users to copy files from one machine to another machine.
- Controlling access to ensure that only users with proper authorization access particular resources.

**Distributed Operating System :-** A distributed operating system looks like an ordinary centralized operating system that runs on multiple independent CPUs. It is collection of processors that do not share memory. Each processor has its own local memory.

The use of multiple processors is invisible to the user i.e. the users are not aware of where their programs are being run or where their files are residing. These are handled automatically and efficiently by the operating system.

**Advantages :-**

- Resource Sharing
- Powerful and cheap microprocessor technology

**Reliable :-**

- Better services to users
- Communication and information sharing

**Functions of Operating System**

Operating System as Resource Manager

1. **Process Management :-** a process is an executable program. During execution, a process requires certain resources like CPU Time, Memory Space, and I/O Devices. At a particular instance of time, a computer system normally consists of a collection of processes. The process Management module of the operating system takes care of the creation and deletion of processes, scheduling of various resources to the different processes requesting them, and providing mechanisms for synchronization and communication among processes.
2. **Memory Management :-** To execute a program, it must be loaded; together with the data it accesses, in the main memory. To improve CPU utilization and to provide better response time to its user, a computer system keeps several programs in main memory. The memory management module of an operating system takes care of the allocation and de-allocation of memory space to the various programs in need of the resource.
3. **File Management :-** All computer systems are used for storage, retrieval and sharing of information. A computer normally stores such information in units called files. Processes can read the information from the files and can create new files for storing the new information in the files. The file management module of an operating system takes care of file related activities such as organizing, storing, retrieval, naming, sharing and protection of files.
4. **Device Management :-** A computer system consists of various I/O devices as terminals, printers, disks and tapes. The device management module of the operating system takes care of controlling all the computer's I/O devices.
5. **Security :-** Computer system stores a large amount of information, some of which is highly sensitive and valuable for their user. User can trust the system and rely on it only if the various resources and information of a computer system are protected against unauthorized access. The security module of the operating system ensures it.
6. **I/O Management :-** Operating system also manages input output devices. The function of input output devices are controlled by the operating system.
7. **Scheduling :-** Operating system is responsible for the scheduling of the input output device