M.Sc. IV Sem. (Mathematics)

Paper 2nd - Fundamentals of Computer Science - II
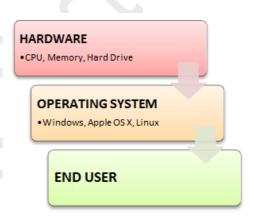
Unit IV

Reference Book : **C. Ritchie,** *Operating Systems incorporating UNIX and Windows,* **BPB Publications, New Delhi.**

Topic : Operating System (OS)

An operating system is a program which acts as an interface between the user and the computer hardware. Every computer must have at least one operating system to run other programs. An application like Chrome, MS Word, Games etc. needs some environment in which it will run and perform its task. The OS helps us to communicate with the computer without knowing how to speak the computer's language. It is not possible for the user to use any computer or mobile device without having an operating system.

Every general purpose computer must have an operating system to run other programs. Operating system performs basic tasks such as recognizing input from the keyboard, sending output to the display screen, keeping track of the files and directories on the disk, controlling peripheral devices such as disk, drive and printers.

It is just like traffic cop. It makes sure that different programs and users running at the same time do not interfere with each other.

The operating system is also responsible for security, ensuring that unauthorized users do not access the system.

Examples : UNIX, MS-DOS, MS-Windows - 98/XP/Vista, Windows-NT/2000, OS/2, Mac OS, Windows, Android, iOS, Linux etc.

Function of an Operating System :

1. **Process Management**:- Process management helps OS to create and delete processes. It also provides mechanisms for synchronization and communication among processes.

2. **Memory Management:-** Memory management module performs the task of allocation and de-allocation of memory space to programs in need of this resources.

3. **File Management**:- It manages all the file-related activities such as organization storage, retrieval, naming, sharing, and protection of files.

4. **Device Management**: Device management keeps tracks of all devices. This module also responsible for this task is known as the I/O controller. It also performs the task of allocation and de-allocation of the devices.

5. **I/O System Management:** One of the main objects of any OS is to hide the peculiarities of that hardware devices from the user.

6. **Secondary-Storage Management**: Systems have several levels of storage which includes primary storage, secondary storage and cache storage. Instructions and data must be stored in primary storage or cache so that a running program can reference it.

7. **Security**:- Security module protects the data and information of a computer system against malware threat and authorized access.

8. **Command Interpretation**: This module is interpreting commands given by the end acting system resources to process that commands.

9. **Networking:** A distributed system is a group of processors which do not share memory, hardware devices, or a clock. The processors communicate with one another through the network.

10. **Job Accounting**: Keeping track of time & resource used by various job and users.

11. **Communication Management**: Coordination and assignment of compilers, interpreters, and another software resource of the various users of the computer systems.

Types of Operating system :

- Batch Operating System
- Multitasking/Time Sharing OS
- Multiprocessing OS
- Real Time OS
- Distributed OS
- Network OS
- Mobile OS

Batch Operating System

Some computer processes are very lengthy and time-consuming. To speed the same process, a job with a similar type of needs are batched together and run as a group.

The user of a batch operating system never directly interacts with the computer. In this type of OS, every user prepares his or her job on an offline device like a punch card and submit it to the computer operator.

Multi-Tasking/Time-sharing Operating systems

Time-sharing operating system enables people located at a different terminal (shell) to use a single computer system at the same time. The processor time (CPU) which is shared among multiple users is termed as time sharing.

Real time OS

A real-time operating system (RTOS) is an operating system (OS) intended to serve real-time applications that process data as it comes in, typically without buffer delays. Examples: Military Software Systems, Space Software Systems.

Distributed Operating System

Distributed systems use many processors located in different machines to provide very fast computation to its users.

Network Operating System

Network Operating System runs on a server. It provides the capability to serve to manage data, user, groups, security, application, and other networking functions.

Mobile OS

Mobile operating systems are those OS which is especially that are designed to power smartphones, tablets, and wearables devices.

Some most famous mobile operating systems are Android and iOS, but others include BlackBerry, Web, and watchOS.