**OPERATING SYSTEM - OVERVIEW**

An operating System (OS) is an intermediary between users and computer hardware. It provides users an environment in which a user can execute programs conveniently and efficiently.

In technical terms, It is a software which manages hardware. An operating System controls the allocation of resources and services such as memory, processors, devices and information.

**Definition**

An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.



An Os is a program that manages the computer hardware. It also provides a basis for application programs and acts as an intermediary between the computer user and the computer hardware. An amazing aspect of operating systems is how varied they are in accomplishing these tasks.

*Mainframe operating systems are designed primarily to optimize utilization of hardware.*  *Personal computer (PC) operating systems support complex games, business applications, and everything in between.* *Operating systems for handheld computers are designed to provide an environment in which a user can easily interface with the computer to execute programs.* Thus, some operating systems are designed to be *convenient,* others to be *efficient,* and others some *combination of the two.*

Because an operating system is large and complex, it must be created piece by piece. Each of these pieces should be a well-delineated portion of the system, with carefully defined inputs, outputs, and functions. To understand more fully the operating systems role, we explore operating systems from two viewpoints: that of the user and that of the system.

**1.1 User View**

The user's view of the computer varies according to the interface being used. Most computer users sit in front of a PC, consisting of a monitor/keyboard/ mouse, and system unit. Such a system is designed for one user to monopolize its resources. The goal is to maximize the work (or play) that the user is performing. In this case *the operating system is designed mostly for ease of use with some attention paid to performance and none paid to resource utilization various hardware and software resources are shared.* Performance is, of course, important to the user; but such systems are optimized for the single-user experience rather than the requirements of multiple users.

**1.1.2 System View**

From the computer's point of view, the operating system is the programs intimately involved with the hardware. In this context, we can view an *operating system as a resource allocator.* *A computer system has many resources that may be required to solve a problem: CP*U time, memory space, file-storage space, I/0 devices, and so on. *The operating system acts as the manager of these resources.* Facing numerous and possibly conflicting requests for resources, the operating system must decide how to allocate them to specific programs and users so that it can operate the computer system efficiently and fairly. As we have seen, resource allocation is especially important where many users access the same mainframe or minicomputer. A slightly different view of an operating system emphasizes the need to control the various I/0 devices and user programs. *An operating system is a control program*. *A control program manages the execution of user programs to prevent errors and improper use of the computer. It is especially concerned with the operation and control of I/O devices.*

1.2 **Defining Operating Systems**

We have looked at the operating system's role from the views of the user and of the system. How, though, can we define what an operating system is? In general, we have no completely adequate definition of an operating system. *Operating systems exist because they 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. Toward this goal, computer hardware is constructed. 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/ 0 devices. The common functions of controlling and allocating resources are then brought together into one piece of software: the operating system.

**1.3 Operating System** **Structure**

An operating system provides the environment within which programs are executed. Internally, operating systems vary greatly in their makeup, since they are organized along many different lines.

**Batch processing**

Batch processing is a technique in which Operating System collects one programs and data together in a batch before processing starts. Operating system does the following activities related to batch processing .

* OS defines a job which has predefined sequence of commands, programs and data as a single unit.
* OS keeps a number a jobs in memory and executes them without any manual information.
* Jobs are processed in the order of submission i.e. first come first served fashion.
* When job completes its execution, its memory is released and the output for the job gets copied into an output spool for later printing or processing .



**Advantages**

* Batch processing takes much of the work of the operator to the computer.
* Increased performance as a new job get started as soon as the previous job finished without any manual intervention.

**Disadvantages**

* Difficult to debug program.
* A job could enter an infinite loop.
* Due to lack of protection scheme, one batch job can affect pending jobs.

**Multiprogramming**

One of the most important aspects of operating systems is the ability to multi-program. A single program cannot, in general keep either the CPU or I/O devices busy at all times: Single users frequently have multiple programs running.

When two or more programs are residing in memory at the same time, then sharing the processor is referred to the multiprogramming . Multiprogramming assumes a sing le shared processor.  *Multiprogramming increases CPU utilization by organizing jobs(code and data) so that the CPU always has one to execute the idea is as follows:* The operating system keeps several jobs in memory simultaneously. Since, in generate main memory is too small to accommodate all jobs, the jobs are kept initially on the disk in the job poo1. This pool consists of all processes residing on disk awaiting allocation of main memory.

The set of jobs in memory can be a subset of the jobs kept in the job poo1. The operating system picks and begins to execute one of the jobs in memory. Eventually, the job may have to wait for some task, such as an I/O operation, to complete. In a non-multi-programmed system, the CPU would sit idle. In a multi-programmed system, the operating system simply switches to, and executes, another job. When thatjob needs to wait, the CPU is switched to *another* job, and so on. Eventually the first job finishes waiting and gets the CPU back. As long as at least one job needs to execute, the CPU is never idle.



Memory layout for a multiprogramming system.

Multi-programmed systems provide an environment in which the various system resources (for example, CPU, memory, and peripheral devices) are utilized effectively, but they do not provide for user interaction with the computer system.

Operating system does the following activities related to multiprogramming :

* The operating system keeps several jobs in memory at a time.
* This set of jobs is a subset of the jobs kept in the job pool.
* The operating system picks and beg ins to execute one of the job in the memory.
* Multiprogramming operating system monitors the state of all active programs and system resources using memory management programs to ensures that the CPU is never idle unless there are no jobs

**Advantages**

* High and efficient CPU utilization.
* User feels that many programs are allotted CPU almost simultaneously.

**Disadvantages**

* CPU scheduling is required.
* To accommodate many jobs in memory, memory management is required.