



@ **VELACHERY**

**Ph: 044-42088685**

**9500142214/9500142215**

## **OPERATING SYSTEM (OS)**

### **INTRODUCTION**

An operating system act as an intermediary between the user of a computer and computer hardware. The purpose of an operating system is to provide an environment in which a user can execute programs in a convenient and efficient manner.

An operating system is a software that manages the computer hardware. The hardware must provide appropriate mechanisms to ensure the correct operation of the computer system and to prevent user programs from interfering with the proper operation of the system.

### **system software**

Operating System (OS) is system software, which acts as an interface between a user of the computer and the computer hardware. The main purpose of an Operating System is to provide an environment in which we can execute programs. The main goals of the Operating System are:

- (i) To make the computer system convenient to use,
- (ii) To make the use of computer hardware in efficient way.

Operating System may be viewed as collection of software consisting of procedures for operating the computer and providing an environment for execution of programs. It is an interface between user and computer. So an Operating System makes everything in the computer to work together smoothly and efficiently.

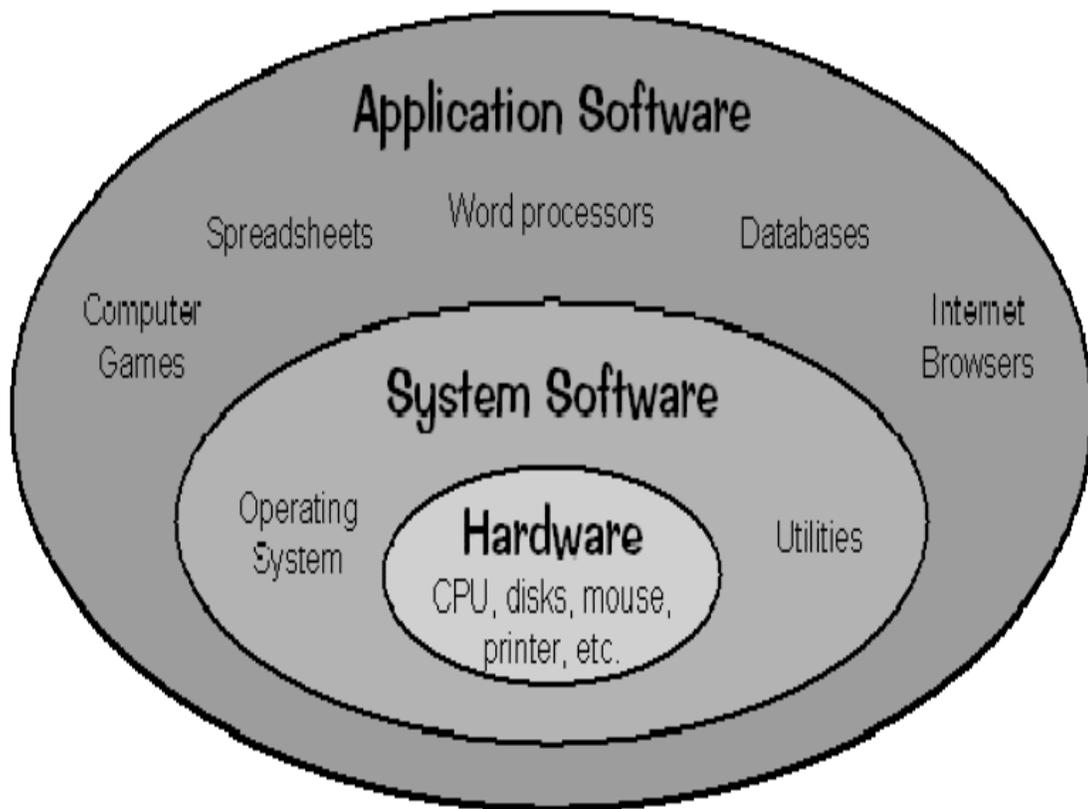
Basically, an Operating System has three main responsibilities:

- (a) Perform basic tasks such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.
- (b) Ensure that different programs and users running at the same time do not interfere with each other.
- (c) Provide a software nplatform on ton of which other programs can run.

The Operating System is also responsible for security and ensuring that unauthorized users do not access the system. Figure 1 illustrates the relationship between application software and system software.

The first two responsibilities address the need for managing the computer hardware and the application programs that use the hardware. The third responsibility focuses on providing an interface between application software and hardware so that application software can be efficiently developed. Since the Operating System is already responsible for managing the hardware, it should provide a programming interface for application developers.

As a user, we normally interact with the Operating System through a set of commands. The commands are accepted and executed by a part of the Operating System called the command processor or command line interpreter.

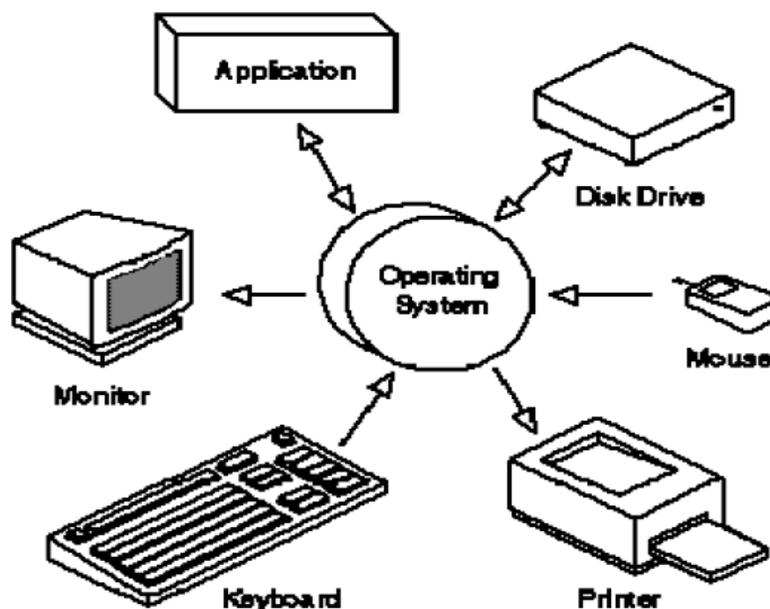


**Figure 1: The relationship between application and system software**

**Definition of Operating System:**

- An Operating system is a program that controls the execution of application programs and acts as an interface between the user of a computer and the computer hardware.

- A more common definition is that the operating system is the one program running at all times on the computer (usually called the kernel), with all else being applications programs.
- An Operating system is concerned with the allocation of resources and services, such as memory, processors, devices and information. The Operating System correspondingly includes programs to manage these resources, such as a traffic controller, a scheduler, memory management module, I/O programs, and a file system.



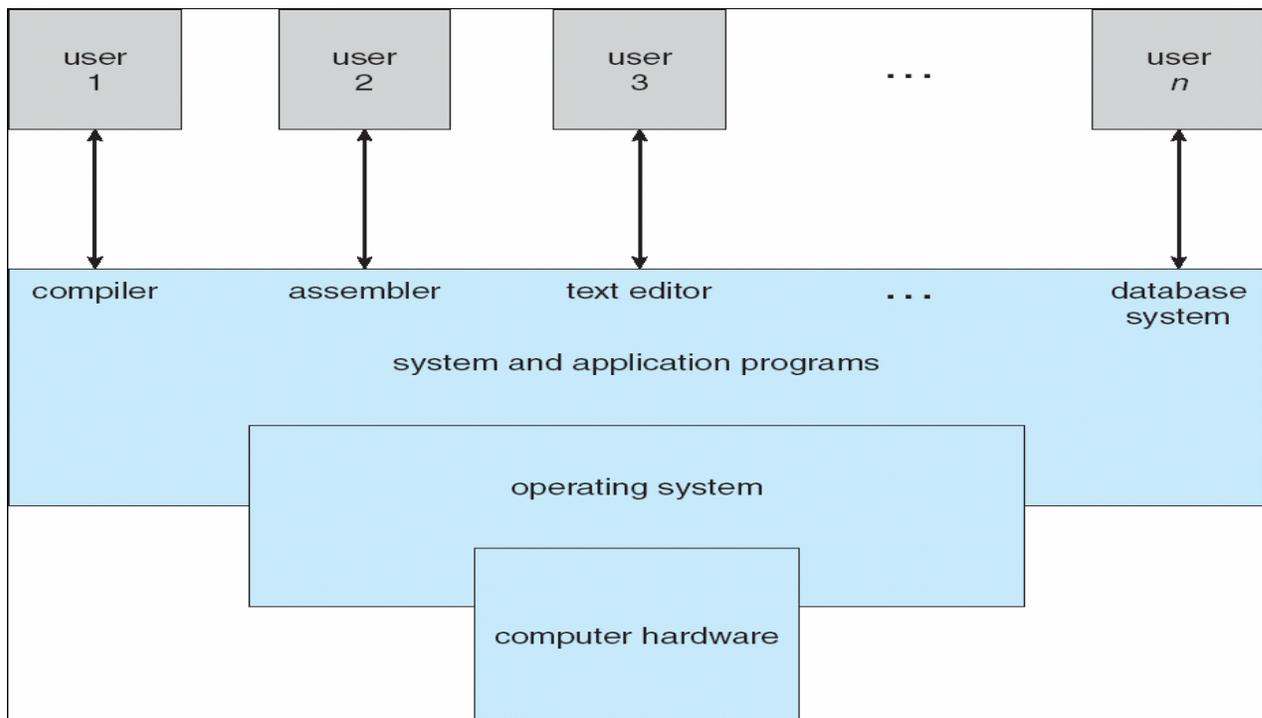
**Figure 2: The interface of various devices to an operating system**

In order to understand operating systems we must understand the computer hardware and the development of Operating System from beginning. Hardware means the physical machine and its electronic components including memory chips, input/output devices, storage devices and the central processing unit.

Software are the programs written for these computer systems. Main memory is where the data and instructions are stored to be processed. Input/Output devices are the peripherals attached to the system, such as keyboard, printers, disk drives, CD drives, magnetic tape drives, modem, monitor, etc.

The central processing unit is the brain of the computer system; it has circuitry to control the interpretation and execution of instructions. It controls the operation of entire computer system. All of the storage references, data manipulations and I/O operations are

The entire computer systems can be divided into four parts or components (1) The hardware (2) The Operating System (3) The application programs and system programs (4) The users.



The hardware provides the basic computing power. The system programs the way in which these resources are used to solve the computing problems of the users. There may be many different users trying to solve different problems. The Operating System controls and coordinates the use of the hardware among the various users and the application programs.

We can view an Operating System as a resource allocator. A computer system has many resources, which are to be required to solve a computing problem. These resources are the CPU time, memory space, files storage space, input/output devices and so on.

The Operating System acts as a manager of all of these resources and allocates them to the specific programs and users as needed by their tasks. Since there can be many conflicting requests for the resources, the Operating System must decide which requests are to be allocated resources to operate the computer system fairly and efficiently.

An Operating System can also be viewed as a control program, used to control the various I/O devices and the users programs. A control program controls the execution of the user programs to prevent errors and improper use of the computer resources. It is especially concerned with the operation and control of I/O devices. As stated above the fundamental goal of computer system is to execute user programs and solve user problems. For this goal computer hardware is constructed. But the bare hardware is not easy to use and for this purpose application/system programs are developed. These

various programs require some common operations, such as controlling/use of some input/output devices and the use of CPU time for execution.

The common functions of controlling and allocation of resources between different users and application programs is brought together into one piece of software called operating system. It is easy to define operating systems by what they do rather than what they are.

The primary goal of the operating systems is convenience for the user to use the computer. Operating systems makes it easier to compute. A secondary goal is efficient operation of the computer system. The large computer systems are very expensive, and so it is desirable to make them as efficient as possible. Operating systems thus makes the optimal use of computer resources. In order to understand what operating systems are and what they do, we have to study how they are developed. Operating systems and the computer architecture have a great influence on each other. To facilitate the use of the hardware operating systems were developed.

First, professional computer operators were used to operate the computer. The programmers no longer operated the machine. As soon as one job was finished, an operator could start the next one and if some errors came in the program, the operator takes a dump of memory and registers, and from this the programmer have to debug their programs.

The second major solution to reduce the setup time was to batch together jobs of similar needs and run through the computer as a group. But there were still problems. For example, when a job stopped, the operator would have to notice it by observing the console, determining why the program stopped, takes a dump if necessary and start with the next job. To overcome this idle time, automatic job sequencing was introduced. But even with batching technique, the faster computers allowed expensive time lags between the CPU and the I/O devices.

Eventually several factors helped improve the performance of CPU. First, the speed of I/O devices became faster. Second, to use more of the available storage area in these devices, records were blocked before they were retrieved. Third, to reduce the gap in speed between the I/O devices and the CPU, an interface called the control unit was placed between them to perform the function of buffering.

A buffer is an interim storage area that works like this: as the slow input device reads a record, the control unit places each character of the record into the buffer. When the buffer is full, the entire record is transmitted to the CPU. The process is just opposite to the output devices. Fourth, in addition to buffering, an early form of spooling was developed by moving off-line the operations of card reading, printing etc. SPOOL is an acronym that stands for the simultaneous peripherals operations on-line. For example,

incoming jobs would be transferred from the card decks to tape/disks off-line. Then they would be read into the CPU from the tape/disks at a speed much faster than the card reader.

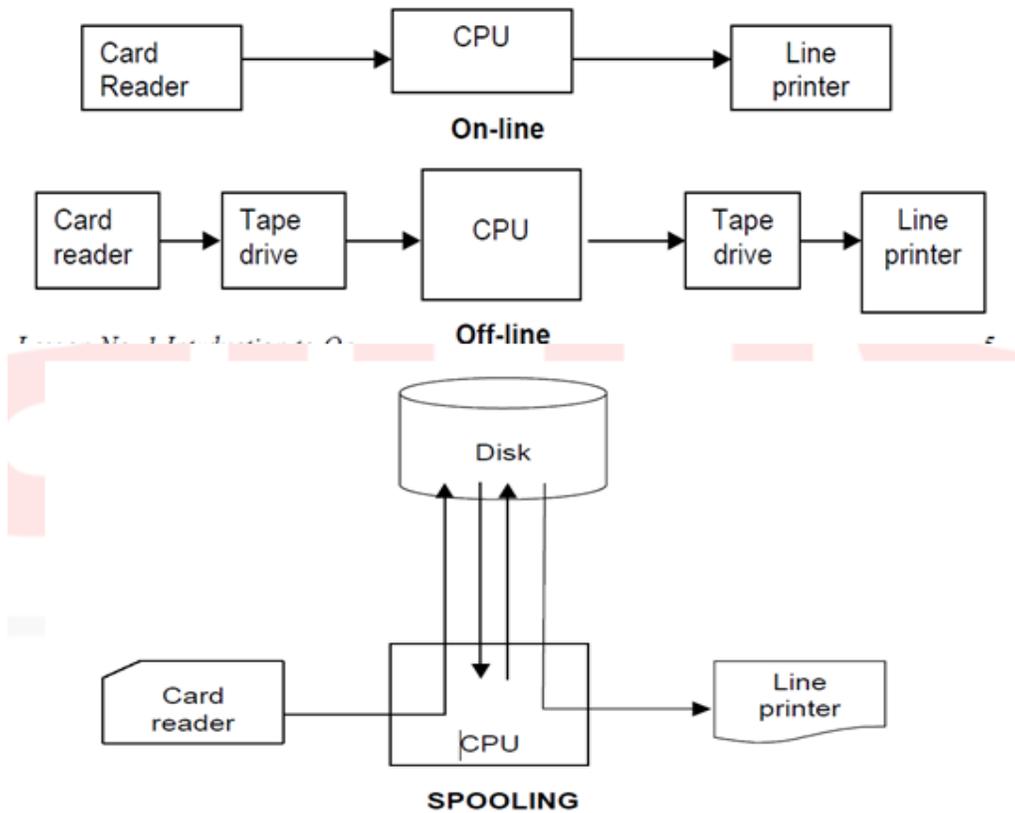
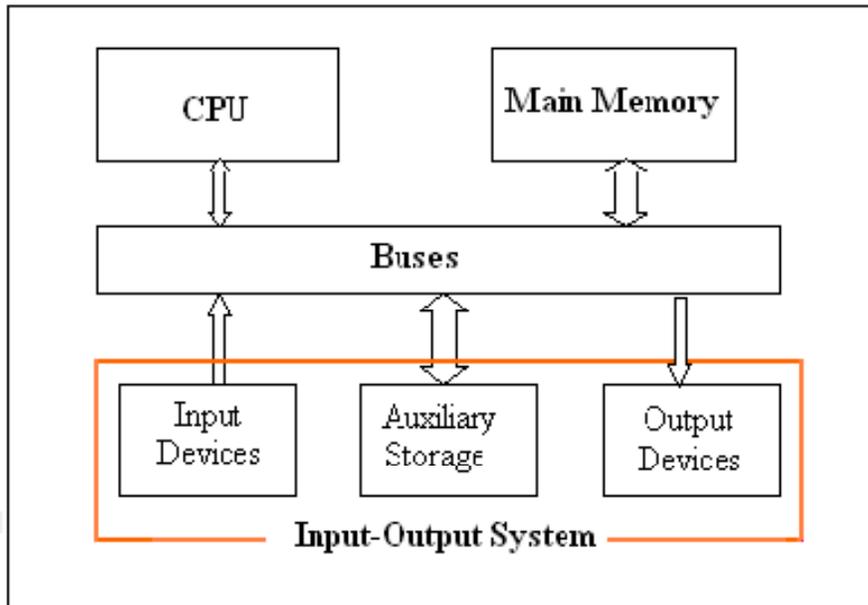


Figure 4: the on-line, off-line and spooling processes

## Operating System as User Interface

- Every general purpose computer consists of the hardware, operating system, system programs, application programs. The hardware consists of memory, CPU, ALU, I/O devices, peripheral device and storage device. System program consists of compilers, loaders, editors, OS etc. The application program consists of business program, database program.
- Every computer must have an operating system to run other programs. The operating system coordinates the use of the hardware among the various system programs and application program for a various users. It simply provides an environment within which other programs can do useful work.
- The operating system is a set of special programs that run on a computer system that allow it to work properly. It performs basic tasks such as recognizing input from the keyboard, keeping track of files and directories on the disk, sending output to the display screen and controlling a peripheral devices.
- The operating system organizes application so that users can easily access, use and store them.

- It provides a stable and consistent way for applications to deal with the hardware without the
- user having known details of the hardware.



- If the program is not functioning properly, the operating system again takes control, stops the application and displays the appropriate error message
- The operating system controls and coordinate a user of hardware and various application programs for various users
- It is a program that directly interacts with the hardware
- The operating system is the first encoded with the Computer and it remains on the memory all time thereafter.

### **OS is designed to serve two basic purposes :**

1. It controls the allocation and use of the computing system's resources among the various user and tasks.
2. It provides an interface between the computer hardware and the programmer that simplifies and makes feasible for coding, creation, debugging of application programs.

### **The operating system must support the following tasks. The tasks are :**

1. Provides the facilities to create, modification of program and data files using and editor.
2. Access to the compiler for translating the user program from high level language to machine language.
3. Provide a loader program to move the compiled program code to the computer's memory for execution.
4. Provide routines that handle the details of I/O programming.

