

# Unit 1:

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## INTRODUCTION

# Definition

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**Operating system** An operating system, or OS, is a software program that enables the computer hardware to communicate and operate with the computer software. Without a computer operating system, a computer would be useless.

# Definitions cont....

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An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

Some popular Operating Systems include Linux Operating System, Windows Operating System, VMS, OS/400, AIX, z/OS, etc.

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.

# Over View of Operating System

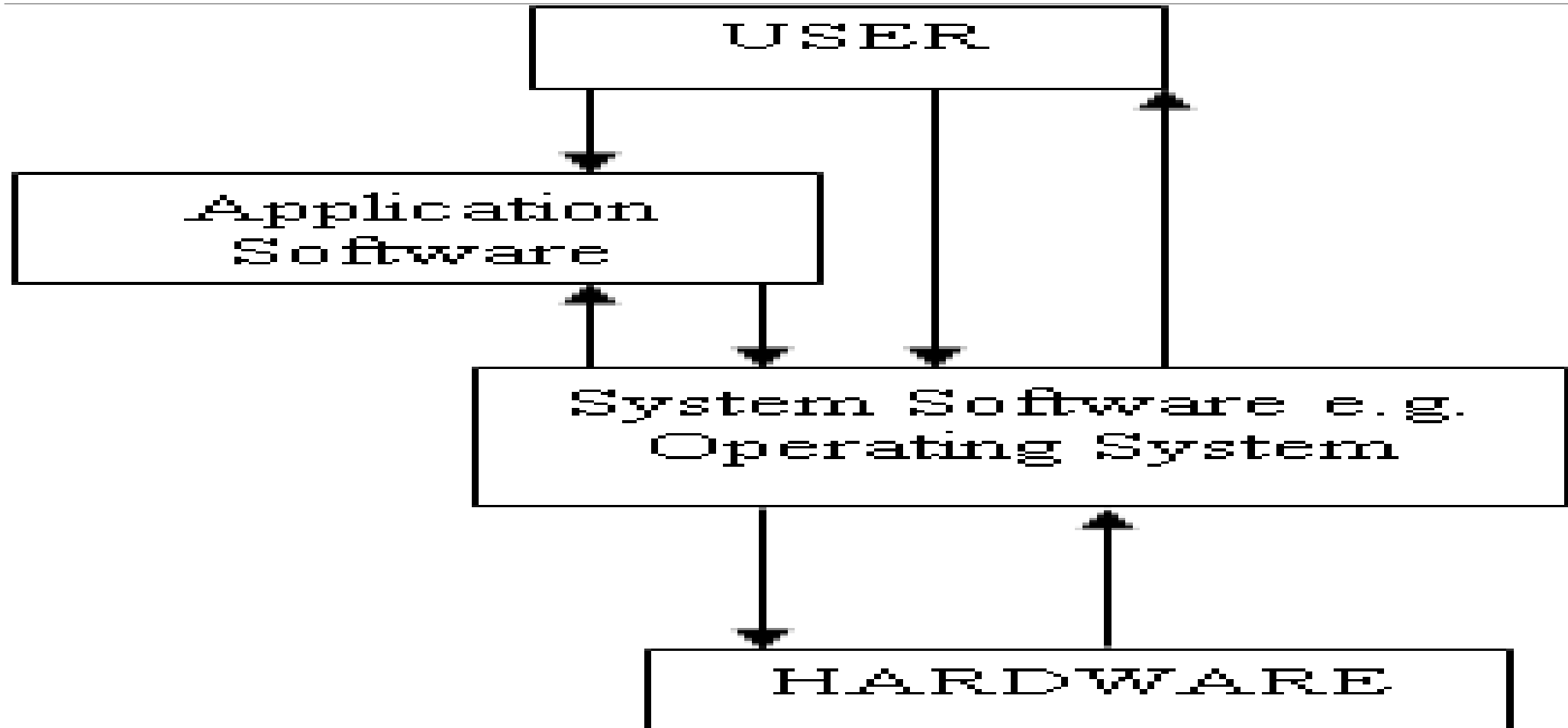
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This is the **executive manager**, the part of computing system that manages all of the hardware and software. It controls every file, every device, and every section of the main memory and every non-second of processing time. It controls who can use the system and how. It is an integrated set of programs that is used to manage the various resources and overall operation of a computer system.

Its prime objective is to improve the performance and efficiency of a computer system. Thus like a manager of a company an operating system is responsible for the smooth and efficient operation of the entire computer system. Examples of operating systems are; Windows, Dos, Linux, Unix, e.t.c.

An operating system is a set of programs that enable a user to communicate with a computer system and also enable a computer's equipment to communicate with each other. An operating system acts as an interface between a user of the computer and the hardware. The operating system is used to bridge the gap between the hardware and the user.

# Abstract view of the components of a computer system



# Abstract view of the components of a computer system

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The hardware provides the basic computing services. Application programs/software make use of these resources to solve the user problems. There may be many users using different application programs to solve different problems. The OS controls and coordinates the use of hardware among various application programs for different users. So we can view the OS as a Resource Manager and an extended machine or Virtual machine.

# Operating system as a Resource Manager.

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Modern computers consists of processors, memories, timers, disks, terminals, magnetic tape drives, network interfaces, printers and a wide variety of other devices. The job of OS is to provide an orderly and controlled allocation of the processors and memories, and input/output devices among the various programs competing for them. For example for programs trying to print their output simultaneously on the same printer.

In this view, the primary task is to keep track of who is using which resource, to grant resource requests, to account for usage, and to mediate conflicting requests from different programs and users. Bare hardware can not be easily used so programs are written for certain basic common operations. A layer of software is embedded on hardware to manage the system and present the user with an interface or extended machine.

# Operating system as an extended machine

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The architecture of most computers at the machine language level is primitive and difficult to program especially for I/O. For example, reading from a floppy disk requires knowledge of how data is organised in a floppy disk and address where the data to be written and how to switch on the floppy device motor, how to position the R/W head (Read/Write) to the particular address and many more details.

The programmer doesn't want to get too intimately involved with all these details, instead what the programmer wants is a simple high level abstraction to deal with. In case of disks, typical abstraction would be that of disk contains a collection of named files. Each file can be opened for reading, writing, then read, or written and finally closed. The programme that hides the truth about the hardware from the programmer and presents a nice simple view of named files that are read and written, is of course the "OPERATING SYSTEM". It also conceals a lot of unpleasant business concerning interrupts, timers, memory management and other low level features. In each abstraction presented to the user is simpler and easier to use than the underlying hardware.

# Functions of operating systems:

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1. Hide the fact that resources are being shared. This gives the concept of the OS as a virtual machine.
2. Bridge the gap between the machine and the user levels.
  - Memory management. Checks the validity of each request for memory space and if legal, it allocates a portion which isn't in use.
  - In multi-user environment, it sets up a table to keep track of who is using which section of the memory.
  - Preserves the space in the main memory that is occupied by the Operating System itself.

# Functions of operating systems:

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## 4. Device management

This monitors every device channel and control units. Its job is to choose the most efficient way to allocate all of the system devices like keyboard, printer, disk, and modem.

## 5. File management

This keeps track of every file in the system, including utility programs like compilers, interpreters, and assemblers, data files and application programs.

Enforces protection policies; access rights, access control. It enforces access restrictions on each file depending on how the file was declared.

The file manager also allocates the resources by opening the file and then deallocates it by closing the file. It helps in backing up of files and recovery mechanisms during competition for information.

Synchronisation and communication. Maintenance of internal clock and log off system usage for all users.

# Functions of operating systems:

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## 6. Processor management.

- It handles the jobs as they enter into the system. This is handled by the job scheduler, which accepts or rejects the jobs.
- It then manages the processes within those jobs. This is handled by the Process scheduler and decides which process gets the CPU and for how long.