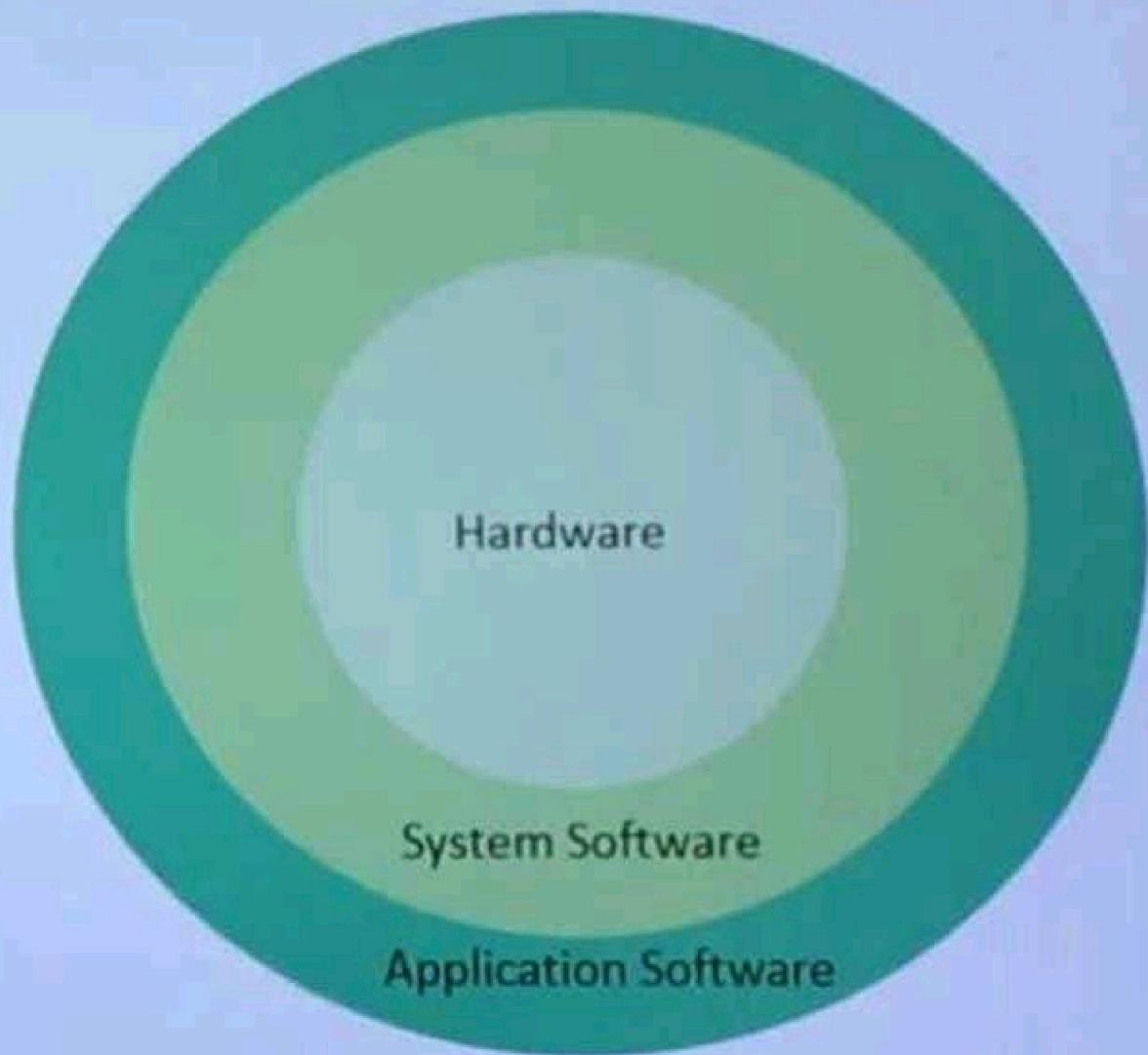


# Operating System



# Operating System

**Operating system (OS) is the lifeline of computer**

Computer does not start unless it has an operating system installed in it because OS:

- keeps all hardware parts in a state of readiness to follow user instructions
- co-ordinates between different devices
- schedules multiple tasks as per priority
- allocates resource to each task
- enables computer to access network
- enables users to access and use application software

# Operating System

- Some important functions of an operating system:
  - ✓ Managing computer resources like hardware, software, shared resources, etc.
  - ✓ Allocating resources
  - ✓ Prevent error during software use
  - ✓ Control improper use of computer
- One of the earliest operating systems was MS-DOS, developed by Microsoft for IBM PC.
- MS-DOS was a Command Line Interface (CLI) OS
- DOS was difficult to use
- Microsoft developed Graphical User Interface (GUI) based OS called Windows

## **Batch operating system**

The users of a batch operating system do not interact with the computer directly. Each user prepares his job on an off-line device like punch cards and submits it to the computer operator. To speed up processing, jobs with similar needs are batched together and run as a group. The programmers leave their programs with the operator and the operator then sorts the programs with similar requirements into batches.

## **Time-sharing operating systems**

Time-sharing is a technique which enables many people, located at various terminals, to use a particular computer system at the same time. Processor's time which is shared among multiple users simultaneously is termed as time-sharing.

- Problem of reliability.
- Question of security and integrity of user programs and data.
- Problem of data communication.

## • **Distributed operating System**

Distributed systems use multiple central processors to serve multiple real-time applications and multiple users. Data processing jobs are distributed among the processors accordingly.

The processors communicate with one another through various communication lines (such as high-speed buses or telephone lines).

- With resource sharing facility, a user at one site may be able to use the resources available at another.
- Speedup the exchange of data with one another via electronic mail.
- If one site fails in a distributed system, the remaining sites can potentially continue operating.



A YouTube Channel

## **Real Time operating System**

A real-time operating system (RTOS) is an operating system (OS) intended to serve real-time applications which process data as it comes in, typically without buffering delays.

A real-time operating system must have well-defined, fixed time constraints, otherwise the system will fail.

Scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, air traffic control systems, etc.

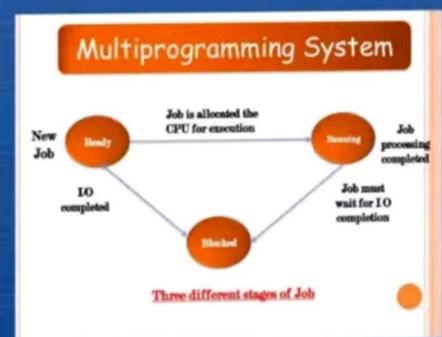
# Multiprogramming Operating System

What is Multiprogramming Operating System?

- It is extension of batch operating system
- It has the ability to load multiple programs in the memory
- Operating system monitors the active programs/active jobs & it also ensures to increase the CPU utilization by scheduling a new job to CPU whenever CPU is idle.

Advantage of multiprogramming Operating System

- CPU never idle as long as jobs are available.



## Multiprogramming Operating System

Drawback of Multiprogramming Operating System.

- Starvation possible

Application of Multiprogramming Operating System

- Windows

# Introduction to Embedded System

**Embedded** mean to combine different features into a single object.



**System** is a way of performing one or many tasks according to a fixed way.



**Embedded system** is a combination of hardware and software performing specific task.

## **Three major components of Embedded system are:**

**Hardware:** Hardware is physically used component that is physically connected with an embedded system. It comprises of **microcontroller** based integrated circuit, power supply, LCD display etc.

**Application software:** Application software allows the user to perform varieties of application to be run on an embedded system by changing the **code** installed in an embedded system.

**Real Time Operating system (RTOS):** RTOS supervises the way an embedded system work. It act as an interface between hardware and application software which supervises the application software and provide mechanism to let the processor run on the basis of scheduling for controlling the effect of **latencies**.

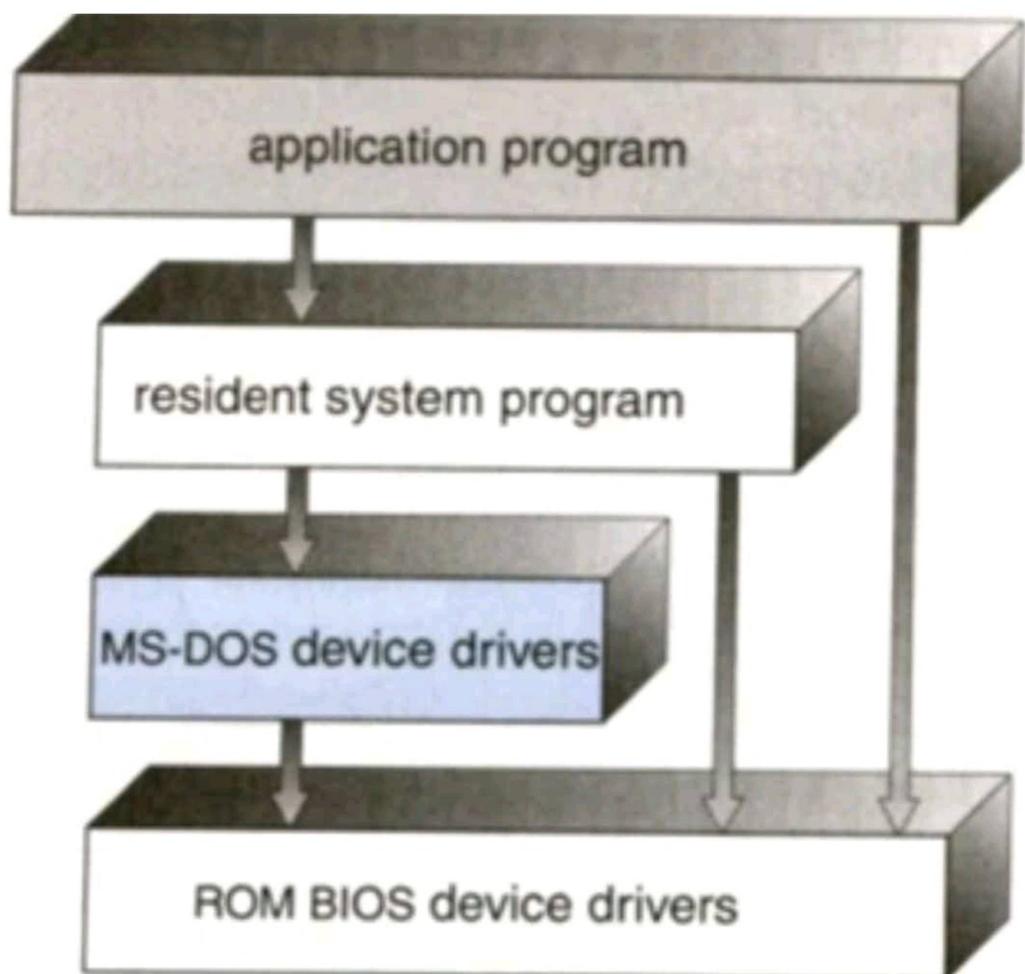
## Operating System Structure

1. **Simple Structure:** There are several commercial system that don't have a well defined structure such operating systems begin as small, simple and limited systems and then grow beyond their original scope.

MS-Dos is an example of such systems.

It was not divided into modules.

Another example is UNIX system.



**2. Layered Approach:** in the layered approach, the OS is broken into a number of layers (levels) each built on top of lower layers.

The bottom layer (layer 0) is the hardware and the topmost layer(layer n) is the user interface. The main advantage of this approach is modularity.

This approach simplifies debugging and system verification, i.e. the first layer can be debugged without concerning the rest of the system. Once the first layer is debugged, its correct functioning is assumed while the second layer is debugged and so on.

If an error is found during the debugging of a particular layer, the error must be on that layer because the layer below it is already debugged.

Each layer is implemented using only operations provided by lower layer, A layer does

not need to know how these operations are implemented, it only needs to know what these operations do.

The layered approach was defined in six layers:

<b>Layers</b>	<b>Function</b>
Layer 5	User Program
Layer 4	I/O Management
Layer 3	Operator Process Communication
Layer 2	Memory Management

<b>Layers</b>	<b>Function</b>
Layer 5	User Program
Layer 4	I/O Management
Layer 3	Operator Process Communication
Layer 2	Memory Management
Layer 1	CPU Scheduling
Layer 0	H/W

3. **Kernel Structure**: A kernel structure is the control module of an operating system. It is the one structure which loads first and remains in the memory.

It lies between system programs and hardware.

This kernel uses system calls to perform all its functions like CPU scheduling, memory management etc.

It is also known as command line interpreters.

### **Main functions of Kernel are:**

- i. It provides mechanism for creation and deletion of processes.
- ii. It provides CPU scheduling, memory management and I/O management.
- iii. It provides mechanism for inter-process communication.