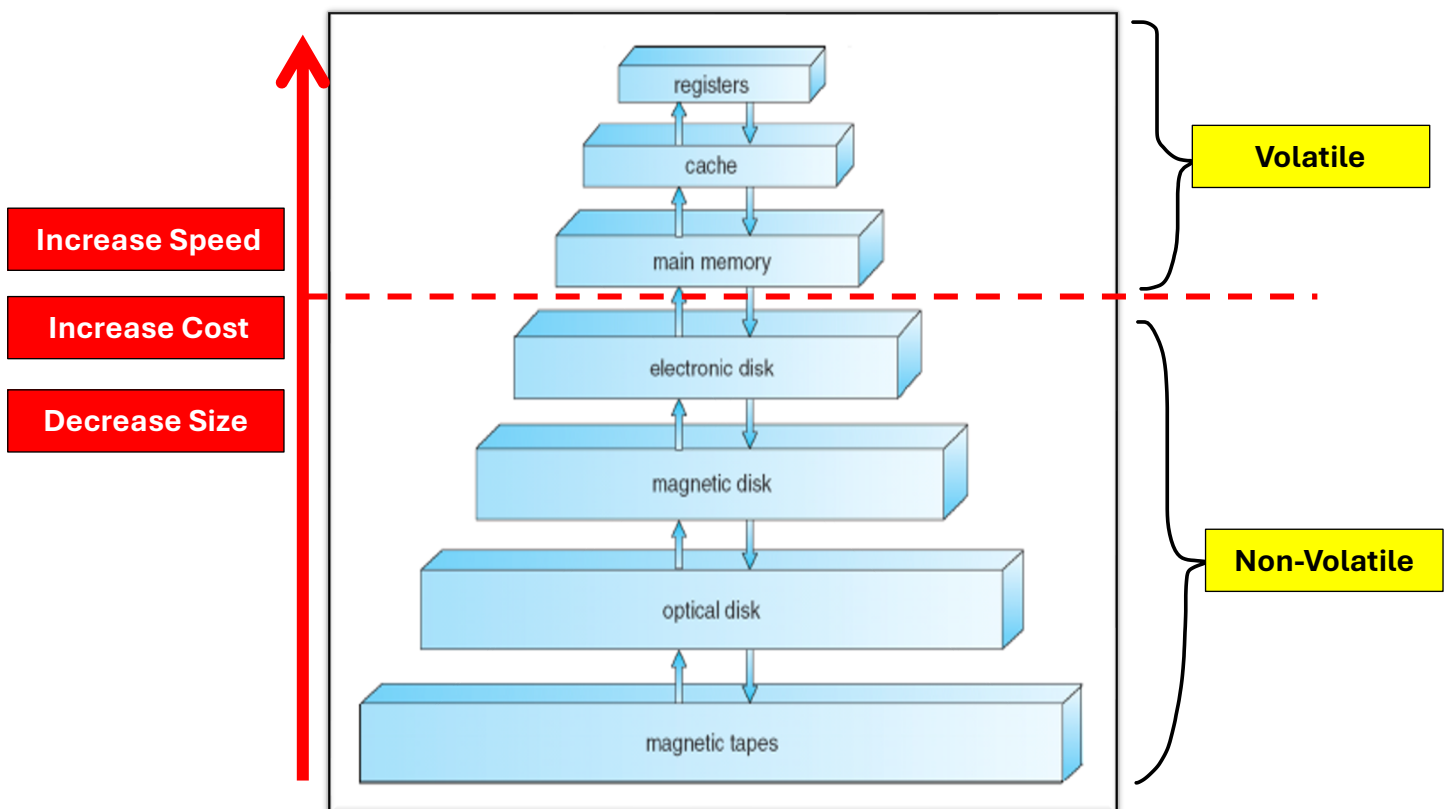# OSSA – Lec 2 – Discussing General Concepts About an OS.

Learning Topics
1. *Storage Structure*
2. *Booting Up Process*
3. *Multiprocessor System*
4. *Interrupts Handling*
5. *Operating System Structures*

1. Storage Structure

Storage Systems Hierarchy

Increase Speed

Increase Cost

Decrease Size

Volatile

Non-Volatile

Storage System Features
- Speed
- Cost
- Volatility
- Size/Capacity

2. Booting Up Process

Bootstrap program,

- It's a **Firmware** stored inside ROM.
- Loading when we provide the power to the computer.
- Do **POST – (Power On Self Test)** Operation.
    - Purpose of the POST is checking all aspects of the system working or not.

3. Multiprocessor System

Single Processor → 1 CPU Only
Multiprocessor → Multiple CPUs

Single-Processor	Multiprocessor
Only 1 CPU.	Multiple CPUs.
Only 1 program execute inside the CPU at a time and other programs are waiting in the RAM.	Multiple programs can be allocated to different CPUs at a time.
It executes only 1 process.	It executes more processes within a certain time-period, called **Increased throughput**.
Economically not good.	**Economically** good
If 1 CPU fails, whole system fails.	If 1 CPU fail system still can perform processes, called **Reliability.**

2 Types of Multiprocessors,

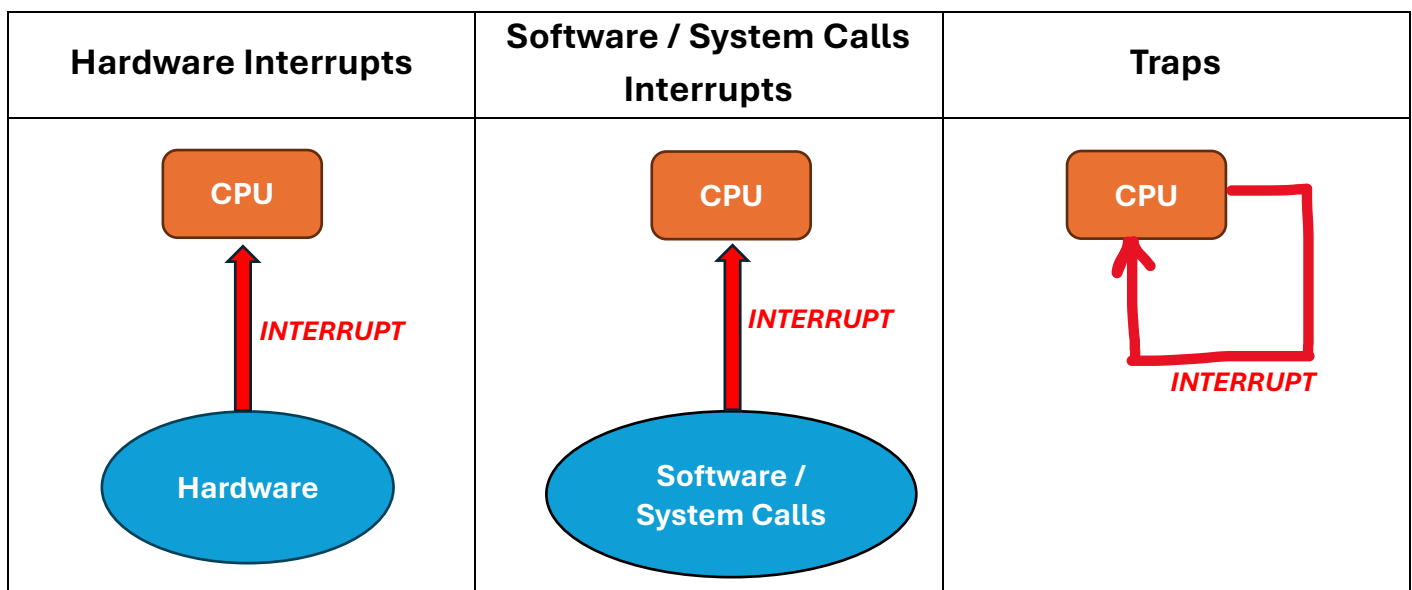| Asymmetric Multiprocessing	Symmetric Multiprocessing
There is 1 CPU called **Master CPU** and other CPUs called **Slave CPUs** Master CPU allocating workload to the Slave CPUs. Master CPU is not executing user programs and It's monitoring other CPUs.	There are **No Masters or Slaves**. all are providing user process execution services. Common memory system is using by different CPUs.

Clustered System

- A Clustered System having multiple CPUs sometimes.
- It's a **network of Computers** connected through **LAN** include with storage device.
- Computers are known as **Nodes** that connected through the network.
- Provide High availability services.

4. Interrupts Handling

Interrupts

- Signals sent to the CPU by external devices.

3 types of Interrupts

Hardware Interrupts	Software / System Calls Interrupts	Traps
CPU ↑ *INTERRUPT* Hardware	CPU ↑ *INTERRUPT* Software / System Calls	CPU *INTERRUPT*

Interrupts Handling Steps

→ When CPU gets *INTERRUPT* signal, it immediately suspends the process

→ and gives control to the *OS* to find a solution

→ OS is reading table called *INTERRUPT VECTOR* from the *KERNAL* memory

→ Iinterrupt vector have specific *ADDRESS NUMBERS*

→ address numbers can be found in *INTERRUPT SERVICE ROUTINE*

→ OS access and execute address files in ISR

→ results of the execution will pass to the OS and OS send it to the CPU as a notification.

→ CPU get know OS finish in handling the interrupt and CPU finish the running program and come to suspended process
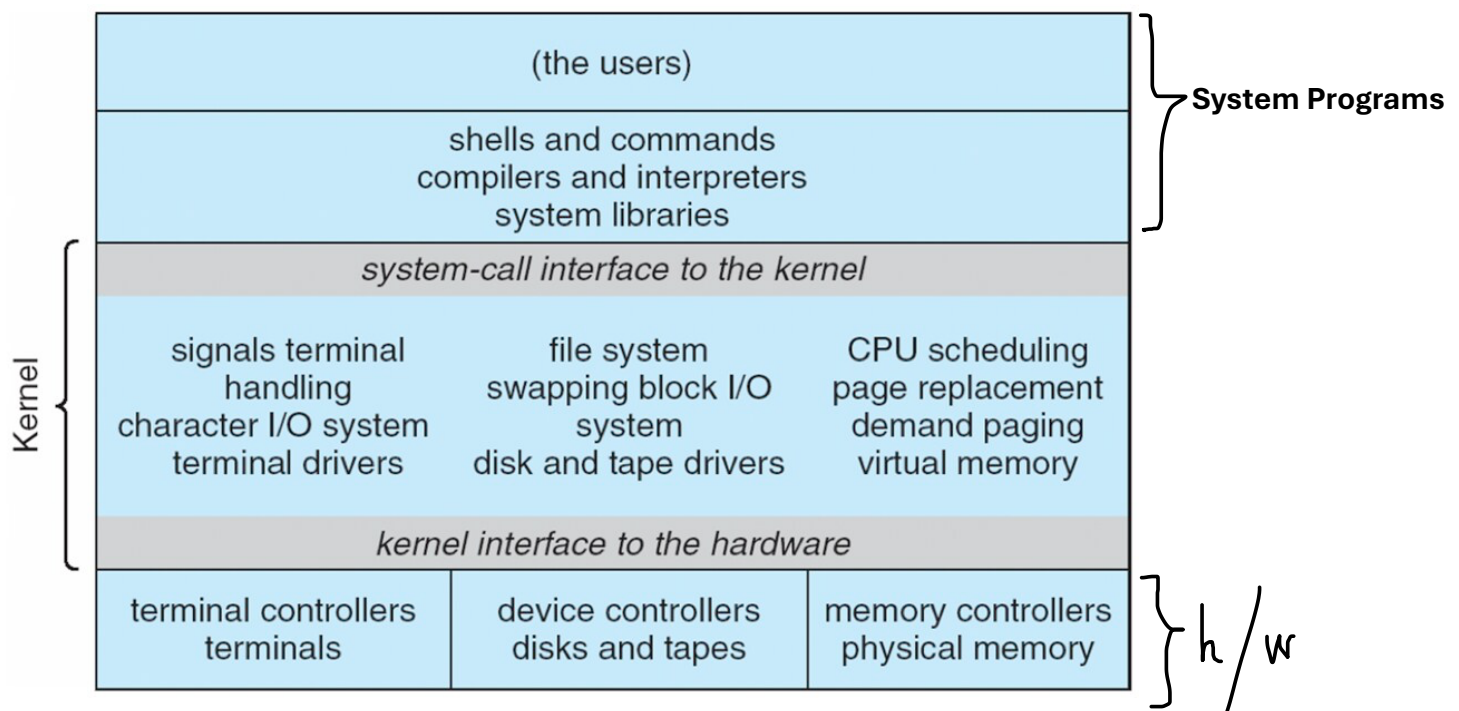
→ Resume the process.

5. Operating System Structures

Simple Structure – MS DOS
- Related to the BIOS Setup
- It consists of BIOS device drivers
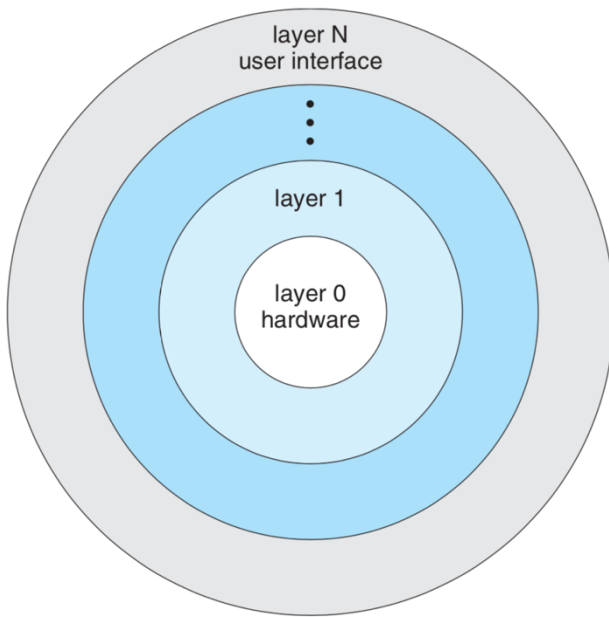
Non-Simple Structure – UNIX
- Limited hardware and system services.
- 2 categories (**System Programs / Kernel**).

- All the component in the OS are in one common area.

Layered Approach

- Consist with layers.

- Layer 0 is always Hardware.
- Layer functionalities are not fixed it can change. – *ISSUE*

Microkernel System

- Microkernel means **size of the OS is in micro level**.
- Few components are selected to kernel.
- Outside components from the microkernel called as **System Programs**.
- System programs communicate through a secure method called **Message Passing** but it **Slow.**

Modules Architecture

- Uses **Object Oriented** Concepts.
- In booting process **Core Part** loading first.
- Around the core part other components are gather, like main class and sub classes.
- Main components and subcomponents are communicate with **Faster Communication** method.