SNS COLLEGE OF TECHNOLOGY
DEPARTMENT OF AIML
23CST202- OPERATING SYSTEMS
II YEAR IV SEM AIML-B
UNIT 1 – OVERVIEW AND PROCESS MANAGEMENT
TOPIC – COMPUTER SYSTEM ARCHITECTURE AND OPERATION

Computer System Architecture

Types of Computer systems

- Based on number of General Purpose Processors :

① Single Processor

② Multi Processor

③ Clustered systems.

① Single Processor

* One Main CPU executes general purpose instruction set including instructions from user processes.

* special Purpose Processors → device specific tasks

② Multiprocessor systems

* Also called as Parallel systems or tightly coupled systems.

* 2 or more processors, shared computer bus, sometimes shares clock, memory and peripheral devices

* In close communication

* Increased throughput
* Economical
* Increased reliability

Multi Processor systems

Symmetric Multiprocessing

Asymmetric Multiprocessing
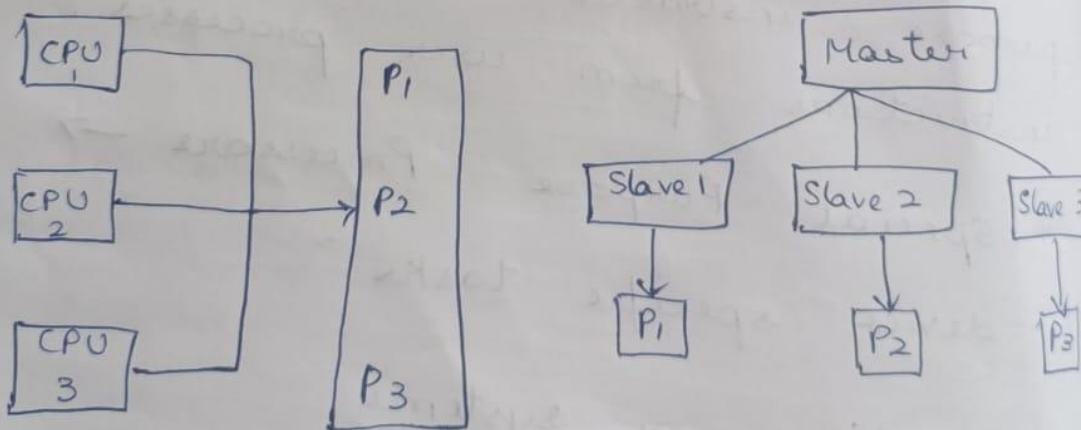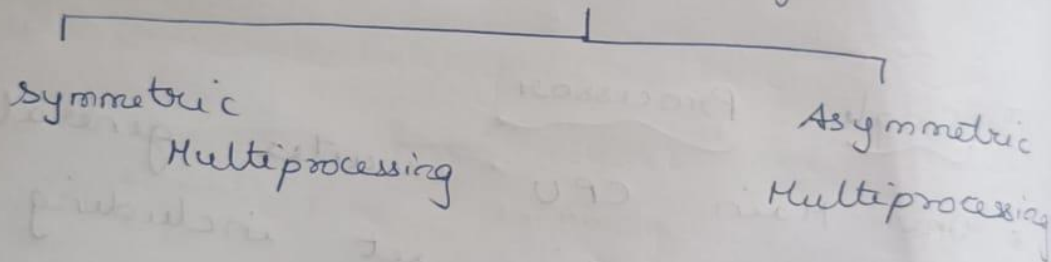
③ Clustered Systems

* Multiple CPU to accomplish computational work

* 2 or more systems coupled together.

* High availability

* Asymmetric or symmetric
  ↓
Hot Standby mode
other runs appln.

↓
2 or more host

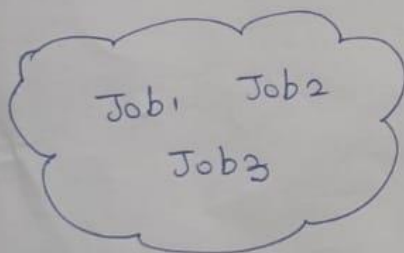DLM - distributed lock manager
SAN storage area n/w
Beowulf clusters

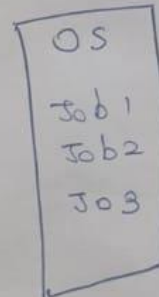symmetric is better.

Operating system structure

Commonalities
① Multiprogramming
② Multitasking

① Multiprogramming → Increases CPU utilization

Job Pool

Job1 Job2 Job3

OS
Job1
Job2
Jo3

* No user interaction with computer system

② Multitasking / Time Sharing

* User interaction is possible while running
* CPU does multiple jobs by switching among them frequently

```
┌─────────────────┐  ──→ User 1
│  Time Shared    │ ←──
│  System         │ ←──→ User 2
│                 │ ←──→ User 3
└─────────────────┘
```
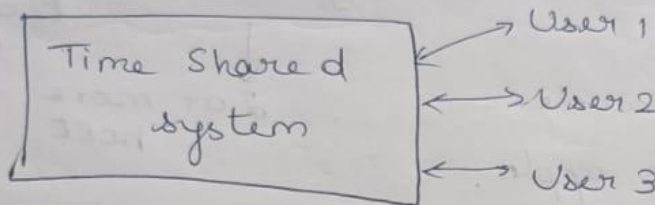
* CPU scheduling is done

* All user has atleast one program waiting to be executing.

* A program loaded into memory and executing is called a "PROCESS".

Operating system Operations

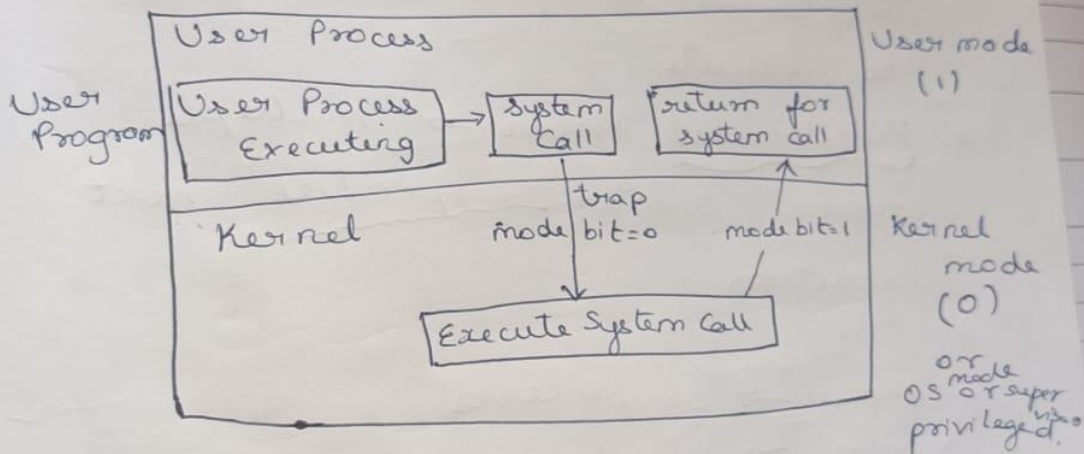* Interrupt driven → H/w
  → s/w Trap exception

(Error) Division by zero exception
(or) invalid memory access.

* Dual Mode → User Mode (1)
  → Kernel Mode (0)
  ↑
  Mode Bit

```
┌─────────────────────────────────────────────┐
│ User Process                    User mode    │
│  ┌──────────────┐  ┌──────┐  ┌──────────┐    │  (1)
│  │ User Process │→ │System│  │ return for│    │
│  │ Executing    │  │ Call │  │ system call│   │
│  └──────────────┘  └──────┘  └──────────┘    │
│ Kernel          trap                Kernel   │
│           mode bit=0    mode bit=1   mode     │
│              ↓                ↑       (0)     │
│       ┌────────────────────┐         or      │
│       │ Execute System Call│    OS or super  │
│       └────────────────────┘    privileged.  │
└─────────────────────────────────────────────┘
```

User Program

Trap or exception → Software generated
interrupt.