SNS COLLEGE OF TECHNOLOGY

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A'Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

COURSE NAME : **23CST202-OPERATING SYSTEMS**

II YEAR / IV SEMESTER

Unit 1-OVERVIEW AND PROCESS MANAGEMENT

Topic : Computer System Architecture & Operation

Computer-System Architecture

Most systems use a single general-purpose processor

- Most systems have special-purpose processors as well

Multiprocessors systems growing in use and importance

● Also known as **parallel systems**, **tightly-coupled systems**

Advantages include:

1. **Increased throughput**

2. **Economy of scale**

3. **Increased reliability** – graceful degradation or fault tolerance

Two types:

1. **Asymmetric Multiprocessing** – each processor is assigned a

specie task.

2. **Symmetric Multiprocessing** – each processor performs all tasks
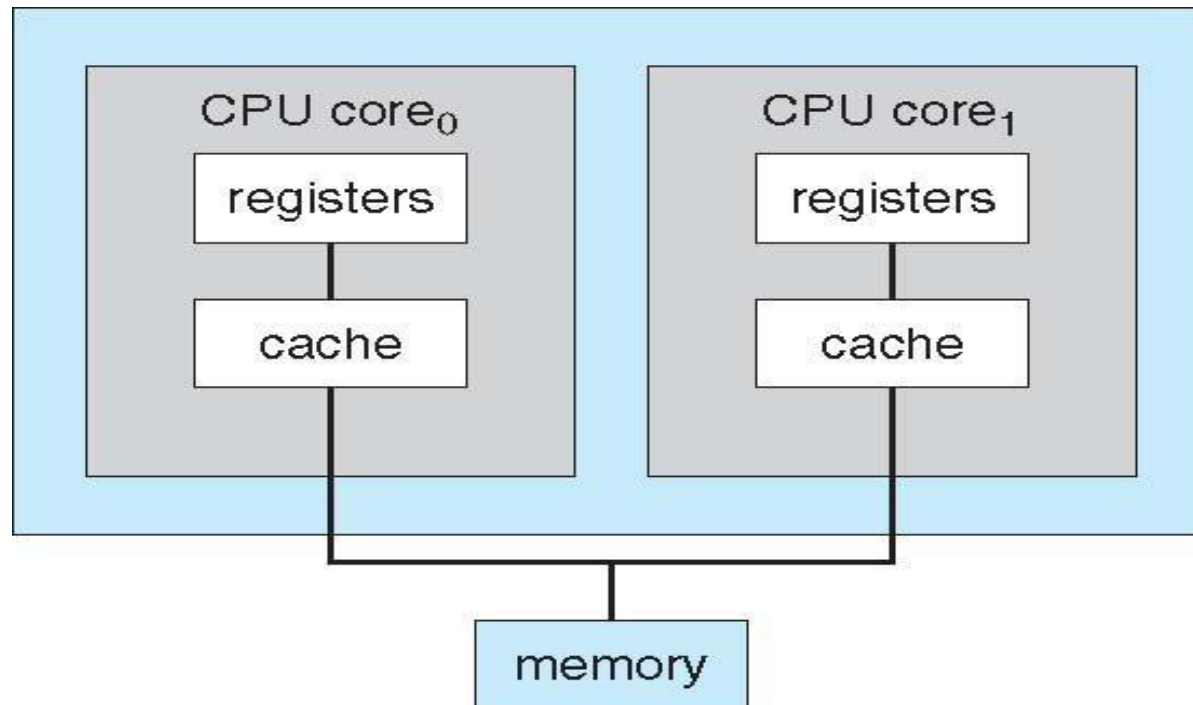
Symmetric Multiprocessing Architecture

OVERVIEW AND PROCESS MANAGEMENT/COMPUTER SYSTEM ARCHITECTURE&OPERATION/ DURGALAKSHMI B/AIML/SNSCT
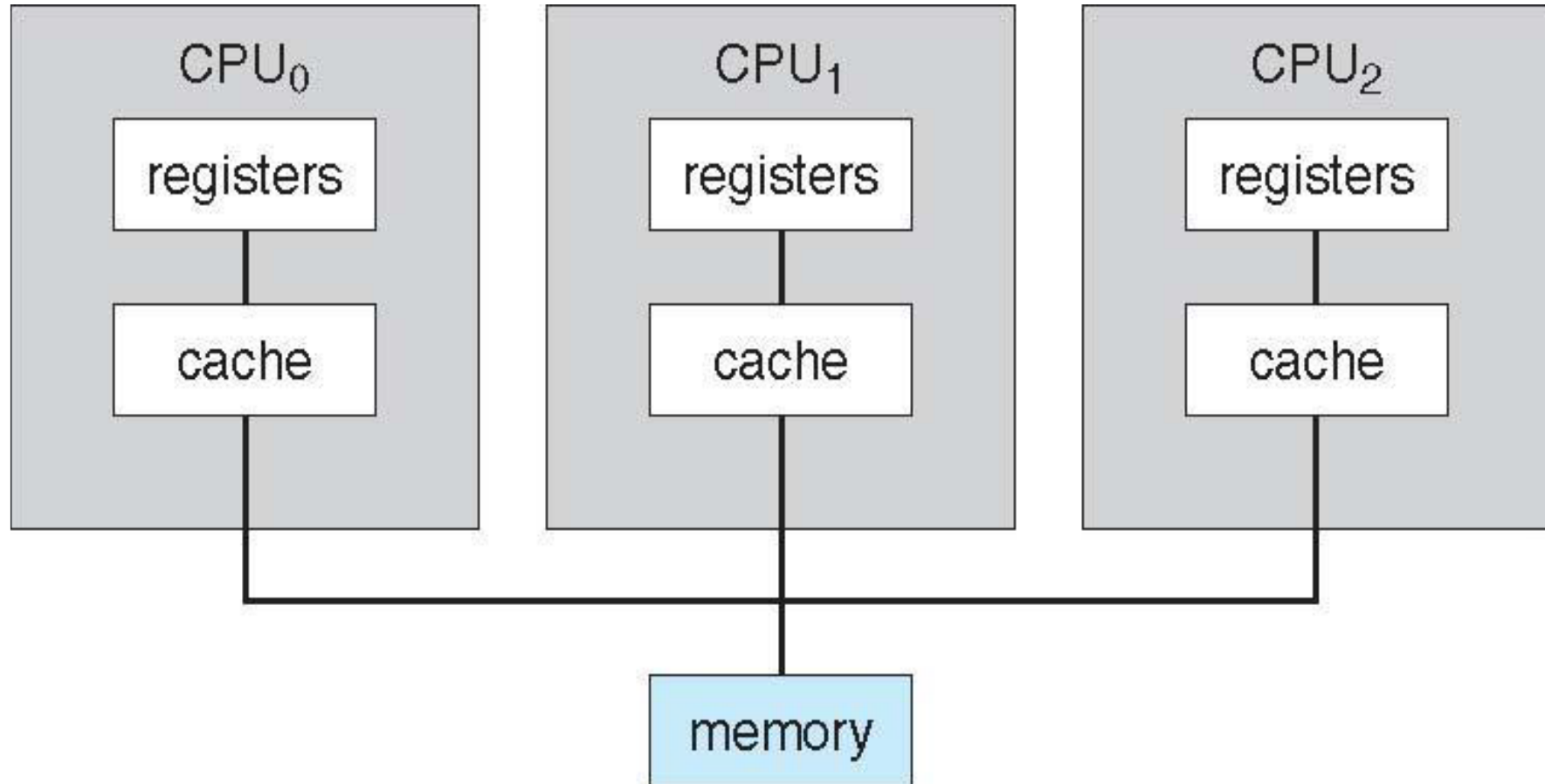
A Dual-Core Design

Multi-chip and **multicore**

- Systems containing all chips

- Chassis containing multiple separate systems

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Clustered Systems

Like multiprocessor systems, but multiple systems working together

● Usually sharing storage via a **storage-area network (SAN)**

● Provides a **high-availability** service which survives failures

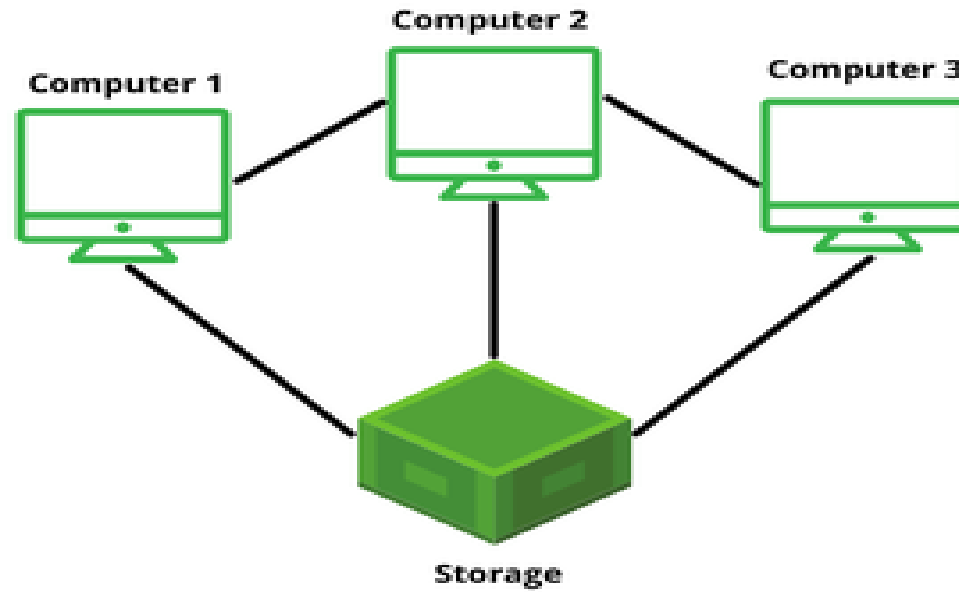**Asymmetric clustering** has one machine in hot-standby mode

Symmetric clustering has multiple nodes running applications, monitoring each other

● Some clusters are for **high-performance computing (HPC)**

4 Applications must be written to use **parallelization**

● Some have **distributed lock manager** (**DLM**) to avoid conflicting operations

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Clustered Systems

OVERVIEW AND PROCESS MANAGEMENT/COMPUTER SYSTEM
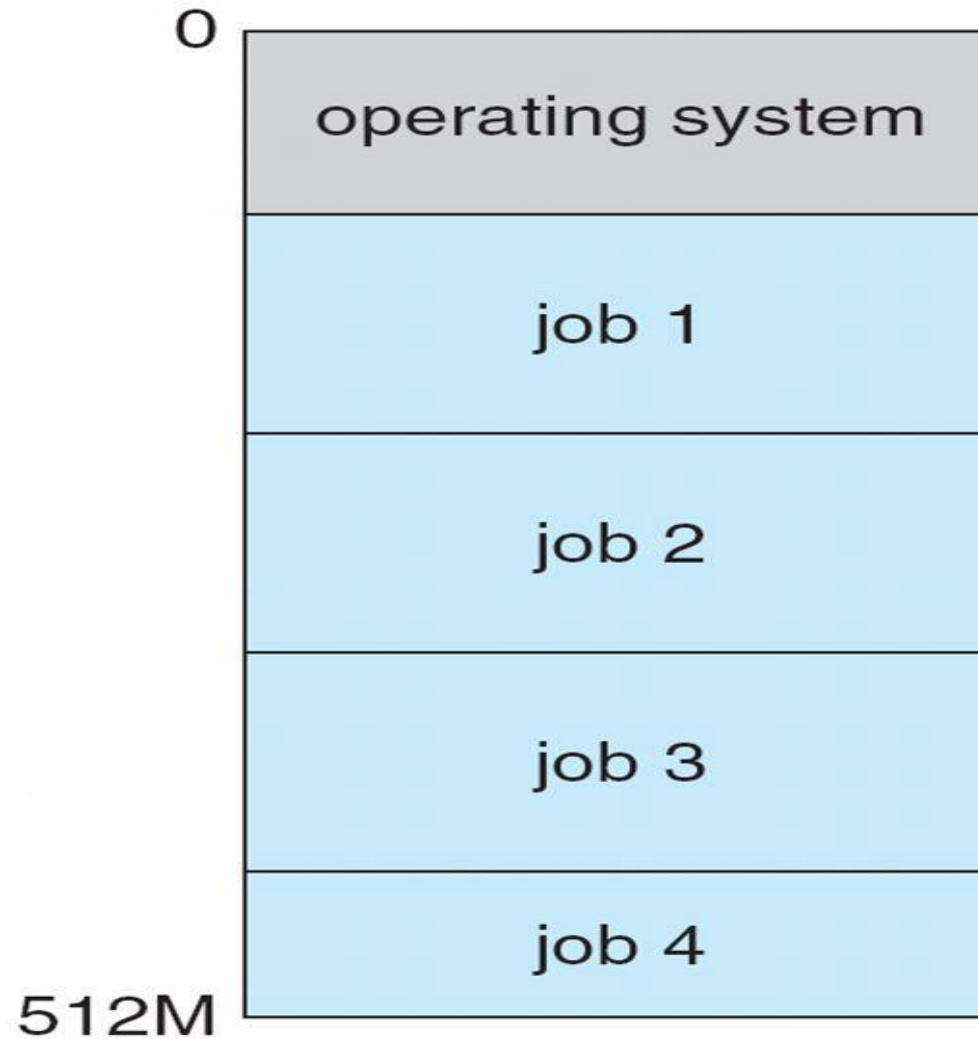ARCHITECTURE&OPERATION/ DURGALAKSHMI B/AIML/SNSCT

Multiprogramming (**Batch system**) needed for efficiency
- Single user cannot keep CPU and I/O devices busy at all times
- Multiprogramming organizes jobs (code and data) so CPU always has one to execute
- A subset of total jobs in system is kept in memory
- One job selected and run via **job scheduling**
- When it has to wait (for I/O for example), OS switches to another job
- **Timesharing** (**multitasking**) is logical extension in which CPU switches jobs
so frequently that users can interact with each job while it is running, creating **interactive** computing
- **Response time** should be < 1 second
- Each user has at least one program executing in memory ▯ **process**
- If several jobs ready to run at the same time ▯ **CPU scheduling**
- If processes don't fit in memory, **swapping** moves them in and out to run
- **Virtual memory** allows execution of processes not completely in memory

Memory Layout for Multi programmed System

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Interrupt driven (hardware and software)

● Hardware interrupt by one of the devices

● Software interrupt (**exception** or **trap):**

1. Software error (e.g., division by zero)

2. Request for operating system service

3. Other process problems include infinite loop,processes modifying each other or the operating system

Dual-mode operation allows OS to protect itself and other system components
- **User mode** and **kernel mode**
- **Mode bit** provided by hardware

Provides ability to distinguish when system is running user code or kernel code. Some instructions designated as **privileged**, only executable in kernel mode System call changes mode to kernel, return from call resets it to user.
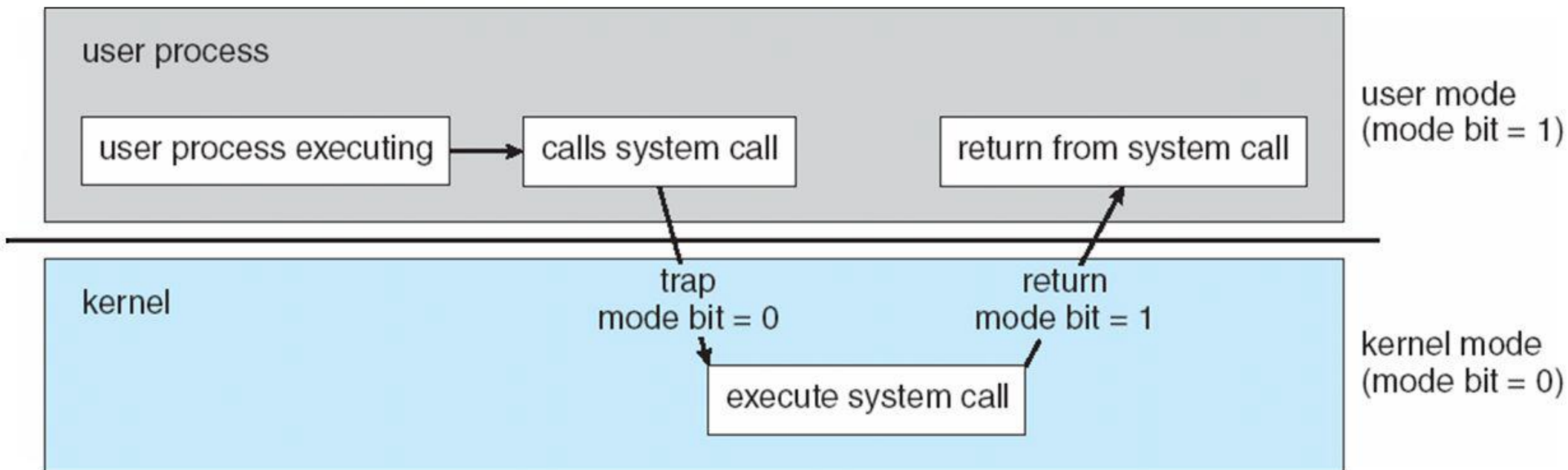- Increasingly CPUs support multi-mode operations
- i.e. **virtual machine manager** (**VMM**) mode for guest **VMs**

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Timer to prevent infinite loop / process hogging resources
- Timer is set to interrupt the computer after some time period
- Keep a counter that is decremented by the physical clock.
- Operating system set the counter (privileged instruction)
- When counter zero generate an interrupt
- Set up before scheduling process to regain control or terminate

program that exceeds allotted time

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THANK YOU