UNIT I

INTRODUCTION

Introduction

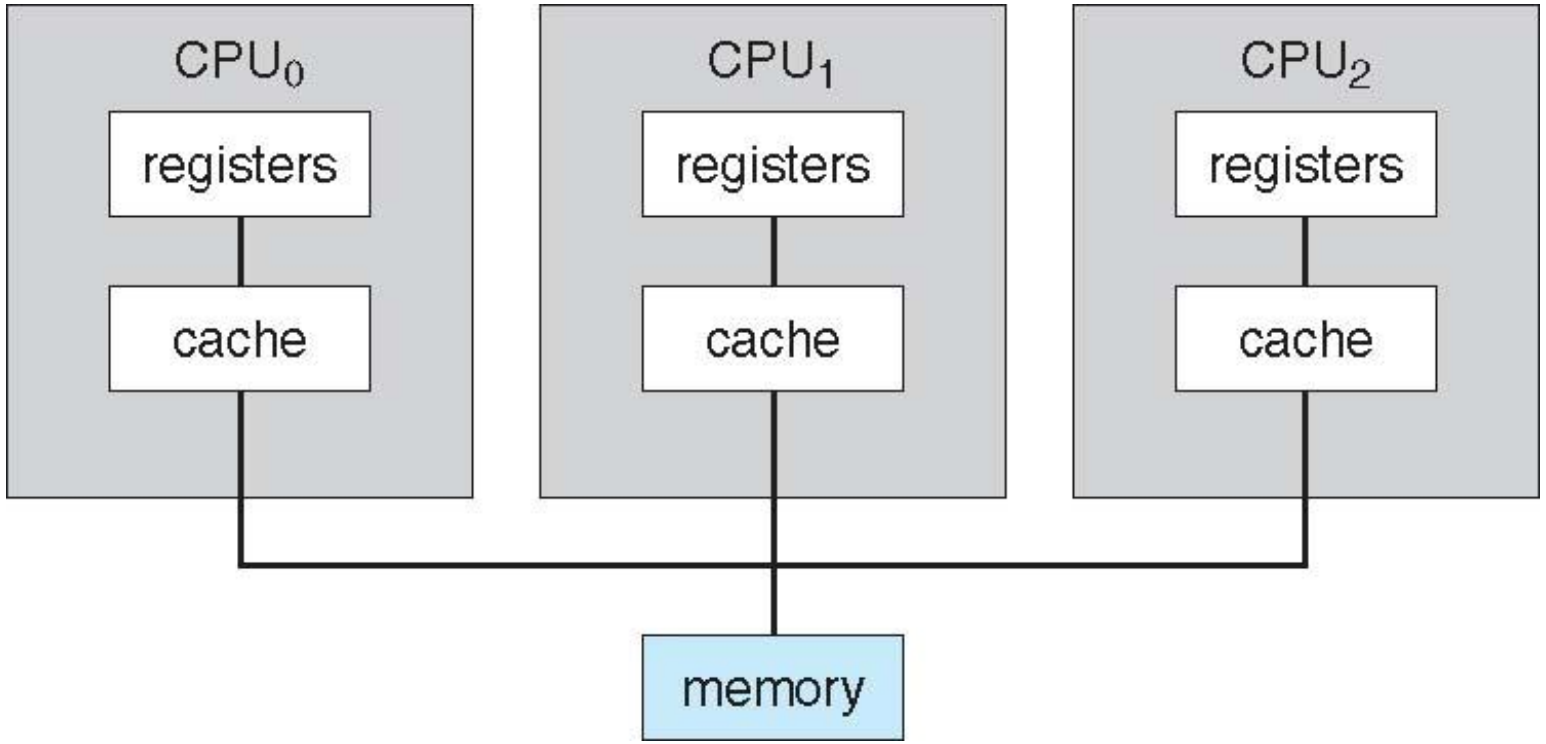
- **Introduction**
  - What Operating Systems Do
  - Computer-System Architecture
  - Operating-System Structure
  - Operating-System Operations
  - Operating-System Services
  - User Operating System Interface
  - System Calls
  - Types of System Calls
  - System Programs
  - Operating System Structure
  - System Boot

- **Process Concept**
  - Process Scheduling
  - Operations on Processes
  - Interprocess Communication

Computer-System Architecture

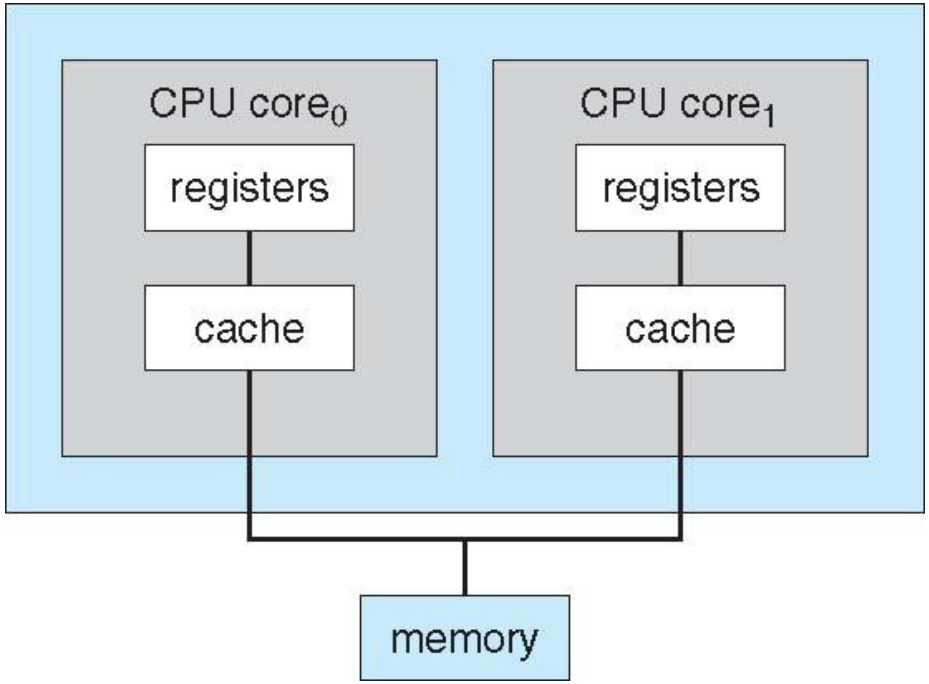
- Most systems use a single general-purpose processor
- **Multiprocessors** systems growing in use and importance
  - Also known as **parallel systems**, **tightly-coupled systems**
  - Advantages include:
    1. **Increased throughput**
    2. **Economy of scale**
    3. **Increased reliability** – graceful degradation or fault tolerance
  - Two types:
    1. **Asymmetric Multiprocessing** – each processor is assigned a specific task.
    2. **Symmetric Multiprocessing** – each processor performs all tasks

Symmetric Multiprocessing Architecture



A Dual-Core Design

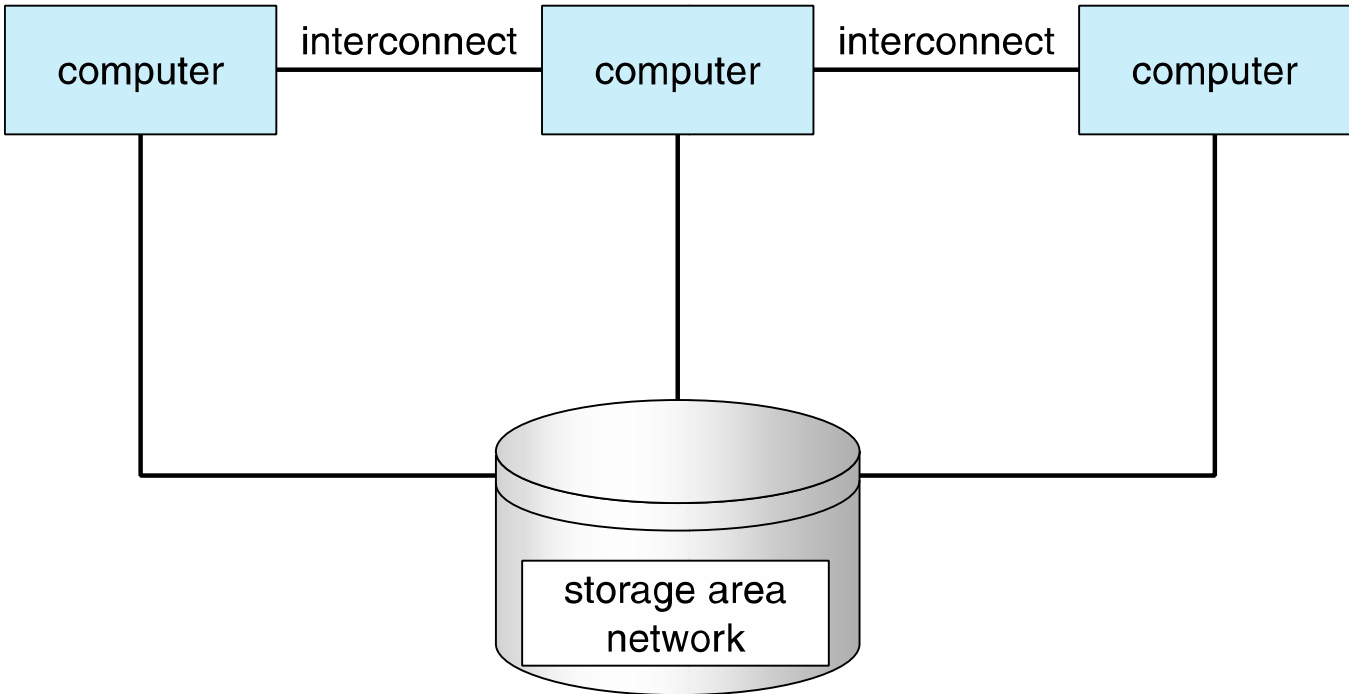
- Multi-chip and **multicore**
- Systems containing all chips
  - Chassis containing multiple separate systems



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)**
    - Applications must be written to use **parallelization**
  - Some have **distributed lock manager (DLM)** to avoid conflicting operations

Clustered Systems



Operating System Structure

Multiprogramming (Batch system) needed for efficiency

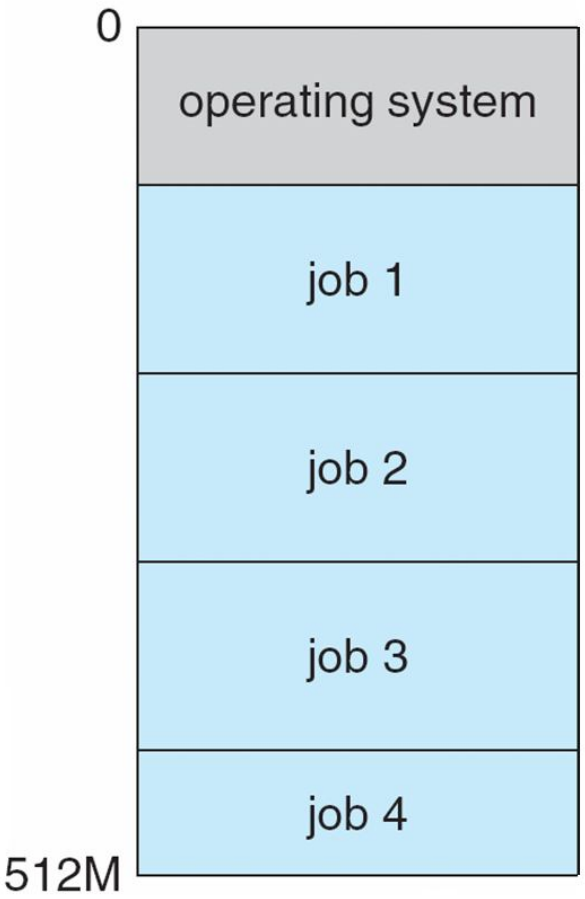
- Single user cannot keep CPU and I/O devices busy at all times
- Multiprogramming organizes jobs (code and data) so CPU always has one to execute
- A subset of total jobs in system is kept in memory
- One job selected and run via **job scheduling**
- When it has to wait (for I/O for example), OS switches to another job

Operating System Structure

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 Multiprogrammed System



TEXT BOOK

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2. Jane W. and S. Liu. “Real-Time Systems”. Prentice Hall of India 2018.

3. Andrew S Tanenbaum, Herbert Bos, Modern Operating Pearson , 2015.

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2. D.M.Dhamdhere, “Operating Systems: A Concept based Approach”, 3rdEdition, Tata McGraw hill 2016.

3. P.C.Bhatt, “An Introduction to Operating Systems–Concepts and Practice",4th Edition, Prentice Hall of India., 2013.

THANK YOU