# Computer-System Architecture

- Computer system can be organized in a number of can categorize roughly according to the number of general-purpose processors used.
- How a modern computer system works

The general-purpose processors are categorized as follows

- 1.)Single-Processor Systems
- 2.)Multiprocessor Systems

- Single-Processor Systems:
- Most computer systems used a single processor.
- On a single processor system, there is one main CPU capable of executing a general purpose instructionset, including instructions from user processes.

- Almost all single processor systems have other special-purpose processors as well.
- They come in the form of device-specific processors, such as disk, keyboard, and graphics controllers.
- on mainframes, they may come in the form of more general-purpose processors, such as I/O processors that move data rapidly among the components of the system

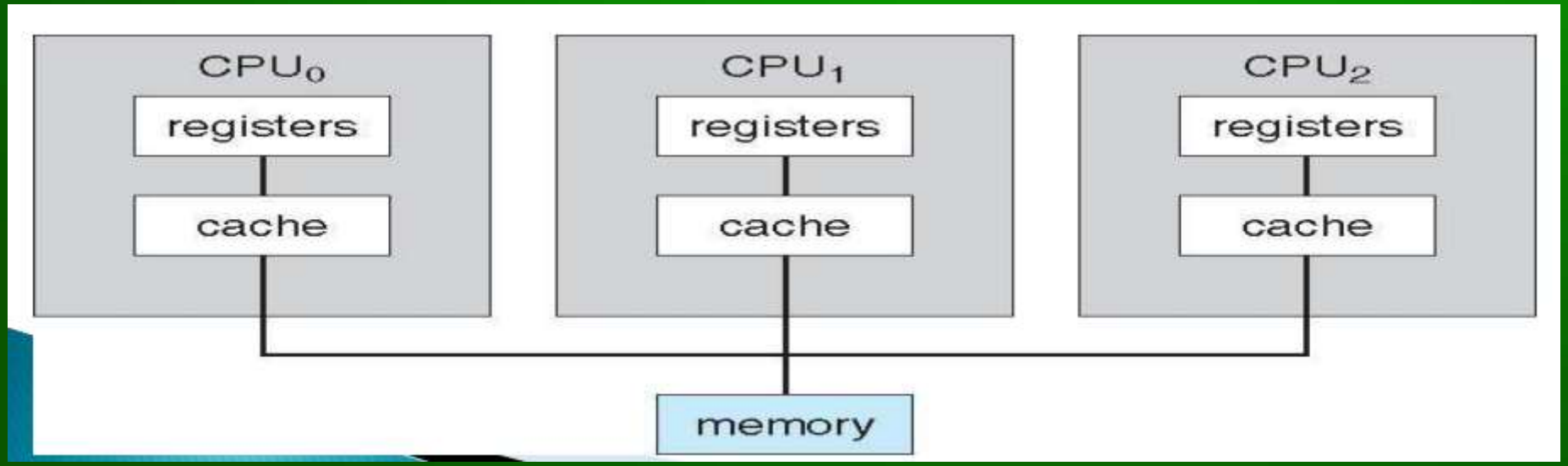
- All of these special-purpose processors run a limited instruction set and do not run user processes.
- They are managed by the operating system, in that the operating systems ends them information about their next task and monitors their status

- For example, a disk-controller microprocessor receives a sequence of requests from the main CPU and implements its own disk queue and scheduling algorithm.
- This arrangement relieves the main CPU of the overhead of disk scheduling

- PCs contain a microprocessor in the keyboard to convert the keystrokes into codes to be sent to the CPU.
- In other systems or circumstances(situation), special-purpose processors are low-level components built into the hardware.
- The operating system cannot communicate with these processors; they do their jobs autonomously.
- The use of special-purpose microprocessors is common and does not turn a single-processor system into a multiprocessor

- Multiprocessor Systems: -
- The multiple-processor systems in use today are of two types.
- 1. Asymmetric multiprocessing.
- 2. Symmetric multiprocessing.
- Asymmetric multiprocessing: in which each processor is assigned a specific task.

- Symmetric multiprocessing (SMP):
- The most common systems use symmetric multiprocessing (SMP), in which each processor performs all tasks within the operating system.



- Multiprocessor Systems:
- multiprocessor systems also known as parallel systems or multicore systems.
- Multiprocessor systems have two or more processors in close communication, sharing the computer bus and sometimes the clock, memory, and peripheral devices

# 1.)Single Processor Systems:-

- Single Processor Systems
  - One CPU
  - May have other special-purpose processors (such as disk controllers)
    - Run a limited instruction set
    - Do not run user processes
    - Sometimes managed by OS

    For example a disk controller processor receives a sequence of requests from the main CPU and implements its own disk queue and scheduling algorithm to relieve the main CPU of the overhead of disk scheduling.

# 2.)Multiprocessor systems:-

- Two or more processors in close communication, sharing the computer bus and sometimes the clock, memory, and peripherals.
- Advantages:
  - Increased throughput
    - The speed-up ratio with N processors is not N however.
  - Economy of scale
    - Sharing of peripherals, mass storage, power supplies
  - Increased reliability
    - Graceful degredation
    - Fault tolerance
      - Failure detection, diagnose and correction
      - Hardware duplication

- Two types:
  - **Asymmetric multiprocessing** in which each processor is assigned a specific task. A master processor controls the system, scheduling and allocating work to slave processors.
  - **Symmetric multiprocessing (SMP)** in which each processor performs all tasks within the operating system. All processors are peers.