



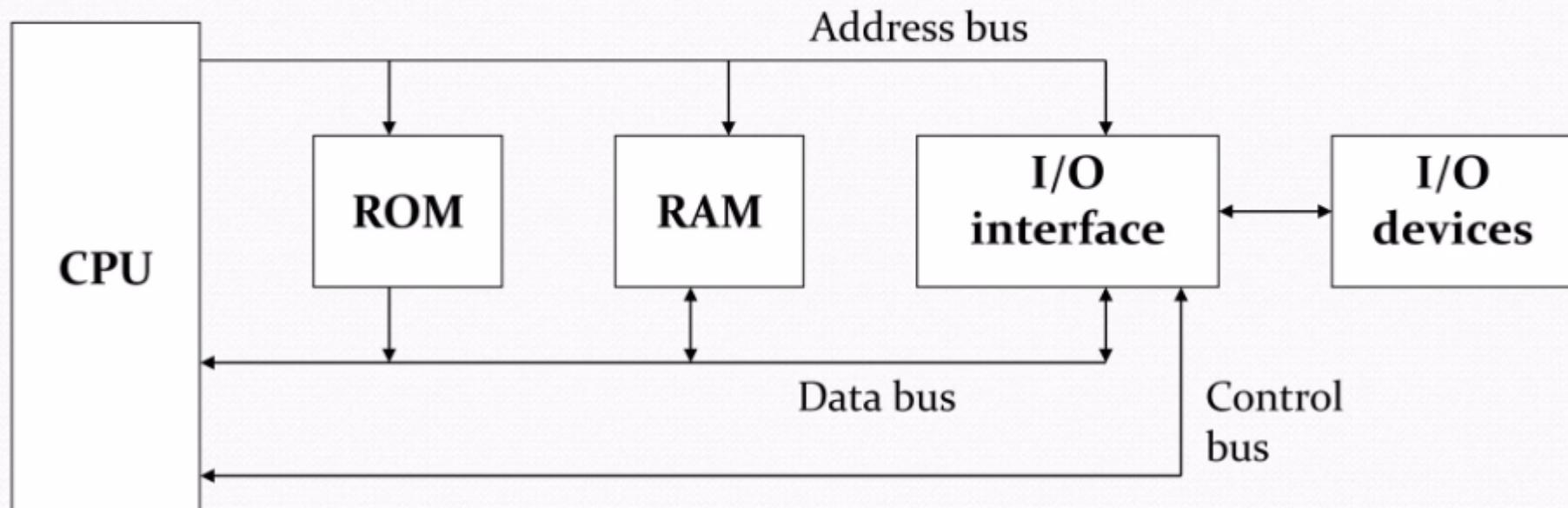
# **Chapter 1**

## **Introduction to Microprocessor**

# Introduction

**Computer:** A computer is a programmable machine that receives input, stores and manipulates data/information, and provides output in a useful format.

Basic computer system consist of a CPU, memory and I/O unit.

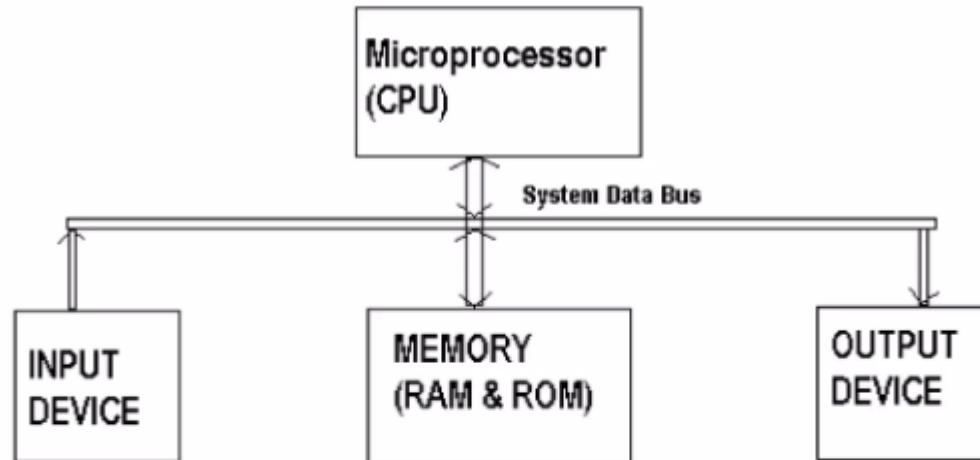


**Block diagram of a basic computer system**

# Basic Concepts of Microprocessors

- **Microcomputer:-** It is a programmable machine. The two principal characteristics of a computer are:
  - Responds to a specific set of instructions in a well-defined manner.
  - It can execute a prerecorded list of instructions (a program)
  - Its main components are
    - CPU
    - Input & Output devices
    - Memory
- **Microprocessor:-** It is a programmable VLSI chip which includes ALU, register circuits & control circuits. Its main units are-
  - ALU
  - Registers
  - Control Unit
- **Microcontroller:-** Silicon chip which includes microprocessor, memory & I/O in a single package

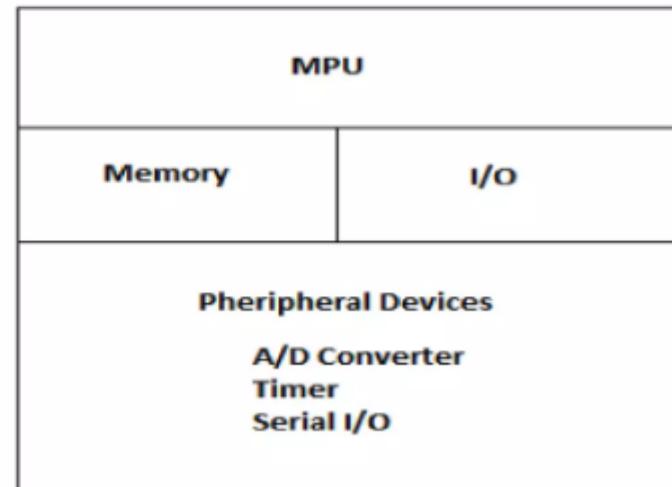
# Block Diagram



Microcomputer



Microprocessor

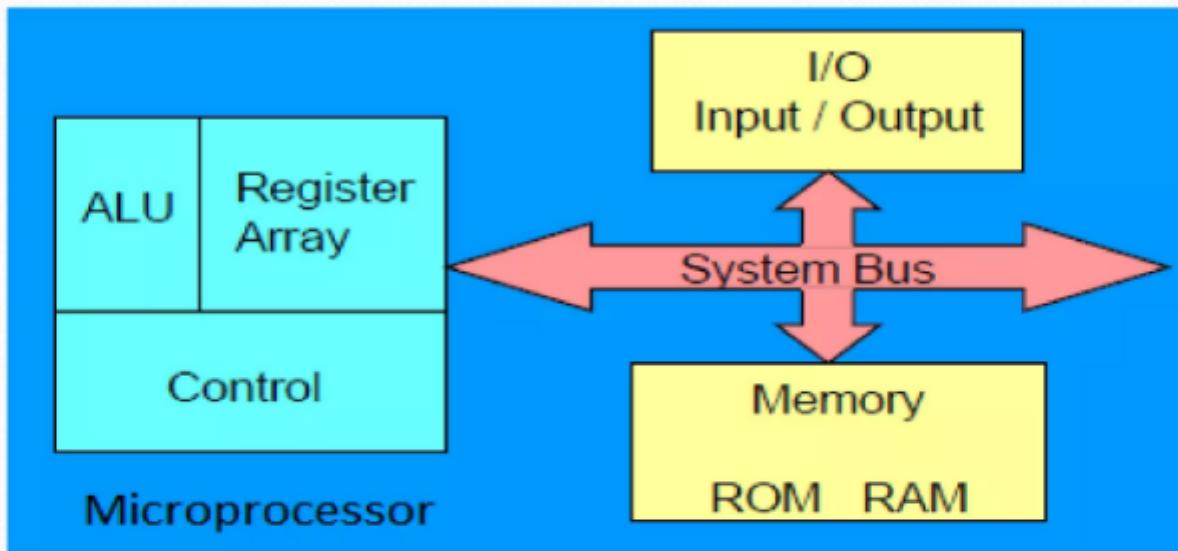


Microcontroller

# **Definition of the Microprocessor**

- ✓ Microprocessor is a **Programmable, Clock driven, Register based, Electronic device** that reads instruction from a storage device, takes the data from input unit and process the data according to the instructions and provides the result to the output unit.
  - **Programmable**- Perform Different set operation on the data depending on the sequence of instructions supplied by the programmer.
  - **Clock Driven** – Whole task is divided into basic operations, are divided into precise system clock periods.
  - **Register Based** – Storage element
  - **Electronic Device** – fabricated on a chip

# Microprocessor Based System with bus Architecture



- **ALU:**- Arithmetic and logical operations like add, subtraction, AND & OR.
- **Register Array:** - Store data during the execution of program.
- **Control Unit:** Provides necessary timing & control signal. It controls the flow of data between microprocessor and peripherals.

\*Microprocessor is one component of microcomputer.

- **Memory:**

- Stores information such as instructions and data in binary format (0 and 1).
- “Sub-system” of microprocessor-based system. sub-system includes the registers inside the microprocessor .
  - ✓ **Read Only Memory (ROM):** used to store programs that do not need alterations.
  - ✓ **Random Access Memory (RAM) (R/WM):** used to store programs that can read and altered like programs and data.

- **Input/output:** Communicates with the outside world.

- **System Bus:** Communication path between the microprocessor and peripherals.

- group of wires to carry bits.

# How does a Microprocessor works

- ✓ To execute a program, the microprocessor “reads” each instruction from memory, “interprets” it, then “executes or perform” it.
- ✓ The right name for the cycle is
  - Fetch
  - Decode
  - Execute
- ✓ This sequence is continued until all instructions are performed.

# Machine Language

- ✓ To communicate with computer, instruction is given in binary language.
- ✓ MP has 8 bit data so  $2^8 = 256$  combinations. So difficult to write programs in set of 0's and 1's .

for eg:

- 0011 1100 – is an instruction that increments the number in accumulator by 1
- 1000 0000- is an instruction that add the number in register B to the accumulator content , and keep the result in A.

So it is very tedious and error inductive. For convenience, written in Hexadecimal code. For example 0011 1100 is equivalent to 3C H

# 8085 Assembly Language

- ✓ Even program is written in Hexa decimal .. It is difficult to understand.
- ✓ Program is written in mnemonic.

For E.g.: binary code 0011 1100 (3C H in hexadecimal) is represented by INR

A

- INR A -INR stands for Increment, A is accumulator... this symbol suggest the operation of incrementing the accumulator by 1

Similarly 1000 0000 is equivalent ( 80 H) is represented as

- ADD B- ADD stands for addition and B represents content in register B. this symbol suggest that addition of the number in register B to the accumulator content , and keep the result in A.

\*\*\*So MP has 246 such bit pattern amounting to 74 different instruction for performing various operations