Warm Greetings!

Dear Students,

In this note, we are going to discuss Chapter-3- Computer Organisation.

Chapter 3: Computer Organisation

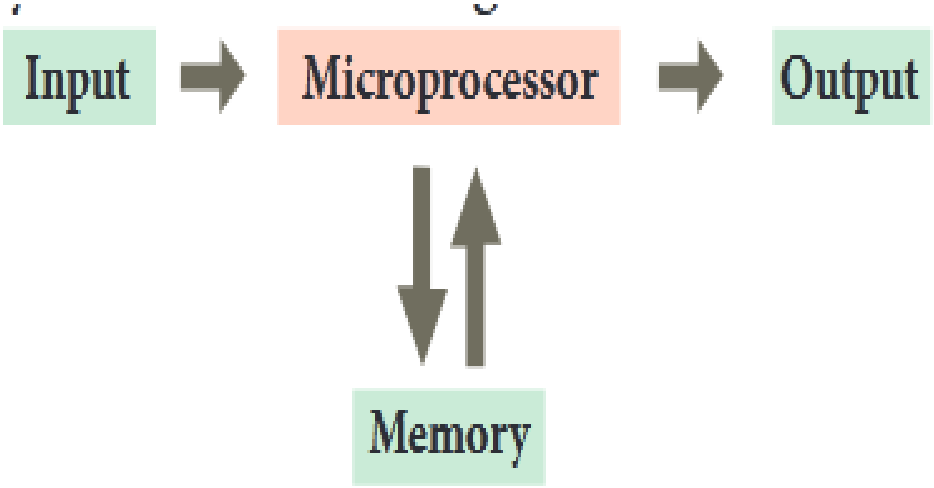
Introduction

- Computer organisation deals with the hardware components of a computer system.
- It includes Input / Output devices, the Central Processing Unit, storage devices and primary memory.
- It is concerned with how the various components of computer hardware operate.
- It also deals with how they are interconnected to implement an architectural specification. .
- The term computer organisation looks similar to the term computer architecture.
- But, computer architecture deals with the engineering considerations involved in designing a computer.
- On the other hand, Computer Organisation deals with the hardware components that are transparent to the programmer.

Basics of Microprocessors

- The CPU is the major component of a computer, which performs all tasks.
- This is realized by the microprocessor which is an Integrated Circuit.
- Microprocessors were first introduced in early 1970s.
- The first general purpose microprocessor, 4004 was developed by IntelInc.
- The microprocessor is a programmable multipurpose silicon chip.
- It is driven by clock pulses.
- It accepts input as a binary data and after processing, it provides the output data as per the instructions stored in the memory.

A block diagram of a microprocessor based system



Arithmetic and Logic unit (ALU):

To perform arithmetic and logical instructions based on computer instructions.

Control unit:

To control the overall operations of the computer through signals.

Registers (Internal Memory):

They are used to hold the instruction and data for the execution of the processor

Characteristics of Microprocessors

- A Microprocessor's performance depends on the following characteristics:
  - a)Clock speed
  - b)Instruction set
  - c)Word size

a) Clock Speed

- Every microprocessor has an internal clock that regulates the speed at which it executes instructions.
- The speed at which the microprocessor executes instructions is called the clock speed.
- Clock speed is measured in MHz (Mega Hertz) or in GHz (Giga Hertz).

b) Instruction Set

- A command which is given to a computer to perform an operation on data is called an instruction.
- Basic set of machine level instructions that a microprocessor is designed to execute is called as an instruction set.
- This instruction set carries out the following types of operations:
  - •Data transfer
  - •Arithmetic operations
  - •Logical operations
  - •Control flow
  - •Input/output

c) Word Size

- The number of bits that can be processed by a processor in a single instruction is called its word size.
- Word size determines the amount of RAM that can be accessed by a microprocessor

Data communication between CPU and memory

- The Central Processing Unit (CPU) has a Memory Data Register (MDR) and a Memory Address Register (MAR).
- The Memory Data Register (MDR) keeps the data which is transferred between the Memory and the CPU.
- The Program Counter (PC) is a special register in the CPU which always keeps the address of the next instruction to be executed.
- The Arithmetic and Logic unit of CPU places the address of the memory to be fetched, into the Memory Address Register.
- A bus is a collection of wires used for communication between the internal components of a computer.
- The word in the RAM has the same size (no. of bits) as the Memory Data Register (MDR).
- If the processor is an 8-bit processor like Intel 8085, its MDR and the word in the RAM both have 8 bits.
- The read operation transfers the data (bits) from word to Memory Data Register.
- The write operation transfers the data (bits) from Memory Data Register to word.