Unit 3

Information Technology Components

Lecture 1

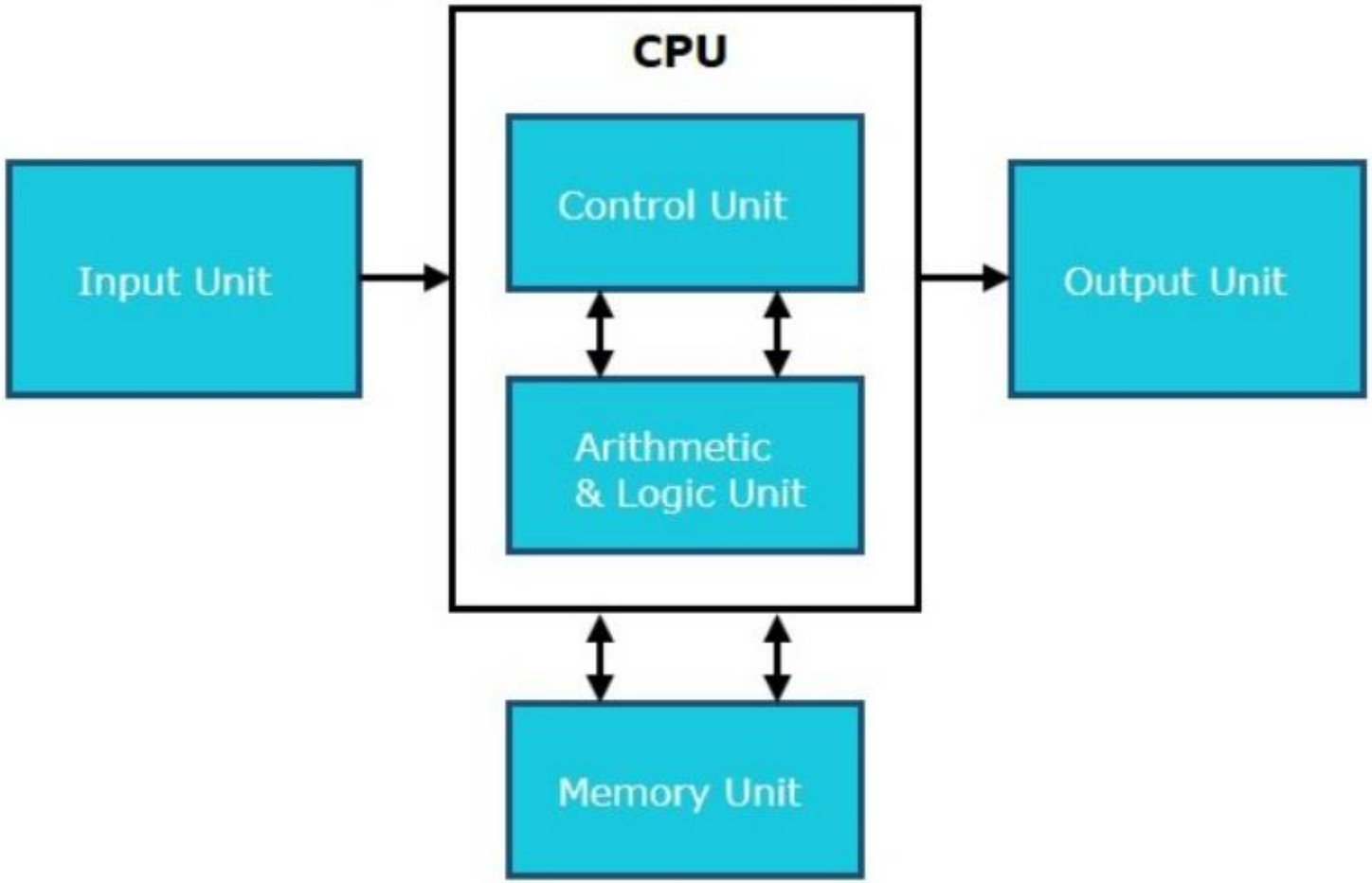
CPU

It consists of the following features –

- CPU is considered as the brain of the computer.
- CPU performs all types of data processing operations.
- It stores data, intermediate results, and instructions (program).
- It controls the operation of all parts of the computer.

CPU itself has following three components.

- Memory or Storage Unit
- Control Unit
- ALU(Arithmetic Logic Unit)


CPU
Control Unit
Input Unit
Output Unit
Arithmetic
& Logic Unit
Memory Unit

a) Memory or Storage Unit

This unit can store instructions, data, and intermediate results. This unit supplies information to other units of the computer when needed. It is also known as internal storage unit or the main memory or the primary storage or Random Access Memory (RAM).

Its size affects speed, power, and capability. Primary memory and secondary memory are two types of memories in the computer. Functions of the memory unit are –

- It stores all the data and the instructions required for processing.
- It stores intermediate results of processing.
- It stores the final results of processing before these results are released to an output device.
- All inputs and outputs are transmitted through the main memory.

b) Control Unit

This unit controls the operations of all parts of the computer but does not carry out any actual data processing operations.

Functions of this unit are –

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It manages and coordinates all the units of the computer.
- It obtains the instructions from the memory, interprets them, and directs the operation of the computer.
- It communicates with Input/Output devices for transfer of data or results from storage.
- It does not process or store data.

c) ALU (Arithmetic Logic Unit)

This unit consists of two subsections namely,

- Arithmetic Section
- Logic Section

i. Arithmetic Section

Function of arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication, and division. All complex operations are done by making repetitive use of the above operations.

ii. Logic Section

Function of logic section is to perform logic operations such as comparing, selecting, matching, and merging of data.

8. Storage

It is used to store data and instructions. Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one. For example, if the computer has 64k words, then this memory unit has 64 * 1024 = 65536 memory locations. The address of these locations varies from 0 to 65535.These are if 2 types:-

a. Primary
b. Auxiliary

a) Primary Memory (Main Memory)

Primary memory holds only those data and instructions on which the computer is currently working. It has a limited capacity and data is lost when power is switched off. It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instruction required to be processed resides in the main memory. It is divided into two subcategories RAM and ROM.

Characteristics of Main Memory

- These are semiconductor memories.
- It is known as the main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is the working memory of the computer.
- Faster than secondary memories.
- A computer cannot run without the primary memory.

i.Cache Memory

ii. RAM and its type

iii. ROM and its type

b) Secondary Memory

This type of memory is also known as external memory or non-volatile.It is slower than the main memory. These are used for storing data/information permanently. CPU directly does not access these memories, instead they are accessed via input-output routines. The contents of secondary memories are first transferred to the main memory, and then the CPU can access it. For example, disk, CD-ROM, DVD, etc.

Characteristics of Secondary Memory

- These are magnetic and optical memories.
- It is known as the backup memory.
- It is a non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.
- Computer may run without the secondary memory.
- Slower than primary memories.

Types of Secondary storage Devices

i. Magnetic Tape

ii. Hard Disk

iii. Pen Drive

iv. Memory Card

v. Optical Disk

- CD
- DVD
- Magneto-optical (MO) drives

Registers:

- Are the smallest and fastest temporary storage locations in the CPU made from electronic devices such as transistors, flip flop etc.
- Registers are primarily used to store data temporarily during the execution of program are accessible through instructions.
- Registers are directly accessed and manipulated by the CPU.
- **Registers** store data, instructions, addresses and intermediate results of processing.

Some of the important registers in CPU are,

- Accumulator (ACC)
- IR (Instruction Register)
- Memory Address Register (MAR)
- Program Counter (PC)
- Data Register (DR)
- Memory Buffer Register (MBR)