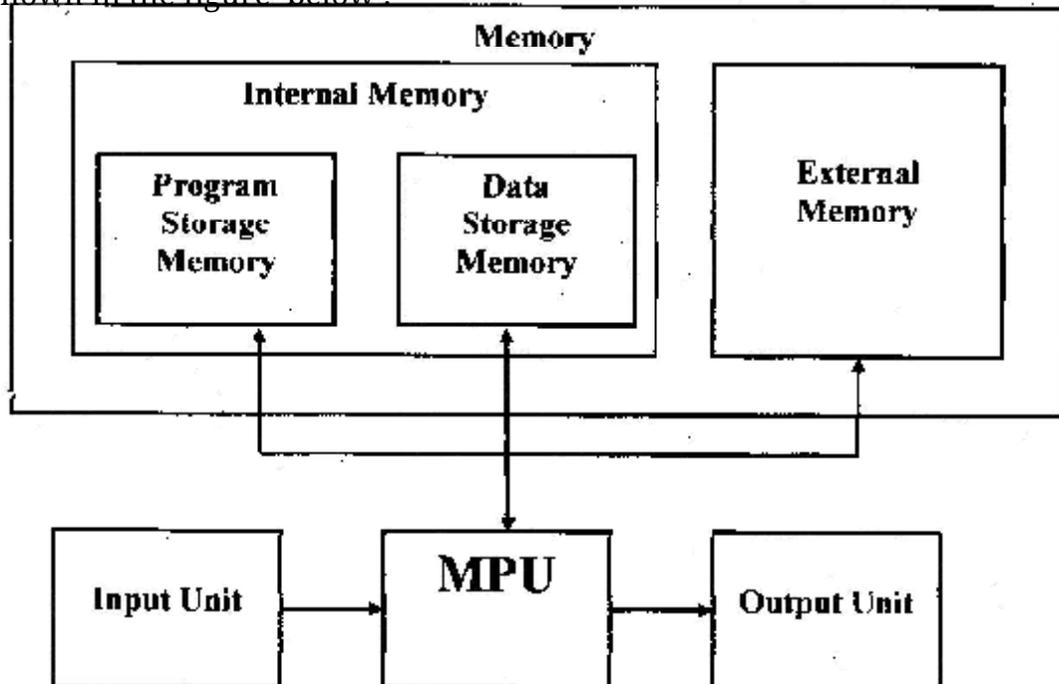## Microcomputer

Microcomputer is a general purpose electronic system that intended to use in a wide variety of applications, microcomputer employs *VLSI* (very large integrated circuit) to implement a smaller computer system with high performance and low cost.

## General Architecture of Microcomputer system

the hardware of microcomputer can be devided into five functional parts :

1- input unit
2- Microprocessor unit (MPU)
3- memory unit
4- output unit
5- bus system

as shown in the figure below :

The MPU of microcomputer is implemented with a *VLSI* device Known as Microprocessor; Microprocessor is General purpose Processing Unit built into a single integrated circuit.

MPU is responsible for executing instructions of programs and processing data, it performs all arithmetic and logical operations it also controls overall system operation.

Input unit is the part that used to input information and commands to MPU such as Keyboard, mouse and joystick that used in video games.

Output unit is used to give a feedback to the user and producing results such as monitors and printers.

Memory is used to store information and data such as numbers and characters, it has the ability to hold this information for processing or outputting at later time, it also contains programs that define who the computer is to operate and process data.
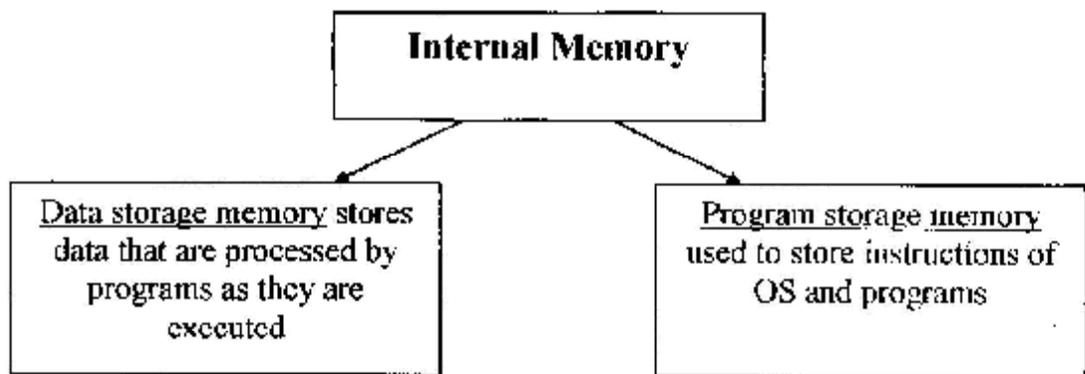
Memory divided into two types:-

1- External Memory.

2- Internal Memory.

External memory used for long storage of information that are not currently being used such as programs and files.

Floppy disks and compact disks (CD) and hard disk are examples of external memory.

Internal memory is a smaller segment of memory used for storage of active information and programs such as operating system of the computer and programs that currently being executed and data that being used.

```
┌─────────────────────────┐
│     Internal Memory     │
└─────────────────────────┘
```

```
┌──────────────────────────┐      ┌──────────────────────────┐
│ Data storage memory      │      │ Program storage memory   │
│ stores data that are     │      │ used to store            │
│ processed by programs     │      │ instructions of          │
│ as they are executed     │      │ OS and programs          │
└──────────────────────────┘      └──────────────────────────┘
```

## ROM and RAM

Internal memory implemented with ROM and RAM integrated circuits.

ROM is holding the (OS) operating system and basic language that necessary for computer work. These information are nonvolatile i.e. they will not be lost if power is turned off.

RAM contains data under processing and information that can be read and modified by the processor. RAM is volatile when power is turned off all information and data in RAM will be lost.

## ROM

ROM is an integrated circuit, we can not write on it, ROM contains the BIOS (Basic Input Output System) which contains all routines that deal with I/O devices and it is responsible for the POST operation (Power On Self Test)

## *POST*

When the computer is powered on the first thing is done is the POST operation (power on self test), this operation check the parts of the computer (processor, RAM, video card....etc) and if there are errors it tries to repair these errors or it stop working and gives warning messages until errors are repaired.

BIOS check all I/O devices (Hard disk, floppy disks, serial and parallel ports, key board ...etc) , it did that depending on information saved in CMOS chip, after that the BIOS searches for an operating system such as (WINDOWS, DOS, Linux, UNIX....etc )and gives the control to it.

At this point the BIOS does not stop working, but it continues working with OS to perform I/O operations and without it the OS can not save data and can not retrieve it.

# System Bus

**1 Data Bus**
**2 Address Bus**
**3 Control Bus**
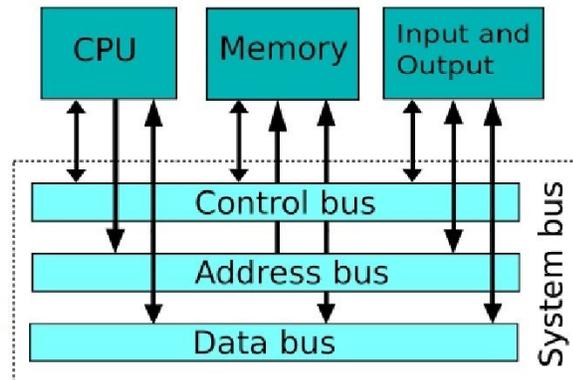


5. System Bus: The components of the computer system must communicate with each other and with the outside world. Although it may be possible to connect each component to the CPU separately as a practical matter this would require too many physical connects. To keep the number of connections manageable,

the processor is connected to memory and all peripherals using a bus.

A Bus is a bunch of wires, and electrical path on the printed IC to which everything in the system is connected. There are three types of Bus:
1- Address Buss (AB): the width of AB determines the amount of physical memory addressable by the processor.

2- Data Bus (DB): the width of DB indicates the size of the data transferred between the processor and memory or I/O device.

3- Control Bus (CB): consists of a set of control signals, typical control signals includes memory read, memory write, I/O read, I/O write, interrupt acknowledge, bus request. These control signals indicates the type of action taking place on the system bus.