

# Chapter 1

# Computer System Organization

Prepared By:

Manish Kumar Prajapati

PGT (Comp.Sc.) (First Shift)

Kendriya Vidyalaya Bailey Road Patna-14

# What is Computer?

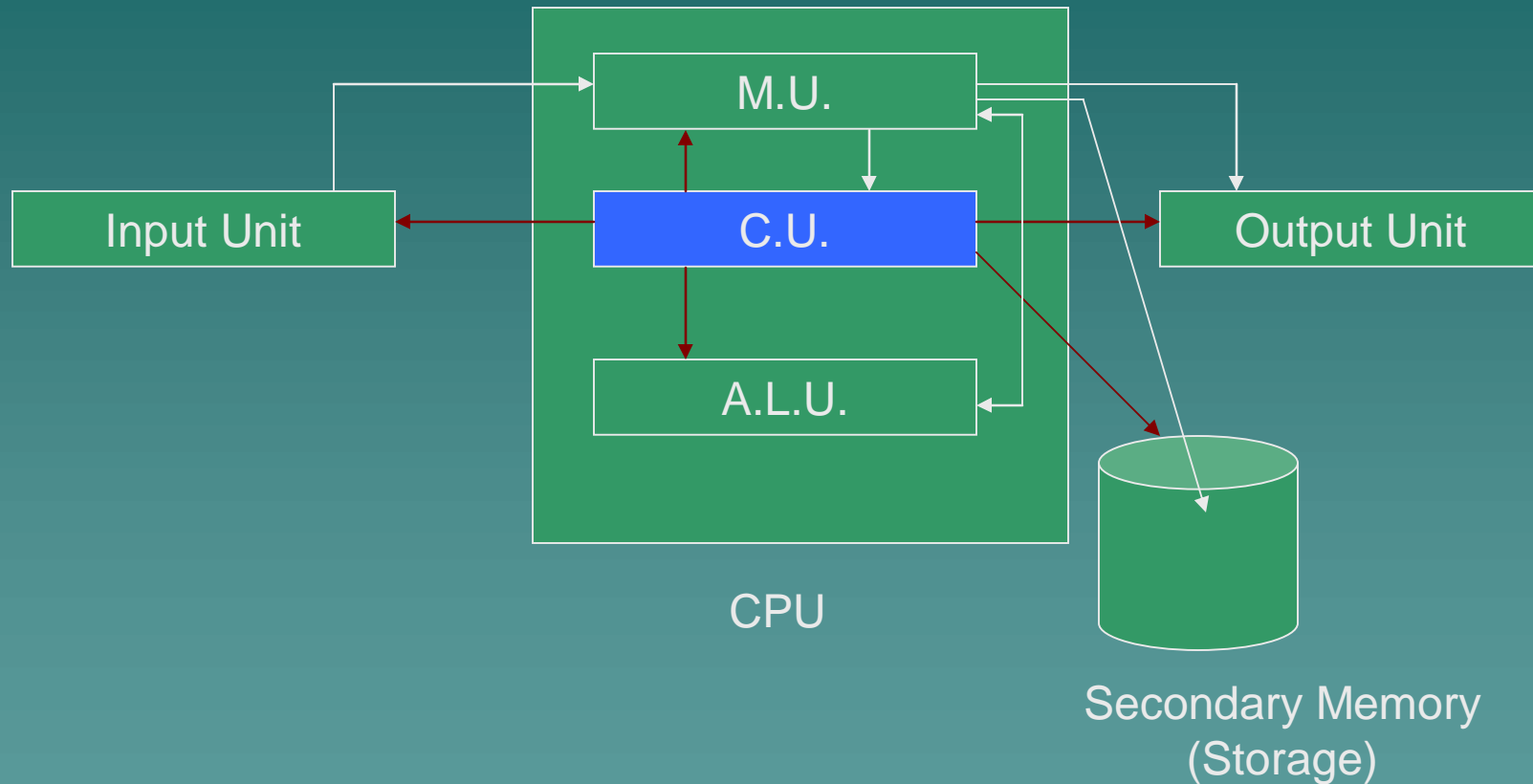
- ◆ A computer is an electronic device that can perform a variety of operations as per given instructions (Program) at very high speed.
- ◆ Computer is a Data Processing Device which convert data in to information.



# Data vs. Information

- ◆ The term Data is derived from the word 'Datum' which means raw facts and figures whereas Information is processed data.
- ◆ Data is irrelevant to user whereas Information is meaningful and useful to user.

# Functional component of a computer



All the devices around the system is known as *Peripherals*

# Central Processing Unit (CPU)

It is the brain of computer system. It controls, guides, directs to all the connected devices. It is divided in to two major parts-

- ◆ **Control Unit:** It controls to all the devices and guides the flow of data and information.
- ◆ **Arithmetic Logic Unit (ALU):** This unit performs all the arithmetical (+, -, x, /) and logical (>, <, <=, >=, <>) calculations.

Both Unit is designed in a single Circuit known as **Microprocessor** in PCs.

# Input Devices

Input device is a peripheral used to enter data, instructions or commands and user response in to computer.

The following devices are used as input device-

- ◆ Key Board
- ◆ Mouse  
(Mechanical,  
Optical)
- ◆ Light Pen
- ◆ Touch Screens
- ◆ Joystick
- ◆ Graphic Tablet
- ◆ Mic
- ◆ MICR
- ◆ OCR
- ◆ OMR
- ◆ Smart card Reader
- ◆ Scanner (Hand held,  
Flatbed & Drum)
- ◆ Biometric Sensor
- ◆ Digital / Web  
Camera

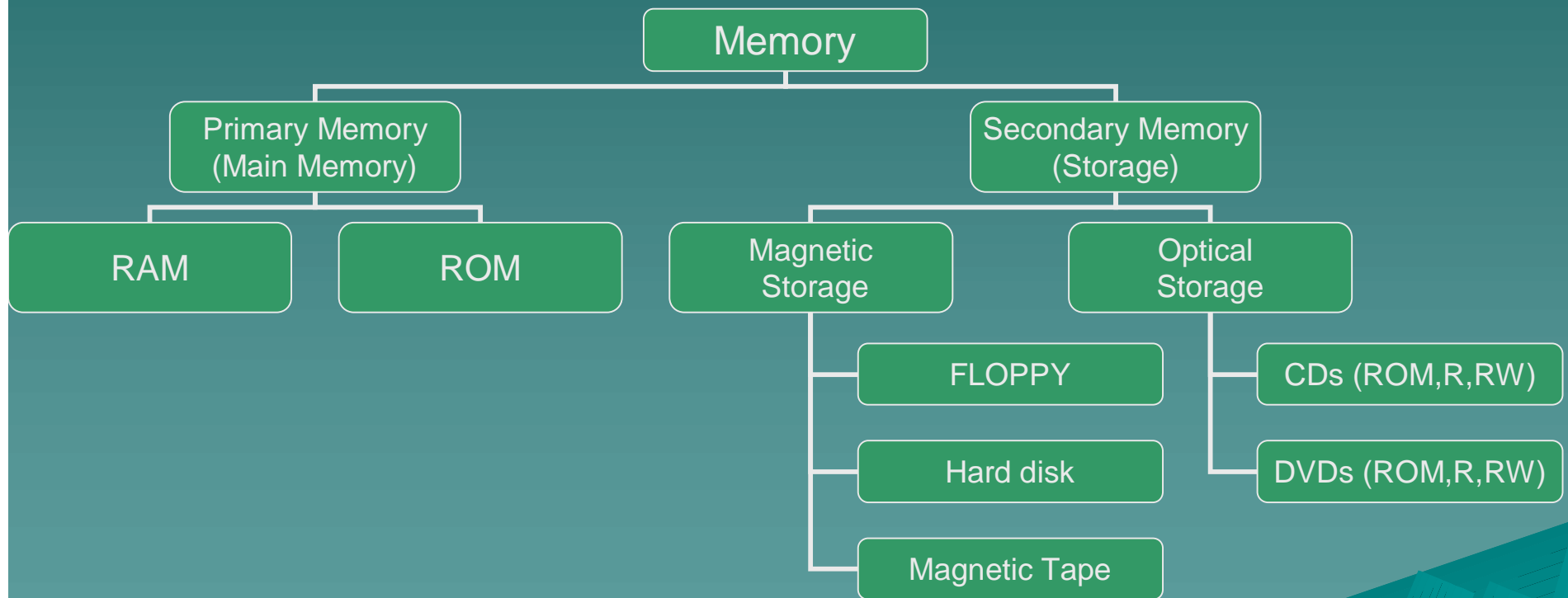
# Output Devices

Output devices produce output (result) in human understandable form. The following devices are used as output device-

- ◆ Monitor (CRT & LCD / TFT [Thin Film Transistors])
- ◆ Printer (Dot Matrix, Inkjet, Laser)
- ◆ Plotters
- ◆ Speakers

# Memory Devices

Memory devices are used to store data, information and programs temporarily or permanently.-





# Memory Measurement

All the data/ information processed and stored in the form of Binary Digit (either 0 or 1), and is known as BIT. Therefore the smallest unit of memory is a BIT.

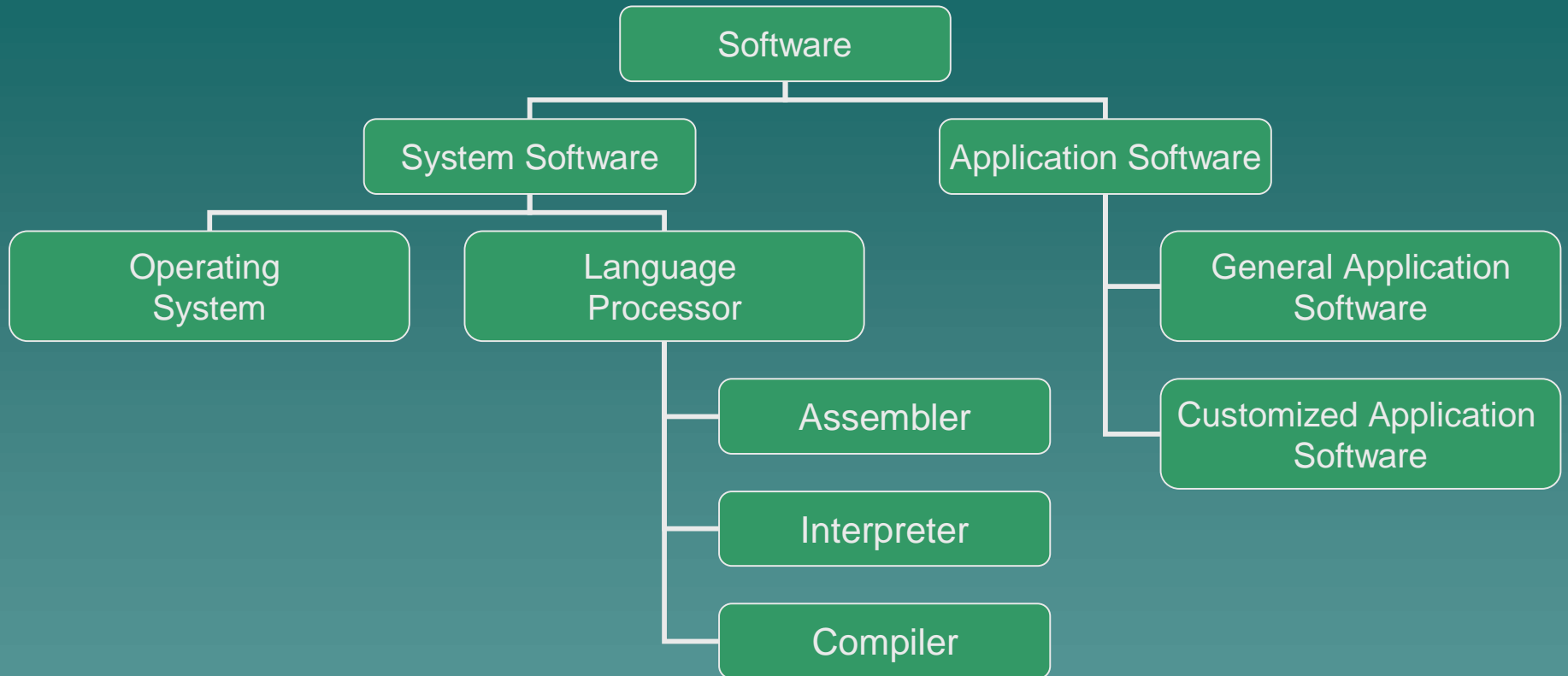
- ◆ 4 Bit = 1 Nibble
- ◆ 8 Bit = 1 Byte
- ◆  $2^{10}$  (1024) Byte = 1 Kilo Byte (KB)
- ◆  $2^{10}$  (1024) KB = 1 Mega Byte (MB)
- ◆  $2^{10}$  (1024) MB = 1 Giga Byte (GB)
- ◆  $2^{10}$  (1024) GB = 1 Tera Byte (TB)

# Hardware & Software

- ◆ All the physical and tangible component (Mechanical, Electrical or Electronic) of the computer is known as Hardware (Peripherals).
- ◆ Software represents the set of programs that controls the operation of computer and make the hardware functional.

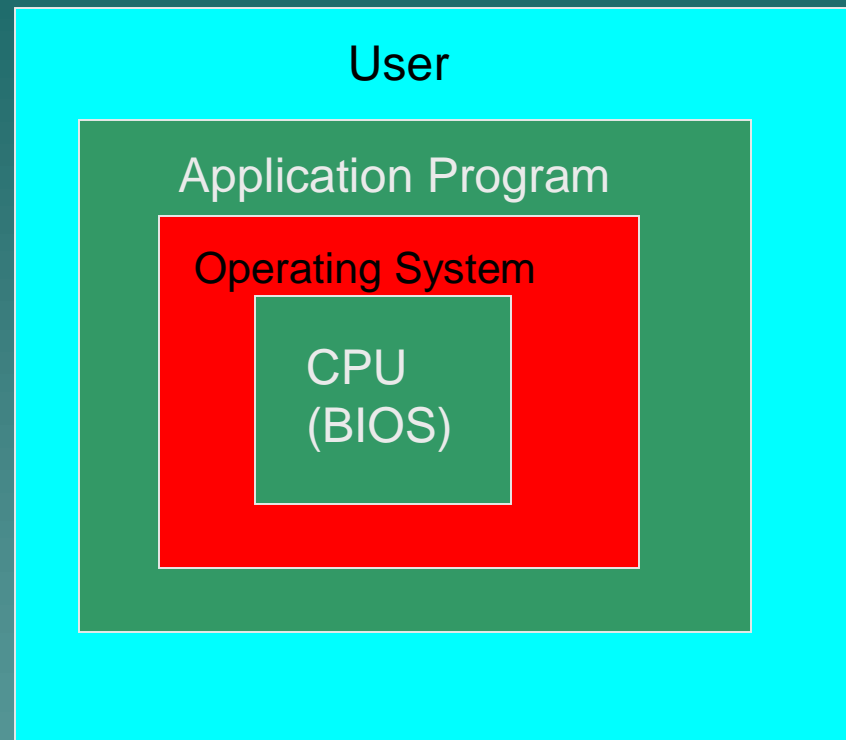
A set of instruction is called Program and a big sized Program is known as Software. Hardware can be manufactured but Software can be developed.

# Types of Software



An Operating System is a Program which works as an interface between user and hardware. It is also called Resource Manager because it controls all the I/O devices, Memory and user's programs (Process) running in the memory.

# A computer System



Like Hardware & Software, Firmware is a prewritten program that is permanently stored in ROM memory and used to configure the device.

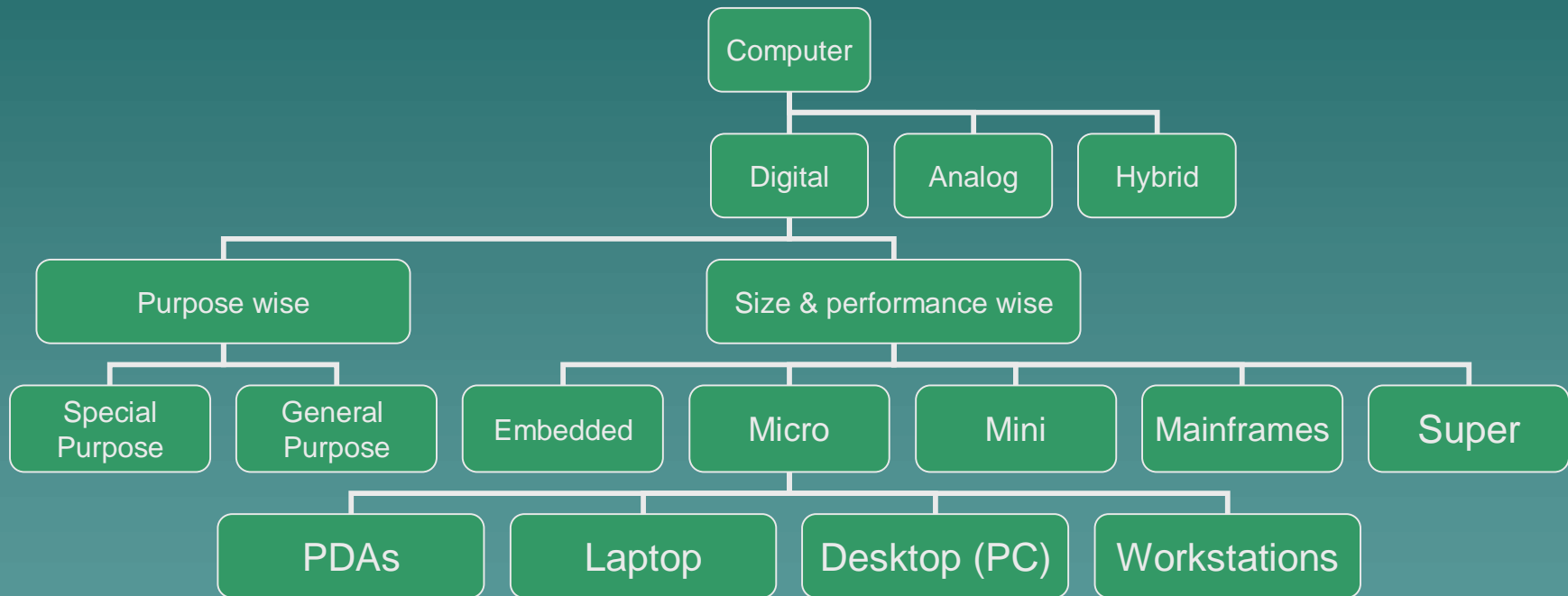
Liveware is a term generally used for the people associated with computer.

# Strength & Limitations of Computer

- ◆ Speed
- ◆ High Storage Capacity
- ◆ Accuracy
- ◆ Reliability
- ◆ Versatility
- ◆ Lack of Decision making power
- ◆ IQ zero



# Types of Computers



# Evolution of Computers

- ◆ Abacus (3000 BC)
- ◆ Napier's Bones (1622)
- ◆ Pascal's Adding Machine (1642)
- ◆ Leibnitz's Calculator (1671)
- ◆ Jacquard's Loom (1801)
- ◆ Babbage's Difference Engine (1822)
- ◆ Babbage's Analytical Engine (1833)
- ◆ Hollerith's Machine (1887)
- ◆ Mark I (1943)- the first general purpose computer by Prof. Howard Aiken (USA)

# Generations of Modern Computers

- ◆ First Generation (1945-55)
- ◆ Second Generation (1956-65)
- ◆ Third Generation (1966-1975)
- ◆ Fourth Generation (1976-1990)
- ◆ Fifth Generation (1990- Present )



# Generations of Modern Computers

## ◆ First Generation (1945-55)

- Vacuum tubes used.
  - Big and clumsy computers
  - High Electricity Consumption
  - Machine Level Language (MLL) is used
- Example: ENIAC, EDVAC, EDSAC, UNIVAC

## ◆ Second Generation (1956-65)

- Transistors are used
- More reliable, Faster and smaller in size
- Low electricity consumption
- Core Memory, Magnetic Tape and Disk used
- Assembly Level Language is introduced.

Example:

IBM 1401, IBM 1620, CDC 3600, UNIVAC 1108

# Generations of Modern Computers

## ◆ Third Generation (1966-75)

- Integrated Circuits (IC) used.
  - Smaller, Faster and more reliable.
  - Low Electricity Consumption
  - High Level Language (HLL) is used
- Example: IBM 360, ICL-2900, PDP 11

## ◆ Fourth Generation (1976-90)

- VLICs, Microprocessor used.
- More Smaller (Portable) , reliable, Faster
- Faster Secondary Storage used.
- Applied in Computer Networking, Multimedia, Virtual Reality etc.

Example:

Microcomputer by IBM and Apple.

# Generations of Modern Computers

## ◆ Fifth Generation (1990- Present)

- ULSI (Ultra Large scale Integrated Circuits) may be used.
- More Smaller, Faster and more reliable.
- Based on Artificial Intelligence (AI)
- Used in Voice recognition, Parallel Processing, Super conductor application
- Quantum Computation and Nano Technology may be used.

Example: Robotics

# Communication Bus

- ◆ Bus is a collection of wires used to transmit data/ instruction/ address in the form of electrical signals from one unit to another.
- ◆ Three major buses are :

## **1. Address Bus:**

Unidirectional bus connecting Processor to Memory to carry address of memory to be read or write. (16/32 bit)

## **2. Data Bus:**

Bi-directional bus between processor and other external units like memory & I/O devices, to carry data. (8/16/32 bit)

## **3. Control Bus:**

Quad-directional bus containing wires to carry signals to / from control unit and all the devices attached. It represents the capacity of Micro processor. (16/32/64 bit processor)

# What is Port?

- ◆ Ports are connecting points used to connect external devices to the computers.

- ◆ Types of Ports:

## 1. Serial Port:

It is 9-pin/25-pin sized connector transmits 8 bit data serially. Generally used to connect Mouse and Modem etc.

## 2. Parallel Port:

It is 25-pin connector transmit 8 bit data in parallel way. Generally used for Printer, Scanner, Tape drive etc.

## 3. AGP (Accelerated Graphics Port)

It is used to connect Graphic card to provide high speed video performance. Generally used for Game applications.

# Port cont....

## 4. USB Port:

It is 9-pin sized connector used to connect various devices like Printer, Mouse, Joystick, Camera, Pen drive etc.

## 2. IR (Infra Red) Port:

It sends/receives Infrared signals. IR is a special Radio transmission suitable for short distance. It is modulated rays used in wireless communication.

## 3. Blue Tooth:

It is telecommunication industry specification used to connect Mobile/PDAs and computers. It requires low cost trans-receiver chip in the device that makes wireless communication.

## 4. Network Port:

A Network Port is an address within computer to connect a particular Application Protocol, like FTP, HTTP etc.

## 5. Phone Port:

A phone port allows connecting telephone equipment with computer's sound card.

# External Memory Card

- ◆ A memory card (Flash Memory) is a small storage media used to store data (text/picture /audio/video etc) for transporting purpose.
- ◆ Various types of Memory cards are-

- **Smart Card**

Used in Digital Cameras, Music Player, Cellular Phones, Digital Voice Recorder etc.

- **Extreme Digital Card (xD)**

Requires less power, 9-10 MB/Sec W/R speed.

- **Multimedia Card (MMC)**

Low powered and reliable. Used in Mobile phones.

- **Secure Digital Card (SD)**

Secure, reliable with write protection feature. (Mini/Micro/SDHC)

- **Compact Flash Card**

Used in Digital Camera, MP3 player as embedded memory.

- **Memory Stick**

Suitable for small AV electronic products. It high capacity, low power consumption and reliable. (Soni PRO, Duo, MagicGate)