

UNIT-1: HARDWARE CONCEPTS

Computer's Basic Definitions:

What is a Computer?

The computer is an advanced electronics device which can take the data as input and processes these data as per instruction given by the user and gives your required output with great accuracy.

The term 'computer' is taken from the word 'compute' which means to calculate.

Charles Babbage is known as the father of computer.

What is data?

Data is a collection of raw facts and figures that need to be processed.

Eg:- Each student's mark, roll number etc.

What is information?

When data is processed in a meaningful manner that is known as information.

Eg:- Average marks of your classroom or section or school

Data Processing:-

It is the step-by-step refinement of the data to get out the desired information. It is manipulating data through operations like classification, sorting, merging, calculating and summarizing so as to provide the desired output.

Difference between data and information:-

Data:-

- i. Data is a form of raw facts and figures.**
- ii. Data can be calculated in un-sequential manner**
- iii. Data is an input form.**
- iv. Data can't be understood.**

Information:-

- i. Information is the result of processed data.**
- ii. Information is presented in a meaningful form.**
- iii. Information is output form.**
- iv. Information is completed an under-stand able.**

What is I.T.?

I.T. stands for Information Technology.

Definition: - It is the technology which deals with the management of information in computer over

communication network. (or)

I.T. is an integration of technology related to computers communication and also to management.

CHAPTER-1

BASIC COMPUTER ORGANIZATION

A computer works very fast and does the following function.

Input:It accepts data from the input device. The data entered in the computer is called input.

Processing :It processes (carries out arithmetic or logical operations on) data and convert them to useful information.

Output :It presents the final result for the user in form

of output (printed or visual display format)

Store :It stores data and instructions for the use of the system as and when requires.

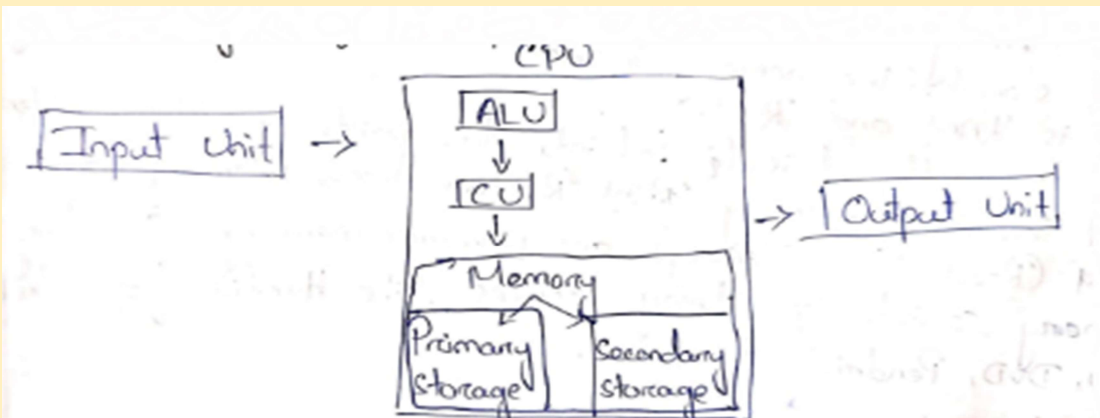
Control :It controls (co-ordinate and synchronize) all four operation described

above.

Block diagram of a computer:

There are three parts

mentioned below.



1. Input Unit: Used to enter input the computer, keyboard, mouse, microphone, web-camera etc. are input devices.

2. C.P.U: CPU stands for Central Processing Unit. CPU Processes data and produces the result. CPU is called 'brain' of the computer. All functions of processing take place in CPU. After processing it produces results.

It is divided into 3 parts.

i. ALU (Arithmetic and Logic Unit):It can do the following operations i.e. add, subtract, multiply, divide etc.The result of a logical operation can be either true or false.

ii. CU (Control Unit):Control Unit controls the functions

of computer. It is the bridge between ALU and Memory. It is responsible for controlling different parts of computer. It takes the input from input unit and gives instructions to store the data in memory. It processes data and sends results to the output unit.

iii. Memory: Memory is the main part of the CPU where instructions are stored. The memory inside a computer is of two typed. It is RAM and ROM.

Basically it is divided into two parts i.e. Primary memory and Secondary Memory.

RAM (Random Access Memory) and ROM (Read Only Memory) are primary memory.

Secondary memory consists of storage devices like hard

disk, floppy disk CD, DVD, Pen drive.

3. Output Unit:-Used to print, see or listen the output.

Printer, Monitor, speakers are output devices.

Central Processing Unit (CPU) :-

- i. The Central Processing Unit or simply the processor is a component in a digital computer which is capable of executing a program.**
- ii. It is considered to be the brain of a computer system.**
- iii. A CPU i.e. manufactured as a single Integrated Circuits (IC) is usually known as a microprocessor.**
- iv. The term 'CPU' has been used in the computer industry at the beginning in the mid1970s.**

Working of a CPU:-

There are 4 basic steps that nearly all Vonn Neumann CPUs use in their operations.

- i. Fetch:- The instruction is retrieved (by the control Unit) from the memory and fed into the Instruction Register (IR) where the operation and address parts are separated.**
- ii. Decode: The control Unit then sends the operation part to the decoder and the address part to the M.A.R.**

(Memory Address Register).

- iii. Execute:** The decoder interprets the instruction and accordingly the control unit sends signal to the appropriate units to carry out the specified task. E.g. For any arithmetic or logical operation the signal is sent to the A.L.U. The ALU carries out the necessary operation and sends a signal to the control Unit as soon as the operation is finished.
- iv. Write back:** The result is returned back either to a register the CPU for further processing or a slower, but cheaper and larger main memory of the computer. As each instruction is executed, the address of the next instruction is automatically loaded into the PC register

and step 1 to 4 is repeated.

Memory:-

- i. Computer Memory is the storage space in computer where data is to be processed and instructions required for processing are stored.**
 - ii. The memory is divided into large number of small parts called cells.**
 - iii. Each location or cell has a unique address which varies from 0 to memory size-1.**
 - iv. For example, if computer has 64K words, then this memory unit has $64 \times 1024 = 65536$ memory location.**
 - v. The address of these locations varies from 0 to 65535.**
- The memory inside a computer is of 2 types i.e. RAM and**

ROM.

RAM:

RAM stands for Random Access Memory. This means that the access time to read data from the first location to the last location is same. Both read and write operation is possible in this memory. This is volatile in nature i.e. contents will be lost once power is off.

RAM is measured in Mega bytes and the speed is measured in nano seconds. RAM chips can read data faster than ROM.

ROM:-

ROM stands for Read Only Memory. In this memory only read operations is possible. There is no write operation

possible in this memory.

The content of this memory is written by the manufacturer. It is non-volatile in nature i.e. contents will not be lost after power is off.

Difference between RAM and ROM:

RAM:-

- i. RAM stands for Random Access Memory.**
- ii. RAM allows the computer to read data quickly to run applications.**
- iii. It allows reading and writing.**
- iv. It is volatile in nature.**

ROM:-

- i. ROM stands for Read Only Memory.**

- ii. It stores the program required to initially boot the computer.**
- iii. It only allows reading.**
- iv. It is non-volatile in nature.**

Units of Memory:-

Bit is the smallest unit in the computer memory.

1 nibble = 4 bit	
1	byte=
8bit=2 nibble	

1KB (Kilo Byte) = 2^{10} = 1024 bytes

1MB (Mega Byte) = 2^{10} KB = 1024 KB

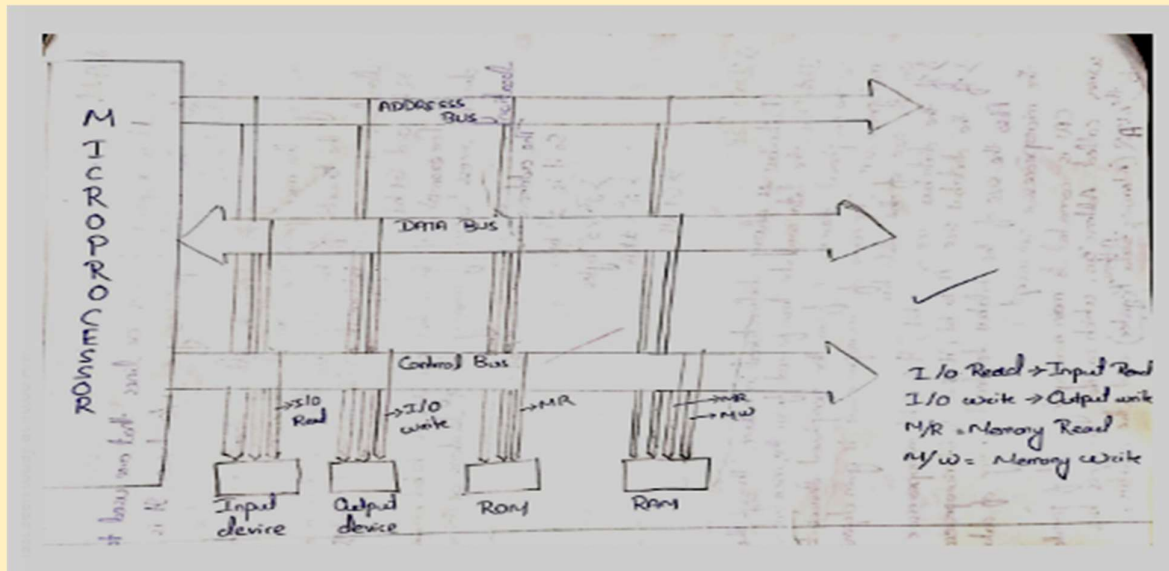
1GB (Giga Byte) = 2^{10} MB = 1024 MB

1TB (Tera Byte) = 2^{10} GB = 1024 GB

1PB (Peta Byte) = 2^{10} TB = 1024 TB

1EB (Exa Byte) = 2^{10} PB = 1024 PB

Communication Bus:



A Bus is a bunch of parallel copper wires, which can be used for data transfer operation between the microprocessor and the peripheral devices.

The information is transferred byte by byte. The CPU

logically controls the transfer of data, instructions and commands between them.

The Bus is of 3 types. They are: - 1) Address Bus

2) Data Bus

3) Control Bus

1. Address Bus:

- i. It is a group of wires or lines that are used to transfer the addresses of memory or I/O devices.**
- ii. It is unidirectional.**
- iii. The Size of the address bus always decides how much memory the microprocessor can directly access.**
- iv. The width of the address bus determines how many**

locations it can access. Typical widths are 8bit, 16 bit, 32 bit and 64 bit.

v. For example, if the address bus size is 16 bit, it can directly access 64 KB of memory i.e. 2^{16} locations or 65536 locations.

The address bus size is 16 bit.

So it is 2^{16} bytes

= $2^6 \times 2^6$ bytes

= $2^6 \times 1$ KB

= 64 KB

2. Data Bus:

i. Data bus is always bidirectional in nature.

ii. Through Data Bus, The data can be transferred from

the micro process to the peripheral devices or from the peripheral devices microprocessor.

iii. The name of microprocessor is given depending on the size of the data bus.

a) If the data bus Size is 8 bit, It is 8 bit microprocessor.

b) If the data bus size is 16 bit, it is a 16 bit microprocessor.

iv. Also the size of the data bus decides the range of data the microprocessor can accept.

3. Control Bus:

i. The Control Bus is used by the CPU to direct and monitor the actions of the other-functional areas of the computer.

- ii. It is used to transmit a variety of individual signals (read, write, interrupt, acknowledge etc.) necessary to control and co-ordinate the operations of the computer.**

Ports:

A Port is a Physical docking Point using which an external device can be connected to the computer.

1. Serial Port:

- i. Used for external modems and older computer mouse.**
- ii. Serial ports come in the form of 9 pin or 25 pin male connector.**
- iii. Data travels at 115 kilo bits per second (kbps).**

2. Parallel Port:

- i. Used for scanners and printers.**

- ii. Also called printer port.**
- iii. Parallel Ports come in the form of 25 pin,**
- iv. These Ports are built in Mother Board and consist of 25 wires. 8 of those wires are responsible to transfer data and control complete circuit.**

3. Ps/2 Port:

- i. Used for old computer keyboard and mouse.**
- ii. Also called mouse port.**
- iii. These are 6 pin low speeds serial connection Ports which are used with mouse and key boards mostly.**

4. USB Post:

- i. USB stands for Universal Serial Bus used for short**

distance digital data communication.

- ii. It can connect all kinds of external USB devices such as external hard disk, printer, scanner, mouse, keyboard etc.**
- iii. The port allows data transfer between devices with little electric power.**
- iv. Most of the computers provide two USB ports as minimum**
- v. Data travels at 12 mega bits per second (mbps).**

5. VGA Port:

- i. VGA stands for Visual/Video Graphics Array, used to connect monitor to a computer's video card.**
- ii. It has 15 Holes.**

iii. Similar to serial port connector, but serial port connector, but serial port connect has pins, it has holes.

6. RJ (Register Jack) 45 Port

- i. This port is used for Ethernet connections and can be used between computer and any networked device such as a cable modem or a network hub.**
- ii. It is an 8 wire connector.**

7. RJ 11 Port:

- i. This port is for connecting to a telephone line.**
- ii. It has 6 wire connector in each and is smaller than RJ 45.**