CHAPTER-1

BASICS OF COMPUTER

1.1 BRIEF HISTORY OF DEVELOPMENT OF COMPUTERS.

→ The first computer in the world was ABAcus (first counting machine) which was invented by the Babylonians as early as 2,400 B.C.

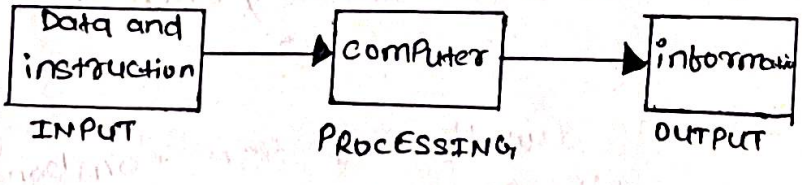
→ In 1642, Blasie Pascal invented a numerical wheel calculator in the shape of rectangular box called Pascaline (numerical wheel calculator).

→ In 1822, charles Babbage known as "father of the computer" invented the first digital computer called the "Difference Engine", that could perform mathematical computation with 20-decimal capacity.

1.2. DEFINITION OF COMPUTER.

→ The full form of COMPUTER is, "commonly operated Machine Particularly used for Technical Educational Research"

→ A computer is an electronic device that accepts data and instructions, Processes the data according to the instruction set and the desired information. It is also known as data Processing machine and Problem-solving machine.



1.3. BLOCK DIAGRAM OF COMPUTER:

→ The block diagram of digital computer is given in fig. 1.2 and major functional units of computer are as the following:

1. Central Processing unit (CPU)
2. Input unit
3. Output unit
4. Storage device

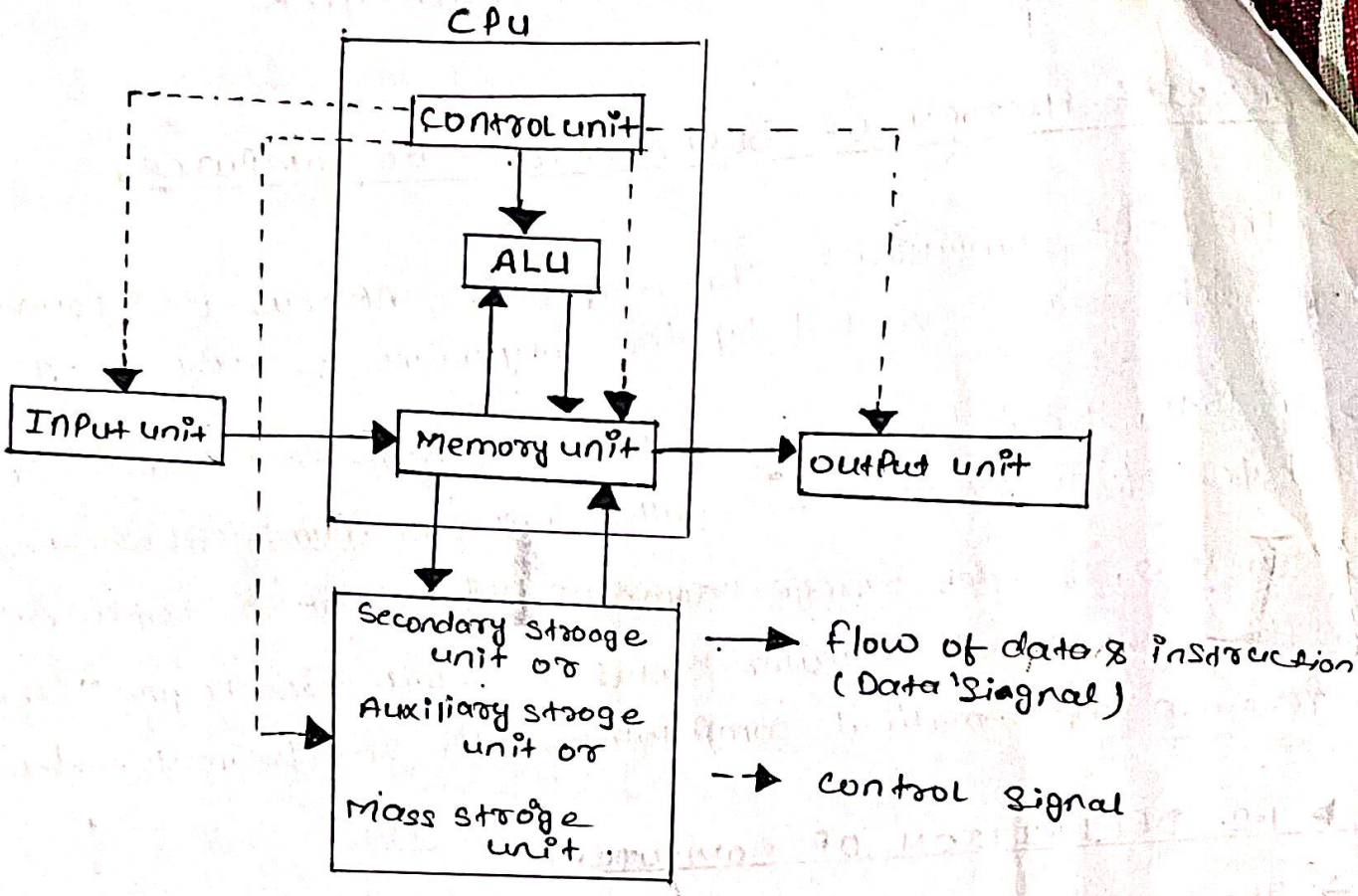


fig. 1.2 Block diagram of computer System.

1.3.1. CENTRAL PROCESSING UNIT (CPU)

→ CPU is considered as brain of the computer.
→ CPU is responsible to perform all type of data processing operations.
→ It consists of control unit, Arithmetic & Logic unit (ALU) and main memory.

* **FUNCTIONS OF CPU:** The function of the components of CPU are as follows:

1. The primary function of the CPU is to execute programs stored in the memory.
2. It takes the data from input device and processes them according to the instructions.
3. It gives the processed information to output device.
4. All the parts of computer system are connected with CPU through cable and connectors.

1.3.1.1. ARITHMETIC & LOGIC UNIT (ALU)

→ function of arithmetic section is to perform arithmetic operation like addition, subtraction, multiplication and division.

→ function of logic section is to perform logic operation such as ANDing, ORing, Inverting, XORing, comparing, selecting of da

1.3.1.2. CONTROL UNIT

→ control unit controls the operations of all parts of computer and does not carry out any actual data processing operation

- It retrieves the data required to be processed from the main memory and decides what is to be taken.
- It Places the processed results in the output area of the memory.

1.3.2 INPUT UNIT

→ The input unit consists of input devices which are responsible for entering the data and instruction into computer.

→ The various input devices are keyboard, Mouse, scanner, microphone Light pen, Digitizer, viedo camera etc.

* FUNCTION.

→ It accepts the data or instructions from outside word.

→ It converts these data and instructions in computer acceptable form ie... binary form.

1.3.3. OUTPUT UNIT

→ The output unit consists of output devices which are responsible for transforing the information or the result stored in the computer to the outside word.

→ It is also acts as the bridge between computer and the user

→ The various output devices are monitor, printer, Loud speaker, Projector, Plotter etc.

* **FUNCTION:**

→ It accepts the result in the coded or binary form produced by computer.

→ It converts the coded results into human readable form.

→ It displays the converted result to the outside world.

1.3.4. MEMORY OR STORAGE UNIT

→ The term 'memory' identifies data storage that comes in the form of chips.

→ The memory or storge unit is responisble for storing those instructions and data.

→ It also stores the intermediate and final results produced after processing by the CPU.

* **FUNCTIONS / TYPES:**

→ The storage units used in computer system are of two:

- Primary Storage
- Secondary storage.

1. Primary Storage :- The primary storage or memory is small but relatively fast storage unit.

→ It is also known as internal storage unit or main memory.

→ It communicates directly with the CPU and acts as the part of CPU.

The size of main memory affects used within memory affects. Speed, Power and capability of the Computer System.

→ There are two types of Primary memory used within computer system.

→ These are Random Access Memory (RAM) and Read only memory (ROM).

2. Secondary Storage :- Secondary Storage unit or secondary memory is used for storing Program and data Permanently.

→ It is also known as auxiliary memory.

→ It is external to cpu.

→ The speed of secondary storage is lesser than Primary memory.

→ It is non-volatile memory.

→ Examples of secondary memory are compact Disk (CD), DVD, floppy disc, Hard Disc, flash memory, SSD etc.

▶ 1.4. COMPUTER HARDWARE & COMPUTER SOFTWARE

On the basis of working, the computer System is classified into parts given as following:

1. Computer hardware.
2. Computer software.

▶ 1.4.1 COMPUTER HARDWARE.

The Physical device or tangible entity or equivalent (anything you can see and touch) used within or with the computer System is called hardware. It is further classified as External hardware and Internal hardware.

1.4.1.1 EXTERNAL HARDWARE

→ These are the devices that are located outside the computer.

→ Input devices (Keyboard, Mouse, Scanner, Microphone, Touchpad, Joy Stick, Light Pen, Webcam .etc.)

→ output devices (Monitor, Printer, Speaker, Projector etc.).

1.4.1.2 INTERNAL HARDWARE

These are the devices located inside the computer like CPU, Motherboard, Hard Disc Drive (HDD), LAN card, Chipset, RAM, ROM, I/O ports etc.

1.4.2. COMPUTER SOFTWARE

→ Software is a set of instruction or programs that tells a computer what to do or how to perform a specific task.

→ It brings life to the computer as soul in the human.

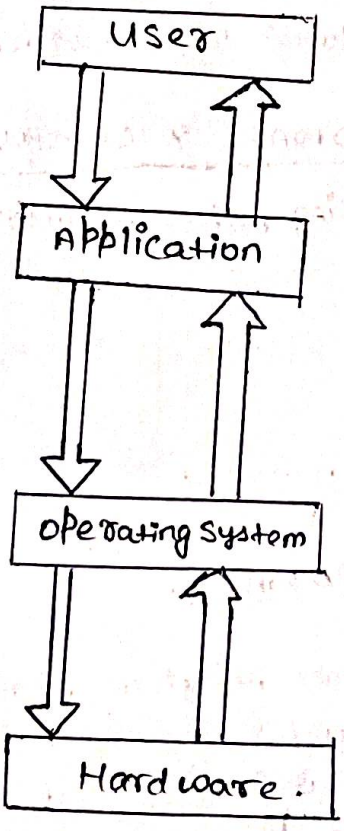


fig.1.1. Interaction between user, hardware and Software.

4.2.1 SYSTEM SOFTWARE

→ System software is a set of one or more programs designed to control the operation of a computer system.

→ These are the programs stored permanently on the computer.

→ It performs a verity of functions like memory management, file editing, resource accounting, database management, compilation, execution and many internal activities.

→ System software can be categorized into following three parts:-

1. Operating System Software (System management software)
2. Programming Languages (system development Software)
3. Utility software.

*1. **Operating system:-** The operating system is the first program that is loaded into the computer main memory is automatically loaded at the starting time of computer (PC).

→ Examples of operating system include DOS, Microsoft windows, the Macintosh operating system and Linux.

* **FUNCTIONS.**

i) Processor management

ii) Memory management

iii) Input/Output (I/O) management

iv.) file management

v.) Security management

vi.) Resource management

vii.) Data management

viii.) scheduling.

2. Programming Language: → Programing language is the essential part of the system software, a user uses to communicate with the computer that understand only machine Language.

→ Programming Languages are the various method of writing computer instruction.

→ Till now, more than 200 Programming Languages have been developed including c, c++, c sharp, visual basics, Java, HTML etc.

⇒ The Programing Languages are further categorized as :-

i) Machine Language Programming (Low level Language)

ii) Assembly Language programming (Moderate level Language)

iii) High level Language Programming.

3. Utility Software: → Utility software is the additional programming funcation that ~~examples~~ expands the performance of operating system in a specific manner.

→ It is not the part of operating system.

→ It Perfoms the funcation like virus detecation, troubleshooting hard ware, damage inspection.

1.4.2.2 APPLICATION SOFTWARE

→ Application software is the set of programs that is used to perform a specific task on a computer for the user.

→ Some basic examples are MS word, Photoshop, Google chrome, etc.

→ The major categories of application software as the following

(1) Spreadsheets for creating numeric-based documents.

(2) Word processing software for creating text based document.

(3) Presentation software for creating and presenting electronic slide shows.

(4) Multimedia software for making digital movie including sound, video.

(5.) Entertainment software for playing games, listening songs, and watching movies.

(6.) Educational software for virtual experimentation and simulation

→ Application Software is of two types:

(i) General-Purpose software.

(ii) Customized software.

1.5. BOOTING IN COMPUTER SYSTEM

→ Booting is a process by which the computer is made ready to perform operations for the user by loading an operating system into the computer main memory or Random Access Memory (RAM).

→ Booting is basically the process of starting the computer system.

→ During the booting process, the computer system will check all the hardware and software

→ * Types of booting:

(1) Cold booting / Soft booting

(2) Hot (warm) booting / Hard booting.

1. Cold or Soft booting.

→ When the computer is shut-down state and we press the power ON button to start the system, than this type of process to start the computer is called cold or soft booting.

→ This booting takes more time than hot or warm booting.

→ The cold booting is symbolized as ⏻ (Alt + f4) Shutdown.

2. Hot (warm) or Hard booting.

→ The hot or hard booting is the booting process in which the system is allowed to restart during ON condition.

→ It is also refferd to as rebooting.

→ Rebooting may be required when we install new software or hardware.

→ The cold booting is symbolized as (Ctrl + Alt + Del Press) (RESTART)

Input Devices

An input device is an electromechanical device that accepts data from the outside world and translates them into a form the computer can interpret.

→ The various input devices are keyboard, Mouse, Light pen, Touch screens, Graphics, tablets, Joystick, Mic, MICR, OCR, scanner, smart card reader, barcode reader, Biometric sensor, web camera, Digital camera, etc.

1) **Keyboard**: Keyboard is the most commonly used input device. It is a primary input device and is used for entering commands and data into the computer. Keyboards come in a variety of sizes and shapes. Certain number of features are:-

i) Standard typewriter keys
ii) Function keys
iii) special purpose keys
iv) cursor movement keys.
v) Numeric keys.

* **Advantages of keyboard:**

i) Keyboards have special keys that perform specific functions.
ii) Reliable way of inputting data.
iii) Keyboards are less expensive.

* **Disadvantages of keyboard:**

i) The people using the keyboard have to learn how to type.
ii) It is very slow while accessing menu options.

2) Mouse:

→ A mouse is small handled box used to position th screen cursor.

→ when the mouse moves on a flat surface, the cursor on the screen also moves in the direction of mouse's movement.

→ A mouse usually has two or three buttons.

→ There are three type of mouse;

(i) Mechanical mouse:

→ Mechanical mouse contains a small rubber ball in the bottom of mouse.

(ii) Wireless mouse:

→ wireless mouse is not connected to computer. wireless mouse usually works via radio frequencies commonly reffered to as RF.

→ RF wireless mouses requires two components to work properly; a radio transmitter and a radio receiver.

(iii) Optical mouse:

→ optical mouse emits a beam of light from its underside It uses the light's reflection to judge the distance, direction and speed of travel.

Advantages of mouse:

i) Fast input device.
ii) we can easily choose commands from menus.
iii) user friendly.

Disadvantages of mouse:

i) Always requires a flat surface to move the mouse.

Touch screen:

→ A touch screen is a device that allows the users to choose from available option by simply touching with their finger the desired icon or menu item displayed on the computer's screen.

→ The computers having touch screen facility uses optical sensors in or near the computer's screen that can detect the touch of a finger on the screen.

Advantages of touch screen:

i) Easy to use and user friendly.
ii) user can use directly without any training.

Disadvantages of touch screen:

i) prone to failures as proper handling is required.
ii) expensive.

4) Microphone or Mic:

→ Microphone is a popular input device which is used to record speech.
→ Microphones make the computers useful for audio conferencing over internet.
→ We need a microphone and a sound card that translates the analog signals (i.e., sound waves) into digital codes.
→ This process is called digitizing.

Advantages of microphone:

i) useful for recording sounds.
ii) easy to use.

Disadvantage of microphone:

→ For using it, we require specific hardware (sound card) and specific software (sound card drivers).

5) Scanner:

→ A scanner is an input device that is used to translate paper documents into an electric format that can be stored in a computer.

→ It transfers the image directly into the computer.

→ Scanner is an input device attached to the computer by a cable and controlled by software.

→ The input documents may be text, graphics, pictures on handwritten material.

→ Scanners use optical technology for converting an image into electronic form.

→ There are two type of scanners; Flatbed scanner, handheld scanner.

→ A 'Flatbed scanner' is like a photocopying machine.

→ Handheld scanner has a set of light emitting diodes encased in a small case.

Advantages of scanner:

i) Produces images with good clarity and resoluting.

ii) Any document can be converted from paper to digital form.

Output devices

An out device is an electro-mechanical device that accepts data from a computer and translates them into the form suitable for use by outside world.

→ when the output is obtained on a paper, it is called a hard copy and when it is obtained on a display terminal, it is called a soft copy.

→ The various output devices are; Monitor, printer, plotter, speaker etc.

1) Monitor or video Display Unit(VDU):

→ Monitor is the popular output device for producing soft copy output.

→ They display the generated output on a television like screen.

→ Two basic types of monitors are used with PCs.

→ Cathode Ray Tube (CRT)

→ Liquid Crystal Display (LCD).

Advantages of monitors:

i) LCD monitors provide desk space savings, better display size and Low power consumption.

ii) used for displaying text and graphics.

iii) cheap and reliable.

Disadvantages of monitors:

i) All CRT monitors are extremely bulky and heavy.

ii) use large amount of energy.

iii) Generate excess heat.

2) Printers:

→ Printers are most common output device for producing hard copy output.
→ Printers are classified into two categories; Impact and non-impact.
→ Impact printers are similar to typewriters, which use small hammers to strike the ribbon.
→ The most common type of impact printer is Dot Matrix Printer (DMP).
→ In non-impact printers, the character is formed on the paper by a non-mechanical process. e.g., using heat, laser technology, or photographic techniques.
→ Thermal printer, InkJet printers and Laser printers are examples of non-impact printers.

3) Plotter:

→ A plotter is a specialized output device designed to produce high quality Graphics in a variety of colours.
→ Plotters are an ideal output device for architects, engineers, graphic designers.
→ Plotters are of two types; Drum plotter and Flatbed plotter.
→ In drum plotter, the paper on which the design has been made is placed over a drum that can rotate in both clockwise and anti-clockwise directions to produce vertical motion.
→ Flatbed plotters use two robotic arms, each of which holds a set of coloured ink pens, Pens or pencils.

Advantages of plotters:

i) Used for printing drawings.
ii) Can print large size of papers.
iii) Produce good quality print and high resolution.

01
10

Nibble = 4 bit
0101
1001

Disadvantages of plotters:

i) slow than printers.
ii) expensive than printers.
iii) Not good for printing text.

Units of memory

→ In a digital computer system, the information is usuall Presented in binary Form (0s and 1s) which is used in memory
→ A memory unit is the amount of data that the memory ca hold.

1) Bit (Binary digit):

→ A binary digit is logical 0 and 1 representing a passive or an active state of a component.
→ Logic 0 is called Low signal and logic 1 is called as HIG signal.
→ It is represented by 'b'.

2) Nibble:

→ A group or collection of 4 bits is called nibble.
→ For example, 0110 is a nibble.

3) Byte:

→ A group or collection of 8 bits is called byte.
→ It is represented by capital letter 'B'.
→ For example, 01101101 is a byte. (1 byte = 2 nibble = 8 bits).

Memory unit	Description
1 Bit	Binary Digit (0,1)
4 Bits	1 Nibble
8 Bits	1 Byte (B)
1024 Bytes	1 Kilo Byte (KB)

CHARACTERISTICS of computer

1) CPU speed:

→ Speed is one of the major characteristics of computer system.
→ The computer is considered as the fastest calculating machine ever invented.
→ The speed of the computer is measured in MHz or GHz.

2) Accuracy:

→ Computers not only run on fastest speed, instead they are highly accurate in the simple as well as complex calculations.

→ The degree of accuracy in the computer system is very high.

3) Diligence:

→ Unlike a human being, the computer system can perform billions of operation of calculations without tiredness, lack of concentration, fatigue etc.

4) Versatility (Flexibility):

→ Flexibility is the biggest advantage of the computer system.

→ In a single or particular time, it has the capability to browse the internet, play the audio file, compute the salaries of employees, prepare the presentation, edit the image file and perform many more functions.

5) Reliability:

→ The computer is such a reliable machine that a human being can have faith on the results produced by it bindly. blindly

→ Though, this condition arises only when the data given to the computer by input device is correct.

6) Consistency:

→ The computer is so consistent that it provides the same result each and every time when the input given to it does not change.

→ It can work 24 by 7 or 365 days a year continuously in a consistent manner.

7) Power of remembrance:

→ The computer has the power to store any data or information as long as the user requires it.

→ The date can be recalled easily when needed.

→ The user can erase the data on the same day or can retrieve the stored data after 10 years also.

8) Dumb machine (NO.I.Q.):

→ Computer is such a dumb machine that it works only when an instruction is given to it.

→ It does not perform any extra work on its own.