

## Unit-1: Introduction to Computers

Being a modern-day kid you must have used, seen, or read about computers. This is because they are an integral part of our everyday existence. Be it school, banks, shops, railway stations, hospital or your own home, computers are present everywhere, making our work easier and faster for us. As they are such integral parts of our lives, we must know what they are and how they function. Let us start with defining the term computer formally.

The literal meaning of computer is a device that can calculate. However, modern computers can do a lot more than calculate. **Computer** is an electronic device that receives input, stores or processes the input as per user instructions and provides output in desired format.

### What is a Computer???

*A computer system is a basic and functional computer that includes all the hardware and software that are required to make it functional for the user.* It is an electronic device that accepts the data as input, processes the data in a pre-determined way and then communicates the result as output on the screen. CPU which stands for Central Processing Unit is the brain of the computer. It is an electronic circuit within a computer that executes instructions that make up a computer program. Various blocks of CPU are-

- It carries out the operations of arithmetic and logical expressions.
- The timing and Control Unit controls the entire operation being performed on the computer system.
- The register is a very small amount of very fast memory that is built into the CPU in order to store the current data and instructions that are being performed by the CPU.

- unit is the storage unit of the computer system which is used to store the program statement and data.
- Input and Output unit sends and receives data to display it to the user.

## **Characteristics of Computer System**

Let's go over the characteristics of computers.

### **1. Speed**

Executing mathematical calculation, a computer works faster and more accurately than human. Computers have the ability to process so many millions (1,000,000) of instructions per second. Computer operations are performed in micro and nano seconds. A computer is a time saving device. It performs several calculations and tasks in few seconds that we take hours to solve. The speed of a computer is measure in terms of GigaHertz and MegaHertz.

### **2. Diligence**

A human cannot work for several hours without resting, yet a computer never tires. A computer can conduct millions of calculations per second with complete precision without stopping. A computer can consistently and accurately do millions of jobs or calculations. There is no weariness or lack of concentration. Its memory ability also places it ahead of humans.

### **3. Reliability**

A computer is reliable. The output results never differ unless the input varies. the output is totally depend on the input. when an input is the same the output will also be the same. A computer produces consistent results for similar sets of data, if we provide the same set of input at any time we will get the same result.

#### **4. Automation**

The world is quickly moving toward [AI \(Artificial Intelligence\)](#)-based technology. A computer may conduct tasks automatically after instructions are programmed. By executing jobs automatically, this computer feature replaces thousands of workers. Automation in computing is often achieved by the use of a program, a script, or [batch processing](#).

#### **5. Versatility**

Versatility refers to a capacity of computer. Computer perform different types of tasks with the same accuracy and efficiency. A computer can perform multiple tasks at the same time this is known as versatility. For example, while listening to music, we may develop our project using [PowerPoint](#) and Wordpad, or we can design a website.

#### **6. Memory**

A computer can store millions of records. these records may be accessed with complete precision. Computer [memory storage](#) capacity is measured in Bytes, Kilobytes(KB), Megabytes(MB), Gigabytes(GB), and Terabytes(TB). A computer has built-in memory known as primary memory.

#### **7. Accuracy**

When a computer performs a computation or operation, the chances of errors occurring are low. Errors in a computer are caused by human's submitting incorrect data. A computer can do a variety of operations and calculations fast and accurately.

## Components of a Computer

The **functional components of a digital computer** include the **Input Unit**, which takes in data; the **CPU**, which processes data with its **Control Unit (CU)**, **Arithmetic Logic Unit (ALU)**, and **Registers**; the **Memory Unit**, which stores data temporarily (RAM) or permanently (HDD/SSD); the **Output Unit**, which displays results; and the **Bus System**, which connects and transfers data between components. These parts work together to execute tasks and provide results.

The **functional components of a computer** are the key parts that work together to process and manage data. These include the **Input Unit** for receiving data, the **CPU** for processing it, the **Memory Unit** for storing information, the **Output Unit** for displaying results, and the **Bus System** that connects all parts. These components help the computer perform tasks efficiently.

### 1. Input Unit

- **Purpose:** Captures data and instructions from users or external sources.
- **Function:** Converts user input into binary signals that the computer can process.
- **Common Devices (2025):**
  - Keyboard, Mouse, Touchscreens
  - Scanners, Sensors, Stylus pens
  - Voice Assistants (e.g., Siri, Alexa)
  - Biometric devices (face/fingerprint recognition)
  - Iot-based inputs from smart devices

## 2. Central Processing Unit (CPU) – The Brain of the Computer

The **CPU** executes instructions and controls all internal operations. In 2025, CPUs will often have multiple **cores** and **threads** to handle parallel processing efficiently.

### Components of CPU:

#### a. Arithmetic Logic Unit (ALU)

- Performs arithmetic operations (add, subtract, multiply, divide).
- Handles logical operations (comparison, decision-making).
- Supports AI/ML tasks using built-in vector/matrix operations (in modern CPUs).

#### b. Control Unit (CU)

- Directs the operations of all computer parts.
- Decodes instructions and coordinates data flow.
- Sends control signals to memory and I/O devices.

#### c. Registers

- **High-speed memory locations** within the CPU.
- Temporarily store instructions, addresses, and intermediate data.
- Examples: Accumulator, Instruction Register, Program Counter, Address Register.
- **Modern CPUs** include 64-bit or even 128-bit registers for faster processing.

## 3. Memory / Storage Unit

The **memory unit** holds data and instructions before, during, and after processing.

#### **a. Primary Memory (Main Memory):**

- **RAM (Random Access Memory):** Temporarily stores data during execution.
  - Types in 2025: DDR5, LPDDR5X, and emerging **MRAM**.
- **ROM (Read-Only Memory):** Stores boot-up instructions and firmware.
- **Cache Memory:** Ultra-fast memory between CPU and RAM (L1, L2, L3 levels).

#### **b. Secondary Storage:**

- Used for long-term data storage.
- **Examples:** SSDs (NVMe drives), HDDs, flash drives, and cloud storage.
- **Modern Trend:** Use of **Cloud Integration** and **hybrid storage models**.

### **4. Output Unit**

- **Purpose:** Converts processed data (binary) into a form users can understand.
- **Examples:**
  - Visual: Monitors (LED, OLED, 4K/8K displays)
  - Print: Printers (Inkjet, Laser, 3D Printers)
  - Audio: Speakers, Headphones
  - Haptic: Vibration feedback devices
- **Emerging Tech:** AR/VR headsets, voice-based output, Braille displays for accessibility

### **Types of Computer By Size**

Computers vary in size, from huge machines to pocket-sized devices. Here are the main types:

## 1. Supercomputers

Supercomputers are the speed demons of the computer world, performing billions of calculations per second. They're like the Hulk of tech, tackling huge tasks like predicting weather or designing spacecraft.

### **Features:**

- Lightning-fast, thanks to thousands of processors teaming up.
- Super expensive and massive, often taking up entire rooms.
- Used for big-deal research, like studying stars or curing diseases.

**Examples:** Frontier (helps with climate research), Fugaku (aids medical breakthroughs).

**For Students:** Supercomputers power the weather apps you check to see if you need an umbrella for recess.

**Fun Fact:** The world's fastest supercomputer, Frontier, can do a quintillion calculations per second—that's a 1 with 18 zeros!

## 1. Mainframe Computers

Mainframes are big machines that juggle tons of tasks and users at once. Think of them as a school librarian helping hundreds of kids find books at the same time.

### • **Features:**

- Handles thousands of users and programs simultaneously.
- Huge storage and speedy processing for massive data.
- Used by banks, airlines, and big companies to manage records.

• **Examples:** IBM zSeries (keeps bank transactions secure).

• **For Students:** When you buy a game online, mainframes make sure your payment goes through safely.

• **Fun Fact:** Mainframes can run for years without shutting down, like a teacher who never takes a day off!

## 1. Minicomputers

Minicomputers are mid-sized machines that support multiple users (4–200) for tasks like accounting or billing. They're smaller than mainframes but bigger than your laptop.

- **Features:**
  - More portable than mainframes but still hefty.
  - Reliable for medium-sized jobs.
  - Used in schools, businesses, or labs for specific tasks.
- **Examples:** PDP-11 (an older model used in universities).
- **For Students:** Minicomputers might track your school's attendance or grades.
- **Fun Fact:** Minicomputers were nicknamed "minis" in the 1960s, like the mini skirts of that era!

## 1. Workstation Computers

Workstations are high-powered computers for one user, built for heavy-duty tasks like creating animations or designing buildings. They're like a turbo-charged art studio for tech work.

- **Features:**
  - Fast processors, tons of memory, and awesome graphics.
  - Perfect for video editing, 3D modeling, or simulations.
  - Stronger than a regular PC but smaller than a mainframe.
- **Examples:** HP Z Workstations (used by engineers or animators).
- **For Students:** Workstations create the special effects in your favorite movies or video games.
- **Fun Fact:** Pixar uses workstations to render animated films like *Toy Story*, frame by frame!

## 1. Personal Computers (PCs)

PCs are built for one person to use at home, school, or work. This includes desktops, laptops, tablets, and smartphones—stuff you probably use all the time.

- **Features:**
  - Small, affordable, and easy to use.
  - Great for homework, gaming, browsing, or video calls.
  - Comes with a CPU, memory, and input/output devices like keyboards and screens.
- **Examples:** Dell laptops, Apple iMac, iPads, Samsung Galaxy phones.
- **For Students:** You use PCs for writing essays, playing Minecraft, or watching YouTube tutorials.
- **Fun Fact:** The first “personal computer,” the Altair 8800, came as a kit you had to build yourself in 1975!

## 1. Server Computers

Servers store and share data or programs over a network. They’re like a school cafeteria serving up data to lots of devices at once.

- **Features:**
  - Run 24/7 to deliver services like websites or email.
  - Built to share resources with many пользователей.
  - Manage data for multiple devices or users.
- **Examples:** Web servers (host sites like Google), database servers (store school records).
- **For Students:** When you pull up a website for a school project, servers send that webpage to your device.
- **Fun Fact:** Servers “talk” to each other so fast that a website can load in milliseconds, quicker than you can blink!
- Supercomputers
- Mainframe Computers

- Minicomputers
- Microcomputers (PCs)

Now, we are going to discuss each of them in detail.

## **1. Supercomputer**

When we talk about speed, then the first name that comes to mind when thinking of computers is supercomputers. They are the biggest and fastest computers (in terms of speed of processing data). Supercomputers are designed such that they can process a huge amount of data, like processing trillions of instructions or data just in a second. This is because of the thousands of interconnected processors in supercomputers. It is basically used in scientific and engineering applications such as weather forecasting, scientific simulations, and nuclear energy research. It was first developed by Roger Cray in 1976.

### **Characteristics of Supercomputers**

- Supercomputers are the computers that are the fastest and they are also very expensive.
- It can calculate up to ten trillion individual calculations per second, this is also the reason which makes it even faster.
- It is used in the stock market or big organizations for managing the online currency world such as Bitcoin etc.
- It is used in scientific research areas for analyzing data obtained from exploring the solar system, satellites, etc.

### **Mainframe computer**

Mainframe computers are designed in such a way that they can support hundreds or thousands of users at the same time. It also supports multiple programs

simultaneously. So, they can execute different processes simultaneously. All these features make the mainframe computer ideal for big organizations like banking, telecom sectors, etc., which process a high volume of data in general.

### **Characteristics of Mainframe Computers**

- It is also an expensive or costly computer.
- It has high storage capacity and great performance.
- It can process a huge amount of data (like data involved in the banking sector) very quickly.
- It runs smoothly for a long time and has a long life.

### **Minicomputer**

Minicomputer is a medium size multiprocessing computer. In this type of computer, there are two or more processors, and it supports 4 to 200 users at one time. Minicomputer is similar to Microcontroller. Minicomputers are used in places like institutes or departments for different work like billing, accounting, inventory management, etc. It is smaller than a mainframe computer but larger in comparison to the microcomputer.

### **Characteristics of Minicomputer**

- Its weight is low.
- Because of its low weight, it is easy to carry anywhere.
- less expensive than a mainframe computer.
- It is fast.

### **Workstation Computer**

A workstation computer is designed for technical or scientific applications. It consists of a fast microprocessor, with a large amount of RAM and a high-speed

graphic adapter. It is a single-user computer. It is generally used to perform a specific task with great accuracy.

### **Characteristics of Workstation Computer**

- It is expensive or high in cost.
- They are exclusively made for complex work purposes.
- It provides large storage capacity, better graphics, and a more powerful CPU when compared to a PC.
- It is also used to handle animation, data analysis, CAD, audio and video creation, and editing.

### **Personal Computer (PC)**

Personal Computers is also known as a microcomputer. It is basically a general-purpose computer designed for individual use. It consists of a microprocessor as a central processing unit(CPU), memory, input unit, and output unit. This kind of computer is suitable for personal work such as making an assignment, watching a movie, or at the office for office work, etc. For example, Laptops and desktop computers.

### **Characteristics of Personal Computer (PC)**

- In this limited number of software can be used.
- It is the smallest in size.
- It is designed for personal use.
- It is easy to use.

### **Introduction to Programming Languages**

Programming languages are the foundation of software development, allowing developers to create applications, websites, and systems through computer-understandable instructions.

- They use a formal syntax and rules to write code that is translated into machine language for execution by the computer.
- Programming languages bridge human logic and machine execution, providing a structured way to solve problems.
- Different languages serve different purposes — for example, Python is beginner-friendly and versatile, while C++ is used for high-performance tasks like game development.

## Types of Programming Languages

Programming languages are classified based on their level of abstraction:

- **High-Level Languages**: Human-readable and are portable across computers. Examples: Python, Java, JavaScript. They need a compiler or interpreter to run.
- **Low-Level Languages**: Close to machine code, giving more control over hardware but harder to write. Examples: Machine code.
- **Assembly Languages**: A mix between high- and low-level, using simple symbolic instructions for a computer. An assembler converts it into machine code.

## What is Computer Memory?

A physical device that stores data or information temporarily or permanently in it is called memory. It's a device where data is stored and processed. In common, a computer has primary and secondary memories. Auxiliary (secondary) memory stores data and programs for long-term storage or until the time a user wants to

keep them in memory, while main memory stores instructions and data during programme execution; hence, any programme or file that is currently running or executing on a computer is stored in primary memory.

## Types of Computer Memory

Computer memory comes in various types and serves different purposes –

- **Primary Memory (RAM - Random Access Memory)** – Volatile memory loses its contents when the machine is turned off. RAM stores the data that is actively being used. During the booting process of a system, the operating system actively uses RAM and applications that are necessary to execute a file or a program. It speeds up CPU processing by providing fast data and instruction access.
- **Secondary Memory (Storage)** – Secondary Memory is also known as permanent memory or non-volatile memory of a computer. Secondary memory retains data when the machine shuts down. Files, programmes, and the OS are stored there permanently. HDDs, SSDs, USB flash drives, and optical discs are non-volatile memory devices.
- **Cache Memory** – Memory that is smaller and faster than RAM is called cache memory. It is placed closer to the CPU than the RAM. It saves data and instructions that are used a lot so that processing goes faster.
- **Register Memory** – Register memory, which is also called processor registers or "registers," is the smallest and fastest type of computer memory that is directly integrated into the CPU. Registers are small, fast storage units inside the CPU that are used to quickly store data that is being processed or instructions that are being run.

## Primary Memory

**Computer primary memory** is also known as volatile memory, as it loses contents when the machine is turned off. There are two types of primary memory: RAM and ROM. RAM stores the data that is actively being used. During the booting process of a system, the operating system actively uses RAM and applications that are necessary to execute a file or a program. It speeds up CPU processing by providing rapid data and instruction access.

Here is the classification of primary memory:

- **RAM (Random Access Memory)**
  - SRAM (Static RAM)
  - DRAM (Dynamic RAM)
    - SDRAM (Synchronous DRAM)
    - DDR (Double Data Rate) RAM
- **ROM (Read-Only Memory)**
  - PROM (Programmable ROM)
  - EPROM (Erasable Programmable ROM)
  - EEPROM (Electrically Erasable Programmable ROM)
  - Flash ROM

### 1. Random Access Memory (RAM)

**RAM** contains of a various number of memory locations wherein each location, typically 8-bits are stored. It can be possible to read from a RAM location, as well as write to a RAM location. The drawback of RAM is that it is volatile. That means, when the power supply to the RAM is switched off, the information in the RAM will be lost.

From the memory, data can be accessed in two different ways – Sequential Access and Random Access.

**Sequential Access** – Sequential access and random access are two types of accessing information. In sequential access, it is mandatory to access information strictly in order. If there are 4000 memory locations, it have to be accessed in the order of 1, 2, 3,...,4000. Thus, it takes minimum time to access information from location 0 and at most time to access information from location 4000. Magnetic tape is an example that employs sequential access.

**Random Access** – In a random access technique, it can be possible to access a memory location in any order. For example, one can read from the 4000 locations in the order of 1500, 1210, 3060, 1640, 1352, and so on. Second, it takes a similar time to read from a memory location irrespective of its position. In a RAM, the access method is random, and its name, in fact, is derived based on the method of access.

## 2. Read Only Memory (ROM)

**ROM** consists of a number of memory locations wherein each location typically stores 8 bits like a RAM. A ROM also uses random access method just like a RAM. The advantage of ROM is that it is non-volatile in nature. That means, though the power supply to the ROM is switched off, the information in the ROM will not be lost. However, only reading operation is possible from a ROM location. Thus, in a computer, ROM is used for storing information which is not lost when power is switched off.

Let us discuss different versions of ROM provided by semiconductor manufacturers for storing information:

**Mask-Programmed ROM** It derives this name because the information is written to this type of ROM at the time of manufacture by applying a suitable mask. Once written, the information cannot be changed, even by the manufacturer. It is cheaper compared to other types of ROMs when considering cost per unit

quantity, but requires bulk ordering. It is used in equipment produced in large quantities.

**Programmable Read Only Memory (PROM)** The user writes information to this type of ROM using a PROM programmer. Once written, the information cannot be changed. Like Mask-Programmed ROM, the information is permanent. It is more expensive than mask ROM but allows purchasing in smaller quantities.

**Erasable Programmable Read Only Memory (EPROM)** Information is written by the user with an EPROM programmer. As its content is erasable and rewritable, the user can modify it multiple times. Data is erased using strong ultraviolet (UV) light on the quartz window of the EPROM chip, which removes all content. Users can purchase a single piece of EPROM and rewrite its content multiple times.

**Electrically Erasable Programmable Read Only Memory (EEPROM)** Information is written by the user using an EPROM programmer. Unlike EPROM, EEPROM data is erased using electrical signals rather than UV light. EEPROM allows selective data erasure and is more expensive than other ROM types. It is gaining popularity due to its flexibility.

| Types of ROM        | Info.entered by | Possible to change info? | Cost per chip | Min.order quantity | Method of erasing info. | Application area       |
|---------------------|-----------------|--------------------------|---------------|--------------------|-------------------------|------------------------|
| Mask-programmed ROM | Manufacturer    | No                       | Cheapest      | Large              | Not possible            | Large-scale production |

|        |      |     |                  |     |                          |                         |
|--------|------|-----|------------------|-----|--------------------------|-------------------------|
| PROM   | User | No  | Costlier         | One | Not possible             | Medium-scale production |
| EPROM  | User | Yes | Even more costly | One | Using strong UV source   | R& D                    |
| EEPROM | User | Yes | Costliest        | One | Using electrical signals | R& D                    |

## Secondary Memory

**Computer secondary memory** stores data and programs permanently, even when the computer is off. The secondary memory is also known as external memory or auxiliary memory.

## Classification of Secondary Memory

Here is the complete classification of secondary memory:

- **Magnetic Storage**
  - Hard Disk Drive (HDD)
  - Floppy Disk (Obsolete)
  - Magnetic Tape
- **Optical Storage**
  - CD (Compact Disc)
    - CD-ROM (Read-Only Memory)

- CD-R (Recordable)
  - CD-RW (Rewritable)
- DVD (Digital Versatile Disc)
  - DVD-ROM
  - DVD-R/DVD+R
  - DVD-RW/DVD+RW
- Blu-ray Disc (BD)
- **Flash Storage (Solid-State Storage)**
  - Solid-State Drive (SSD)
  - USB Flash Drive (Pen Drive)
  - Memory Cards (SD Card, microSD, etc.)
- **Cloud Storage**
  - Google Drive
  - Dropbox
  - OneDrive
  - Amazon S3
- **Hybrid Storage**
  - Hybrid Drive (HDD + SSD Combination)
  - SSHD (Solid-State Hybrid Drive)

## **Input and Output Devices**

An **input/output (I/O) device** is any hardware that enables a human user or another system to communicate with a computer. As the name suggests, these devices can both **receive data (input)** from the user or another source and **deliver data (output)** from the computer. Essentially, an I/O device bridges the computer and external entities, facilitating seamless data exchange.

## **1. Input Devices**

Input devices are the devices that are used to send signals to the computer for performing tasks. The receiver at the end is the CPU (Central Processing Unit), which works to send signals to the output devices. Some of the classifications of Input devices are:

- Keyboard Devices
- Pointing Devices
- Composite Devices
- Game Controller
- Visual Devices
- Audio Input Devices

Some of the input devices are described below.

### **Keyboard**

The keyboard is the most frequent and widely used input device for entering data into a computer. Although there are some additional keys for performing other operations, the keyboard layout is similar to that of a typical typewriter. Generally, keyboards come in two sizes: 84 keys or 101/102 keys but currently keyboards with 104 keys or 108 keys are also available for Windows and the Internet.



## *Keyboard*

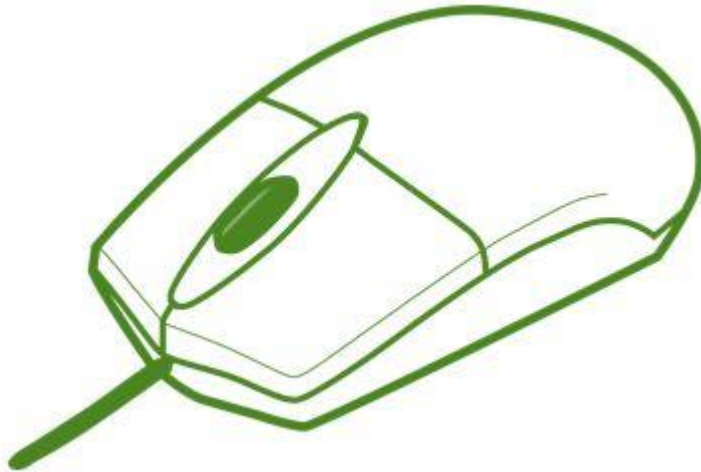
### **Types of Keys**

- **Numeric Keys:** It is used to enter numeric data or move the cursor. It usually consists of a set of 17 keys.
- **Typing Keys:** The letter keys (A-Z) and number keys (09) are among these keys.
- **Control Keys:** These keys control the pointer and the screen. There are four directional arrow keys on it. Home, End, Insert, Alternate(Alt), Delete, Control(Ctrl), etc., and Escape are all control keys (Esc).
- **Special Keys:** Enter, Shift, Caps Lock, NumLk, Tab, etc., and Print Screen are among the special function keys on the keyboard.
- **Function Keys:** The 12 keys from F1 to F12 are on the topmost row of the keyboard.

## **Mouse**

The most common pointing device is the mouse. The mouse is used to move a little cursor across the screen while clicking and dragging. The cursor will stop if you let go of the mouse. The computer is dependent on you to move the mouse; it won't move by itself. As a result, it's an input device. A mouse is an input device that lets you move the mouse on a flat surface to

control the coordinates and movement of the on-screen cursor/pointer. The left mouse button can be used to select or move items, while the right mouse button when clicked displays extra menus.



*Mouse*

## **Joystick**

A joystick is a pointing device that is used to move the cursor on a computer screen. A spherical ball is attached to both the bottom and top ends of the stick. In a socket, the lower spherical ball slides. You can move the joystick in all four directions.



*Joystick*

The joystick's function is comparable to that of a mouse. It is primarily used in CAD (Computer-Aided Design) and playing video games on the computer.

### **Track Ball**

Track Ball is an accessory for notebooks and laptops, which works on behalf of a mouse. It has a similar structure to a mouse. Its structure is like a half-inserted ball and we use fingers for cursor movement. Different shapes are used for this like balls, buttons, or squares.

### **Light Pen**

A light pen is a type of pointing device that looks like a pen. It can be used to select a menu item or to draw on the monitor screen. A photocell and an optical system are enclosed in a tiny tube. When the tip of a light pen is moved across a monitor screen while the pen button is pushed, the photocell sensor element identifies the screen location and provides a signal to the CPU.



*Light Pen*

### **Scanner**

A scanner is an input device that functions similarly to a photocopier. It's employed when there's information on paper that needs to be transferred to the

computer's hard disc for subsequent manipulation. The scanner collects images from the source and converts them to a digital format that may be saved on a disc. Before they are printed, these images can be modified.



*Scanner*

### **Optical Mark Reader (OMR)**

An Optical Mark Reader is a device that is generally used in educational institutions to check the answers to objective exams. It recognizes the marks present by pencil and pen.

### **Optical Character Reader (OCR)**

OCR stands for optical character recognition, and it is a device that reads printed text. OCR optically scans the text, character by character turns it into a machine-readable code, and saves it to the system memory.

### **Magnetic Ink Card Reader (MICR)**

It is a device that is generally used in banks to deal with the cheques given to the bank by the customer. It helps in reading the magnetic ink present in the code

number and cheque number. This process is very fast compared to any other process.

### **Bar Code Reader**

A bar code reader is a device that reads data that is bar-coded (data that is represented by light and dark lines). Bar-coded data is commonly used to mark things, number books, and so on. It could be a handheld scanner or part of a stationary scanner. A bar code reader scans a bar code image, converts it to an alphanumeric value, and then sends it to the computer to which it is connected.

### **Web Camera**

Because a web camera records a video image of the scene in front of it, a webcam is an input device. It is either built inside the computer (for example, a laptop) or attached through a USB connection. A webcam is a computer-connected tiny digital video camera. It's also known as a web camera because it can take images and record video. These cameras come with software that must be installed on the computer to every broadcast video in real-time over the Internet. It can shoot images and HD videos, however, the video quality isn't as good as other cameras (In Mobiles or other devices or normal cameras).

### **Microphone**

The microphone works as an input device that receives input voice signals and also has the responsibility of converting it also to digital form. It is a very common device that is present in every device which is related to music.

## 2. Output Devices

Output Devices are the devices that show us the result after giving the input to a computer system. Output can be of many different forms like image, graphic audio, video, etc. Some of the output devices are described below.

### Monitor

Monitors, also known as Visual Display Units (VDUs), are a computer's primary output device. It creates images by arranging small dots, known as pixels, in a rectangular pattern. The amount of pixels determines the image's sharpness. The two kinds of viewing screens used for monitors are described below.

- **Cathode-Ray Tube (CRT) Monitor:** Pixels are minuscule visual elements that make up a CRT display. The higher the image quality or resolution, the smaller the pixels.
- **Flat-Panel Display Monitor:** In comparison to the CRT, a flat-panel display is a type of video display with less volume, weight, and power consumption. They can be hung on the wall or worn on the wrist.

Flat-panel displays are currently used in calculators, video games, monitors, laptop computers, and graphical displays.

### Television

Television is one of the common output devices which is present in every can house. It portrays video and audio files on the screen as the user handles the television. Nowadays, we are using plasma displays as compared to CRT screens which we used earlier.

## Printer

Printers are output devices that allow you to print information on paper. There are certain types of printers which are described below.

- Impact Printers
- Character Printers
- Line Printers
- Non-Impact Printers
- Laser Printers
- Inkjet Printers

### Impact Printer

Characters are printed on the ribbon, which is subsequently crushed against the paper, in impact printers. The following are the characteristics of impact printers:

- Exceptionally low consumable cost.
- Quite noisy
- Because of its low cost, it is ideal for large-scale printing.
- To create an image, there is physical contact with the paper.

### Character Printers

Character Printer **canto produce** print only one character at a time. It is of two types.

- Dot Matrix Printer
- Daisy Wheel

### Line Printers

Line Printers are printers that have the capability to print one line at a time. It is of two types.

- Drum Printer
- Chain Printer

## **Non-Impact Printers**

Characters are printed without the need for a ribbon in non-impact printers. Because these printers print a full page at a time, they're also known as Page Printers. The following are the characteristics of non-impact printers:

- Faster
- They don't make a lot of noise.
- Excellent quality
- Supports a variety of typefaces and character sizes

## **Laser Printers**

Laser Printers use laser lights to produce dots which will produce characters on the page.

## **Inkjet Printers**

Inkjet printers are printers that use spray technology for printing papers. High-quality papers are produced in an Inkjet printer. They also do color printing.

## **Speakers**

Speakers are devices that produce sound after getting a command from a computer. Nowadays, speakers come with wireless technology also like Bluetooth speakers.

## **Projector**

Projectors are optical devices that have the work to show visuals on both types of screens, stationary and moving both. It helps in displaying images on a big screen. Projectors are generally used in theatres, auditoriums, etc.

## **Plotter**

Plotter is a device that helps in making graphics or other images to give a real view. A graphic card is mandatorily required to use these devices. These are the pen-like devices that help in generating exact designs on the computer.

## **Headphones**

Headphones are just like a speaker, which is generally used by a single person or it is a single-person usable device and is not commonly used in large areas. These are also called headsets having a lower sound frequency.

## **Unit-2:Algorithm and Flowchart**

In programming, algorithm is a set of well defined instructions in sequence to solve the problem.

### **Qualities of a good algorithm**

1. Input and output should be defined precisely.
2. Each steps in algorithm should be clear and unambiguous.
3. Algorithm should be most effective among many different ways to solve a problem.
4. An algorithm shouldn't have computer code. Instead, the algorithm should be written in such a way that, it can be used in similar programming languages.

## Examples Of Algorithms In Programming

**Write an algorithm to add two numbers entered by user. Step 1: Start**

**Step 2:** Declare variables num1, num2 and sum.

**Step 3:** Read values num1 and num2.

**Step 4:** Add num1 and num2 and assign the result to sum.  $\text{sum} \leftarrow \text{num1} + \text{num2}$

**Step 5:** Display sum

**Step 6:** Stop

**Write an algorithm to find the largest among three different numbers entered by user.**

**Step 1:** Start

**Step 2:** Declare variables a,b and c.

**Step 3:** Read variables a,b and c.

**Step 4:** If  $a > b$  If  $a > c$  Display a is the largest number. Else Display c is the largest number. Else If  $b > c$  Display b is the largest number. Else Display c is the greatest number.

**Step 5:** Stop

## Advantages of algorithm

1. It is a step-wise representation of a solution to a given problem, which makes it easy to understand.
2. An algorithm uses a definite procedure.
3. It is not dependent on any programming language, so it is easy to understand for anyone even without programming knowledge.
4. Every step in an algorithm has its own logical sequence so it is easy to debug.
5. By using algorithm, the problem is broken down into smaller pieces or steps hence, it is easier for programmer to convert it into an actual program

## Disadvantages of algorithm.

1. Writing algorithm takes a long time.
2. An Algorithm is not a computer program, it is rather a concept of how a program should be.

**Flowchart** ->A **flowchart** is a type of diagram that represents an algorithm, workflow or process. The **flowchart** shows the steps as boxes of various kinds, and their order by connecting the boxes with arrows. ... **Flowcharts** are used in analyzing, designing, documenting or managing a process or program in various fields.

## Flowchart Symbols

Flowcharts use special shapes to represent different types of actions or steps in a process. Lines and arrows show the sequence of the steps, and the relationships among them. These are known as flowchart symbols.

## Common Flowchart Symbols

- **Rectangle Shape** – Represents a process
- **Oval or Pill Shape** – Represents the start or end
- **Diamond Shape** – Represents a decision
- **Parallelogram** – Represents input/output

### Advantages of flowchart:

1. The Flowchart is an excellent way of communicating the logic of a program.
2. It is easy and efficient to analyze problem using flowchart.
3. During program development cycle, the flowchart plays the role of a guide or a blueprint. Which makes program development process easier.
4. After successful development of a program, it needs continuous timely maintenance during the course of its operation. The flowchart makes program or system maintenance easier.
5. It helps the programmer to write the program code.
6. It is easy to convert the flowchart into any programming language code as it does not use any specific programming language concept.

### Disadvantage of flowchart

1. The flowchart can be complex when the logic of a program is quite complicated.
2. Drawing flowchart is a time-consuming task.
3. Difficult to alter the flowchart. Sometimes, the designer needs to redraw the complete flowchart to change the logic of the flowchart or to alter the flowchart.

4. Since it uses special sets of symbols for every action, it is quite a tedious task to develop a flowchart as it requires special tools to draw the necessary symbols.
5. In the case of a complex flowchart, other programmers might have a difficult time understanding the logic and process of the flowchart.
6. It is just a visualization of a program, it cannot function like an actual program