Chapter 1. Computer Fundamentals-I

1. Input Devices:

The devices which are used to input the data and the programs in the computer are known as "**Input Devices**" or Input device can read data and convert them to a form that a computer can use. **Output Device** can produce the final product of machine processing into a form usable by humans. An **input device** is any machine that feeds data, information and instructions into a **computer**. We may classify **input devices** into the following two broad categories. Basic **Input Devices**: The **input devices** which are essential to operate a PC are called basic **input devices**.

It provides man to machine communication. Some of the I/O devices are explained below:

- Keyboard

- Mouse

- Joy Stick

- Light pen

- Track Ball

- Scanner

- Graphic Tablet

- Microphone

- Magnetic Ink Card Reader(MICR)

- Optical Character Reader(OCR)

- Bar Code Reader

- Optical Mark Reader(OMR)

1.1 Keyboard

- Keyboard is the most common and very popular input device which helps to input data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions.

Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

The keys on the keyboard are as follows –

S.No	Keys & Description
1	**Typing Keys** These keys include the letter keys (A-Z) and digit keys (09) which generally give the same layout as that of typewriters.
2	**Numeric Keypad** It is used to enter the numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.
3	**Function Keys** The twelve function keys are present on the keyboard which are arranged in a row at the top of the keyboard. Each function key has a unique meaning and is used for some specific purpose.
4	**Control keys** These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).
5	**Special Purpose Keys** Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

1.2   Mouse

Mouse is the most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base, which senses the movement of the mouse and sends corresponding signals to the CPU when the mouse buttons are pressed.

Generally, it has two buttons called the left and the right button and a wheel is present between the buttons. A mouse can be used to control the position of the cursor on the screen, but it cannot be used to enter text into the computer.

Advantages

- Easy to use
- Not very expensive
- Moves the cursor faster than the arrow keys of the keyboard.

1.3 Joystick

Joystick is also a pointing device, which is used to move the cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions.

The function of the joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing (CAD) and playing computer games.

1.4 Light Pen

Light pen is a pointing device similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube.

When the tip of a light pen is moved over the monitor screen and the pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU.

1.5 Track Ball

Track ball is an input device that is mostly used in notebook or laptop computer, instead of a mouse. This is a ball which is half inserted and by moving fingers on the ball, the pointer can be moved.

Since the whole device is not moved, a track ball requires less space than a mouse. A track ball comes in various shapes like a ball, a button, or a square.

1.6 Scanner

Scanner is an input device, which works more like a photocopy machine. It is used when some information is available on paper and it is to be transferred to the hard disk of the computer for further manipulation.

Scanner captures images from the source which are then converted into a digital form that can be stored on the disk. These images can be edited before they are printed.

1.7 Digitizer

Digitizer is an input device which converts analog information into digital form. Digitizer can convert a signal from the television or camera into a series of numbers that could be stored in a computer. They can be used by the computer to create a picture of whatever the camera had been pointed at.

Digitizer is also known as Tablet or Graphics Tablet as it converts graphics and pictorial data into binary inputs. A graphic tablet as digitizer is used for fine works of drawing and image manipulation applications.

1.8 Microphone

Microphone is an input device to input sound that is then stored in a digital form.

The microphone is used for various applications such as adding sound to a multimedia presentation or for mixing music.

1.9 Magnetic Ink Card Reader (MICR)

MICR input device is generally used in banks as there are large number of cheques to be processed every day. The bank's code number and cheque number are printed on the cheques with a special type of ink that contains particles of magnetic material that are machine readable.

This reading process is called Magnetic Ink Character Recognition (MICR). The main advantages of MICR is that it is fast and less error prone.

1.10 Optical Character Reader (OCR)

OCR is an input device used to read a printed text.

OCR scans the text optically, character by character, converts them into a machine readable code, and stores the text on the system memory.

1.11 Bar Code Readers

Bar Code Reader is a device used for reading bar coded data (data in the form of light and dark lines). Bar coded data is generally used in labelling goods, numbering the books, etc. It may be a handheld scanner or may be embedded in a stationary scanner.

Bar Code Reader scans a bar code image, converts it into an alphanumeric value, which is then fed to the computer that the bar code reader is connected to.

1.12 Optical Mark Reader (OMR)

OMR is a special type of optical scanner used to recognize the type of mark made by pen or pencil. It is used where one out of a few alternatives is to be selected and marked.

It is specially used for checking the answer sheets of examinations having multiple choice questions.

1.2 Output Devices:

In brief, **output** unit is responsible for providing the **output** in user readable form. It can be text, graphics, tactile, audio, and video.

Following are some of the important output devices used in a computer.

- Monitors
- Graphic Plotter
- Printer

1.2.1 Monitors

Monitors, commonly called as **Visual Display Unit** (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels.

There are two kinds of viewing screen used for monitors.

- Cathode-Ray Tube (CRT)
- Flat-Panel Display

1.2.2 Cathode-Ray Tube (CRT) Monitor

The CRT display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity or resolution. It takes more than one illuminated pixel to form a whole character, such as the letter 'e' in the word help.

A finite number of characters can be displayed on a screen at once. The screen can be divided into a series of character boxes - fixed location on the screen where a standard character can be placed. Most screens are capable of displaying 80 characters of data horizontally and 25 lines vertically.

1.2.3 Flat-Panel Display Monitor

The flat-panel display refers to a class of video devices that have reduced volume, weight and power requirement in comparison to the CRT. You can hang them on walls or wear them on your wrists. Current uses of flat-panel displays include calculators, video games, monitors, laptop computer, and graphics display.

The flat-panel display is divided into two categories −

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- **Emissive Displays** − Emissive displays are devices that convert electrical energy into light. For example, plasma panel and LED (Light-Emitting Diodes).

- **Non-Emissive Displays** − Non-emissive displays use optical effects to convert sunlight or light from some other source into graphics patterns. For example, LCD (Liquid-Crystal Device).

1.2.4 Printers

Printer is an output device, which is used to print information on paper.

A **printer** is an external hardware output device that takes the electronic data stored on a computer or other device and generates a hard copy of it. For example, if you created a report on your computer you could print several copies to hand out at a staff

meeting. Printers are one of the most popular computer peripherals and are commonly used to print text and photos.

Types of Printer:

- Dot Matrix Printer(DMP)
- Daisy Wheel

1.2.4.1 Dot Matrix Printer

In the market, one of the most popular printers is Dot Matrix Printer. These printers are popular because of their ease of printing and economical price. Each character printed is in the form of pattern of dots and head consists of a Matrix of Pins of size (5*7, 7*9, 9*7 or 9*9) which come out to form a character which is why it is called Dot Matrix Printer.

Advantages

- Inexpensive
- Widely Used
- Other language characters can be printed

Disadvantages

- Slow Speed
- Poor Quality

1.2.4.2 Daisy Wheel

Head is lying on a wheel and pins corresponding to characters are like petals of Daisy (flower) which is why it is called Daisy Wheel Printer. These printers are generally used for word-processing in offices that require a few letters to be sent here and there with very nice quality.

Advantages

- More reliable than DMP

- Better quality

- Fonts of character can be easily changed

Disadvantages

- Slower than DMP

- Noisy

- More expensive than DMP

1.2.4.3 Line Printers

Line printers are the printers which print one line at a time.

These are of two types –

- Drum Printer

- Chain Printer

1.2.4.4.Drum Printer

This printer is like a drum in shape hence it is called drum printer. The surface of the drum is divided into a number of tracks. Total tracks are equal to the size of the paper, i.e. for a paper width of 132 characters, drum will have 132 tracks. A character set is embossed on the

track. Different character sets available in the market are 48 character set, 64 and 96 characters set. One rotation of drum prints one line. Drum printers are fast in speed and can print 300 to 2000 lines per minute.

Advantages

- Very high speed

Disadvantages

- Very expensive

- Characters fonts cannot be changed

1.2.4.5 Laser Printers

These are non-impact page printers. They use laser lights to produce the dots needed to form the characters to be printed on a page.

Advantages

- Very high speed

- Very high quality output

- Good graphics quality

- Supports many fonts and different character size

Disadvantages

- Expensive

- Cannot be used to produce multiple copies of a document in a single printing

1.2.4.6 Inkjet Printers

Inkjet printers are non-impact character printers based on a relatively new technology. They print characters by spraying small drops of ink onto paper. Inkjet printers produce high quality output with presentable features.

They make less noise because no hammering is done and these have many styles of printing modes available. Color printing is also possible. Some models of Inkjet printers can produce multiple copies of printing also.

Advantages

- High quality printing
- More reliable

Disadvantages

- Expensive as the cost per page is high
- Slow as compared to laser printer

1.3 Storage Devices:

A storage device is used in the computers to store the data.

1.3.1 Primary Storage

• Also known as main memory.

• Main memory is directly or indirectly connected to the central processing unit via a memory bus.

• The CPU continuously reads instructions stored there and executes them as required.

• Example: – RAM – ROM – Cache

1.3.1.1 RAM

 • It is called Random Access Memory because any of the data in RAM can be accessed just as fast as any of the other data.

• There are two types of RAM: –

o   DRAM (Dynamic Random Access Memory)

o   SRAM (Static Random Access Memory)

RAM

Static RAM	Dynamic RAM
• Faster • More expensive • More power consumption • does not need to be refreshed	• Slower • Less expensive • Less power consumption • needs to be refreshed thousands of times per second

1.3.1.2 ROM

• This memory is used as the computer begins to boot up.

• Small programs called firmware are often stored in ROM chips on hardware devices (like a BIOS chip), and they contain instructions the computer can use in performing some of the most basic operations required to operate hardware devices.

• ROM memory cannot be easily or quickly overwritten or modified.

1.3.1.3 Cache

• Cache is a high-speed access area that can be either a reserved section of main memory or a storage device.

• Most computers today come with L3 cache or L2 cache, while older computers included only L1 cache.

1.3.2   Secondary Storage

• It is not directly accessible by the CPU.

• Computer usually uses its input/output channels to access secondary storage and transfers the desired data using intermediate area in primary storage.

• Example: – Hard disk

1.3.2.1 Hard Disk

• The hard disk drive is the main, and usually largest, data storage device in a computer.

• It can store anywhere from 160 gigabytes to 2 terabytes.

• Hard disk speed is the speed at which content can be read and written on a hard disk.

• A hard disk unit comes with a set rotation speed varying from 4500 to 7200 rpm.

• Disk access time is measured in milliseconds.

1.3.2.2 Optical Disc

• Optical disc is any storage media that holds content in digital format and is read using a laser assembly is considered optical media.

• The most common types of optical media are

 – Blu-ray (BD)

– Compact Disc (CD)

– Digital Versatile Disc (DVD)

1.3.2.3 Off-line Storage

• Examples: – Floppy Disk – Zip diskette – USB Flash drive – Memory card

1.3.2.3.1 Floppy Disk

 • A soft magnetic disk.

 • Floppy disks are portable.

• Floppy disks are slower to access than hard disks and have less storage capacity, but they are much less expensive.

• Can store data up to 1.44MB.

• Two common sizes: 5 ¼" and 3 ½"

1.3.2.3.2 USB Flash Drive

• A small, portable flash memory card that plugs into a computer's USB port and functions as a portable hard drive.

• Flash drives are available in sizes such as 256MB, 512MB, 1GB, 5GB, and 16GB and are an easy way to transfer and store information.

1.3.2.3.3 Memory Card

• An electronic flash memory storage disk commonly used in consumer electronic devices such as digital cameras, MP3 players, mobile phones, and other small portable devices.

• Memory cards are usually read by connecting the device containing the card to your computer, or by using a USB card reader.

1.4 Operating Systems:

The low-level software that supports a computer's basic functions, such as scheduling tasks and controlling peripherals.

Definition - What does *Operating System (OS)* mean?

An operating system (OS), in its most general sense, is software that allows a user to run other applications on a computing device. While it is possible for a software application to interface directly with hardware, the vast majority of applications are written for an OS, which allows them to take advantage of common libraries and not worry about specific hardware details.

The operating system manages a computer's hardware resources, including:

- Input devices such as a keyboard and mouse
- Output devices such as display monitors, printers and scanners
- Network devices such as modems, routers and network connections
- Storage devices such as internal and external drives

The OS also provides services to facilitate the efficient execution and management of, and memory allocations for, any additional installed software application programs.

However, the three most easily defined components are:

- **Kernel:** This provides basic-level control over all of the computer hardware devices. Main roles include reading data from memory and writing data to memory, processing execution orders, determining how data is received and sent by devices such as the monitor, keyboard and mouse, and determining how to interpret data received from networks.
- **User Interface:** This component allows interaction with the user, which may occur through graphical icons and a desktop or through a command line.
- **Application Programming Interfaces:** This component allows application developers to write modular code.