

Module 1-INTRODUCTION

Computer

Computer is an electronic device that processes data, converting it into information that is useful to people. Any computer—regardless of its type—is controlled by programmed instructions, which give the machine a purpose and tell it what to do.

Types of computers

I. Computers for individual users

The six primary types of computers in this category are

- Desktop computers
- Workstations
- Notebook computers
- Tablet computers
- Handheld computers
- Smart phones

These systems are all examples of personal computers (PC's)-a term that refers to any computer system that is designed for use by a single person. Personal computers are also called micro computers, because they are among the smallest computers created for people to use

Desktop computers

The most common type of personal computer is the desktop computer—a PC that is designed to sit on (or under) a desk or table. These are commonly found in schools, homes, and offices. As its name implies, a desktop computer is a full-size computer that is too big to be carried around. The main component of a desktop PC is the system unit, which is the case that houses the computer's critical parts, such as its processing and storage devices. There are two common designs for desktop computers

- Horizontally oriented system unit
- Vertically oriented system unit

Horizontally oriented system unit usually lies flat on the top of the user's desk. Many users place their monitor on top of the system unit. Vertically oriented

tower models have become the more popular style of desktop system. This design allows the user to place the system unit next to or under the desk, if desired.

Workstations

A workstation is a specialized, single-user computer that typically has more power and features than a standard desktop PC. These machines are popular among scientists, engineers, and animators who need a system with greater-than-average speed and the power to perform sophisticated tasks. Workstations often have large, high-resolution monitors and accelerated graphics handling capabilities, making them suitable for advanced architectural or engineering design, modeling, animation, and video editing.

Notebook computers

Notebook computers, as their name implies, approximate the shape of an 8.5-by-11-inch notebook and easily fit inside a briefcase. Because people frequently set these devices on their lap, they are also called laptop computers. Notebook computers can operate on alternating current or special batteries. Notebooks are fully functional microcomputers; the people who use them need the power of a full-size desktop computer wherever they go. Because of their portability, notebook PCs fall into a category of devices called mobile computers.

Tablet computers

The tablet PC is the newest development in portable, full-featured computers. Tablet PCs offer all the functionality of a notebook PC, but they are lighter and can accept input from a special pen—called a stylus or a digital pen—that is used to tap or write directly on the screen. Many tablet PCs also have a built-in microphone and special software that accepts input from the user's voice.

Handheld computers

Handheld personal computers are computing devices small enough to fit in our hand. A popular type of handheld computer is the personal digital assistant (PDA). A PDA is no larger than a small appointment book and is normally used for special applications, such as taking notes, displaying telephone numbers and addresses, and keeping track of dates or agendas. Many PDAs can be connected to larger computers to exchange data. Most PDAs come with a pen that lets the user write on the screen. Some handheld

computers feature tiny built-in keyboards or microphones that allow voice input.

Smart phones

Some cellular phones double as miniature PCs. Because these phones offer advanced features not typically found in cellular phones, they are sometimes called smart phones. These features can include Web and e-mail access, special software such as personal organizers, or special hardware such as digital cameras or music players

II. Computers for organization

The primary types of computers in this category are

- Network servers
- Mainframe computers
- Minicomputers
- Super computers

Network servers

Today, most organizations' networks are based on personal computers. Individual users have their own desktop computers, which are connected to one or more centralized computers, called network servers. A network server is usually a powerful personal computer with special software and equipment that enable it to function as the primary computer in the network. Large organizations may have dozens or hundreds of individual servers working together at the heart of their network. Such groups sometimes called clusters or server farms

Mainframe computers

Mainframe computers are used in large organizations such as insurance companies and banks, where many people frequently need to use the same data. In a traditional mainframe environment, each user accesses the mainframe's resources through a device called a terminal. There are two kinds of terminals.

- Dumb terminal
- Intelligent terminal

A dumb terminal does not process or store data; it is simply an input/output (I/O) device that functions as a window into a computer located somewhere else.

An intelligent terminal can perform some processing operations, but it usually does not have any storage. Mainframes are large, powerful systems. The largest mainframes can handle the processing needs of thousands of users at any given moment

Minicomputers

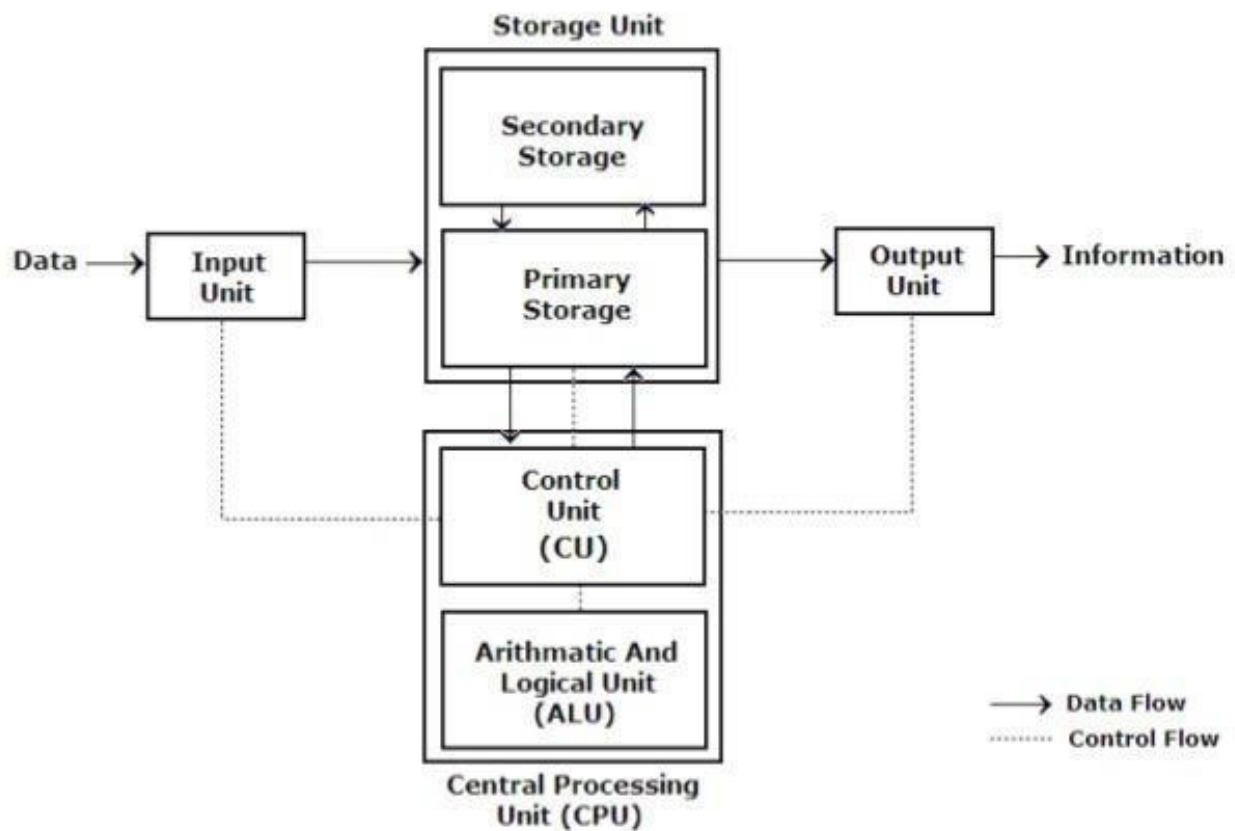
First released in the 1960s, minicomputers got their name because of their small size compared to other computers of the day. The capabilities of a minicomputer are somewhere between those of mainframes and personal computers. For this reason, minicomputers are often called midrange computers. Like mainframes, minicomputers can handle much more input and output than personal computers can.

Super computers

Supercomputers are the most powerful computers made, and physically they are some of the largest. These systems can process huge amounts of data, and the fastest super* computers can perform more than one trillion calculations per second. Some supercomputers can house thousands of processors. Supercomputers are ideal for handling large and highly complex problems that require extreme calculating power

Functional units of a computer system

Block diagram of computer



A computer consists of 5 functionally independent units. They are

- ❖ Input unit
- ❖ Memory unit
- ❖ Arithmetic and Logic unit
- ❖ Output unit
- ❖ Control unit

Operation: The input unit accepts information from users through input devices such as keyboard, mouse etc. The information received is either stored in the computer memory or passed to the ALU to perform the desired operation. Finally the results are sent back to the outside world through output devices such as monitors, printers etc. All of these actions are controlled by the control unit

Input unit

Input unit is used to accept information or data from the user through input devices such as keyboard, mouse etc. functions of input unit are

- ❖ Accept or read the list of instructions and data from the outside world
- ❖ Convert these data into computer acceptable form ie-in binary code
- ❖ Passes the converted instructions and data to the memory or ALU for further processing

Memory unit

The functions of the memory unit is to store programs and data. There are two classes of storage-**primary and secondary**

Primary storage is a fast memory that operates at electronic speed. The memory contains a large number of semi conductor storage cells ,each capable of storing one bit of information. These cells are processed in group of fixed size called words. The number of bits in each word is called word length. Primary storage is tends to be expensive. So in order to store large volume of data secondary storage is used. Secondary storage is inexpensive and portable. Examples of secondary storage devices are pendrive, CD, floppy etc

Arithmetic and Logic unit

The actual processing of data and instructions are performed by the ALU. The major operations performed by the ALU are Addition, subtraction, multiplication and comparison operations etc. The ALU contain certain set of circuits to perform all of these operations. At the time of operations, the data must be transferred to the ALU from the storage unit. These data are stored in high speed memory locations in ALU called registers. Each register can store one word of data. After processing the result is returned back to the memory for further operations

Output unit

Output unit is the counter part of the input unit.ie its function is just reverse of the input unit. Examples of output unit include monitor, printer etc. functions of output units are

- ❖ It accepts the results produced by the computer, Which are in coded form. Hence it cannot understood by the user
- ❖ Convert these coded results into human acceptable form
- ❖ Passes the converted results into the outside world

Control unit

The memory, ALU and I/O units store and process information and perform I/O operations. The operations of these units must be coordinated in some way. This is the task of control unit. The control unit is responsible for co-ordinating various operations other units. The control unit performs these tasks by issuing timing signals. The timing signals are signals that determine when a given action is to take place

Characteristics of computer

. Speed: - As you know computer can work very fast. It takes only few seconds for calculations that we take hours to complete. Computer can perform millions (1,000,000) of instructions and even more per second.

Therefore, we determine the speed of computer in terms of microsecond (10⁻⁶ part of a second) or nanosecond (10 to the power -9 part of a second).

2. Accuracy: - The degree of accuracy of computer is very high and every calculation is performed with the same accuracy.

3. Diligence: - A computer is free from tiredness, lack of concentration, fatigue, etc. It can work for hours without creating any error. If millions of calculations are to be performed, a computer will perform every calculation with the same accuracy.

4. Versatility: - It means the capacity to perform completely different type of work. You may use your computer to prepare payroll slips. Next moment you may use it for inventory management or to prepare electric bills.

5. Power of Remembering: - Computer has the power of storing any amount of information or data. Any information can be stored and recalled as long as we require it, for any numbers of years.

6. No IQ: - Computer is a dumb machine and it cannot do any work without instruction from the user. It performs the instructions at tremendous speed

and with accuracy. It is you to decide what you want to do and in what sequence. So a computer cannot take its own decision as you can.

7. No Feeling: - It does not have feelings or emotion, taste, knowledge and experience. Thus it does not get tired even after long hours of work. It does not distinguish between users.

8. Storage: - The Computer has an in-built memory where it can store a large amount of data. You can also store data in secondary storage devices such as floppies, which can be kept outside your computer and can be carried to other computers.

COMPUTER HARDWARE AND SOFTWARE

COMPUTER HARDWARE

Computers hardware devices fall into one of the following categories

- ❖ Processing devices
- ❖ Memory devices
- ❖ Input/output devices
- ❖ Storage devices

Processing devices

Processor is called the brain of the computer. It organizes and carries out instructions from the user. In a personal computer, the processor usually consists of one or more specialized chips called microprocessor, which contain many tiny electronic circuits. To process data or instructions, the computer passes electricity through the circuits.

The microprocessor is plugged into the computer's motherboard. The motherboard is a rigid rectangular board containing the circuitry to connect the microprocessor. Motherboard is an example of circuit board. In most PC, many internal devices such as video card, sound card etc. are housed on their own smaller circuit board which is then attached to the motherboard.

Memory devices & Storage devices

In a computer, memory is one or more chips that store data and program instructions either temporarily or permanently. The two important memory's are random access memory(RAM) and read only memory(ROM)

Random Access Memory(RAM)

RAM is like an electronic scratch pad inside the computer. RAM holds data and program instructions while the CPU works with them. When a program is launched, it is loaded into and run from memory. As the program needs data, it is loaded into memory for fast access. As new data is entered into the computer, it is also stored in memory— but only temporarily. Data is both written to and read from this memory. (Because of this, RAM is also sometimes called read/write memory.)

RAM is volatile, meaning that it loses its contents when the computer is shut off or if there is a power failure. Therefore, RAM needs a constant supply of power to hold its data. For this reason, you should save your data files to a storage device frequently, to avoid losing them in a power failure

Read Only Memory(ROM)

Read-only memory (ROM) permanently stores its data, even when the computer is shut off. ROM is called nonvolatile memory because it never loses its contents. ROM holds instructions that the computer needs to operate. Whenever the computer's power is turned on, it checks ROM for directions to start up, and for information about its hardware devices.

Storage devices

There are two main types of computer storage

- Magnetic storage
- Optical storage

Magnetic storage

There are many types of computer storage, but the most common is the magnetic disk. A disk is a round, flat object that spins around its center.

(Magnetic disks are almost always housed inside a case of some kind, so you can't see the disk itself unless you open the case.) Read/write heads, which work in much the same way as the heads of a tape recorder or VCR, are used to read data from the disk or write data onto the disk. The device that holds a disk is called a disk drive. Some disks are built into disk drive and are not meant to be removed; other kinds of drives enable you to remove and replace disk

Optical storage

In addition to magnetic storage, there are also optical storage devices. Optical storage devices use lasers to read data from or write data to the reflective surface of an optical disc. The CD-ROM drive is the most common type of optical storage device. Compact discs (CDs) and DVD's are a type of optical storage devices

There are two types of compact disk .They are

1. CD-R --written only once
2. CD-RW --can written multiple times

DVD(digital video disc) is another kind of optical input device which has more powers than CD

Input/output devices

Input devices are used to accept information or data from the user. The most common input device is the keyboard, which accepts letters, numbers, and commands from the user. Another important type of input device is the mouse, which lets you select options from on-screen menus.

The function of an output device is to present the processed data to the user. The most common output devices are the monitor and the printer. The computer sends output to the monitor (the display screen) when the user needs only to see the output. It sends output to the printer when the user requests a paper copy—also called a hard copy—of a document.

COMPUTER SOFTWARE

Software's are the set of instructions that are used to communicate with the computer. There are two types of software

- System software
- Application software

System software

System software is any program that controls the computer's hardware or that can be used to maintain the computer in some way so that it runs more efficiently. There are three basic types of system software:

- An operating system tells the computer how to use its own components. It is an interface between hardware, application program and the user. Examples of operating systems include Windows, the Macintosh Operating System, and Linux etc.
- A network operating system allows computers to communicate and share data across a network
- A utility is a program that makes the computer system easier to use or performs highly specialized functions. Examples include antivirus software, backup software etc.

Application software

Application software tells the computer how to accomplish specific tasks, such as word processing or drawing, for the user. Thousands of applications are available for many purposes. Some of them are

- ***Word processing software*** for creating text-based documents such as newsletters or brochures
- ***Spreadsheets*** for creating numeric-based documents such as budgets or balance sheets.
- ***Presentation software*** for creating and presenting slides
- ***Graphics programs*** for designing or manipulating photographs, movies or animation

INPUT DEVICES

I. KEYBOARD

The keyboard was one of the first peripherals to be used with computers, and it is still the primary input device for entering text and numbers. A standard keyboard includes about 100 keys; each key sends a different signal to the CPU.

The Standard Keyboard Layout

Keyboards come in many styles. The various models differ in size, shape, and feel; except for a few special-purpose keys, most keyboards are laid out almost identically. Among IBM-compatible computers, the most common keyboard layout is the IBM Enhanced Keyboard. It has about 100 keys arranged in five groups

➤ The alphanumeric keys

The area of the keyboard that looks like a typewriter's keys are arranged the same way on almost every keyboard. Sometimes this common arrangement is called the QWERTY layout because the first six keys on the top row of letters are Q, W, E, R, T, and Y. Along with the keys that produce letters and numbers, the alphanumeric key group includes four keys having specific functions. They include tab, CAPS LOCK, backspace, and enter keys

➤ The Modifier Keys

The SHIFT, ALT (Alternate), and CTRL (Control) keys are called modifier keys because they modify the input of other keys. In other words, if you hold down a modifier key while pressing another key, then you are changing the second key's input in some way. For example, when you press the letter j by hold down the shift key, you get a capital letter J when the caps lock key is off

➤ The Numeric Keypad

The numeric keypad is usually located on the right side of the keyboard. The numeric keypad looks like a calculator's keypad, with its 10 digits and mathematical operators (+, -, *, and /). The numeric keypad also features a NUM LOCK key, which forces the numeric keys to input numbers. When NUM LOCK is deactivated, the numeric keypad's keys perform cursor movement control and other functions.

➤ **The Function Keys**

The function keys, which are labelled F1, F2, and so on are usually arranged in a row along the top of the keyboard. They allow us to input commands without typing long strings of characters or navigating menus or dialog boxes. Each function key's purpose depends on the program we are using. For example, in most programs, F1 is the help key

➤ **The Cursor-Movement Keys**

Most standard keyboards also include a set of cursor-movement keys, which let you move around the screen without using a mouse. In many programs and operating systems, a mark on the screen indicates where the characters you type will be entered. This mark, called the cursor or insertion point, appears on the screen as a blinking vertical line, or some other symbol to show our place in a document or command line

➤ **Special-Purpose Keys**

In addition to the five groups of keys all IBM compatible keyboards feature six special-purpose keys, each of which performs a unique function. Since 1996, nearly all IBM-compatible keyboards have included two additional special-purpose keys designed to work with the Windows operating systems

- ❖ **Start**- This key, which features the Windows logo (and is sometimes called the Windows logo key), opens the Windows Start menu on most computers. Pressing this key is the same as clicking the Start button on the Windows taskbar.
- ❖ **Shortcut** - This key, which features an image of a menu, opens an on-screen shortcut menu in Windows-based application programs.

HOW THE COMPUTER ACCEPTS INPUT FROM THE KEYBOARD

When you press a key, a tiny chip called the keyboard controller notes that a key has been pressed. The keyboard controller places a code into part of its memory called the keyboard buffer, to indicate which key was pressed. (A buffer is a temporary storage area that holds data until it can be processed.) The keyboard controller then sends a signal to the computer's system software, notifying it that something has happened at the keyboard.

When the system software receives the signal, it determines the appropriate response. When a keystroke has occurred, the system reads the memory

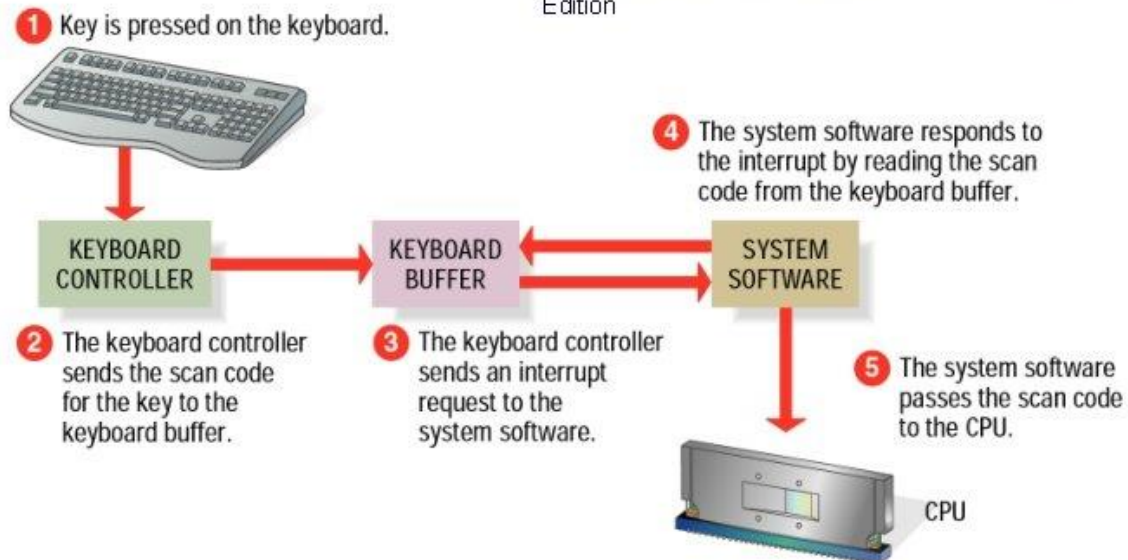
location in the keyboard buffer that contains the code of the key that was pressed. The system software then passes that code to the CPU.

Keyboards

The function of the keyboard



Figure 2. Peter Norton's Introduction to Computers 4th Edition



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II. MOUSE

A mouse is an input device that you can move around on a flat surface (usually on a desk or keyboard tray) and controls the pointer. The pointer (also called the mouse pointer) is an on-screen object, usually an arrow, that is used to select text; access menus; and interact with programs, files, or data that appear on the screen.

The mechanical mouse is the most common type of pointing device. A mechanical mouse contains a small rubber ball that protrudes through a hole in the bottom of the mouse's Case. When you move the mouse, the ball rolls inside this case around on a flat surface

Another popular type of mouse is the optical mouse. This type of mouse emits a beam of light from its underside; it uses the light's reflection to judge the distance, direction, and speed of its travel

The mouse offers two main benefits.

- First, the mouse lets you position the cursor anywhere on the screen quickly without using the cursor-movement keys.
- Second, instead of forcing you to type or issue commands from the keyboard, the mouse and mouse-based operating systems let you choose commands from easy-to-use menus and dialog boxes

Functions of mouse include

- ❖ Clicking
- ❖ Double-clicking
- ❖ Dragging
- ❖ Right-clicking

Clicking-To click an item with the mouse, you move the pointer to the item on the screen. When the pointer touches the object, quickly press and release the primary mouse button once

Double-clicking-Double-clicking an item means, pointing to the item with the mouse pointer and then pressing and releasing the mouse button twice in rapid succession

Dragging- Dragging an item means positioning the mouse pointer over the item, pressing the primary mouse button, and holding it down as we move the mouse. As we move the pointer, the item is “dragged” along with it across the screen. we can then drop the item in a new position on the screen. This technique is also called drag-and-drop editing, or just drags and drop

Right-clicking - Windows and many Windows programs support right clicking. Which means, pointing to an item on the screen, then pressing and releasing the right mouse button. Right-clicking usually opens a shortcut menu that contains commands and options

III. Variants of the Mouse

Mouse variants include

- **Trackballs**
- **Track pads**
- **Joystick**

Trackballs

A trackball is a pointing device that works like an upside-down mouse. We should rest our index finger or thumb on an exposed ball, then place our other fingers on the buttons. To move the pointer around the screen, you roll the ball with your index finger or thumb. Because you do not move the whole device, a trackball requires less space than a mouse. Trackballs gained popularity with the advent of laptop computers, which typically are used on laps or on small work surfaces that have no room for a mouse.

Track pads

The track pad (also called a touchpad) is a stationary pointing device. The movement of a finger across a small touch-sensitive surface is translated into pointer movement on the computer screen. The touch-sensitive surface may be only 1.5 or 2 inches square, so the finger never has to move far. The track pad's size also makes it suitable for a notebook computer. Some notebook models feature a built-in track pad rather than a mouse or trackball

Joystick

A joystick is an input device commonly used to control video games. Joysticks consist of a base and a stick that can be moved in any direction. The stick can be moved slowly or quickly and in different amounts. Some joysticks have sticks that can also be rotated to the left or right. Because of the flexible movements a joystick allows, it can provide much greater control than the keys on a keyboard. In computers, a joystick is a cursor control device used in computer games.

IV. OPTICAL INPUT DEVICES**Bar Code Readers**

Bar code readers are one of the most widely used input devices. The most common type of bar code reader is the flatbed model, which is commonly found in supermarkets and department stores. These devices read bar codes, which are patterns of printed bars that appear on product packages. The bar codes identify the product. The bar code reader emits a beam of light—frequently a laser beam—that is reflected by the bar code image. A light-sensitive detector identifies the bar code image by recognizing special bars at both ends of the image. After the detector has identified the bar code, it

converts the individual bar patterns into numeric digits—code the computer can understand.

Image Scanners and Optical Character Recognition (OCR)

The bar code reader is a special type of image scanner. Image scanners (also called scanners) convert any printed image into electronic form by shining light onto the image that can be stored in a computer's memory. Then we must use software to organize or manipulate this electronic image.

Optical character recognition (OCR) software is used to translate the image into text that we can edit. When a scanner first creates an image from a page, the image is stored in the computer's memory as a bitmap. A bitmap is a grid of dots, each dot represented by one or more bits. The job of OCR software is to translate that array of dots into text that the computer can interpret as letters and numbers. To translate bitmaps into text, the OCR software looks at each character and tries to match the character with its own assumptions about how the letters should look. Because it is difficult to make a computer recognize an unlimited number of typefaces and fonts, OCR software is extremely complex and not always 100 percent reliable

OUTPUT DEVICES

1. MONITORS

There are two types of monitors are used with PCs. The first is the typical monitor that comes with most desktop computers; it looks like a television screen and works in much the same way. This type of monitor uses a large vacuum tube, called a **cathode ray tube (CRT)**. The second type, known as a flat-panel display, was used primarily with portable computers in the past. Today, flat-panel monitors are a popular feature with desktop computers.

All monitors can be categorized by the way they display colours:

- **Monochrome monitors** -display only one colour (such as green, amber, or white) against a contrasting background, which is usually black. These monitors are used for text-only displays where the user does not need to see colour graphics.

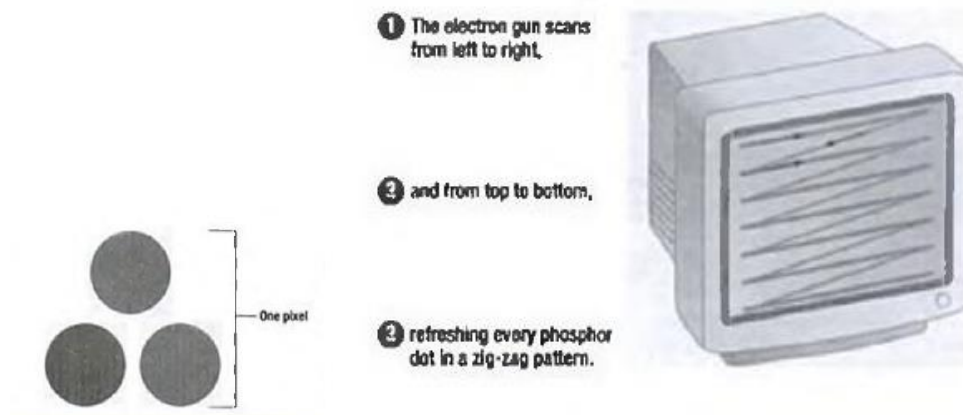
- **Grayscale monitors** -display varying intensities of gray (from a very light gray to black) against a white or off-white background and are essentially a type of mono chrome monitor. Grayscale flatpanel displays are used in low-end portable systems—especially handheld computers— to keep costs down
- **Colour monitors**-can display between 16 million colours. Today, most new monitors are colour monitors.

❖ **CRT (Cathode Ray Tube)Monitors**

Near the back of a CRT monitor's housing is an electron gun. The gun shoots a beam of electrons through a magnetic coil (sometimes called a yoke), which aims the beam at the front of the monitor. The back of the monitor's screen is coated with phosphors, chemicals that glow when they are struck by the electron beam. The screen's phosphor coating is organized into a grid of dots. The smallest number of phosphor dots that the gun can focus on is called a pixel, a contraction of the term picture element.

The electron gun systematically aims at every pixel on the screen, starting at the top left corner and scanning to the right edge. Then it drops down a tiny distance and scans another line. Like human eyes reading the letters on a page, the electron beam follows each line of pixels across the screen until it reaches the bottom of the screen. Then it starts over. As the electron gun scans, the circuitry driving the monitor adjusts the intensity of each beam

A colour monitor works like a monochrome one, except that there are three electron beams instead of one. The three guns represent the primary additive colours (red, green, and blue), although the beams they emit are colorless. In a colour monitor, each pixel includes three phosphors—red, green, and blue—arranged in a triangle. When the beams of each of these guns are combined and focused on a pixel, the phosphors light up. The monitor can display different colours by combining various intensities of the three beams. The methods of arranging phosphorus dot in CRT monitors is called shadow mask method



Disadvantages of CRT Monitors

- Because CRT monitors are big, they take up desktop space and can be difficult to move
- CRT monitors require a lot of power to run

❖ Flat-Panel Monitors

Flat panel displays are both used in portable computers as well as desktop computers. These new monitors provide the same viewable area as CRT monitors, but they take up less desk space and run cooler than traditional CRT monitors.

There are several types of flat-panel monitors, but the most common is the **liquid crystal display (LCD) monitor**. The LCD monitor creates images with a special kind of liquid crystal. One disadvantage of LCD monitors is that their images can be difficult to see in bright light. For this reason, laptop computer users often look for shady places to sit when working outdoors or near windows. Another disadvantage of LCD monitors however is their limited viewing angle—that is, the angle from which the display's image can be viewed clearly. In many older flat-panel systems, the user must face the screen nearly straight on to see the image clearly.

There are two main categories of liquid crystal displays:

- **The passive matrix LCD** – It relies on transistors for each row and each column of pixels, thus creating a grid that defines the location of each pixel.

- **The active matrix LCD** – This technology assigns a transistor to each pixel, and each pixel is turned on and off individually. Active matrix screens have a wider viewing angle than passive matrix screens.

Other Types of Flat panel Monitors

- ❖ **Paper-white displays** – They are used by document designers such as desktop publishing specialists, newspaper or magazine compositors, and other persons who create high-quality printed documents. An LCD version of the paper-white display is called a page-white display
- ❖ **Electroluminescent displays (ELDs)** are similar to LCD monitors but use a phosphorescent film held between two sheets of glass. A grid of wires sends current through the film to create an image.
- ❖ **Plasma display panel (PDP)** - Plasma displays are created by sandwiching a special gas (such as neon) between two sheets of glass. It glows, when the gas is electrified via a grid of small electrodes. By controlling the amount of voltage applied at various points on the grid, each point acts as a pixel to display an image.
- ❖ **Light emitting diode display (LED)** - It is a flat panel display that uses light emitting diodes as the video display. An LED display panel can be either a small display or part of a larger display. It has larger viewing angle as compared to the LCD monitors

The specifications used for comparing monitors include

❖ Size

A monitor's size affects how well you can see images. With a larger monitor you can make the objects on the screen appear bigger..

❖ Resolution

The term resolution refers to the sharpness or clarity of an image. A monitor's resolution is determined by the number of pixels on the screen. The more pixels a monitor can display, the higher its resolution and the images appear clearer. For example, a resolution of 640 X 480 means that there are 640 pixels horizontally across the screen and 480 pixels vertically down the screen

Refresh Rate

A monitor's refresh rate is the number of times per second that the electron guns scan every pixel on the screen .Refresh rate is important because phosphor dots fade quickly. If the screen is not refreshed, it appears to flicker, and flicker.

Dot Pitch

Dot pitch is the distance between the like-coloured phosphor dots of adjacent pixels. Dot pitch is measured as a fraction of a millimetre (mm), and dot pitches can range from .15 mm (very fine) to .40 mm or higher.

2. PRINTERS

Generally, printers fall into two categories: **impact and nonimpact**.

An **impact printer** creates an image by using pins or hammers to press an inked ribbon against the paper. A simple example of an impact printer is a typewriter, which uses small hammers to strike the ribbon.

Nonimpact printers use other means to create an image. Ink jet printers, for example, use tiny nozzles to spray droplets of ink onto the page. Laser printers work like photocopiers, using heat to bond microscopic particles of dry toner to specific parts of the page

❖ Impact Printers**Dot Matrix Printers**

A type of printer that produces characters and illustrations by striking pins against an ink ribbon to print closely spaced dots in the appropriate shape. Dot-matrix printers are relatively expensive and do not produce high-quality output. However, they can print to multi-page forms (that is, carbon copies). They also are used to print very wide sheets, generating large reports with wide columns of information. A dot matrix printer creates an image by using a mechanism called a print head, which contains a cluster (or matrix) of short pins arranged in one or more columns. On receiving instructions from the PC, the printer can push any of the pins out in any combination. By pushing out pins in various combinations, the print head can create alphanumeric characters the speed of dot matrix printers is measured in characters per second (cps)

Line Printers

A line printer is a special type of impact printer. It works like a dot matrix printer but uses a special wide print head that can print an entire line of text at one time. Line printers do not offer high resolution but are incredibly fast; the fastest can print 3,000 lines of text per minute.

Band Printers

A band printer features a rotating band embossed with alphanumeric characters. To print a character, the machine rotates the band to the desired character then a small hammer taps the band, pressing the character against a ribbon. Band printers are very fast and very robust. Depending on the character set used, a good-quality band printer can generate 2,000 lines of text per minute.

❖ Non-Impact Printers**Ink Jet Printers**

Ink jet printers create an image directly on the paper by spraying ink through tiny nozzles. These models typically attain print resolutions of at least 300 dots per inch. Compared to laser printers, the operating cost of an ink jet printer is relatively low. Colour ink jet printers have four ink nozzles: cyan (blue), magenta (red), yellow, and black. For this reason, they are sometimes referred to as CMYK printers, or as using the CMYK colour process. These four colours are used in almost all colour printing, because it is possible to combine them to create any colour. The colours are different from the primary additive colours (red, green, and blue) used in monitors. Printed colour is the result of light bouncing off the paper, not colour transmitted directly from a light source. Consequently, cyan, magenta, yellow, and black are sometimes called subtractive colours and colour printing is sometimes called four-color printing.

Laser Printers

Laser printers are more expensive than ink jet printers, their print quality is higher and most are faster. As their name implies, a laser is at the heart of these printers. A CPU and memory are built into the printer to interpret the data that it receives from the computer and to control the laser. The quality and speed of laser printers make them ideal for office environments, where several users can easily share the same printer via a network. Just as the electron gun in a monitor can target any pixel, the laser in a laser printer can aim at any point on a drum, creating an electrical charge. Toner, which is composed of tiny particles of ink, sticks to the drum in the places the laser has charged. Then, with pressure and heat, the toner is transferred off the drum onto the paper.

