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CHAPTER 4:
PERIPHERAL DEVICES AND CLASSIFICATION OF COMPUTER SYSTEMS: INPUT, OUTPUT, STORAGE, AND COMPUTING TYPES

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Abstract
This chapter provides a comprehensive overview of peripheral devices and the classification of computer systems based on size, structure, and purpose. It begins with a detailed explanation of input devices, highlighting their role in converting human-readable data into machine-processable form. Various input devices such as keyboards, mouse, scanners, and recognition systems (OCR, MICR, OMR) are discussed along with their functionalities.
The chapter further explores output devices, including monitors, printers, and plotters, emphasizing their types, working principles, advantages, and limitations. Different display technologies such as CRT, LCD, LED, and OLED are also examined. In addition, the chapter provides an in-depth understanding of storage and printing technologies.
Beyond peripheral devices, the chapter classifies computers based on size and processing power, including supercomputers, mainframe computers, minicomputers, and microcomputers. It also discusses computer types based on hardware structure, such as analog, digital, and hybrid computers, as well as classification based on purpose, including general-purpose and special-purpose computers. The chapter concludes with an explanation of personal computers, their characteristics, configurations, and types, offering a holistic understanding of modern computing systems.

Keywords: Peripheral Devices, Input Devices, Output Devices, Storage Devices, Keyboard, Mouse, Scanner, Monitor, Printer, Plotter, Computer Classification, Supercomputer, Mainframe, Minicomputer, Microcomputer, Analog Computer, Digital Computer, Hybrid Computer, Personal Computer

Peripheral Devices:-

What is Input and Input Devices:-

"Any data or instruction that is used by a computer is called input. This data or instruction can come directly from end user or from other devices." "An input device is a hardware device that is used to provide input (data / instructions) to a computer so that it can be processed". Input device translates words, sounds images, and actions that people understand into symbols that the system unit can process. Input devices include keyboards, Mouse, digital Camera and light pen. Besides the widely used input devices like keyboard & Mouse there are other different input devices that perform various input operations like a scanner scan images / documents. Webcams capture videos & images.

For example, while you prepare word documents or spread sheets, you use the keyboard to enter text & numbers and use command keys to save / print documents. You can also perform operations on computer using voice

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commands. These are all different methods of providing an input to a computer.

1.Keyboard:-

A keyboard is an essential input device that combines a typewriter keyboard with a numeric keypad. The special purpose keys and the function keys are used to perform a special tasks like pressing Control key (CTRL) key in combination with "P" prints a document, or pressing the "F2" function key opens a window with help content about any issue or topic. Nowadays Multimedia keyboards are common as they have task specific keys & buttons. For example, volume control ext. Wireless keyboards are also popular these days that can be connected to a tablet or a computer via Bluetooth.

2. Mouse:-

The mouse is another essential input device that controls the pointer displayed on the monitor. A mouse can have 2 or more buttons. Mostly the Right-Mouse Button and the Left-Mouse button, and a wheel button for scrolling pages.

Mouse is of three types.

1.Mechanical Mouse

A mechanical mouse is considered as the traditional mouse and is now replaced by optical mouse. A mechanical mouse has a ball on the bottom, which is attached to the system unit through a cord. A mechanical mouse requires periodic cleaning.

2. Optical mouse

Optical Mouse is widely used these days. Like the mechanical mouse, it does not have any moving parts. It emits & senses light to detect mouse movements. Optical mouse can be used on any surface with great precision as compared to Mechanical mouse.

3.Wireless Mouse

A wireless mouse or cordless mouse uses infrared or radio wares to communicate with the system units. A wireless mouse is battery powered and can be connected to a laptop or tablet computer.

3.Character and mark recognition devices:-

Character and mark recognition devices are scanners that are able to recognize special characters and marks. Essentially used for certain applications.

Types of character and mark recognition devices are as follows:-

MICR (Magnetic Ink Character Recognition): Used by banks to read numbers written on cheque. Special purpose machine reads character made of ink containing magnetized particles.

OCR (Optical Character recognition): Special preprinted characters that can be read by light source and changed into machine readable form. Used in department stores to read retail price tags by reflecting light.

OMR (Optical Mark Recognition): An OMR device senses the presence or absence of a mark such as pencil mark. Used to calculate or store multiple choice tests.

4.Scanner:-

A scanner is an electronic device that scans printed or handwritten text documents, images, or a particular object to convert them into a digital file format. Most of the scanners use CCD, (charge-coupled device) or CIS, (Contact Image Sensor) as the image sensors. The common types of scanners we see today are flatbed scanners, handheld scanners, sheet-fed scanners, etc.

1. Flatbed Scanner:- A flatbed scanner is made up of a glass pane and a moving optical CIS or CCD array. The pane is illuminated with the help of bright light planted underneath it. The image which is to be scanned is then placed on the glass pane. The sensor and the source of light move across the glass pane to scan the document and produce its digital copy.

2. Sheet-fed Scanner:- In sheet-fed scanners, the document that is supposed to be scanned is fed into the horizontal or vertical slot provided in the scanner. The vital components of sheet-fed scanner are the sheet-feeder, scanning module and calibration sheet. Such scanners are most often used to scan single page documents. It can't be used to scan thicker objects, like books, which turn out to be its major drawback.

3. Handheld Scanner:- A handheld scanner is a small manual scanning device which is moved over the object that need to be scanned. For instance, if a document needs to be scanned, the handheld scanner has to be dragged over the document. Using a handheld scanner can prove to be a cumbersome task, as the hand needs to be steady all

the time. Slight movement of the hand can lead to distortion of the image. One of the most utilized handheld scanner is the barcode scanner, typically used in shopping stores to valuate goods.

4.Photo Scanner:- Photo scanners are mostly used to scan photographs. High resolution and color depth are the most vital requirements for scanning photographs, and photo scanner provides the same. If the motive of buying a scanner is to digitize film negatives and slides, then the photo scanner is the best option. They are specially designed to work on slides and negatives. The in-built software in some photo scanners can also help in cleaning old photographs.

5. Film Scanner:- A film scanner is utilized to scan photographic films directly into a computer. The photographer has direct control over certain aspects, such as cropping, ratio of original image on the film, etc. Some film scanner shave specialized software through which it is possible to minimize scratches and improve color quality. Low-end film scanners most often accept 35 mm film strips while the high-end scanners have interchangeable film loaders which can accept 35 mm strips or 120 mm ones, or individual slides.

6.Portable Scanners:- Being small in size, portable scanners can be easily carried with oneself anywhere. Some scanners are as small as your PDAs, hence, can be easily carried in the pockets. Such scanners are useful for text document scanning. The drawback of these scanners is their limitation as far as resolution is concerned. They cannot be used for scanning photographs or other such applications which require high resolution scanning.

5.Monitor:-

A computer monitor, technically termed as a visual display unit, can be plainly described as an electronic device that transmits information from the computer onto a screen, thereby acting as an interface and connecting the viewer with the computer. At present, computer monitors are available in a variety of shapes, designs, and colors. However, based on the technology used to make computer monitors, they can be broadly categorized into three types.

- CRT (Cathode Ray Tube)
- LCD (Liquid Crystal Display)
- LED (Light-Emitting Diodes)
- OLED(Organic light-emitting diodes)

CRT (Cathode Ray Tube) Monitors:- These monitors employ the CRT technology used most commonly in the manufacturing of television screens. In this, a stream of intense high energy electrons is used to form images on a fluorescent screen. A cathode ray tube is a basically a vacuum tube containing an electron gun at one end and a fluorescent screen at another end. From this electron gun, a process called thermionic emission generates a strong beam of electrons. These electrons travel through a narrow path within the tube with high speed using various electro-magnetic devices and finally strike the phosphor points present on the fluorescent screen, thus creating an image.

There are several Advantages of using CRT monitors:

- These monitors are highly reliable and efficient, and are capable of generating a resolution of up to 2048 x 1536 pixels, thereby providing a clear picture quality. Also, CRT monitors that are now available are capable of producing thousands of different colors.
- Secondly, CRT monitors are affordable and cost effective.
- Unlike conventional CRT monitors, modern technological advancements have resulted in the development of flat screen CRT monitors that reduce the glare and are good for the eyes.

Disadvantage of CRT Monitor:-

However, the only concern with buying CRT monitors is that they are heavy and can occupy a great deal of work space. Also, these devices get heated up very easily.

LCD (Liquid Crystal Display) Monitors:- Liquid crystal display, also known as liquid crystal diode, is one of the most advanced technologies available at present. Typically, an LCD monitor consists of a layer of color or monochrome pixels arranged schematically between a couple of transparent electrodes and two polarizing filters. Optical effect is achieved by polarizing the light in varied amounts and making it pass through the liquid crystal layer. At present, there are two types of LCD technology available. These include the active matrix or TFT and a passive matrix technology. Among these, TFT technology is more secure and reliable, and generates better picture quality. On the other hand, passive matrix has a slow response time and is slowly becoming outdated.

In recent times, LCD monitors have become increasing popular with consumers. Some major advantages of using an LCD monitor include:

- These monitors are compact, lightweight, and do not consume much desk space.
- Secondly, these monitors do not consume much electricity and can even be operated by using batteries.
- Also, the images transmitted by these monitors do not get geometrically distorted and have little flicker.
- However, LCD monitors do have certain disadvantages. Most importantly, these monitors are very expensive. Secondly, image quality is not constant when viewed from different angles. Also, an LCD monitor's resolution is always constant. Any alterations can result in a reduced performance.

LED (Light-Emitting Diodes) Monitors:- LED monitors are the latest types of monitors in the market today. Like LCD, it is again a flat panel display making use of light-emitting diodes for back-lightning instead of Cold Cathode Fluorescent (CCFL) back-lightning used in LCDs. Primarily, the display is of LCD only but the back-lightning is done by LEDs. LED monitors are said to use much lesser power than CRT and LCD. Thus, they are also considered environmental friendly. Other core advantages of LED monitors are:

- They produce images with higher contrast
- They have less negative environmental impact when disposed
- Lifespan and durability of LED monitors is more than CRT or LCD monitors
- Because of the technology, the monitor panels can be made very thin
- Do not produce much heat while running

The only Disadvantage is this LED monitors are little expensive than the former types.

There are multiple ways by which LED back-lightning is done.

- White-edge LEDs are fixed around the rim of the monitor. It used a special diffusion panel to spread light evenly behind the screen.
- An array of LEDs are placed behind the screen. Their brightness is not controlled individually.
- Again an array of LEDs are placed behind the screen, but the brightness of each individual LED is controlled separately.

OLED Monitors:- Organic light-emitting diodes that can light up individual picture elements is an improvement in LED technology. It works without a backlight so the monitors can be thinner and more energy efficient while producing vivid color saturation and displaying deep black levels. Currently there are few OLED monitors on the market due to the high costs in manufacturing. It is a technology that is beginning to show up in HDTVs, and in time, if successful, may translate into the computer monitor market.

Ultra-High Definition Monitors:- UHD takes LED technology and adds more pixels onto the screen, going from about 2 million pixels in full HD (1,920 by 1,080) to more than 8 million pixels in UHD (3,240 by 2,160). Also called 4K technology, the level of image detail and sharpness is excellent, especially when viewing videos, pictures, graphic designs and other content that is created in 4K. When sitting close to a UHD monitor, you can notice the clarity of the images on the screen.

The primary disadvantage to a UHD monitor is the high price when compared to other LED monitors that are in full HD, but not UHD. Plus, the small amount of 4k content is a detriment.

Touch screen Monitors:- Touch screens have been around for many years, and with advancements in technology, screens are sleeker, lighter and more accurate with your touch. You can type of the screen, but for some, keeping a keyboard and mouse for some tasks is still desired. A key advantage to a touch screen monitor is it allows you to use the touch option when you want to. Touch screen monitors are a little more expensive than non-touch monitors, but the pricing is pretty close. As the popularity of touch screens increases in all devices including Smartphone's, tablets and laptops, touch screen computer monitors will also gain in popularity and convenience.

Plasma Display Panel Monitor:- Plasma display panel monitors use small cells of charged gases to create an image. These cells are similar to household fluorescent light bulbs. Each plasma cell creates its own illumination, which eliminates the need for a separate back light and gives PDP monitors strong contrast. A plasma monitor is typically heavier than an LCD display. Plasma screens also draw more power than both LCD and LED monitors, and are susceptible to "burned in" images if they are left on for long periods of time.

6.Printer:- A printer is an external output device that takes data from a computer and generates output in the form of graphics / text on a paper". There are two types of printers.

1.Impact printers:- An impact printer makes contact with the paper. It usually forms the print image by pressing an inked ribbon against the paper using a hammer or pins. Following are some examples of impact printers.

- **Dot-Matrix Printers(DMP):-** The dot-matrix printer uses print heads containing from 9 to 24 pins. These pins produce patterns of dots on the paper to form the individual characters. The 24 pin dot-matrix printer produces more dots that a 9 pin dot-matrix printer, which results in much better quality and clearer characters. The general rule is: the more pins, the clearer the letters on the paper. The pins strike the ribbon individually as the print mechanism moves across the entire print line in both directions, i-e, from left to right, then right to left, and so on. The user can produce a color output with a dot-matrix printer (the user will change the black ribbon with a ribbon that has color stripes). Dot-matrix printers are inexpensive and typically print at speeds of 100-600 characters per second.

- **Daisy-wheel printers:-** In order to get the quality of type found on typewriters, a daisy-wheel impact printer can be used. It is called daisy-wheel printer because the print mechanism looks like a daisy; at the end of each "Petal" is a fully formed character which produces solid-line print. A hammer strikes a "petal" containing a character against the ribbon, and the character prints on the paper. Its speed is slow typically 25-55 characters per second.

- **Line printers:-** In business where enormous amount of material are printed, the character-at-a-time printers are too slow; therefore, these users need line-at-a-time printers. Line printers, or line-at-a-time printers, use special mechanism that can print a whole line at once; they can typically print the range of 1,200 to 6,000 lines per minute. Drum, chain, and band printers are line-at-a-time printers.

- **Drum printer:-** A drum printer consists of a solid, cylindrical drum that has raised characters in bands on its surface. The number of print positions across the drum equals the number available on the page. This number typically ranges from 80-132 print positions. The drum rotates at a rapid speed. For each possible print position there is a print hammer located behind the paper. These hammers strike the paper, along the ink ribbon, against the proper character on the drum as it passes. One revolution of the drum is required to print each line. This means that all characters on the line are not printed at exactly the same time, but the time required to print the entire line is fast enough to call them line printers. Typical speeds of drum printers are in the range of 300 to 2000 lines per minute.

- **Chain printers:-** A chain printer uses a chain of print characters wrapped around two pulleys. Like the drum printer, there is one hammer for each print position. Circuitry inside the printer detects when the correct character appears at the desired print location on the page. The hammer then strikes the page, pressing the paper against a ribbon and the character located at the desired print position. An impression of the character is left on the page. The chain keeps rotating until all the required print positions on the line have filled. Then the page moves up to print the next line. Speeds of chain printers range from 400 to 2500 characters per minute.

- **Band printers:-** A band printer operates similar to chain printer except it uses a band instead of a chain

and has fewer hammers. Band printer has a steel band divided into five sections of 48 characters each. The hammers on a band printer are mounted on a cartridge that moves across the paper to the appropriate positions. Characters are rotated into place and struck by the hammers. Font styles can easily be changed by replacing a band or chain.

2.Non-impact printers:- Non-impact printers do not use a striking device to produce characters on the paper; and because these printers do not hammer against the paper they are much quieter. Following are some non-impacted printers.

- **Ink-jet printers:-** Ink-jet printers work in the same fashion as dot-matrix printers in the form images or characters with little dots. However, the dots are formed by tiny droplets of ink. Ink-jet printers form characters on paper by spraying ink from tiny nozzles through an electrical field that arranges the charged ink particles into characters at the rate of approximately 250 characters per second. The ink is absorbed into the paper and dries instantly. Various colors of ink can also be used. One or more nozzles in the print head emit a steady stream of ink drops. Droplets of ink are electrically charged after leaving the nozzle. The droplets are then guided to the paper by electrically charged deflecting plates [one plate has positive charge (upper plate) and the other has negative charge (lover plate)]. A nozzle for black ink may be all that's needed to print text, but full-color printing is also possible with the addition of needed to print text, but full-color printing is also possible with the addition three extra nozzles for the cyan, magenta, and yellow primary colors. If a droplet isn't needed for the character or image being formed, it is recycled back to its input nozzle. Several manufacturers produce color ink-jet printer. Some of these printers come with all their color inks in a cartridge; if you want to replace on color, you must replace all the colors. Other color ink-jet printers allow you to replace ink individually. These printers are a better choice if user uses one color more than other colors. These printers produce less noise and print in better quality with greater speed.

- **Laser printers:-** A laser printer works like a photocopy machine. Laser printers produce images on paper by directing a laser beam at a mirror which bounces the beam onto a drum. The drum has a special coating on it to which toner (an ink powder) sticks. Using patterns of small dots, a laser beam conveys information from the computer to a positively charged drum to become neutralized. From all those areas of drum which become neutralized, the toner detaches. As the paper rolls by the drum, the toner is transferred to the paper printing the letters or other graphics on the paper. A hot roller bonds the toner to the paper.Laser printers use buffers that store an entire page at a time. When a whole page is loaded, it will be printed. The speed of laser printers is high and they print quietly without producing much noise. Many home-use laser printers can print eight pages per minute, but faster and print approximately 21,000 lines per minute, or 437 pages per minute if each page contains 48 lines. When high speed laser printers were introduced they were expensive. Developments in the last few years have provided relatively low-cost laser printers for use in small businesses.

Advantages of Laser Printer:-

- The main advantage of Laser printer is its speed & efficiency at which it prints high-quality quality graphics & text.
- Laser printers produce high-quality output as compared to other printers.
- Laser printers are quite and do not produce disturbing sounds.
- They are also capable to produce color prints.

Disadvantages of Laser Printer:-

- The main disadvantage of Laser printer is its cost; they are relatively costly as compared to other printers.
- The maintenance, repair & servicing charges are also high of these printers.
- Laser printers emit small amount of ozone and are hazardous to health and the atmosphere.

7. Plotters:- A plotter is a special output device used to produce hard copies of large graphs and designs on paper, such as construction maps, engineering drawings, architectural plans and business charts. The plotter is either a peripheral component that you add to your computer system or a standalone device with its own internal

processor. Plotter has following types:-

- **1.Drum Plotter:-** A drum plotter is a pen plotter that wraps the paper around a drum with a pin feed attachment. The drum then rotates the paper as pens move across it and draw the image. It was the first output device used to print graphics and large engineering drawings. There are two types of drum plotters, external and internal. With an external drum plotter, the paper is wrapped around its external surface, while the internal drum plotter uses a sheet of paper wrapped around its internal surface.
- **2.Flat-Bed Plotter:-** A flat-bed plotter is a mechanical drafting device used with many CAD programs for designers. The paper remains stationary on a flat surface while a pen moves across it horizontally and vertically. This plotter may use several different pen colors to create the graphics. The size of the graphic is limited to the size of the flat-bed plotter's surface.
- **3.Inkjet Plotter:-** The inkjet plotter creates an image by spraying small droplets of ink on to paper. A popular choice for advertising agencies and graphic designers, inkjet plotters are used generally for large outputs, such as banners and billboards and large signs often seen along roadsides. They are available in thermal or piezoelectric models. Thermal inkjet plotters use heat to apply droplets of ink, while piezoelectric plotters use charged crystals to apply the ink. Inkjet plotters typically produce better quality graphics than other plotter types.
- **4.Cutting Plotter:-** The cutting plotter is a large scale cutting device that produces ready-cut mylar or vinyl lettering and graphics. Automated plotter knives cut into a sheet of the material lying on the plotter's flat surface area, carving out the design stored in the attached computer. Used for sign making, billboard advertising and vehicle graphics, the devices offer far greater speed and precision than can be achieved with the traditional method of creating sign lettering and logos by hand.

Types of computer according to their size and power:- Computers can be generally classified by size and power as follows, though there is considerable overlap .The four basic types of computers are as under:

1. Supercomputer 2. Mainframe Computer 3. Minicomputer 4.Microcomputer

1.Supercomputer:- An extremely fast computer that can perform hundreds of millions of instructions per second. The most powerful computers in terms of performance and data processing are the Supercomputers. These are specialized and task specific computers used by large organizations. These computers are used for research and exploration purposes, like NASA uses supercomputers for launching space shuttles, controlling them and for space exploration purpose. he supercomputers are very expensive and very large in size. It can be accommodated in large air-conditioned rooms; some super computers can span an entire building.

Uses of Supercomputers

Space Exploration:-Supercomputers are used to study the origin of the universe, the dark-matters. For these studies scientist use IBM's powerful supercomputer "Roadrunner" at National Laboratory Los Alamos.

Earthquake studies:- Supercomputers are used to study the Earthquakes phenomenon. Besides that supercomputers are used for natural resources exploration, like natural gas, petroleum, coal, etc.

Weather Forecasting:- Supercomputers are used for weather forecasting, and to study the nature and extent of Hurricanes, Rainfalls, windstorms, etc.

Nuclear weapons testing:- Supercomputers are used to run weapon simulation that can test the Range, accuracy & impact of Nuclear weapons.

2.Mainframe computer:- A powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously. Although Mainframes are not as powerful as supercomputers, but certainly they are quite expensive nonetheless, and many large firms & government organizations uses Mainframes to run their business operations. The Mainframe computers can be accommodated in large air-conditioned rooms because of its size. Super-computers are the fastest computers with large data storage capacity, Mainframes can also process & store large amount of data. Banks educational institutions & insurance companies use mainframe computers to store data about their customers, students & insurance policy holders.

Popular Mainframe computers:-

Fujitsu's ICL VME 2. Hitachi's Z800

3.Minicomputer:- A multi-user computer capable of supporting up to hundreds of users simultaneously. Minicomputers are used by small businesses & firms. Minicomputers are also called as "Midrange Computers".

These are small machines and can be accommodated on a disk with not as processing and data storage capabilities as super-computers & Mainframes. These computers are not designed for a single user. Individual departments of a large company or organizations use Mini-computers for specific purposes. For example, a production department can use Mini-computers for monitoring certain production process.

Popular Minicomputers:-

K-202 2.Texas Instrument TI-990 3. SDS-92 4. IBM Midrange computers

4.Microcomputer:- Desktop computers, laptops, personal digital assistant (PDA), tablets & Smartphone's are all types of microcomputers. The micro-computers are widely used & the fastest growing computers. These computers are the cheapest among the other three types of computers. The Micro-computers are specially designed for general usage like entertainment, education and work purposes. Well known manufacturers of Micro-computer are Dell, Apple, Samsung, Sony & Toshiba. Desktop computers, Gaming consoles, Sound & Navigation system of a car, Netbooks, Notebooks, PDA's, Tablet PC's, Smartphone's, Calculators are all type of Microcomputers.

Types of Computer according to their Hardware Structure:- Here are three basic kinds of computers. This is based on the hardware structure and the way physical quantities are represented in a computer. The following are the three types.

Analog Computers:- Analog computers are used to process analog data. Analog data is of continuous nature and which is not discrete or separate. Such type of data includes temperature, pressure, speed weight, voltage, depth etc. These quantities are continuous and having an infinite variety of values. It measures continuous changes in some physical quantity e.g. The Speedometer of a car measures speed, the change of temperature is measured by a Thermometer, the weight is measured by Weights machine. These computers are ideal in situations where data can be accepted directly from measuring instrument without having to convert it into numbers or codes. Analog computers are the first computers being developed and provided the basis for the development of the modern digital computers. Analog computers are widely used for certain specialized engineering and scientific applications, for calculation and measurement of analog quantities. They are frequently used to control process such as those found in oil refinery where flow and temperature measurements are important. They are used for example in paper making and in chemical industry. Analog computers do not require any storage capability because they measure and compare quantities in a single operation. Output from an analog computer is generally in the form of readings on a series of dial (Speedometer of a car) or a graph on strip chart.

Digital Computers:- A Digital Computer, as its name implies, works with digits to represent numerals, letters or other special symbols. Digital Computers operate on inputs which are ON-OFF type and its output is also in the form of ON-OFF signal. Normally, an ON is represented by a 1 and an OFF is represented by a 0. So we can say that digital computers process information, which is based on the presence or the absence of an electrical charge or we prefer to say a binary 1 or 0. A digital computer can be used to process numeric as well as non-numeric data. It can perform arithmetic operations like addition, subtraction, multiplication and division and also logical operations. Most of the computers available today are digital computers. The most common examples of digital computers are accounting machines and calculators. The results of digital computers are more accurate than the results of analog computers. Analog computers are faster than digital. Analog computers lack memory whereas digital computers store information. We can say that digital computers count and analog computers measures.

Hybrid Computers:- A hybrid is a combination of digital and analog computers. It combines the best features of both types of computers, i-e. It has the speed of analog computer and the memory and accuracy of digital computer. Hybrid computers are used mainly in specialized applications where both kinds of data need to be processed. Therefore, they help the user, to process both continuous and discrete data. For example a petrol pump contains a processor that converts fuel flow measurements into quantity and price values. In hospital Intensive Care Unit (ICU), an analog device is used which measures patient's blood pressure and temperature etc, which are then converted and displayed in the form of digits. Hybrid computers for example are used for scientific calculations, in defense and radar systems.

Type of computer according to their Purpose:- There are two types of computers according to their purpose.

General-Purpose Computers:- Most computers in use today are General-Purpose computers — those built for a great variety of processing jobs. Simply by using a general purpose computer and different software, various tasks can be accomplished, including writing and editing (word processing), manipulating facts in a data base, tracking manufacturing inventory, making scientific calculations, or even controlling organization's security system, electricity

consumption, and building temperature. General purpose computers are designed to perform a wide variety of functions and operations. You will probably use this type of computer reading this article and I am using a general purpose computer typing this article in some software (MS Word). A general purpose computer is able to perform a wide variety of operations because it can store and execute different programs in its internal storage. Unfortunately, having this ability is often achieved at the expense of speed and efficiency. In most situations, however, you will find that having this flexibility makes this compromise a most acceptable one

Special-Purpose Computers:- As the name states, a Special-Purpose Computer are designed to be task specific and most of the times their job is to solve one particular problem. They are also known as dedicated computers, because they are dedicated to perform a single task over and over again. Such a computer system would be useful in playing graphic intensive Video Games, traffic lights control system, navigational system in an aircraft, weather forecasting, satellite launch / tracking, oil exploration, and in automotive industries, keeping time in a digital watch, or Robot helicopter. While a special purpose computer may have many of the same features found in a general purpose computer, its applicability to a particular problem is a function of its design rather than to a stored program. The instructions that control it are built directly into the computer, which makes for a more efficient and effective operation. They perform only one function and therefore cut down on the amount of memory needed and also the amount of information which can be input into them. As these computers have to perform only one task, therefore, they are fast in processing. A drawback of this specialization, however, is the computer's lack of versatility. It cannot be used to perform other operations.

Difference between Supercomputer and Mainframe

Supercomputer is a broad term for one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations (number crunching). For example, weather forecasting requires a supercomputer. Other uses of supercomputers scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e.g. in petrochemical prospecting). Perhaps the best known supercomputer manufacturer is Cray Research.

Mainframe was a term originally referring to the cabinet containing the central processor unit or "main frame" of a room-filling Stone Age batch machine. After the emergence of smaller "minicomputer" designs in the early 1970s, the traditional big iron machines were described as "mainframe computers" and eventually just as mainframes. Nowadays a Mainframe is a very large and expensive computer capable of supporting hundreds, or even thousands, of users simultaneously. The chief difference between a supercomputer and a mainframe is that a supercomputer channels all its power into executing a few programs as fast as possible, whereas a mainframe uses its power to execute many programs concurrently. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe. The distinction between small mainframes and minicomputers is vague, depending really on how the manufacturer wants to market its machines.

Personal computer(PC's):-

It can be defined as a small, relatively inexpensive computer designed for an individual user. In price, personal computers range anywhere from a few hundred pounds to over five thousand pounds. All are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is for playing games and recently for surfing the Internet.

Configuration and specifications of PC's:-Personal computers first appeared in the late 1970s. One of the first and most popular personal computers was the Apple II, introduced in 1977 by Apple Computer. During the late 1970s and early 1980s, new models and competing operating systems seemed to appear daily. Then, in 1981, IBM entered the fray with its first personal computer, known as the IBM PC. The IBM PC quickly became the personal computer of choice, and most other personal computer manufacturers fell by the wayside. P.C. is short for personal computer or IBM PC. One of the few companies to survive IBM's onslaught was Apple Computer, which remains a major player in the personal computer marketplace. Other companies adjusted to IBM's dominance by building IBM clones, computers that were internally almost the same as the IBM PC, but that cost less. Because IBM clones used the same microprocessors as IBM PCs, they were capable of running the same software. Over the years, IBM has lost much of its influence in directing the evolution of PCs. Therefore after the release of the first PC by IBM the term PC increasingly came to mean IBM or IBM-compatible personal computers, to the exclusion of

other types of personal computers, such as Macintoshes. In recent years, the term PC has become more and more difficult to pin down. In general, though, it applies to any personal computer based on an Intel microprocessor, or on an Intel-compatible microprocessor. For nearly every other component, including the operating system, there are several options, all of which fall under the rubric of PC.

Main Characteristics of PC's:- Today, the world of personal computers is basically divided between Apple Macintoshes and PCs. The principal characteristics of personal computers are that they are single-user systems and are based on microprocessors. However, although personal computers are designed as single-user systems, it is common to link them together to form a network. In terms of power, there is great variety. At the high end, the distinction between personal computers and workstations has faded. High-end models of the Macintosh and PC offer the same computing power and graphics capability as low-end workstations by Sun Microsystems, Hewlett-Packard, and DEC.

Types of Personal Computer:-

Actual personal computers can be generally classified by size and chassis / case.

1. Type of computer according to chassis:- The chassis or case is the metal frame that serves as the structural support for electronic components. Every computer system requires at least one chassis to house the circuit boards and wiring. The chassis also contains slots for expansion boards. If you want to insert more boards than there are slots, you will need an expansion chassis, which provides additional slots. There are two basic flavors of chassis designs–desktop models and tower models–but there are many variations on these two basic types.

Tower model:- The term refers to a computer in which the power supply, motherboard, and mass storage devices are stacked on top of each other in a cabinet. This is in contrast to desktop models, in which these components are housed in a more compact box. The main advantage of tower models is that there are fewer space constraints, which makes installation of additional storage devices easier.

Desktop model:- A computer designed to fit comfortably on top of a desk, typically with the monitor sitting on top of the computer. Desktop model computers are broad and low, whereas tower model computers are narrow and tall. Because of their shape, desktop model computers are generally limited to three internal mass storage devices. Desktop models designed to be very small are sometimes referred to as slim line models.

2. Type of computer according to size:- Then come the portable computers that are computers small enough to carry. Portable computers include notebook and subnotebook computers, hand-held computers, palmtops, and PDAs.

Notebook computer:-An extremely lightweight personal computer. Notebook computers typically weigh less than 6 pounds and are small enough to fit easily in a briefcase. Aside from size, the principal difference between a notebook computer and a personal computer is the display screen. Notebook computers use a variety of techniques, known as flat-panel technologies, to produce a lightweight and non-bulky display screen. The quality of notebook display screens varies considerably. In terms of computing power, modern notebook computers are nearly equivalent to personal computers. They have the same CPUs, memory capacity, and disk drives. However, all this power in a small package is expensive. Notebook computers cost about twice as much as equivalent regular-sized computers. Notebook computers come with battery packs that enable you to run them without plugging them in. However, the batteries need to be recharged every few hours.

Laptop computer:- A small, portable computer -- small enough that it can sit on your lap. Nowadays, laptop computers are more frequently called notebook computers.

Subnotebook computer:- A portable computer that is slightly lighter and smaller than a full-sized notebook computer. Typically, subnotebook computers have a smaller keyboard and screen, but are otherwise equivalent to notebook computers.

Hand-held computer:- A portable computer that is small enough to be held in one's hand. Although extremely convenient to carry, handheld computers have not replaced notebook computers because of their small keyboards and screens. The most popular hand-held computers are those that are specifically designed to provide PIM (personal information manager) functions, such as a calendar and address book. Some manufacturers are trying to solve the small keyboard problem by replacing the keyboard with an electronic pen. However, these pen-based devices rely on handwriting recognition technologies, which are still in their infancy. Hand-held computers are also called PDAs, palmtops and pocket computers.

Palmtop:- A small computer that literally fits in your palm. Compared to full-size computers, palmtops are severely limited, but they are practical for certain functions such as phone books and calendars. Palmtops that use a pen rather than a keyboard for input are often called hand-held computers or PDAs. Because of their small size,

most palmtop computers do not include disk drives. However, many contain PCMCIA slots in which you can insert disk drives, modems, memory, and other devices. Palmtops are also called PDAs, hand-held computers and pocket computers.

PDA:- Short for personal digital assistant, a handheld device that combines computing, telephone/fax, and networking features. A typical PDA can function as a cellular phone, fax sender, and personal organizer. Unlike portable computers, most PDAs are pen-based, using a stylus rather than a keyboard for input. This means that they also incorporate handwriting recognition features. Some PDAs can also react to voice input by using voice recognition technologies. The field of PDA was pioneered by Apple Computer, which introduced the Newton MessagePad in 1993. Shortly thereafter, several other manufacturers offered similar products. To date, PDAs have had only modest success in the marketplace, due to their high price tags and limited applications. However, many experts believe that PDAs will eventually become common gadgets. PDAs are also called palmtops, hand-held computers and pocket computers.

Workstation:- A powerful, single-user computer. A workstation is like a personal computer, but it has a more powerful microprocessor and, in general, a higher-quality monitor. It is a type of computer used for engineering applications (CAD/CAM), desktop publishing, software development, and other types of applications that require a moderate amount of computing power and relatively high quality graphics capabilities. Workstations generally come with a large, high-resolution graphics screen, at large amount of RAM, built-in network support, and a graphical user interface. Most workstations also have a mass storage device such as a disk drive, but a special type of workstation, called a diskless workstation, comes without a disk drive. The most common operating systems for workstations are UNIX and Windows NT. Like personal computers, most workstations are single-user computers. However, workstations are typically linked together to form a local-area network, although they can also be used as stand-alone systems. In networking, workstation refers to any computer connected to a local-area network. It could be a workstation or a personal computer.

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